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OR,

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OF

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OF

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BY

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CYCLOPÆDIA:

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OF

ARTS and SCIENCES.

PERTUSSIS.

PERTUSSIS, 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 synonimous 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*, *clangosa*, *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

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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 *Pyrexiæ*, 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. mccccx.) 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 kinks (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 chincough, in which a conſiderable degree of pyrexia and dyſpnæa 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 choaked 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 Chincough, 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

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 dyſpnæa 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 dyſpnæa 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 phthiſical 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 morbific 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 by various external caufes, 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 thofe means which leffen irritability local or general, and give tone to the fyftem at large; in other words, by *antifpafmodics* and *tonics*.

The moft effectual means of allaying irritability are found in the *narcotic* antifpafmodics, fuch as *opium*, *henbane*, and *hemlock*, in their various preparations; and the moft powerful of thefe is opium. This medicine requires confiderable caution, however, in its adminiftration. "If very liberally employed," to ufe the words of Dr. Watt, "it fuppreffes the cough, allows the mucus to accumulate, obftructs the breathing, increafes the fever, and in fact aggravates every fymptom of the difeafe. This is ftill more particularly the cafe, if previous evacuations have been neglected. Where the bowels are already in a loaded and torpid ftate, opiates invariably do harm. Some practitioners have fuppofed, that they may be given in fuch fmall dofes as to compofe the nervous fyftem, and yet not interfere with the operation of other remedies. If this can be done, the practice is lefs objectionable." It is only in fmall dofes that opiates can be adminiftered, even in the later ftages of whooping-cough, on account of this aftringing and fuppreffing power over the difcharges. On this account, perhaps, the *conium* or *hyofcyamus* are preferable remedies. They are more gently anodyne, and have no aftringency, and therefore interfere little with the fecretion of mucus, and perhaps not at all with the alvine fecretions. The conium, or hemlock, has been extolled by Dr. Butter as almoft a fpecific in this difeafe; and from our own experience, we can fpeak favourably of its influence, when the inflammatory ftage of the diforder is paft. The hyofcyamus is likewife beneficial under the fame circumftances. The *digitalis*, or fox-glove, from its power in moderating vafcular action, and thus of reftraining exceffive fecretion, as well as of acting upon the urinary difcharge, might be expected to be ferviceable in this difeafe; and experience feems to have proved its utility.

The more ftimulant antifpafmodics, fuch as *affafœtida*, *caftor*, *mufk*, *oil of amber*, *camphor*, &c. have alfo been recommended by feveral practitioners for the relief of whooping-cough. The evidence, however, which the fubfequent obfervation of cautious phyficians has obtained, is by no means favourable to the efficacy of thefe medicines; and if there is any tendency to fever, or congeftion about the lungs, the influence which they do exert muft prove hazardous, if not always injurious.

But thefe ftimulants have been frequently applied *externally*, fince the time of Hoffmann, in liniments and embrocations; and they are popularly employed, in various empirical noftrums, in the fame manner. The oils of turpentine, amber, thyme, nutmeg, &c. with foap, camphor, the compound fpirit of ammonia, tincture of opium, of cantharides, &c. the juice of garlic, liniments of tartrite of antimony, and various other irritants, have been employed, feparately and combined, being rubbed into the cheft, and on the back in the courfe of the fpine, and even on the feet, by continued but moderate friction. This mode of ufing antifpafmodics is certainly productive of beneficial effects; and thefe may be produced in two ways, namely, by the actual abforption of the fubftance fo applied to the fkin, or by the mere ftimulation of the furface, which thus occafions a fort of counter-irritation. Opiate liniments unqueftionably operate in the former manner, and produce fimilar effects, though in a fmaller degree, with opiates taken by the mouth. They relieve the difficulty of breathing, and diminifh the cough, and difpofe the patient to reft, and therefore have been deemed by fome writers the fafeft form in which opium can be employed. It is probably, however, in the fecond mode only that the majority of embrocations and liniments operate; and accordingly it will generally be found, that they are productive of the greateft relief, when they excite fome degree of rednefs or eruption on the fkin.

The adminiftration of tonics, and efpecially of the *Peruvian bark*, has been much extolled by Dr. Cullen, as the moft effectual mode of curing the difeafe in its fecond ftage, when the fever had difappeared. This remedy may doubtlefs be reforted to with advantage, towards the conclufion of the difeafe, when all the inflammatory fymptoms have been previoufly fubdued by other means, or where they have been naturally very mild, and have fpontaneoufly fubfided. But in other circumftances, 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 confiderable change in the fituation and manner of life was fuggefted as a remedy for whooping-cough, and efpecially a *change of air*, which has been very generally deemed the moft effectual remedy in the advanced ftages of the difeafe. So ftrong, indeed, has this impreffion been made upon the public, that it has been generally believed, that any change of air, even from a better to a worfe, is beneficial. This, however, feems improbable; and the fact perhaps is as Dr. Watt has ftated it. "It no doubt frequently happens," fays 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 fuppofed to be worfe than the former. Here, however, I fhould be difpofed to attribute the good effects, not to coming into a more impure atmofphere, but to the child's *being abroad*, any atmofphere being better than confinement to the houfe." (Loc. cit. p. 222.) In fummer, or when the temperature is mild and dry, the fymptoms of whooping-cough, even in the early ftage, appear to be alleviated by expofure to the open air, and to be aggravated when the patient returns into the houfe: but this alleviation only takes place, when it is unaccompanied by actual pneumonic inflammation, when the pulfe is neither ftrong, nor full, nor frequent, when the cough is not very violent, when there is no pain of the cheft, and, above all, when there is no oppreffion of the breathing. Under the prefence of thefe fymptoms, fuch expofure is extremely deleterious. Towards the conclufion of the difeafe, travelling, or other conftant exercife in the open air, as in other cafes of convalefcence from coughs, is doubtlefs one of the moft effectual remedies that can be reforted to.

PERU, in *Geography*, a viceroyalty of South America, the limits of which have been greatly reftricted during the courfe of the laft 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, feveral opulent provinces in the fouth of Peru were annexed to the new viceroyalty of La Plata. Modern Peru, therefore, according to the ftatement of Mr. Pinkerton, extends N. and S. from the river Tumbez to the chain of Vilcanota, being, by the computation of Eftalla, 289 geographical leagues; but along the coaft to the river Loa, the length may be 423 leagues; its medial breadth may be about 80 leagues; fo that its whole content may be eftimated at 33,630 fquare leagues. By the map of La Cruz, the fouthern extremity of the chain of Vilcanota is 15°, and the river Tumbez in 3° 30', both S. lat.; and the difference, being 11° 30', will give 690 geographical miles; but that long ftrip, called the province of Arica, extending to the river Loa 21° 15', the nominal length will be augmented by by about 6° 15', or 375 geographical miles. The viceroyalty of Peru borders, towards the N., on that of 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 Peru extends eastwards so as to include Colonna, or the land 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 surprised 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 Titiaca, 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 Ocollo (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

taminated 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 Yahuar-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 marquisses of Onepesa and Alcanises. 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° 30′, (without mentioning the subjection of Quito) to the river Mauli in Chili, 35°, that is, 31° 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 surprised 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 Ahatualpa, his successor in the kingdom of Quito, and left the rest of his dominions to Huascar (Inca-Cusi, Hual), 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 raged 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 Ahatualpa was encamped with a considerable body of troops. Pretending 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.

Ahatualpa, 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 breviary 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 Ahatualpa 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. Ahatualpa'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, feized him by the arm, dragged him to the ground, and carried him to his quarters as a prifoner. The fate of the monarch increafed the precipitate flight of his followers, who were purfued by the affailants, and flaughtered, though the wretched fugitives did not once offer to refift. The carnage did not ceafe till the clofe of the day; and, by taking a medium of different accounts, 4000 Peruvians were killed. Pizarro himfelf was wounded, but not a fingle Spaniard fell. The plunder of the field was immenfe; and the march of the Spaniards was followed by the moft extravagant exultation. The Inca made a moft liberal offer of a ranfom. The apartment in which he was confined was 22 feet in length, and 16 in breadth; neverthelefs, the captive monarch undertook to fill it with veffels of gold as high as he could reach. Pizarro clofed eagerly with this tempting propofal; and a line was drawn upon the walls of the chamber, to mark the ftipulated height to which the treafure was to rife. Ahatualpa, tranfported with the profpect of regaining his liberty, difpatched meffengers to Cuzco, Quito, and other places, to collect the gold that was neceffary for completing his ranfom. In the mean while, the Spaniards remained tranquil and unmolefted in Caxamalca. At this time Almagro arrived with a confiderable reinforcement, which was highly acceptable and encouraging to the Spaniards, and no lefs alarming to the Inca. Perceiving his own deftruction to be inevitable, and apprized that his brother Huafcar had promifed to the Spaniards, on condition of their efpoufing his caufe, a quantity of treafure very much exceeding what Ahatualpa had engaged to pay for his ranfom, determined to facrifice his brother's life, that he might fave his own; and his orders for this purpofe were immediately executed. The treafures promifed by Ahatualpa being collected, and fome pieces of curious fabric being referved as a prefent for the emperor, the dividers of the fpoil fet apart a fifth part for the crown, and 100,000 pefos as a donation to the foldiers who had arrived with Almagro, and there remained 1,528,500 pefos to Pizarro and his followers. In this divifion, above 8000 pefos, at that time not inferior in effective value to as many pounds fterling in the laft century, fell to the fhare of each horfeman, and half that fum to each foot foldier. Pizarro himfelf, and his officers, received dividends proportioned to the dignity of their rank. Although the Inca's ranfom was paid, Pizarro had no thoughts of fulfilling his promife by granting liberty to the captive fovereign. While Almagro and his followers, who had made a demand of an equal fhare in the Inca's ranfom, infifted eagerly on putting him to death, that all the adventurers in Peru might afterwards be on an equal footing, Pizarro himfelf either actually felt or feigned fome apprehenfions on account of the forces that were affembled in the remote provinces of the empire. Ahatualpa alfo inadvertently contributed to haften his own fate, by expreffing his contempt of Pizarro, as a perfon of mean attainments. All thefe circumftances concurred to bring him to a kind of mock-trial; Pizarro, Almagro, and two affiftants being appointed judges, with full power to acquit or condemn. The refult was what might have been expected, the condemnation of Ahatualpa to be burnt alive; but Valverde, availing himfelf of the fears of the Inca, prevailed upon him to be baptized, in token of his having embraced the Chriftian faith; and thus, inftead of being burnt, he was ftrangled at the ftake. On the death of Ahatualpa, the government was diffolved, and Pizarro invefted one of his fons with the enfigns of royalty; hoping to take advantage of the inexperience of youth, rather than to entruft power in the hands of an ambitious monarch, who had been accuftomed to independent command. This happened in the year 1533. Pizarro haftened his march to Cuzco, and took quiet poffeffion of that capital. During this march, that fon of Ahatualpa, whom Pizarro treated as Inca, died; and as the Spaniards fubftituted no perfon in his place, the title of Manco Capac, a brother of Huafcar, whom the people of Cuzco and the adjacent country acknowledged as Inca, feems to have been univerfally recognized. In the mean time Benalcazar, governor of St. Michael, marched to Quito, and reduced it. Whilft thefe operations were carried on, Ferdinand Pizarro arrived in Spain; and by the immenfe quantities of gold and filver which he carried with him, fecured a very favourable reception; and in recompence of his brother's fervices, his authority was confirmed with new powers and privileges, and the addition of 70 leagues, along the coaft, to the fouthward of the territory, granted in his former patent. On Almagro was conferred the title of Adelantado, or governor, with jurifdiction over 200 leagues of country, ftretching beyond the fouthern limits of the province allotted to Pizarro. Ferdinand himfelf was admitted into the military order of St. Jago, and foon fet out on his return to Peru, accompanied by many perfons of higher rank than any of thofe who had yet ferved in that country.

In the year 1534, Pizarro, after fettling fome differences between him and Almagro, began to introduce a form of regular government into the extenfive provinces fubject to his authority. He diftributed the country into various diftricts; he appointed proper magiftrates to prefide in court; and eftablifhed regulations concerning the adminiftration of juftice, the collection of the royal revenue, the working of the mines, and the treatment of the Indians, extremely fimple, but well calculated to promote the public profperity. In his march through the country, he was ftruck with the beauty and fertility of the valley of Rimac, one of the moft extenfive and beft cultivated vallies in Peru. There, on the fide of a fmall river of the fame name with the vale which it watered and encircled, at the diftance of fix miles from Callao, the moft commodious harbour in the Pacific ocean, he founded a city, which he deftined 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 infurrection took place in Peru, which was excited and encouraged by the Inca, Manco Capac; who recovered poffeffion of one-half of Cuzco, though it was vigoroufly defended by the three brothers Juan, Gonzalo, and Ferdinand Pizarro. On this occafion Juan was killed. But the intereft and power of the Pizarros were ftill more endangered by Almagro; who was at length, in 1538, defeated and taken prifoner, and foon after impeached of treafon, formally tried, and condemned to die. The fentence was executed by firft ftrangling him in prifon, and afterwards publicly beheading him. In 1540 Pizarro divided Peru among his followers; but in the following year the adherents of Almagro confpired againft his life, and without much delay put him to death. Pizarro was fucceeded in the government by Vaca de Caftro. During thefe convulfions in Peru the emperor and his minifters were employed in preparing regulations for reftoring tranquillity there, and introducing a more perfect fyftem of internal policy into all their fettlements in the new world. Blafco Nugnez Vela was appointed governor of Peru, with the title of viceroy. His conduct after his arrival increafed the difaffection and tumult which had begun to take place; and the malcontents made choice of Gonzalo Pizarro for their leader, which happened in 1544, and occafioned a civil war. After a decifive victory gained by Pizarro in a battle, which terminated his life, Pizarro was advifed to affume the fovereignty of Peru; but he chofe to negociate 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 cheared 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 fortress, 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 fea-coaft. Thefe works of the Incas might be compared even to the famous military ways, which remain as monuments of the Roman fkill and power. The formation of thefe roads introduced another improvement, which was that of bridges, equally unknown over all the reft of America. See Bridge, Balza, and Boat.

The Peruvians had alfo made confiderable progrefs in arts, that may be called elegant. As they poffeffed metals in greater abundance than any people of America, they manifefted great fkill and contrivance in procuring them, and in applying them to purpofes of ufe and ornament. Accordingly in works of mere curiofity, and of an ornamental nature, their ingenuity has been highly celebrated. Many fpecimens of thefe have been dug out of the "Guacas," or mounds of earth, with which the Peruvians covered the bodies of the dead. Among thefe are mirrors of various dimenfions, of hard fhining ftones highly polifhed; veffels of earthen ware of different forms; hatchets, and other inftruments, fome deftined for war, and others for labour. Some were of flint, fome of copper, hardened by an unknown procefs to fuch a degree as to fupply the place of iron on feveral occafions. But notwithftanding a variety of circumftances, fome of which have been enumerated, and which feem to indicate a high degree of improvement in Peru, others occur that fuggeft the idea of a fociety ftill in the firft ftages of its tranfition from barbarifm to civilization. The Peruvians had no cities befides Cuzco. Every where elfe, the people lived moftly in detached habitations, difperfed over the country, or, at the utmoft, fettled together in fmall villages. In confequence of this ftate of limited affociation and imperfect union, they had no perfect feparation of profeffions, which was lefs complete than that which fubfifted among the Mexicans. From the want of cities in Peru, there was little commercial intercourfe among the inhabitants of this great empire. But the moft remarkable, as well as moft fatal defect in their character, was their unwarlike fpirit. By reafon of this character, their country was fubdued at once, and almoft without refiftance, and remained in a ftate of fubjection; and the fame character, connected with mildnefs of temper and manners, has defcended to pofterity: fo that the Indians of Peru are now more tame and depreffed than any people of America. Their feeble fpirits, relaxed in lifelefs inaction, feem hardly capable of any bold or manly exertion.

Spanifh writers have recorded fome facts, which manifeft, notwithftanding all their good qualities, a great degree of remaining barbarifm in their manners. On the death of the Incas, and of other eminent perfons, a confiderable 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 ferved with the fame refpect. On the death of Huana Capac, the moft 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 thofe of moft rude tribes. Although they were acquainted with the ufe of fire in preparing maize, and other vegetables for food, they devoured both fifh and flefh perfectly raw, and aftonifhed the Spaniards by a practice repugnant to the ideas of all civilized people. For other particulars we refer to the third volume of Dr. Robertfon's "Hiftory of America."

The account which is given of the difpofition, character, and condition of the Peruvian Indians, in the "Mercurio Peruano," a periodical paper publifhed at Lima in 1791, and the following years, differs in many particulars from that of Dr. Robertfon, and alfo of Kotzebue and Marmontel. They are faid to be of very limited capacities, and of little or no variety in their characters; melancholy from temperament; timid and difpirited from oppreffion; daftardly in moments of danger; favage and cruel after victory; and fevere and inexorable in the exercife of authority. They ftand greatly in awe of the Spaniards, and are docile and obedient to their commands; but they fecretly diflike them, and fhun their fociety, and only hate them lefs than they do the negroes and mulattoes. They are of diftruftful tempers, and fufpect every one who does them a kindnefs, of a defign to impofe upon them. They are ftout and robuft, and capable of enduring labour; but lazy, dirty, and improvident. Their habitations are miferable hovels, deftitute of every convenience or accommodation, and difguftingly filthy. Their drefs is poor and mean, and their food coarfe and fcanty. Their ftrongeft propenfity is to fpirituous liquors; and to this indulgence they facrifice every other confideration. Their religion is ftill tainted with the fuperftition of their forefathers; but they are great obfervers of the external rites and ceremonies of the church, and they fpend large fums of money in maffes and proceffions; a fpecies of profufion to which they are naturally excited and encouraged by their priefts, who profit by it.

We fhall here add fome particulars from the work referred to, concerning the prefent condition of thefe people; firft premifing that foon after the conqueft of America, that country was parcelled out into encomiendas, a fort of feudal benefices, which were diftributed on certain conditions to the Spaniards. The encomendero, or holder of the benefice, befides owing military fervice to the ftate, was bound to refide on his encomienda, to protect and defend the Indians living upon it, and to fee them properly inftructed in the principles of religion. The Indians were bound in return to pay him a ftipulated tribute; but fo far were they from being reduced to flavery, that he could not lawfully exact from them any perfonal fervice whatever. The fyftem of encomiendas was introduced by the emperor Charles V.; and though varioufly modified and changed by his fucceffors, it was not finally abolifhed till the reign of Philip V. All accounts agree, that, however well intended, it was in its effects oppreffive and injurious to the Indians. The encomendero was continually exacting from them more than he was entitled to demand, and doing for them lefs than he was bound to perform.

The fyftem of encomiendas was followed by the ftill more fatal plan of repartimientos; according to which the government, in confideration of the limited faculties and improvident character of the Indians, directed the corregidor or judge of the diftrict in which they lived, to fupply them with cattle, feed-corn, inftruments of agriculture, and even clothes and other neceffaries of which they were in want, according to his difcretion and opinion of their neceffities; but at a price regulated by law, and without any profit to himfelf. The abufes to which this fyftem muft have led, may eafily be conceived. They became at length fo enormous, as to call again for the interference of the government, which, after mature deliberation, determined on abolifhing the repartimientos. This was accordingly done in 1779.

The fyftem followed at prefent with regard to the Indians, is more confonant to reafon and juftice, and more favourable to the developement of their faculties, than any under which they have lived fince the conqueft. They are left to manage their own concerns as they pleafe; and no one, under pretence of doing them good, can interfere with the difpofal of their time or their property. It muft be confeffed, that, in fome parts of the country, the indolence and fluggifhnefs

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of their character have fo far prevailed, fince they were taken from under the controul of the corregidor, that they have fuffered the breed of mules, fo neceffary for the mines, to decreafe ; but in other parts they have been roufed to greater induftry and exertion. At Lambayeque, in particular, they have applied to agriculture, manufactures and commerce, with fuch affiduity, as far to furpafs the Spaniards ; and as the produce of their farms and induftry is exempt from the alcabala, and all other taxes, they have great advantages over the other cafts, of which they want only induftry and ability to make a proper ufe.

The Indians pay a perfonal tax or tribute, which is extremely moderate, and to be regarded rather as a diftinctive mark and token of vaffalage, than as a ferious 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 fole inhabitants, they are governed by their caziques ; and none of the other cafts are permitted to encroach upon their lands, or to fettle among them, without their confent.

The Indians are fubject to another burden, the mita, or compulfory labour in the mines. Every male Indian from 18 to 50 muft take his fhare in this fervice ; and, for that purpofe, a lift is kept of all the Indians of the requifite age, who are divided into feven parts, each of which ferves in its turn. The term of fervice lafts for fix 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 ferve. 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 fmall allowance for their travelling expences, and receive, for their work in the mines, at leaft have a dollar a day, and, in general, a greater fum.

The Indians and Meftizoes are the only cafts in America who are able to endure the fatigue and unwholefomenefs of the mines. The Spaniards and Negroes have been often tried in this fpecies of labour, but they always fink under it after a fhort time. Befides the mitayos, there are Indians who ferve voluntarily in the mines, and engage themfelves for a ftipulated hire. The greater part of the miners is indeed of that defcription ; and it is to be regretted, that there fhould be any perfons who ferve upon other terms. A more intolerable hardfhip, and more flagrant injuftice than the mita, cannot well be imagined. A forced confcription for national defence, though liable to great abufe, is on every principle a juftifiable meafure ; but a forced confcription, for the purpofe of digging riches from the bowels of the earth for the profit of another, is the extremity of cruelty and injuftice.

The number of Indians in South America has diminifhed confiderably fince the conqueft ; and as the other cafts have not increafed in a degree correfponding to this diminution, the whole population of the country is lefs than when firft difcovered by the Spaniards. The firft cenfus after the conqueft was made in 1551, when the Indian population of Peru, Santa Fé, and Buenos Ayres, amounted to 8,255,000 fouls ; but the fame countries hardly contain, at prefent, four millions of inhabitants, of all claffes and defcriptions. A fecond enumeration of the Indians was made in 1581, by D. Francifco Toledo, viceroy of Peru, previoufly to the eftablifhment of the mita ; from which it appeared, that Peru and Potofi, 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 leaft 4,270,788 perfons. But the whole population, from Tumbez to Buenos Ayres, does not exceed, at prefent, two millions and a half, or three millions of fouls. Of whom not more than one-third are Indians.

Independent of thefe computations, there are many proofs of Peru having been formerly more populous and better cultivated than it is at prefent. Veftiges of former cultivation, and remains of extenfive works for irrigation, are ftill to be feen, where the country is now uncultivated and deferted ; and travellers meet continually with the ruins of towns and villages, which have been long fince abandoned, and without inhabitants.

That this devaftation is to be attributed, in a great meafure, to the miftaken policy, not to the inhumanity of the Spanifh government, cannot be doubted ; but many other caufes have contributed to thin fo dreadfully the number of the Indians. The abufe of fpirituous liquors deftroys vaft numbers of them. Ulloa alleges, that the ufe of fpirits is fatal to more Indians in one year than the mines are in fifty. The Indians of the Sierra are fo immoderately fond of ardent fpirits, 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 fale and manufacture of fpirits, on account of an epidemic fever then raging among the Indians, which owed its deftructive power in a great meafure to their habits of intoxication. The fmall-pox and meafles make alfo great havock among them ; and a peftilential fever, which broke out in 1720, fwept away the inhabitants of whole villages, and caufed every where the greateft mortality. Another caufe, which is continually diminifhing the number of the Indians, and which muft, in the end, extinguifh them as a feparate race, is the progrefs of the other cafts. It is obferved, that wherever the Indians are fettled along with the Spaniards, their numbers decreafe ; but as their place is fupplied with Meftizoes and Samboes, this lofs 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 loft 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 fmall province of Caxamarco, containing hardly 70,000 inhabitants, there were eight perfons alive in 1792, whofe ages were 114, 117, 121, 131, 132, 135, 141, and 147 ; and in the fame province, a Spaniard died in 1765, aged 144 years, 7 months and 5 days, leaving 800 perfons lineally defcended from him.

The Meftizoes, or offspring of the Spaniards and Indians, are the next clafs in rank to the Spaniards, and the moft numerous after the Indians. They have neither the privileges and exemptions of the Indians, nor are they fubject to the fame burdens. They are cordially attached to the Spaniards, but conftantly at variance with the Indians. The Quarteroons, or offspring of the Spaniards and Meftizoes, are hardly to be diftinguifhed from Spaniards. The Cholos, on the contrary, fprung from the Indians and Meftizoes, are claffed with the Indians, and fubjected to tribute.

The Negro flaves in Peru are either employed in domeftic fervice, or on the fugar plantations and farms of their mafters. 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 diforderly, and the authors of moft of the murders and robberies committed in the kingdom.

The Mulattoes are called by Spanifh writers the gypfies of South America, on account of their refemblance in complexion, manners, and character to the Spanifh gypfies. The female mulattoes are ufually employed by the Creole ladies as wet nurfes for their children ; and they often ac-

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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, Paſtas, Caxamarquilla, 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 Maranon. 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, vicunas, pacochas, 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, Vicuna 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 Valparaiſo, Conception, 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 moft populous towns are on the coaft, Piura, Lambayeque, Truxillo; and, in the Sierra, Caxamarca, the royal ftation of the mines of Chota; and towards the S. Ica, Arequipa, and the royal ftation of Tarapaca; and towards the interior, Pafco, which is a mineral ftation belonging to the intendancy of Tarma, Guanacha, Jauja, Guancavelica, Guamanga, and Cuzco. At thefe and other places, as Guarochiri, Caxatanbo, &c. traders or agents fell for the merchants of Lima, European goods, liquors, and other articles fufficient for the confumption of the neighbourhood; and the returns are generally in bullion or coin, but fometimes in articles of food for the ufe 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 Liquanda, cited by Pinkerton, the viceroyalty lofes, 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; fo that the amount being deducted, the lofs 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 exports 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; fo that the balance in favour of Peru is near 1,200,000, independent of the profits on the carriage of the goods, which belongs alfo ot Peru, as the carriers are Peruvians. Cuzco and Arequipa are the routes through which this trade paffes.

The chief exports to the Rio Plata are brandy, wine, maize, fugar, 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 ufed formerly to take woollens, to a great amount, from Quito; but it is now found more economical to procure thefe articles from Europe by the way of Buenos Ayres. The indigo exported from Peru is previoufly imported from Guatimala.

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

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

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

	Imports.	Exports.	Balance for Callao.	Balance againft 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	
Guatimala - - - -	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 againft 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. againft Peru.
Chili - - - -	46,675		46,675
Panama and Guayaquil	350,000	130,000	220,000
	396,675	130,000	266,675

III.—Refult of both.

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

Forty-one veffels, of different fizes and defcriptions, 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 feamen.

The chief exports from Peru to Chili are European goods, previoufly imported at Callao. Sugar, coarfe woollens, made in Peru, indigo from Guatimala, falt, cotton, pita, yarn, and fome other trifling articles. The imports are chiefly wheat, copper; Negro flaves, fome of them natives of Chili, but the greater part from Rio de Janeiro and Buenos Ayres; tallow, wine, paraguay tea, falt meat, timber, cordage, and leather. Part of the copper is ufed in the mint at Lima, and the remainder, except a fmall quantity fent to Guayaquil, re-exported to Spain. The ports of Chili that trade with Peru, are Valparaifo, Conception, and Coquimbo; but Valparaifo alone carries on three times as much trade as the other two. The timber is brought from the ifle of Chiloe.

Three-fourths of the exports to Guayaquil confift of European goods, and the remaining fourth of flour, wine, brandy, and copper. The imports are chiefly cacao and timber. There is alfo imported into Peru, on account of the government, a confiderable 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 fuch magnitude, has declined fince the middle of the laft century, and is now reduced to a fmall importation of timber and cacao, and to the remains of a flave trade, which is every day diminifhing. The exports from Peru to Panama are coarfe woollens, fugar, flour, and brandy. There is alfo a remittance of 300,000 dollars a-year from the treafury of Lima, to pay the garrifon and civil government of Panama; without which that city muft have fallen to ftill greater infignificance.

Indigo is the principal article of import from Guatimala. Small quantities of logwood, pitch, timber, and cacao, are alfo imported. The exports, which are very trifling, confift chiefly of wine and woollens. The wines and brandies of Peru might be exported with advantage to San Blas, for the confumption of Cinaloa, Sonora, and California; but though permiffion has been frequently folicited from the government, it has been conftantly refufed, from an apprehenfion of interfering with the trade of the mother country in thefe articles.

The trade of Peru with Spain was carried on by Porto Bello and Panama till 1748, when regifter fhips were fubftituted for galleons, and the voyage by Cape Horn, for the circuitous route formerly in ufe. It is amufing to confider the progrefs made fince that time in the art of navigation. The firft Spanifh veffels which failed by Cape Horn, were infured againft fea rifk at Cadiz, at the exorbitant rate of 20 *per cent.* of their value; but the veffels which perform the fame voyage at prefent are infured for two. The regifter fhips, though liable to objections, were preferable in every refpect to the galleons. They fhortened the intercourfe between the mother country and the colony, and leffened the expence attending it. By affording quicker returns, they led to more frequent adventures; and by meeting more effectually the demand, they diminifhed the inducements to contraband. But the trade was ftill clogged and impeded with much ufelefs expence and unneceffary delay, and fubjected to an arbitrary licence, which was withheld or burdened with reftrictions at the caprice of the minifter.

The regifter fhips continued to be employed in the trade of Peru with the mother country, till the war for American independence, during which there was little intercourfe between Spain and this diftant colony. At the peace of 1783, the fyftem of free trade, the order for which had been iffued at Madrid fome years before, began to be carried into effect in the South Sea. According to this fyftem, the moft wife and liberal which Spain has ever laid down for her colonies, an unlimited intercourfe, without licences or other reftrictions, is permitted between certain ports of Spain and certain ports of Spanifh America; and among the privileged ports of America, are Callao and Arica, both fituated in Peru.

The refult of thefe 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 induftry has been excited, the value of their exports increafed, and the produce of their mines nearly doubled. Nor has the change of fyftem been lefs beneficial to the mother country, though fome individuals have fuffered 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 prefent, the exports from Peru and Chili alone, exceed 6,000,000 annually; and the imports from Europe have increafed in the fame proportion. For fome years, indeed, after the opening of the free trade, the merchants of the mother country, ignorant of the real ftate and refources of Peru, poured into that country a greater quantity of goods than its effective demand required, or enabled it to confume; and by the confequent want of fale, and depreciation of thefe goods, the importers paid dearly for their rafhnefs. But though fome merchants fuffered by their over-fpeculation, the manufactures of the mother country were benefited by it; and with regard to Peru, it would be difficult to fhew how the abundance and low price of goods could be injurious to the confumer. On the contrary, the fpirit of induftry has been awakened in that kingdom, by the fight of luxuries and accommodations, formerly unknown to its inhabitants, or placed beyond their reach; and the increafe of its exports fince the free trade, is the fureft proof of its growing profperity.

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 Coft when exported.	Coft, with Duties and other Expences to Lima.
In the year 1785	1,932,040 $0\frac{7}{8}$	3,106,056 $2\frac{3}{4}$	5,038,096 $3\frac{5}{8}$	6,965,231 $3\frac{3}{4}$
1786	5,113,389 $5\frac{1}{8}$	6,358,901 5	11,472,221 $2\frac{1}{8}$	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 $6\frac{3}{4}$
1788	1,298,250 $7\frac{1}{8}$	995,055 $6\frac{7}{8}$	2,293,306 $5\frac{7}{8}$	2,940,992 $7\frac{3}{4}$
1789	1,007,663 $7\frac{4}{8}$	1,216,855 $3\frac{1}{8}$	2,224,517 $2\frac{7}{8}$	2,856,965 $0\frac{7}{8}$
Total, according to the Cuftom-houfe entry	12,576,510 $0\frac{3}{8}$	14,103,450 $7\frac{1}{2}$	26,679,960 $7\frac{7}{8}$	34,755,015 $7\frac{5}{8}$
Addition of 22 *per cent.*	2,727,064 1	2,990,428 5	5,717,492 6	7,344,297 7
Total	15,303,574 $1\frac{3}{8}$	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 $6\frac{1}{8}$

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 $7\frac{5}{8}$ reals.

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

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

The

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

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

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

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, $9\frac{1}{2}$ *per cent.*; and gold $2\frac{1}{2}$ *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 $4\frac{4}{8}$	21,302,385 2
From 1785 to 1789 -	42,099,313 $6\frac{6}{8}$	35,979,339 $6\frac{7}{8}$
Total for ten years -	65,937,497 $3\frac{1}{8}$	57,281,725 $0\frac{7}{8}$
Exceſs of the 2d period above the 1ſt	18,261,130 $2\frac{7}{8}$	14,676,954 $4\frac{7}{8}$

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
	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 caſts 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 caſts, 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-

dye-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 Tumbez 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 alliodora, which is a large timber tree, whoſe leaves and freſh wood emit a ſmell of garlic; and the coffæa 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 capſicum, 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 *Chola*, 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,

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 intendancy of *Cuzco*, with its dependency of *Curahuasi*, 19 mines of silver were wrought. In the intendancy of *Arequipa*, with its dependency of *Cailloma*, 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 intendancy 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 intendancy of *Guancavelica*, 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. Mercuro 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 kiliometres, in 14 communes.

PERUGIA, anciently *Perusin*, 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 Tuscany; 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 Thrasimenus," 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 Massaccio. 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 Braſil, 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 parviſiæ in Oxford. See MOOT.

Mr. Somner ſays, that perviſe ſignifies *palatii atrium, vel area illa a fronte aulæ 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 ſatchel. Schreb. Gen. 703. Mart. Mill. Dict. v. 3. (Pera; Mutis in Stockh. Tranſ. for 1784. 299.)—Claſs and order, *Dioecia Polyandria*. Nat. Ord. *Tricoccæ*, 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.

Obſ. Mutis ſuſpects that what he has called calyx, may be bracteas. 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.

Eſſ. 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 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 *Maſtic 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 kiliometres, in 28 communes.

PERYGUA, in *Botany*, a name given by ſome authors to a plant of the caſſine kind, called the *caſſioberry* 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 *Monetæ*, 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 CONVOLVULUS and OXALIS.

PES *Columbinus*. See GERANIUM.

PES *Tigridis*. See IPOMÆA.

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

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

PESA, an old law-term for a weigh, or certain weight of cheese, 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 immoveable, 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 switch, 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 figs 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 petrifactions, on occasion of its teeth: many species of the glossopetræ 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 gallies; 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 Vieste.

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 Pistoya.—Also, a town of Italy, in the Trevisan; seven miles S. of Trevigio.

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′.

PESHWA, 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 bukshi, 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 bukshi 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 state. (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, fon of Vifwanatha, was pefhwa, he was fucceeded by his fon Bajy Rao, or Bajerow. He was fucceeded by his fon Balaji Baji Rao, who died in 1761, when his fon and fucceffor Mhadu Rao was but fifteen years old. Raganath Rao, the brother of the late pefhwa, affumed the guardianfhip of the minor, and retained the power of a regent to an undue period, which involved the ftate in fome troubles, and himfelf in imprifonment. He was, however, releafed by his nephew, who foon after died, in 1772, leaving the pefhwafhip to his brother Narayan Rao, and confiding him to the efpecial care of the uncle Raganath. It may be noted here, that the widow of Mhadu Rao burnt herfelf on the pile with her hufband's corpfe. Her name was Rama Bye. (See SATI). Raganath Rao, better known in the fubfequent troubles of the weftern fide of India by the name of Ragoba, pledged himfelf to the protection of the young pefhwa Narayan Rao, whom he caufed to be murdered the following year. His widow Gangabye was defirous of becoming a fati, or felf-devoted victim to the flames, but fhe was found to be pregnant, and the Brahmans foretold a future pefhwa; and the facrifice was not permitted.

The Mahratta nation was indignant at the atrocious murder of the pefhwa, and Ragoba was compelled to flee from its juft refentment. After various attempts to obtrude himfelf on the nation, he was forced to yield, and was with his family imprifoned, and he died in confinement. He had two fons, Baji Rao, and Chimnaji Appah; and he had, before their birth, in defpair of male iffue, adopted a lad named Amrit Rao. Thefe three were alfo kept in confinement.

The widow of the murdered Narayan Rao was delivered of a fon, who was acknowledged as the rightful pefhwa, and Nanna Furnaveefe, as dowan, or minifter; and during the minority, the latter great man ruled the empire. The pofthumous fon 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 fon. Nanna Furnaveefe, the fole minifter, during a long minority, unwilling to refign his power, endeavoured to obtain another minority, by caufing the widow of the deceafed to adopt a child; but finding his political opponents determined on fruftrating his views by an act of juftice, he refolved on anticipating them in that point, and brought the family of Ragoba from their imprifonment, and placed the eldeft, Baji Rao, in the pefhwafhip, to which he had the hereditary right. In confequent troubles and contentions of parties, he has been more than once depofed and forced to flee his capital, and latterly his country; to both of which he was reftored by the interpofition of a Britifh force under general Wellefley, (now field marfhal Wellington), and it feems likely, that under the prefent government, guaranteed and protected by the Englifh, the Mahratta empire will enjoy a feries of peaceful years, which it has hitherto never known. It may be noticed, that Amrit Rao has been fufpected of fomenting the troubles that have of late years convulfed the Mahratta ftates. Difappointed in his views on the pefhwafhip for himfelf or his fon, he has contrived to obtain Britifh fecurity for about 70,000*l.* fterling *per annum*, and under Britifh protection has retired to Benares, the ufual refuge with Hindoos of difcontentment and difappointed 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 diftrict of Gray; 10 miles S. of Gray. The town contains 1688, and the canton 15,188 inhabitants, on a territory of 282½ kiliometres, in 37 communes. N. lat. 47° 17'. E. long. 5° 39'.

PESOLA, a lake of Naples, in Bafilicata, 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 diftrict of Bourdeaux. The place contains 1336, and the canton 7686 inhabitants, on a territory of 505 kiliometres, in 8 communes.

PESSARY, an inftrument, machine, or contrivance, invented for the purpofe of reftraining the uterus, and preventing it from defcending into the vagina, of paffing the external orifice, and appearing externally. This complaint, a defcent of the uterus, is in a particular manner incident to women who have had feveral children, efpecially fuch as have had difficult labours, or who have fuffered from laceration of the perinæum. It is not, however, entirely confined to fuch fubjects. Some women who have never been pregnant, of feeble habit of body, or who have long fuffered from fluor albus, are fubjected to this accident; alfo wafher-women, laundreffes, and thofe whofe occupations oblige them to be much on their feet, or to carry heavy loads.

Reft, cold aftringent injections into the vagina, and bracing or ftrengthening medicines, may affift fomewhat in the cure, but it is only to be completely effected by wearing a peffary. See *Bearing down of the* WOMB.

Peffaries are of various forms; but that in moft frequent ufe, and which is generally found to anfwer the purpofe, is the ring peffary; a circular piece of box, or other light wood, two, three, or four inches in diameter, and about a third of an inch in thicknefs, with a hole cut through its centre to allow a paffage for the menftrual flux. Some prefer them of an oval fhape, and made of cork, but they are not fo eafily retained in the paffage. Others make ufe of a globular ball; but thefe, for obvious reafons, can only be ufed by women who have no hufbands. Women fometimes conceive while wearing a ring peffary. In fuch cafes, the peffary muft be taken away when they are about five months advanced in pregnancy.

When a peffary is intended to be introduced, the woman fhould confine herfelf to her room for a day or two, and principally in a recumbent pofture, and take an opening medicine, that the uterus may have an opportunity of retracting or returning to its natural fituation, and may be reduced in bulk. Thefe preliminary fteps being taken, fhe muft be laid on a bed, on her left fide, her head only raifed on a pillow, her knees drawn up to her belly. The furgeon will then open the labia of the pudenda with the forefinger of his left hand, which he will pafs through the external orifice, to enlarge it a little, then taking a peffary, of a proper fize, 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 oppofite to the os uteri, the other looking downward to the os externum.

The peffary fhould be fo large as to pafs the os externum with difficulty, otherwife it will fall out again when the woman is on her legs. The hole in the centre fhould be large, that if the os uteri fhould enter it, it may not be ftrangled, which might occafion pain, and perhaps fome ferious mifchief.

PESSOMANTIA, Πεσσομαντεια, in *Antiquity*, the fame with cleromancy.

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

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

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

PEST-HOUSE, a lazaretto, or infirmary, where goods, perfons, &c. infected, or fufpected to be infected with fome contagious difeafe, are difpofed, and provided for. See LAZARETTO.

PESTI, in *Geography*, a town of Naples, in Principato Citra, fituated near the ruins of the ancient *Pæftum*; which fee.

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

PESTILENCE, formed from *peftis*, which fignifies the fame, in *Medicine*, an epidemical, malignant, and contagious difeafe, ufually mortal, popularly known under the name of *plague*; which fee.

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

PESTILENTIAL CARBUNCLE. See CARBUNCLE.

PESTILENTIAL *Difeafes*. See DISEASE.

PESTILENTIAL *Fevers*, among *Phyficians*, are fuch as do not only afflict the patient with a vehement heat, but alfo with fome malignant and venomous quality, and in fome approach to the nature of the plague.

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

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

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

PESVER, a town of Perfia, in the province of Irac; 60 miles W. of Kermanfha.

PESUNSCUT, a river of America, in Cumberland county, Maine, which purfuing a winding courfe of 20 miles, carries off the furplus water of Sebacook 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 captainfhip of Rio Grande, and W. by Tupuy: it contains mines of filver.

PETAJA, a town of Sweden, in Tavaftland; 22 miles N. of Jamfio.

PETALIONS, a clufter of fmall iflands in the Grecian archipelago, near the S.W. coaft of the ifland of Negropont. N. lat. 37° 59′. E. long. 24° 16′.

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

The petalifm at Syracufe was nearly the fame thing as the oftracifm at Athens, except that the latter was for ten years, and the former only for five.

The petalifm was performed by the people's writing the name of the perfon condemned, on a leaf; whence the term from πεταλον, *leaf*.

PETALODES, πεταλωδης, a name given to urine, when it feems to have little leaves, flakes, or fcales in it.

PETALOMA, in *Botany*, a new Weft Indian genus, eftablifhed by Swartz, and named by him, from πεταλον, *a petal*, and λωμα, *a border*; becaufe the petals are inferted 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; Juff. 320. Lamarck Illuftr. t. 360. Mouriri; Aubl. Guian. v. 1. 452.)—Clafs and order, *Decandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Onagræ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, of one leaf, cup-fhaped, permanent, with five acute, equal, flightly fpreading teeth. *Cor.* Petals five, oblong, fpreading, their claws inferted between the teeth of the calyx, deciduous. *Stam.* Filaments ten, inferted into the rim of the calyx, longer than the corolla; anthers oblong, incumbent, opening by two pores at one end. *Pift.* Germen inferior, ovate; ftyle elongated, awl-fhaped; ftigma fimple, acute. *Peric.* Berry globofe, flefhy, crowned by the calyx, of one cell. *Seeds* from one to four, angular on one fide, convex on the other.

Eff. Ch. Calyx pitcher-fhaped, five-toothed. Petals five, inferted between the teeth of the calyx. Stamens inferted 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 bafin latioribus, acuminatis, inodoris, ex adverfo fitis, flore pentapetaloide pallidè albicante; Sloane Jam. v. 2. 78. t. 187. f. 3.)—Stalks folitary, fingle-flowered. Leaves nearly feffile, ovate, taper-pointed, oblique at the bafe.—Native of Hifpaniola and Jamaica, in low woods; being known in the laft-mentioned ifland by the name of Silver wood. Swartz defcribes it as a *fhrub*, two or three feet high; Sloane fays the *trunk* is twenty feet in height, ftraight and undivided. Both agree that the *bark* is fpotted with white, whence arofe the Englifh name. The *leaves* are oppofite, entire, thin, fmooth, and inodorous, one and a half or two inches long. *Flowers* axillary, folitary, rarely oppofite, on fhortifh ftalks, white, fmaller than a currant bloffom, but with long projecting *ftamens* and *ftyle*. *Berry* ovate, crowned with the *calyx*, black and fhining when ripe, with feldom more than one *feed*. The afpect of the whole plant is like fome fpecies of myrtle, but it wants the ftrong tafte and fmell of that genus, and the ftructure of the *flowers* is totally different.

2. P. *Mouriri*. Sw. Ind. Occ. 835. Willd. n. 2. (Mouriri guianenfis; Aubl. Guian. v. 1. 453. t. 180.)—Stalks cluftered. Leaves ftalked, broad-ovate, pointed. Berries with four feeds—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*, fpreading in every direction. The *bark* is grey; the *wood* whitifh, hard and clofe-grained. *Leaves* longer, and much broader than thofe of the foregoing, as well as of a firmer texture, paler underneath, but fmooth and fhining on both fides. *Footftalks* fhort and thick. *Flower-ftalks* axillary, cluftered, and fomewhat umbellate, with fmall, oppofite, acute *bracteas*. *Flowers* yellow. *Anthers* with a fort of fpur at their bafe. *Berry* yellow, minutely dotted with red, containing four *feeds*. Nothing is recorded of the qualities or ufe of this tree, but the inhabitants of the country where it grows name it *Mouririchira*.

PETALOSTEMUM, fo called by Michaux, from πεταλον, *a petal*, and στημων, *a ftamen*, on account of the union of thofe two parts of the flower into a tube. Michaux Boreal-Amer. v. 2. 48. t. 37. See DALEA.

PETALUM, the petal, or leaf of the flower, πεταλον 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, πέταμαι, *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 surprised.

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, $\frac{7}{10}$ 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 "madrier;" 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*, πετασίτης of the Greeks, the Butter-bur, owes that name to its large round leaf, resembling a very broad hat or umbrella, πέτασος. See TUSSILAGO.

PETASUS, among the Romans, a covering for the head, not unlike our hats; it had a broad brim, and was used in journies, 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 fort of chariot, advance with fafety and expedition. The foil of this province is fandy, and produces very little rice; but all other kinds of grain are abundant, as well as moft of the fruit-trees which we have in Europe. The rivers fupply abundance of fifh, and the mountains have mines of coal. The temperature does not feem 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 fuch a degree, that horfes and waggons, with the heavieft load, may fafely pafs over them. It is remarked, as a fingular circumftance, that the whole body of ice is formed in one day, and that feveral days are requifite to thaw only the furface. The rainy feafon occurs towards the end of July, and the beginning of Auguft: there is little rain at any other time, but the night dew fupplies the want of it. It is obferved by Grofier that the people of this province have not the fame aptitude for acquiring literature and fcience, as thofe who inhabit the fouthern provinces of the empire; but they are more robuft and warlike, and better fitted for enduring the hardfhips and fatigues of war. The fame obfervation applies to the Chinefe of all the other northern countries. This province is diftinguifhed from all others, by being, as it were, the depot of the richeft productions of the whole empire. According to the ftatement of fir George Staunton, in the appendix to the fecond volume of the "Embaffy to China," this province contains 58,949 fquare miles, or 37,727,360 acres, and 38,000,000 of people. The revenue which it remits into the imperial treafury at Pekin, amounts to 3,036,000 takels, or ounces of filver, *viz.* 2,520,000 land, 437,000 falt, and 79,000 other taxes.

PETCHORA, or Petshora, a river of Ruffia, called alfo *Bolfkaia*, or great *Petchora*, by way of diftinction from the Vifhera, which the Siryanes call Petfhoyra, whence originates the name, takes its rife on the weftern fide of the Ural mountains, in the government of Vologda, follows a N.W. courfe, and falls into the Frozen ocean, in the government of Archangel, after dividing into feveral powerful arms. It now flows through a low, forefty, and almoft uninhabited country. At firft, when Siberia was conquered, the way thither was generally by the Petchora. Thofe who vifited that country, failed up the Duina, the Vichegda, and the Vim, then went a fhort fpace 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 Irtyfh, the Oby, the Ket, and from the Ket into the Yeniffey, &c.

PETECHIÆ, in *Medicine*, otherwife called *Peticulæ*, *Puncticula*, *Senticulæ*, &c., are fmall purple, reddifh, livid, or blackifh fpots upon the fkin, occafioned by the effufion of a minute portion of blood under the cuticle, or fcarf-fkin. When thefe fpots are very minute, like fmall points, they are called *ftigmata*; when they are large, and fpread into broad irregular patches, like the effufions occafioned by a bruife, they are called *ecchymofes* and *ecchymomata*; and when they occur in ftripes, like the effects of the ftrokes of a whip, they are denominated *vibices*.

Petechiæ occur under various circumftances, but are moft frequently feen in fevere fevers, of a dangerous and malignant character, efpecially in typhus, when it exifts in gaols, hofpitals, and the ill-ventilated habitations of the poor; they are occafionally feen intermixed with the puftules of fmall-pox, efpecially of the confluent kind, and with the worft fpecies of fcarlet fever. Whence they have generally been accounted indications of great danger, and have been confidered as figns of the general putrefcency of the circulating fluids, and as demanding the exhibition of the moft powerful ftimulants and antifeptics, whenever they appear.

On the contrary, however, petechiæ of the largeft dimenfions, and even extenfive ecchymofes and vibices, together with actual hæmorrhages, are occafionally feen, unaccompanied by fever, and fometimes with but little derangement of the health. Whence authors have written of "Petechiæ fine febre" as a diftinct difeafe, which has been alfo called Purpura, Hæmorrhæa *Petechialis*, &c. See the former of thefe words, where this chronic petechial difeafe will be found defcribed at length.

It is but too obvious, that the nature of thefe petechial fpots is not yet fufficiently underftood: but fome recent light has been thrown upon the fubject by medical obfervers, which bids fair to lead both to a more fatisfactory theory and practice in refpect to them, as will be ftated in the article juft referred to.

PETECHIAL Fevers are thofe varieties of typhus, in which petechiæ occur in confiderable numbers, conftituting one of the moft prominent features of the difeafe. See Typhus and Fever.

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

PETER, Simon, in *Scripture Biography*, whofe furname Cephas, or Petrus, Peter, fignifies a ftone or rock, was born at Bethfaida, upon the banks of the fea of Galilee; and his occupation was that of a fifherman upon this lake, as was alfo, in all probability, that of his father Jonas, Jonah, or John. He had a brother, whofe name was Andrew, fuppofed by fome writers to have been older, but more generally, younger than himfelf. Andrew, as we learn from the gofpel of St. John (ch. i. 35—42.), firft introduced his brother, Peter, to an acquaintance with our Saviour; and as he had received Jefus as the Meffiah, Peter readily concurred in the fame belief and profeffion. From the teftimony of John, by whom they had been probably baptized, and from perfonal converfation with our bleffed Lord, they were convinced that he was the promifed Meffiah; and it is likely that from this time they had frequent intercourfe with him, and were witneffes of fome 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 ftated attendance on Jefus is recorded by three evangelifts; after which event they became his intimate companions, and when he completed the number of his apoftles, they were included among them. At the time of Simon Peter's being called to attend upon our Lord, he was married, and upon occafion of that alliance, he feems to have removed from Bethfaida to Capernaum, where his wife's family refided. It appears alfo, that when our Lord "left Nazareth, and came and dwelled at Capernaum" (fee Matt. iv. 13.), he took up his occafional refidence in Peter's houfe, and hither the people reforted to him in the evening, as we read in Luke, iv. 40. Matt. viii. 16. Mark, i. 32. 34. See alfo Matt. xvii. 24—27. In the evangelical hiftory of this apoftle, the diftinguifhing features of Peter's character are very fignally pourtrayed; and it redounds in no fmall degree to the credibility of the hiftorians, that they have blended, without difguife, feveral traces of his precipitance and prefumption with the honourable teftimony which their narration of facts affords to the fincerity of his attachment to Chrift, and the fervour of his zeal in the caufe of his bleffed mafter. Of his

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 resented 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 expresly mentioned in the New Testament,

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

Peter, ſurnamed *Chryſologus*, 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 Cornelii. 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 Chryſologus, 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 Cologn, 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 gived 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 negociating 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

take refuge in Portugal, he entered into a negociation with the king of that country, alfo called Peter the Cruel, to deliver them up, upon condition that, on his part, he fhould deliver up thofe Portuguefe who had been concerned in the death of Agnes de Caftro. This was punctually performed on both fides, and was the caufe of many bloody executions. In 1361 he completed the meafure of his domeftic cruelties by the murder of his firft queen, Donna Blanca, then confined in the fortrefs of Xeres. A fhort time after this he perfidioufly put to death the Moorifh prince of Grenada, Mahomet Barbaroffa, with all his fuite, who had attended on him at Seville, on the fecurity of a fafe conduct. His enormities at laft produced a confederacy againft him between the kings of Arragon and Navarre, and Henry de Traftamare, at the head of the emigrant Caftilian nobility. Peter had, by no means, been deficient in vigour or fuccefs in carrying on the war againft the king of Arragon, and his depofition was therefore much defired by that monarch, who, in fact, was nearly as perfidious and fanguinary as himfelf. A band of mercenaries, ready to fight in any caufe, was brought out of France, under the command of Bertrand de Guefclin, and others; and Henry entering Caftile was admitted into Calahorra, and proclaimed king. Advancing to Burgos, he received the homage of the nobles of Caftile, and was folemnly inaugurated; while Peter retired to Portugal, and thence to Guienne, to the court of Edward the Black Prince. The treafures which he carried with him made him welcome to the prince and his barons, and the offer of Bifcay, together, probably, with the notion of the duty of affifting the rightful fovereign, induced the gallant Edward to undertake his reftoration. 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 prifoners on this occafion, but was reftrained by the humanity of the prince of Wales. He now paid no fort of regard to his promife of recompence to his victorious allies, and after refuming his crown, he indulged the feverity of his nature by numerous favage executions.

Henry was not, however, difheartened by his misfortunes, but, after the departure of the Englifh, collected his forces and engaged again the affiftance 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 compofed of a very motly affemblage, there being among them many Jews and Moors. A battle enfued, in which Peter was completely defeated, and he was forced to take refuge in Monteil. He was, for want of provifions, foon obliged to quit this place, which he did at midnight with eleven companions, but was ftopped and carried to the tent of his captor. His brother Henry, informed of the fact, arriving, words of reproach paffed between them, and Peter caught Henry in his arms, threw him on the ground, and attempted to kill him. In the ftruggle, Henry was affifted by his attendants, and they difpatched 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 juftly execrated, though it is not unlikely that his crimes have been exaggerated, and it is quite certain that feveral of his contemporaries deferved the opprobrious title as well, and nearly as much as himfelf. Univer. Hift.

Peter *of Sicily*, fo called from the ifland which gave him birth, was a man of noble defcent, who flourifhed at the clofe of the ninth century. He was taken into the fervice of the emperor Bafil, who, in the year 870, fent him into Armenia for the purpofe of negociating an exchange of prifoners. This bufinefs, which he performed to the fatisfaction of the emperor, having occafioned him to fpend nearly nine months at Tibrica, the capital of Armenia, he embraced feveral opportunities of holding conferences with the Paulicians, a branch of the Manichæans, who were numerous in that country, and undertook the tafk of drawing up in Greek "A Hiftory of the Rife and Progrefs, and Decline of that Sect." The work to which he gave this title was dedicated by him to an archbifhop of Bulgaria. Part of it was tranflated into Latin, and inferted by cardinal Baronius in his "Annals." It was afterwards publifhed with the original, under the title of "Hiftoria de varia et Stolida Manichæorum Hærefi." This work is an object of curiofity, as it prefents us with a view of the fentiments of the Paulicians at the time in which Peter lived.

Peter *of Blois*, a learned French ecclefiaftic in the 12th century, was a native of the city on the Loire, whence he derived his furname. Having been inftructed in the claffics and polite learning at Paris, he went to the univerfity of Bologna, where he acquired great reputation by the proficiency which he made in the ftudy of civil and canon law, and the various branches of profane literature. He then returned to France and devoted himfelf wholly to the ftudy of divinity, under the celebrated John of Salifbury, bifhop of Chartres, of whofe church it feems probable that he was made a canon. In 1167 he travelled into Sicily with Stephen, fon of the count of Perche, and coufin to the queen of that ifland, where he was appointed tutor, and afterwards fecretary to William II. king of Sicily. When Stephen, who had been made chancellor of the kingdom, and archbifhop of Palermo, was fent into banifhment, Peter was involved in his fortune, and found it neceffary to take refuge in his native country. Hence he was invited into England by king Henry II., at whofe court he continued fome time, and was nominated archdeacon of Bath. He next entered into the fervice of Richard archbifhop of Canterbury, who appointed him his chancellor, and fent him to negociate bufinefs of importance relating to the metropolitan fee with king Henry II., and popes Alexander III. and Urban III.

After the death of king Henry, he refided 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 compenfated for his lofs by obtaining that of London, the duties of which he difcharged with the utmoft fidelity. He died in England in the year 1200. He is faid to have been the firft perfon who made ufe of the word *Tranfubftantiation*, to exprefs the doctrine of the Catholic church on the fubject of the eucharift. His remains chiefly confift of "Letters," 183 in number, which he formed into a collection by order of king Henry II., and which will be found ufeful in illuftrating the civil and ecclefiaftical hiftory of the period in which he flourifhed. Moreri.

Peter, furnamed *Comeftor*, or the Eater, another French ecclefiaftic, was a native of Troyes in Champagne. Having embraced the clerical profeffion, he became canon, and afterwards dean of the cathedral in that city. Here he acquired fuch celebrity, that he was invited to Paris, where he was appointed dean of the metropolitan church. Some time after this, he refigned his benefices, renounced the world, and entered among the canons regular of St. Victor, at Paris, where he gave himfelf up entirely to ftudy and devotion. He died in 1198. He was efteemed a man of learning for the age in which he lived, and he had the fortitude publicly to condemn fome of the abufes and corruptions of the Romifh church, particularly the celibacy of the clergy.

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

"*Petrus* eram, quem Petra tegit, dictufque *Comeftor*
Nunc comedor. Vivus docui, nec ceffo docere
Mortuus; ut dicant, qui me vident incineratum,
Quod fumus, ifte fuit, erimus quandoque quod hic eft."

He was author of "Hiftoriæ Ecclefiafticæ, lib. xvi.," containing a fummary of facred hiftory, from the beginning of Genefis to the end of the Acts of the Apoftles. To his pen has been attributed a work entitled "Catena Temporum," &c. confifting of a compilation of univerfal hiftory, publifhed at Lubeck in 1475, in two vols. folio, of which a tranflation into French was publifhed in 1488, under the title of "Mer des Hiftoires."

Peter Nolasque, a faint of the Roman calendar, was founder of the order for the redemption of captives, commonly called *the order of* Mercy; which fee. He was of noble defcent, and born about the year 1189. Having loft his father when he was only fifteen years of age, he attached himfelf to Simon, count de Montfort, who placed him in the fervice of James, king of Arragon. By his talents and virtues, he recommended himfelf to the favour of that prince, a circumftance of confiderable importance to him when he afterwards undertook the foundation of his order. The firft defign of it was fuggefted to him by a private fociety of gentlemen at Barcelona, who made a common purfe for the exprefs purpofe of redeeming Chriftian captives, and relieving the fick. Struck with the generofity of their undertaking, he meditated a plan for converting this private fociety into a religious and military order. He laid his plan before the king, who fanctioned it with his approbation, and the order was eftablifhed in 1123, under the title of "The Confraternity of Mercy;" at firft it confifted of fix priefts and feven laymen, who, befides the cuftomary vows, bound themfelves to devote their perfonal exertions to the tafk of redeeming captives from Mahometan flavery. Peter Nolafque was appointed the firft fuperior-general; but this office did not exempt him from engaging in the common duties of the fociety. He is faid to have been fo fuccefsful in his two firft expeditions into the kingdoms of Valentia and Grenada, as to redeem upwards of four hundred captives from their moft oppreffive bondage. He afterwards paffed over into Africa, where he met with much ill treatment, while employed in zealoufly purfuing the object of his benevolent miffion. In 1249 he refigned the office of fuperior-general, and he died in 1256. Peter Nolafque was canonized by pope Urban VIII. in 1628. Several houfes of his order have been founded in France and other countries; but its principal eftablifhments have always been in Spain. Moreri.

Peter, the Hermit, a celebrated perfon, to whom we have frequently, in the courfe of our volumes, referred, was born in the 11th century at Amiens, in Picardy. He entered into the army, and ferved under the counts of Bologne, but having imbibed the holy zeal of the age, he quitted the world, and devoted himfelf to a life of religious folitude and aufterity. About the year 1095 he made a pilgrimage to Jerufalem, then in the hands of the Turks, and was deeply impreffed with the oppreffions fuftained by the Chriftian inhabitants, and the vifitors of that memorable city. In the warmth of his emotions, he promifed the Greek patriarch to ufe his endeavours to roufe the weftern 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 ftature fmall, his body meagre, his countenance fhrivelled, 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 defign; and Peter immediately fet out on his travels as a miffionary through the provinces of Italy and France. He rode on an afs, 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 addrefs, drew innumerable crowds of all ranks to liften to his preaching. When he painted the indignities offered to the true believers at the birth-place and fepulchre of their Saviour, every heart was melted to compaffion, and animated to revenge. His fuccefs in raifing recruits for the holy war, was fuch as might have been expected from the rude enthufiafm and martial fpirit of the age. (See Croisade and Godfrey.) Collecting above 60,000 perfons of both fexes, and of the loweft ranks in life, from the borders of France and Lorraine, he proceeded with them along the banks of the Rhine and Danube. The progrefs was marked by pillage and diforders of all kinds, and by the maffacre of all the Jews that came in their way. As they approached the confines of Hungary and Bulgaria, the fierce natives of thofe countries arofe upon them, and cut them off in fuch numbers, that only a third part, with Peter himfelf, efcaped into Conftantinople. Almoft all thefe were afterwards flain 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 fiege of Antioch, but his ardour was confiderably cooled, and he would gladly have made his efcape, but Tancred caufed him to fwear that he would never defert an expedition of which he had been the prime mover. He afterwards diftinguifhed himfelf at the fiege of Jerufalem, and has been celebrated in the verfe of Taffo. After the capture of that city, he was appointed by the patriarch, during his abfence 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. ftyled the Great, emperor of Ruffia, was the third fon of the czar Alexis Michaelovitch. He was born at Mofcow in the year 1672, and on the death of his eldeft brother, in 1682, he was nominated to the fucceffion, in exclufion of his other brother Iwan, who was fet afide on account of incapacity. Shortly after, a terrible mutiny of the guards, fomented fecretly by the princefs Sophia, the adult fifter 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 difplayed a fpirit which fhewed 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 difpofition to convulfive or epileptic fits. It was not long before he attempted to put himfelf beyond the influence of Sophia; he married againft her will, in his 18th year, and claimed a feat at the council board, from which fhe procured his exclufion, and an open rupture was the confequence. Peter took the bold refolution of arrefting and imprifoning his fifter, who, on her part, is faid to have formed a confpiracy againft her brother's life, or, at leaft, againft his liberty. Peter prevailed, confined his fifter to a nunnery for life, and affumed the reins of government in 1689. Although he had given way to the fenfuality natural to a young prince in a rude and diffolute court, yet he appears early to have had juft ideas of thofe ftate reforms, of which former fovereigns in Ruffia, and efpecially his father, had given fome examples. He had been employed in training a fmall body of troops in the German 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 Perislaf. 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 gallies 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 shipbuilding 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 cooperation 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 difciplined troops he foon obtained a complete victory over the Ruffians, who fought without judgment or fkill. Peter was not difpirited; he melted down the great bells of his churches to repair his lofs in artillery, and exerted all his powers to recruit and difcipline his troops. After various actions with different fuccefs, the Ruffians gained a footing in Ingria and Livonia, and became mafters of the river Neva. The place where that river enters the gulf of Finland appeared to him a proper fpot for a port, by means of which he might obtain a fhare of the navigation of the Baltic; and having formed the plan, no obftacles could prevent him from the accomplifhment of his purpofe. A morafs furrounded with forefts, in the 60th degree of north latitude, was the uninviting fcite which he chofe for a new capital of his empire. The firft erection was a fortrefs on an ifland, the foundation of which was laid in May 1703. A hut, for his own refidence on a neighbouring ifland, a larger wooden houfe for his favourite Mentfckikof, and an inn, were the firft buildings of St. Peterfburg. Such was the eagernefs with which he purfued his defign, with all the refources of defpotic power, that in lefs than nine years from thefe rude commencements, the feat of empire was transferred from Mofcow to Peterfburg. A vaft number of lives was facrificed in carrying on thefe labours, but human life never enters into the calculations of defpots. Every thing muft be fubfervient 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 houfes in the new capital. But it was chiefly inhabited by foreigners, whom he encouraged to fettle in his dominions, and even to the prefent time foreigners and their defcendants make a great part of its population. The removal of the metropolis to a corner of this vaft empire, at fuch a diftance from its moft defirable diftricts, and from the neighbouring courts, was thought to be highly impolitic, but it proved to be very inftrumental in civilizing the great body of the people, by breaking thofe national habits of life which were foftered in the barbaric grandeur of Mofcow. In the year 1704, the czar, in perfon, took Narva by affault. On this occafion, his foldiers committing the ufual exceffes in a captured town, he was, though at much perfonal rifk, extremely active in reftoring order and tranquillity. Entering the town-houfe, whither many of the citizens had retired for refuge, he laid his bloody fword on the table, and exclaimed, "It is not ftained with the blood of the people of Narva, but with that of my own foldiers, which I have fhed to preferve your lives." Cruelty to a vanquifhed foe was not among the characteriftics of Peter. He continued faithfully to adhere to the interefts 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 Auguftus, Ruffia remained the fole object of hoftility to the hero of Sweden: the dethronement of the czar was his avowed aim; "but," faid Peter, "though my brother Charles affects to act the Alexander, I truft he will not find me a Darius." In 1708, Charles advanced to Grodno, where he narrowly miffed taking the czar prifoner. He pufhed forwards towards the Dnieper, and gave the Ruffians, who oppofed him, a total defeat, though fo much were they improved by practice and difcipline that they ftood feven charges before they gave way. Charles now croffed the Dnieper, and marched to meet the coffack Mazeppa in the Ukraine. In the mean time his general, Lewenhaupt, was leading an army in Livonia to reinforce him. Peter, in perfon, attacked Lewenhaupt at Lefnau, with a force not much fuperior in number, and after a defperate conflict of three days, took or deftroyed half his army. This fuccefs was the prelude of the great victory at Pultowa, in June 1709, which entirely defeated all the plans of the Swedifh monarch, and made him an exile among the Turks. Auguftus was replaced on the throne of Poland; Pruffia made an alliance with Ruffia; Elbing, Wiburg, and Riga yielded to Peter's arms; and Carelia and Livonia acknowledged him as their fovereign. In 1711 the Turks declared war againft Ruffia, in the courfe 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 negociation. The principal inftrument which he ufed on this occafion, and which freed him from fo perplexing a fituation, was a woman, whom, from the loweft origin, he had raifed to be the partner of his bed, and to whom he had been privately married. This was the emprefs Catharine I., originally a parifh foundling, and who had paffed through various hands to thofe of her fovereign. By the fweetnefs of her voice, and the mildnefs of her manners, fhe was able to foothe her fovereign and lord, in all the paroxyfms of rage and gloom to which he was occafionally fubject; and fhe retained her influence over him to the very laft moment of his life. He rewarded her fervices in this important inftance, by a public declaration of marriage in the following year, and by the inftitution of the order of St. Catharine, of which fhe was the head and patronefs.

Peter being at peace was left to purfue his defigns, and in the years 1713 and 1714 he effected a total reduction of Finland, and a victory of the Ruffian fleet over the Swedifh rendered him mafter of the ifle of Oeland. The czar foon after vifited Copenhagen, and a grand plan was formed for the invafion of Sweden by the Danes and Ruffians, in conjunction with an Englifh and Dutch fleet: it was, however, rendered abortive, probably, by means of a fecret negociation entered into between the czar and the Swedifh minifter baron Goertz, in which very advantageous terms were granted to Ruffia, in order to obtain a peace. Some great revolutions in the north of Europe entered into the projects of this daring minifter, 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 purpofe 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 vifited France, where he opened to the regent, duke of Orleans, a plan calculated for the advantage of France and Ruffia, in which were comprized peace with Sweden, the humiliation of Denmark, and the difturbance of England; but that prince's clofe connection with George I. prevented him from liftening to it. Soon after his return a domeftic event took place, which was one of the calamities of Peter's reign, and has left a ftain on his memory that can never be obliterated. His fon Alexis, born in 1690, was the fole offspring of his firft marriage with Eudocia Lapookin; his education had been much neglected, and he had imbibed deep prejudices, and a rooted averfion from his father's improvements. As he grew up, he contracted habits of intemperance and grofs debauchery, with a fondnefs for the loweft company. His father probably never entertained for him a fpark of the paternal affection, and treated him with a harfhnefs that rendered him always uneafy in his prefence. Alexis married a very amiable woman, whom he made wretched by his brutality, and fhe died very foon after fhe had brought him a fon, in the year 1715. In the following year, renouncing his right of fucceffion in favour of Peter's fon by Catharine, he requefted permiffion 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 nomination 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 Romanof 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 Ruffia, and fucceffor to the crown, by his aunt the emprefs Elizabeth, in 1742, after having conformed to the Greek church, and in 1745 he efpoufed Sophia Augufta, princefs of Anhalt-Zerbft, who took the name of Catharine. Peter had received a bad education, and was eftranged by Elizabeth from public affairs. Being, therefore, a prey to idlenefs, he gave himfelf up to trifling purfuits, and indulged in low fenfualities. One of his principal amufements was the training of his fervants, and a fmall body of foldiers, which he was allowed to keep at his palace, in the German difcipline. He conftructed a petty fortrefs, in which he acted as governor, and affiduoufly practifed all the minutiæ of military fervice. At the fame time, he bore with impatience the conftraint in which he was held by the emprefs, and often broke out into invectives, which, by the fpies placed about him, were carried in an exaggerated ftate to her ears. Nor did he conceal his hatred and contempt of the Ruffian nation, nor his partiality to foreigners, in whom he feemed to place the moft unbounded confidence. Elizabeth, therefore, urged by the chancellor Beftuchef, was nearly perfuaded to fet him afide from the fucceffion. She did not, however, perfift in this intention, and on her death, in December 1761, Peter afcended the throne without oppofition, and with all the joy of a perfon enlarged from a long imprifonment into a ftate of perfect liberty. He immediately releafed the principal ftate prifoners, who had been confined by Elizabeth; among thefe were Biren, duke of Courland, marfhal Munich, and Leftof; and in all ftate affairs he conducted himfelf upon political principles, diametrically oppofite to thofe of the late emprefs. He recalled alfo from exile the victims of the defpotifm of the former reign, who are faid to have amounted to feventeen thoufand perfons. He abolifhed the dreadful fecret ftate inquifition, and formed a plan for correcting abufes in the courts of judicature. He freed the nobles from the obligation of ferving in the army, and permitted them to vifit foreign countries without particular licence. An extravagant admiration of the great Frederic of Pruffia was one of his paffions, and he became an ally to that monarch. At the fame time he formed a defign of conquering the duchy of Slefwick from Denmark, which he conceived belonged to him as duke of Holftein. Although, as has been obferved, he introduced important changes in the government, yet the falutary part of them was accompanied with projects of innovation, fome of them trifling, and others at leaft dangerous and imprudent. He offended the Greek clergy, by fecularizing their monafteries, and feizing their eftates, and by fhewing 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 Holftein troops, and his rigour in introducing the Pruffian difcipline; and he affronted the nobility by the appointment of his uncle, prince George of Holftein, to the poft of generaliffimo, and by the exclufive confidence which he placed in foreigners. But his conduct to the emprefs Catharine was that which efpecially haftened his ruin. He had frequently treated her with great indignity, and at length did not fcruple to avow an intention of arrefting and repudiating her, fetting afide her fon, the grand duke Paul, from the fucceffion, as not being his, and marrying his favourite miftrefs, the countefs of Woronzof. Catharine was, however, beforehand with him, and a revolution was effected completely in her favour. Peter was forced to fign his own abdication in the moft humiliating terms. After this he was fent a prifoner to Robfcha, a fmall palace at fome diftance from Peterfburg, 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, fuppofed to be about twelve years of age, and had fubfifted in thofe woods upon the bark of trees, berries, &c. for a confiderable time. How long he had been in that ftate could never be afcertained, but when found, the remains of a fhirt 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 fpeak. It was pretty well afcertained that he was an ideot. He was placed under the care of a farmer at North Church in Hertfordfhire, where he lived on a ftipend of 35*l.* *per ann.* allowed him by the government.

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

It was called *Peter-pence*, becaufe collected on the day of *St. Peter ad vincula*; by the Saxons it was called *Rome-feoh*, *i. e.* the fee of Rome, and alfo *Rome-fcot*, and *Rome-pennying*, becaufe collected and fent to Rome: and laftly, it was called *hearth-money*, becaufe every dwelling houfe was liable to it, provided there were thirty pence *vivæ pecuniæ* belonging to it, nay, and every religious houfe; the abbey of St. Alban's alone excepted.

This Peter-pence was at firft given as a penfion or alms, by Ina, king of the Weft 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 fupport of the Englifh fchool or college at Rome; the popes, however, fhared it with the college; and at length found means to appropriate it to themfelves.

At firft it was only an occafional contribution; but it became at laft a ftanding tax; being eftablifhed by three laws of king Canute, Edward the Confeffor, the Conqueror, &c.

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

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

It was abolifhed under that prince, and reftored 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 Landfperg.—Alfo, a town of the fame duchy; three miles W.N.W. of Windifch Weiftritz.—Alfo, a town in the fame duchy; fix miles W. of Cilley.—Alfo, a town of Auftria; 12 miles W.S.W. of Freuftadt.—Alfo, an ifland on the river Rhine, ftrongly fortified, near Mentz.—Alfo, a town on the S.W. coaft of the ifland of Cape Breton, in a bay to which it gives name, and which is a very commodious place for carrying on the fifhery.—Alfo, a fmall ifland in the Weft Indies, among thofe which form the clufter called "Virgin iflands," dependent on Virgin Gorda.

PETER'S, *St.*, a town of the ifland of Antigua.—Alfo, a town of the ifland of Stronfa. N. lat. 59°. W. long. 2° 31'.—Alfo, a river on the coaft of Labrador, about four leagues from the ifland of Belle-ifle, in the ftraits of that name.—Alfo, a river of Louifiana, being one of the north-weftern branches of the Miffifipi river, which it joins in about 45° 6' N. lat. W. long. 94° 22'.

PETER'S, *St.*, *Bank*, a large fifhing ground off the S. end of 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° 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° 25'. W. long. 62° 20'.

PETER'S, *St. Haven*, a harbour on the E. coast of Labrador. N. lat. 56° 31'. W. long. 60° 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° 46'. W. long. 56° 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 KEENEEBALOO.

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

PETER'S, *St.*, and *St. Paul*, in *Geography.* See AVATSCHA. 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° 0' 38". E. long. 198° 43': the variation in 1779 being 6° 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° 10'. W. long. 2° 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 Peada, 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 abbies 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 Gilden-burgh. In reference to the saint to whom the dedication was made, this name was afterwards changed to Peter-burgh. 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 Cloſe, 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 impannelled, 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

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 *Sanctpeterbourg*, 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-oſtrof 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 ſcite 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 Moſkofſkoi; and along the Ligova canal, the Rojeſtvenſkoi, to which the Yæmſkoi quarter adjoins. Then follow the Vaſſilieoſtroi, 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.

It was here likewife that fhe ended her days on the fourth of November 1796.

The fummer gardens likewife, or the principal public promenade, lie within the bounds of this admiralty quarter. By their original deftination they belonged to the imperial fummer palace, a fpacious wooden edifice, fince demolifhed; but are now entirely devoted to the public. They are well laid out and ornamented with fountains and ftatues. The baluftrade by which they are entered is a truly furprifing work of art; it runs in a line with the houfes on the bank of the Neva, and confifts of thirty-fix maffy columns of granite, connected together by an iron palifade of exquifite workmanfhip, defigned and executed by a Swede. The columns are two fathoms in height, and their diameter exceeds three feet: the fhafts, refting on granite pedeftals of fix cubic feet, and the pillars are decorated at top by a regular interchange of urns and vafes. The huge maffes of ftone, the wonderful ingenuity difplayed in the iron work, the ornaments of which are highly gilt, the connection of the whole with the fuperb edifices ranging at either extremity, and the view of the Neva with its noble granite quay, fill the beholder with aftonifhment and delight.

This quarter contains four public fquares. In one of them ftands the juftly famous monument of Peter the Great. This ftatue is truly a mafter-piece. Falconet has fucceeded in the refemblance to admiration; the features of the czar's countenance are admirably expreffed. The artift reprefents the hero on horfeback, as in the act of afcending a fteep rock, the fummit of which he propofes to attain. Peter is in an Afiatic drefs, and crowned with laurels; he extends his right arm with graceful dignity, while with the left he holds the bridle of his horfe, whofe beauty of form, and elegant attitude, captivate the admiration of all fpectators. The fiery courfer rifes on his hinder feet, and is in the attitude of ftretching to attain the fummit of the rock. To combine folidity with excellence was therefore a difficult tafk; but this the ingenious artift found a way to accomplifh. The brazen ferpent, which is trampled on by the horfe, is emblematical, doubtlefs, of oppofition to the views of the monarch; but it artfully ferves likewife to give the proper equipoife to the ftatue; the point of bearing being by this means not perceived, which is the full and flowing tail of the horfe gently falling on the ferpent writhing with pain. The hewn rock on which it ftands is a flightly mingled granite, formed of white and variegated quartz, white and red feldfpath, white and black glimmer, having here and there likewife grains of iron and fchorl cryftals. On one fide of it is this fimple infcription, in letters of caft brafs.

PETRU PERVOMU
EKATERINA VTORAIA.
LIETA 1782.

And on the fide towards the fenate the fame in Latin:

PETRO PRIMO
CATARINA SECUNDA.
MDCCLXXXII.

The figure of the monarch is eleven feet in height, and that of the horfe feventeen. The expence of this grand monument was truly imperial. The tranfport of the rock from Lachta in Finland, coft 70,000 rubles; Stephen Falconet, the ftatuary, received, during his nine years' ftay, about 48,000 rubles; for his maintenance, 26,800 rubles; apart for the fount, 17,500 rubles; his three fubordinate artificers, 27,284; the founder Chailof, 2500 rubles, befides incidental charges: the whole amounting, according to the report of the board of works, to 424,610 rubles. It was caft in a ftrong building, conftructed over the rock for that purpofe in Auguft 1775. It is a bell-metal of copper, with a fmall mixture of tin and zinc, and weighed 44,041 Ruffian pounds. The head of the hero was modelled by Mad. Collot, who was afterwards married to Peter Falconet, fon of the ftatuary.

In this quarter of the town, too, is the marble palace. This fuperb edifice, built originally by Catharine for the manfion of Gregory Orlof, at his death reverted to the emprefs, and during her life-time it remained uninhabited; but her fon and fucceffor Paul, having invited Staniflaus Poniatoffky, king of Poland, to St. Peterfburg, affigned him this palace for his refidence; and here, by a fingular turn of fortune, he terminated his troublefome and inglorious life.

The college of foreign affairs, the poft-offices, the fenate, and the loan bank, are among the public ftructures; which, either from their magnificence, or ftyle of architecture, deferve to be reckoned remarkable objects in this quarter of the town, and the number of which is augmented by fixteen palaces of noblemen, and a multiplicity of other beautiful and fpacious buildings.

A very important rank in the topography of the fame diftrict is alfo maintained by the admiralty, with its lofty tower, from which it affords a view up the ftreets diverging from it as radii from their centre, and efpecially that called the Great Perfpective, extending at leaft five miles in length. The body of the building is an oblong fquare, and, as is juftly obferved by M. Storch, remarkable for nothing fo much as its ugly appearance. The fide of the admiralty to the Neva occafionally prefents the public with a magnificent fpectacle; here being the wharf and dock-yard from whence fhips of war of fixty to a hundred guns are built, and every launch is a great holiday.

The grand church dedicated to St. Ifaac, which was intended by the emprefs Catharine II. to be the moft fumptuous of all the city, was not completed in her reign. Like the marble palace, it is erected on a bafement of granite, the fuperftructure, both within and without, being of marble, jafper, and porphyry. This church, which at the deceafe of Catharine had been building upwards of twenty-fix years, was raifed to the top of the walls, and a beginning had been made with the dome. Her fucceffor, impatient to fee the edifice completed, to the amazement of all who were not acquainted with his imperial tafte, caufed it to be finifhed of brick.

The fquare, contiguous to the fummer-gardens, is remarkable for nothing, except the ponderous monument erected to the memory of field marfhal Romanzof. The Ifaac place, on which the church of that name is built, is in the form of an obtufe triangle, and is enclofed by handfome houfes. The Peter's place, in which the famous ftatue of that monarch ftands, is the grandeft of all, whether we confider it in itfelf, or in the picture viewed from it compofed of the noble river, the paffing fhips and boats, the thronged bridge, and the oppofite fhore of Vaffily-oftrof, bordered by palaces, the imperial academies and fumptuous houfes. In this quarter of the town originate three ftraight, long, and elegant ftreets, denominated perfpectives, becaufe from their feveral points of view they afford a profpect of the admiralty's gilded fpire. It proceeds in a direct line, one little curvature excepted, from the admiralty to the monaftery of St. Alexander Nevfky, and in breadth it may vie with the fineft ftreets in Europe; being, according to the above-mentioned author, by one-half broader than Oxford-ftreet, in London. Rents in this part of the town are confiderably higher than in every other, and even the price of provifions and other neceffaries is here much enhanced by the readinefs wherewith the luxury of the inhabitants complies with the moft exorbitant demands.

The principal public edifices of the fecond admiralty quarter are the court ftables, the college of medicine, and the opera houfe. This laft is a fpacious maffy ftructure in a noble fimplicity of ftyle, in the conftruction of which, due regard was had to the feveral requifites of its deftination. Within the purlieus of this quarter of the town ftand two of the principal Greek churches. In that dedicated to God's mother, of Kazan, containing her portrait, which is held in the higheft veneration, the folemn thankfgivings for the fuccefs of public affairs are ufually celebrated, at which the fovereign is occafionally prefent in perfon. The church of Nicolai, or the failors' church, confifts of two ftories, whereof the lower may be heated in winter. Its five cupolas are richly gilded. The greateft curiofity of the third admiralty quarter is the bank, perhaps the moft elegant building in all Peterfburg. Of the churches in this quarter, only the Catholic and the Armenian are deferving of fpecification; both of them are rather confpicuous for the tafte difplayed in their ftructure, than for their grandeur and magnificence. The inhabitants of the two laft-mentioned quarters belong chiefly to the trading claffes.

Among the public buildings of the Styckhof, the arfenal is the moft remarkable. It forms an open quadrangle of three ftories, is built in a grand ftyle, and wears an afpect of dignity, correfpondent to its defign. Facing the Styckhof road it has a magnificent portico, and the roof is ornamented with trophies and allegorical figures of excellent fculpture. Oppofite the principal front, on the other fide of the ftreet, is a large fquare court filled with piles of cannon balls and bombs. Remarkable of itfelf, and from the viciffitudes it has undergone, is the edifice that was formerly the pantheon of prince Potemkin, which the emprefs Catharine II. afterwards purchafed, and deftined for her autumnal refidence, denominating it the Tauridan palace. At that time, this fuperb edifice confifted properly of only one floor; but the body of the building, having wings extending along the ftreet, had over the grand portal, fupported upon columns, two ftories furmounted with a large cupola. The left wing was greatly lengthened by the emprefs, by a feries of additional erections, taking in one entire ftreet, fitted up as dwellings for her retinue, orangeries, and neceffary offices. She likewife changed the whole interior of the principal ftructure, and augmented it by the addition of a theatre. Above fifteen hundred labourers were employed in this work, which was even profecuted during the night by the light of torches, as the emprefs had refolved to pafs the enfuing autumn there. Dying a few years after its completion, this gorgeous palace was by her fon and fucceffor converted into barracks.

In this compartment are the imperial Italian gardens, the imperial tapeftry manufactory, the foundery of cannon, the imperial brewery, and the flobode of the horfe guards. Here are likewife the churches of St. Sergius and of the Preobajenfkoi guards, dedicated to the transfiguration of Chrift, with the church of St. Pantaleon and Simeon on the Fontanka, and the fubaltern Yæger church on the Ligova canal, which is the only one of timber. The Lutheran church of St. Anne, belonging to the Germans, ftands here in the third Artillery ftreet. The Styckhof contains likewife the palaces of the princes of Wurtemburg, and on the Fontanka that of prince Sheremetof, with its fpacious court ornamented with ftatues and a pleafure garden in the Dutch tafte.

The Rojeftvenfkoi quarter, though comparatively fmall and inconfiderable, yet contains the only monaftery and the only convent within the city. The Vofkrefenfkoi nunnery, or convent, was originally built and inhabited by the emprefs Elizabeth, while grand-duchefs, and on her acceffion to the throne it was, in 1744, converted into a convent for twenty nuns. The building and walls inclofe a large quadrangle, in the centre of which ftands the church. Catharine II. fuffered the nunnery to remain, but enlarged the ftructure, and founded in it a feminary for young ladies of noble families. The monaftery of Alexander Nevfki is built in the fhape of a fpread eagle, and contains in its ample bounds the palace of the metropolitan, the cells of fixty monks, five churches, a fchool, &c. The famous fhrine of St. Alexander, compofed entirely of wrought folid filver, occupies a confiderable fpace in the elegant church erected exprefsly for that purpofe. Beneath the pavement is the vault conftructed by Catharine II. for her relics, and thofe of her imperial fucceffors.

Among the public edifices of the Mofkoffkoi quarter, is the imperial Yægerhof for the *corps de chaffeurs*. This fpacious and noble edifice was juft finifhed at the demife of Catharine II. and her fon Paul converted it into barracks. The town-hofpital is likewife fituated here, and deferves notice from the grandeur of its architecture.

Vaffili-oftrof is the feat of commerce and of literature. The Exchange and Academy of Sciences ftand on this ifland. The Academy of Arts alfo here raifes its majeftic front on the fhore of the Neva, over-againft the Galerenhof. Afcending the river, the coaft is lined with the fpacious edifices of the land cadet corps; and the eaftern promontory of the ifland is decorated with the three large ftructures which form the Academy of Sciences, at the extremity of which appears the fuperb Exchange. Among the numerous churches fituate on the Vaffili-oftrof, the Lutheran church of St. Catharine is principally confpicuous for the neatnefs and fimplicity of its architecture, the portico of which is from the model of the temple of Concord.

The Peterfburg quarter of the town confifts of feveral iflands; and though it has no fumptuous edifices to boaft of, yet contains the parent of all that exift in the imperial refidence, namely, the original wooden palace or cottage of Peter the Great, over which is erected a brick building, on arches to preferve it from the inclemencies of the weather, as a facred relic of that creative genius. Thefe iflands are Petroffki-oftrof, which, befides a fmall wooden fummerhoufe belonging to the grand duke Conftantine, has nothing worth mentioning, and is partly covered with foreft trees. Of the fame defcription is the Apothecary ifland, which has its name from the garden upon it belonging to the medical college. Another petty ifland is occupied by the hemp magazines, on which account, during the fummer, a numerous fleet of barks and galleots are conftantly collected about it. Kammenoi-oftrof, belonging to one of the imperial family, has upon it an elegant villa, an hofpital for invalids, and a number of beautiful pleafure houfes. The ifland Yelagin, fo defignated from the name of its proprietor, is highly embellifhed by art, and laid out in walks, parterres and avenues, with plantations and fhrubberies, fo as to refemble the pleafure-grounds of an Englifh nobleman. Kreftofki-oftrof, the largeft of thefe iflands, belongs to count Razumofki, and though lefs transformed by art, is however, by reafon of its delightful profpects, arifing from the noble viftas and walks, and the fhores of the furrounding ifles, very much frequented by the inhabitants of the city. The laft and greateft curiofity of this quarter is the citadel, which ftands on the ifland in the Neva, four hundred fathoms long and half as much in breadth, near the

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 fortreſs 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 Beſborodko, 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 chooſing 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 copeek, which is ſomewhat leſs than a halfpenny. Good beef is bought for four copeeks 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 ſledge-roads. 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 Occa; 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 *viſhneſca* and *malinoſca* muſt not be forgot, a ſort of wine made from cherry-juice put into fermentation by ſugar and brandy; *kiſliſhtſhi*, 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 hogſheads 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

firing 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 hogſhead; Madeira 300 rubles the hogſhead; 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 *iſvoſhik*, 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 houſekeepers 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 warehouſe.—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 Perſia, 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 Sonneberg.

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

PETERSWALD, 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 *Ixora 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 *Ixoræ*; 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. Lygistum* 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. *Stipulas* 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 Carthagena. 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 setâ terminatis, racemis alaribus; Browne Jam. 144.)—"Leaves ovate, somewhat villous. Stipulas 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. Mansel, or Maunsel, 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 Maunsels 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 *petechiæ*, 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*.

PETILIUM, 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 Cagiano.

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 dilated, 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 Niſmes, 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 geographer 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 occaſioned 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 Leipſic, 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: "Miſcellanearum 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 Nepenthes, ſive, de Helenæ Medicamento luctum avolente Diſſertatio," ibid. 1689, 8vo.: "Commentarii in tres priores Aretæi 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 Ryſwick, 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 remedied

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

This ingenious man died at Paris on the 18th of June, 1741, aged 77. He left feveral works behind, befides the papers which he communicated to the academy. They were written in a negligent, and not always correct ftyle; for the conftant occupation of his time in obfervation and experiment prevented him from exercifing the *limæ labor* on his writings, and rendered him carelefs about the turn of his phrafes. His works are; " Trois Lettres d'un Medecin des Hofpitaux du Roi à un autre Medecin de fes Amis, fur un Nouveau Syfteme du Cerveau," Namur, 1710, 4to. " Differtation fur une Nouvelle Methode de faire l'Operation de la Cataracte," Par. 1727, 12mo. " Lettre dans laquelle il eft démontré que la Cryftallin eft 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 fur ce que M. Hecquet, M.D. a fait imprimer touchant les Maladies des Yeux," 1729, 4to. " Lettres contenant des Reflexions fur les Decouvertes faites fur les Yeux," 1732, 4to. Eloy Dict. Hift.

PETIT, JOHN LEWIS, a celebrated furgeon, was born of a refpectable family at Paris, on the 13th of March, 1674. From his childhood he difplayed an acutenefs and penetration beyond his years, which gained him the attachment of M. de Littre, a celebrated anatomift, who refided in his father's houfe. This kindnefs of M. de Littre, and his own curiofity, fometimes attracted the boy to the diffecting room of the former, where he foon evinced an intereft in anatomical purfuits. Diffection, fo far from alarming him, became his play: he was found one day, in a garret, where he had fecreted himfelf, diffecting a rabbit, which he had caught, in imitation of what he had feen M. de Littre perform. This able anatomift did not fail to cultivate this inclination; and from the age of feven years, his young pupil regularly attended at his demonftrations, and made fuch rapid progrefs, that he had fcarcely attained the age of twelve, when M. de Littre confided to him the fuperintendance of his anatomical theatre. He afterwards ftudied furgery under Caftel and Marefchal, and was admitted Mafter at Paris in 1700. He was born, it has been faid, for the art which he practifed, and would have created furgery, if it had been previoufly unknown. He became the firft practitioner, and, as it were, the oracle of furgery in Paris; he was confulted in all cafes of importance; and there were few operations of difficulty and delicacy, which he did not fuperintend, or actually perform; and his hand and his counfels were alike fuccefsful. Such a reputation was of courfe not limited to his native city, but extended throughout Europe. In 1726 he was fent for by the king of Poland, and again in 1734 by Don Ferdinand, afterwards king of Spain: he re-eftablifhed the health of both thefe princes, who endeavoured to retain him near their perfons with the offer of great rewards. But he preferred his native capital to the moft brilliant fituations, and found there a fufficient number of perfons who properly eftimated his merits. He became a member of the Academy of Sciences in 1715, and was appointed director of the academy of furgery, and cenfor and royal profeffor at the fchools. He was likewife chofen 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 thofe of his underftanding; for his difpofition was naturally lively and hofpitable, and his manners were indicative of opennefs and warmth of heart, rather than the refult of a ftudied politenefs. He was extremely animated in every thing that concerned his profeffion; and an overfight irritated him more than an infult. But his anger was ever of fhort duration, and he entertained no enmities. His benevolence towards the fuffering poor was unbounded, and he fpared no labour or exertions for their relief.

He communicated many memoirs to the Academy of Sciences, and feveral to the Academy of Surgery, which were printed in their firft volume. His only feparate 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 publifhed by M. Ant. Louis, with an hiftorical and critical effay refpecting it fubjoined: and his pupil, M. Lefne, publifhed his pofthumous 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 chirurgical inftruments. His treatife on the bones involved him in feveral controverfies; but the only chagrin which he felt, arofe from finding Winflow, who, as cenfor royal, had approved the work, retract his approbation, in a letter inferted in the Journal des Savans for May, 1725. Eloy Dict. Hift.

PETIT, ANTHONY, a diftinguifhed anatomift, was born at Orleans, and received the degree of doctor of phyfic 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 profeffion procured for him the appointment of infpector of military hofpitals in 1768, and, in the following year, the chair of anatomy and furgery at the king's garden, where his fcience and eloquence attracted a crowd of auditors. In 1775 he was fucceeded by M. Vicq d'Azyr in the duties of this chair, while he remained titular profeffor. 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 fubi à faint Côme, en 1749, pour fervir d'Eclairciffement a ce qu'en dit M. Fréron," 4to. 1749. " Difcours fur la Chirurgie," an introductory lecture delivered at the fchools of medicine, 1757. " Confultation en faveur des Naiffances tardives," 1764, 8vo. " Premier et feconde Rapport en faveur de l'Inoculation," 1766, 8vo. " Deux Confultations Medico-legales," relative to a cafe of fuppofed felf-murder, and to a fuppofed infanticide, 1767. He alfo edited, " Anatomie Chirurgicale publicé cidevant par Jean Palfin," 2 tom. 8vo. 1753. Eloy Dict. Hift. de la Med.

PETIT, *Cape*, *Jury*, *Larceny*, *Serjeanty*, *Seffion*, *Treafon*. See the fubftantives.

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

PETIT *Port*, a harbour on the coaft 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 acrofs to the head of Kennebecfius.

PETITE GUERRE, Fr., in *Military Language*, is carried on by a light party, commanded by an expert partifan, confifting of between one and two thoufand men, feparated from the main army, in order to fecure the camp on a march, to reconnoitre the enemy or the country, to feize their pofts, convoys, or efcorts, to plant ambufcades, and to practife every ftratagem for furprifing or difturbing 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 diftrict of Savarne.

varre. The place contains 1019, and the canton 9323 inhabitants, on a territory of $292\frac{1}{2}$ kiliometres, 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 kiliometres, in 28 communes.

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

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. *Personatæ*, 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. Mærter, 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 imparlance 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 sir 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 ufual price of Petitot for a portrait was 30 piftoles; but for fome 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 affociated and lived together for 50 years, without the fmalleft conteft or mifunderftanding.

He left a fon of his own name, who practifed the fame profeffion with his father; and though he was not by any means equal to him, yet he obtained very confiderable employment and repute. His age and the period of his death are alike unknown.

PETIVARS, in *Geography*, a tribe, inhabiting towards the north-eaft of Brafil, who are faid to be benevolent and hofpitable. They bore their lips, and adorn them with a green ftone, of which they are fo vain as to defpife all other nations. When the wife has brought forth a child, the hufband confines himfelf to his bed for a month, and receives vifits of congratulation. Eftalla obferves, that this cuftom is not only common in many parts of America, but was alfo known to the ancient Spaniards, as mentioned by Strabo. The reafon of this cuftom is, that if any accident were to befal the father, the new-born babe muft fuffer.

PETIVER, James, in *Biography*, an Englifh naturalift and indefatigable collector, who flourifhed at the end of the 17th and beginning of the 18th centuries, paffed the chief part of his life as an apothecary, at the White Crofs in Alderfgate-ftreet, 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 fays, "this ferpent, with feveral other animals, I find amongft fome Cape paintings, which our worthy kinfman Dr. Sherard hath lately given me to figure," &c. It were unjuft to defraud him of even the fhadow of fo illuftrious a relationfhip. Dr. Pulteney has afcertained that Petiver was apprenticed to Mr. Feltham, apothecary to St. Bartholomew's hofpital, and that after he was eftablifhed for himfelf in Alderfgate-ftreet, he became apothecary to the Charter-houfe, and obtained a confiderable fhare of practice in his profeffion. He had an early propenfity to collect natural curiofities, and engaged various captains and furgeons of fhips to bring home any thing they could find to enrich his growing mufeum. He fupplied fuch perfons with printed lifts, and indications, of what was beft worth their notice, as well as with inftructions for preferving what they might collect. Nor was he lefs induftrious 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 fcarcely explored. His fubfequent publications fhew that he was in the daily habit of obferving the minuteft productions of the animal as well as vegetable kingdoms, in the neighbourhood of London. His mufeum and his reputation gradually increafed, infomuch that Sir Hans Sloane, fome time before Petiver's death, offered him four thoufand pounds for the former, and afterwards purchafed it; while the latter is evinced by his being elected a Fellow of the Royal Society, and ftill more by his being acknowledged as the liberal and intelligent correfpondent and affiftant 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 Philofophical Tranfactions, between the years 1697 and 1717. Thefe are moftly accounts of various productions of the three kingdoms of nature, fent to the author from diftant countries. One of his treatifes however has a higher aim, and entitles him to rank as a philofophical naturalift. This occurs in vol. xxi. N° 255, under the denomination of "Some attempts made to prove, that herbs of the fame make, or clafs, for the generality, have the like vertue, and tendency to work the fame effects." The idea had indeed been fuggefted by Cæfalpinus, but it was firft exemplified by Petiver. Linnæus afterwards carried it further, nor can any reflecting perfon doubt of the foundnefs of the doctrine.

The firft publication of our author was a fmall octavo of 96 pages, with two plates, entitled *Mufei Petiveriani Centuriæ decem*; 1695—1703. This is more than a bare catalogue of his collection, as many of the articles are fcientifically defined, and accompanied with brief but intelligent remarks. Copious accounts of his correfpondents and benefactors are interfperfed. An invidious mention of his contemporary, and rival collector, Plukenet, occurs in p. 78, where that botanift is accufed of "rafh conjectures" and "falfe references," and of refufing to compare fome of Petiver's fpecimens with his own, for the purpofe of afcertaining fynonyms. Thefe authors were always at variance; for though they now and then fpeak of each other with civility, they much more frequently lay afide all decorum in their criticifms. Plukenet in his *Mantiffa* (fee Plukenet) handles Petiver very roughly; nor was the latter at all behind-hand in abufe. This does not indeed appear by the generality of his publications; but we have feen in the collections of Tournefort and Vaillant at Paris, various tickets, whether manufcript or printed we cannot pofitively fay, attached to a number of dried fpecimens, in which the fubject of our prefent article difplays a malignity and coarfenefs of criticifm, directly calculated to defeat its own defign, and of which we have fcarcely ever met with another inftance.

Petiver publifhed, in 1702, the 1ft and 2d Decades of his *Gazophylacium Naturæ et Artis*, the plates of which are in folio, the letter-prefs 32 pages in 8vo. Thefe were followed by three more Decades in 1704, with 48 pages of letter-prefs; and "A Claffical and Topical Catalogue" of the whole work was fubjoined, in 14 pages more. The 50 plates, which compofe thefe five Decades, contain a great number of objects of natural hiftory, difperfed without any order, many of them very imperfect, efpecially the fpecimens of plants. In turning over thefe engravings, it is impoffible not to recollect Shakfpear's defcription of the Mantuan apothecary:

> " —— in his needy fhop a tortoife hung,
> An alligator ftuff'd, and other fkins
> Of ill-fhap'd fifhes;" &c.

The infects are better than the reft, but of thefe the moft famous is an impofture. The *Papilio*, figured in t. 10. f. 6, which Linnæus has named *Ecclipfis*, and defcribed from this figure alone, was found, on the infpection of the original fpecimen by Mr. Jones, to be no other than *P. Rhamni*, which, being artificially painted, impofed on our author. The late Dr. Grey indignantly ftamped the fpecimen to pieces.

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

It would be impoffible as well as ufelefs to particularize the publication of every one of Petiver's lifts and catalogues. They were all, as far as could be collected, republifhed in two vols. folio, under the title of *Jacobi Petiveri Opera*, by John Millan in 1767, price plain fix guineas; or with the infects coloured, which is the beft, feven guineas; and with the whole coloured, which muft chiefly have been done from imagination, twenty guineas.

The firft volume confifts of the *Gazophylacium* extended to 156 plates, with explanations of all but the laft, which contains 37 fhells copied from Bonanni. A great part of the laft fifty of thefe plates, at leaft, are compilations from printed works, fuch as thofe of Plumier, Pona, Merian, and others, whofe figures certainly gain nothing in being copied and diminifhed by Petiver. Some of the plates, however, are taken from original drawings. The moft extraordinary circumftance is his defcending to copy his rival Plukenet, as in t. 106, f. 10 and 11, and elfewhere. The reft of this volume is made up of 22 plates of Amboyna fhells 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. Tranf. n. 255, is judicioufly introduced into the letter-prefs of this volume; as well as an illuftration of Ray's fyftem, as far as regards Englifh plants.

The fecond volume, defigned to have commenced with the above-mentioned rudiments of Botany, is particularly eftimable, as containing 72 plates of Englifh Plants, with 12 plants in each plate, arranged and named according to the 1ft and 2d editions of Ray's *Synopfis*. This performance, though incomplete, as it ends with the *Cufcuta*, R. Syn. ed. 2. 282, the laft of the herbaceous plants, is of great importance in many cafes. The figures fhew, with tolerable accuracy, what was known of Ray's plants by his contemporaries, and have proved of ufe in fome difficult queftions, as appears by the *Flora Britannica;* though indeed few of them are done from original drawings, and fome are copied from books erroneoufly cited by Ray himfelf, as the *Hieracium*, t. 13. f. 6, and the *Scilla*, t. 67. f. 5. Next follow four plates of ufeful Peruvian plants, not ill copied from Feuillée; and two of rare medicinal ones, chiefly from Pomet. Haller, who had no complete fet of Petiver's works, fays he remembers to have feen with difguft his very faulty reprefentation of the plant yielding the Peruvian bark. Nothing certainly can be much worfe than this figure, which occurs twice; yet we can perceive that it was taken from one of the large downy-leaved fpecies of *Cinchona*, and not from what Haller had elfewhere feen reprefented; fo that it throws fome light on the obfcure hiftory of the valuable drug in queftion. It muft alfo be recollected, that Petiver publifhed thefe plates folely for the purpofe of obtaining better information. They were intended to be fent abroad, to affift travellers in their enquiries, nor had he any thing better within his reach. Next to thefe plates follow five of marine plants or animals, and Italian graffes, copied from Boccone, Barrelier, &c.; and two of Egyptian plants from Profper Alpinus. Copies of Plumier's *Filices*, with fome *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 fubjoined. Six very ufeful ones of Englifh *Papiliones* conclude the engravings of this volume. They are accompanied by printed catalogues of explanations, and various other papers, all, for the moft part, the original impreffions, which appear to have lain dormant on the bookfeller's hands, till this republication of the whole was contrived. The purchafer fhould, by collating his copy with fome authentic one, take care that it is complete. The *Concordia Graminum, Mufcorum*, &c., a work often cited by Englifh writers, is one of the moft valuable things in this collection. Our copy has but 12 pages, and ends with n. 375, being evidently imperfect; yet we have never feen more. The *Botanicum Anglicum; Hortus Siccus Chirurgicus* and *Pharmaceuticus*, confift of tickets, intended to be feparately applied to dried fpecimens, for fale, like fome publications of Ehrhart and Dickfon. To them are annexed labels for fix different noftrums, fold, as we prefume, by our author; thefe are the Indian Purge, Ambretta, Purging Marmalade, Golden Aqua Mirabilis, Purl Royal or Elixir Regale, and Syrup of Manna, or the Cordial Purge. Thefe favour of quackery, and account for the flourifhing ftate of Petiver's finances; while they perhaps may partly explain the caufe of Plukenet's difdainful enmity, as the latter was a learned and regular, but unfuccefsful, phyfician.

It does not appear that Petiver had any family, or that he was ever married. He died at his houfe in Alderfgate ftreet, on the 20th of April 1718, but of his age we find no mention. His body lay in ftate at Cooke Hall, and was probably interred at his parifh church, to the charity-fchool attached to which he left 50 pounds, and five guineas to Dr. Brady for preaching his funeral fermon. His pall was fupported by fir Hans Sloane, Dr. Levit, phyfician to the Charter-houfe, and four other phyficians. 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 fir Hans Sloane, now make a part of the Britifh Mufeum. They are frequently reforted to for the fake of afcertaining obfcure fynonyms, his plates being fo generally cited by Linnæus, and in many inftances fo infufficient to exprefs the precife 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 Englifh naturalift; fee the laft article. Plum. Gen. 50. t. 39. Swartz. Obf. 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. Juff. 84. Lamarck Illuftr. t. 272. Gærtn. t. 75. Clafs and order, *Heptandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of four linear, obtufe, equal, erect, permanent leaves. *Cor.* none, "except the calyx, being coloured, fhould be fo denominated." *Linn.* *Stam.* Filaments fix to eight, awl-fhaped, erect, unequal, moftly fhorter than the calyx; anthers linear, cloven. *Pift.* Germen oblong, compreffed, emarginate; ftyle very fhort, lateral, received into a longitudinal furrow of the germen; ftigma pencil-fhaped. *Peric.* none. *Seed* oblong, compreffed, dilated upwards, emarginate, furnifhed at each fide with two rigid, acute, reflexed briftles.

Eff. Ch. Calyx of four leaves, inferior. Corolla none. Style lateral. Stigma pencil-fhaped. Seed one, with four reflexed briftles.

Obf. Dr. Swartz has materially corrected the Linnæan character, in which the briftles of the feed were taken for ftyles; and finding the number of ftamens, though variable from fix to eight, very commonly feven, he has transferred this genus from *Hexandria Tetragynia* to *Heptandria Monogynia*.

1. P. *alliacea*. Guinea-hen Weed. Linn. Sp. Pl. 486. Stockh. Tranf. for 1744. 287. t. 7. Trew Ehret. 33. t. 67. (P. folani foliis, loculis fpinofis; Plum. Ic. 213. t. 219.)—Common about hedges and dry bufhy places in the Weft Indies. *Swartz*. The *root* is perennial. *Stem* fomewhat fhrubby, erect, alternately branched, about two feet high, roundifh, ftriated, downy, leafy. *Leaves* alternate, on fhort ftalks, elliptic-oblong, three inches in length, generally fmooth, with one rib and feveral tranfverfe veins; their margin either quite entire, or with a few fhallow blunt ferratures. *Stipulas* a pair of obtufe, fometimes ftalked, glands, at the bafe of the footftalks. *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 kidnies, 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 ſquamæ 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 ſhe 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 Kerin-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 ſea-port 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 doctorial 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 Abbè 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 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 *Memoires* 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 Vaucluse 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 ceremonials. 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,

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 Piſa 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 de 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 difcovery of the valuable Familiar Epiftles of that great man. Although his reading was chiefly confined to Latin authors, yet he extended his fearch to the Greek, and his literary reputation procured him from Conftantinople the prefent of a copy of Homer's poems. He had collected, with great care and expence, a large library, which in 1362 he prefented to the republic of Venice. After this he probably collected another; and Petrarch himfelf alludes to a collection which he had made of imperial medals in gold and filver, and which he offered to the emperor Charles IV. This is the earlieft mention of a treafure of that kind. The efteem in which this great man was held by his countrymen, was fhewn by the vaft number of commentators on his works, efpecially his Italian poems, which appeared from his death to modern times. The editions of his poems have been almoft innumerable. The earlieft was that of Venice in 1470, and the beft is faid to be that alfo of Venice, in two volumes 4to. 1756.

PETRARIA, in *Ancient Writers*, is fometimes taken for a quarry of ftone.

In other places petraria is ufed for a fort of engine of war, with which ftones were caft on the enemy; chiefly ufed in fieges, &c.

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

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

PETRE OIL, Πετρέλαιον, the fame as petroleum. See PETROL.

PETRE, *Sir* WILLIAM, in *Biography*, an eminent ftatefman, 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 whofe means he was employed in ftate affairs, and was in the commiffion for vifiting the monafteries. He obtained a large fhare of the church lands in the reign of Mary, to whom he had been counfellor, as he had been to her father and brother. He found means to ingratiate himfelf with queen Elizabeth, who appointed him one of her fecretaries of ftate, and member of the privy council. He was a great benefactor to Exeter and All-Souls' colleges, and founded feveral charitable inftitutions. He died in 1571; leaving very large eftates in Effex, which are now in the poffeffion of his defcendant, the prefent lord Petre.

PETREA, in *Botany*, was fo called by Houftoun, in honour of Robert James, lord Petre, who was born in 1710, and died of the fmall-pox in 1742. Peter Collinfon, in a letter to Linnæus, fpeaks of this nobleman as "the worthieft of men, whofe death was the greateft lofs that botany or gardening ever felt in this ifland." After defcribing his lordfhip's fpacious ftoves, and many of their valuable contents, amongft which numerous tropical trees had attained a degree of growth not to be feen in any other garden; as well as the nurferies for more hardy kinds, in which, at the time of lord Petre's death, were 219,925 individuals, moftly exotic; the writer concludes thus. "As this young nobleman was the greateft man in our tafte that this age produced, I thought it might not be unacceptable to give you fome account of the greatnefs of his genius. But his fkill in all liberal arts, particularly architecture, ftatuary, planning and defigning, planting and embellifhing his large park and gardens, exceeds my talent to fet forth." Mr. Collinfon was feized with his laft illnefs when on a vifit to the fon and worthy fucceffor of this nobleman in 1768. (See COLLINSON.)—Reliq. Houft. 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 Illuftr. t. 539. Gærtn. t. 177.—Clafs and order, *Didynamia Angiofpermia*. Nat. Ord. *Perfonatæ*, Linn. *Vitices*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-fhaped; its limb very large, in five deep, fpreading, oblong, obtufe, coloured, veiny, permanent fegments; the mouth clofed with five double abrupt fcales. *Cor.* of one petal, wheel-fhaped, unequal, fmaller than the calyx; tube very fhort; limb flat, in five rounded, fpreading fegments, the middle one largeft, and differently coloured. *Linn. MSS. Stam.* Filaments four, concealed within the tube, afcending, two of them fhorteft; anthers oval, erect. *Pift.* Germen obovate; ftyle fimple, the length of the ftamens; ftigma obtufe. *Peric.* Capfule obovate, flat at the top, concealed in the hollow of the calyx, of two cells. *Seeds* folitary, obovate, convex at the outfide, flat at the inner, attached to the bafe of each cell.

Eff. Ch. Calyx five-cleft, very large, coloured. Corolla wheel-fhaped, much fmaller. Capfule of two cells, in the bottom of the calyx. Seeds folitary.

1. P. *volubilis*. Climbing Blue Petrea. Linn. Sp. Pl. 873. Jacq. Amer. 180. t. 114. Curt. Mag. t. 628.—Leaves and clufters fimple.—Native of Vera Cruz, the Caracaos, and Martinique, where it blooms in November. Houftoun is faid to have fent it to Chelfea garden before the year 1733; but we agree with Dr. Sims, that the flowers were probably never feen in England, till they appeared in Mr. Woodford's late collection at Vauxhall, in Auguft 1802. It is obferved to thrive beft in rich loam, and a warm moift air, being advantageoufly trained over a trellis, where, if luxuriant, it muft make a beautiful appearance, being one of the moft elegant plants that can be imagined. The *ftem* is fhrubby, twining round every thing in its way, and afcending, without tendrils, to the tops of trees twenty feet high; its *branches* round, roughifh, flender, and leafy. *Leaves* oppofite, on fhort, thick, rather filky *ftalks*, elliptic-oblong, entire, varying in length from two to five inches, and in breadth from an inch to an inch and a half, furnifhed with one rib and many tranfverfe veins producing innumerable reticulations; rough on both fides to the touch, but not to the fight; fhining above; opaque and paler beneath. *Clufters* about the ends of the branches, a foot or more in length, elegantly pendulous, fimple, of many *flowers* turned one way. The *ftalks*, minute *bracteas*, and tube of the *calyx*, are rough with filky brown hairs. Limb of the *calyx* fmooth, light violet; its fegments an inch long when fully grown. *Corolla* of the fame colour, variegated with dark violet and white; fometimes it is faid to be wholly white, the *calyx* remaining of its proper hue. The *piftil* is thought to be occafionally imperfect.—A fpecimen with lanceolate *leaves*, five or fix inches long, gathered at the Caracaos along with the common kind, by Dr. Mærter, feems to us a mere variety, but the following is certainly a new and very diftinct fpecies.

2. P. *multiflora*. Panicled Petrea. (Funis quadrifidus; Rumph. Amboin. v. 5. 4. t. 3.)—Leaves and clufters twice compound.—Gathered in the ifland of Honimoa, or Honimao, by the late Mr. Chriftopher Smith, from whom we have an unnamed fpecimen. The *ftem* is woody, climbing, branched, quadrangular, with four furrows; downy when young. *Leaves* oppofite, on longifh fmooth *ftalks*, twice ternate; *leaflets* on fhortifh ftalks, ovate, undulated, entire, fmooth on both fides; fhining above; rather opaque and fomewhat paler beneath, with a rib and veins like the former fpecies; the terminal ones one and a half inch long, the reft much fmaller. *Clufters* axillary, twelve or eighteen inches

inches long, twice compound, downy, compofed of innumerable, fomewhat whorled, *flowers*, of whofe colour we can determine nothing from the dried fpecimen, but they appear to agree in that refpect with the foregoing. Their fize is rather fmaller. The fegments of the *calyx* are more contracted at the bafe, and its tube has ten ftrong ribs; whereas the other fpecies has five principal ribs, far lefs confpicuous, and a number of minute crowded intermediate ones.

Such is our plant, which accords precifely with the figure of Rumphius; but his defcription is lefs applicable. What he afferts, of the main ftems fplitting into four parts, and difcharging a bitter limpid water, we have no means of verifying. He fays the *flowers* are yellow, or whitifh, with fix minute *petals* and as many *ftamens*, having in the middle a cloven *piftil*, like a lizard's tongue. The *germen* is faid to turn black as it ripens; but of the nature of the *fruit* he gives no account.—Notwithftanding this defcription, his plate exhibits the *calyx* in five deep fegments, with others in an early ftate, exactly as in our fpecimen. There is no reprefentation of the *ftamens* or *piftil*. He defcribes the *leaflets* twice as large as we find them, and remarks that their ftalks, when old, become *clafpers*. The *ftems* are very tough and pliant, ferving for ropes. On the whole there feems little doubt of the plant of Rumphius being the fame with our's, nor, though we have often had his plate and defcription in contemplation, do we find any thing fo applicable to them as this *Petrea*.

Petrea, in *Gardening*, contains a plant of the climbing, exotic, fhrubby kind for the ftove, of which the fpecies cultivated is, the twining petrea (P. volubilis).

It has a variety with bright blue petals.

Method of Culture.—This is increafed by feeds, which muft be obtained from the places where the trees grow naturally, and be fown in pots plunged into a good hot-bed; and when the plants come up, they fhould be each planted in a feparate fmall 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 ftove, where they muft conftantly remain, and be treated like other plants of the fame country.

They afford ornament in ftove collections.

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

Petrel *Ifland*, in *Geography*, a fmall ifland in Dufky bay, near the coaft of New Zealand, N. of the harbour in Anchor ifland.

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

PETRI, Christiern, in *Biography*, was a learned Danifh divine, who flourifhed in the 16th century. It is not certain when he was born; but it appears he purfued his ftudies during feveral 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 alfo chancellor of that fee. After this he took a fecond journey to Paris, where he was entrufted with the care of editing "Danica Hiftoria, lib. xvi. Autore Saxone Grammatico," which made its appearance in the year 1514. He was in Denmark at the time Chriftiern 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 imprifoned, and his affairs became defperate, Petri took up his refidence 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 publifhed various works at Antwerp, in the Danifh language, from 1528 to 1531. Among others he publifhed, in 1529, "The New Teftament tranflated into Danifh." Nor was he lefs 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 Chriftiern III., who, notwithftanding the change in his religious faith, permitted him to enjoy to the laft the emoluments of his canonry. He left behind him a number of works, chiefly on theological fubjects, and on the education of youth. Moreri.

Petri, or *Petieri*, in *Geography*, a town of Africa, on the Ivory coaft.

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

PETRIDIA, in *Natural Hiftory*, the name of a genus of foffils of the fcrupi kind, of a plain uniform ftructure, of no great variety of colours, and emulating the external form of pebbles.

Of this genus there are twelve known fpecies. Hill.

PETRIFACTIONS, are animals and vegetables, or their parts, changed into a foffile fubftance. In the Linnæan fyftem, by Gmelin, petrifactions make the fifth clafs 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,	Fifhes, or their parts.
Entomolithus,	Infects, or their parts.
Helmintholithus,	Worms, or their parts.
Phytolithus,	Vegetables, or their parts.

Before we treat of thefe genera, in the order in which they ftand, we fhall give a general outline of the fubject, as it is defcribed in Mr. William Martin's "Attempt to eftablifh a Knowledge of extraneous Foffils on fcientific Principles;" referring our readers to the work itfelf for the details, and alfo to his other work, entitled "Figures and Defcriptions of Petrifactions collected in Derbyfhire," &c.

Mr. Martin fays, that the natural bodies which conftitute our globe are either organized or unorganized: the firft includes animals and vegetables, the latter foffils.

Foffils are ufually diftinguifhed into *native* and *extraneous*. Native foffils, or minerals, are foffils deftitute of an organic form, exhibiting fuch a ftructure only as arifes from the appofition or continual addition of the particles of which they are compofed. Extraneous foffils, or *reliquiæ*, *relics*, are foffils that have the form or ftructure of animal or vegetable bodies. If it be objected, that thefe bodies poffefs an organic form; it may be replied, that they may neverthelefs be regarded as unorganized, fince that form is no longer inftrumental to growth, motion, or the propagation of the fpecies.

Extraneous foffils comprehend two forts of animal and vegetable relics, *viz.* the *confervata* and *petrifacta*: the *former* are the remains of animals or vegetables, preferved 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 foffils are *general* or *peculiar*. The general phenomena are fuch as are common

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

Extraneous foffils have been found in every quarter of the known world: they are met with embodied in the hard rocks and ftones; but they are not equally common to all rocks and mineral fubftances, inafmuch as granite, fienite, gneifs, micaceous fchiftus, and fome fpecies of limeftone, never contain organic remains; and thofe rocks, in which extraneous foffils are never found, conftitute the higheft mountains. The parts of organized bodies moft common in a foffil ftate, are thofe which are known longeft to refift putrefaction and decay: thefe are wood, and the leaves and ftems of certain plants; fhells, bones, corals, and other hard parts of animals. Very tender and fucculent bodies, whether animal or vegetable, are rarely found in a foffilized ftate. Shells, and various exuviæ of the vermes clafs, are moft commonly found in the ftrata immediately repofing on, or following tracts of granite, gneifs, and the other rocks, in which extraneous foffils are never imbedded. Strata containing the remains of fifh and marine fhells, &c. mixed fometimes with the parts of amphibious animals and plants; or thofe in which vegetables only occur, generally fucceed, or reft on the tracts, in which the exuviæ of vermes alone are found. The remains of land-animals, particularly of the clafs mammalia, rarely occur in regular ftrata. Animal reliquiæ, particularly the marine, are moft common in calcareous ftrata; whereas vegetable reliquiæ frequently occupy argillaceous beds, efpecially thofe productive of coal.

The phenomena *peculiar* to petrifactions are as follow: petrifactions are generally confined to mountains, or other elevated fituations, where the more ancient of the fecondary ftrata are prefented to our view; they are ufually incorporated in the earths and ftones, of which thefe ftrata confift, forming, as it were, a part in the original fabric of the globe; no particular petrifaction is confined wholly to one kind, or fpecies of ftones; the fubftance, which forms the petrifaction, is frequently of the fame nature as the furrounding rock; when it differs, it is found to confift of mineral matter, with a finer texture or grain than that of the matrix. A petrifaction often confifts of feveral diftinct minerals: thus chalk and flint often form feparate parts of an *echinite;* and in Derbyfhire, chert, calcareous fpar, bitumen, and quartz, are frequently incorporated together in the fame fhell.

The common conftituent fubftances of petrifactions are earths and ftones of the calcareous, argillaceous, or filiceous clafs. Animal petrifactions are lefs common, in proportion to the degree of locomotive power which the originals poffeffed.

Shells and zoophytes abound in petrifactions: fifh and infects without wings are more rare. The petrified remains of mammalia are ftill lefs frequent; and winged infects and birds have perhaps never been found in this ftate.

The vegetable petrifactions moft common are fuch as bear the form of plants, growing in moift and boggy grounds. The petrifactions hitherto recognized, however, as bearing the forms of plants or animals, known to exift at prefent, are very few, compared with thofe, the living fpecies of which have not been difcovered.

A petrifaction feldom, if ever, exhibits a complete change, or fubftitution of mineral for organic matter; more or lefs of the original animal or vegetable fubftance being generally prefent, and difcoverable either in the external or internal parts of the foffil. In petrified fhells and corals, the original calcareous matter is frequently feen covering the furface, or remaining in fmall portions in the internal parts, and is readily diftinguifhed, although the fubftituted mineral, forming the principal portion of the foffil, be alfo calcareous.

The petrifying procefs is carried on, in fome waters, at this day, of which we have a ftriking inftance at Matlock; but it appears to be confined to the formation of petrified wood, or woodftone. Petrifactions rarely exift in veins.

The phenomena peculiar to the Confervata are as follow: they are for the moft part found in low or flat tracts, where the ftrata are evidently of modern formation. They are alfo found in the caves and fiffures which pervade the more ancient mountain ftrata, but are rarely incorporated in the ftone, or other fubftance of which fuch ftrata confift: they occur alfo in the beds of rivers, and in moft fituations where mineral or other matter is daily accumulating: they are found in all ftates, 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 fome other natural procefs incident to thefe bodies. The animal confervata moft common are fuch remains as are moft rare in the petrified ftate, fuch as the bones of mammalia and fifh, and fhells of the fame genera as thofe found in the neighbouring feas. The moft common vegetable confervata are wood, and other parts of trees: they are more frequently referrible to plants and animals now exifting than the petrificata, and they are not uncommon in mineral veins.

The origin of extraneous foffils is fhewn by the attendant phenomena. The confervata cannot be faid to originate from, fince they really are the remains of, plants and animals, introduced, by different proceffes of nature, into the mineral kingdom: but petrifacta owe their form to organized bodies; they derive their fubftance 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 fucceffion of ages; but with refpect to thofe from which the petrifacta derive their form, chiefly while the fuperficial parts of the globe were in their primeval liquid ftate, and the ocean far above its prefent level. He therefore confiders the *periods at which*, and the *agency by which*, the depofition of organic bodies has been effected in the mineral regions.

The periods of introduction, he fays, may be reduced to *three:* the *firft* commencing with the exiftence of marine animals, and ending with the formation of plants. During this period, the moft ancient of the fecondary tracts were formed, and the remains of the zoophytes and fhell-fifh, the only animals apparently then exifting, enveloped in the fubftance of the ftrata.

The *fecond,* commencing with the formation of plants, and an increafe of thofe animals which are peculiar to the ocean; ending with the time at which the ocean, after a gradual fubfidence through feveral ages, firft attained its prefent level. During this period our author fuppofed the lefs ancient and fome modern tracts were formed, and the remains of plants and fifh, as well as fhells, and other relics of the vermes, added to the foffil world; and he adds, "Towards the middle of this period, it is probable the mammalia and other land animals were either created, or confiderably increafed in number, as their remains are found, though very fparingly, in fome modern ftrata, fuppofed to have been depofited juft before the fea had finally retired to its prefent limits."

The *third* period commences with the reduction of the 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 petrifactions, 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 ὀρύσσω, *to dig*, and λόγος, *a diſcourſe*, or *treatiſe*, it does not neceſſarily lead the reader to *petrifactions*, 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 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.

SIMIÆ; 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 reliquiæ 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, ſup-

poſed

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 petrifactions 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 Maestricht in Brabant; in Malta; in Leipsic, 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 Elston 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 Wirtemburg 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.

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Ichthyolithus. The body or parts of a fish changed into a fossile 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 Worcestershire. 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.

Helminthólithus. 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 Maestricht.

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 Chassois.

6. A. aurantiaca.

7. A.

7. A. equeftris, in the fandftones in Saxony.

8. A. ophiara, in Italy and Germany, in marble, and with folitary rays in a yellow fhining fandftone.

9. A. pectinata, at Pappenheim, in flaty limeftone.

10. A. multiradiata, near Stutgard, with the rays aggregate.

11. A. Caput Medufæ, found generally in mountains of chalk, limeftone or fandftone, fometimes the mere impreffions are what are left.

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

Section A.

1. Echinus efculentus, found in England, Saxony, Germany, &c. in chalk, lime, marle, 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 limeftone near the falt-pits in Upper Auftria.

5. E. ovarius, in England, France, and Switzerland, in chalk and lime-ftone hills.

6. E. diadema, in the mountain Raudberg in Switzerland, and at Rottenburg in Weftphalia.

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 limeftone mountain Legerburg, and near Baffeville 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. afterizans, found filled with cretaceous matter, the fhell itfelf being converted into fpar.

13. E. teffellatus, in the chalk-hills of Bafil.

14. E. botryoides.

15. E. finuatus, in the chalk and limeftone hills of England.

16. E. femiglobofus, in the calcareous mountains of Silefia and Switzerland.

17. E. quinquelabiatus, in the calcareous mountains of Switzerland.

18. E. conoideus.

19. E. albo-galerus, and the next, are found in the chalk-hills of England, and in marble in Lower Saxony.

20. E. depreffus.

21. E. vulgaris, found abundantly in calcareous hills, in England, Germany, and Silefia.

22. E. quadrifafciatus.

23. E. fexfafciatus.

24. E. fubuculus.

25. E. fcutatus, in the chalk-hills of England and Denmark.

26. E. ovatus.

27. E. puftulofus, in the chalk-hills of England, and in the marble rocks of Germany.

28. E. quadriradiatus, in the coarfe marble of Holftein.

29. E. minor.

30. E. dubius.

31. E. rofaceus, 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 Weftphalia, and in Languedoc.

37. E. placentæ, in Malta.

38. E. cor-anguinum, in the chalk-hills of England, and coarfe marble rocks of Germany.

39. E. lacunofus.

40. E. radiatus.

41. E. complanatus, in the limeftone 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. fpatagus, found in great abundance in the chalk-hills of England, near Maeftricht, 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 fection includes fpecimens, 1. Of the fpines, denominated Jew's-ftone, of which there are nine varieties that do not require particular notice; 2. Of the knobs; 3. Of the feparate compartments of the fhell; and 4. Of the teeth of the fhell, which laft are found abundantly in Great Britain, and various other parts of the globe; the fpines are fhorter or longer, fmooth, ftriated or ftudded.

Chiton, found near Creazzo, in the Venetian territories.

Lepadis, or Acorn-fhell. 1. L. balanus is found in Piedmont, in fandftone; in Malta, Languedoc, and near Drefden in Saxony. 2. L. balanoides. 3. L. tintinnabulum. 4. L. mitella: thefe three laft are all found in Piedmont, either in fandftone or marble. Mr. Parkinfon fays, although feveral fpecies of the Lepas have been found in a mineralized ftate, they are by no means frequent foffils. The L. anferifera is faid to have been found foffil, and fo has the L. diadema; thefe muft, however, be exceedingly rare foffils.

Pholadis. The Pholas in a foffil ftate is by no means common; but the P. crifpata has been found among the Harwich foffils; others have been difcovered in Piedmont, generally imbedded in filica or limeftone.

Mya. This is found in a foffil ftate in England, Arabia, Belgium, Switzerland, Germany, France, and other parts of the continent. The Mya *pictorum* (which fee) is defcribed by Solander as exifting among our Hampfhire foffils; a foffil mya of three or four inches in length is found in the rocks near Bognor.

Solenites. The Solen in a foffil ftate is found in Arabia, Belgium, Switzerland, Germany, France, and other parts of the European continent. Remains of the S. filiqua, and of the S. enfis, have been found at Harwich; and a fmall foffil fhell, named by Solander S. ficus, has been found between Lymington and Chriftchurch.

Tellinites. The Tellina is found foffil in Glocefterfhire, Italy, Switzerland, Bohemia, Auftria, &c. in clay or limeftone. The varieties are, 1. T. lingua felis, in the limeftone mountains of Switzerland and Wirtemberg. 2. T. roftrata, at or near Ball in Wirtemberg, in calcareous earth. 3. T. donacina, near Herbipolis, in limeftone.

Bucardites. The Cardium, or cockle, found in a foffil ftate ſtate in the clay-pits at Richmond in Surry; at Sherborne in Glocelterſhire; 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. paphia is met with on the continent of America.

SPONDYLI. 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 Glocelterſhire and Oxfordſhire, and likewiſe in many parts of Germany and Switzerland.

OSTREÆ. The Oyſter, or ſcallop-ſhell, is found foſſil in different counties of England, as Glocelterſhire, 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. pleuronectes, found in various parts of Germany.
8. O. pallium, in Bohemia, Saxony, Switzerland, and Germany.
9. O. nodoſa, in Alſace.
10. O. puſio, 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 Ariſtorf, 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. terrebratula, 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 criſti-galli, found in Malta, Normandy, Switzerland, Germany. It is ſometimes very large, and generally marmoreous.

2. M. frons; found in Chriſtianſtadt in Sweden, in Belgium, Normandy, and Malta, in marble, ſand, or flint.

3. M. margaritiferus; this is found near Ariſtorf, 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 Ariſtorf 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 Lime 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, marle, ſwineſtone, 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.

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.

BUCCINI; 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 Wirtemburg.

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.

NERITITES. 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 Dentalium, 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 marle. Of the forty-two ſpecies characteriſed 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.

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 madrepores: ſuch are the M. ſimplex turbinata, and the M. ſimplex diſcoides of Waller and Geſner.

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 marle 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.

PHYTOLITHUS, the laſt genus of the claſs Petrifactions, 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 marle 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.

TRUNCI. 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, marle, 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 marle, 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 *ſilex* is formed the calcedoniſied, agatiſied, and jaſperized wood; and with the addition of alumine, &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 Guadaloupe, ſee the article RELIQUIÆ.

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 choak 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 *Petrkow*, 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.

PETROBRUSSIANS, 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 croſs 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 κάλλος, *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. *Siliquoſæ*, Linn. *Cruciferæ*, 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.

Eſſ. 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 πετρος, *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.)

514.)—Clafs and order, *Heptandria Monogynia*. Nat. Ord. *Hefperideæ*, Linn. *Rofaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, turbinate, five-cleft; its fegments ovate, acute, rigid, fpreading. *Cor.* Petals five, ovate, acute, unequal, fmaller than the teeth of the calyx, and alternate with them. *Stam.* Filaments fourteen, capillary, longer than the teeth of the calyx, and inferted into its rim within the petals, feven of them, all on one fide of the calyx barren; anthers feven only, roundifh, burfting at the inner fide. *Pift.* Germen in the bottom of the calyx, ovate, villous; ftyle cylindrical, incurved, villous, longer than the ftamens; ftigma capitate. *Peric.* Drupa large, ovate, compreffed, its flefh fibrous, of one cell. *Seed.* Nut ovate, compreffed, longitudinally furrowed, with unequal wrinkles and tubercles, of two cells, its fhell very hard and almoft ftony, not burfting; kernels folitary, oblong.

Eff. Ch. Calyx five-cleft. Petals five, inferted into the calyx. Seven of the ftamens 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 ftalks.—Gathered by Aublet in the woods of Guiana, forty miles from the fea-coaft, flowering in May, and bearing ripe fruit in Auguft, the nuts of which are fweet, and excellent eating. The *trunk* of the tree is twenty-four feet high, and two or three in diameter, crowned with many fpreading branches, which are clothed when young with rufty down. *Leaves* alternate, on thick downy *ftalks* 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, tranfverfe veins; their upper furface fmooth and fhining; the under white and finely cottony, with reticulated prominent veins. *Stipulas* in pairs, fheathing, lanceolate, concave, externally downy, above an inch long, deciduous. *Flowers* rather fmall, whitifh, numerous, in denfe, terminal, forked, downy and hairy *panicles*, with two or three large ovate *bracteas* at each fubdivifion. *Drupa* green, acid, four inches long, and three in its greateft diameter.

2. P. *campeftris*. Willd. n. 2. (Parinari campeftris; Aubl. Guian. v. 1. 517. t. 206.)—Leaves heart-fhaped, nearly feffile.—Native of the forefts of Guiana, in the quarter of Timoutou; as well as of the ifland of Mauritius, in the quarter of Moka. *Aubl.* Differs from the laft in the broader and heart-fhaped figure of the *leaves*, as well as in the very fhort *footftalks*, and much fmaller fize of the *fruit*, which is fcarcely an inch and half long, with very acute points and angles to the fhell of its nut, which is as hard as the former, and its kernels are likewife eatable. This fruit is known among the Creoles by the name of *Nefle*, or Medlar. Its flefh is pulpy and acid. Its feafon, as well as that of the flowers, is June. By Aublet's fpecimens of thefe plants, one would almoft fufpect them to be varieties, fo exactly do all their parts accord in texture and appearance. Their *fruits* indeed are very different in fize, and their *footftalks* in length.

Juffieu mentions two other fpecies, obferved by him amongft Adanfon's fpecimens from Senegal, called *Mampata* and *Neou*, whofe nuts however are ovate, and lefs furrowed or wreathed, their *ftamens* apparently fifteen, three oppofite to each fegment of the *calyx*. See MAMPATA.

PETROCOSSYPHUS, in *Ornithology*, a name given by fome authors to the bird more ufually called from its colour the *cæruleus*.

It lives among the rocks, in woody mountains, and fings very fweetly. It is a variety of the Lanius infauftus.

PETROJOANNITES, in *Ecclefiaftical Hiftory*, the followers of Peter John, or Peter Joannis, *i. e.* Peter the fon of John, who lived in the twelfth century; whofe 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 fenfe wherein the apoftles preached the gofpel; that the reafonable foul is not the form of man; that there is no grace infufed by baptifm; and that Jefus Chrift was pierced with a lance on the crofs before he expired.

PETROL, or PETROLEUM, in *Chemiftry*, a fluid fubftance, refembling in a high degree the effential oils from vegetables. It is of a brownifh-yellow colour, of a peculiar odour. Its fpecific gravity varies from .73 to .878. When expofed to a gentle heat for diftillation, the fluid which comes over has lefs colour, is much thinner, and has more fmell. In this ftate it is called naphtha. It burns with a white flame, and is employed in the vicinity of the Cafpian fea for lamps. The earths in thefe parts are fometimes fo faturated with it as to be rendered inflammable.

When it is expofed to the air, even that obtained by diftillation, it becomes thick and highly coloured, and puts on the form of bitumen. This no doubt is occafioned by the gradual diminution of its hydrogen, by the oxygen of the atmofphere.

It is foluble in alcohol and ether, and combines with the fixed and volatile oils. It is hence ufed to diffolve refinous bodies and bitumen, and might, in many cafes, anfwer the purpofes of oil of turpentine.

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

The more fluid petrolea, fays Dr. Lewis, have been diftinguifhed by the name of *naphtha;* and the thicker by thofe of *piffafphalthum* and *piffelæum*.

Thefe, according to all appearance, muft be the work of fubterraneous fires, which raife or fublime the more fubtile parts of certain bituminous matters that lie in their way.

Thefe parts, being condenfed into a liquor by the cold of the vaults of rocks, are there collected, and ooze thence through clefts and apertures, with which the difpofition of the ground furnifhes them.

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

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

Hitherto there has been little petrol found, except in hot countries. Olearius fays, he faw above thirty fprings of it near Scamachia, in Perfia. (See PERSIA.) There are alfo petrols in the fouthern provinces of France; but the beft are thofe in the duchy of Modena, firft difcovered by Ariofto, a phyfician, 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 difcharged into little bafons or refervoirs: the firft, as white, clear, and fluid as water, of a brifk penetrating fmell, and not difagreeable; the fecond of a bright yellow, lefs fluid, and of a lefs brifk fmell than the white; the third of a blackifh red, of thicker confiftence, and a fmell more approaching that of bitumen.

There are many varieties of thefe oils in regard to colour, fluidity, fubtility, and the pungency of their fmell, and tafte; the moft fluid are, in general, the moft fubtile and pungent. With us they are commonly fophifticated.

Mr.

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 hogſheads of petroleum.

PETROLEUM *Barbadenſe*, *Barbadoes tar*, a ſpecies of *bitumen*, for an account of which, ſee BITUMEN. Petroleum is a ſtimulating antiſpaſmodic and ſudorific; 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 ♏x to f℥ſs, 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° 24′. W. long. 80° 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 Chondropterigious, 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 πετρον, *a ſtone*, and μυζαν, *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 fiſtulous 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 ſemilunar and hard; the teeth ſerrate.

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 MURÆNA 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 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 pye 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 Bauſter, 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 Lampern: 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 lampern-colour olive, pale or white beneath; the ſecond dorſal fin has an angular outline; the tail is ſhaped like that of the lamprey or lampern; 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.

Argenteus; 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 rounded, 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 *Poitrinal.* 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 suspence 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 Verchouralsk. 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. *Aggregatæ*, 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. Bracteas 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 Krasnouphunik.

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, from 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 πετροσέλινον, 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 ὀρεοσέλινον 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 acceptation.

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.* silex, 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, *saltpetre.*

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 Cranium.

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 Konigingratz; 8 miles E.N.E. of Konigingratz.—Also, a town of Bohemia, in the circle of Moldau; 6 miles S. of Seltschan.

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 Onezſkoe lake; 132 miles N.E. of Peterſburg. N. lat. 61° 40′. E. long. 34° 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°. E. long. 76° 34′.—Alſo, a cape on the north coaſt of Ruſſia, in the Frozen ſea. N. lat. 75° 25′. E. long. 165° 14′.

PETSCHNECZA, a town of the duchy of Carinthia; 12 miles S.W. of Clagenfurt.

PETSKA, a town of Bohemia, in the circle of Koningingratz; 11 miles E.N.E. of Getſchin.

PETSKAU, a town of Bohemia, in the circle of Saatz; 22 miles E. of Eger. N. lat. 50° 4′. E. long. 12° 55′.

PETSMO, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 14′. E. long. 21° 33′.

PETTAL, a town of Hindooſtan, in Madura; 10 miles E. of Coilpetta.

PETTAPOLLY, a town of Hindooſtan, in the circar of Guntoor, ſituated on the coaſt of Bengal; 42 miles S.W. of Maſulipatam.

PETTAPOUR, a town of Hindooſtan, in the circar 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 manufactories are conſiderable; 13 miles E.S.E. of Marpurg. N. lat. 46° 34′. E. long. 15° 53′.

PETTEIA, Πεττεια, 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 πεττεια, *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 πεττεια, their game of cheſs; the muſical petteia being a ſort of combination and arrangement of ſounds, as cheſs is of pieces called πεττοι, 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.

PETTERSDORF, 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. 24° 37′. E. long. 44° 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 Independency 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 Rumſey, 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

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-Looe, in Cornwall; and in the next year he was impeached by sir Heisome 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 Rumsey. He was regarded as a person of great worth, as well as of extraordinary talents and acquirements. 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 has 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 Aeropolita, 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 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

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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 Landsdown, 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 Landsdown 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 Landsdown 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 Landsdown. 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 Landsdown, 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, guagers, 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*, *suitor*, or *wooer*, a little stickling 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

 soften,

foften, in fome degree, the laminæ, and to make them almoft ready to flow. In this ftate they are fufpended over the vapour of their pureft tutenag, or zinc, placed in a fubliming veffel over a brifk fire. The vapour thus penetrates the heated laminæ of the copper, fo as to remain fixed with it, and not to be eafily diffipated or calcined by the fucceeding fufion it has to undergo. The whole is fuffered to cool gradually, and is then found to be of a brighter colour, and of a clofer grain than when prepared in the European way. Lord Macartney's Embaffy, &c. by Sir G. Staunton, vol. ii.

PETUNTSE, or, as it is ufually called, *petunfe*, one of the two fubftances of which the porcelain ware of China is made. The other is named *kaolin*.

The petuntfe is fprinkled 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 fent to the places where it is to be wrought; it is of a hard texture, and of a fomewhat greenifh colour. M. Reaumur, of the Academy of Sciences of Paris, who was extremely induftrious in fearching into the nature of porcelain, obtained fome fpecimens of the petuntfe, both in its native ftate, and in form of the brick, which is given it after it is powdered and reduced to a pafte.

M. Reaumur found that the petuntfe was fo far from being an earth, as ufually fuppofed, that it was truly of the nature of the European flint or pebble, as he eftablifhes the character of that body: but to underftand this rightly, it is to be obferved, that this author makes the flints and pebbles a very large clafs of bodies, fome of which are more, fome lefs tranfparent; and that this petuntfe is of the nature of the coarfer, or lefs tranfparent kind, the furface of which, when broken, is not fo fmooth and polifhed as that of the ordinary flint. Some have fuppofed that this fubftance is a fpecies of gypfum, rather than of flint or talc. By fome experiments of Mr. Scheffer, in the Swedifh Tranfactions, for the year 1753, it appears to be a glittering, flaky, femitranfparent mafs, like the *lapis fpecularis*, of a light greenifh-grey colour, and remarkably heavy. It was not acted upon by acids, and in the fire it burft and fell in pieces, and calcined into a white powder, interfperfed with a red ferruginous matter. Calcined in contact with the fuel, it emitted ftrong fulphureous vapours, like the other gypfa, and became quite white, confiderably firm and coherent, and femitranfparent.

The great character of thefe ftones for the porcelain manufactures is, however, that they are very eafily vitrified without the affiftance of any falt, and without the immediate contact of the fire, the operation fucceeding in a crucible, which is not at all the cafe in regard to the European flints, they very difficultly melting alone in a crucible, and then only into a whitifh opaque glafs.

It being certain from hence, that one of the two ingredients of the china-ware is eafily vitrifiable, it follows, from the experiment of the whole mixture, or china-ware, not being reducible into a glafs in a large fire, that it is a compofition of a vitrifiable and a not vitrifiable (or at leaft not eafily vitrifiable) fubftance; and, confequently, that the kaolin is a fcarcely vitrifiable body, and that the refult of the action of fire on a mixture of thefe two is a femivitrification; which is what we call the china-ware.

If we, therefore, could, in Europe, provide the materials of China, or fuch as were like them, we might reafonably hope to fucceed; and this appears far from improbable. The petuntfe is eafily fupplied by many of our own earths, ftones, and fands, as nothing is required in it more than a property of running eafily into a white glafs. The kaolin feems moft to be refembled by our European tales. Mem. Acad. Par. 1727.

The petuntfe, according to Chaptal, is that fpecies of filex, known by the names of feldfpar, rhomboidal quartz, and fpathum fcintillans. It very frequently forms one of the principles of granite, and the cryftals which are found feparate, arife from the decompofition of this primitive rock. The texture of feldfpar is clofe, lamellated, and it is lefs hard than quartz. It fufes without addition into a whitifh glafs. The fpecific gravity of white feldfpar is 25.946: 100 parts of white feldfpar contain, according to Chaptal, about 67 filex, 14 alumine, 11 barytes, and 8 magnefia. See FELSPAR, KAOLIN, and PORCELAIN.

PETWORTH, in *Geography*, a market-town, in the hundred of Rotherbridge, rape of Arundel, and county of Suffex, is fituated on a fmall branch of the river Arun, 49 miles S.W. by S. from London. Its fcite is confidered very falubrious, and the houfes are well built, though the ftreets are irregular. The living is one of the richeft 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 ftone, and has a fquare tower; but there are no monuments worthy of notice, except two very ancient tombs, the one completely defaced, the other in a very dilapidated ftate. In the centre of the town is a handfome market-houfe of ftone, adorned at one end with a buft of William III. The lower part confifts of piazzas, with an open fpace for the market, over which is the room where the quarter-feffions are held. Clofe to the church-yard is a charity-fchool, for the education of twenty boys, and the fame number of girls, founded by the Rev. Mr. Taylor, who alfo left donations of twelve pounds a-year each to two clergymen's widows of the neighbourhood, and fix pounds each to two poor tradefmen, to affift them in bufinefs. The alms-houfes, founded by the duchefs of Somerfet, are built of brick, and adapted for the accommodation of twenty widows, each of whom has an allowance of twenty pounds a-year. Thompfon's hofpital, another benevolent inftitution of the fame kind, affords lodging for fix poor men, and as many women, who annually receive ten pounds each. At a fmall diftance fouth-eaft of the town is the bridewell for the county, a brick edifice, on Howard's plan.

Petworth was the refidence of Jofceline of Louvaine, the progenitor of the renowned Percies of Northumberland; and it was their family-feat till the extinction of the title, when it devolved by marriage to Charles, duke of Somerfet; from whom, alfo by marriage, the manor and manfion-houfe have been tranfmitted to the family of Egremont, the prefent poffeffors.

Petworth-houfe, the magnificent family-manfion of the earl of Egremont, is clofe to the town, the back front opening into the church-yard. It was erected on the fcite of the ancient houfe belonging to the duke of Somerfet. The front of freeftone, adorned with ftatues on the top, forms one unbroken range, having twenty-one windows in each ftory. The interior is elegant, and all the principal apartments are decorated with paintings, antique ftatues, and bufts, fome of which are of the firft excellence. Some of the rooms are noble, well contrived, and richly furnifhed, and the difpofitions of the fpecimens of art tafteful and judicious. The park is very extenfive, the wall being about twelve miles in circumference. In front of the manfion is a fheet of water, which has been formed at a vaft expence. It is fupplied by the fprings collected from the neighbouring hills. This park, which commands delightful views of the Downs of Surrey and Suffex, is well ftocked with deer and game.

game. There are alfo various breeds of cattle and fheep fattened in the park: befides the native breeds of the latter, the prefent earl has imported the Calmuck and Aftracan race, and likewife the fhawl goat of Thibet, from the fleece of which fome of the moft valuable manufactures of the Eaft Indies are produced.

The petty feffions are holden at Petworth. The market is on Wednefday, and there is an annual fair. By the cenfus of 1811, the houfes amounted in number to 453, and the inhabitants to 2459. Beauties of England, vol. xiv. Carlifle's Topographical Dictionary, vol. ii.

PETZENKIRCHEN, a town of Auftria; 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 Diofcorides, and the plants with which he ranges it, fomething of the umbelliferous order; but what precife fpecies, we find little to affift us in determining; neither has Dr. Sibthorp formed any decided opinion refpecting this point. The *Peucedanum officinale*, which this learned traveller gathered on the fea-coaft of Laconia, is full as likely as any thing elfe to be the ancient πευκεδανος, or, as fome have it, πευκεδανον. Concerning the derivation of the name, etymologifts are not agreed; but the moft probable feems to be from πευκη, *a Fir*, or *Pitch-tree*, which its leaves refemble, and δανος, *dry*, or *burning*, in allufion 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. Juff. 223. Tourn. t. 169. Gærtn. t. 21. — Clafs and order, *Pentandria Digynia*. Nat. Ord. *Umbelliferæ*.

Gen. Ch. *General umbel* of numerous, very long and flender rays; *partial* fpreading. *General involucrum* of many, fmall, linear, reflexed leaves; *partial* fmaller. *Perianth* of five minute teeth. *Cor. Univerfal* uniform; flowers of the difk abortive; *partial* of five equal, oblong, incurved, entire petals. *Stam.* Filaments five, capillary; anthers fimple. *Pift.* Germen inferior, oblong; ftyles two, fmall; ftigmas obtufe. *Peric.* Fruit ovate, furrounded with a wing, ftriated at each fide, feparable into two parts. *Seeds* two, ovate-oblong, compreffed, moft convex outwardly, marked with three elevated lines; furrounded by a broad, membranous, undivided border; emarginate at the fummit.

Eff. Ch. Fruit ovate, ftriated at each fide, encompaffed with a wing. Calyx of five teeth. Involucrum very fhort. Flowers of the difk 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; fegments linear, undivided.—Native of falt marfhes and ditches on the fea-coaft of the fouth of Europe; very rare in England, and chiefly found below Feverfham and Whitftable in Kent, flowering from July to September. The whole plant is fmooth, and when bruifed emits a ftrong fulphureous fmell, efpecially the *root*, which is perennial, tap-fhaped, very refinous and fœtid, reported to be ufeful in coughs, obftructions of the vifcera, and nervous diforders. Thefe virtues feem to have been handed down from Diofcorides. *Stem* nearly a yard high, erect, round, ftriated, branched, leafy, tough. *Leaves* narrow and rigid, forming a copious *coma*, or tuft, at the root, as Diofcorides fays of his πευκεδανος; each is divided five or fix times fucceffively, into three deep divifions, the ultimate fegments flattifh, linear, acute, entire. *Umbels* large, rather concave, pale yellow, of innumerable flowers. *Fruit* tawny, broadly elliptical, flat.

2. P. *alpeftre*. Alpine Sulphur-wort. Linn. Sp. Pl. 353. (Peucedanum; Riv. Pentap. Irr. t. 11. Ger. Em. 1054?)—Leaves twice or thrice deeply three-cleft; fegments linear, pinnatifid.—Native of Germany. The authentic Linnæan fpecimen is marked *P. germanicum*, and feems to have been obtained from fome Dutch herbarium or garden. On revifing the fynonyms of the firft fpecies, we have no fcruple in removing fome of them to this; efpecially that of Rivinus, whofe plate accords with this fpecies, and not with the former, in the divifions of its *leaves*, as well as in the fize and whole afpect of the plant. This fynonym therefore ought to be ftruck out of Prodr. Fl. Græc., and a reference to Engl. Bot. t. 1767, fubftituted in its ftead. A correction of Linn. Sp. Pl. as well as of Willdenow and Aiton, is alfo neceffary; *P. germanicum* being no other than *P. alpeftre*; and the large fuppofed variety called *italicum*, is the very identical *officinale* itfelf, above defcribed, anfwering to the Linnæan character and authentic fpecimen. *P. alpeftre* is a much fmaller plant than *officinale*, and effentially characterized by the ultimate divifions of its *leaves* being pinnatifid, and fomewhat decurrent, while the general divifions are fewer. The *umbel* is very much fmaller, of fewer but ftouter rays. *Seed* with a broader and pale border.

We have fome fcruple refpecting Gerarde's fynonym. His firft figure may probably be only a fmaller reprefentation of the *officinale*, with which the ftructure of its leaves agrees.

3. P. *capillaceum*. Capillary Cape Sulphur-wort. Thunb. Prodr. 50. Willd. n. 3. — "Leaves doubly pinnatifid; fegments 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; fegments lanceolate, bordered, oppofite or alternate."—From the fame country.

5. P. *fibiricum*. Siberian Sulphur-wort. Willd. n. 5.—"Leaves more than twice compound; leaflets linear, acute. Firft umbels feffile."—Native of Siberia.—*Leaves* fupradecompofite; their leaflets long, linear, acute, running down into the partial footftalk; the lower ftem-leaves furnifhed at the bafe with an ample fheath. Firft *umbel* feffile in the fork of the ftem; the reft ftalked. General *involucrum* wanting; partial ones fetaceous and very fhort. *Petals* inflexed. *Styles* permanent, divaricated. Ripe *feeds* not feen by Willdenow, who referred this plant to *Peucedanum* by its habit. We have a fpecimen of a plant from Pallas, who found it in dry fituations about the Wolga frequent, which may poffibly be the fame with what Willdenow defcribed. In ours indeed there is no feffile *umbel*, but the inflorefcence is fo irregular, fome *umbels* being proliferous juft below their bafe, that, as the other characters agree with tolerable exactnefs, we feel little uncertainty on the fubject. Pallas fays Cuffon meant to call his plant *P. anagymnodes*. Its radical *leaves* are defcribed as four times ternate. There is a minute roughnefs on the foliage of the fpecimen.

6. P. *japonicum*. Japanefe Sulphur-wort. Thunb. Jap. 117. Willd. n. 6. (San bofu; Kæmpf. Amoen. Exot. 825.)—"Leaves five times deeply three-cleft; fegments three-cleft, wedge-fhaped."—Native of the fea-coafts of Japan, flowering in September and October. Whole *plant* fmooth. *Stem* fcarcely a foot high, as thick as a goofe-quill, erect, branched, zigzag. *Leaves* with a broad, ftriated, fheathing bafe to the footftalk. *Seeds* ovate, furrowed, with a flight border. *Thunb.*

7. P.

7. P. *Silaus*. Meadow Sulphur-wort. Linn. Sp. Pl. 354. Engl. Bot. t. 2142. Mart. Ruft. t. 128. Jacq. Auftr. t. 15.—Leaflets pinnatifid; their fegments oppofite, decurrent. General involucrum of barely two leaves.—Not unfrequent in rather moift paftures, throughout Europe, flowering in Auguft and September. A dark-green, rigid, nearly fmooth plant, varying very much in the breadth and decompofition of its *leaves*, fœtid when bruifed, and fuppofed to give a bad flavour to butter in fome parts of Norfolk; but there is a doubt whether cattle will eat it. The *ftem* is from one to two feet high, very ftraight. *Flowers* greenifh-white. *Fruit* but obfcurely bordered.

8. P. *alfaticum*. Alfatian Sulphur-wort. Linn. Sp. Pl. 354. Jacq. Auftr. t. 70. (Daucus alfaticus; Bauh. Prodr. 77.)—Leaflets pinnatifid; their fegments three-cleft, bluntifh, palmate.—Native of various parts of Auftria, Alfatia, and the Palatinate, in moift ground. The *leaflets* are much fhorter and broader than the laft, with more apparent roughnefs at the edges. *Umbels* very copious, fmaller, yellowifh.

9. P. *aureum*. Golden Sulphur-wort. Ait. n. 5. Willd. n. 9.—Leaves triply pinnate; thofe on the ftem with linear-lanceolate, thofe from the root with oblong, many-cleft, leaflets.—Native of the Canaries, from whence Mr. Maffon brought it to Kew in 1779. It is a greenhoufe biennial plant, flowering in June. We have feen no fpecimen.

10. P. *obtufifolium*. Blunt-leaved Sulphur-wort. Sm. Prodr. Fl. Græc. n. 659. Fl. Græc. t. 277, unpublifhed. —Leaflets pinnatifid, coriaceous; their fegments oppofite, obovate, obtufe.—Gathered by Dr. Sibthorp in Bœotia, and on the fhores of the Euxine. *Root* perennial, with a fibrous crown. *Stems* a foot high, bowed, round, leafy. *Leaves* fmooth, a foot long, firft three-cleft, then pinnatifid, of a thick leathery texture. *Footftalks* with a hollow fheathing bafe. *Umbels* yellowifh-white, of ftout, not numerous, rays. General and partial *involucrum* of feveral fhort, broad, acute leaves. *Corolla* a little irregular. *Seeds* with a thickifh border. This plant has much of the afpect of an *Heracleum*.

11. P. *microphyllum*. Small-leaved Sulphur-wort.—Leaves thrice pinnate; leaflets three-cleft, flefhy. General involucrum fcarcely any.—Gathered plentifully in the falt deferts about the Wolga, by Pallas, who fent it to Linnæus as a new *Peucedanum*, but we do not find that it has been any where publifhed. It is fmaller than the laft, with differently compounded *leaves*, and much fmaller *leaflets*. *Stem* glaucous. General *involucrum* fometimes of a fingle fetaceous leaf, but oftener wanting, as the partial ones alfo feem moftly to be. We have feen no *feeds*, fo that the genus muft remain doubtful.

12. P. *nodofum*. Knotty Sulphur-wort. Linn. Sp. Pl. 354. Willd. n. 10.—“Leaflets alternately many-cleft.”—Found in Crete, by Tournefort, who defines the *ftem* as knotty, and the *leaves* like fennel. We know nothing more of this fpecies.

13. P. *geniculatum*. Bent Sulphur-wort. Forft. Prodr. 22. Willd. n. 11.—“Leaves roundifh kidney-fhaped, crenate.”—Native of New Zealand. This is alfo unknown to us. Analogy would lead us to prefume that the word *leaflets*, not *leaves*, fhould be ufed in the fpecific character.

PEVENSEY, in *Geography*, a member of the town and port of Haftings, in the rape of Pevenfey, and county of Suffex, is fituated on the Englifh channel, 60 miles S.E. by S. from London. Though of little note now, Pevenfey was formerly of importance as a commercial port, but the gradual receding of the fea, from which it now ftands at fome diftance, has occafioned its decline. Boats with difficulty afcend to the village by a fmall rivulet. It is a place of great antiquity, and according to Richard of Cirencefter, was the Anderida Portus of the Romans. It is reckoned among the fea-ports ravaged by Godwin, earl of Kent, in the time of Edward the Confeffor. It is alfo celebrated in hiftory, as the place where William the Conqueror landed with his invading army. From Madox's Hiftory of the Exchequer, it appears that in the fixth year of the reign of king John, Pevenfey, among other trading towns, paid a quinxieme, or tax, for its merchandife, and that three years afterwards the barons of Pevenfey fined forty marks for licence to build a town upon a fpot between Pevenfey and Langley; which fhould enjoy the fame privileges as the cinque-ports, and have a yearly fair to laft feventeen days, commencing on the anniverfary of St. John Baptift; alfo 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 confequence of Pevenfey is the caftle, which ftands on the eaft fide 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 reafon to believe that it was conftructed out of fome Roman fortrefs. The external walls, of which the towers are tolerably entire to the height of 20 or 25 feet, are circular, and inclofe an area of feven acres. The principal entrance is from the weft or land fide, between two round towers, in which are confiderable layers of Roman brick, fome fingle, others double, about twenty feet from the ground, and four or five afunder. Many fuch layers of white brick or ftone hewn into that form, lie between the ftrata of red, or in place of them, in the walls between the other towers to the north-weft, and in the north-eaft tower are fome ftones laid herring-bone fafhion towards the bottom. Within is a fmaller fortification, of a quadrangular form, moated on the north and weft. It has round towers and a drawbridge, which correfponds with the outer gate, and, like the latter, is not in the centre of the weft fide, but rather more to the fouth. The eaft wall of both is the fame, and ftands on a kind of cliff, that appears to have been once wafhed by the fea, which, however, muft have receded before the town was built. There are no Roman bricks in the inner work, and only in the north and weft fides of the outer. Several of the turrets in the latter are of folid mafonry, and feem to have been defigned, not for defence, but to deceive an enemy. In the area of the outer caftle, are two culverins without carriages; one of them meafures eleven feet in length, is hooped, has a rofe 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, funk into the earth and pointing to the fea. Sir William Burrell relates, that in 1710, a workman, engaged in conveying water from the moat of the caftle into the town, was obliged for that purpofe to make his way under the wall, the thicknefs of which he computed to be about ten feet. The foundation he difcovered to confift of piles, planked over with flabs of an extraordinary fubftance, but notwithftanding the length of time fince the erection of the caftle, there appeared to be no decay in the flabs. The colour only feemed to be changed, and the leaves of faggots found there were ftill found. William the Conqueror gave the town and caftle to his half brother Robert, earl of Mortaigne, in Normandy, and created him earl of Cornwall. Thefe honours he enjoyed during the life of that king, but having taken part under his fucceffor in an infurrection excited by his brother Odo, earl of Kent, in favour of Robert

bert Courthose, an army was sent against this castle, on which he thought proper to surrender, and make his peace. He was succeeded in his possessions by William, earl of Mortaigne and Cornwall, who, on being refused the earldom of Kent by Henry I., joined in a rebellion with Robert de Belesme, earl of Shrewsbury. The king in consequence seized all his estates, demolished most of his castles, and exiled him from the realm. He gave to Gilbert de Aquila the town and castle of Pevensey, which thence was called the "Honour of the Eagle," with all their dependencies, in whose descendants it remained vested for some time, but being again forfeited to the throne, Henry III. granted it to his son prince Edward, and his heirs, kings of England, that it should never more be separated from the crown. It, however, came into the family of Lancaster, and from them to that of Pelham, till about the middle of the last century, when it came to earl Wilmington, on being created baron of Pevensey, from whom, by an intermarriage, it has devolved to lord Cavendish. The eccentric and celebrated Andrew Borde was a native of this place. (See Borde, Andrew.) The church is dedicated to St. Nicholas. By the census of 1811, the number of houses was 149, and the inhabitants amounted to 838. The Hasting's Guide, 2d edit. 1797.

PEVEREL Point, a cape or point of land on the coast of Dorsetshire, in the English channel, S. of Pool harbour, having at its end a ledge of rocks, which extends far into the sea. 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 spindle 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. Jussieu supposes it to be allied to his *Rubentia*, the *Elæodendrum* of Jacquin, Murray, Schreber, &c.

PEUTINGER, Conrad, in *Biography*, a learned German, was born at Augsburg in 1465. He pursued his studies in the principal universities of Italy, and returned a graduate in civil and canon law. In the year 1493 the senate of Augsburg appointed him to the secretaryship 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 sent to Bourges to compliment Charles V. on his accession to the empire. He employed all his credit with these sovereigns for the benefit of his native city, and procured for it the privilege of coining money. He was through almost the whole of a long life an active and useful member of the state to which he belonged, and died in the year 1547, at the age of 82, having passed his latter years in a state of second childhood. He left a large and well chosen library, which remained many years in the family, but which finally came to the Jesuits of Augsburg. The name of this author is best known from the ancient Peutingerian table, of which the following is the history. It is a rude chart drawn by an unknown hand during the reign of Theodosius the Great, and marking the Roman military roads through the greatest part of the western empire; it was found in a German monastery by Conrad Celtes, who presented it to Peutinger. He intended to publish it, but did not execute his design, and after his death it disappeared for several years. At length fragments of it were found and published at Venice in 1591, under the title of "Fragmenta Tabulæ antiquæ ex Peutingerarum bibliotheca." In the eighteenth century, it was discovered entire among Peutinger's MSS., and a fine edition of it was given at Vienna in 1753 by Scheib, illustrated with notes and dissertations. Peutinger was the author of "Romanæ vetustatis Fragmenta in Augusta Vindelicorum," &c. 1508, which was reprinted under the title of "Inscriptiones vetustæ Romæ et eorum Fragmenta in Augusta Vindelicorum:" "Sermones Conviviales," which have been frequently reprinted, and many other works. Moreri.

PEWET Island, in *Geography*, a small island in the German sea, near the coast of Essex; five miles S.S.W. from the entrance into Harwich harbour.—Also, a small island in Poole harbour.

PEWIT, in *Ornithology*, the English name of a common bird of the *larus*, or sea-gull kind, called by some authors *larus cinereus*, and by others *cepphus*, and in some of the counties of England the *black-cap*, and *sea-crow*: this is the Larus *ridibundus* (not *rudibundus* as misprinted) of Linnæus.

It has its English name from its note, which seems to express the word *pewit*, and is a kind of hoarse laugh. It is affirmed by many, that the head of this bird is only black at a certain season of the year.

Pewits are birds of passage, resorting to pools and fens in some of the inland counties, particularly Staffordshire, in the spring, and after the breeding season dispersing to the sea-coasts. The young were formerly much esteemed and fattened for the table. Plot relates, that at the death of the lord of the soil, they shift their quarters for a certain time. There was a piece of ground near Portsmouth, which formerly produced 40*l.* a-year to the owner, by the sale of pewits. Ray and Pennant.

Pewit is also a name given to the bastard plover, or *lapwing*; which see. See also Tringa *Vanellus*.

PEWSUM, in *Geography*, a town of East Foresland, the principal place of a bailiwick; six miles N.N.W. of Emden.

PEWTER, a factitious metal used in domestic utensils. It is very uncertain in its composition. The common utensils of the lowest price are made from an alloy composed of about 20 of tin, 3 of lead, and 1 of brass. The lead is of no use, but to make it cheaper, and doubtless on this account is often used in larger proportion. The brass is intended to give stiffness and hardness, the tin being of itself much too soft.

Another alloy of this kind is made without lead, consisting of tin combined with antimony, and copper in small proportion, to give it hardness. This is manufactured into almost all the articles which are usually made of plated copper, and is known by the name of Britannia metal.

The practice of putting lead into these alloys is extremely dangerous. Malt liquor, and particularly porter, always contains more or less acetic acid, which cannot fail to dissolve some of that deleterious metal.

The basis of this metal is, as we have already said, tin, and it consists of three different standards: *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 six or seven pounds of the latter. Wallerius gives for this finest kind of pewter, the proportions of 12 parts of tin, 1 of antimony, and about $\frac{1}{16}$ of copper. A very fine metal is made of 100 parts of tin, 8 of antimony, 1 of bismuth, and 4 of copper. The use of these additions to the tin is to harden it, and preserve its whiteness, and this fine kind of pewter takes a very high polish, has a beautiful silvery lustre, and is not readily tarnished. Tin, with a little zinc or brass, brafs, makes a very fine hard alloy. The antimony is fo intimately united to the tin, that it is not volatilized when ftrongly heated, or only in a very fmall degree, and it is not eafily diffolved by any weak acid, fo that in the ufe 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 fort of metal is ftill farther alloyed by lead, fo 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 deftroying the malleability of the compound metal, whereas the brittle metals, and copper, impart a brittlenefs to the alloy, when they exceed certain proportions. Hence lead and tin, with or without other fmaller additions, form the pewter in ordinary ufe. Lead being the cheapeft of the two metals, the manufacturer finds it his intereft to employ it in as large a proportion as poffible; but danger having been apprehended from this noxious metal, the French government appointed a commiffion of fome very able chemifts to examine the fubject; and they found, that when wine or vinegar is allowed to ftand in veffels compofed of an alloy of tin and lead in different proportions, the tin is firft diffolved; whilft the lead is not fenfibly oxydated by thefe liquors, except at the line of contact of the air and the liquor; and no fenfible quantity of lead is diffolved even by vinegar, after ftanding for fome days in veffels 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 diffolved, a pewter may be confidered as perfectly fafe, which contains about 80 or 82 *per cent.* of tin; and where the veffels are employed merely for meafures, a much lefs 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 refults of the proceffes of Meffrs. Bayen and Charlard for afcertaining the nature and proportions of the feveral alloys ufed by the pewterers of Paris, we refer to Chaptal's "Elements of Chemiftry," vol. ii. See TIN.

Pewter has occafionally ferved for money. In the Philofophical Tranfactions, M. Putland informs us that king James II. turned all the pewter veffels, &c. of the Proteftants in Ireland he could feize, into money; half-crowns were fomewhat bigger than halfpence, and other pieces in proportion.

He ordered it to be current in all payments: whence, our author obferves, people abfconded for fear of being paid their debts: he alfo mentions crown pieces of this metal, with this legend on the rim, *melioris teffera fati.*

PEYAUNNY, in *Geography*, a town of Hindooftan, in Oude; 18 miles S. of Mahomdy.

PEYERBACH, a town of Auftria; 7 miles W. of Efferding.

PEYERI GLANDULÆ, in *Anatomy*, the mucous glands of the fmall inteftine, fo named from Peyer of Schaffaufen, who defcribed them in a work entitled "Exercitatio Anatomico-Medica de glandulis inteftinorum," 1677. Reprinted in the Bibliotheca of Mangetus.

PEYERSON'S POINT, in *Geography*, a cape on the N. coaft of Antigua. N. lat. 17° 18′. W. long. 61° 32′.

PEYJUREE, a town of Hindooftan, 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 diftrict of Carcaffonne. The place contains 1370, and the canton 13,109 inhabitants, on a territory of 307½ kiliometres, in 18 communes.

PEYREHORADE, a town of France, in the department of the Landes, and chief place of a canton, in the diftrict of Dax; 10 miles S. of Dax. The place contains 1986, and the canton 9949 inhabitants, on a territory of 172½ kiliometres, in 13 communes.

PEYRELAU, a town of France, in the department of the Aveyron, and chief place of a canton, in the diftrict of Milhau; 9 miles N.E. of Milhau. The place contains 261, and the canton 3921 inhabitants, on a territory of 255 kiliometres, in 9 communes.

PEYRERE, ISAAC LA, in *Biography*, a French writer, was born at Bourdeaux about the year 1594. He was educated a Proteftant, and at one time had an employment under M. de la Thuillerie, ambaffador from France to the court of Denmark. After this he obtained a poft in the eftablifhment of the prince of Conde. He was a hard ftudent, but thought to be very deficient in enquiry. He publifhed a work in 1655, with the title of "Præadamitæ, five Exercitatio fuper verfibus 12, 13, 14, cap. xv. Epift. Pauli ad Romanos," in which he attempted to prove that it is the origin of the Jewifh nation, and not of the human race, which we find recorded in the book of Mofes, and that our globe was inhabited by many nations before Adam, whom he confidered as the father of the Jews. The book was, almoft as foon as it made its appearance, condemned to be burnt by the common executioner. Though the author had not fubfcribed his name to it, the fact was well known, and he was arrefted at Bruffels, and thrown into prifon. Through the interpofition of the prince of Conde he was fet at liberty. Smarting under this profecution he determined to run no more rifks on account of his herefy, and with this view he went to Rome to avow a change in his principles: here, in 1656, he abjured the Proteftant religion, and alfo his treatife on the præadamites, and was, of courfe, favourably received by pope Alexander VII. His motives were always fufpected, as well by Catholics, whom he joined, as by the Proteftants whom he left. After his return to Paris he was patronized by the prince of Conde, who made him his librarian, which poft he kept till he entered the feminary of our Lady of the Virtues, where he died at the age of 82. He was author of another fingular treatife "Concerning the Recall of the Jews," in which he endeavoured to maintain, that after their reftoration to the land of Canaan, they would be fubject not only to the fpiritual authority of Jefus, but to the government of a temporal king, the grand inftrument of bringing about that event; and he concluded that king to be the king of France. M. Peyrere was author alfo 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 diftrict of Aix; 9 miles N.E. of Aix. The place contains 1750, and the canton 6164 inhabitants, on a territory of 210 kiliometres, 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 Marfeilles in 1700, was fon of a phyfician in that city: he received the elementary parts of his education under the fathers of the Oratory in Marfeilles, and was fent to Paris for its completion. He returned to his native place juft before

before the dreadful plague, fo well known in hiftory, to which calamity, his father, in fulfilling the duties of his office, fell a victim. The young man was deftined for the practice of the law, and having ftudied at Aix, he was admitted an advocate in the year 1723. He exercifed his profeffional talents with much credit at Marfeilles during fifteen years, at the fame time that he purfued, with avidity, his literary ftudies. He, together with his elder brother, was principally inftrumental in founding the Academy of Belles Lettres in that city. After this he went out a fecretary to the French embaffy at the Porte; and then accompanied the marquis de Villeneuve as plenipotentiary to negociate the peace of Belgrade. He employed himfelf, while abroad, in compofing works on the commerce of the Levant; the embaffy in which he engaged; and the remains of antiquity which he obferved 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 likewife fome curious marbles tranfmitted to the royal cabinet of antiquities, with their explanations. He was, in the year 1747, nominated to the confulfhip of Smyrna, and, in the next year, the Academy of Infcriptions elected him a foreign affociate. He employed perfons, at his own expence, to furvey the countries of Leffer Afia, fouth of the Meander, and made fome journies thither for the fame purpofe, in order that he might throw light on thofe parts of the globe which, at that time, were little known to Europeans. Though lefs attached to natural hiftory than to antiquities, he communicated fome ufeful and interefting facts to Duhamel for his Treatife on Trees and Shrubs. He died in the year 1757. As a commercial refident he was highly efteemed for his intelligence and difintereftednefs, and fome papers, publifhed in the Memoirs of the Academy of Infcriptions, efpecially one "On the Kings of the Bofphorus," exhibit abundant proofs of his learning and diligence of refearch.

The eldeft fon of M. Peyfonnel was alfo a conful at feveral ports, and he made himfelf known by feveral hiftorical and political works: of thefe one of the moft important is entitled "Obfervations Hiftoriques et Geographiques fur les Peuples Barbares qui ont habitè les Bords du Danube, et du Pont Euxin; fuivies d'un Voyage fait a Magnefie, à Thyatire, à Sardes, &c. avec Figures." The tour in Afia Minor defcribed in this volume, is illuftrated with ancient monuments, infcriptions, and medals. Among his other literary performances are "Obfervations on Baron de Tott's Memoirs," and a "Treatife 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 Auftria; 12 miles W.S.W. of Feldfburg.

PE-YU, a fmall ifland near the coaft of China, in the Chinefe fea. 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 Ruffia, in the government of Archangel, which rifes in lake Varzefkoi, and runs into the Mezen; 12 miles S.E. of Ofokolfkoi.

PEZENES, a town of France, in the department of the Herault, and chief place of a canton, in the diftrict of Beziers. The town, which is large and commercial, contains 8070, and the canton 11,796 inhabitanst, on a territory of 35 kiliometres, in four communes. N. lat. 43° 27′. E. long. 3° 31′.

PEZIZA, in *Botany*, fomewhat altered from the Greek πεζικη, which is derived from πεζα, *the fole of the foot*. Pliny fpeaks of *Pezicæ* as the Greek appellation of fuch *Fungi* as grow without any ftalk, or apparent root. Linnæus has adopted the above word for a genus to which that character is, for the moft part, applicable. Linn. Gen. 568. Perf. Syn. 631. Mart. Mill. Dict. v. 3. Hudf. 633. Juff. 4. Lamarck Illuftr. t. 886. (Octofpora; Hedw. Crypt. v. 2. 4. t. 3—10. Schreb. 770.)—Clafs and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*.

Eff. Ch. Receptacle hemifpherical, concave, flightly tumid, lined with a fmooth coloured hymenium. Cafes imbedded, inconfpicuous to the naked eye, each containing eight volatile feeds.

The celebrated Perfoon, fo deep and fcientific in this natural order of plants, has juftly reftored the original genus of *Peziza*, only removing from it that of *Cyathus*, called by fome authors *Nidularia*, which belongs to a totally different tribe of *Fungi*, and of which *Peziza lentifera* of Linnæus, Hudfon, &c. is the moft common fpecies. *Cyathus* has been omitted in its proper place by our predeceffor, and *Nidularia* being not received by writers in general, though furely preferable as a name, we have paffed it over. Hedwig determined to retain the appellation of *Peziza* for that genus, and therefore invented the word *Octofpora*, alluding to the eight feeds 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 fupport him.

This writer defines one hundred and fifty-one fpecies of *Peziza*, difpofed in feven fections, of each of which we fhall give an example or two. The refemblance between their fructification and the fhields of a *Lichen*, is too ftriking to be overlooked; there is indeed fcarcely a difference between them; for the number of the minute feeds is too obfcure, and indeed too uncertain, a character, to be reforted to. Hedwig fays they are invariably eight in the genus before us; but they appear to be often double, and their number is fo different in different *Lichenes*, that nothing is to be depended upon concerning it in that tribe. With regard to habit, the diftinction is more abfolute. A *Lichen* has a vegetating ftem, herb, or cruft, moftly of perennial duration, extending itfelf without end; a *Peziza* has but a fhort exiftence, perifhing as foon as it has perfected the one folitary fructification, which is the end of its creation. Hedwig moreover obferves, that a fibrous texture, highly bibulous in its nature, is interwoven with the feed-cafes of a *Lichen*; while thofe of a *Peziza* are feparated, if at all, only by unconnected vertical fibres. In a word, the one plant has the flefhy evanefcent nature of a *Fungus*, the other the permanent, revivefcent, and vegetative conftitution of an *Alga*.

Section 1. *Tremella-like; more or lefs of a gelatinous fubftance.* Fourteen fpecies.

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. Octofpora elaftica; Hedw. Crypt. v. 2. t. 6. f. E.)—Gregarious, vifcid, ftaining black; at length convex and obconical; externally rugged, downy, and of a lighter brown. Not uncommon on the trunks of felled oak trees, efpecially in autumn and winter, or in a wet fummer, always growing, as Perfoon remarks, in longitudinal rows. Its fubftance is leathery, but internally pulpy; hard when dry; its diameter an inch, more or lefs. When touched, its *difk* ftains the fingers with a black flimy moifture. In a dry ftate, the fine velvet-like downinefs of the outfide is moft confpicuous, and affumes a much lighter hue.

P. *farcoides*. Perf. n. 5. (P. tremelloidea; Bull. Fr. t. 410. f. 1. Helvella farcoides; 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. Persoon 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 umber 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. Persoon omits it.

P. *Sowerbæana.* 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. *hemisphærica.* 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 cast, and clothed with clustered, short, prominent hairs; the *disk* concave, of a singular pearly or glaucous white.

P. *scutellata.* Perf. 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 Persoon believes, the real *cupularis* of Linnæus, 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. *virginea.* Perf. n. 71. (P. nivea; Dicks. 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-four

four ſpecies; twenty-four of which are ſtalked, the reſt ſeſſile.

P. *firma*. Perſ. 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*. Perſ. 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*. Perſ. n. 106. Sibth. Oxon. 386. With. v. 4. 347. Sowerb. Fung. t. 151. (Octoſpora 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*, Perſ. 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*. Perſ. 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.—Perſoon 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*. Perſ. n. 120. Obſ. 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 Perſoon, 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. *patellaria*. Perſ. 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 ſought for the plant in vain in England, nor can we decide any thing concerning it, though moſt inclined to the opinion of Perſoon, 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*. Perſ. 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 Perſoon ſeems to have inclined to eſtabliſh as a genus, by the name of *Stictis*. One example will ſuffice.

P. *radiata*. Perſ. 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 Linnæus 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 Carpobolus*, in a ſeparate genus. Hoffmann, Sowerby, and Perſoon, 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*. Perſ. n. 149. (Solenia ochracea; Hoffm. Germ. v. 2. t. 8. f. 2.)—Rather crowded, ſlender-pear-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*.

P. candida. Perf. n. 151. (Solenia candida; Hoffm. ibid. t. 8. f. 1.)—Very flender, cylindrical, fnow-white, with a revolute margin.—Found on rotten wood. It feems even more minute than the laft, from which it is very diftinct.

Albertini and Schweiniz, in their learned *Confpectus Fungorum Agri Nifkienfis*, have figured and defcribed feveral fpecies of *Peziza* not in Perfoon, and have furnifhed valuable remarks on fome of his minute or obfcure ones. They confirm the account of the fruit of *P. radiata*, n. 146, as being at firft gelatinous, then waxy, and finally intermixed with fibres. The fame acute obfervers have feen the *P. carpinea*, n. 144, twice; in April it had little convex clofed cups, and in October a flat open difk. If there be no deception in this, we muft allow it to remain here. After all, great obfcurity muft attend thefe diminutive productions; nor can fuch be put to the teft of difplaying their volatile feeds, in the form of fmoke, from an organized difk, 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 Afturia; 40 miles W. of Oviedo.

PEZRON, Paul, in *Biography*, a learned French abbot, who flourifhed in the 17th and 18th centuries, was born at Hennebon, in Bretagne, in the year 1639. At the age of 22 he embraced the monaftic life, and went to purfue his ftudies at the college of the Bernardins in Paris. He foon became diftinguifhed for his ardour in the purfuit of knowledge, as well profane as facred; and his early proficiency fecured to him the refpect and efteem of the abbot, who appointed him his fecretary, 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 houfes belonging to his order in the ifle of France. In 1697, Lewis XIV., in order that he might reward literary merit, beftowed on him the abbey de la Charmoye, which he retained till the year 1703, when he refigned it, that he might devote his whole time to ftudy. The intenfenefs 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, reftored and defended againft the Jews and the New Chronologifts:" in which he maintains the chronology of the Septuagint, in preference to that of the Hebrew text of the bible, which he fuppofes to have been corrupted by the Jews fince the deftruction of Jerufalem: he alfo claims for the world a much higher antiquity than is allowed by any other modern chronologer. 2. "An Attempt at a Literal and Hiftorical Commentary on the Prophets." 3. "The Evangelical Hiftory confirmed by thofe of the Jews and Romans," in 2 vols. 12mo. 4. "A Treatife concerning the Antiquity of the Nation and of the Language of the Celts, otherwife called Gauls," &c. Moreri.

PFAFF, in *Geography*, a mountain of Auftria, bordering on Stiria.

PFAFFENBERG, a town of Bavaria; 16 miles N. of Landfhut.

PFAFFENDORF, a town of Bavaria, in the bifhopric of Bamberg; five miles E. of Weifmain.—Alfo, a town of Bavaria, in the fame bifhopric; five miles S.E. of Lichtenfels.—Alfo, a town of the duchy of Wurzburg; fix miles N. of Ebern.—Alfo, a town of Pruffia, in the palatinate of Culm; 10 miles E.S.E. of Culm.

PFAFFENHAUSEN, a town of Bavaria, in the bifhopric of Augfburg, on the Mindel; 21 miles S.W. of Augfburg.—Alfo, a town of Bavaria; 13 miles N.N.W. of Landfhut.

PFAFFENHOFEN, a town of Bavaria, on the Ilm: 14 miles S.S.E. of Ingolftadt. N. lat. 48° 25′. E. long. 11° 28′.—Alfo, a town of Bavaria; 13 miles S.W. of Amberg.—Alfo, a town of France, in the department of the Lower Rhine; nine miles W. of Haguenau.

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 Wonfiedel.

PFAFFEYEY, 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; 76 miles from Freyberg.

PFALDORF, a town of Bavaria, in the principality of Aichftatt; fix miles N.E. of Aichftatt.

PFALZEL, a town of France, in the department of the Sarre, and chief place of a canton, in the diftrict 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*, fon of a counfellor of the count de Oetingen, was born at Augfburg in 1641. He ftudied at Altdorf, Gotha, and Jena, and acquired a profound knowledge of jurifprudence, philofophy, and other branches of learning. After having been fucceffively governor to feveral young gentlemen, the duke of Saxe-Gotha made him fecretary of his archives, and employed him to inftruct his fons in hiftory and politics. In the year 1686 he was nominated counfellor to all the Erneftine line. He was fo well verfed in public affairs, that he obtained the name of "The living archives of the houfe of Saxony:" he bore an eftimable character, but had, through exceffive ftudy, contracted a melancholy difpofition. 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 Hiftory of the Peace of Weftphalia;" "A Treatife on German Princes;" "A Treatife on the Principle of Hiftorical Faith," &c. &c. Moreri.

PFASKIRCHEN, in *Geography*, a town of Auftria; five miles N.E. of Putzeinftorf.

PFEDDERSHEIM, a town of France, in the department of Mont Tonnerre; 24 miles N.N.W. of Spire.

PFESSIKON, a town of Switzerland, in the canton of Zurich; 10 miles E. of Zurich.

PFETER, a town of Bavaria, on a fmall river of the fame name; 14 miles E. of Ratifbon.

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, encompaffed with walls, on the Danube; 14 miles E. of Ingolftadt.

PFORTEN, a town of Lufatia; 12 miles S. of Guben.

PFORZHEIM, a town of Baden, on the Entz, which here receives the Nagold and Warm. It comprehends a fpecial fuperintendance, a grammar-fchool, and an orphan-houfe; 8 miles S.S.E. of Durlach. N. lat. 48° 58′. E. long. 8° 50′.

PFRAME, a town of Auftria; 6 miles S.S.W. of Marcheck.

PFREIMBDT, 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 fuch till the year 1802, when it was given among the indemnities to the margrave of Baden; 14 miles W.N.W. of Ravenfpurg. 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 Conftance.

PHACA, in *Botany*, a name borrowed by Linnæus from Diofcorides, whofe φακος, neverthelefs, the Lentil *Ervum* (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. Juff. 358. Gærtn. t. 154. (Aftragaloides; Tourn. t. 223.) —Clafs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

Cal. Perianth inferior, of one leaf, tubular, five-toothed. *Cor.* papilionaceous: ftandard obovate, ftraight, largeft; wings oblong, obtufe, fhorter; keel fhort, compreffed, obtufe. *Stam.* Filaments diadelphous, one fet of nine, the tenth folitary; anthers roundifh, afcending. *Pift.* Germen oblong; ftyle awl-fhaped, afcending; ftigma fimple. *Peric.* Legume oblong, inflated, half divided into two cells; the upper future depreffed towards the lower. *Seeds* feveral, kidney-fhaped.

Obf. The legume in fome is ftraight, but in others recurved, infomuch that the point fometimes touches the bafe. As the partition of the legume of fome *Aftragali* is not actually attached to the lower future, though brought very near to it, the clofe affinity between thefe two genera is evident.

Eff. Ch. Calyx with five teeth; the two upper ones moft diftant. Legume divided half way into two cells, inflated.

1. Ph. *bætica*. Hairy Baftard Vetch. Linn. Sp. Pl. 1064. (Aftragalus primus, five bœticus; Cluf. Hift. v. 2. 233, 234. A. lufitanicus Clufii; Lob. Ic. v. 2. 78. Ger. Em. 1238.)—Hairy. Stem erect. Leaflets numerous, oval. Stipulas linear-lanceolate. Legume oblong, boat-fhaped, fomewhat depreffed.—Native of Portugal, Spain, and Greece. Dr. Sibthorp found it plentifully on mountains in the ifle of Cyprus. We have a fpecimen gathered by the late Dr. Brouffonet in Barbary. Clufius faw it flowering in the end of January, in Spain. Though this noble plant ftands on the lift of our horticultural riches, it is only from having been cultivated here in Parkinfon's days. Some traveller would do well to reftore it to us. The *root* is perennial, fpindle-fhaped, very thick and ftrong. *Stems* herbaceous, erect, about two feet high, as thick as the little finger, nearly fimple, leafy, flightly angular, a little zigzag, reddifh, clothed, like every other part of the herbage, with fine, foft, hoary hairs. *Leaves* alternate, about fix inches long, pinnate, of nine pair, with an odd one, of ftalked, elliptical, uniform, entire *leaflets*, of a hoary or glaucous green. *Stipulas* not quite an inch long, linear-lanceolate, almoft awl-fhaped, erect, reddifh. *Flowers* copious, large, and handfome, pure white, pendulous, in long, folitary, axillary, ftalked, upright *clufters*, about the length of the leaves. *Legume* near two inches long, ftraight, cylindrical, flightly depreffed, channelled along the back. The modern Greeks know this plant by a name equivalent to Wild Lupine; the Portuguefe call it Dog Lupine. The tafte of the leaves, and efpecially the feeds, is faid by Clufius to be acrid and burning.

Whatever may become of *Robinia veficaria*, Jacq. Ic. Rar. t. 148, we cannot follow Willdenow in introducing it here.

2. Ph. *falfula*. Salt Baftard-Vetch. Willd. n. 3. Linn. Suppl. 336. Pallas Reife v. 3. append. n. 115. t. B, b.—Hoary. Stem erect. Leaflets numerous, obovate; fmooth above, ftipulas oblong. Legume globofe, pendulous.—Gathered by Pallas in falt ground, about the lake *Tarëi*, in Dauria.—This is, in all its dimenfions, fcarcely half the fize of the preceding, and diftinguifhed by being finely hoary in every part, (except the upper furface of the *leaves*, which is glaucous,) with fine, clofe-preffed, fhort pubefcence. The *flowers* are much fewer, not above fix or eight in each clufter, and of a fine red. *Legumes* globofe, ftalked, pendulous. It flowers in its native country about the end of June, and has never been obferved in any other fpot than the above-mentioned.

3. Ph. *alpina*. Alpine Baftard Vetch. Linn. Sp. Pl. ed. 1. 755. Willd. n. 4. Jacq. Ic. Rar. t. 151. Villars Dauph. v. 3. 472. (Ph. leguminibus pendulis, femiovatis; Gmel. Sib. v. 4. 35. t. 14. Aftragalus n. 410; Hall. Hift. v. 1. 175. Aftragaloides alpina hirfuta erecta, foliis viciæ, floribus dilutè luteis; Till. Pif. 19. t. 14. f. 2.)—Erect, branched; fomewhat hairy. Leaves of many pair of elliptic-lanceolate obtufe leaflets. Legumes half-ovate, acute. Stipulas linear-lanceolate.—Native of the mountains of Switzerland, France, Savoy, Auftria, and Siberia, from all which countries we have fpecimens. The *root* is perennial, woody, very long and ftrong, fubdivided. *Stems* erect, about two feet high, branched, leafy, more or lefs clothed with fhort, clofe-preffed, white hairs. *Leaves* alternate, two or three inches long, compofed of from ten to fourteen pair, with an odd one, of elliptic-oblong, or fomewhat lanceolate, obtufe *leaflets*, whofe medium length is half an inch, clothed, efpecially beneath, with fuch hairs as the ftem. *Stipulas* nearly linear, broad at the bafe, from a quarter to half an inch long, fmooth on both fides, but fringed at the edges. *Flowers* yellow, in fhortifh, long-ftalked, axillary *clufters*, with linear, fringed *bracteas*. *Partial footftalks* fhort, flightly drooping, clothed, as is the *calyx* in fome degree, with fhort black hairs. The *germen* is very denfely fo clothed, but the *legumes* become fmooth, and are ftalked, pendulous, fcarcely an inch long, inflated, half-ovate, the back being nearly a ftraight line. *Seeds* ufually three or four.

This being certainly the original *Ph. alpina* of Linnæus, that name is properly retained for it, though he fometimes confounded this and the following.

4. Ph. *frigida*. Northern Baftard-Vetch. Linn. Syft. Nat. ed. 10. 1173. Fl. Lapp. ed. 2. 227. Willd. n. 5. Jacq. Auftr. t. 166. (Ph. alpina; Linn. Sp. Pl. 1064. Fl. Suec. ed. 2. 256. Ait. n. 2. Fl. Dan. t. 856. Aftragalus n. 402; Hall. Hift. v. 1. 176.)—Stem erect, unbranched, fmooth. Leaves of about five pair of ovate, flightly hairy, obtufe leaflets. Legumes oblong. Stipulas broad-ovate, reflexed.—Native of the alps of Lapland and Norway, as well as of the more lofty mountains of Auftria and Switzerland. Differs from the laft in being ufually of a more humble ftature, though in its feparate parts much larger. The above characters fufficiently mark the effential diftinctions. The *leaflets* are an inch long, and nearly half as broad, fmooth above. *Stipulas* very large and broad, fringed, or hairy. *Flowers* cream-coloured, drooping. *Legumes* pendulous, fomewhat boat-fhaped, flightly hairy, narrower, and fcarcely longer than the former.

The

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 unluckily 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. *halicacaba*. Reticulated Bladder Baſtard-Vetch. Willd. n. 8.—"Stems procumbent. 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 bracteas. *Willd.*

9. Ph. *denſifolia*. Crowded-leaved Baſtard-Vetch.—Stem decumbent, branched, ſmooth. Leaflets numerous, crowded, obovate, emarginate, villous beneath. Calyx woolly. Legume turgid, ovate, nearly ſmooth.—Gathered by Mr. Menzies in California. The habit and ſize of this curious nondeſcript 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 ; Lamarck 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 ſemiorbicular *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

The *ftem* is flender, branched, partly downy. *Leaves* ternate, very unequal in fize; *leaflets* obovate, entire, an inch long at moft; minutely hairy on both fides; finely reticulated with veins beneath. *Footftalks* fhort, hairy. *Stipulas* half-ovate, ribbed, chaffy, hairy, taper-pointed, deciduous. *Clufter* terminal, of about 20 flowers, in pairs, on downy glandular ftalks. *Legumes* half an inch long, tranfverfely veiny, nearly fmooth.

PHACELIA, a genus of Juffieu's, to which he applied this name, in allufion "to the cluftered fpikes, from φακελος, *a bundle*;" the figures of both fpecies neverthelefs have racemofe flowers. Juff. Gen. 129. Michaux Boreal-Amer. v. 1. 134.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Afperifoliæ*, Linn. *Borragineæ*, Juff.

Juffieu gives the following character.—"Calyx in five deep fegments. Corolla nearly bell-fhaped, five-cleft, with five furrows at the bafe internally, whofe membranous margins embrace the bottom of the filaments. Stamens prominent. Style fhort. Stigmas two, long. Capfule of two cells, four feeds, and two valves each with a partition from its middle, and containing one feed in each half cell. The herb is downy; with alternate pinnate leaves. Flowers turned one way, in upright, fafciculated, terminal fpikes. From an old fpecimen."—Michaux extracts a part of the above character only, without any alteration or addition. His plate reprefents a very long capillary ftyle.

1. Ph. *pinnatifida*. Mich. n. 1. t. 16.—"Erect. Leaves pinnatifid; their fegments cut and lobed. Spikes moftly cloven, oblong, many-flowered. Corolla blue; its lobes with a nearly fimple margin."—Native of the weftern woods of the Allegany and Kentucky mountains. The *ftem* is round, alternately branched. *Leaves* alternate, ftalked, deeply pinnatifid, or pinnate, with oppofite, pinnatifid or cut, fegments, apparently fmooth. *Clufters* terminal, folitary, downy, of about feven *flowers* turned one way, on partial ftalks half an inch long. *Fruit* globofe, crowned with the permanent ftyle.

2. Ph. *fimbriata*. Mich. n. 2. (Heliotropium pumilum glabrum, nafturtii foliis, americanum; Pluk. Phyt. t. 245. f. 5.)—"Procumbent, fomewhat afcending. Leaves pinnatifid; their fegments undivided. Spike folitary, fhort. Corolla white; its lobes fringed."—Native of lofty mountains in Carolina.

Such is Michaux's account. His latter fpecies however fhould feem, by the fynonym, to be no other than *Ellifia Nyctelea*. The figure cited proves on examination to be the original from whence Morifon copied his fect. 11. t. 28. f. 3, which is certainly the ELLISIA; fee that article. Probably therefore the *Phacelia bipinnatifida* may prove a new fpecies of *Ellifia*; for moft affuredly nothing is faid of it that gives any room to fuppofe it a diftinct genus.

PHACOIDES, a word ufed by the ancient phyficians to exprefs any thing that in fize and fhape approached to a lentil. Thus the cryftalline humour of the eye was fo called.

PHACOPTISANA, a medicine often mentioned by the ancient writers as a nourifhing and ftrengthening thing: it was a ptifan with lentils.

PHACO'SIS, from φακη, *a lentil*, a black fpot in the eye, refembling a lentil.

PHÆCASIA, in *Antiquity*, a kind of fhoes.

PHÆDO, in *Biography*, a Greek philofopher, founder of the ELIAC *fchool*, 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 flave. He came into the fervice of the emperor Auguftus, by whom he was enfranchifed, as appears from the title prefixed to his work of "Augufti Libertus." Of his life nothing more is known, except that in the reign of Tiberius he was a fufferer under the injuftice and tyranny of Sejanus, whom he furvived. It is probable he lived to an advanced age. He was author of five books of fables, compofed in Iambic verfe. They are valuable for their precifion, purity, elegance, and fimplicity. The matter of thefe fables is generally borrowed from Æfop, but Phædrus intermixes ftories or hiftory-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 circumftance, together with the affertion of Seneca, "that the Romans had not attempted Fables and Æfopean compofitions," might throw a fufpicion on the genuinenefs of the work, did not its ftyle and manner refer it to the beft age of Roman literature. It remained unknown to the moderns till 1595 or 1596, when Francis Pithou difcovered a copy in the library of St. Remi at Rheims, and fent it to his brother Peter, who publifhed it. Two manufcripts of Phædrus are faid to exift, both of which are not only imperfect, but being tranfcribed from the fame copy very carelefsly, they are full of errors; hence few ancient works have given more trouble and room for conjecture to critics. The beft editions of Phædrus are thofe of Burmann 4to. 1727; Hoogftraten 4to. 1701; and Barbou 12mo. Paris 1754.

PHÆNIX, the name of an ancient mufical inftrument, which, according to Mufonius, was ufed by the king of Thrace in the national feftivals: its invention is attributed by fome authors to the Phœnicians, probably from the analogy between the two names.

PHÆNOGAMOUS PLANTS, in *Botany*, from φαινω, *to fhew*, or *make apparent*, and γαμος, *marriage*; a term invented, if we miftake not, by the German botanifts, for fuch vegetables as have the parts of the flower, or organs of impregnation, evident and intelligible, like the generality of plants. The term therefore is oppofed to Cryptogamous Plants. See CRYPTOGAMIA.

PHÆNOMENON, or PHENOMENON, φαινομενον, formed from φαινομαι, *I appear*, ftrictly an appearance in phyfics, an extraordinary appearance in the heavens, or on earth; either difcovered by obfervation of the celeftial bodies, or by phyfical experiments; and whofe caufe is not obvious. Such are meteors, comets, uncommon appearance of ftars and planets, earthquakes, &c. Such alfo are the effects of the magnet, phofphorus, &c.

The phenomena of comets are inconfiftent not only with the folidity of the heavens, fuppofed in the Ptolemaic hypothefis, but equally with the plenitude of the heavens, afferted by the Cartefians.

That hypothefis is beft which folves moft phenomena. Sir Ifaac Newton fhews, that all the phenomena of the heavenly bodies follow from the attraction of gravity, which intercedes thofe bodies; and almoft all the phenomena of the leffer bodies from the attraction and repulfion between their particles; fo fimple is nature.

PHÆNOMENON, *Parallax of a*. See PARALLAX.

PHÆOPUS, in *Ornithology*, a fpecies of *Scolopax*; which fee.

PHAËTHUSA, in *Botany*, fo called by Gærtner, from φαω, *to fhine*, in allufion to the great fize of the plant, its very abundant yellow flowers, and confequently ftriking appearance. The name is borrowed from heathen mythology; the nymph who bore it having been one of the fifters of Phaëton. Gærtn. 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. *Corymbiferæ*, Juss.

Gærtner 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 *Verbesina*, and concluded the *Phaëthusa* 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 *Phaëthusa* cannot be maintained; for no person surely would insist on the small number of radiant florets. Michaux seems right in referring this plant to *Verbesina*, 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 albicores. 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 tipt 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.

PHŒNICURUS; 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 φαγω, *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, φαγησια, in *Antiquity*, a festival in honour of Bacchus, celebrated during the Dionysia.

It was otherwise called *phagesiposia*, φαγησιποσια; which names come from φαγειν, *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 φαιος, *brown*, is evidently, by his description, the beautiful *Limodorum Tankervilliæ*, 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*.

PHALACROCOROX, 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.

In

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 ſubcaudal; 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 exſerted, 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 talc; 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 pectinated, 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.

Cytherea. Wings grey, with cinereous ſtreaks and a tranſparent eye. Found at the Cape of Good Hope.

Mylitta. Wings falcate, yellow, with a ferruginous ſtreak

ſtreak 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 Chuſan.

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.

Semiramis. 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.

Argus. 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 ſemitranſparent 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.

Arculata. 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, ſerrate, grey; the hind margin is dotted with white.

Promula. Wings ſlightly indented, brown, immaculate; abdomen cheſnut-brown. It inhabits Java.

Cassandra. Wings ferruginous, with darker ſtreaks; thorax cheſnut-brown on the fore part.

Capensis. Wings pale red; upper pair with two

 flexuous

flexuous ftreaks, the pofterior of which is joined to a black one. It inhabits Africa.

ORIENTALIS. Wings teftaceous, with three ferruginous ftreaks, beneath a fingle one. This is an Eaft Indian infect.

ALUCO. Wings brown, cinereous at the tip. It inhabits the Cape of Good Hope.

AUSTRALASIÆ. Wings orange-red; lower ones beneath ferruginous at the bafe. This is a native of New Holland.

QUADRICINCTA. Wings chefnut-brown, with four pale ftreaks. It inhabits the Eaft Indies.

* FAGI. Wings reddifh-cinereous, with two linear, flexuous, yellow bands.

* TRIFOLII. Wings ferruginous; upper pair with a pale ftreak 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 defcribed by Mr. Donovan.

STIGMA. Wings teftaceous, fpeckled with brown, and with a central fnowy dot. Found in America.

LUSCA. Wings ferruginous; upper pair with a black fpot in the middle. A native of Coromandel.

* PRUNI. Wings indented, yellow, with two brown ftreaks, and a white dot. This is found on the plum. The larva is fmooth, and of an afh-colour; it is marked with blue lines, and furnifhed with tufts of hair on the neck, and along the fides; the hind legs are ftretched out at a diftance from one another. The pupa is black on the fore part of the body, and of a light brown behind.

AMPHIMONE. Wings entire, pale afh, with a black ftreak; the upper pair with a fulvous dot in the middle. It is a native of Terra del Fuego.

* POTATORIA. Wings flightly indented, yellow-brown, with an oblique fulvous line, and two white dots, in the upper pair. The larva is tailed, crefted, hairy, dark brown, fpeckled 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.

OCCULATISSIMA. Wings white, with numerous black ocellar dots. This and the next two are natives of America.

PUNCTATISSIMA. Wings and body fnowy, dotted with white; thorax with a black lunule on each fide.

PITHECIUM. Wings clouded with brown, a palmate fpot on the difk, acute-angled at the bafe.

HIBISCI. Both furfaces of the wings alike, yellow, with two brown ftreaks on the upper, and one on the lower pair. A native of India.

CYNORA. Wings yellow, with two brown ftreaks, and three connected brown rings on the upper pair. Found in Surinam.

OPERCULARIS. Wings yellow; the anterior margin and difk brown, with numerous whitifh lines. This and the next are natives of America.

PYXIDEFERA. Wings yellow; the difk with numerous brown and black flexuous patches.

* PINI. Wings grey, fpeckled with brown, with a ferruginous band and bafe, and triangular white dot. This is figured and defcribed by Mr. Donovan.

VELLEDA. Wings black, with white nerves; the margin with four white ftreaks.

* DUMETI. Wings brown; upper pair with a yellow dot, band, and hind margin.

* VERSICOLORA. Upper wings grey, varied with brown and tranfverfe black and white lines; the lower ones are ferruginous.

* RUBI. Wings fawn-coloured, marked with two whitifh ftreaks on their upper furface. It is found on the bramble and willow. The larva is hairy, black on the under fide, and of a rufty colour, marked with black rings on the upper fide. When young, it is covered with a veil of black filk. The pupa is blackifh, marked with three yellow rings, and enclofed in a covering of filk.

LANIGERA. Wings black, with two whitifh ftreaks, and a fnowy lunule in the middle.

* VINULA. Wings grey, with blackifh waves and ftreaks; thorax and abdomen grey, fpotted with brown. This is a remarkably elegant infect, without any gaiety of colour, being a middle-fized white moth, variegated with numerous fmall black ftreaks and fpecks; the thorax and abdomen are extremely downy, and the body is marked with tranfverfe black bars. The larva of this moth is far more brilliant in its appearance than the image or complete infect; it is of confiderable fize, meafuring above two inches in length, and is of a moft beautiful green, with the back of a dull purple, freckled with very numerous deeper ftreaks in a longitudinal direction; the purple part of the back is feparated from the green on the fides by a pair of milk-white ftripes, which, commencing from the head, run upwards to the top of the back, that part being elevated confiderably above the reft into a pointed procefs; and from thence are continued along the fides to the tail; the face is flat, and fubtriangular, yellowifh, furrounded, firft by a black, and then by a red border; and it is diftinguifhed by two deep black eyes or fpots on each fide the upper part: from the tail, which is extended into two long, roughened, fharp-pointed, tubular proceffes, proceed, on the leaft irritation, two long, red, flexible tentacula, the infect feeming to exert them as if for the purpofe of terrifying its difturbers; lifting up the fore-part of the body, at the fame time, in a menacing attitude, and prefenting a highly grotefque appearance. This creature poffeffes the power of fuddenly ejecting from its mouth, to a confiderable diftance, an acrimonious reddifh fluid, which it ufes as a farther defence, and which produces confiderable irritation, if it happen to be thrown into the eyes of the fpectator. It is principally feen on willows and poplars, and when the time of its change comes, it defcends to the lower part of the tree, and envelops itfelf in a glutinous cafe, prepared by moiftening with its faliva the woody fibres of the tree, and covering itfelf with them, attaching the edges very clofely to the bark, and in this ftate it remains fecure throughout the whole winter, it being too clofe to be affected by the froft, and too ftrong to be fuccefsfully attacked by birds. The chryfalis is thick, fhort, and black, and in the month of May or June, according to the warmth of the feafon, gives birth to the moth, which, immediately on emerging from the upper part of the chryfalis, difcharges a quantity of fluid fufficient to foften effectually the walls of its prifon, and effect a ready efcape.

* LANESTRIS. Wings of a rufty colour, marked with a white ftreak; the upper wings are white at the bafe, and marked with a white dot. It is a native of this and other countries of Europe, and found on the lime-tree, the floe, and the willow. It produces eggs covered with afh-coloured wool. The larva is hairy and black. It is gregarious, and lives in habitations which it forms for itfelf, compofed of many cells; going out in queft of food, it returns through parallel holes. The pupa is of a fulphur colour.

RUBICUNDA. Upper wings rofy, with a broad yellow band. It is a native of Virginia.

* POPULI. Brown, the fore part pale; wings brownifh, with a flexuous whitifh ftreak, and contiguous fmaller one.

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 fingle darker ftreak on the female, and two on the male. The larva is gregarious and hairy; and the fkin, which it cafts off, is faid to produce inflammation, if touched.

Pithyocampa. Wings grey, with three darker ftreaks; the lower ones are pale, with a brown dot near the tail. It is found in Auftria, and fo is the next.

Varia. Wings brown, with waved paler ftreaks.

Mori; Silk-worm. Wings pale, with three obfolete brown ftreaks. This is by far the moft important of all the moths. It is a native of China or Perfia, and was introduced into Europe by Juftinian. It varies a little in fize and colour, the wings being fometimes yellowifh, and fometimes whitifh. The larva is furnifhed with a tail, is naked, and whitifh. The pupa is light brown, enclofed in a thick filky covering, from which filk is manufactured. The firft perfon who unravelled the cocoons of the filk-worm, and manufactured them into filk, was Pamphilia, a woman of Coos, the daughter of Latona. See Silk and Silk-*Worm*.

Tricolor. Upper wings fnowy, with a fcarlet rib, and a ftreak of black dots; the lower ones are fcarlet; thorax fnowy, 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 ftreaks, and only one beneath.

* Castrensis. Wings dufky, with two paler bands.

Americana. Wings whitifh, with patches of brown. A native of North America.

Franconia. Wings hyaline, whitifh, with a pale ftreak and black border. It is a native of Auftria, as is the next.

Taraxaci. Wings pale, both furfaces 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 ftreak. It is found in the oak, in divers parts of France.

Mali. Wings cinereous, with a finuate darker band, in which is a black dot. A native of Germany.

Hieracii. Wings entire, footy black. It is found in fome parts of Europe, on the Delphinium hieracium. The larva is hairy, black, with a red dorfal line, and fecretes itfelf within a follicle, which it makes of dry leaves and ftraws.

Apiformis. Wings footy black; body covered with ferruginous hairs. It is a fmall infect, and found in Italy.

c. *Wings deflected.*

Lagopus. Wings yellowifh, with brown fpecks and two ftreaks; the fore legs are projecting, and very hairy. It is a native of China.

Imperatoria. Wings yellow, fpotted with brown, all of them with a fubocellar ferruginous fpot. It is a native of India.

Senatoria. Wings brown, teftaceous, with a brown ftreak; the upper pair with a central fnowy dot. This and the next are natives of America.

Pellucida. Wings brown, teftaceous, with a purple outer margin; upper pair with a central fnowy dot.

Crassicornis. Wings cinereous, with brown fpecks and waved ftreaks. It is a large infect, and a native of India.

Hyphinoe. Wings blue; upper pair fpotted with yellow. This and the next are natives of Amboina.

Cyane. Wings black, with hyaline fpots; lower ones with fulvous lunules.

Regalis. Wings grey-brown, with fulvous veins and yellow fpots. It inhabits North America.

* Dispar. Upper wings of the male brown, with black flexuous bands; of the female whitifh, with tranfverfe flexuous brown lines. The larva is hairy, with white lines and blue fpots on the fore part, and red ones behind. When handled, it caufes an unpleafant itching on the fkin. The pupa is folliculate, with four black dots.

Lantanæ. Wings fnowy, with three or four ftreaks of connected brown rings. It is a native of America.

Amasis. Wings whitifh, with black ftreaks; lower ones yellow, fpotted with black; the abdomen is black, with red belts. It inhabits Surinam.

* Pudibunda. Wings cinereous, with three waved brown ftreaks.

* Fascellina. Wings cinereous, with black fpecks and two fulvous ftreaks.

Leucophæa. Wings brown, upper pair with a broad whitifh ftreak, a black line at the bafe, and a white dot at the hind angle. This and the next are natives of America.

Leucostigma. Wings grey, upper pair with black ftreaks and lines, and a white lunule at the hind angle. The female is apterous.

* Bucephala. Wings grey, with two double brown flexuous ftreaks, and a large yellow fpot at the tip.

Helops. Wings clouded; lower ones pale chefnut; abdomen chefnut-brown, annulate with white. A native of America.

Oleagina. Wings flightly tailed, green-brown, with two white fpots, the anterior pupillate, the hind one larger. Found in Germany.

Cœruleocephala. Wings brown, marbled with blueifh, and a double irregular whitifh fpot.

Argentina. The wings of this fpecies are toothed on the back, grey, with two filvery fpots, the anterior heart-fhaped. 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 finuate indented glaucous band. A native of Sweden.

Dione. Wings white, ftriate, and dotted with black; beneath there is a purple margin. A native of North America.

* Ziczac. Wings toothed on the back, clouded brown and reddifh-white, with a large clouded ocellar fpot at the tip; the antennæ are fcaly. Larva folitary, naked, pale rofy, with white lateral lines, and two gibbofities 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, furrounded with white. It is found in feveral parts of Auftria.

Elegans. Wings glaucous, with two black ftreaks and fpot in the middle, in the latter of which is a ferruginous lunule. It is found at the Cape of Good Hope.

Camelus. Wings yellowifh, with two red ftreaks, and a line in the middle. It is a native of India.

Dictæa. Wings appearing as if parched with a whitifh ftripe; the lower ones whitifh.

Gnoma. The wings of this fpecies are flightly indented, grey-

grey-white, with a marginal black band, in which is a white ſpot. Found at Hamburg.

Dromedarius. 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.

* Monacha. 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.

Læta. 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 ſetaceous. 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. nigrum. 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.

Auriflua.

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-ſhanks 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.

* Jacobææ. 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 cheſnut-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.

* Matronula. 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;

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

Hera. 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 tipt 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 ſhanks 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 tipt with brown. It is an Italian inſect.

e. *Wings convolute.*

Bella. Wings yellow, with ſix bands of black dots; the lower ones are red, tipt 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 ſurrounded 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.

a. *An-*

a. *Antennæ pectinate.*

* LACTEARIA. 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.

* FALCATARIA. 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.

* DEFOLIARIA. 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. *Antennæ 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 ſubfaſciate 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

waves and ftreaks, 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 ftreaks, the two middle ones flexuous and croffing each other.

* ALBICILLATA. Wings whitifh, with a brown margin and fpot at the bafe and tip.

* HASTATA. All the wings white, irregularly barred, and fpotted with black.

* TRISTATA. All the wings black, with two white immaculate bands.

* CLATHRATA. All the wings yellowifh, with black lines and ftreaks croffing each other.

* CHÆROPHYLLATA. Black; wings erect; upper pair white at the tip.

* PROCELLATA. Upper wings white, with three brown bands, the middle one reaching half way acrofs, the hind one marginal, with a white fpot in the middle.

* FLUCTUATA. Wings pale cinereous, with three abbreviated brown bands on the upper pair.

* BILINEATA. Wings yellow, with teftaceous waves, and brown flexuous bands and white ftreaks. The larva is greenifh, nearly immaculate, and fometimes with white lines.

* VOLUTATA. All the wings of this infect are green, with two white ftreaks.

* LYNCEATA. Wings rounded, white, with two brown bands and a dot at the tip.

* BRUMATA. Wings yellowifh, with a black ftreak, and paler behind; the female is apterous and of a brown colour.

* CHENIPODIATA. Upper wings teftaceous, with three grey bands, a brown prominent dot and line at the tip above.

* HEXAPTERATA. Upper wings varied with grey and brown; lower ones whitifh, with an additional pair of wings at the bafe.

* DAPLICATA. Upper wings grey, with three brown flexuous bands.

* ALCHEMILLATA. Wings brownifh; the upper pair waved, with a fnowy band, with cinereous waves, and line within the tip.

* SUCCENTURIATA. Wings whitifh, with a darker border, and black dot.

* MACULATA. All the wings yellow, with brown fpots.

* EUPHORBIATA. All the wings brownifh-grey, immaculate.

* PUNCTATA. Wings rounded, fnowy; upper pair with a brown dot in the middle, the margin is dotted with black.

* MURINATA. Wings cinereous, with three darker ftreaks; 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 greenifh, with two purple bands on the upper pair.

* IMMUTATA. All the wings fnowy, with darker waved ftreaks; the hind margin dotted with black.

* CINGULATA. All the wings are brown, with a fnowy ftreak.

* URTICATA. Wings white, with macular brown bands; the thorax and tail yellow.

* LIMBATA. 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 infect is aquatic, fix-footed, green, with tufted lateral fpiracles; the pupa is folliculate, tapering both ways, and of a ferruginous colour.

* NYMPHÆETA. Wings cinereous, all of them alike, with reticulate white fpots.

* LEMNATA. Wings white; lower ones with a terminal black band, in which are four white dots.

c. *Wings forked.*

* FARINALIS. Feelers recurved; wings polifhed, yellowifh, with white flexuous ftreaks, the bafe and tip glaucous. This is found chiefly in bran and meal.

* GLAUCINALIS. Feelers recurved; wings glaucous, with two brown flexuous ftreaks.

* BARBALIS. Antennæ pectinate, longer than the feelers; fore-thighs with a projecting beard. This is found on the Trifolium pratenfe.

* TENTACULARIS. Antennæ pectinate, as long as the projecting feelers; wings pale cinereous, with brown ftreaks.

* PROBOSCIDALIS. Feelers projecting, approximate, longer than the thorax; the wings are grey, with ferruginous ftreaks.

* ROSTRALIS. Feelers projecting, longer than the thorax; wings greyifh, 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 ftreaks, 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 ftreaks.

* VERTICALIS. Wings glabrous, pale, fub-fafciate with brown; beneath it is waved with brown. The larva of this infect is fixteen-footed, hairy, with yellow head and legs; the pupa is brown, the three laft fegments have each a fmall tooth.

SALICALIS. Wings cinereous, with three oblique fulvous ftreaks on the upper pair; antennæ pubefcent. The larva is fourteen-footed, naked, green, with a darker dorfal line. The pupa is of a fine fhining black.

* STICTICALIS. Wings grey, with a yellow fpot in the middle, and a marginal ftreak. The fpot in the middle is notched on each fide, and the marginal ftreak has a contiguous fmaller one. Beneath it is variegated.

* PURPURALIS. Wings purplifh, with two yellow bands on each.

* COSTALIS. Wings purplifh, with two yellow coftal fpots, and hind margin.

* ATRALIS. Wings black, with two white fpots on each.

NOCTUA.

a. *Wings expanded.*

ZENOBIA. Wings variegated; beneath ferruginous, with black waves. It inhabits Surinam.

PATROCLUS. Wings tailed, both furfaces 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 blueifh eye, and double black pupil. A native of China.

NOCTILIO. Wings fuberous, brownifh, with waved

 black

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 ſtudded, 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 cheſnut-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.

* Absinthii. Wings hoary, with black bands, and dots diſpoſed in a quadrangle.

* Alori. Wings ſooty, with two grey patches, the firſt with a black marginal dot.

* Delphinii. Wings purpliſh, with two whitiſh bands; lower ones duſky.

* Perspicillaris. Wings with brown ſtreaks, twice two-toothed behind, with a ſingle kidney-ſhaped common ſpot.

* Pisi. Wings purpliſh, with two darker ſpots, and a yellowiſh waved ſtreak at the tip.

* Oxyacanthæ. The colour of the wings is dark

 brown,

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.

* LUCIPARA. 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.

* XANTOGRAPHA. 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 ψ; 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 χ.

* 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 tipt 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.

* CHLORÆNA. 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 chesnut-brown mark. The larva is rosy, with

white

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.

* BRYNNICHANA. 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.

* MODEIERIANA. 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 cheſnut 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.

* CAUDANA. Wings falcate, emarginate, the ribs grey, with a fulvous ſtreak.

* SCABRANA. 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 coſtal ſpots.

* OCELLANA. Wings cinereous, with a red patch in the middle, in which is a whitiſh dot.

* FORSKAHLIANA. The upper wings are yellow, and reticulate with ferruginous, with a browniſh patch in the middle.

* LŒFLINGIANA. 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 cheſnut-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.

* UNGUICANA. Wings cinereous, ſub-faſciate, the tip recurved and pointed, the outer margin behind tranſverſely ſtriate with white.

* CYNOSBANA. Upper wings brown, tipt 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.

* PRUNIELLA. 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.

* ARGENTELIA. 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.

* Pusiella. 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 ſecretes 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 ſcutel is black, tipt 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 teſſellate 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.

* Parenthesella. 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.

* Leucatella. 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 cheſnut 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.

* Moufsetella. 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.

* Swammerdammella. Wings pale, immaculate; the antennæ are very long.

* Robertella. Wings brown, angle of the tail white; antennæ very long.

* Frischella. Wings brown-gold; the antennæ are moderately long, and tipt with white.

* Calthella. Black; upper wings gold, the head is ferruginous.

* Degeerella. Wings black-gold, ftriate 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 fometimes wanting.

* Podella. Wings black-gold, ftriate 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 laft.

* Reaumerella. Wings black, bronzed outwardly; the antennæ are very long.

* Fasciella. Wings gilt, with a brown band; the antennæ are tipt with white.

* Sulphurella. Upper wings gilt, with two oppofite fulphur fpots; the lower ones are yellow.

* Oppositella. Wings brown, with two yellow oppofite fpots; the lower ones are brown.

Pterophorus.

* Monodactyla. Wings expanded, linear, undivided.

* Didactyla. Wings cleft, red-brown, with white ftreaks; the upper pair bifid.

* Tesseradactyla. Wings expanded, cleft, clouded with cinereous; the lower ones are clouded with brown.

* Pterodactyla. Wings extended, cleft, teftaceous, with a brown dot.

* Pentadactyla. Body and wings fnowy; upper pair bifid, lower ones three-parted. The larva of this fpecies is fixteen-footed, hairy, green, with black dots, and a white dorfal line; the pupa is hairy, green, dotted with black. It appears in Auguft: its larva feeds on nettles.

* Hexadactyla. Wings cleft, cinereous, fpotted with brown; all of them are fix-parted. This fpecies is found on the Lonicera xylofteum, or Honey-fuckle; it as a very elegant and beautiful infect, and often flies into the houfe in the evening: it makes its appearance in the month of September. It has been frequently called, by Englifh collectors, the twenty-plumed moth; this, however, is an improper name, the plumes being, in reality, twenty-four.

PHALAIA, a word invented by Bafil Valentine, and ufed as the name of a panacea, or univerfal medicine; but Rolfink has fince ufed it to exprefs a tincture of jalap.

PHALAINA, φαλαινα of Ariftotle, a fpecies of *Balæna*. See Mysticetus.

PHALANGER. See Didelphis *Orientalis*.

PHALANGIUM, in *Botany*, φαλαγγιον, a name adopted, by the earlier botanifts among the moderns, from Diofcorides. Their example was followed by Tournefort, Haller, and others; but Linnæus always objected to this name, as properly belonging to an infect, to which it had been appropriated from the moft remote antiquity, and for which therefore he retained it in the Zoological part of his fyftem, preferring *Anthericum*, another ancient denomination, for the genus of plants in queftion. Of late, however, Juffieu and other French botanifts, fome of whom never heartily affented to the above decifion of Linnæus, having divided his genus *Anthericum*, have reftored *Phalangium*. Whether the genus to which they have applied it, characterifed by its fmooth 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 fenfe and to every fyftematic rule. *Phalangites* prefents itfelf as a fynonym to the fame plant in Diofcorides, and is unexceptionable. The flowers of this genus are obferved by Juffieu to be white or purplifh; thofe of his *Anthericum* yellow. *Anthericum græcum*, *ferotinum*, Engl. Bot. t. 793, *Liliago*, *Liliaftrum*, &c., are examples of the former; *A. frutefcens*, Curt. Mag. t. 816, *aloides*, t. 1317, *afphodeloides*, and feveral others, of the latter, in which *Narthecium* of Fl. Brit. is, by fome botanifts, alfo retained. See Anthericum and Narthecium.

Phalangium, in *Entomology*, a genus of infects of the order Aptera; the generic character is, mouth with horny mandibles, the fecond joint with a very fharp moveable cheliferous tooth; feelers filiform; no antennæ; two eyes on the crown, and two at the fides; eight legs, the abdomen is generally rounded. There are nineteen fpecies, divided into two fections, which are fubdivided. Of all the infects of this order, few are more repulfive than thofe of the Phalangium genus. Some of them are armed with weapons refembling thofe of the fpider genus, but operating with much malignity. They differ very much in fize, fome being very minute, while others are equal in magnitude to the larger kind of fpiders.

A. *Mouth with a conic tubular fucker.*

a. Four feelers, the upper ones chelate.

Species.

* Grossipes. Body minute, cylindrical glabrous; fhoulders tuberculate; legs very long. It inhabits European feas. The body is of a dirty red, very minute and flow; it infinuates itfelf into the fhells of mufcles, and deftroys the fifh.

Hirtum. Body filiform and hairy. It inhabits the Norway ocean, and is about the fize of the laft.

Spinipes. Body cylindrical, flender; legs very long and fpinous. This alfo is found in the feas of Norway.

b. Two feelers.

* Balænarum. Two feelers; body ovate, red on the back. It inhabits European feas. Found under ftones. The fucker projects ftraight, is obtufe at the lip, with a round perforation; the feelers as long as the fucker, and placed at its bafe; the legs are pointed.

B. *Mouth without fucker.*

a. Feelers projecting, incurved.

Bicolor. Body roundifh and black above; legs very long, with teftaceous joints and tips. It is a large infect, and is found in Switzerland.

Morio. Abdomen ovate, black beneath, and bafe of the legs pale. It inhabits Norway, about rocks; larger than the Opilio, which comes next.

* Opilio. Abdomen ovate, grey, beneath whitifh. It inhabits Europe and America, and wanders about by night. This is the moft common infect of the genus, and during autumn it may be obferved in gardens, about walls, &c.; it is remarkable for its plump, but at the fame time flattifh orbicular body, and its extremely long and flender legs, which are generally fo carried that the body appears fufpended or elevated to a confiderable height above the furface on which the animal refts; the eyes are fituated on the top of the head, and refemble two very minute glaffy globules; the colour of the whole animal is a pale greyifh-brown. This fpecies preys on the fmaller kind of infects.

* Cornutum. Abdomen depreffed; mandible conic, afcending; feelers refembling eggs. It is found in this country and other parts of Europe, like the laft, to which it bears a refemblance.

Bilineatum. Pale, with two black dotted dorfal lines. This and the next are found among the rocks of Norway.

Diadema. Thorax with an elevated fpinous tubercle on the back. This tubercle is furnifhed with a large eye on each fide.

Carinatum. Brown; abdomen depreffed, carinate; the fore legs are one-toothed before the tip. It is found chiefly at Drefden, and is about the fize of the Opilio.

* Duo-maculatum. Abdomen black, with two white fpots. This is an Englifh infect, and is defcribed and figured by Mr. Donovan. The body is very fmall, ovate, and black, with two white fpots; abdomen is furrounded with a very fine fub-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 fouthern parts of Ruffia. Its bite is faid to be extremely poifonous, occafioning livid tumours, and fometimes death itfelf. The body of this infect is foft, livid, woolly, with inflated claws.

* Cancroides. Abdomen obovate, depreffed, ferruginous; the claws are oblong and hairy. A variety has ovate claws. It is found in divers parts of Europe, befides this country, in cellars and damp places, and is the little infect which gets into our legs and under the fkin, caufing a very painful itching.

Acaroides. Abdomen cylindrical, yellowifh; claws ovate and fmooth. It inhabits America. Is twice as large as the former, and its bite is reported to be extremely painful and dangerous.

b. Feelers thick, fpinous, and furnifhed with a claw at the tip.

* Hirsutum. Feelers ferrate; body fub-oval, with ten angles. It is found in this country.

Reniform. Feelers ferrate; fore-legs very long and filiform; thorax kidney-fhaped. It inhabits South America, and its iflands. It is one of the largeft of the genus, and has the appearance of a very large fpider.

Caudatum. The feelers of the infects of this fpecies are branched; the tail ends in a briftle. The claws are large, and toothed on the infide towards the tips. It is a native of the Eaft Indies.

Lunatum. Feelers very long, and fpinous at the tip; thorax kidney-fhaped. It inhabits America. The feelers are four times as long as the body, they are fmooth, except at the tip, which is very fpinous.

Phalangium *Apulum*, the *Apulian phalangium*, a name given by authors to that large and poifonous fpecies of fpider, called by the vulgar the tarantula, from the name of a city of Calabria, Tarantum; near which it is very common.

PHALANGOSIS, from φαλαγξ, *a row of foldiers*, in *Surgery*, a difeafe, in which the row of hairs, compofing the eye-lafhes, turn inward, and irritate the eye. See Trichiasis.

PHALANX, in *Anatomy*, a name applied to the bones of the fingers and toes, which are diftinguifhed by the numerical terms, firft, fecond, and third, reckoning from the metacarpus and metatarfus. The two rows of carpal bones are alfo called phalanges; the firft or radial, the fecond or metacarpal.

Phalanx, φαλαγξ, in *Antiquity*, a huge, fquare compact battalion, formed of infantry, fet clofe to one another, with their fhields joined, and pikes turned crofs-ways; infomuch that it was almoft impoffible to break them.

It confifted of eight thoufand men: Livy fays, that this fort of battalion was invented by the Macedonians, and that it was peculiar to them; whence, among writers, it is fometimes called the *Macedonian phalanx*.

St. Evremont obferves, that the Macedonian phalanx had the advantage in valour and ftrength over the Roman legion.

Phalanx, in *Natural Hiftory*, a term ufed by Dr. Woodward, and fome other writers of foffils, to exprefs an arrangement of the columns of that fort of foffil coralloid body found frequently in Wales, and called *lithoftrotion*.

In the great variety of fpecimens which are found of this, fome have the whole phalanx of columns cracked through, and others only a few of the external ones; but thefe cracks never remain empty, but are found filled up with a white fpar, as the fmaller cracks of ftone ufually are. This is not wonderful, as there is much fpar in the compofition of this foffil; and it is eafily wafhed out of the general mafs to fill up thefe cracks, and is then always found pure, and therefore of its natural colour, white. The lithoftrotion, or general congeries of thefe phalanges of columns, is commonly found immerfed in a grey ftone, and found on the tops of the rocky cliffs about Milford in Wales. It is ufually erect, though fomewhat inclining in fome fpecimens, but never lies horizontal. It feems to have been all white at firft, but to have been fince gradually tinctured with the matter of the ftone in which it lies. The fingle columns which form each phalanx are ufually round or cylindric, though fometimes flattened and bent; fome of them are alfo naturally of an angular figure; thefe, however, are not regular in the number of their angles, fome confifting of three fides, fome of five, and fome of feven; fome are hexangular alfo, but thefe are fcarce. They are from five or fix to fixteen inches in length; and the largeft are near half an inch over, the leaft about a quarter of an inch; the greater number are very equal to one another in fize; but the fides of the columns being unequal, the fame column meafures of a different thicknefs when meafured different ways; the phalanges or congeries of thefe are fometimes of a foot or more in diameter.

The columns are often burft, as if they had been affected by external injuries; and it is evident, that they were not formed before feveral other of the extraneous foffils; for there are found fometimes fhells of fea-fifhes and entrochi immerfed and bedded in the bodies of the columns. It appears plainly from hence, that when thefe bodies were wafhed out of the fea, and toffed about in the waters which then covered the tops of thefe cliffs, this elegant foffil, together with the ftony bed in which it is contained, were fo foft, that thefe other bodies found entrance into their very fubftance, and they were formed, as it were, upon them. This foffil takes an elegant polifh, and makes in that ftate a very beautiful appearance, being of the hardnefs of the common white marble, and carrying the elegant ftructure vifible in the fmalleft lineaments. Woodward's Coll. of Foff. p. 11.

PHALARIS, in *Biography*, tyrant of Agrigentum, in Sicily, who rendered himfelf famous by the cruelties which he committed, but of whofe perfonal hiftory very little is known. He is thought to have been born in Crete, and to have been banifhed from that ifland on account of his political intrigues. He went to Sicily, and by his abilities was enabled to obtain the fovereignty of Agrigentum about the year B. C. 571. He found it neceffary to maintain by harfhnefs and feverity, the place to which he had rifen by 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 φαλαρις 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. Lamarck 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. Nectary of two lanceolate, pointed, pellucid 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; ſtigmas villous. *Peric.* none, 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. Engl. Bot. t. 1310. Knapp. t. 3. Mart. Ruſt. 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. *Stipulæ* 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, clapped 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 *ſtipulæ*. 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 *Mantiſſa*, 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. Hoſt. Gram. Auſtr. v. 2. 29. t. 39. (Ph. minor; Retz. Obſ. faſc. 3. 8. Ehrh. Exſicc. 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 Schrader, 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; Schrader 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, bluntiſh, 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. *cæruleſcens.* Blueiſh Canary-graſs. Desfont. Atlant. v. 1. 56. (Gramen phalaroides hirſutum, ſpicâ longiſſimâ; Buxb. Cent. 4. 30. t. 53.)—Panicle cylindrical, ſpike-ſhaped, rather lax. Valves of the calyx boat-like,

 tapering,

tapering, pointed. Corolla acute.—Gathered by Buxbaum, in meadows about the Bofphorus, in May; by Desfontaines in fields at Algiers. This is compared by the latter to *Ph. bulbofa*, by which there is good reafon to fuppofe he meant the grafs fo called by Linnæus; fee PHLEUM *tenue*. Buxbaum took his plant for that of Barrelier, cited under our laft fpecies, and therefore found fault with that figure; but he was miftaken, as was Linnæus no lefs in citing him under *aquatica*, from which the plant of Buxbaum and Desfontaines feems to differ in having fmooth *leaves*, and a more lax *panicle;* but efpecially in the *calyx*, which is blueifh, with taper-pointed valves. We do not underftand why Buxbaum terms his "a hairy grafs." We have feen no fpecimen, and as Desfontaines does not advert to the double *corolla*, even in *Ph. canarienfis*, it is impoffible to afcertain from him whether the prefent plant has one or two valves in the outer *corolla*. His expreffion of "an inner *calyx*," in thefe and other graffes, alludes only to the *corolla* altogether, after the French mode.

5. Ph. *paradoxa*. Briftled-fpiked Canary-grafs. 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. fil. Dec. 2. 35. t. 18. Schreb. Gram. 93. t. 12. Hoft. Gram. Auftr. v. 2. 30. t. 40.—Panicle cylindrical, obtufe, fpike-fhaped. Valves of the calyx fingle-toothed, awned. Lower flowers abrupt and abortive.—Native of Iftria, Italy and Greece, in cultivated ground, flowering in May and June. *Root* annual, of many downy fibres. *Stems* numerous, afcending, 12 or 18 inches high, bent at the joints, almoft entirely clothed with the long, more or lefs inflated, fheaths of the *leaves*, the uppermoft of which embraces the lower part of the *panicle*, where a great many of the *flowers* affume a ftrange appearance, being ftarved, abortive, and of an abrupt wedge-like figure. The *flowers* above, in their natural ftate, 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 ftraight awn, various in length. Schrader has obferved a minute outer *corolla* of two valves; the inner confifts of two, rather unequal, ovate, acute, fomewhat downy ones. *Seed* minute. Linnæus obferved, that all the *flowers* became perfectly formed, in cultivated fpecimens.

6. Ph. *arundinacea*. Reed Canary-grafs. 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. Hoft. Gram. Auftr. 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 fpreading 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, fpreading to a great extent. *Stems* from two to five feet high, erect, ftrong, reedy, fmooth and leafy, with feveral joints. *Leaves* alfo reed-like, lanceolate, ftriated, pointed, fmooth, rather glaucous, with tight, or fcarcely fwelling, fheaths. *Stipula* fhort, bluntifh. *Panicle* very different from any of the preceding, confifting of numerous, compound, angular, rough *branches*, turned one way, and bearing numerous, crowded, often purplifh, tufts of *flowers*. The *calyx-valves* are lanceolate, nearly equal, keeled, ribbed, awnlefs. Outer *corolla* of two very minute, linear, gibbous, hard valves, each bearing a tuft of hairs exceeding their own length. Thefe hairs mifled the ingenious Dr. Solander to refer the grafs in queftion to *Arundo*, a miftake in which we concurred in Fl. Brit. but which is now corrected in *Engl. Bot.* by the fubftitution of a new page 402, in confequence of the very accurate remarks of Dr. Schrader, whofe *Flora Germanica* excels every work, in this tribe of plants, that we have feen.

7. Ph. *capenfis*. Cape Canary-grafs. Thunb. Prodr. 19. Willd. n. 3.—"Panicle ovate, fpike-fhaped. Glumes entire. Stem bent and decumbent."—Native of the Cape of Good Hope. Having feen neither fpecimen, nor any further defcription of this fpecies, we dare not remove it from *Phalaris*, though it may poffibly be a *Phleum*.

To the latter genus we now refer the Linnæan *Phalaris bulbofa*, *dentata*, *phleoides*, as well as *arenaria* of Fl. Brit. and *afpera* of Willdenow. The *utriculata* is fhewn in Fl. Græc. t. 63 to be an *Alopecurus*, beyond all poffible doubt; *oryzoides* will be found under *Leerfia; zizanoides* is *Andropogon muricatum*, Retz. Obf. fafc. 3. 43. *Ph. hifpida*, Thunb. Jap. 44, appears a very doubtful plant, but there is evidently no reafon to retain it here. See PHLEUM.

PHALARIS, in *Agriculture*, the title of a genus of graffes, of which there are feveral fpecies, but none that can be introduced into field culture with advantage. It is the canary grafs.

PHALARIS, in *Ornithology*. See FULICA *Atra*.

PHALARIS'S *Bull*, in *Ancient Hiftory*, was a brazen bull for tormenting criminals, conftructed by Perillus the Athenian, in order to flatter the cruelty of Phalaris, tyrant of Agrigentum. The artift, demanding too great a reward for his contrivance, was the firft who fuffered in it. Some have treated this fragment of ancient hiftory 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 deftruction of Agrigentum, found among other things this bull, and reftored it to the inhabitants of Agrigentum, where it was to be feen when Diodorus wrote his hiftory, *viz.* in the reign of Auguftus. See BULL *of Phalaris*.

PHALAROPE, in *Ornithology*, is a fpecies of the *tringa* in the Linnæan fyftem. Mr. Pennant gives the following general character of this fpecies: the bill is ftraight and tender; the noftrils minute; the body and legs like thofe of the fand-piper, and the toes furnifhed with fcallopped membranes. He alfo more particularly defcribes the grey phalarope, or *tringa lobata* of Linnæus, and the red or *tringa hyperborea* of the fame 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 nofe, defcribed by Galen in his Treatife on Bandages.

PHALERÆ, among the *Ancients*, horfe-trappings.

PHALERUM, in *Ancient Geography*, the moft ancient port of Athens, which, being found narrow and inconvenient, was fucceeded by the more capacious harbour of Piræus, conftructed by Themiftocles. (See PIRÆUS.) Phalerum was diftant from the city, according to Thucydides, 35 ftadia, but, according to Paufanias, only 20. It was from this port that Mneftheus, an ancient king of Athens, took his departure with a fquadron for the fiege of Troy. Thefeus likewife went from hence to Crete, to combat the Minotaur. Near this port was a temple of Ceres, a temple of Minerva Scirada, fo called after Sciras, one of the propheteffes of Dodona, a temple of Jupiter, fome altars to unknown gods, different altars to feveral heroes, fuch as the children of Thefeus and thofe of Phalerus, from whom this port derived its name, and who was ranked among the Argonauts, and an altar to Androgeus, with this brief infcription, "To the Hero." Paufan. in Attic. On the road which led from Phalerum to Athens there had fubfifted for

for a long time a temple of Juno, which was burnt by Mardonius, on occaſion of the invaſion of the Perſians. See Athens.

PHALEUCUS, or Phalecius, 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 thyrſi.

PHALLOPHORI, φαλλοφοροι, a name given at Sicyon to certain mimes, who ran about the ſtreets ſmutted with black, and clothed in ſheep ſkins, bearing baſkets full of various herbs, as chervil, brancha 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 φερω, *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. Perſ. Syn. 242. Hudſ. 629. Juſſ. 4. Lamarck Illuſtr. t. 885. Venten. Mem. de l'Inſtit. v. 1. 503. Uſt. 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. *fœtidus*. 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 honeycomb-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, unconnected, except at the top; externally much like a honeycomb, pale, but covered when at maturity with a viſcid, fœtid, greeniſh-black fluid, which ſoon runs off, carrying away the *ſeeds*. Flies are very fond of this fluid.

2. Ph. *cancellatus*. Latticed Stink-horn. Perſ. n. 2. Venten. n. 10. (Ph. volvatus, pileo apice clauſo; Rothm. Stockh. Tranſ. for 1742. 19. t. 2. Ph. alpinus, volvâ ſubrotundâ albâ, pileolo cellulato, 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. *induſiatus*. Veiled Stink-horn. Venten. n. 13. Perſ. n. 3. (Ph. dæmonum; Rumph. Amboin. v. 6. book 11. 131. 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, netlike *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 Nepaul, 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. Perſ. 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 Coſſey and Crown Point, near Norwich. Mr. Bowman ſays the unexpanded 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 *fœtidus*, 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. *Mokuſin*. Chineſe Stink-horn. Cibot Act. Petropol. v. 19. 373. t. 5. Linn. Suppl. 452. Perſ. 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 ſcent 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. Perſ. 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. Sterbeeck'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 *fœtidus*, 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 Perſoon 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 Perſoon's *Morchella 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 $197\frac{1}{2}$ kiliometres, 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 φανερος, *conſpicuous*, a genus of Loureiro's, founded on the *Bauhinia ſcandens*, Linn. Sp. Pl. 535, the Folium linguæ, Rumph. Amboin. v. 6. 1. t. 1. This plant, it ſeems, has but three *ſtamens*, and a *calyx* of four leaves. Its habit however is altogether that of a genuine *Bauhinia*, 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, φαντασμα, *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 intellection. 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 ſubtile 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 *Agoræus*, 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 reverenced 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 Tachasara. 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 Chaldæa. 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. If. 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 $\frac{\overline{n-2} \times y}{n \times \overline{n-1}} + \frac{2}{n \times \overline{n-1}}$, or $\frac{\frac{1}{2}n+1}{n \times \overline{n-1}}$, ſuppoſing $y=\frac{1}{2}$. In the third caſe, his gain is $\frac{3y}{2 \times \overline{n-1}}$, or $\frac{3}{4 \times \overline{n-1}}$, ſuppoſing $y=\frac{1}{2}$. In the fourth caſe, the gain of the banker, or the loſs of the ponte, is $\frac{2n-5}{\overline{n-1} \times \overline{n-3}}\, y$, or $\frac{2n-5}{2 \times \overline{n-1} \times \overline{n-3}}$, 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 2*l.* 19*s.* 10*d.* 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 φαρυγξ, *the throat*, and τομη, *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 פרם, in the Hebrew, or rather Chaldee tongue; whence is formed the Greek Φαρισαιος, and the Latin *Phariſæus*. 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 פרש, *expoſuit*, 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. Joſ. Ant. lib. xiii. cap. 10. §. 5, 6. cap. 15. § 5. and cap. 16. § 1. According to Baſnage, 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 Tungunska. N. lat. 61° 35'. E. long. 106 54'.

PHARMACEUTICA, Φαρμακευτικη, that part of physic which directs the preparation and application of medicines. See PHARMACY.

PHARMACI, Φαρμακοι, 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 ισχαδες, 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 soteria*, Φαρμακα σωτηρια, which were amulets against the former: such was the herb moly, which preserved Ulysses from Circe's enchantments; the laurel, the sallow-tree, the rhamnus or Christ-thorn, fleabane, 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 ampelites, or cannel-coal.

PHARMACIUS SINUS, in *Ancient Geography*, a gulf of Thrace, on the Bosphorus of the same name, south-west of the gulf Bætycolpas. 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 Φαρμακον, *remedy*, and ποιειν, *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, Quincy, &c. The latest, and most in esteem, are the Edinburgh, London, and Dublin Dispensatories.

PHARMACOPOLA, or PHARMACOPOEIUS, 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 Φαρμακον, and πωλειν, *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 Circé.

PHARMACY, Φαρμακεια, derived from Φαρμακον, *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 Galenical 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, exsiccation, 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 anfwered to the month of April among the Romans.

PHARNACEUM, in *Botany*, a name taken from Pliny, faid to have been given to fome plant in honour of its difcoverer Pharnaces, fon 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 affert it has nothing to do with the prefent Linnæan genus; nor can we guefs at the motive for its application to a fet of plants, almoft deftitute of any fenfible qualities, and of too trivial an afpect 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. Juff. 300. Lamarck Illuftr. t. 214. Gærtn. t. 130.—Clafs and order, *Pentandria Trigynia*. Nat. Ord. *Caryophyllei*, Linn. Juff.

Gen. Ch. *Cal.* Perianth of five, nearly ovate, concave, fpreading, equal, permanent leaves, coloured withinfide, thin-edged. *Cor.* none; hence the coloured thin-edged calyx. *Stam.* Filaments five, awl-fhaped, the length of the calyx; anthers cloven at the bafe. *Pift.* Germen fuperior, ovate, triangular; ftyles three, thread-fhaped, the length of the ftamens; ftigmas obtufe. *Peric.* Capfule ovate, flightly triangular, invefted by the clofed calyx, of three cells and three valves. *Seeds* numerous, polifhed, orbicular, depreffed, furrounded by an acute border.

Obf. Reichard remarks that the parts of fructification in *Ph. Mollugo* differ fomewhat from the above account. This remark is fuggefted by the defcription in Linn. Mant. 561, which belongs to *Mollugo Spergula*, fee MOLLUGO; but we find the flowers are variable on the fame individuals. We have already indicated the clofe affinity between thefe genera.

Eff. Ch. Calyx of five leaves, coloured internally. Corolla none. Capfule fuperior, of three cells, with many feeds.

The four fpecies defined in Sp. Pl. ed. 2, have fubfequently been augmented, chiefly by difcoveries at the Cape of Good Hope, to 14, as may be feen in Willdenow. Their habit is for the moft part flender, like a *Spergula* or *Arenaria*; in fome cafes herbaceous and annual, in others fhrubby; but always of humble ftature. *Leaves* fimple, entire, fmoothifh, varioufly difpofed; their *ftipulas* fometimes very remarkable for a fhining membranous afpect, and curious fubdivifion. *Inflorefcence* moftly forked, panicled. *Flowers* copious, variegated with green and white, or a reddifh tint.

1. Ph. *Cerviana*. Umbellate Pharnaceum. Linn. Sp. Pl. 388. Willd. n. 1. Ait. n. 1. (Ph. umbellis fimpliciffimis; Gmel. Sib. v. 3. 102. t. 20. f. 2. Alfine; Pluk. Phyt. t. 332. f. 1.)—Flower-ftalks lateral, fomewhat umbellate, about as long as the linear whorled leaves.—Native of Ruffia, Siberia, Spain, Guinea and the Eaft Indies. The *root* is fmall and annual. *Herb* fmooth. *Stems* numerous, fpreading in every direction, thread-fhaped, yellowifh, three or four inches long, fimple or divided. *Leaves* about ten in each whorl, linear, glaucous, an inch long, more or lefs. *Umbels* of two or three greenifh-white *flowers*, on capillary *ftalks* bent toward one fide. Minuart, a Spanifh botanift, is cited by Linnæus as having written a monograph on this fpecies, under the name of *Cerviana*, but we have never been able to difcover any fuch work.

2. Ph. *Mollugo*. Bedftraw 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 ftellaris five Afperula minor humifparfa, flofculis albis æthiopica; Pluk. Mant. 163. Mollugo n. 1.; Linn. Hort. Cliff. 28.)—Flower-ftalks axillary, fingle-flowered, half the length of the linear whorled leaves.—Native of the Cape of Good Hope. The *root* is annual. *Stems* numerous, proftrate, alternately branched, zigzag, round, jointed, whitifh, very fmooth and polifhed. *Leaves* fix or feven in a whorl at each joint, fpreading, about half an inch long, linear, entire, fmooth, light green, each tipped with a fmall briftly point. *Flowers* very minute, about the fize of a *Herniaria*, green, with white edges, pentandrous, each on a fhort fimple ftalk, feveral together at each whorl; but we find no proper umbel, as defcribed in the *Supplementum*, though we perceive what caufed that error.

Great confufion has exifted between this plant and the *Mollugo Spergula* of Linnæus, but the above fynonyms will not fail to prevent any further miftake. Since the article MOLLUGO was publifhed, various fpecimens from Dr. Rottler have enabled us better to underftand the *M. Spergula*, a moft variable plant, fome of whofe *flowers* anfwer, as far as we can judge of them dried, to the defcription in Mant. 561; whilft others, from the fame root, are fimply triandrous, without either *petals* or barren *filaments*, as they ought to be in a *Mollugo*. Linnæus cultivated it in the Upfal garden, and, no doubt, faw there what he has fo minutely defcribed, though one of his fpecimens from thence has fimply triandrous *flowers*. This fpecimen, moreover, has fo nearly loft all the lateral pubefcence from the *ftem*, and has its *leaves* fo much elongated, that no one could think it the fame with the authentic wild fpecimen of *M. Spergula*, which we have defcribed in its proper place, did not the various parts of Dr. Rottler's moft fatisfactorily combine the two. We muft obferve that *M. Spergula* is the *Pharnaceum Mollugo* of moft botanifts, they being mifled by the wrongly printed fpecific name in *Linn. Mant.* 561, which in the margin ought to have been *Spergula*. Willdenow, bewildered by this miftake, has increafed it by the mention of *Mollugo verticillata*.

3. Ph. *ferpyllifolium*. Thyme-leaved Pharnaceum. Linn. Suppl. 186. Willd. n. 8. Thunb. Prodr. 54.—"Stalks fingle-flowered. Leaves ovate, ftalked."—From the Cape. A delicate annual herb, refembling a fmall plant of *Herniaria glabra*. *Stems* branched, forked, thread-fhaped, jointed, fmooth. *Leaves* two or more at each joint, ftalked, ovate, many times fhorter than the intermediate fpaces. *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 fame country. Willdenow and Aiton mark it annual. We have feen no fpecimen of this or the laft.

5. Ph. *lineare*. Linear-leaved Tawny Pharnaceum. Linn. Suppl. 185. Willd. n. 2. Ait. n. 2. Andr. Repof. t. 326.—Umbels irregular, partly compound, on long terminal ftalks. Leaves linear, whorled. Stem proftrate, fomewhat fhrubby.—Sent from the Cape by Mr. Maffon, in 1795, and occafionally introduced fince, though often loft, being difficult of prefervation. The *ftem* is fomewhat fhrubby and perennial, and is, according to Mr. Andrews, increafed by cuttings. *Leaves*, and whole appearance, much like our Englifh *Spergula arvenfis*, but the *flowers* have a tawny hue, and grow in fpurious *umbels*, fome of whofe ftalks are racemofe. The ftructure of the *fructification* anfwers 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 Pharnaeeum. 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 Bladh, 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 briſtle. *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. *diſtichum.* Double-cluſtered Pharnaceum. Linn. Mant. 221. Willd. n. 13. (Alſine ſpergula indiæ orientalis, ſpicatis floribus ex alis emergentibus; Pluk. Mant. 9. Phyt. t. 332. f. 4. A. holoſtea 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* appears 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 Brunduſium, 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, inſomuch 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 Cnidos, 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 Pharphar, in *Ancient Geography,* one of the rivers of Damaſcus, or rather an arm of the Barrady or Chryſorrhoas (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 Theſſaly, 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. Gen. 492. Schreb. 639. Willd. Sp. Pl. v. 4. 396. Mart. Mill. Dict. v. 3. Browne Jam. 344. Ait. Hort. Kew. v. 5. 278. Juſſ. 33. Lamarck Illuſtr. t. 769.—Claſs and order, *Monoecia 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 muricated with little ſoft adheſive hooks. *Seed* oblong, large, with a furrow along one ſide.

Obſ. 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. Obſ. 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*,

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 Melanogetulians and of mount Sagapola.

PHARYCADUM, a town of Macedonia, in the Estiotide, 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 Leipsic 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. Muf. 19. Sm. Fl. Brit. 1149. Turn. Musc. Hib. 1. Swartz. Musc. Suec. 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 *Syst. 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, destined 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. cohærens*, Hedw. Sp. Musc. 25. t. 1. f. 1 - 6. We have however, from Mr. Menzies, a New Holland nondescript *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 chesnut-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. Dicks. Crypt. fasc. 4. 1. 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 overtopped by the *leaves*.

Ph. *multicapsulare*. Many-fruited Earth-moss. Sm. Fl. Brit. n. 7. (Ph. sphærocarpos; Abbot. 230. Ph. crispum; Swartz Musc. Suec. 17. Engl. Bot. t. 618, but not of Hedwig.)—Caulescent 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. Dickſ. 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 ſerrated 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 ſerrated 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. *ſerratum*. Serrated Phaſcum. Schreb. Phaſc. 9. t. 2. Sm. Fl. Brit. n. 15. Engl. Bot. t. 460. Dickſ. Crypt. faſc. 1. t. 1. f. 1.—Stem none. Shoots ſpreading, repeatedly branched, capillary, jointed, barren. Leaves lanceolate, acute, ſerrated.—Schreber, who diſcovered this extremely minute ſpecies, in rich moiſt meadows near Leipſic, 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 ſerrated, 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. Dickſ. 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 *ſerratum* 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 PHASAELIS, 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 φασηολος, 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. Gærtn. 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 ſun. *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.

Obſ. 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 bracteas.

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. ed. 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. Bracteas 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 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 blueish 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. *Ait.* Ph. puniceo flore; Cornut. Canad. 184. t. 185. Ph. indicus, flore coccineo; Moris. 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 misled 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. Gerarde 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. Cliffort'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; Triumf. 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, sive 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 zigzag, 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

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. hirfutus flexicaulis, Mungo affinis e maderafpatan, caule tereti; Pluk. Almag. 290.) —"Stem zigzag, fomewhat twining, hairy, round. Legumes capitate, hairy."—Native of the Eaft Indies. Linnæus having raifed this in the Upfal garden, found it diftinct from the preceding, with which it appears by his manufcripts he had once confounded it. The round *ftem*, more difpofed to climb, and the capitate *flowers*, feated on a fmooth, ovate, long-ftalked receptacle, are, by his defcription, fufficient marks of difference. We find no fpecimen in his herbarium of this fpecies, but it is mentioned in the late Mr. Donn's Cambridge catalogue.

Ph. *capenfis.* Trailing Cape Kidney-bean. Thunb. Prodr. 130. Willd. n. 18.—Stem thread-fhaped, decumbent. Stalks fingle-flowered. Leaflets lanceolate.—Gathered at the Cape of Good Hope by Thunberg. The *ftem* is very flender, rough with minute briftles or prickles. *Leaflets* an inch and a half long, linear-lanceolate, veiny, minutely hifpid. *Stipulas* fmall, ovate. *Flower-ftalks* axillary, thrice as long as the leaves, and thrice as thick as the footftalks, ftraight, fingle-flowered, very rough at the top with deflexed rufty briftles, as is the *calyx* with erect ones. The *corolla* is purple, large and handfome. Our fpecimen fhews nothing of the proper character of the genus, for which we muft rely on Thunberg. In the Bankfian herbarium this plant is referred to *Dolichos*. There appears to us much of the character of *Glycine*, the *ftyle* being actually curved backwards, with the *keel*, fo 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 *Phafeolus*.

Phaseolus, in *Gardening*, contains plants of the climbing, efculent, and flowering kinds, of which the fpecies cultivated is the common kidney-bean (P. vulgaris.)

But other fpecies may be cultivated, for the purpofe of variety, as flower-plants.

Thefe were formerly called *Sperage beans*, *French beans*, &c.

And the principal fub-varieties of the dwarf, or low-growing forts, are; the early white dwarf; the early fpeckled 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 fpeckled dwarf; black-ftreaked dwarf; the red-fpeckled dwarf; the fpeckled amber dwarf; the fparrow-egg dwarf; the Canterbury white dwarf; the Batterfea white dwarf; the China fpeckled dwarf, confifting of black and white fpeckled, brown and white, red and white, &c. Thefe are of upright dwarf-bufhy growth, rarely exceeding fifteen or eighteen inches in height; and feldom throw out runners, except the Canterbury and Batterfea forts, which fometimes fend out a few ftragglers, but which feldom extend to much diftance.

But the firft three or four forts are at prefent in moft efteem for their coming early into bearing; being of fmaller growth than the other forts, they fooner form themfelves for bloffom and bearing, of courfe are proper for planting for the earlieft crops, and for forcing in hot-beds, &c. As they, however, do not continue long in bearing, they are not fo proper for the main crops as the larger dwarf forts; particularly the black and white fpeckled, the Canterbury and Batterfea kinds, which are all excellent bearers; but the two latter moft of all, and the pods are fmaller, more numerous, and efteemed the fweeteft eating of all the dwarf kinds whilft young, though the pods of the large white dwarf, and the fpeckled kind in particular, continue exceedingly good, even when of pretty large fize, but fuperior in the latter, both in a more plentiful longer production, and goodnefs for eating, being excellent for a principal crop in a family garden; as are alfo the Batterfea and Canterbury forts, which fhould not be admitted on the fame occafion; and thefe two varieties are commonly in moft efteem for general culture by the market-gardeners for main crops, as being by them confidered both the moft profitable for bearing, and having a fmaller pod, the moft faleable in the markets: however, any of the other dwarf forts are alfo proper to cultivate occafionally, for variety, both for private and public ufe.

There is a fcarlet bean, which is by fome confidered as a diftinct fpecies, but probably a variety of this, the running or twining ftalks of which, if properly fupported, rife to the height of twelve or fourteen feet: the leaves are fmaller than thofe of the common garden-bean: the flowers grow in large fpikes, and much bigger, and of a deep fcarlet colour: the pods are large and rough; and the feeds are purple marked with black, and fometimes pure white.

The principal fub-varieties of thefe are; the large fcarlet climber, which rifes with many twining runners upon fupport, eight or ten to twelve or fifteen feet high, having numerous large clufters of fcarlet flowers, fucceeded by large, thick, rough, flefhy feed-pods, containing large, thick, purplifh beans.

The large white climber, having large clufters of white flowers, large, thick, rough feed-pods, and white feed. Thefe forts are all alike in refpect to their growth, differing only in the colour of their flowers and feed, which is pretty permanent: they are great bearers; and the plants of the fame crop continue in bearing from July or Auguft until October; the pods, even when large, boiling exceedingly green, being remarkably tender and well-flavoured.

The large Dutch climber, which rifes with twining runners, upon fupports, ten or twelve feet high; has numerous clufters of white flowers, fucceeded by long, broad, comprelfed, flat, fmooth pods, containing large, oblong, flat, white feed: this is alfo a very great bearer, but it does not continue near fo long in production as the two former climbers; its pods, however, which are very long, fmooth, and flefhy, boil exceedingly green, tender, and good: and, of the runner kind, it is a very defirable family bean, inferior to none for fweetnefs of flavour.

But the following forts are of a more moderate growth. The Negro runner; the Batterfea white runner; and the Canterbury runner; which, though climbers, ramble lefs, but bear plentifully and continue fome time. The pods are fmaller, but very tender, and very delicate in eating, while in moderate young growth.

Method of Culture.—As thefe are all plants of the annual tender tribe, they require to be raifed every year, in the latter fpring and fummer months, as from April till June, or later, by different fowings, at the diftance of a few weeks, when the danger of frofts is over.

Culture in the Dwarf kinds.—In cultivating thefe forts, proper kinds fhould be chofen for the different crops, as for the forward ones, any of the early forts are proper, but the early white, early fpeckled, dun, and yellow kinds, are rather the earlieft bearers; and for the main crops, any of the larger dwarf kinds, though preference fhould be given to the fpeckled, the Batterfea, and the Canterbury dwarf kinds, as being all plentiful bearers, and continuing long in fucceffional bearing on the fame plants.

Thefe forts of beans, from their tender nature, feldom admit

admit of being fown or planted earlier than April, when the weather is become a little fettled ; as the feed is not only impatient of cold moifture in the ground, and very fubject to rot, but the young plants that happen to come up early are often cut off, or greatly injured, by the morning frofts, 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, fome may be ventured in a warm dry fituation, and light foil, for the early natural crops ; and in the latter end of it, or beginning of the following month, when the weather is fuitable, it is proper to begin to put in the firft general crops in the open quarters, &c., and to continue planting fome every fortnight or three weeks, until the middle or latter end of July ; by which means regular fupplies 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 feafon.

Where, however, it is defired to try them as early as poffible in the full ground, fome may be put in about the beginning of April, in dry weather, clofe under a warm wall, or other fimilar fituation, where the foil is dry ; and in a fortnight after fome more, in a larger proportion. If the firft fhould fail, thefe fometimes fucceed ; and if both are attended with fuccefs, one will follow the other in bearing ; though it is two to one againft the fuccefs of the firft planting. But as only a few fhould be planted fo early, if they fail, it is only the lofs of a little labour and feed, as the fame ground will do again ; and if they fucceed, and produce only a few but a week fooner than common, they will be efteemed a rarity, either for family ufe or the market.

They all fucceed in any common dry foil of the garden ; but for the forward crops, a dry light foil fhould conftantly be chofen, rejecting heavy and wet grounds, for in fuch a foil moft of the early planted feed infallibly rot. Likewife for the early crops, it is highly requifite to have a fheltered warm fituation, full to the fun : a warm fouth border is a very proper expofure ; but for the main crops, any of the open quarters may be made ufe of with propriety.

The methods of fowing or planting all the forts is in fhallow drills, from two to three feet afunder, to remain where fown.

For the early crops, take advantage of a dry day ; neat drills fhould be drawn with a hoe from north to fouth, two feet or thirty inches afunder, and near an inch deep, and to afford a greater chance of fuccefs, a drill may be made clofe along under the wall, where practicable ; in thefe drills the beans fhould be dropped in rows along the bottoms, only about an inch and a half afunder, as many of this early fowing 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 moift dampnefs of the earth. As foon as they are covered in, the furface fhould be lightly raked fmooth ; when the work is finifhed. They come up in about twelve days or a fortnight ; when they fhould be managed as directed below ; and the plants moftly come into bearing in fix or eight weeks afterwards.

For the main crops to be planted afterwards, almoft any fituation, either in the borders, or an open expofure, may be employed ; though an open fituation in any of the large quarters is, as has been feen, the moft proper. In this cafe drills fhould be drawn two feet and a half afunder, and about one inch deep ; or, when it is defigned to plant rows of favoys or cabbage plants between, (as is often practifed where neceffary to hufband the ground to the beft advantage but which fhould always be avoided if poffible,) the drills fhould be a yard afunder at leaft ; the beans being dropped in fingly along the bottom of each drill, about two or three inches afunder, covering them in evenly afterwards with the earth about an inch deep, and finifhing with a light raking to fmooth the furface. They moftly come up at this feafon in ten or twelve days, and fometimes fooner in fine weather ; and the plants ufually come into plentiful bearing in fix or eight weeks afterwards.

In planting out the later general crops, when the weather proves very dry and hot, and the ground of courfe very dry, it is proper either to foak the beans a few hours in foft water previous to planting ; or, inftead 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 thefe methods is very advifable in dry weather in the heat of fummer ; it being neceffary at fuch times to promote the free germination of the feed, in order to bring them up foon and regularly, as they would otherwife rife in a ftraggling manner.

General Culture.—When the plants of all the above crops are come up, they are in general to remain where fown or planted, to yield their produce ; though when neceffary fome may be tranfplanted, keeping them clean from weeds by occafional hoeing in dry weather ; and when the plants are advanced about three or four inches high, hoeing up a little earth to their ftems on each fide, which will forward their growth and promote their ftrength ; continuing the care of deftroying weeds as often as their growth may render it neceffary ; which is principally all the culture required for thefe forts, in the full ground, till they arrive at a bearing ftate, and their produce is fit to gather ; except to the earlieft crops on warm funny borders, in very hot dry weather, when it may be beneficial to give occafional waterings to the plants in the mornings or evenings, efpecially when in bloffom, or fruiting.

In gathering the produce of thefe forts of beans, it fhould always be performed when the pods are quite young, or at leaft before they become large, and the beans in them attain any confiderable fize, as they are then tough, ftringy, and rank tafted ; and in order to continue the plants in bearing as long as poffible, the gatherings fhould be regularly repeated two or three times a week ; for by gathering the pods often and clean, as they become fit, the plants bloffom more abundantly, and continue fruiting more plentifully, and for a much longer period.

Large quantities of thefe dwarf kinds are often cultivated in the gardens and fields in the neighbourhood of large towns, for fupplying the markets during the latter part of the fummer feafon.

Culture of early Crops by artificial Heat.—In order to have thefe forts of beans as early as poffible, recourfe is had to raifing them by the aid of heat, in two or three different methods, as by raifing the plants in a hot-bed, an inch or two high, and then planting them out into a warm border, by raifing and continuing the plants in a hot-bed fo as to bear their crops, and by aid of a hot-houfe.

In the firft of thefe methods, they may be forwarded a fortnight earlier than thofe fown entirely in the full ground ; for this purpofe, towards the latter end of March, or early in the following month, a moderate hot-bed fhould be prepared a foot and a half or two feet in depth of dung, covered either with a frame or hand-glaffes, or arched over with hoops or rods, to be covered with mats ; earthing the bed with fine, light, rich mould, fix inches deep ; then having fome feed of the early forts, it fhould be fown pretty clofe either all over the furface, an inch or two apart, covering them with earth about half an inch deep, or in fmall clofe drills, earthing them over the fame depth ; or where only

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 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 ſtowed 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 thoſe 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 ſeed; 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 ſeed of this kind to be of much conſequence.

PHASES, φασεις, formed from φαινω, *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 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 ſalacious (ſee COCK); it claps it 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 tipt with white; the feathers of the upper part of the body greyiſh, with a white and black ſtreak; breaſt reddiſh; greater wing-coverts reddiſh-cheſnut, 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.

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 *Turkiſh* 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 tuberous 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 tipt with yellow; bill and unarmed 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 coketing. 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 *pied* 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 ſubulate. 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, *Nehr 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 Caſtor 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 Uſoza; 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. Obſ. 38.)

Clafs and order, *Didynamia Angiofpermia.* Nat Ord. *Perfonatæ*, Linn. *Scrophulariæ*, Juff.

Eff. Ch. Calyx five-cleft; upper fegment largeft. Corolla ringent; upper lip very fmall, cloven. Capfule pod-fhaped, of one cell, with four feeds.

1. Ph. *parviflora.* Willd. (Micranthus oppofitifolius; Wendl. Obf. 39.)—Suppofed to be a native of India. *Root* annual. *Stem* erect, fquare, clothed in the upper part with long 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. *Capfule* fmaller 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 incruftrations on the roofs of fubterraneous caverns. It was fuppofed 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 rooft in a morning. When mufty 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 bafk in the fun in a dry fandy place. With thefe regulations, 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 paftures, 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 fuppofed 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 fportfman 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 frighted 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 fportfman 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 within hearing, he is to raife it to more and more loudnefs, and at length he will be anfwered 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 frighted away.

As foon as a pheafant anfwers, the fportfman is to creep nearer and nearer, ftill calling, though not fo loud; he will ftill be anfwered, 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 fportfman 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 fportfman is to 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 springes.

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 Bidassao, 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 Ventenat 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 sound at least, which considering some others, that we are forced to endure, is no small recommendation. Vent. Malmais. 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.

Ess. 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. Malmais. 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, bluntish, 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.

PHEDOROVKA, in *Geography*, a town of Ruſſia, in the government of Ekaterinoſlav, on the Bug; 60 miles N.W. of Cherſon.

PHEDOSIEVKA, a town of Ruſſia, in the country of the Coſſacks, on the Choper; 44 miles W. of Archedinſkaia.

PHEER-FARRID, a town of Hindooſtan, 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 Theſſaly, 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.

PHELLANDRIUM, in *Botany*, the Water Hemlock, is uſually derived from φελλος, *cork*, and ανηρ, 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 φηλεω, *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. *Umbelliferæ*.

Gen. Ch. *General umbel* of numerous rays; *partial* ſimilar to it. *General Involucrum* 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.

Eſſ. Ch. Flowers all fertile; thoſe of the diſk ſmalleſt. Fruit ovate, ſmooth, crowned with the calyx and ſtyles. General involucrum wanting.

Obſ. This genus is certainly nearly allied to OENANTHE, (ſee that article,) to which Lamarck has united it; but the flowers being all fertile, the general involucrum 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 *Oenanthe*. 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

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, ſupported 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, φελλος, in *Antiquity*, a feſtival in honour of Bacchus, being a preparative to the Dionyſia.

PHELLUS, in *Ancient Geography*, a town of Aſia Minor, in Lycia, ſituated on low ground, oppoſite to Antiphellus.

Phellus, or *Phello*, a town of the Peloponneſus, in the Elide, in the vicinity of Olympia. Strabo.

PHELLUSA, 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 Mœcenates 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. *Perſonatæ*, Linn. *Pediculares*, 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.

Eſſ. 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.

Obſ. 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 Forſkall, 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 β; 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; Griſl. Luſit. 66. Moriſ. v. 3. 502. Lathræa Phelypæa α; 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 Maſcar, by Deſfontaines. Forſkall 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. *Bracteas* 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.

Forſkall ſays the baſe of the *germen* is ſurrounded by a yellow ring. That our plant is what Griſley 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 *bracteas* 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 tranſparence; 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 tranſparence, 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 always 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 *ſtæbe* and *cnaphon*.

PHERÆ, in *Ancient Geography*, a river of the Peloponneſus, below the river Pamiſus, 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 Phtiotide. 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 Pagaſes. 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 Pherecratian, 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 Pherecydes, 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, Orphæus, 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, Φερεφαττια, in *Antiquity*, a feſtival at Cyzicum, wherein a black heifer was ſacrificed to Pherephatta or Proſerpine.

PHERME, or FERME, in *Ancient Geography*, a mountain of Egypt, in the Thebaid, which is ſaid to have been the abode of Paul the Hermit.

PHERONIA, a town on the E. ſide of the iſland of Sardinia, between the mouth of the river Cœdrus and the town of Olbia. Ptolemy.

PHERRACIA, a town of Aſia, in the Colchide. Strabo.

PHERVINTASKOI, 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 Tuliſurgium and Canduum. Ptolemy.

PHIAL, PHIALA, formed of φιαλη, 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. Pauſanias.

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 Alcamenes, 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 ſuperintendant 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. Neverthelefs, 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 ſcite of Phigalia, there was a temple of Diana

Diana Confervatrix, in which was her ftatue. There were fome other ftatues in a place of exercife not far diftant.

PHIGIA, a town in the interior of Arabia Felix, between Saphtha and Badais. Ptolemy.

PHI-HAHIROTH, or PI-HAHIROTH, a town fituated on the banks of the Red fea: it denotes the defile or the mouth of Hahiroth. Calmet fuppofes that it was the town of Heroopolis.

PHILA, an ifland of Africa, in the courfe of the river Triton, in Libya. Diod. Sic.

PHILA, in *Mythology*, one of the attributes of Venus, which diftinguifhes her as the mother of love, from φιλεω, *to love*.

PHILACTES, in *Ancient Geography*, a river of Afia Minor, which ran into the gulf "Hermonius," in the Thracian Bofphorus.

PHILADELPHIA, in *Antiquity*, were games inftituted at Sardis, to celebrate the union of Caracalla and Geta, the fons of Septimius Severus.

PHILADELPHIA, in *Ancient Geography*, a town of Afia Minor, at the foot of mount Tmolus, at fome diftance E. of Sardis. It derived its name from Attalus Philadelphus, the brother of Eumenes: and was much celebrated for its feafts and public games. It became epifcopal, and was very confiderable when the Turks took poffeffion of it.—Alfo, a town of Afia, in the interior of Cilicia, between Domitiopolis and Seleucia Afpera, according to Ptolemy: it was feated on the Calycadnus, at a fmall diftance W. from Olba. This alfo became epifcopal.—Alfo, a capital of the Ammonites, fituated on the mountains of Gilead, towards the fources of the river Arnon. Its eaftern name was Rabbath-Ammon. According to Steph. Byz. it was the third town of Syria, which affumed fucceffively the name of Ammana (or Ammon), Aftarte, and then Philadelphia, after the name of Ptolemy Philadelphus. It was one of the Decapolis of Paleftine. See AMMONITES.—Alfo, a town of Egypt. Steph. Byz.

PHILADELPHIA, in *Geography*, a populous and highly cultivated county of Pennfylvania, bounded W. by Delaware county, N.W. by Montgomery, N.E. by Poquafin creek, which feparates it from Burk's county, and S. and S.E. by the river Delaware, which divides it from the ftate of New Jerfey. It contains about 89,600 acres, and is divided into 18 townfhips, and contains 81,009 inhabitants. On the banks of Schuylkill in this county is an excellent quarry of marble, which fupplies the ftone-cutters of Philadelphia.

PHILADELPHIA, the metropolis of Pennfylvania, is fituated in the county to which it gives name, on the weftern bank of the river Delaware, which is here a mile broad. This city is diftant 110 miles from the Atlantic ocean by the courfe of the bay or river, and about 55 or 60 in a S.E. direction. The river is navigable for a 74-gun fhip as far as the city; for floops 35 miles farther to Trenton, and for boats loaded with eight or nine tons to a greater diftance of 100 miles. Philadelphia was laid out by the famous William Penn (fee his article) in the year 1683, and fettled by the influx of adventurers from England to fuch a degree, that in lefs than a century it was eftimated to contain 6000 houfes, and 40,000 inhabitants, including thofe of the fuburbs as well as the city. The form of the ground plot of the city is an oblong fquare, about one mile N. and S. and two E. and W. lying in the narroweft part of the ifthmus between the Delaware and Schuylkill rivers, about five miles in a right line above their confluence. In the progrefs of building, it was found that the Delaware front was of itfelf fufficient for quays and landing places. The buildings now occupy a fpace not exceeding three miles in length from N. to S., and in the moft extended part do not reach a mile from the Delaware. All the houfes built beyond the boundary line of the oblong fquare are faid to be in the "Liberties," as the jurifdiction of the corporation does not extend to that part of the town. Here the ftreets are very irregularly built. But the city is interfected by a great number of ftreets, which crofs each other at right angles. Of thefe there were originally nine, which extended from the Delaware to the Schuylkill, and thefe were croffed by 23, running N. and S. The number of fquares in the original plan was 184; but as feveral of thefe have been interfected by new ftreets, their number now amounts to 304; and feveral of thefe are again interfected by lanes and alleys. Broad-ftreet is 113 feet wide; High-ftreet 100; Mulberry-ftreet 60; and the other ftreets in the original plan 30 feet wide. The greateft part of the city is tolerably well paved with pebble ftones in the middle, and with neat foot paths of brick, furnifhed with common fewers and gutters, fo that the ftreets are, in general, kept very clean. The fpace occupied by Water-ftreet was intended, in the original plan, for a cart way, in order to accommodate the wharfs and ftores; but it is now occupied, a few vacancies excepted, by lofty houfes, reaching through the whole front, and commodious wharfs of a rectangular form, and conftructed of wood, are extended into the river, and here the largeft fhips that are in the port may lie in fafety, both to receive and difcharge their cargoes; and they are defended from the ice, in winter, by piers firmly fixed. Another ftreet, called Dock-ftreet, was formerly a fwamp, but is now by a plantation of a row of Lombardy poplars on each fide rendered one of the pleafanteft ftreets in the city. Lamps, to the amount in number of 662, difpofed at convenient diftances, give light to all parts of the city in the night.

The houfes in the city and fuburbs are generally conftructed of brick, three ftories high, plain and neat, without much ornament. The general height of the ground, on which the city ftands, is nearly 40 feet above the Delaware; but fome of the ftreets are confiderably lower, and have on this account been fubject to damage from the overflow of the river, by flood tides, and a ftrong fouth-eaft wind.

The city contains 27 places for public worfhip, *viz.* five for Friends or Quakers, fix for Prefbyterians and Seceders, three for Epifcopalians, three for Roman Catholics, two for German Lutherans, two for Methodifts, one for German Calvinifts, one for Swedifh Lutherans, one for the Moravians, one for Baptifts, one for Africans, and a Jewifh fynagogue. The other public buildings are a ftate-houfe and offices, two city court-houfes, a county court-houfe, an univerfity, the philofophical fociety's hall, a public library, an hofpital, difpenfary, an alms-houfe, a gaol, three incorporated banks, two dramatic theatres, a medical theatre, a laboratory, an amphitheatre, four brick market-houfes, a fifh-market, a houfe of correction, and a powder magazine. Two fteam-engine houfes have not long ago been erected, for fupplying the city with wholefome water from the Schuylkill. The roof of the firft Prefbyterian church is fupported in front by fix pillars of the Corinthian order, and the whole building would do honour, by the elegance of its ftructure, to any part of Europe. The German Lutheran church, erected to fupply the place of that which was burnt in 1795, is one of the handfomeft churches in the United States. Each of the Epifcopal churches is furnifhed with an organ; fo are the German, and two of the

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 pleaſant promenade. The Philadelphia library originated with Dr. Franklin, and was incorporated in 1742, and has been gradually gaining an increaſe in books, &c. At preſent it contains upwards of 12,000 volumes, beſides a muſeum, and a valuable philoſophical apparatus. It is open every day in the week, except Sunday, to any perſon who has an inclination for reading. Books may alſo be borrowed out of the library, by leaving a depoſit to inſure their ſafe return, and paying a ſmall ſum for the uſe of them. The ſubſcribers amount to ſeveral hundred, and each ſubſcriber pays ten ſhillings annually. The building belonging to the library company is an elegant ſtructure; and in front of the edifice is a ſtatue of Dr. Franklin of white marble, executed in Italy at the expence, as it is ſaid, of 500*l.*, and given to the company by William Bingham, eſq. The apartments of the public gaol are arched with ſtone, as a ſecurity againſt fire; and the whole building is the largeſt, ſtrongeſt, and neateſt of the kind in the United States. Adjoining to it is a work-houſe, in which the ſexes are kept apart, and the criminals are ſeparated from the debtors, which undoubtedly is a circumſtance of great importance. Here are alſo apartments for the ſolitary confinement of criminals. The market-houſe is amply ſupplied with various proviſions, which are expoſed for ſale every Wedneſday and Saturday. This is an extenſive building, and is ſupported by 300 pillars. The new bank of Pennſylvania, lately erected under the ſuperintendance of Mr. Latrobe, is a large and remarkably elegant edifice of marble, of the Ionic order, conſtructed after the model of the ancient temple of Minerva in Greece. The eaſtern and weſtern fronts are adorned with two lofty colonnades of ſolid marble. The new theatre near the ſtate-houſe, finiſhed in 1793, is ſpacious and convenient. The large building, intended for the accommodation of the preſident of the United States, has been purchaſed by the univerſity of Pennſylvania, which conſiſts of two literary inſtitutions, that had for ſome time been eſtabliſhed in Philadelphia; one deſignated by the above name, the other by that of the college, academy, and charitable ſchools of Philadelphia. They now conſtitute a reſpectable ſeminary, incorporated in 1791. The philoſophical apparatus has lately been very much enlarged at a conſiderable expence, and is very complete of its kind. The funds of the univerſity produce annually a revenue of about 2365*l.* The aggregate number of ſtudents in the ſeveral ſchools is, on an average, about 510; and thoſe uſually admitted to degrees every year are about 25. The chief literary and humane ſocieties are the American philoſophical ſociety, formed in 1769; the college of phyſicians, inſtituted in 1737, and incorporated in 1739; the ſociety for promoting political inquiries, inſtituted in 1787; the Pennſylvania hoſpital, eſtabliſhed in 1751; the Philadelphia diſpenſary, in 1786; the Pennſylvania ſociety for the abolition of ſlavery, begun in 1774, and enlarged in 1787; the ſociety for alleviating the miſeries of priſons; the Pennſylvania ſociety for the encouragement of manufactures and uſeful arts, inſtituted in 1787; the Philadelphia ſociety for the information and aſſiſtance of immigrants, inſtituted in 1794; and two other ſocieties of the ſame kind; and an humane ſociety, inſtituted in 1790, an agricultural, marine, and various charitable ſocieties. Here are alſo a grand lodge of free and accepted maſons, and eight ſubordinate lodges. Few cities in the world, of the ſame population and wealth as Philadelphia, are more liberally provided with uſeful inſtitutions, both public and private. Here are alſo numerous academies for the inſtruction of both ſexes. Almoſt every religious ſociety has one or more ſchools under its immediate direction, in which children belonging to the ſociety are taught to read and write, and are furniſhed with books and ſtationary articles.

In the city and ſuburbs are ten rope-walks, which manufacture about 800 tons of hemp annually; 13 breweries, which are ſaid to conſume 50,000 buſhels of barley yearly; ſix ſugar-houſes; ſeven hair-powder manufactories in and about town; two rum diſtilleries and one rectifying diſtillery; and three card manufactories. The other manufactories are 15 for earthen-ware, ſix for chocolate, four for muſtard, three for cut nails and one for patent nails, one for ſteel, one for aquafortis, one for ſal ammoniac and Glauber ſalts, one for oil colours, twelve for bruſhes, two for buttons, one for Morocco leather, and one for parchment; beſides gun-makers, copper-ſmiths, 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 ſtate enable the printers to carry on their buſineſs more extenſively than is done in any other place in America. There are 31 printing-offices in this city; five of which publiſh each a daily gazette; two others publiſh gazettes twice a-week, one of which is in the French language; beſides four weekly papers, one being in the German language. The other offices are employed in printing books, pamphlets, &c. The catalogue of books for ſale in this city contains upwards of 300 ſets of Philadelphia editions, together with a great variety of maps and charts. The pleaſure-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 ſame ſhape; in the front it is left quite open down to the bottom, and the driver ſits on a bench under the roof of the carriage. There are two ſeats in it for the paſſengers, who ſit with their faces towards the horſes. The roof is ſupported by ſmall props, which are placed at the corners: on each ſide of the doors, above the pannels, it is quite open; and to guard againſt bad weather, there are curtains, which are made to let down from the roof, and faſtened to buttons placed for the purpoſe on the outſide. There is alſo a leathern curtain to hang occaſionally between the driver and the paſſengers. The light waggons are on the ſame conſtruction, and are calculated to accommodate from four to twelve people. The roads from this city are in a ſtate of progreſſive improvement; ſtage-coaches perform the journey to Lancaſter, the diſtance being 58 miles, on the new turnpike-road, in 11 hours.

This city is governed by a mayor, recorder, eight aldermen, and ſixteen common-council men, who make a quorum to tranſact buſineſs: they have full power to conſtitute and appoint laws and ordinances for the government of the city. The mayor, recorder, and aldermen, are juſtices of the peace, and juſtices of oyer and terminer. They hold a court four times a-year, to take cognizance of all crimes and miſdemeanors 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 juſtice of the peace. The trade of Pennſylvania is chiefly carried on from this city, and there are few commercial ports in the world where ſhips from Philadelphia may not be found in ſome ſeaſon of the year; but the amount of the exports and imports has varied at different periods, and under different circumſtances.

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 ſurpriſe 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 ſurly and ill-mannered in his preſence."

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 deſtined 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″. Morſe'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 Rycaut 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, incruſted over and preſerved in a ſpar of the nature of that which forms incruſtations in Knareſborough 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 myſtics, 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 gûide, 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 reſtoration of all intelligent beings to perfection and happineſs.

PHILADELPHUS, Φιλαδελφος, in *Antiquity*, a title or ſurname, borne by ſeveral ancient kings; formed from the Greek φιλος, *friend, lover*, and αδελφος, *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 Philadelpha, without any other name. M. Vaillant tells us, that Philip, king of Syria, had alſo the title Philadelphus.

PHILADELPHUS, in *Botany*, φιλαδελφος, 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 συριγξ, *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 differences 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; Ger. 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

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 Antolycus, 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 Antolycus 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, φιλανθρωπια, *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, φιλαυτια, formed from φιλος, *amicus*, and αυτος, *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 Carmina, were edited by Wensdorf, at Leipſic, 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 kiliometres, 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 Εμπορος 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.

PHILESIA, in *Botany*, ſo named by Commerſon, from φιλεω, *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 Thrace, upon the Euxine ſea, near Philopolis. Ptolemy.

PHILIASKOI, in *Geography*, a town of Ruſſia, in the government of Tobolſk, on the Irtiſch; 120 miles N. of Tobolſk.

PHILIDOR, Andre', 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, maitre 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 cheſs 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. Cæcilia'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

As his time was more occupied by chefs than mufic, he printed in London, at a large fubfcription, in 1749, his "Analyfis of the Game of Chefs," *Analyfe des Echec.* In 1754 he returned to Paris, in the month of November, and devoted his whole time to mufic. He had his "Laudæ Jerufalem" performed at Verfailles; but it was found to be too Italian, and as the queen of Louis XV. difliked that ftyle of mufic in the church, his hopes of obtaining, by this compofition, a place of maitre de chapelle, were fruftrated.

In 1757 he compofed an act of a ferious opera, but Ribel, opera manager, would not let it be performed, telling him that he would have no airs introduced in the fcenes of that theatre.

In 1758 he produced fome airs for "the Pilgrims of Mecca," at the comic opera; Corbi, the manager, propofed to him the undertaking to fet an entire opera for that theatre; and the firft drama he fet was "Blaife le Savetier," Blaife the Cobler, which was performed at La Foire St. Laurent, in 1759, with the greateft fuccefs, and afterwards five more fuccefsful comic operas iffued from his pen, among which "Le Marechal ferrant," or the Blackfmith, fupported more than a hundred reprefentations. In 1762, at the union of the Opera Comique and the Theatre Italien, he produced "Sanch Panca;" in 1763, "Le Bucheron," and a mufical entertainment for the piece; in 1764, "Le Sorcier;" in 1765, "Tom Jones," which at firft was hiffed, but afterwards acquired great favour. In 1767 his ferious opera of "Ernclinde" was performed at the great operahoufe, which was the beginning of the revolution in the ftyle of mufic at that theatre. In 1769 he fet for the comic opera "Le Jardinier de Sidon;" in 1770, "Le Jardinier fuppofé;" 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 himfelf under the guidance of Baretti. The performance was attended at Freemafons' Hall by all perfons of learning and talents, in expectation of a revival of the mufic of the ancients, and, by many, of its miraculous powers. To what kind of mufic the "Carmen Seculare" was performed at Rome, we pretend not to fay; but in London we could trace the compofer's models for the choruffes 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 finging, particularly thofe of Gretry, would be elegant and pleafing mufic any where.

Philidor, however, in fetting the fecular ode, it muft be confeffed, manifefted his knowledge of counterpoint in the ftyle of the old mafters; and that, in fpite of chefs, he had found time for the ferious ftudy of mufic; we believe that no one found himfelf much the wifer concerning the mufic of the ancients after hearing this mufic performed to Latin words, than after hearing an oratorio of Handel, or an opera of Rameau. This miraculous chefs-player, and ingenious and pleafing compofer of comic operas, died in London in 1795. Laborde.

PHILINUS, in *Medical Hiftory*, a phyfician, born in the ifland of Cos, was a difciple of Herophilus, and flourifhed in the thirty-eighth century, A.M. He was a diftinguifhed member of the Empirical fect, of which, indeed, he divides the honour with Serapion, of Alexandria, of being efteemed the founder. He is faid, by Athenæus, to have been the author of a treatife on herbs, and of fome commentaries on the works of Hippocrates. See Le Clerc, Hift. de la Med.

PHILIP II., in *Biography*, king of Macedon, was the third fon of king Amyntas. In his youth he was fent, by his father, as a hoftage to Thebes, where he was educated in the houfe of Polymnas, the father of Epaminondas. On the death of his brother Perdiccas, he returned fuddenly and fecretly to Macedon, where he affumed the regency, as guardian to his infant nephew. It was, however, with the unanimous confent of the nation, then furrounded by enemies, and under circumftances of great difficulty, that he took upon himfelf the royal title and authority, in the year 360 B.C., being then in the 23d year of his age. His firft meafures were thofe of a prudent politician. By declaring Amphipolis free, he took away the chief caufe of a war with the Athenians, who had fent an army in fupport of a competitor to the crown; and by prefents diftributed among the leading people of Pœonia, he prevented a war with that people. He next turned his attention to the effential point of new-modelling and difciplining his army, in which he applied the leffons of military art that he had derived from the Thebans. He very foon acquired the confidence of his troops, defeated Argæus, his competitor for the crown, invaded and fubdued the Pœonians, and forced the Illyrians to fubmit to a treaty, by which they refigned all their conquefts in the Macedonian territory.

Philip was a decided character, and he fet out in life with a determinate object, of which he appears never to have loft fight, *viz.* the extenfion of his dominions, and the elevation of the kingdom of Macedon to that confequence among the Grecian ftates, which circumftances had hitherto prevented it from affuming. This purpofe he fteadily purfued, by policy or by force, as beft fuited the occafion, neither deterred by difficulties, nor moved by confiderations of juftice. One of his firft offenfive meafures was an attack upon Amphipolis, to which city he had, by his treaty with Athens, renounced all claim. He took it by ftorm, banifhed or put to death fuch of the citizens as oppofed his intereft, and treated the reft with kindnefs. 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 Neftus, rich in gold mines, and at that time poffeffed by the Thracians. He took Crenides, its principal town, the name of which he changed to Philippi; and inftantly began to work the mines, which fupplied him with a metal not lefs powerful in effecting his purpofes than iron. The Phocian or facred war occupying at this time the attention of all Greece, Philip was at liberty to purfue unmolefted his plans of aggrandizement. Being defirous of fubjecting Thrace, he determined to poffefs himfelf of Methone, a fmall city, incapable of fupporting itfelf by its own ftrength, but which gave him much uneafinefs, and obftructed his defigns, whenever it was in the hands of his enemies. Accordingly he razed it to the ground. Here he loft one of his eyes. After of Amphipolis had offered his fervices to Philip, telling him that he was fo excellent a markfman, that he could bring down birds in their moft rapid flight. "Well," faid the monarch, "I will take you into my fervice, when I make war upon ftarlings." Stung with the reply, he refolved upon revenge. After, having thrown himfelf into the city, let fly an arrow, on which was written, "To Philip's right eye." This carried the moft unqueftionable evidence as to his fkill in fhooting, for it hit the king exactly in his right eye. Philip ordered the arrow to be fent back, with the following label: "If Philip takes the city, he will hang After;" and he was as good as his word.

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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 Therſites. He inſtantly checked his ſallies 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 diſcontents, 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, "juſt," 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 clement; a kind maſter,

master, and generally a just sovereign. He was himself learned, and a patron of learning. A variety of anecdotes are recorded of this prince, which redound greatly to his credit. Of these we shall select two or three, that shew the greatness of his mind, in bearing patiently reproof from inferiors. It was his custom, as it had been that of his predecessors, to administer justice in person; but a love of conviviality would sometimes interfere with the more imperious calls of duty. Having several 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, cease to be a king." Struck with the propriety of the reprimand, he instantly attended to her case, and gave redress. 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 reconsidered, 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 incessant 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 Cynoscephalæ, which terminated in the king's total defeat, and reduced him to supplicate for peace. This was granted upon the terms, that he should withdraw all his garrisons from the Greek cities of Europe and Asia, which were to be left free; that he should deliver up his prisoners and deserters, 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 ineffective 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 prefect. 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 unanimously 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 Mœsia and Macedonia, he marched against the Carpians, a barbarous tribe who

who infested the banks of the Danube. After defeating them, and obliging them to fue for peace, he returned to Rome.

The year 248 was regarded as the thoufandth year from the foundation of Rome, and on this occafion Philip celebrated the fecular games with great magnificence. Thefe were the laft celebrations of the kind, and they were fucceeded in the following ages by the Chriftian jubilees. He likewife publifhed an ordinance, by which he abolifhed that public licence of unnatural practices, which had hitherto fubfifted even under the beft emperors. Philip had thus far worn in peace the crown which he had acquired by the worft of crimes; but in the fifth year of his reign, a revolt was excited in the eaftern provinces. To reduce the troops to fubmiffion, Philip obliged Decius, a fenator of high reputation, much againft his will, to accept the government of Pannonia and Mœfia. As foon as he arrived in that country, he was compelled by the foldiers to affume 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 lefs warlike body of troops. An engagement enfued near Verona, which terminated in the defeat and death of the emperor. His fon alfo was killed by the prætorians as foon as intelligence of the event reached Rome. This event occurred in June 249.

It has been a matter of warm controverfy whether Philip was or was not a Chriftian, not that his conduct would in any degree do honour to the religion of the meek and benevolent Jefus, but in order that it might be afcertained whether he was entitled to the honour of being the firft Chriftian emperor. Dr. Lardner enters at large into this fubject; he fays, "Baronius, Huet, and fome others, take the affirmative fide of the queftion, others the negative. Tillemont fays, it is not without difficulties, and Mofheim has done his utmoft to perplex this queftion; and, the more to increafe the difficulty, argues, that he might be a Chriftian fecretly, though not openly." Having quoted his authorities on both fides of the queftion, he gives his reafons to prove that Philip was not a Chriftian, which are as follow: 1. That divers Chriftian writers fay, that Conftantine was the firft Roman emperor that made a profeffion of faith in the Chriftian religion; 2. That all heathen writers are filent about the Chriftianity of Philip and his fon; 3. That Philip celebrated the fecular games at Rome, in the thoufandth year of the city; 4. That the Philips were deified after their death. Upon the whole, therefore, fays Dr. Lardner, "I can fee no reafon to believe that the emperor Philip was by belief or profeffion a Chriftian. There is no doubt, however, that he was a protector of the new faith, and fhewed refpect to its minifters." Origen addreffed feveral epiftles to him, his wife and mother, which are not preferved.

Philip I., king of France, fon of Henry I., was born in 1052. At the death of his father in 1060, he was left under the guardianfhip of Baldwin, earl of Flanders, who adminiftered the public affairs with much ability and wifdom till his death in 1067. Philip then, at the age of 15, was declared of age, and affumed the government. One of his firft exploits was to enter Flanders with an army, to fupport the family of Baldwin's eldeft fon againft the younger, but meeting with a defeat near St. Omers, he abandoned the caufe. After this, he was involved in wars with William of England, called the Conqueror, and with thefe two kings commenced that rivalry between the Englifh and French crowns, which fubfifted fo long, and with fo much mutual lofs and bloodfhed.

After the death of William, Philip took little part in foreign affairs; he was naturally indolent and fond of pleafure, and a paffion in which he became involved, occupied him with domeftic difputes during many years of his reign. He had married Bertha, daughter of the count of Holland, by whom he had three children; but upon fome difguft, he divorced her on the pretence of kindred, and married Bertrade, wife of Foulques, count of Anjou. In confequence of this irregularity, he was excommunicated by pope Urban II., and his fubjects were difcharged from their allegiance. He repented, was abfolved, but fell into the fame fin again, which produced a repetition of the punifhment. At length Bertha died, and the marriage with Bertrade was at leaft connived at. To ftrengthen his authority, which had been greatly weakened by his own mifconduct, he affociated in the government, in the year 1104, his fon, Lewis le Gros; but Bertrade, who had children of her own, rendered the fituation of Lewis fo difagreeable, that he withdrew to the court of England, where his mother-in-law made fome attempts upon his life, which, however, he fortunately efcaped, and obliged the unnatural queen to beg forgivenefs of her crimes. Philip, after a long and inglorious reign of 48 years, died in 1108. The firft crufade was undertaken in his reign, but though it was very popular, he took fcarcely any part in it. Univer. Hift. Hift. of France, 1790.

Philip II., king of France, furnamed *Auguftus*, fon of Lewis the Young, was born in 1165, and fucceeded 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 affumed the reins of government, which he managed during his whole reign with equal vigour and prudence. One of his firft meafures was to banifh from his court the licentious players and buffoons who infefted it; he next expelled from his kingdom all the Jews, who by their art and induftry had poffeffed themfelves of a large fhare of its wealth. Their ill conduct and extortions were made the pretext for this feverity, but the true caufe appeared in the king's feizure of all their immoveable property, and his cancelling all debts due to them from his fubjects. He afterwards found it expedient to recall them, at the fame time, by laws made for the occafion, fetting fome limits to their ufurious extortions. The mercenary bands which had been engaged in the fervice of his father and the king of England, now committing great outrages in the kingdom, under the name of Brabancons, Philip fent troops againft them, which cut off the greater part, and expelled the reft. The capture of Jerufalem, in 1187, roufed the zeal of the weftern Chriftians, and a new crufade was fet on foot by the pope. In confequence, the kings of France and England took the crofs, and promifed to fufpend their differences. Their friendfhip was but fhort lived; a war between the monarchs enfued, and Henry of England was obliged to make a humiliating compromife, which he did not long furvive. Richard, who fucceeded to the Englifh crown, agreed with Philip upon a conjoint expedition to the Holy Land, in which both feemed actuated by the generous fpirit of chivalry. They met in the ifland of Sicily, and quarrelled about the king of that place. When the difputes were adjufted, they proceeded to the fiege of Acre, which fell before them. New differences arofe, and Philip returned to his own dominions in 1191. Soon after his return, Philip married Ingelburga, fifter of the reigning king of Denmark, againft whom, on the marriage night, he conceived a difguft, which induced him immediately to feparate from her. Philip, on pretence of remote affinity, procured from fome of his bifhops a divorce, and he efpoufed Agnes, daughter to the duke of Merania. Upon the complaint of the king of Denmark, pope Celeftin declared this marriage null,

null, and his successor, Innocent III., upon Philip's refusal to take Ingelburga again, laid the kingdom under an interdict. 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 Britanny, 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 enterprize 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 Poictiers, 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 revolters 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 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 Anagnia, 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 Liſle, 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-imburſement 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 Launay, 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

that he conftantly merited, though he was never able to acquire, the efteem and affection of his fubjects. He is characterifed as a wife, confcientious, public-fpirited prince, pious without bigotry, and a great lover of learning.

Philip VI., king of France, furnamed *De Valois*, born in 1293, was fon of Charles of France, count of Valois, and grandfon 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 difputed between Philip and Edward III. king of England, who was fon of Ifabella, fifter to the late king. The title to the regency was in truth that of the fucceffion 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 fhort time, delivered of a daughter, Philip affumed the title of king, and was crowned at Rheims with unufual pomp. His firft great act was to reftore the count of Flanders to that throne from which he had been expelled by his fubjects for his attachment to the interefts of France. The terror of his arms induced the Flemings to make their fubmiffion, and confent to the reftoration of their count. The competition for the crown between Philip and Edward naturally left much ill blood, and Philip, to increafe the difference, fummoned Edward to do homage for Guienne and his other fiefs in France, who returned for anfwer, that it did not become the fon of a king to humiliate himfelf before the fon of a count. The threat, however, of confifcation 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 ftate. After many difputes concerning the nature of homage, he was permitted to pay it in general terms. But after his return, a deputation was fent 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 refpect, fo that their amity feemed to be well eftablifhed; but this was only in outward appearance, and an incident foon occurred which caufed their fecret animofity to burft into a flame. The count of Artois, after the death of the laft count, had been adjudged to Maud, his daughter, in oppofition to the pretenfions of Robert d'Artois, Maud's nephew. Robert retired to England, and did not ceafe to urge the commencement of hoftilities againft Philip, who had proved himfelf inimical to his claims. In 1339 the war commenced. Edward, having made an alliance with the emperor Lewis of Bavaria, and alfo with Arteville, the brewer of Ghent, laid fiege to Cambray, but without fuccefs; and Philip, with a very numerous army, covered his frontiers fo well, that his rival could obtain no advantage over him. At the fame time the French fleet made great depredations on the Englifh coaft, took and burnt Southampton, and landed in various other places. Thefe infults were however completely revenged the next year, by the great naval combat of Sluys, in which Edward in perfon deftroyed half the French fleet with the crews. The war was continued with various fuccefs for feveral years. In the fummer of 1346, Edward landed at La Hogue with 30,000 men, accompanied by his fon, the Black Prince. They immediately began reducing the ftrongeft cities in the neighbourhood, after which they fpread fire and fword on every fide, 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 lofs of men greater than the number of the whole Englifh army, comprehending many of the principal nobility. In the courfe of this war France was reduced to the moft diftrefsful condition; the people difheartened and ruined by exceffive impofitions, famine defolating the country, and a peftilence raging in the capital. Fortunately for Philip, peace was as neceffary for Edward as for him, and a truce was negociated for three years. Philip now became captivated with the charms of the princefs Blanche of Navarre, whom he had deftined for the fecond wife to his eldeft fon, that he efpoufed her himfelf, and married his fon to the widow of Philip of Burgundy, count d'Artois. The feftivities on account of thefe nuptials were however very foon fucceeded 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 lofe the affections of his fubjects, by whom he was once idolized, though his misfortunes rather than his faults were the occafion. Univer Hift. Hift. of France, 1790.

Philip I., king of Spain, and archduke of Auftria, fon of the emperor Maximilian I., was born in 1478. A marriage between him and Joanna, daughter of Ferdinand of Arragon and Ifabella of Caftile, took place in 1496; and the death of her only brother, Don Juan, left Joanna the heirefs of their vaft dominions. In 1502, the archduke and his fpoufe vifited Spain, where they were acknowledged by the Cortes as the lawful fucceffors to the crown of that kingdom. In paffing 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 fuited to the folemn ftatelinefs of the Spanifh court, and notwithftanding the intreaties of his wife, who doated on him, he haftily returned to the Low Countries. He now figned a treaty with Lewis, by which he hoped all differences between the crowns might be adjufted, but his father-in law, Ferdinand, finding his affairs profperous in Italy, paid no regard to it. Ifabella died in 1504, and left the regency of Caftile to Ferdinand, till her grandfon Charles fhould come of age. Ferdinand was however obliged to refign the regency, and Philip was put in poffeffion of the royal authority. The diflike which this prince always fhewed to the Inquifition, and the preference which he gave to his Flemifh favourites, began to produce alarming difcontents, when death put a period to his reign, in the year 1506, at the age of twenty-eight. He is diftinguifhed only as being the father of the emperor, Charles V., fee his article. Univer. Hift. Robertfon.

Philip II., king of Spain, fon of the emperor Charles V., and Ifabella of Portugal, was born in 1627. When he was only in his fixteenth year he was married to Mary, daughter to the king of Portugal, and at the fame time his father, on leaving Spain for Germany, committed the adminiftration of that country to him, with minute inftructions for his conduct, and affigning him the duke of Alva as his counfellor in military affairs. No event of confequence happened under his regency in Spain, and in 1547, Charles being defirous of having him near his perfon, he configned his authority to his coufin Maximilian, and embarked for Germany. In this progrefs, he acted the part of a great prince with a dignity fuitable to his high rank, and gave a favourable impreffion of himfelf to all the diftinguifhed perfonages in Italy and Germany, who were introduced to him on the way. He met the emperor at Bruffels, and the ftates of the Low Countries formally recognized Philip as their future fovereign; and in all the towns which he vifited, he was received with extraordinary rejoicings; but in the midft of thefe feftivities he difplayed a feverity of difpofition, and an exclufive attachment to his Spanifh attendants, which infpired the Flemings with a permanent diflike.

In

In 1550 he appeared with his father at the diet of Augsburg. 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 Bruſſells 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, neverthelefs, 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 Eſcurial 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 fè* (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 enterprizes, 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 en-

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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 Eſcurial, 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 negociated 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 traiterous 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

ginning of the following year, and married the daughter of the duke of Savoy. At firft every thing feemed to promife a quiet acceffion and profperous reign, but a ftorm was fecretly rifing, which foon diffipated thefe flattering appearances. Several of the European powers, jealous of the influence which France would acquire over the Spanifh counfels under a French prince, made a league to place the archduke Charles on that throne. Into this grand alliance entered England, Holland, and almoft all the German princes, with the emperor, and it was afterwards joined by Portugal and Savoy. Philip gave an opportunity for forming a party againft him in Spain, by a journey into Italy to appeafe a revolt in Naples, and to take poffeffion of the duchy of Milan. He was prefent with the duke of Vendome at the battle of Luzzara, where he gave proofs of great perfonal courage. Returning into Spain, he found that difaffection to his caufe had made alarming progrefs; and the archduke Charles was publicly declared king of Spain, at Vienna, in 1703. An Englifh fleet conveyed him the next year to Portugal, and he now found that he had an arduous conteft to fuftain for his crown. The war of which Spain then became the feat, was attended with various viciffitudes of fortune. Gibraltar was taken by a coup-de-main by the Englifh, and a formal fiege for its recovery proved fruitlefs, as all have done fince. In 1705 Barcelona was taken by the allies, and was thenceforth the feat of king Charles's government. The allied army penetrated to Madrid, of which it took poffeffion. Philip, however, very foon recovered the capital, which was much more attached to him than to his competitor. The war was continued with various fuccefs till 1710, when the duke of Vendome arrived from France to take the command, and his ability foon changed the face of affairs. This general, accompanied by Philip, made prifoners of general Stanhope and all his army, and defeated count Staremberg. From this time Philip maintained a decided fuperiority, and when, in 1712, the congrefs 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, figned an act of renunciation for himfelf and his fucceffors to all right of inheritance to the crown of France; and the ftates of the kingdom fettled the fucceffion to the Spanifh throne upon the male defcendants of Philip, in preference to the females, though nearer in blood. Peace was concluded in 1713; but Barcelona held out till taken by marfhal Berwick in 1714. Philip had gone through this conteft for a crown with a confiderable fhare of reputation, though it was evident, that he was rather formed to be governed than to govern. In military tranfactions he committed the whole direction to the general officers, contented with giving the fupport of his prefence. The affairs of Spain were foon put into the hands of the minifter Alberoni, the confident of Philip's fecond queen, Elizabeth Farnefe, princefs of Mantua. The politics of that enterprifing projector involved Spain in new troubles. He took poffeffion of Sardinia in 1717, and of Palermo in Sicily, and would have conquered the whole ifland, had not the neighbouring powers taken the alarm. A confederacy was formed againft him by France, England, and Holland: fir George Byng deftroyed the greater part of the Spanifh fleet, and Philip was obliged, in 1720, to part with his minifter Alberoni, as the condition of peace. Soon after this he fell into a morbid melancholy, which, without affecting his intellectual faculties, had fuch 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, tranfacting bufinefs at hours the oppofite to thofe which he had ufually kept. He fometimes imagined that he was dead, and afked why they did not bury him. Nothing was found effectual in foothing his mind, and rendering him at all manageable, but mufic, and the celebrated finger Farinelli, who was retained about his perfon, became a moft important character at court. At length, in 1724, he abdicated the throne in favour of his eldeft fon Lewis. The young king dying in a few months of the fmall-pox, Philip was perfuaded to refume the fceptre. His melancholy in a great meafure difappeared, and he applied himfelf diligently to affairs of the ftate, efpecially to improving the adminiftration of juftice, and encouraging manufactures, arts, and fciences. In the war of 1733, he joined France againft 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 occafion of the right of fearch claimed by Spain in the American feas. Philip did not live to fee 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 fituation out of the reach of danger, he quietly remained there; if circumftances brought him in the midft of the warmeft fire, he preferved the fame phlegm, and amufed himfelf with the fears of thofe about him. He was eafy with his fervants, familiar and good-humoured to thofe about him; but his qualities were rather paffive than active, and his attachments were more the refult of habit than fenfibility. He was devout; but his devotion confifted in minute punctilios; he was confcientious, and narrowly fcrupulous. Timid, referved, and taciturn in public, he obferved characters and actions with judgment and accuracy, but fuffered things to take their courfe." Univer. Hift.

Philip, duke of Burgundy, furnamed the *Good*, was born at Dijon in 1396. After the death of his father, in 1419, Philip, who fucceeded him to the dukedom, joined the party of the Englifh under Henry V., and affifted in carrying defolation through France, during the clofe 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 moft powerful and wealthy fovereigns of his time, having united to the duchy of Burgundy almoft the whole of the feventeen 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 hofpitable reception, but refufed to affift him in making war upon his father. The duke's fon, the count de Charolois, afterwards Charles the Bold, was of a fiery difpofition, and not likely to accommodate himfelf to the difpofition of their gueft. On the acceffion of Lewis, the duke and his fon were prefent at his coronation, and every thing feemed, at firft, to denote peace and amity, but fome perfidious conduct of Lewis caufed the count de Charolois openly to join in the "league for the public good," againft him, in which he was countenanced by his father, who refigned to him the adminiftration of his ftate. He died at Bruges in 1467, leaving behind him the character of a wife and generous prince, who had promoted the profperity of his fubjects. He inftituted the order of the Golden Fleece. Univer. Hift.

Philip, duke of Orleans, regent of France, the fon of Philip, brother of Lewis XIV., by Charlotte Elizabeth of Bavaria, was born in 1674. From a child he manifefted great quicknefs of parts, with a boundlefs curiofity, and a capacity for almoft 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 Luxemburg; 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 reſignation 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 Cambray, 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 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 kiliometres, in 13 communes.

PHILIPPI, Henry, in *Biography*, a learned Jeſuit, a native of Luxemburg, 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 Ratiſbon, 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; "Chronologiæ 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 *Theſſaliæ Philippi*, the town of Thebes, in Theſſaly. 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, φιλιππικοι λογοι, 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 Halicarnaſſeus 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, *conſpicuæ divina Philippica famæ*. 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 *Bahia de Cortes*, 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, *New*. 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 defcribe, in the oppofite direction, that fegment of the circle, which had anciently been traced by the filver and the gold.

The Philippine iflands, almoft innumerable, and caft up by volcanoes, are healthy, fertile, and, befide all the grains of Europe, produce gold, copper, iron, fhip-timber, hemp, alum, faltpetre, cattle, hides, fago, rice, raifins, cacao, fugar, tobacco, wax, fifh, and couries, which are the money of Hindooftan. Thefe, with the filver, indigo, and cochineal of America, the company barters with the merchants of Afia for muflins, cottons, filks, fpices, tea, quickfilver, and china ware, which, with the fuperabundant produce of the iflands, are now brought by the Cape of Good Hope to Europe, and are admitted under eafy duties into Spain with a drawback of one-third on their exportation.

But the hopes which this beneficial trading eftablifhment excited foon vanifhed, and like other monopolies, the advantages refulting from it became of no long duration.

PHILIPPISTS, in *Ecclefiaftical Hiftory*, a fect or party among the Lutherans; the followers of Philip Melancthon.

That reformer having ftrenuoufly oppofed the Ubiquifts, who arofe in his time; and the difpute growing ftill hotter after his death, the univerfity of Wittemberg, who efpoufed Melancthon's opinion, were called, by the Flacians, who attacked it, Philippifts.

PHILIPPOPEL, in *Geography*. See Filippopoli.

PHILIPPOPOLIS, in *Ancient Geography*, a town in the interior of Thrace, according to Ptolemy, who fays that it recognized Philip, the fon of Amyntas, for its founder or its reftorer. It was fituated on the Hebrus.—Alfo, 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 Englifh poet, was born of a Leicefterfhire family in 1671. He was educated at St. John's college, Cambridge, where he obtained a fellowfhip, and took deacon's orders. He attached himfelf to the Whig party, and obtained an introduction to Addifon and Steele. He had already made himfelf known by his poetical compofitions, and in 1703 he dates a copy of verfes from Utrecht; but his fituation or object at that place is not known. In 1709 he was at Copenhagen, where he was probably in fome public capacity. From this place he wrote his much admired lines to the earl of Dorfet. On his return, he found his friends out of power, and he employed himfelf in tranflating Perfian tales for Tonfon the bookfeller. In 1712 he appeared as a dramatic writer, in his tragedy of "The diftreft Mother," which was acted with great applaufe at Drury-lane, and which is ftill in reputation as a ftock play. The literary diftinction that he had now obtained was probably the caufe of an exaggerated compliment from Tickell, which eventually expofed him to ridicule and mortification. That writer, in a paper of the Guardian upon poetry, made the paftoral pipe defcend in fucceffion from Theocritus to Virgil, Spencer, and Philips. Pope, who found his own juvenile paftorals undervalued, fent to the fame periodical paper a comparifon between his own and thofe of Philips, in which he ironically gave the preference to the latter. Addifon detected the purpofe, and the paftoral reputation of Philips was ruined. From this moment open hoftilities were declared between the two poets, envenomed by the double power of party and rivalry. At the acceffion of George I., Philips was made one of the magiftrates for the city of Weftminfter; and he applied to Addifon, then fecretary of ftate, for another place, who told him, that he was confidered as already provided for by his office as juftice; to which he indignantly replied, that "though poetry was a trade he could not live by, he fcorned to owe his fubfiftence 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 feveral refpectable coadjutors. It was printed collectively in three volumes, but has long fince been forgotten. After this he brought out two more tragedies, *viz.* "The Briton," and "Humphrey Duke of Glocefter," which were well received. In 1724 he accompanied, in quality of fecretary, his friend Dr. Boulter to Ireland, created archbifhop of Armagh. Here he enjoyed other emoluments, which enabled him to reprefent in parliament the county of Armagh. On his return to England in 1748, he found himfelf the furvivor of moft of his early friends and enemies. He died in the following year, at the age of 78. His poems were publifhed collectively in one volume, 1748; and they now make a part of the body of Englifh poetry. "The paftorals have more natural defcription than Pope's melodious imitations; but they are not excellent in this refpect: and the air of fimple rufticity thrown over them, while it gives no refemblance to real life, difgufts by meannefs and puerility. That the author, when he aimed at the elegance of cultivated verfe, could attain it, is proved by his two tranflations from Sappho, and his letter from Copenhagen, which are undoubtedly his beft performances: the latter is fcarcely furpaffed as a defcriptive piece." Johnfon's Lives of the Poets.

Philips, John, an Englifh poet, born in 1676 at Brampton, in Oxfordfhire, was the fon of Dr. Stephen Philips, archdeacon of Salop. He received his claffical education at Winchefter fchool, where he gained great reputation by his Greek and Latin exercifes. In 1694 he removed to Chriftchurch college in Oxford, where he fully maintained the claffical diftinction he had acquired, and obtained the efteem of feveral literary characters. In 1703 he became known to the public by his poem of "The fplendid Shilling;" and the reputation which he acquired by this effufion was the caufe of his being felected by Harley and St. John, the heads of the Tory party, to celebrate the victory of Blenheim, in competition with Addifon, the poet of the Whigs. His poem on this occafion did not add to his fame. His didactic poem on Cyder, in 1706, is his principal piece, and to this his name is chiefly affociated. It at once became popular, and raifed him to eminence among the poets of his time. He had meditated a poem on the "Laft Day," which he did not live to finifh. 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 blamelefs and benevolent character. A tablet was erected to his memory in the Hereford cathedral, where he was buried; and a monument was placed in Weftminfter abbey by lord chancellor Harcourt, with a long and claffical epitaph, compofed by bifhop Atterbury. The "Splendid Shilling" and the "Cyder" of this poet are read with pleafure. "In both, the Miltonic verfe and diction are imitated: the *firft*, for comic effect, by contrafting the folemnity of the ftyle with the levity of the fubject; the *fecond*, for the purpofe of elevating a topic taken from common life. Dignity and variety are likewife attempted to be given to the didactic poem, by a clofe imitation of the plan and manner of Virgil's Georgics, particularly in frequent digreffions, from which the writer ufually returns with much fkill to his proper fubject. 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 Sussex, on the E. bank of the Delaware, opposite to Easton in Pennsylvania; 41 miles N.W. of Trenton.

Philipsburg, or *Philipstown*, 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 irreconcileable. 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; Bualzebub, or Beelzebub, 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 Shamgar, 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 rescued 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 Uzziah, 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 Bethshemesh, 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 Askelon 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 Naucratis, 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 Philistus 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 Pagæus.

PHILLYRA, a river of the Peloponnesus, in Arcadia.

PHILLYREA, in *Botany*, φιλλυρεα of Dioscorides, supposed to be so called from *Phillyra*, the mother of Chiron. The modern Greeks know this shrub under the name of φύλλικα, or φυλλίκι.—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 Illustr. t. 8. Gærtn. t. 92.—Class and order, *Diandria Monogynia*. Nat. Ord. *Sepiariæ*, Linn, *Jasmineæ*, Juss. *Oleinæ*, 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.

Eff. 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, bracteated, 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. Hift. v. 1. 52.)—Leaves linear-lanceolate, entire; or nearly fo.—Native of Italy, Spain, and Portugal. It is fold in the markets at Lifbon to make brooms, and called *Lentifco*, according to a note of Lœfling's, in the Linnæan herbarium. This differs from the former merely in its narrower and fomewhat longer *leaves*, which are dotted, and occafionally toothed, precifely as in that fpecies, nor can we confider it as more than a variety, though kept diftinct, and even fubdivided into feveral varieties of its own, in the Hortus Kewenfis.

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. fecunda; Cluf. Hift. v. 1. 52. Ger. Em. 1396.)——β; Ph. prima; Cluf. Hift. v. 1. 51. Ger. Em. 1600.—Leaves ovate, fomewhat heart-fhaped, ferrated; rarely entire; fometimes fharply toothed.—Very abundant in the fouth of Europe, on open hills, and as frequent as moft evergreens in our fhrubberies. Dr. Sibthorp confiders this as the identical φιλλυρεα of Diofcorides, being very common in Greece and its iflands. The *leaves* are of a dark fhining green, dotted beneath, of a broad ovate figure, about an inch long, pretty uniformly ferrated; in the variety β they are very fharply and ftrongly toothed, and fometimes 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 fhort broad figure. We have no doubt of *latifolia* and all its varieties being diftinct from the other two; the only queftion is whether they are diftinct from each other.

Phillyrea, in *Gardening*, contains plants of the hardy, evergreen, fhrubby kind, of which the fpecies cultivated are; the lance-leaved phillyrea (P. media); the narrow-leaved phillyrea (P. anguftifolia); and the broad-leaved phillyrea (P. latifolia).

Of the firft fort there are feveral varieties, namely, the privet-leaved and olive-leaved; which are of humbler growth, feldom more than eight or ten feet high; the branches of the firft are weaker, fpread wider, and are covered with a light brown bark: the leaves are ftiff, almoft two inches long, and half an inch broad in the middle, drawing to a point at both ends, and fit clofe to the branches; the flowers are in little axillary clufters, fmall and whiter. In the latter the branches are ftronger, and fpread out wider; the bark is of a lighter colour; the leaves are ftiff, fmooth, and entire, on very fhort footftalks, of a lucid green, and terminating in a point; the flowers in clufters, on pretty long peduncles, from the axils of the young branches, fmall 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 ftraddling; and the box-leaved.

In the fecond fort there is a variety termed rofemary-leaved, which is of humbler growth, feldom rifing more than four or five feet high, fending out flender, oppofite, ftraight branches, fparfedly difpofed; the leaves dark-green, ftiff, and entire; about an inch long, and not more than an eighth of an inch broad; feffile; the flowers are fmall, white, in clufters from the fide of the branches; the berries very fmall, rarely ripening in this climate. And in the Kew catalogue another variety is mentioned, under the name of dwarf phillyrea.

The third fort has alfo a variety, the prickly broad-leaved, which is as high as the fmooth one, fends out feveral ftrong 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 fpine. And the Kew catalogue has another under the name of the ilex-leaved.

Method of Culture.—Thefe plants are capable of being increafed either from feeds or layers, but the latter being the moft expeditious method is chiefly preferred in this climate.

And the beft feafon for laying them down is in autumn, when the ground fhould be dug round the ftems of the plants intended to be laid, rendering it very loofe; then making choice of a fmooth part of the fhoot, a flit fhould be made in it upwards, in the manner practifed 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 flit into the ground, fo as that the flit may be open, it fhould be faftened down with a forked ftick that it may remain fteady, covering that part of the branch with earth about three inches thick, keeping the upper part erect. The layers muft be kept clean from weeds in the fpring and fummer following, as, if fuffered to grow up amongft them, they will prevent their taking root. In the autumn following, moft of the plants thus laid will be rooted, at which time they may be taken off, and carefully planted in a nurfery, where they may be trained three or four years in the manner they are intended to grow; during which time the ground fhould be dug between the rows, and be cut about the roots of the plants every year, to caufe them to ftrike out ftrong fibres, fo as to fupport a good ball of earth when they are removed. Their ftems fhould likewife be well fupported with ftakes, in order to make them ftraight, otherwife they are very apt to grow crooked and unfightly. When they have been thus managed three or four years, they may be removed into the places where they are defigned to remain. The beft time for this is the end of September, or beginning of October; but in the removing them their roots fhould be dug round; and all downright or ftrong roots, which have fhot out to a great diftance, be cut off, that they may have balls of earth preferved to their roots, otherwife they are liable to mifcarry: and when placed in their new fituations, fome mulch fhould be laid upon the furface of the ground to prevent its drying.

The plants fhould likewife be fupported with ftakes until they have taken faft hold of the earth, to prevent their being turned out of the ground, or difplaced by the winds, which deftroy the fibres that are newly put out; and greatly injure the plants.

They delight in a middling foil, which is neither too wet and ftiff nor too dry, though the latter is to be preferred to the former, provided it be frefh. The forts with fmall leaves are commonly two years before they take root when laid: therefore they fhould not be difturbed, as the raifing them out of the ground greatly retards their rooting.

In the feed method, the feeds fhould be fown in the autumn foon after they are ripe, as when they are kept out of the ground till fpring they do not grow the firft year. They fucceed beft when fown in pots or boxes filled with light loamy earth, and placed under a garden frame where they may be fcreened from hard frofts, but always expofed to the open air in mild weather. If the feeds are fown early in the autumn, the plants appear in the fpring; but if they fhould not come up, the pots fhould be plunged into the ground in an eaft border, where they may only have the morning fun, in which fituation they fhould remain the following fummer: during which time they may be conftantly kept clean from weeds, and in the autumn removed again under a frame for fhelter in winter, and the fpring following the plants will certainly come up, if the feeds were good. Towards the middle of April, the pots fhould 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 hardier, 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 φιλος, *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 Parandis 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 exercifed 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 negociations: 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 reſentment 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.

PHILOCANDROS, 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, 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 Chryſippus. 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 choler, 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 περι φωνης, mentioned by Laertius.

Perhaps Diogenes, as is uſual with panegyriſts, 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 Αμουσος, 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 multiform; 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.

CHAP.

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 definer, 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.

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 rose, 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.

PHILÖE, 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 Philöe, 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 Philöe, must be transported by land to Syene, to be there re-embarked. Beyond Philöe the river is quite open and navigable. After Philöe 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. Philöe 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 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-baſe 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 ſaints 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 Aſopus, 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 ſciſſon 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, φιλολογια, 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 μανθανω, *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, φιλοπατωρ, formed from φιλος, *lover*, and πατηρ, *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 Euergetes; and had for his ſucceſſor Ptolemy Philometer. The Syrians had their Seleucus Philopator, Antiochus Philopator, &c.

PHILOPŒMEN, 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 Laconian 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; Philopœmen exerted himſelf with the utmoſt valour to drive him out again, and when he was unable to effect this, at the hazard 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 abufes which had gained ground in that body, and rendered it famous throughout Greece for fuperior courage and difcipline. In the year 210, he was raifed to the ftation of prætor or commander-in-chief of the Achæan league. After fpending fome months in improving the military fyftem of the Achæans, with refpect to their tactics and armour, he at length led them againft Machanidas, tyrant of Sparta, who was marching with a powerful army to invade Achaia. He met the enemy at Mantinea, an engagement enfued, and Philopœmen gained a complete victory. This noble exploit was commemorated by the Achæans, by a brazen ftatue placed in the temple of Delphi, reprefenting him in the attitude in which he ran his fpear into the body of the tyrant. Nabis, the fucceffor of Machanidas, defeated Philopœmen at fea, but he recovered this lofs in an action on land, took Sparta, razed its walls, and abolifhed the laws of Lycurgus. The Meffenians having revolted, Philopœmen marched againft them, but was taken prifoner by falling from his horfe. He was conveyed to Meffene, where the people, after the firft triumph on their fuccefs, were filled with compaffion, at the fight of one whom they had long confidered as a hero and benefactor, reduced to that wretched condition. He was inhumanly thruft into a fubterranean dungeon, and on the next day an affembly was convened to determine his fate. The people were inclined to favour him, but the fenate prevailed and carried a decree to put him to death. An executioner was accordingly fent to his prifon with a cup of poifon. As foon as the hero beheld him, he raifed himfelf with difficulty from the ground, and enquired whether Lycortas and his companions had efcaped; and being affured that they were all fafe, he replied, "then we are not entirely unfortunate," and calmly drank the poifon, which foon proved mortal. He died at the age of 70, in the year 183 B.C. His fate, which he fo little deferved, excited the grief and refentment of the whole Achæan league, and numbers flocked to join a force led by Lycortas to revenge his death. The Meffenian people opened their gates without refiftance, and put into his hands the authors of the deed, who were referved as facrifices to his manes. The afhes of the noble commander were carried in great pomp to Megalopolis, where funeral honours of every kind were paid to his memory. Moft of the cities of Greece alfo erected his ftatue, with infcriptions recording his great actions. Several years after his death, when Corinth was deftroyed by the conful Mummius, a Roman moved for the fubverfion of all his ftatues and monuments, as thofe of an implacable enemy of Rome. Polybius, however, in an eloquent harangue defended his memory, and the conful would not permit fuch a pofthumous infult to a truly great man. Plutarch. Univ. Hift.

PHILOPOLIS, in *Geography*, a fettlement of America, in Luzerne county, Pennfylvania, 12 or 14 miles W. of mount Ararat, and at the head of the weftern branch of Tunkhanock creek, about 45 miles S.E. of Athens, or Tioga point. N. lat. 41° 40′. W. long. 75° 33′.

PHILOSEBASTUS, φιλοσέβαστος, i.e. *a friend of Auguftus*, was a title affumed by feveral princes and cities, as a public teftimony of their attachment to any emperor. This title is found on the marbles of Cyzicum and in other infcriptions.

PHILOSOPHER, φιλόσοφος, a perfon well verfed in philofophy; or who makes profeffion of, or applies himfelf to, the ftudy of nature and morality.

When a race of felf-created preceptors arofe in Greece, who affumed the name of "fophifts," or wife men, their arrogant pretenfions gave great offence to fuch as were capable of diftinguifhing between real and counterfeit wifdom, and led them to adopt an appellation more fuitable to the character of men, who modeftly profeffed themfelves to be in the *purfuit*, rather than in the *poffeffion* of truth and wifdom, *viz.* that of philofophers. Cicero afcribes 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 feven eminent men, who have fince been univerfally denominated the "feven wife men" of Greece: that, at a ftill earlier period, Lycurgus, and, even in the heroic ages, Ulyffes and Neftor, were called wife men; and, in fhort, that this appellation has, from the moft ancient times, been given to thofe who have devoted themfelves to the contemplation of nature. This title continued in ufe till the time of Pythagoras. It happened, while this great man was at Phlius, that Leon, the chief the Phliufians, was exceedingly charmed with the ingenuity and eloquence with which he difcourfed upon various topics, and afked him, in what art he principally excelled; to which Pythagoras replied, that he did not profefs himfelf mafter of any art, but that he was a "philofopher." Leon, ftruck with the novelty of the term, afked Pythagoras, who were philofophers, and in what they differed from other men. Pythagoras replied, that, as in the public games, while fome are contending for glory, and others are buying and felling in purfuit of gain, there is always a third clafs of perfons, who attend merely as fpectators; fo, in human life, amidft the various characters of men, there is a felect number of thofe, who, defpifing all other purfuits, affiduoufly apply themfelves to the ftudy of nature, and the fearch after wifdom: thefe, added Pythagoras, are the perfons whom I call philofophers. Cicero Tufcul. Difp. l. v. c. 3.

This appellation, thus affumed merely through modefty, to intimate that even they who have made the greateft advances in knowledge, are rather to be confidered as "lovers of wifdom," than as "wife men," foon loft its original meaning, and was borne with as much haughtinefs and vanity, as if it had implied an exclufive right to the poffeffion of wifdom. "Some there are," fays Quintilian (Proœm. Inft.) "who, defpifing the occupation of an orator, have employed themfelves in prefcribing rules for the conduct of life; thefe have infolently affumed to themfelves the title of the *fole profeffors of wifdom*."

The fects of philofophers are very numerous; and their dogmata or tenets very contradictory.

Helmont, and fome of the chemifts, denominate themfelves *philofophers by fire*.

The alchemifts, and adepti, are frequently denominated *the philofophers*, by way of eminence.

PHILOSOPHER'S *Stone*, the greateft object of alchemy, is a long-fought-for preparation, which, when found, is to tranfmute or exalt impurer metals, as tin, lead, and copper, into gold and filver.

Some of the Greek writers in the fourth and fifth centuries, fpeak of an art, as being then known, of tranfmuting the bafer metals into gold; and towards the end of the thirteenth century, when the learning of the eaft had been brought hither by the Arabians, the fame pretenfions began to fpread through Europe. It is fuppofed that this art, called *alchemy*, was of Egyptian origin: and that when the ancient Greek philofophers travelled into Egypt, they brought back fome of the allegoric language of this Egyptian art, ill underftood, which afterwards paffed into their mythology. Alchemy was the earlieft branch of chemiftry, confidered as a philofophical fcience: in the other parts of chemical

chemical knowledge, facts preceded reafoning or fpeculation; but alchemy was originally fpeculative. See TRANSMUTATION.

The alchemifts fuppofed the general principles of metals to be chiefly two fubftances, which they called mercury and fulphur; they apprehended alfo, that the pure, mercurial, fulphureous, or other principles of which they imagined gold to be compofed, were contained, feparately, in other bodies: and thefe principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digeftions; and by thus conjoining the principles of gold, if they could be fo procured and conjoined, it might be expected that gold would be produced. But the alchemifts pretend to a product of a higher order, called the *elixir*, the medicine for metals, the tincture, the philofopher's ftone; which, by being projected on a large quantity of any of the inferior metals in fufion, fhould change them into fine gold: which being laid on a plate of filver, copper, or iron, and moderately heated, fhould fink into the metal, and change into gold all the parts to which it was applied: which, on being properly heated with pure gold, fhould change the gold into a fubftance of the fame nature and virtue with itfelf, fo as thus to be fufceptible of perpetual multiplication; and which, by continued coction, fhould have its power more and more exalted, fo as to be able to tranfmute greater and greater quantities of the inferior metals, according to its different degrees of perfection.

There are three ways by which the alchemifts have attempted to arrive at the making of gold: the firft by feparation; for it is affirmed, that every metal yet known contains fome quantity of gold: only, in moft, the quantity is fo little, that it will not defray the expence of getting it out.

The fecond is by maturation; for the alchemifts hold mercury to be the bafis and matter of all metals; that quickfilver purged from all heterogeneous bodies would be much heavier, denfer, and fimpler, than the native quickfilver; and that by fubtilizing, purifying, and digefting 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. Becaufe their matter is not pure mercury, but has other heterogeneous bodies adhering to it: And, 2. Becaufe the digeftion, by which mercury is turned into gold, would not fucceed in other metals, in regard thefe had not been long enough in the mines.

Weight is the individual and inimitable character of gold, &c. Now mercury, they fay, has ever fome impurities in it; and thofe impurities are lighter than mercury. Could thofe be purged quite out, as it does not appear to them impoffible but they might, mercury would be as heavy as gold: and what is as heavy as gold is gold, or at leaft might very eafily be made gold. See *Fixing of* MERCURY.

The third method is, that of tranfmuting, or of turning all metals readily into pure gold, by melting them in the fire, and cafting a little quantity of a certain preparation into the fufed matter, upon which the fæces immediately retire, are volatilized and burnt, and fo carried off; and the reft of the mafs is turned into pure gold. That which works this change in the metals is called the philofopher's ftone. See TRANSMUTATION.

Whether this third method be poffible or not, is very hard to fay. We have fo many teftimonies of it from perfons, who on all other occafions fpeak truth, that it is fomewhat hard to fay they are guilty of falfehood, even when they fay, that they have been mafters of the fecret. All required is, they fay, 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 befide mercury and gold. Now, if I had any body which would fo agitate all the parts of lead, as to burn all that is not mercury therein; and had alfo fome fulphur to fix the mercury; would not the mafs remaining be converted into gold? There is nothing in nature fo heavy as lead, gold and mercury alone excepted. It is evident, therefore, there is fomething in lead that comes very near to gold. But in lead there is alfo fome heterogeneous matter different both from mercury and gold. If now nineteen ounces of lead be diffolved by the fire, and eight ounces be thus deftroyed, they argue that we fhall have the reft good gold; the ratio of lead to gold being as eleven to nineteen. If then the philofopher's ftone can purify the mercurial matter in lead, fo as that nothing fhall remain but the pure mercurial body, and you can fix and coagulate this, by means of fulphur, 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 ftandard, you will have gold; provided you have but a fulphur with which to fix and coagulate it. Such is the foundation of the opinion of the philofopher's ftone; which the alchemifts contend to be a moft fubtile, fixed, concentrated fire, which, as foon as it melts with any metal, does, by a magnetic virtue, immediately unite itfelf to the mercurial body of the metal, volatilizes and cleanfes off all that is impure therein, and leaves nothing but a mafs of pure gold. Many frauds and artifices have undoubtedly been practifed in this operation; and there might be political reafons why princes and others fhould encourage thofe who pretended a power of furnifhing this inexhauftible fource of wealth: but it would be wrong to cenfure as impoftors, all thofe who have declared themfelves convinced, from their own experiments, of the tranfmutability of bafe metals into gold. However, there are ftrong reafons to believe that the authors have been deceived themfelves by fallacious appearances. Mr. Boyle gives an account of a procefs, by which he imagines part of the fubftance of gold to have been tranfmuted into filver. (See MENSTRUUM *Peracutum.*) He alfo relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was publifhed in his own life-time, and fince reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the tranfmutability of metals. See an account of this experiment, with remarks upon it, by Dr. Lewis, in his Commerce of Arts, fect. xii. p. 297, &c.

King Henry VI. granted letters patent to certain perfons, who undertook to find out the philofopher's ftone, and to change other metals into gold, &c. to be free from the penalty of the ftat. 5 Hen. IV. made againft the attempts of chemifts of this nature. Pat. 34 Hen. VI. 3 Inft. 74. See ALCHEMY.

PHILOSOPHER'S *Tree*, a chemical preparation, called alfo *Arbor Dianæ*, Diana's Tree.

PHILOSOPHICAL, fomething that relates to philofophy.

PHILOSOPHICAL *Æther*. See ÆTHER.

PHILOSOPHICAL *Chemiftry*. See CHEMISTRY.

PHILOSOPHICAL *Criticifm*. Sbe CRITICISM.

PHILOSOPHICAL *Egg*, among the *Chemifts*, is a thin glafs 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*, *Regulæ 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 perceiveable 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, Φιλοσοφια, 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 σοφος, *wiſe*, given to his predeceſſors, Thales, Pherecydes, &c. as too aſſuming; and contented himſelf with the ſimple appellation of φιλοσοφος, *quaſi* φιλος της σοφιας, *a friend or lover of wiſdom.*

Chauvin rather derives the name from φιλια, *deſire*, or *ſtudy*, and σοφια, *q. d. ſtudium ſapientiæ*; 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 ſcientifical, 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 whoever 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

coheſion

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 *laxer 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, κατάληψις, *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 philoſophy 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 methaphyſics, 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 out 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

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 muſt 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. *Mimanſa;* 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 *upaderſena,* 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. Vaiſiſhika,	Kanada,	Ionic,	Thales.
2.	1. Mimanſa,	Jaimini,	Platonic,	Socrates.
	2. Vedanta,	Vyaſa,		Plato.
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 Boodh, 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; 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 diſcipline 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 farthers 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

are borne out by fuch examination, that we can feel a reafonable fatisfaction in their correctnefs.

As to the proper conduct of our philofophical enquiries, in inveftigating the laws of the human mind, we have great fatisfaction in referring to fome of the ftatements of Reid and Stewart. We regret to fee, in various paffages from the pen of the latter of thefe philofophers, when fpeaking of the principles of Hartley, a tone of cenfure, (fometimes bordering on contempt,) which is clearly founded on mifapprehenfion. This we fhall hereafter have occafion to notice more fpecifically. In feveral of Mr. Stewart's more general pofitions, we alfo widely differ from him. But the reader of this article will have opportunities of perceiving, that there are fome extenfive 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 wifh to feparate between important and well-afcertained truths, and principles which reft wholly on conjecture. "The metaphyfical opinions which we may happen to form refpecting the nature either of body or of mind; and the efficient caufes, by which their phenomena are produced, have no neceffary connection with our inquiries concerning the laws, according to which thefe phenomena take place." Without pretending to afcertain the bounds beyond which human intellect cannot pafs, it appears to us certain, that in the prefent ftate of mental philofophy, we can advance no farther with fafety or practical utility, than the regiftering and claffification of phenomena, the deriving from them thofe conclufions which may be regarded as general laws of the human mind, and the application of thefe laws to explain other phenomena, and to determine the probable refult of the operation of our mental principles, in cafes where the previous circumftances are known. The grand point in mental as well as in phyfical fcience is, to obferve correctly, to difcriminate accurately, and to generalize with caution.

When the attention of the mind is directed to its own ftates and operations, (whether thefe are directly intentional, femi-voluntary, or the refult of habit or external impreffion,) it is termed *reflection.* The capacity of reflection, on what paffes within us, is feldom perceived very early; and agreeably to the obvious order of nature, it ought not to be predominant till the world without us has furnifhed abundant materials for our mental operations: but Dr. Reid is certainly miftaken when he afferts (Intellectual Powers, eff. 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 fome very decifive cafes; and, in various other inftances, in children under ten or twelve. We are no advocates for the premature or exceffive culture of reflection; but the rudiments of the habit fhould be early *begun,* with a view to moral culture; and no one can doubt that mental philofophy can be fuccefsfully purfued, 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 fubject of examination. Some at the commencement of their mental inveftigations may find this a tafk of great difficulty; but the more it is attempted, the more eafy it will become; and when the habit has been in any confiderable degree acquired, it will in various ways reward itfelf. It is this difficulty which fo generally operates to prevent the ftudy of the human mind. Though in fome refpects the mental philofopher has great advantage over the natural philofopher, (requiring, for inftance, no apparatus, no rare or expenfive fubftances to fubmit to examination,) yet the inveftigations of the former muft, from the very nature of their objects, be attended with obftacles which in no way affect the latter. The fleeting nature of our notions and feelings, and the extreme difficulty, in many cafes, of feparating the operations of thought from thofe of language, conftitute fome of the leading caufes which impede our fuccefs in this department of fcience; and thefe are made ftill more efficacious, by the difficulty of avoiding, in our explanations of mental phenomena, illuftrations derived from the objects of fenfation. Neverthelefs, the leading principles of the mind are not obfcure or difficult to be inveftigated; and where thefe are once fully eftablifhed, and the inquirer is guided by them in his refearches, he cannot but attain refults which will prove of great practical utility; while at the fame time he will find fources of intereft not furpaffed by any which prefent themfelves to the phyfical philofopher.

It might not be unattended with confiderable benefit to lay before our readers a connected view of the leading fyftems which have been adopted refpecting the operations of the mind; but it is not neceffary for our object; nor will the limits we muft fubmit to permit it. Thofe of our readers who are defirous of feeing the opinions of the principal metaphyficians, ancient and modern, on the fubject of our mental faculties, ideas, &c. will find a great fund of valuable information in Dr. Reid's Effays on the Intellectual Powers, efpecially in the fecond.

While we thus refer to Dr. Reid, we think it neceffary to ftate that we cannot accord with the leading features of his philofophy; and it is clear that he fell into the common error of regarding the hypothefis of vibrations, as an effential part of the Hartleyan fyftem. We regard it as an incumbrance on the fyftem; and we are fatisfied that no candid reader of the Obfervations on Man will fay that Hartley in any degree invefts it with the importance which he juftly attaches to the doctrine of affociation. It is *this* which conftitutes his fyftem; and it is *this* on which he refts his Rule of Life: and however groundlefs the hypothefis of vibrations may appear, or may really be, the grand law of affociation is in no way whatever affected.

Into the leading principles of the Hartleyan philofophy, Dr. Reid feems fcarcely to have entered. Indeed he was not likely to fee their force; for they reft upon a foundation diametrically oppofite to what he regards as the grand peculiarity of his own philofophical opinions,—that our perceptions neceffarily imply the belief of the prefent exiftence of the external objects of them, and that thefe are the *immediate* objects of perception. In endeavouring to overturn opinions from which abfurd conclufions have been unjuftly drawn, Dr. Reid has been led to deny what appears to us the moft obvious fact, (entirely independent of the theories of Locke and Hartley,) that there are in the mind objects of thought diftinct from the external caufes of their production. Numerous valuable obfervations are fcattered in various parts of Dr. Reid's writings; and the advanced ftudent of mental philofophy may read them with pleafure and profit; but as far as his opinions are founded upon the hypothefis that there are not in the mind any objects of its operations diftinct from thofe acts or operations, we cannot hefitate in pronouncing them vifionary in the extreme. If we had to choofe between two theories, the immaterial fyftem of Berkeley, and the non-ideal fyftem of Reid, we fhould be compelled to adopt the former; for we could fooner doubt the exiftence of external caufes of our fenfations, than we could the exiftence of our ideas. We are confcious of thoughts and feelings, of notions and conceptions, the objects of our mental operations, of recollection, affociation, comparifon, reflection, &c.: and we could as foon doubt our own exiftence as theirs. We admit that by the

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 term 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 conceptions,

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 sight. 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 to 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. lxviii.), 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 acount 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

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 acceptation 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

the cuftomary nomenclature. We have no term appropriated to denote motory changes accompanied with confciousnefs: this deficiency probably arifes from the circumftance, that mufcular action is fo much an object of the fenfes, that, by affociation, it is referred to the moving mufcle, and not to the intermediate fibrous motions and fenforial changes. Thus, while writing, all the motion feems to be in the fingers, and in the fingers alone, though even the minuteft motion, except that which is produced by fome external ftimulus upon the motory nerve, neceffarily fuppofes motory changes of the fenforium, and fhould, fcientifically fpeaking, be referred to the fenforium, or mind.

To fhew that fenforial changes are not neceffarily accompanied with confciousnefs, we obferve, that the diminution of confciousnefs can be traced in its various ftages, from the ftate of active attention, to cafes where we have no reafon to believe that confciousnefs is excited, where yet we have good reafon to believe that there were fenfible changes, becaufe thofe effects are produced which we know are produced by fenfations, (that is, by fenfible changes of which we are confcious,) and, as far as we know, in no inftance without fenfible changes. The following facts will at leaft illuftrate this pofition, which we muft leave to the reader's clofe reflection on the procedures of his mind. Perfons much accuftomed to employ notes in finging, fometimes feel fo deeply interefted in the thoughts and feelings excited by the words they are finging, that though the notes continue to regulate their tones of voice, the fenfible changes are altogether unnoticed by them, they do not excite the confciousnefs. Again, many who have been long accuftomed to perform upon a mufical inftrument, and are able to play with eafe at firft fight, can, while playing, even a piece of mufic which they have not feen before, converfe and carry on a train of reafoning, and yet play correctly. The appropriate fenfible changes muft in fuch cafes be produced; for otherwife the proper motory changes which occafion the motions of the fingers could not; but they are not accompanied with confciousnefs: as foon as they are, attention to the converfation or train of reafoning is interrupted. In the fame manner, perfons accuftomed to read aloud, can continue to read aloud even what they have never read before, (provided the modes of expreffion be not peculiar,) with correctnefs, at leaft, and at the fame time have their thoughts clofely engaged on other fubjects. 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, efpecially if it be familiar to us, our minds may be inftantly occupied in reflection or converfation, fo that the appearances of the road which direct our motions, fhall not, in the flighteft degree, excite the notice of the mind. That thofe appearances do direct us, and, of courfe, produce fenfible changes, though they do not excite the confciousnefs, is obvious; becaufe if we keep our fight from them, by clofing the eyes, by reading, &c. we are continually interrupted by a little trip or jar, unlefs the road is extremely fmooth, or extremely familiar to us. In this laft cafe, either the fenfible changes produced by the impreffions on the feet, direct the appropriate motory changes and confequent mufcular motions; or, one motory change is followed, owing to long affociation, by its next fucceffive motory change, and fo on.

We are fully aware that, in thefe ftatements, we fhall not meet with the concurrence of thofe who adopt Mr. Stewart's theory on the fubject, in his chapter on Attention; but it is, in opinion, abundantly more confonant with the laws of the mind, and more borne out by the clofeft reflection on our mental proceffes, to fuppofe that fenforial changes of different kinds may produce each other, without exciting the confciousnefs, than to imagine, with Mr. Stewart, that when the mind is moft deeply engaged upon a train of thought, it may at the fame time be continually paffing to impreffions produced by external objects on the organs of fenfe, and actually *willing* the motions with which thofe impreffions have been long connected; and all this, confeffedly, without our being able, in any degree, to retrace the change of attention, or the act of volition, in thofe cafes where the connection between the external impreffion and the mufcular motion is habitual, and the thoughts clofely occupied upon the internal object of attention. It not unfrequently happens that perfons, under the influence of very ftrong excitement of feeling, or deep engagement of thought, pace their chambers with rapid ftep, utterly unobfervant of every external object, and for the time utterly unconfcious of every thing but the immediate object of thought and feeling; and yet they never run againft the wall, but turn with as much correctnefs when they ought to turn, as if their attention were particularly directed to the objects around them. Now is it, we would afk, in any way conceivable, that though the entrance of a perfon into the room, the loud founds of carriages paffing, &c. would in no degree obtain their attention, the cuftomary impreffions from the walls, &c. fhould every moment have a portion of their attention, which muft on this fuppofition be *conftantly* fluctuating to them from its immediate object, and all this without leaving the flighteft trace in the memory. Innumerable impreffions are inceffantly produced on the corporeal organs of fenfation, (befides thofe of fight and hearing,) particularly on the organs of feeling, both from the action of external objects, and from the various perceptible motions of the bodily fyftem. Thefe we feldom notice, till fome circumftance or other particularly directs our attention to them. The moment this is the cafe, we have the appropriate fenfations; for inftance, thofe produced by the preffure 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 mufcular motions attending refpiration, the beating of the heart, the twinkling of the eye, &c. Now if Mr. Stewart's theory were juft, thefe and every other impreffion which might, at any one time, produce fenfations, and which the mind really obferves, when its notice is from any caufe directed to them; all thefe muft be every inftant attracting its notice with inconceivable rapidity, and in an imperceptible degree, and this even when the mind is fo completely abforbed with its own contemplations, that a violent external impreffion could not divert its attention from them. As foon as Mr. Stewart's hypothefis is thus carried to its juft extent, it lofes every appearance of rational foundation; and fince it cannot be confiftently relinquifhed, (as far as we can perceive,) fo long as Dr. Reid's leading principle is retained, the abfurd conclufions to which it leads may be regarded as an additional proof that the principle itfelf is without foundation in the nature of the human mind. The fact appears to us to be, that the external impreffions do produce fenfible changes, juft the fame whether the attention of the mind is directed to them or not; that when the attention is fully occupied, if the fenfible changes are not fufficiently vivid to interrupt the train of thought, or are not clofely connected with other fenforial changes, they produce no farther effect than a tendency to a more eafy (if not more impreffive) recurrence from fimilar impreffions; that, in fhort, the mental fyftem is no farther affected by them; but that if other fenforial changes have been habitually

bitually connected with them, thefe will be produced by them, without the confcioufnefs of the mind being excited to the procefs. The refult may be mufcular motion; and in this cafe, (and fometimes by this only,) we have proof of the operation of the external impreffion on the mental organs.

If the reader's own experience or obfervation do not furnifh him with fatisfactory proof of our pofition, that fenforial changes may take place, (and if fo, very often do take place,) without exciting confcioufnefs, we are difpofed to think that the following fact, (ftated by Dr. Percival, in his Moral and Literary Differtations, p. 110.) may be refted upon as decifive. "Several years ago, the countefs of —— fell into an apoplexy about feven o'clock in the morning. Among other ftimulating applications, I directed a feather, dipped in hartfhorn, to be very frequently introduced into her noftrils. Her ladyfhip, when in health, was much addicted to the taking of fnuff, and the prefent irritation of the olfactory nerves produced a junction of the fore-finger and thumb of the right hand, the elevation of them to the nofe, and the action of fnuffing in the noftrils. When the fnuffing ceafed, the hand and arm dropped down in a torpid ftate. A frefh application of the ftimulus renewed the fucceffive effort; and I was witnefs to their repetition, till the hartfhorn loft its power of irritation, probably by deftroying the fenfibility of the olfactory nerves. The countefs recovered from the fit about fix o'clock in the evening; but though it was neither long nor fevere, her memory never afterwards furnifhed the leaft trace of confcioufnefs during its continuance."

The gradual diminution of the confcioufnefs of external impreffions is perceptible on various occafions. If we are obferving an extenfive profpect, a picture of the whole field of view is formed at once on the retina. We fuppofe it will generally be admitted, that whenever a vifual impreffion is thus produced, the intermediate organs convey fome notice of it to the mental organs. As a matter of fact, it is clear that till the attention is given to fome particular parts, we perceive the whole field of view with more or lefs impreffivenefs, according as the parts are more or lefs diftinctly and vividly delineated on the retina, and near the axis of vifion. By degrees the attention is drawn to fome particular object, or part of the profpect; and the confcioufnefs of impreffions on the external organ from the other parts is diminifhed. If the mind is clofely engaged in obferving that object, it may be, and often is, utterly unconfcious of any other: if the attention to it leffens, the other parts are perceived again; in other words, the mind again becomes confcious of the fenfible changes produced by the external impreffions; and this confcioufnefs is more or lefs diftinct, in proportion to the degree in which the attention is left unengaged by any particular object, and to the circumftances above ftated. It requires fome fkill in the exercife of reflection to obferve thefe, and fimilar proceffes 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 ftate of the cafe is lefs perceptible. To obferve the operations of the mind fuccefsfully, we muft frequently obferve them, till the direction of the attention to them becomes eafy; 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 obferving what paffes within us; and when early produced by mental and moral culture, the beft foundation is laid for fuccefs in the purfuit of mental fcience. The following may be to many a more familiar cafe than what we have above adduced. Suppofe any one in a room near a water-fall, a forge, or fomething elfe producing a uniform found, or fitting near a clock: if every thing befides is quiet, and the mind in that mufing ftate in which its own trains are lefs impreffive than the impreffions from external objects, the found is perceived, and more or lefs diftinctly, according as the attention is directed to it; and it is eafy to obferve the variations in the degree of the mind's notice of it, from the ftate of direct attention to that in which one can hardly tell whether it is noticed or not. We often may catch ourfelves at the very inftant that the confcioufnefs of the found is vanifhing altogether: and that it does fo, 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 fo in a greater or lefs degree, till his attention being again engaged with fome other object, the found lofes its impreffivenefs, and is altogether loft from the view of the mind.

We are aware that the facts in the preceding paragraph, and others fimilar to them, may to a certain degree be accounted for, by fuppofing that the mental organs ceafe to be affected by external impreffions, when the attention is given to any other object; that, in fact, the impreffions on the retina, for inftance, then only affect the ultimate organs of fenfation, (*i. e.* produce fenfible changes in the fenforium,) when the attention of the mind is not engaged on other objects. But it appears to us much more philofophical to fuppofe, that the intermediate and mental organs of fenfation are always affected in proportion to the degree in which the external organs are; and that the fole caufe of their not exciting the notice of the mind is, the greater degree in which it is given to fome other object of thought or fenfation. We cannot fuppofe that the mere diminution of attention to other objects, fhould renew the progrefs of that change in the organs of fenfation which begins in the external organ. It feems unreafonable, in itfelf confidered, to fuppofe that the attention of the mind to other objects fhould ftop the progrefs of the change which takes place in the organs of fenfation, (beginning at the external organs,) before the mental organs are affected; or that this progrefs fhould be renewed by the mere diminution of the attention to thofe objects. And at any rate, if impreffions on the external organs may, without exciting the confcioufnefs, be followed by mufcular motion, not originating in the mere external ftimulus, (as we fee abundant reafon to conclude,) then the point may be regarded as proved, that every affection of the external organ of fenfation produces a correfponding change in the intermediate and ultimate organs, and that the degree of attention given by the mind to the fenfible change, (the change in the fenforium or mental organs,) depends upon the comparative impreffivenefs of the change, arifing from various caufes, and particularly affected by the degree in which the attention is engroffed by objects of thought, feeling, or perception, not related to the fenfible change.

We have no wifh to carry our opinions on this fubject beyond the bounds of fact and experience; but we fee reafon to conclude that ideal changes alfo may take place without exciting the confcioufnefs. Here the difficulties are greatly increafed, becaufe we have no evidence of the exiftence of any mental changes, of which we are not confcious, except by their caufes and confequences. The following cafe, however, appears to us fatisfactory on this point. Every one who can add up a column of figures, knows the nature of the mental operation, becaufe it is learnt after the memory has acquired confiderable power. The fum of two or three figures is firft afcertained; the ideal change of that fum muft, of courfe, be in the mind; and with that fum is combined the next figure, and fo 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 fenfible change, and there is the ideal change of the fum, and fo on, continually recurring; all this we perceive when we are adding up flowly. But perfons who are very familiar with fuch additions, will tell the refult, or final fum, apparently without an effort, apparently without the intervention of the mind, or any confcioufnefs of the operations and ideal changes which muft have paffed in the mind, before the refult could have been obtained. It will not, unfrequently, be found, that perfons very much habituated to thefe operations, can add up much more correctly, while they leave themfelves unconfcious of the operations and ideal changes, than when they direct the attention in any way to them; and what appears to us to fettle the point, as far as confcioufnefs is concerned, the fkilful accountant who, by conftant exercife, has become familiar with all the poffible combinations of fmall numbers, can go through a feries of additions, (and in one inftance which we have heard of, a complex feries, fuch as the addition of the columns of pounds, fhillings, and pence, at one operation,) and at the fame time clofely engage the attention upon fome other object; for example, can dictate to an amanuenfis.

As to motory changes, the fact is fo obvious, that mufcular actions, which muft have had their origin in the mind, (as being regulated by impreffions on the external organs of fenfe,) go on in long fucceffion, and with frequent variation, while, at the fame time, the attention is fully occupied by fome object of thought, that we are ready to fuppofe that nothing but its oppofition to a pre-formed hypothefis could lead a perfon to imagine that, in fuch cafes, the mufcular action excites the confcioufnefs. Such an immenfe variety of mufcular actions are continually taking place, in cafes in which volition was once concerned, without, in any perceivable degree, exciting the notice of the mind, and this is fo obvious a fact, and fo fatisfactorily accounted for by the Hartleyan philofophy, that however plaufible the counter confiderations of that really eminent philofopher Dugald Stewart (fee Elements, ch. ii.), we cannot fuppofe that his hypothefis can gain admiffion where the operations of the affociative power are thoroughly underftood.

It feems to us not impoffible that the whole of thofe fenforial changes which are not modified or occafioned by the re-action of the fentient principle, *might* take place without *mind* in the ufual philofophical fenfe of the term. We do not, of courfe, mean, that there could be *fenfations*, or *ideas*, or *voluntary motions* without mind; but that the correfponding fenforial changes (fenfible, ideal, or motory,) might, in all other inftances, except what we have juft excluded, have been produced, and the *mechanifm* of the mind, have, in fome meafure, gone on, without percipiency. And when we confider the wonderful phenomena of life, growth, and re-production, which are brought about by the delicate material ftructure of plants and animals, we feel no difficulty in allowing, that *thus far* the material part of the human fyftem is fufficient to account for the phenomena, not of *thought*, but of the *immediate occafions* of thought. The immediate *mechanifm* of fenfation, of ideas, of affociation, and of motion, we would refer to the fenforium; and we might fuppofe the fenforium to be material; but there is fomething beyond this. The fenfitive change is not a fenfation; the ideal change is not an idea; thefe imply percipiency and thought; thefe imply *mind* in the ftricteft fenfe; and the percipient principle is the mind itfelf. The motory change might be produced by its mechanical connection with different fenfitive or ideal changes; but this is not volition; volition is a property of the *mind*.

We excepted the fenforial changes occafioned or modified by the re-action of the percipient principle. As far as fenfible changes merely are concerned, the exception is of little confequence; for in *receiving* thefe, the mind has little to do. Exercife and attention may increafe the fufceptibility and vigour of the external organs, and the fenfible changes may confequently become more lively and vigorous; and the effect of any fenfible change upon the mental fyftem will, in a great degree, depend upon the attention which the mind gives to it; but we fee no adequate room to doubt, that whenever the external organ is affected, a correfpondent change takes place in the fenforium, whether it affect the percipient principle or not, *i. e.* whether or not it become a fenfation. The cafe, however, is different refpecting ideal changes, and the affociations which take place among them. In the firft place, were it not for the attention of the mind to the fenfible changes, few of them, comparatively fpeaking, would be retained; and then none of thofe affociations could be formed, in which the mind, properly fo called, has any fhare, none arifing from the perception of various relations, from intentional combinations, from acts of reafoning, volition, &c.; all would be mere mechanifm, exquifite and perfect in its nature, yet ftill nothing but mechanifm.

We have fometimes been inclined to confider the fenfitive, retentive, and affociative powers, "as the elementary powers of the mind, to the operation of which all *intellectual* phenomena may be referred" (fee INTELLECTUAL *Education*, col. 2.); but farther reflection on the claffification of our intellectual phenomena and their mental caufes, induces us to extend the number of our intellectual powers. We ftill fee no reafon to hefitate in fuppofing that thofe elementary powers are fufficient to account for all the phenomena of memory, conception, and fancy; and there cannot be a reafonable doubt that the operations of the affociative power have great influence among our other intellectual phenomena; but we fully agree with Mr. Stewart, in the opinion which he has ftated in different parts of his works, that it is injurious to the progrefs of mental fcience to fimplify mental principles too far. We are fatisfied that he has not gone far enough; that under the fettering reftraints of Reid's principles, he is contented to reft with various extenfive claffes of our mental phenomena as ultimate facts, where the operations of the affociative power afford an explanation equally clear and important; but the ftudent of Hartley fhould alfo ftudy the writings of Mr. Stewart; in many, and thefe the moft valuable parts, they are perfectly confiftent with Hartleyan principles; where his views are inconfiftent with them, we have feldom feen reafon to follow him, but there are cafes in which he furnifhes a falutary check upon the tendencies which the full adoption of thofe principles can fcarcely fail to give the ardent inquiring mind, unreftrained by the caution of experience, and fuppofing them omnipotent becaufe their inadequacy has not been fuggefted by oppofing fyftems, or by the actual application of them to the phenomena of thought. If the mentalift is fo little able to think and judge for himfelf, that he muft implicitly imbibe his philofophy from another, we fhould greatly prefer his adopting the fyftem of Hartley to that of the fchool of Stewart; becaufe the former, though imperfect, and in fome degree incorrect, is radically and extenfively true, and leads to the moft important practical principles for the regulation of the affections and the conduct of life; but where there is the bafis of a found and independent underftanding, to ftudy 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. Belſham'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 Senfitive Power.*—The brain is a foft pulpy mafs, of a whitifh colour on the infide, occupying all the cavity of the fkull. Minute differences are obfervable in the fubftance of the brain, in different parts of it; but it is unneceffary to enter upon a ftatement of them here. (See BRAIN, and its dependent articles.) The fpinal marrow is the continuation of the loweft part of the brain, which paffes through the great opening of the fkull down the hollow of the back bone. From the brain and fpinal marrow proceed the nerves, which at firft are fine fibres of the fame fubftance with the brain; thefe fibres meet, and form foft white pulpy cords, which afterwards fpread themfelves over various parts of the body, by fplitting into innumerable and exceedingly minute branches. Anatomifts count forty pair of nerves (for they come off in pairs though they afterwards feparate); of which nine or ten only come from the brain at the bottom of the fkull, and the reft from the fpinal marrow. Thofe from the brain are diftributed to various parts of the head; thofe from the fpinal marrow are diftributed over the trunk and extremities. See NERVES.

The external organs of fenfe, the nerves, and the brain, in which, for brevity, we include the whole medullary fubftance, are the corporeal organs of fenfation. All, as we are at prefent conftituted, are neceffary to fenfation. If the external organ is deftroyed, no fenfation can be produced; where there are no nerves, there is no fenfation; where the nervous branches are moft numerous, there is moft fenfation; if the nerve be deftroyed, fenfation cannot be produced from thofe parts to which the nerve belongs, which are farther from the brain than the injured parts. The brain is the ultimate organ of fenfation of which we have any knowledge. All the nerves terminate in the brain. If the brain is compreffed, fenfation is fufpended. If the brain is confiderably injured, fenfation ceafes.

There is, in like manner, confiderable reafon to fuppofe that the brain may be the immediate organ of ideas. If the brain is difeafed, many of the phenomena of thought are altogether changed. If the brain is compreffed, thought is fufpended. If the brain is materially injured, ideas ceafe.

So alfo the brain appears to be the primary organ of all motions which are not produced by the immediate action of external objects upon the mufcles. The mufcles are the immediate organs of motion. (See MUSCLE.) The mufcles confift of flefhy fubftances, and generally alfo of tendon. The tendons faften the mufcles to the bones; and the flefhy parts, by their contractions, produce the motions of the bones. Into the flefhy parts of the mufcles, numerous nerves enter; they are diffufed over their furface, and within their fubftance. Thefe nerves, as before-mentioned, terminate in the brain; they are the intermediate organs of voluntary motion between it and the mufcles. If a nerve be compreffed or punctured, motion is produced in the mufcle over which that nerve is diftributed. If a portion of that nerve be cut, or otherwife deftroyed, voluntary motion can no longer be produced in that mufcle over which it was diftributed. If the brain be touched with any inftrument, or cauftic be applied to it, the mufcular fyftem undergoes the moft violent contortions. If the fpinal marrow be compreffed, the power of voluntary motion is fufpended in thofe mufcles which receive their nerves from the back. If the brain is confiderably injured, all power of voluntary motion ceafes.

Some of our readers may hope that we are now going to give fome hypothefis on the nature of thofe changes in the corporeal organs which occafion or accompany fenfation, idea, and voluntary motion. We have, however, none to give. If our object were different, we fhould lay before them Hartley's hypothefis of vibrations, with the arguments for and againft it; but we cannot convince ourfelves that it has any thing to do with mental philofophy. All that appears to us important, in the prefent ftate of our knowledge refpecting the connection between the mind and the body, we have already ftated: no hypothefis as to the phyfical occafions of thought can, yet, really explain the operations of thought. If there muft be fome hypothefis, connected with the doctrine of affociation, we recommend the reader to affume Hartley's hypothefis, employing the term *vibrations* merely to denote the changes, whatever they be, in the ultimate material organs of the mind, which occafion or accompany the various exercifes of the percipient principle. We do not think he will gain much by it; but it will do lefs harm than by defining the nature of thofe changes. On the hypothefis of vibrations, the reader may confult Reid and Belfham. The latter has given a luminous ftatement of the arguments for and againft 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 fubftance. (See Haller's Elementa Phyfiologiæ, vol. iv. fect. 8. art. Conjecturæ, § 4.) Refpecting the part of the brain moft intimately connected with the mental functions, feveral curious facts are ftated in a paper by M. de la Peyronnie, fubjoined to Jurain's French tranflation of Hartley's firft 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 callofum* is the feat of the foul. We have no opportunity of knowing what Dr. Ferriar may have urged againft this opinion in the Manchefter Tranfactions.

The *external Organs of Senfation* are ufually claffed under five heads, fight, hearing, feeling or touch, fmell, and tafte. The fenfe of feeling might probably be divided, with convenience, into two or three; becaufe the claffes of fenfations which are referred to this fenfe differ confiderably in themfelves, and in the external caufes producing them. But the common arrangement is fufficient for our purpofe.

The prefent article, and the next following, have unexpectedly been configned to the writer of thofe on Education. If he had forefeen this circumftance, he would have made references to this article from INTELLECTUAL and MORAL *Education*. As it is, he has, in feveral parts of thofe articles, introduced obfervations which would otherwife have had place here; and though it would be eafy to reftate them with confiderable amplification, yet his limits being neceffarily confined, he prefers referring to thofe articles, for fuch obfervations as may be neceffary for his prefent purpofe.

To perceive the influence of each fenfe in forming our notions and feelings, it is neceffary carefully to diftinguifh between the mere fenfation, and thofe ideas which are, by affociation, fo connected with it, as to appear at firft view a part of the fenfation. When the fenfation, produced by an external object, is fo clofely united with ideas derived from other fenfes, or from the fame fenfe in different circumftances, that the whole fhall appear to be one feeling, apparently derived immediately from the external impreffion, the whole together, the fenfation and affociated complex idea, is called a *perception*. For farther illuftration, fee INTELLECTUAL *Education*, chap. ii. col. 3, 4. The change of fenfations into perceptions, furnifhes fome very important inftances of the operation of the affociative power; and without an acquaintance with the influence of affociation in making fenfations at once bring complex ideas into the view of the mind, it is impoffible to underftand the real nature of perception. It clearly was not underftood by Dr. Reid;

nor

nor indeed was it poffible for him to enter into the diftinction between fenfation and perception, without calling in the agency of affociation; and as we have already hinted, he could not receive the doctrine of affociation, when his fundamental pofition rendered the exiftence of this principle impoffible. By long exercife, the operations of perception become fo intimately united with fenfations, that, in numerous cafes, the fenfation is with great difficulty diftinguifhed from the affociated idea; and it is not to us at all furprifing, that a man of fuch cool and fteady character of mind, fhould not have been able to difcriminate between the fenfation and, in his cafe, the *unvarying* affociated ideas, fince he had not acquired an infight into the formation of ideas by affociation, and had even brought himfelf to deny the exiftence of any *objects* of our mental operations feparate from the external objects of fenfation. He faw that the Berkleyan hypothefis was contradicted by the obvious dictates of common fenfe, and being unaided by the principles of affociation, he had no refource but to make the fenfation introduce the belief of an external caufe of it, by inftinct, or a kind of infpiration.

1. *Senfe of Feeling.*—When the mind has connected the complex ideas derived from the touch, with the vifible appearance of objects, the fight is then indefinitely the moft ufeful channel of knowledge refpecting external objects; but in the earlieft ftages of the intellectual progrefs, the touch is the moft ufeful; in fact, as man is formed, it is then abfolutely neceffary to render the fight productive of moft of its prefent utility. The fenfe of feeling differs from the other fenfes, in belonging to every part of the body, external or internal, to which nerves are diftributed. The term *touch* is moft correctly limited to the fenfibility which is diffufed over the furface of the body. The touch exifts with the moft exquifite degree of fenfibility, at the extremities of the hands and in the lips. The fenfe of touch is thus very commodioufly difpofed, for the purpofe of encompaffing fmaller bodies, and for adapting itfelf to the inequalities of larger ones.

The fenfations acquired by the fenfe of feeling, are thofe of heat, hardnefs, folidity, roughnefs, drynefs, motion, diftance, figure, &c.; and all thofe corporeal feelings which arife from a healthy or difeafed ftate of the nerves, and of the part of the body to which they belong.

The pains of this fenfe are more numerous and vivid than thofe derived from any other fenfe; and therefore the relics of them affociating and coalefcing with one another, conftitute the greateft fhare of our mental pains. On the other hand, its pleafures being, in general, faint and rare, in comparifon with others, and particularly thofe of the tafte, have but a fmall fhare among the rudiments of the mental pleafures. The fexual feelings of a corporeal nature, however, when under due regulation, do undoubtedly contribute, in more advanced periods, to the compofition of fome refined mental feelings; and for fome very important remarks refpecting the origin and influence of thefe defires, we beg to refer to Hartley's 73d propofition.

The touch is the original medium of our knowledge refpecting the real qualities of fubftances, and indeed is the fole medium by which we gain a knowledge of external objects as fuch. It is by the touch, and originally by the touch alone, aided by the power of mufcular motion, that we diftinguifh our own bodies from other objects that furround us, and from the impreffion which every one has, that the objects which affect the fight, the hearing, &c. are external. When we touch a fenfible part of our bodies, we have fenfations conveyed to the mind through two nervous branches; when we touch any other body, we have only one fenfation. For fome interefting and often fatisfactory fpeculations as to the influence of different fenfes in forming our ideas refpecting external objects, fee Condillac's Traité des Senfations. Mr. Stewart appears to have been led by that work to fome remarks at the clofe of his chapter on Perception; and we do not hefitate in faying, that thofe remarks entirely overthrow the fundamental principle of Dr. Reid's theory of perception, by which he imagined he had demolifhed the vifionary hypothefis of Berkeley. See PERCEPTION.

The notion that external objects give us the fenfations of found, tafte, fight, and fmell, is fo continually forced upon us by the fenfations of touch, aided by the power of mufcular motion, that there probably was never found a perfon who doubted of the exiftence of the external world as the caufe of his fenfations, except from the influence of philofophical fpeculation. Some very acute thinkers have, indeed, given up the belief of an external world as the caufe of their fenfations; but their opinion never did, nor never can, gain much ground; for it is inconfiftent with the perceptions, which, by the conftitution of our frame, are neceffarily formed from continually recurring fenfations. The philofophic Berkeley, and a late writer, Mr. Drummond, are the chief fupporters of this curious, but to fay the leaft, unimportant opinion. If it were allowable to leave every thing out of confideration, but the occafional vividnefs of our vifual conceptions, and the indifputable fact that fenfations are merely affections of the mind, it might be very difficult to refift the acutenefs of their reafonings; but we are fully fatisfied, that they would never have come to their curious conclufions, if their object had been to inveftigate the fources of that belief which we doubt not they had themfelves, except in the moments of abftract fpeculation; and if they had paid more attention to the influence of the fenfe of feeling (aided, of courfe, by mufcular motion) in the formation of our perceptions. They would then have regarded it as infinitely more probable that this almoft irrefiftible conviction is a well-grounded one, than that every human being is almoft every moment of his life labouring under a delufion by the very conftitution of his nature, for which no fuppofable end can be affigned, and which muft therefore be inconfiftent with the known attributes of the Supreme Being.

Some philofophers have fuppofed, that it is owing to the exquifite delicacy of feeling which exifts in the hand, together with the exquifite mechanifm by which it is applied, that man poffeffes fuch fuperiority in knowledge over the lower claffes of animals. It cannot be juft to attribute to this caufe alone his mental fuperiority: but, indifputably, as man is conftituted, it is effential to the degree of fuperiority now poffeffed; and we obferve, that tribe of animals poffeffes the greateft degree of what may be called human wifdom, which has the fenfe of touch moft perfect; the flexible organ at the end of the elephant's trunk anfwering fome of the purpofes of the human fingers. See INTEGUMENTS.

2. *Senfe of Tafte.*—This fenfe, and that of fmell, are nearly allied to the fenfe of feeling. They are, however, properly diftinguifhed from it, becaufe they have each a peculiar organ, and are each affected by peculiar properties of bodies. The chief organ of tafte is the tongue; and it is fitted for its office, by the numerous extremities of nerves which are lodged along its furface, and particularly at the top and fides. Hartley confiders this fenfe as extending to the other parts of the mouth, and through the throat, and the other parts of the alimentary duct. Taken in this comprehenfive acceptation, the fenfe of tafte conveys

veys to the mind fenfations not only of flavours, but of hunger and thirft.

In order to produce thofe fenfations of tafte which are derived from the tongue, its nervous extremities muft be moiftened; and the action of eating generally produces the effufion of a fluid from different parts of the mouth, which anfwers the purpofe of exciting the tafte and affifting the digeftion.

The tafte undergoes fome remarkable changes in paffing from infancy to old age. Sweets generally grow lefs and lefs agreeable, and fometimes even difagreeable, and at laft naufeous. Aftringent, acid, and fpirituous liquors, which difpleafe at firft, afterwards become highly grateful. Even bitter and acrid fubftances firft lofe their offenfive qualities, and after a fufficient repetition give a relifh to our aliment. And many particular articles of food or medicine, become either extremely pleafant or difgufting, from affociations with fafhion, joy, hope of advantage, hunger, the pleafures of cheerful converfation, &c. or with ficknefs, vomitings, gripings, fear, forrow, &c. Thefe changes are partly in confequence of the ufual effect of cuftom on the organs of fenfation, both external and internal, *viz.* to diminifh the vividnefs of fenfation; and partly owing to the influence of affociation. This operates, Hartley thinks, principally in the following method. The pleafant and painful impreffions which particular foods and medicines make upon the ftomach, always either accompany the tafte, or follow it in a fhort time; and by this means an affociation is formed, whereby the direct pleafantnefs or naufeoufnefs of the tafte is enhanced, if the impreffions upon the tongue and ftomach be of the fame kind, or diminifhed, and perhaps overpowered, and even converted into its oppofite, if they be of different kinds. In like manner, a difagreeable tafte, by being often mixed with a pleafant one, may at laft become pleafant alone, and *vice verfa*: hunger and fatiety may alfo, by being joined with particular taftes, contribute greatly to augment or abate their relifh. It may alfo be obferved here, that the defire of particular foods or liquors, is often directly excited by their affociated circumftances, and this, in fome cafes, more than by their taftes, or even when their taftes are nearly, if not altogether, become indifferent; and it is very common for thefe circumftances, particularly the fight or fmell of the food or liquor, to prevail againft men's better judgments, directing them to forbear, and warning them of the mifchiefs likely to arife from felf-indulgence.

The pleafures derived from tafte are very confiderable; and the power of yielding pleafurable fenfations ufually accompanies the tafte through the whole of life. Hence it is reafonable to infer, that its pleafures conftitute one grand fource of the mental pleafures, that is, of thofe which can be felt without the direct intervention of fenfation. They leave their relics in the mind; and thefe combine together, with other relics of pleafurable fenfations, and they form feelings which often connect themfelves with objects which have no immediate connection with the objects of tafte. To this fource Hartley traces the principal origin of the focial pleafures; and there cannot be a doubt, that the pleafures of tafte are the chief original fource of the filial affections. (See MORAL *Education*, col. 22, 23.) It appears that one end of the long continuance of the pleafures of tafte, is to fupply continual acceffions to the mental pleafures; but, without a doubt, the principal object is to make that a fource of pleafure which is neceffary to felf-prefervation. The pains of tafte are much lefs numerous than thofe of feeling. They are only fuch as are neceffary to prompt to avoid exceffive abftinence or gratification, and to prevent the employment of improper food. "The moft common of thefe painful impreffions is that from excefs, and the confequent indigeftion. This excites and fupports thofe uneafy ftates, which attend upon melancholy, fear, and forrow."

3. *Senfe of Smell.*—This fenfe is very nearly allied to that of tafte; and indeed many of thofe pleafurable fenfations which are ufually referred to the tafte, (as being received during the act of eating and fwallowing,) really belong to the fmell. The external organ of fmell is a membrane or fkin, overfpread with nerves, which line the internal cavity of the noftrils, and the furface and cavities of the bones which join the noftrils. This is affected both by the odorous particles which proceed from external fubftances through the nofe, and by thofe which come from the fubftances which are eaten; for there is a communication between the nofe and the back part of the mouth.

The pains of fmell are obvioufly defigned to affift us in the proper choice of food; and alfo to prompt us to avoid fuch noxious vapours, as may render the air injurious to health and life. It appears alfo, that offenfive odours, in various circumftances, contribute to generate the fenfe of fhame, decency, &c. The pleafures of fmell have a direct connection with thofe of tafte: it is only neceffary, therefore, to add to what has been faid refpecting the latter, that the pleafures of fmell which arife from the various productions of nature, have a confiderable fhare in the formation and vividnefs of fome of our mental pleafures; and, in particular, of thofe which arife from the view of rural objects and fcenes, and from the reprefentations of them by poetry and painting.

4. *Senfe of Sight.*—The organ of fight is a globular body, which contains within it tranfparent fubftances fitted to form on the back part of it, a picture of the object of fight. The examination of an ox's eye will give a pretty accurate idea of the general ftructure of the human eye. We fee in front a horny tranfparent fubftance, 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 folid body, with two furfaces of different convexities, called the *cryftalline lens*. Next to this is the *vitreous humour*, a jelly-like tranfparent fubftance, which fills the ball of the eye. The *retina* confifts of exceedingly minute fibres from the optic nerve, which are fpread over the whole of the back part of the inner furface of the eye. Behind the retina is a mucous fubftance, which in the human eye is of a dark colour, and ferves to imbibe the rays of light which pafs through the retina, fo as to prevent the confufion which would arife from the reflection of them. The retina is the immediate organ of fight. The rays of light proceeding from every vifible point of the object of fight, enter the eye through the cornea, and pafs through the pupil: they are refracted by the three humours of the eye, fo as to form upon the retina an exquifitely beautiful and diftinct, 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 fome luminous object. For a minute account of the ftructure of this organ, fee EYE.

What effect is produced upon the optic nerve by the formation of this picture upon the retina, is not certainly known: it is fufficient for our prefent purpofe, that, by means of the nerve, &c. the impreffion, of whatever nature it be, is communicated to the mental organs, and produces in them thofe effects, which, when they excite the confcioufnefs, are called fenfations.

The picture on the retina is inverted; and yet it does not appear that the vifual fenfation conveys the notion of the object being inverted, even when unaided by the ideas derived from the touch. The firft efforts of children to grafp, &c. afford no indication that the object appears to them inverted; and we are not aware that the rectification of this vifual impreffion is among the leffons which the blind have to learn when they have been reftored to fight. When the kitten playing before the mirror fees her own image, and ftrikes her paw againft it, (before fhe is wife enough to try, like Lee Boo, to look behind it,) fhe aims as if fhe perceived the image in the direct pofition: her image appears at the bottom of the glafs, and, we will fuppofe, on the right fide of it; and there fhe ftrikes; though in the picture on the retina it appears at the top, on the left. The efficacy of affociation to correct the influence of the inverted picture, by the ideas derived from the touch, we could in no way doubt; but, notwithftanding the ftatements of fome optical and metaphyfical writers, we are fatisfied that the mind does not fee objects inverted, though the impreffion upon the retina, if the immediate object of the mind, muft, of itfelf, produce this notion. The nervous fibres of which the retina is compofed, may change their relative pofition before they reach the brain; or the mental organs of touch and thofe of fight may have fuch a relation, (of fituation, if corporeal,) that the fenfations of pofition in this refpect fhall correfpond. Whatever may be the real caufe, however, the fact clearly is, that the inverted picture on the retina does not produce a fenfation of the object as inverted; and that by the vifual impreffions alone, the erect object is perceived as erect. The landfcape or portrait painter can, by long habit, feparate the vifual fenfation from the perception, and fee the objects of fight as they would appear on an uniform furface; but we never heard that he was able to fee them inverted, which he muft fometimes do, in the courfe of his abftract attention to the vifual fenfation, if, as appears to be commonly thought, the vifual impreffion of itfelf, feparate from the ideas derived from the touch, conveyed to the mind the notion of objects as being in an inverted pofition. Even the profound Hartley has paffed over this circumftance without adequate confideration.

If the fenfation produced by the object of fight be confidered unblended with the relics of other fenfations, we find that it is merely what can be communicated by a minute picture on the retina. The fenfation of colour can be thus communicated, and this is the only fenfation which can be confidered as appropriate to the fight. The fenfation of figure can be communicated, but only of figure in two directions, length and breadth; for the picture on the retina can have only thofe two dimenfions. The fenfation of magnitude can alfo be thus communicated, but not of real magnitude; for a fenfation of real magnitude cannot be conveyed by a picture which is almoft indefinitely fmaller than the real object. To ufe the illuftration of Adam Smith: "If you fhut one eye, and hold immediately before the other a fmall circle of plain glafs, of not more than half an inch in diameter, you may fee through that circle the moft extenfive profpects, lawns, and woods, and arms of the fea, and diftant mountains. You are apt to imagine that the vifible picture, which you thus fee, is immenfely great and extenfive; but it can be no greater than the vifible circle through which you fee 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 glafs, that pencil might delineate upon that little glafs, the outline of all thofe extenfive lawns, and woods, and arms of the fea, and diftant mountains, in the dimenfions in which they are feen by the eye." Again, it is obvious, that however large or however fmall the field of view, the picture occupies an equal extent upon the retina. Similar obfervations might be made with refpect to diftance. The organ of fight can convey only that fenfation of diftance which may be produced by a minute picture on the retina; that is, nothing but the fenfation of the diftances of the different parts of the picture, which may bear no proportion to the real diftances, and can only be in two directions. Similar things may be faid of motion, that is, change of pofition. The vifual fenfation 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 themfelves, but the picture formed upon the retina, is the immediate object of the fight. Without the fenfe of touch it is probable that the picture would never have conveyed ideas of real figure, magnitude, motion, or pofition; ftill more, that it would never have conveyed the idea, that external objects produced the picture. Of colour it does convey fenfations which do not receive correction from the touch, and which, can be acquired by the fight alone. Perfons completely blind have been known to diftinguifh objects of one colour from thofe of another, but this is by the feel of the furfaces of thofe objects. If they have never at all poffeffed fight, though they may fpeak of colours, and diftinguifh coloured objects, and even have a remote idea of the caufes of our fenfations of colours, yet they can have no fenfations, nor confequently ideas of colours. Mr. Locke mentions a blind man, who faid, that he imagined the colour of fcarlet refembled the found of a trumpet.

The limits here ftated of the direct power of the fenfe of fight, may appear ftrange to thofe who have not been accuftomed to diftinguifh between the fenfation, and the perception of which the fenfation forms a part. We feem to have an immediate fenfation, by means of the fight, of the real fituation and magnitudes, &c. of objects; but what has been before ftated is an indifputable fact. The cafe is, the compound ideas formed from the fenfations of touch, in connection with certain vifual fenfations, are fo early formed, and fo early connected with thofe vifual fenfations, that we have no recollection of the fimple ideas of fenfation, 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 circumftances which prove the point; the moft fatisfactory are thofe attending the obtaining of the fight, at a period when recollection can regifter the fenfations. One fuch cafe fell under the obfervation of the able Chefelden, and we fhall ftate fome of the principal circumftances of it. Mr. Chefelden couched a youth of thirteen years of age. When he was allowed to ufe his fight, all objects appeared to him alike to touch his eyes, as the things which he felt touched his fkin. He confidered folid bodies as planes differently coloured; and when he had learned to diftinguifh folids by their appearances, he was greatly furprifed, when examining the pictures of folids, to find all the parts plane and fmooth like the reft; he afked which of his fenfes deceived him, his fight or his feeling? Being fhewn a miniature of his father, which was painted on a watch cafe, he at once perceived that it was a reprefentation of his father, but expreffed great furprife that fo large a countenance could be contained in fo fmall a fpace, it appeared to him as impoffible as for a pint to contain a hogfhead. Mr. Ware publifhed, in the Philofophical Tranfactions of 1800, a cafe which feemed to militate greatly againft Mr. Chefelden's conclufions: Mr. Ware's patient from the firft 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 ſen ble 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 degreee 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

two feparate powers or capacities of the mind. This is not done by Hartley, who appears to refer both to fenfation; and it has fubjected him to fome unfounded animadverfions of the great northern philofopher. Speaking of the phenomena of memory as not to be entirely explained by the laws of affociation, Mr. Stewart fays, "The affociation of ideas connects our various thoughts with each other, fo as to prefent them to the mind in a certain order; but it prefuppofes a faculty of retaining the knowledge we acquire." Of this Hartley was perfectly aware; and he has accordingly a diftinct propofition (p. 8.) on the production of ideas.

Without the retentive power, it is obvious that man would be a being of mere fenfation, little if at all fuperior to the loweft orders of the animal creation, and inferior to many of them. The retentive power provides materials for the agency of the affociative power. Without the former, the latter could not be called into exercife; and without the affociative power, the relics of fenfation, (the effects of the retentive power,) would be of no utility. The operations of the retentive power can fcarcely, however, be feparated from thofe of the affociative power; and thefe together conftitute the compound faculty called memory, for fome account of which we refer our readers to a fubfequent part of this article. We introduce the fubject here, merely in reference to the generation of ideas.

We have faid that the receiving fenfations, and the retaining the relics of them, probably depend upon the fame organic caufes, whatever they be. In fome inftances fenfible changes perceptibly continue after the fenfible objects are removed. Two or three facts, which every one muft have noticed or may notice, will illuftrate this principle. If a piece of ftick 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 fenfible changes produced by found, perceptibly continue after the external caufe ceafes. If a founding body be ftruck very rapidly with a ftick, we do not perceive any interval; and, as Hartley well obferves, the moft fimple founds which we hear, being reflected from the neighbouring bodies, confift of a number of founds fucceeding each other at different diftances of time, according to the diftances of the reflecting bodies, though, owing to the effect of each on the auditory organs continuing fome little time after the actual impreffion on the external organ, the founds appear to be exactly fynchronous. The fenfible changes produced by the other fenfes, alfo continue fome time after the impreffions which have been made upon them. If a hard body be preffed upon the palm of the hand, it is not eafy to diftinguifh for a few feconds, whether it remains or is removed. And taftes continue to be perceived, long after the fapid fubftance is removed. This laft circumftance may, however, be accounted for on the fuppofition that the fapid part of the fubftance 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 rife, in the cafe of vifion, to a number of very fingular and interefting phenomena, by fome philofophers called *ocular fpectra*. A confiderable variety of them are ftated by Dr. R. Darwin of Shrewfbury, at the end of the fecond part of Darwin's Zoonomia. We fhall felect a few of the moft ftriking.

Place about half an inch fquare of white paper on a black hat, and looking fteadily on the centre of it for a minute, remove your eyes to a fheet of white paper; after a fecond or two, a dark fquare will appear on the white paper, which will be feen for fome time. A fimilar dark fquare will be feen in the clofed eye, if light be admitted through the eyelids. So after looking at any luminous body, of a fmall apparent fize, as the fun, for inftance, for a fhort time, fo as not much to fatigue the eyes, this part of the retina becomes lefs fenfible to fmaller portions of light: hence when the eyes are turned upon any lefs luminous parts of the fky, a dark fpot is feen refembling the fhape of the luminous body. To the fame caufe Dr. R. Darwin afcribes thofe dark-coloured floating fpots, which are eafily perceptible when the eyes are a little weakened by fatigue, and during illneffes attended with great debility. He fays, that as thefe fpectra are moft eafily difcernible when our eyes are weakened by fatigue, it has frequently happened that people of delicate conftitutions have been much alarmed at them, fearing a beginning decay of their fight, and thence have fallen into the hands of ignorant oculifts. They are not, however, he obferves, the preludes to any difeafe; 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, lofe their fenfibility by a fmall duration of exertion, it frequently happens that fick people, in the extreme debility of fevers, are perpetually employed in picking fomething off from the bed clothes, owing to their miftaking the caufe of thefe dark fpots. An Italian artift, a man of ftrong abilities, relates, that having paffed the whole night on a diftant mountain, with fome companions and a conjuror, and performed many ceremonies to raife the devil, on their return in the morning to Rome, looking up when the fun began to rife, they faw numerous devils run on the tops of the houfes as they paffed along. So much were the fpectra of their weakened eyes magnified by fear, and made fubfervient to the purpofes of fraud or fuperftition.

Again: make with ink on white paper a black fpot, about half an inch in diameter, with a tail about an inch in length, fo as to refemble a tadpole. Look fteadily at this fpot for about a minute; and on moving the eye a little, the figure of a tadpole will be feen 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 fubjected to a lefs excitement, it is more eafily brought into action by being fubjected to a greater. A furface appears black, in confequence of its abforbing all the rays of light; that part of the retina, therefore, which is unemployed while looking at the fpot, is afterwards more fenfible 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 illuftrate the principle. If, when the light is pretty ftrong, we look fteadily for a fhort time at a window, the wood or lead-work of which is dark coloured, on turning the fight immediately afterwards to a white wall, we have a diftinct figure of the window with the panes dark and the wood-work luminous. Upon the fame principle Dr. R. Darwin accounts for the following circumftance. A writer in the Berlin Memoires obferves, that when he held a book, fo that the fun fhone upon his half clofed eye-lids, the black letters which he had long infpected became red. There is a fimilar ftory told by Voltaire of a duke of Tufcany, who was playing at dice with a general of a foreign army; and believing that he faw red fpots on the dice, apprehended that fome dreadful events were about to take place, and retired in confufion. The obferver, after looking for a minute on the black fpots of

a die,

a die, in a bright day, and carelefsly clofing his eyes, would fee red fpots correfponding to the black fpots on the die; and if they were intenfe from the fatigue or weaknefs of the optic organ, thofe appearances would continue, and on looking on the die would be fuppofed to be upon it, juft as perfons in a very weak ftate (as has been already ftated) often fee black fpots, which they refer to the bed-clothes.

We have ftated, that the capacities of fenfation and retention probably depend upon the fame organic caufes, whatever they may be. Dr. Darwin, in his Zoonomia, reprefents ideas as the animal motions or configurations of the organs of fenfe. (Sect. iii. 4. 1.) The more advanced ftudent of mental philofophy, may derive much ufeful information from the perufal of that fingular work; but we know no writer on the fubject whofe views can be received with more doubt and hefitation than Darwin's. He generalizes with extreme rapidity; and often feems to be much more defirous to urge every thing that can be advanced with any plaufibility in fupport of his ftrange hypothefes, than to try them by the touchftone of fact and experience. His peculiarities of nomenclature are extremely perplexing, and in various cafes very injudicious; and the number of them is fo great, that they often interfere with the ftatement of the triteft obfervations. We meet with remarks, which prefent a novel and impofing appearance, and we very frequently find, when we have taken the pains to interpret them into common language, that their novelty and importance confifted merely in their Darwinian drefs. But what we moft object to, is, that his nomenclature is fo completely founded upon his theories, that when he is ftating acknowledged truths, his expreffions convey a meaning beyond them, and the whole import of them, according to his ufe of the terms employed, derives an apparent credibility from the correctnefs of them according to their ufual acceptation.

Dr. Darwin employs the term *idea*, fo as to include the mental changes produced by impreffions on the external organs of fenfe, and alfo thofe which can be reproduced without the intervention of external impreffions; in other words, as including fenfations and ideas. And of both he maintains, that they are contractions, motions, or configurations of the fibres, which conftitute the immediate organ of fenfe. (Sect. ii. 2. 7.) It requires little acquaintance with the principles of mental philofophy, to furnifh a fatisfactory anfwer 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 neceffary to enter into any minute confideration of it. It is not only clogged with difficulties, which at once outweigh every prefumption 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 eafy and, in general, preferable folution without it. We are not, however, prepared to maintain, that, in cafe of vivid conceptions, thofe mental changes, which take place without external impreffions, are never attended with changes in the external organs, correfponding to thofe by which the original fenfible changes were produced; in other words, that conceptions, *i. e.* vivid ideas of fenfation, are never attended with changes in the external organs correfponding to thofe, by which the original fenfations were produced. When we have ftrong vifual conceptions, it *appears* as though we faw with our bodily eyes, juft as if fenfations were produced by external objects. If we were not aware of the efficacy of affociation, in the acquired power of referring fenfations to the part of the body from which they were derived, we fhould confider it as a fact decidedly proved by the feelings of which we are confcious, that when with the mind's eye we fee an abfent friend, there is a correfponding picture formed upon the retina, by the re-action of the changes in the mental organs. The effort to form fuch conceptions is, we think, diftinctly felt in the eyes; and the writer of thefe remarks obferves in his own cafe, that the effort is principally perceived in that eye, which he knows from experience to have the greateft vifual power. We refer to this circumftance, however, merely as a curious fact. It does not appear, admitting that the perception of which we are fpeaking is not the refult of affociation, that it enables us to account better for even the greater diftinctnefs of our vifual conceptions; for if the external organ be thus affected, it muft be in confequence of the very conceptions for which it might be fuppofed to account. If any vifual ideal changes, *i. e.* vifual conceptions, are attended with correfponding affections of the retina, the effect on the fentient principle is to be attributed to the former, not to the latter; all that could reafonably be admitted, is, that in confequence of the affection of the external organ, the conception might be rendered more vivid, fo as to approach nearer to the ftate of the original fenfation. But we need not refort to this opinion, to account for the diftinctnefs and vividnefs of our vifual conceptions. It is a general and well known principle, that when the retentive power is vigorous, *diftinct and vivid fenfations produce, by fufficient repetition, diftinct and vivid ideas.*

Still, when we recollect the general influence of ftates of mind upon the nervous fyftem, and the known fact that certain fenforial changes do affect particular nerves, fo as to produce mufcular motion, and farther take into account the feeling to which we have already referred, of which we prefume others alfo are confcious, we are inclined to think it probable, that conceptions, or vivid ideas of fenfation, may be attended with affections of the external organs of fenfation, fimilar to thofe which furnifhed the materials for thofe conceptions. Hartley's opinion, prop. 59, that an impreffion made upon one eye alone by a fingle object, may propagate itfelf to the other, and there raife up an image almoft equal in vividnefs to itfelf, and that, confequently, when we fee with one eye only, we may have pictures in both eyes, confiderably correfponds to this hypothefis. But whatever be the fact, we do not perceive that it affords any adequate ground for the fuppofition, that ideas cannot exift without affections of the external organs, from which the original fenfations were derived; nor the fhadow of a reafon for the Darwinian hypothefis, that fuch affections are the ideas themfelves. Their effects on the mind muft be produced in the common feat of fenfible, ideal, and motory changes.

Though we do not think it in any way neceffary to enter into any particular examination of this fundamental metaphyfical pofition of the Zoonomia, we wifh to notice one ftatement which Darwin has adduced in fupport of it; fince, if correct, it would furnifh a very fingular phenomenon, connected with the exercife of the retentive power. He fays, (fect. iii. 4. 4.) that "where the organ of fenfe is totally deftroyed, the ideas which were received by that fenfe feem to perifh along with it, as well as the power of perception." If this be fo, (and it muft, if his hypothefis be true,) we muft indeed be merely creatures of fenfe, 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

converfed

converfed with him by figns or writing, and never that he heard any one fpeak to him. "From hence it appears," adds the amufing theorift, "that with the perceptions of founds he has alfo loft the ideas of them; though the organs of fpeech ftill retain fomewhat of their ufual habits of articulation." We prefume that our readers will not think Darwin's hypothefis required to account for this deaf man's dreams; but to make them give fupport to the hypothefis, it fhould have been added, that this was always the cafe from the firft moment of his total lofs of hearing; and to afford any proof of it, it fhould farther have been fhewn, that from that period he never had any recollections (we do not mean diftinct conceptions, but fimple recollections, diftinct or indiftinct) of founds articulate or inarticulate. Refpecting the ideas of fight, Darwin adduces the following ftatement. "I have had the opportunity of converfing with two men, who had been fome years blind: one of them had a complete gutta ferena, and the other had loft the whole fubftance of his eyes. They both told me that they did not remember to have ever dreamt of vifible objects, fince the total lofs of their fight." Upon fuch facts as thefe the author builds his hypothefis. Did he afcertain that thefe men, with the total lofs of fight, loft at once all their vifual conceptions? Did the well-known voices of their domeftic relatives ceafe to recall their vifible appearance? Did they at once forget the features which they had long viewed with delight? Thefe might gradually fade from their memories; and by degrees they might be unable to picture to their minds objects with which their affections were moft clofely affociated. But we fee no room whatever to fuppofe that this was the immediate effect; and unlefs it were, the theory which their *dreams* are adduced to fupport muft be pronounced "bafelefs as the fabric of a vifion."

If we appealed to the common experience of thofe who have loft their fight from ordinary caufes, we fhould doubtlefs be told by the difciples of Darwin, (if fuch there be,) that their cafes were not in point, as their immediate organs of vifion might not be entirely deftroyed; and though we fhould not hefitate to predict the reply of thofe whofe cafes are clearly in point, we have no facts to ftate, and leave the matter, therefore, to the reader's obfervation, with one farther remark. It is indifputable that our ideas of folidity, and of real figure and diftance, are principally derived from the fenfe of touch: is there any reafon whatever to imagine, that when a man has both his arms fhot off, he at once lofes all thofe notions of folidity, figure, &c. with which the organs of touch have fupplied him, and which affociation alone enables the fight to communicate? Does he ceafe to perceive at once, that thofe objects, which his unaided fight would reprefent merely as a beautiful picture on a furface, are in reality folid bodies at various diftances from the eye, becaufe he has loft the organs by which he derived the ideas, now fo firmly connected with the vifual impreffion, as apparently to make a part of the fenfation of fight?

Though fomewhat out of place here, we muft add, that the ideas we have advanced refpecting the poffibility of fenforial change, (fenfible, ideal, and motory,) proceeding without exciting the notice of the mind, derive confirmation from the ftatements of Darwin on the catenation of motions (fect. xvii. 2.); and we particularly wifh to refer our readers to his ingenious (and, in general, juft) remarks on the progrefs of fuch catenations, in the cafe of a perfon learning mufic. The principles on which they are founded may be feen in Hartley's 21ft propofition; but Darwin has given a more detailed view of the progrefs of the tranfition from voluntary to automatic actions, and at the fame time has introduced feveral remarks, which illuftrate fome peculiar procedures of the mind, claffing under the operations of memory.

IV. *Of the Affociative Power.*—This principle, if not the fole caufe of all our mental phenomena, except the original production of fenforial changes and tendencies to them, has fome effect in the origin and modification of all of them. It is owing to this important principle that fenfations become the figns of thoughts and feelings, by which means man becomes a focial being; that the whole mental furniture of perceptions, notions, affections, paffions, fentiments, emotions, &c. is formed from the fimple relics of fenfation; that man, from mere fenfation, rifes to intellect; that he becomes capable of reflection, and of action. In fhort, whatever mental operation we attend to, except at the very earlieft period of mental culture, we find affociation the caufe of its production, or intimately concerned in it.

The fact of the connection which exifts between many of our fenforial changes had long been known; but it had generally been referred to the memory. Mr. Locke appears to have been the firft who employed the principle of affociation to account for aberrations of judgment and feeling, and for cuftomary connections of ideas; but he does not feem to have been at all aware that all our ideas, except thofe of confcioufnefs, and thofe which are produced by mere repetitions of uncompounded fenfible changes, *i. e.* ideas of fenfation, or fimple ideas, are, in reality, formed by the influence of the fame principle, either alone, or under the guidance of the underftanding; that all our affections, and our mental pleafures and pains, are nothing more than the relics of fenfation, varioufly combined by affociation. It feems that Mr. Gay, a clergyman in the weft of England, was the firft who endeavoured to fhew the poffibility of deducing all our paffions and affections from affociation: but his remarks on this fubject, as Dr. Prieftley obferves, amount to little more than conjecture. Thefe, however, led Dr. Hartley to direct his thoughts to it, and by a union of great talents, and of folid acquirements in moral fcience, in natural philofophy, aud in a profeffional knowledge of the human frame, with a mind unobfcured by felfifh tendencies, he was enabled to bring into one extenfive fyftem the progrefs of the mind from its firft rudiments of fenfation, through the maze of complex ideas and affections, to fhew how man rifes from fenfation to intellect. As Dr. Hartley expected, his work remained for a confiderable time almoft unnoticed. Tucker (A. Search) was obvioufly acquainted with it, and owed much to it; though he feldom fpeaks of Hartley but to laugh at him, in reference to his hypothefis of vibrations: and about the time when he began his Light of Nature, the firft volume of the Obfervations, as we have already ftated, was tranflated into French; but it does not feem to have attracted the notice of the French metaphyficians, either at the time or fince. Dr. Prieftley had the merit of bringing Hartley's fyftem forward to the public attention; and the celebrity which he had acquired among different claffes of the philofophic world was favourable to his object. About thirty years after the publication of the original work, he publifhed an abridgment of it; in which he left out the deductions from the principal theory refpecting the rule of life, the truth of Chriftianity, &c. (in fome refpects, we think, very unfortunately), and as much as he could of the hypothefis of vibrations. Since that time the fyftem of Hartley has been rapidly gaining ground in South Britain; and it is now, probably, pretty generally adopted by thofe who think clofely on the fubject. In North Britain, owing partly to theological and metaphyfical prepoffeffions, and not lefs, perhaps, to Dr. Prieftley's rough and unjuftifiably fevere attack upon three of the Scotch philofophers,

fophers, whofe mental and moral character ranked high among their countrymen, the principles of Hartley have made but little progrefs. The philofophical fyftems of Scotland have been fomewhat modified by it; but thofe who rank the higheft feem little inclined to admit it in its full extent. However, the writings of Dugald Stewart fhew that he has done fomething towards clearing the way, and the lectures of the profeflor of moral philofophy at Glafgow muft do more; and we fee reafon to hope, that when the prefent generation has paffed away, the true principles of mental fcience will gain a firm hold there, as well as in South Britain. We earneftly wifh for the extenfive adoption of the Hartleyan fyftem; becaufe, while it fatisfactorily explains a vaft variety of the moft important mental phenomena, it furnifhes the beft guide in the moral and mental culture of the mind. The value of the Obfervations on Man will in fome meafure be perceived from thofe portions, or abftracts of it, which we have introduced into this article; and we fhall think ourfelves happy, if we fhall have fucceeded in making the way fmoother for a judicious acquaintance with that profound and invaluable work, for fuch of our readers as have not previoufly paid much attention to the fubject. We hope that the philofopher juft referred to will excufe this public notice of him. The writer of this article had the great benefit of attending his clafs about fourteen years ago; and he feels grateful to him for the advantages he enjoyed there, both for the acquifition of valuable mental and moral knowledge, and for the aid and encouragement afforded by that liberal and enlightened profeffor, in the free exercife of the underftanding on fome of the moft important objects of its attention. Unfettered by any fyftem, though, probably, not altogether free from the influence of early biaffes towards the Scottifh philofophy, he fhewed his ftudents by example, as well as by precept, and the exercife of their intellectual powers, in what way they ought to purfue philofophical truth; and if ever they faw reafon to differ from him, they never failed to admire his candour, and to refpect his found and difcriminating judgment.

We have already ftated, that the affociative power has two grand modes of operation, *connection* and *compofition.* It is not eafy to keep thefe diftinct; but in many cafes it is practicable, and often tends to precifion in our reflections and reafonings. In what we fhall advance refpecting the operations of this power, we fhall keep this diftinction fomewhat in view. We fhall ftate, firft, the claffes of connections which exift among our fenforial changes; and, fecondly, fome of the principal laws of connections; we fhall then proceed to detail fome of the leading facts relative to compofitions, and the formations of our compound notions and feelings. It might be the moft regular method to begin with compofitions; becaufe connections are formed not only among fimple fenforial changes, but among thofe alfo which are compounded; in other words, not only among fenfations, fimple ideas and fingle mufcular actions, but alfo among thofe which have been blended together into complex ftates: and we fhall fometimes have occafion, in what we ftate relative to connections, to fuppofe fuch compofitions actually formed. On the other hand, connections are much more obvious, and more eafily comprehended, than compofitions; and a ftatement of fome facts refpecting the former will lead to an eafier acquaintance with the latter.

"That one thought is fuggefted to the mind by another," fays the elegant and philofophic Stewart, "and that the fight of an external object often recalls former occurrences, and revives former feelings, are facts which are perfectly familiar, even to thofe who are leaft difpofed to fpeculate concerning the principles of their nature. In paffing along a road which we have formerly travelled in the company of a friend, the particulars of the converfation in which we were then engaged, are frequently fuggefted to us by the objects we meet with. In fuch a fcene, we recollect that fuch a particular fubject was ftarted; and in paffing the different houfes, and plantations, and rivers, the arguments we were difcuffing when we laft faw them, recur fpontaneoufly 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 difcourfe which we have committed to memory; and the connection between the different notes of a piece of mufic in the mind of a mufician; are all obvious inftances of the fame general law of our nature. The influence of fenfible objects in reviving former thoughts and former feelings, is more particularly remarkable. After time has, in fome degree, reconciled us to the lofs of a friend; how wonderfully are we affected the firft time we enter the houfe where he lived. Every thing we fee, the apartment where he ftudied, the chair upon which he fat, recall to us the happinefs we enjoyed together; and we fhould feel it a fort of violation of that refpect which we owe to his memory, to engage in any light or indifferent difcourfe when fuch objects are before us." So, again, every one muft have noticed the connections which exift between our thoughts or fenfations and mufcular actions. A performer looks at the notes of his book, and the appropriate motions of his hands and fingers follow with immediate fucceffion. While we are writing, the thoughts we wifh to communicate fuggeft the appropriate words, and thefe, with an almoft inftantaneous fucceffion of motions, are written on the paper before us. We are perhaps more ftruck with this in writing fhort hand than long; the characters appear as the reprefentatives of our thoughts, almoft without knowing how they are made.

All thefe facts are obvioufly nothing elfe than cafes of thofe connections which are formed, by the operation of the affociative power, among our fenforial changes; in other words among our fenfible, ideal, and motory changes; in other words, again, but lefs generally, among our fenfations, ideas, and motory changes. We fhould, in fome refpects, prefer, in what follows, employing the terms *fenfible changes* and *ideal changes*, rather than the terms *fenfations* and *ideas;* becaufe thefe imply confcioufnefs, which we have before ftated is not neceffarily excited by the operations of the fenfitive and affociative powers: we fhall, however, content ourfelves with requefting the reader to bear in mind, that whatever may be faid refpecting connections among fenfations and ideas, might be ftated more generally refpecting connections among fenfible and ideal changes. Whatever the fenforium be, or whatever be thofe changes of it which excite the confcioufnefs, it is, we conceive, among thofe changes that connections and compofitions take place.

1. *Claffes of Connections.—Firft:* a *fenfation* may be affociated with other *fenfations*, with *ideas*, and with *motory changes*.

A *fenfation*, after having been affociated a fufficient number of times with another *fenfation*, will, when impreffed alone, excite the fimple idea correfponding with that other fenfation. Thus the names, fmells, taftes, &c. of external objects, fuggeft the idea of their vifible appearance; and the fight of them fuggefts their names, &c. In the fame manner, a word half pronounced excites the idea of the whole

whole word; the mention of the letters *a*, *b*, fuggefts the idea of *c*, *d*, &c.; the fight of part of an object fuggefts the idea of the whole; and the fight of one object, recalls the vifual idea of other objects which have been uniformly or very frequently feen with it. Innumerable other inftances might be given with little trouble; but we fhall mention only one other, which may affift fome of our readers in accounting for certain cafes of apparitions. L. was one day haftily paffing by a room in which a very excellent friend had ufually fat, in a particular chair, and in a particular part of the room. His thoughts at the time were employed on fome object which did not excite deep attention; and the fight of the chair raifed in his mind a vivid vifual idea of his friend as fitting in that chair. The friend had been dead fome weeks, and L. involuntarily came back for another vifion, but without effect. Such vifual ideas and fimilar ideas derived from the other fenfes, particularly the hearing, are by Dugald Stewart called conceptions; and where they are vivid and eafily excited, they frequently lead thofe who are inattentive to their fenfations, to fuppofe that they actually faw and heard, at a particular time, what they did not fee or hear.

Senfations become connected with *ideas*, fo that the repetition of the fenfation will excite the connected idea. Of this cafe of connections, the following will ferve as examples. Words affociated with ideas will readily excite them, even when very complex; the words *hero*, *philofopher*, *juftice*, *benevolence*, *truth*, and the like, whether written or pronounced, immediately call up with precifion the correfponding idea. The hearing of a particular national tune, is faid to overpower the Swifs foldier in a foreign land with melancholy and defpair; and it is therefore forbidden in the armies in which they ferve. The found 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 interefting thought and feeling are ufually called up in the mind by the fight of the fcenes of early pleafure, where paffed thofe years when novelty gave charms to every fenfation, every employment of the faculty, when hope prefented no profpects but what were decked in "fancy's fairy froftwork," and prefent joys precluded all regret for the paft.

Senfations may be connected with *mufcular action*, that is, with thofe fenforial changes which are followed by mufcular action; fo that the fenfation will excite the mufcular action, without the intervention of that ftate of mind which is called will. A perfon automically, 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 fhut the eye without thinking about it, or even being confcious of it. When copying from any book, if a perfon is very familiar with the employment, the appropriate motion of the fingers immediately follows the impreffion produced by the appearance of the word. In the fame manner the vifible impreffion derived from mufical notes regulates the motions of the performer. "While I am walking through that grove before my window," fays Darwin, "I do not run againft the trees or the branches, though my thoughts are completely engaged on fome other objects:" the fenfible impreffions produced by the objects around, excite in the fenforium the appropriate connected motory changes, and thefe the action of certain mufcles.

Secondly: ideas may be connected with *fenfations*, with *ideas*, and with *motory changes*.

An *idea* affociated a fufficient number of times with a *fenfation*, will excite the fimple idea belonging to that fenfation. Thus the ideas, whether fimple or complex, which have been fufficiently affociated with names, excite the ideas of their refpective names. Hence it is that we find ourfelves continually thinking in words; that is, the trains of ideas which pafs in our minds, are accompanied with their correfponding expreffions, when thofe expreffions 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 reafoner will do well to cultivate. Thofe who are habituated to reafoning, find their trains of reafoning fo generally clothed in words, and words fo neceffary to their intellectual operations, that the words are what they moft attend to; and fome have even gone fo far as to fuppofe, that *general* reafoning is concerned merely about words, and not about ideas. They feem to lie under a fimilar error, with thofe who imagine that the vifible appearance of objects is all we attend to, when we fpeak of magnitude, fhape, &c.; whereas the fact is, that the vifible appearance is nothing more than a fymbol, which ferves 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 reafoning. We are confcious while we are thinking, of employing the relics of audible fenfations; we feem to have faint fenfations of found paffing in the fenforium; but it appears probable that thofe who have long loft the ufe of their hearing, and have generally employed fight as the inlet of knowledge, have a train of vifual, inftead of audible conceptions. All, however, which we particularly wifh to have noticed here, is, that thefe things afford inftances of the connections of ideas with fenfations, fo that the idea introduces the fimple idea belonging to that fenfation.

Next, an *idea* affociated 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 refpect; of cruelty, that of horror; of meannefs, that of contempt.

Again, an *idea* affociated with a *motory change*, will excite that motory change, and its confequent mufcular action. Thus, the defire to perform a particular action will produce the correfponding voluntary motion of the limbs; joy produces a pleafing caft of countenance; fear excites trembling; and horror, diftortion. In the fame 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 fuggeft and be followed by the appropriate motions of the fingers, and this without the intervention of volition, fometimes without even the confcioufnefs of the motory changes, or of the mufcular actions produced by them. So alfo in fpeaking, unlefs fome difficult pronunciation occur, the mufcular actions requifite for the formation of the founds follow immediately the conception of the words, without the intervention of the will.

Thirdly: motory changes, and their correfponding mufcular actions, may be connected with *fenfations*, with *ideas*, and with other *motory changes*, and their correfpondent mufcular actions.

Mufcular actions may be affociated with *fenfations;* that is, when mufcular actions have been fufficiently long affociated with fenfations, the repetitions of the mufcular action alone will excite the fimple idea belonging to that fenfation. Thus, the action of dancing will bring to mind the conception of the mufic with which it has been often accompanied. Again, children often accuftom themfelves to particular motions of the limbs, while committing to memory, or while repeating

repeating what they have learnt; and thofe mufcular actions in many inftances become neceffary to their correct, and ready recollection, and even to their recollection at all. Addifon, fays Mifs Edgeworth, reprefents with much humour the cafe 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 ftood mute.

So again, *mufcular actions* may be affociated with *ideas;* that is, when mufcular actions have been fufficiently long affociated with ideas, thofe mufcular actions will excite thofe ideas, whether notions or feelings; thus dancing will introduce cheerfulnefs into the mind. So particular mufcular actions have, from habitual connection, a tendency to excite certain trains of thought or ftates of mind: thofe who have been accuftomed to one pofture while ftudying, find it difficult to ftudy fo well in other poftures; and perfons who, while engaged in deep meditation, have been accuftomed to any little motions of body, find the continuance of thofe motions requifite for the continuance of their abftraction of mind. It is upon this principle, that certain poftures of body have a tendency to produce thofe feelings which all fhould have when addreffing the Supreme Being. The cafes, however, in which mufcular action introduces ideas, either fimple or compound, are much lefs numerous than thofe in which fenfations and ideas introduce mufcular actions. In fact it is not the ufual order of affociation; and befides, it is fometimes very difficult to fay what effect is produced by the mufcular action itfelf, and what by the fenfations which generally accompany mufcular action. In the next cafe the point is clearer.

Mufcular actions become connected with other *mufcular actions,* that is, the motory changes which produce the one, with thofe which produce the other; fo that the former may introduce the latter without the intervention of the will. If different mufcular actions are produced together, they are called *fynchronous;* if one immediately follows the other they are called *fucceffive;* and the affociation is, in like manner, termed fynchronous or fucceffive. The motions of the hands when a perfon is playing upon the pianoforte, the motions of the hands in weaving and in fpinning, and various other mufcular actions which will readily fuggeft themfelves to the reader, may be ftated as inftances of *fynchronous* affociations of mufcular actions. The motions of the organs of fpeech, in reading or fpeaking, of the feet in walking, and of the fingers in writing, are inftances of fucceffive affociations of mufcular actions.

Thefe nine cafes of the affociation of fenforial changes are comprehended by Hartley in the following general theorem: "If any fenfation A, idea B, or mufcular motion C, be affociated for a fufficient number of times with another fenfation D, idea E, or mufcular action F, it will at laft excite, *d*, the fimple idea belonging to the fenfation D, the very idea E, or the very mufcular action F." The fenfation itfelf cannot of courfe be re-excited, becaufe that depends upon the prefence of the object of the fenfe; but fometimes, as in the inftance already ftated, the fimple idea belonging to a fenfation is fo vivid, that it equals, if not furpaffes, the original fenfation; that is, any fenfible change, and its fimple ideal change, are the fame in kind, differing only in vividnefs, and fometimes equal in that refpect. It may alfo be well to obferve here, that when Hartley and his difciples fpeak of mufcular actions clinging together, they obvioufly mean, that the motory changes of the fenforium become connected together, and not, as fome writers feem to have fuppofed, and indeed as their words imply, that the motions of mufcles are connected without any intervention of the mind, taking the term in the popular fenfe. It is true the Hartleyan fuppofes that volition has nothing to do in the affociation when complete, though originally perhaps concerned in the formation of it; and alfo that the affociation may go on without even exciting the concioufnefs; but we know of none who fuppofe that the mental organs, (the mind in the popular fenfe,) are lefs concerned in the connections among mufcular actions, than in thofe among fenfations and ideas. All the fenforial changes may and do become connected together; and, as we apprehend, the one may produce the other, and fo on, without the concioufnefs being excited; but no external impreffion, which does not act by ftimulating or impelling the moving mufcle, can produce mufcular action without the action of the mental organs; and in like manner, no mufcular action can produce another mufcular action, (except what may be termed mere phyfical motion, fuch as might be produced by any foreign body mechanically acting upon the mufcular fyftem,) 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 phrafeology refpecting connections among mufcular actions, that it will remove fome of the difficulties which are felt refpecting this part of the Hartleyan fyftem, and fhew that the objections which have been urged againft it, arofe from an incomplete idea of it.

2. *Laws of Connections.*—We now proceed to our fecond object, *viz.* to point out and illuftrate fome of the leading laws of that clafs of affociations which we term connections; premifing that many of the obfervations which follow are, as the reader will readily perceive, equally applicable to that clafs which we term compofitions. Thefe laws regard, 1. The ftrength of connections; 2. The difunion of connections; 3. The formation of connections by means of immediate links, which we may call the law of transference; and 4. Habitual biafes to particular kinds of connections.

(1) *The Strength of Connections.*—The ftrength and durability of connections, depend partly upon the degree of attention with which the connected fenforial changes have been attended, and partly upon the frequency with which they have recurred in connection: lefs generally, partly upon the vividnefs of the connected ideas, and partly upon the frequency with which the connected ideas, or mufcular actions, have recurred in connection. We may adduce, as an illuftration of the former caufe of ftrength and durability, that circumftances of a light and trivial nature, which have occurred while our minds were occupied with fubjects of great intereft, form no connection with the concurring train of ideas, even if the attention were, for a time, drawn off by the former. For inftance, fuppofe we were attending to an interefting difcourfe, if our attention were for a moment called off by the coughing of a perfon near us, the train of thought fuggefted by the fermon would form no connection with the caufe of the interruption, and it would pafs in the mind without the idea of the interruption being produced. But fuppofing a poor man to have fallen down in a fit of apoplexy, the circumftance would ftrongly intereft our fympathy and excite our attention; many feelings would be brought into active exercife; and the ideas which were at that time in the view of the mind, would probably ever after prefent with them thofe of the fcene which fo ftrongly affected us. Hence the importance, that thofe who have the care of education, fhould feize the happy moments when circumftances have peculiarly interefted the mind, to connect with them thofe related acts of prudence, benevolence, and piety, which, fo introduced, may have a lafting effect in regulating the difpofition; but which brought in a form lefs interefting, would have no permanent bond of union, and

and would soon be obliterated. Hence, too, the importance of inftilling into the mind thofe principles which are defigned to have a conftant operation among the thoughts and feelings and actions of life, in fuch a form that they fhall become connected with thofe 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 ftrength and durability of affociation, may be beft explained by the affociations which take place between words and their correfponding ideas. Thefe connections are not, in general, attended with any particular caufe of affociation, except frequency of recurrence, and therefore they are the moft unexceptionable inftances. Now, other things being equal, we find that thofe words which are moft frequently called up in the mind, in connection with the ideas to which they belong, have a clofer connection with thofe ideas; that is, the idea fuggefts the word and the word fuggefts the idea, with greater certainty, and the affociation is more permanent. The following remarks of Dr. Percival will illuftrate this general principle. "Slight paralytic affections of the organs of fpeech, fometimes occur without any correfponding diforder of the other parts of the body. Hence the effort to fpeak fucceeds the volition of the mind flowly and imperfectly, and words are uttered with faltering and hefitation. Thefe are facts of common notoriety: but I have never feen it remarked, that in thefe local palfies, the pronunciation of proper names is attended with peculiar difficulty; and that the recollection of them becomes very obfcure, or is entirely obliterated; while the recollection of perfons, places, and things, remains unchanged. This confirms the theory of affociations, and at the fame time admits of an eafy folution by it. For as words are arbitrary marks, and owe their connection with what they import to eftablifhed ufage, the ftrength of this connection will be exactly proportioned to the frequency of their recurrence, and this recurrence muft be more frequent with general than with fpecific terms."

Befides thefe two univerfally operating caufes of the ftrength and durability of affociations, it is proper to obferve, that they depend alfo upon the predifpofition of the mind, the habitual bias of thought and feeling, and the prevailing caft of the affociations already formed. This may in part be refolved into the firft caufe,—the degree of vividnefs of the connected ideas; but in part it muft be confidered as feparate. Where there are affociations of a contrary tendency, the production of the new affociation implies the deftruction of the old one, and this is one reafon why perfons who have paffed the prime of life, feel it fo exceedingly difficult to acquire new affociations diffimilar from thofe already formed. Hence it is that all thofe improper biafes of thought and feeling which oppofe the beft regulation of thought and feeling, fhould be carefully fhunned; all thofe affociations carefully prevented, which lead the mind away from God and duty, or which fimply check the reception of thofe which accord with the dictates of religion. They do more than directly injure by their own exiftence; they injure alfo, and this in no fmall degree, by preventing the formation of thofe affociations which directly prompt to the courfe which duty points out.

An acquaintance with thefe principles leads us to the direct method of confirming affociations which are effential to our well being; fuppofe, for inftance, the connection of a regard to the will of God, with the conduct: we fhould endeavour to connect as much as poffible thofe pleafurable feelings which have a tendency to ftrengthen the links of union; we fhould cultivate the connection by frequently, and, indeed, continually bringing it into action; and we fhould carefully cultivate thofe related ftates of mind which have a tendency to fofter and ftrengthen the connection. To avoid weakening it, we fhould be careful not to introduce any contrary trains of ideas; for inftance, we fhould never connect feelings of ridicule with any thing connected with religion, and fhould carefully avoid thofe breaks in the affociation which will follow neglect in its cultivation. And it is a moft fatisfactory idea, that if vicious affociations may be formed fo ftrong as to lie beyond the power of the individual to annihilate them, virtuous affociations may alfo be formed fo vigorous and permanent as to bid defiance to time and to temptation. Thefe fhall furvive the wreck of nature, and fhall adorn the mental fabric, when this world, and all its forrows and enjoyments, fhall be no more.

(2) *The Difunion of Connections.*—As connections are neceffarily formed, and frequently without any volition on the part of the individual, by the before mentioned circumftances, it is another very important law of the affociative power, that thefe connections are not indeftructible. We obferve, then, that an affociation may be deftroyed, either by the formation of other contrary affociations, or by the repetition of it being in fome way or other prevented. We have already given one inftance of this principle, in MOR. *Ed.* col. 49, to which we refer our readers: and as in that cafe, fo in numerous others where an affociation unfortunately exifts in the mind unfavourable to the formation or exercife of good difpofitions, it may be weakened, (gradually, indeed, but certainly weakened,) and at laft deftroyed by the fteady culture of oppofite affociations. That conduct to which pious benevolence prompts, may acquire fo attractive an appearance, that ideas of difficulty, of pain, of ridicule, which may have been attached to it, and which may have impeded its exercife, will gradually give way to thofe which the divine approbation affords, of prefent peace and future happinefs. But there is not always time for this flow procedure. It may be neceffary for individual happinefs, that the baneful affociation fhould be deftroyed without one repetition of it to confirm its power. To the general culture of oppofite affociations, muft then be added, a fteady careful prevention of the introduction of the connected ideas. Situations muft be avoided, words difufed, company fhunned, which have a known tendency to introduce a train of thoughts leading to the firft link of the chain which we wifh for ever feparated.

When we hold it out as a grand law of affociation, that connections may be difunited by forming oppofing affociations, and by preventing their repetition, we would by no means reprefent it as in general an eafy, or as in all cafes a practicable tafk. When affociations have been long formed, and often repeated, particularly where they accord with the general bias of the mind, they often bid defiance to the moft ftrenuous exertions of the individual. If he could for a long time prevent their repetition, and fuccefsfully cultivate oppofing ones, the moft inveterate affociations would by degrees loofen their power; but when affociations have been ftrengthened for a long period of time, by being frequently brought into play, and connected with other active affociations, and at the fame time accord with the prevailing difpofition of the mind, the prevention of their repetition, and the culture of oppofing affociations, are fcarcely practicable. Thefe things may be viewed in various lights; fome gratifying to the mind; fome which muft urge every thoughtful perfon to fhun the formation and culture of thofe affociations which he muft fome time or other wifh to break. While they teach us to be affiduoufly careful to prevent all fuch, they alfo fhew us that thofe which we muft wifh to cherifh

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 cannot

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 fcience increafes, thefe difficulties will diminifh, and that by degrees the whole of our mental furniture, except ideas of confcioufnefs, will be traced, as we can trace a great part of it, to fenfations, retained by the retentive power, and combined and varioufly modified by the affociative power. We have no objection to the term *natural* feelings, &c. rightly explained. We underftand by it thofe feelings, &c. which in all cafes, where there is not fomething peculiar in the individual, will fpring up in the mind, in confequence of the influence of generally occurring circumftances, upon the powers with which the great Former of the mind hath endowed it. For inftance, the parental feelings, the filial feelings, &c. are natural feelings: in all cafes where there is not fomething wrong in the individual, thefe feelings will fpring up in his mind in confequence of the influence of generally occurring circumftances upon the powers with which the mind is endued. So alfo, a great variety of other feelings, which, with the ftricteft propriety, may in this fenfe be termed natural. Some objection, however, lies againft another word often ufed in a fimilar way. Such feelings are faid to be *implanted*. If the word be underftood to mean nothing more than what fome do mean when they ufe it, that the feelings, &c. fpring up in the mind with the fame certainty as though they had made a part of the original ftructure of the mind, all is well. But if it be underftood to mean, that thefe feelings do form a part of the original ftructure, then it implies the fame cutting of the Gordian knot, the fame appeal to ignorance, which is implied in the ufe of the word *inftinctive*. If, however, we can reftrict its fignification, we may ufe it without injury. Let it mean no more, than that the feelings, &c. to which it is applied, are the neceffary refults from thofe powers which the Supreme Being has implanted in us; in fact, let it have the fame general meaning as *natural*, with rather more force, denoting the *neceffity* of their arifing from the powers which are given us; and we fhall not be giving way to thofe erroneous views which we muft unlearn before we can acquire truth.

We need not go far for inftances which will explain the law of transference. Suppofe a perfon acquiring another language, the French, for inftance. He learns the meaning of a French word by means of the correfponding Englifh word: by degrees, as the French word becomes familiar to him, it is underftood without the Englifh word being thought of. Here the fignification, (that is, the idea connected with the word,) may be called A, the Englifh 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 fignification is transferred to the French word, fo that B, the Englifh word, is no longer wanting to form the link of union. When a young perfon has acquired fome facility in conftruing French, he generally reads his French work in Englifh; but when he has acquired a pretty complete knowledge of the language, he reads it in French, that is, he underftands it without the intervention of the correfponding Englifh words. Thofe who are converfant with fhort hand, can read it without thinking of the long hand; yet they learnt the former through the medium of the long-hand words. Thofe who have long learnt to read, and who read much to themfelves, feldom think of the found of the words when they are reading in this manner. When we are pretty familiar with a fubject, a fingle 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 fingle word has particularly attracted our attention, when certainly there has not been time for the mind to think of the found of the words. We do not recommend this habit of reading for young perfons, but fimply ftate a fact which is very ufeful and convenient to the mind when it has gone through fufficient difcipline of accuracy, &c. Now it is obvious, that in almoft all cafes, perfons learn to underftand written words through the medium of fpoken words. One more inftance, and we have done with mere illuftration. Thofe who are familiar with writing never think of the printed word, unlefs any particular circumftance call it to the mind. Yet there are few inftances in which the written word is not connected with the fpoken word, by means of the before learnt printed letters or word.

We now proceed to fhew the application of this law, in explaining certain phenomena of belief, and the origin of the difinterefted affections. We are not now to attempt the explanation of the formation of the complex feeling which we call belief, nor of thofe complex ftates of mind which we call affections; but fuppofing them formed to explain fome facts refpecting them, that is, to fhew how thefe facts accord with the general law of affociation which we have been ftating. Belief is transferable from the fteps of the reafoning to the refult of that reafoning. Suppofe a propofition depends for its truth upon a great number of other propofitions, if as we go along every ftep is believed to be true, and every connection of one ftep with another appears to be a juft one, the feeling of belief is fucceffively transferred from one ftep to another, till at laft we come to the refult, the propofition which we wifh to prove, and the feeling will be connected with this, and will remain with it, when all the fteps by which its truth was fhewn are entirely loft from the view of the mind. Every one admits this; and every one who has gone through the procefs knows it to be fo. There are almoft innumerable inftances in which we find the feeling of belief connected with ideas, without our being able at once to fay, or even to fay at all, how we acquired the connection. In this inftance fome philofophers refer to certain inftinctive principles, by which we are neceffarily led to believe, without any further reafon than that our mental conftitution compels. But, we repeat it, we need not refort to fuch hypothefes; they do great injury by checking the refearches of the intellects, and, in fome cafes, by leading people to fuppofe opinions well founded, which have no further ground than an almoft accidental, or, at any rate, unjuft transfer of belief, by means of what was itfelf perhaps entitled to no belief. There are certain refults of reflection and obfervation which we call experience, and it is generally wife to truft to them. But before a man yields to his experience, in oppofition to the clear evidence of others, or to well founded and well connected reafonings, he fhould confider what experience is, and on what ground he has connected belief with it. He will find that belief is not a neceffary attendant upon his experience, but that it has been connected with it by means of intermediate links, which might themfelves have no fatisfactory claim to belief. For inftance, if a man has not obferved accurately, or has not a correct judgment, his experience may not be worth any thing, nor entitled to any belief. Now, in many cafes it is almoft impoffible to recall the intermediate links, in order to prove to ourfelves the correctnefs of our experience, and yet we muft act upon it; this fhews the importance of cultivating in early life thofe habits of cool judgment and accurate obfervation, which fhall give us a full right to believe, and to act upon our belief in the refults of reflection and obfervation. But fome truths, it may be thought, have a neceffary connection with belief. We admit that there are truths which are fo accordant with all the grounds of belief, that

that they inftantaneoufly excite the belief of thofe who have had the opportunity of knowing thofe grounds; but no further. You immediately believe, that $2 \times 2 = 4$; and you would think that man deftitute of common fenfe, who denied it, or who did not immediately admit it. Yet we are well convinced that the belief is formed gradually in confequence of a number of external impreffions; or, to ftate it more familiarly, by frequently counting in the early part of childhood. We perhaps have not the power of difcovering the exact fteps by which we have ourfelves proceeded to the belief of this truth, but we can obferve them in others, and we can trace them in ourfelves, in fimilar circumftances. Belief in fuch truths is often formed through the medium of parental authority, or that of inftructors, and it is probable that, in many inftances, children know no more why $12 \times 12 = 144$, than that they find it fo in their multiplication tables; but even where it has been formed by trials of the truth, thofe trials are generally forgotten, and the truth alone is remembered. We fhould gladly enlarge more on thefe points, but what has been already faid will probably anfwer the two purpofes which we have in view, to fhew the operation of affociation 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 itfelf any reafon why that belief fhould be given up.

A few remarks on the oppofite opinions which have been entertained refpecting the difintereftednefs of the human mind, will be found in MORAL *Education*, col. 27, 28. It is only by reference to the operations of the affociative power, that the real ftate of the cafe can be thoroughly underftood or explained; and we regard the explanation which the theory of affociation affords, of the origin of affections, and their progrefs from their felfifh character towards difintereftednefs, as intitling it to the higheft rank among the difcoveries of philofophy,—whether we confider the immenfe variety of mental phenomena for which this principle accounts, or the vaft importance of its application to moral culture.

When an affection has arrived at its moft complete ftate, in which it has no farther end than its own immediate object (that is, when the object is defired for its own fake), the affection may be termed difinterefted; 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, (fo that we fhould be compelled to fpeak of difinterefted cruelty, difinterefted avarice, &c.) we fhall, for want of a better appellation, term thofe affections which are in their ultimate ftate, *ultimate affections*. Premifing this, we fhall endeavour to explain the progrefs of an affection, from the ftate in which the object of it is a mean, to that in which the object of it becomes the fole end, that is, in which it is an ultimate affection.

The moft fimple inftance is the love of money. Money is firft an object of pleafurable feeling, merely as a means of procuring other things which are regarded as objects of defire. For a moment we may fometimes think of it, as having fome intrinfic value independently of its utility as a means; but we may fatisfy ourfelves that this is not the cafe, by obferving how little it is an object of intereft to children who have not heard much about it, or feen it employed, or employed it themfelves. A child is perhaps pleafed with a piece of money as a plaything, but nothing farther; and children fometimes advance confiderably far in life before they feel its value. E, a boy feven years old, was prefented by his father with half a crown, as a reward for a very fuccefsful and perfevering effort: he was delighted with the approbation which was fhewn him; and as far as the money was a mark of that approbation it pleafed him; but obvioufly nothing farther. In fmall families, children generally learn the value of money early: and we therefore mention the preceding circumftance as an illuftration of what we have juft faid, that originally it is merely defired as a mean. As perfons advance in life, money is continually found to be the means of a great number and variety of the fources of prefent enjoyments; hence pleafurable feelings are continually connected with it, and it becomes more and more an object of defire. In this ftage of the progrefs of the love of money, it is defired as the means of procuring certain pleafurable feelings, without reference to the objects by which thofe pleafurable feelings are directly produced; and even in this ftate of it we find an inftance of the law of transference: the pleafurable feelings refulting from the objects procured, or to be procured, by money, are affociated with the money itfelf, without reference to thofe objects. To revert to one of the modes in which the law was propofed; the pleafurable feelings which purchafable objects produce, the idea of thofe objects, and the idea of money, are the three fets of ideas. Money procures the object; the object the pleafurable feeling: hence the pleafurable feeling becomes connected, by means of the intermediate links, with money; and hence money becomes an object of defire, without any reference to the means of gratification which it procures. Here, to ufe the other ftatement, the pleafurable feelings may be reprefented by A; the objects which produce them, by B; and the money which procures thofe objects, by C: by frequent connection between A and C, by means of B, A is transferred to C; that is, the pleafurable feelings are transferred to the idea of money, and confequently to money itfelf, and are called up by it without any reference to B, the objects by which thofe pleafurable feelings were originally excited. The law of transference may, in this inftance, and in many others, be carried one ftep farther. In the ftate to which we have advanced, money is defired on account of the pleafurable feelings with which it is connected; but by degrees the defire is transferred from thofe pleafurable feelings to money itfelf; and money is loved for itfelf, without any reference to thofe pleafurable feelings. This is fo important a fact in our mental conftitution, that we deem no apology neceffary for endeavouring fo much at length to point out its application. In this laft ftage of the affection, A is the defire excited by B, the pleafurable feeling excited by C, the idea of money; by means of B, A, the defire, is transferred to C, the idea of money; and thus money comes to be defired for itfelf without any reference to the pleafurable feelings which it is the means of procuring. In this ftate the defire of money is become an ultimate affection; it is no longer defired as a means, but as an end; it is defired on its own account. Some remarks on the peculiarities and checks of this affection, will be found in a fubfequent part of our article.

Illuftrations of a fimilar kind might be offered, refpecting the filial, the fraternal, and even the parental affections; and it might be fhewn that they are only gradually difinterefted; but that, at the fame time, the natural tendency is to difintereftednefs, and that it is only where difintereftednefs is oppofed by the culture of wrong affections, affections which, when in their ultimate ftate, are ever felfifh, and by neglect of thofe which are in all their ftages worthy, and which haften the moral progrefs almoft indefinitely, that the mind ftops at partial difintereftednefs, or finks into confirmed felfifhnefs. We have already, however, in MORAL *Education*, col. 9, &c. and 28, &c. given an outline of the

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origin and progrefs of the filial affections, and of the formation of difinterefted benevolence; and we would requeft our readers, before they proceed, to perufe our remarks on the latter point, as affording decided illuftration and explanation of the law of transference, by which *means become ends*. With the fame view we fhall here add, that the defire of doing good may itfelf be fometimes loft from the view of the mind, in attention to the means of doing it. Some of our readers, probably, take an active intereft in the welfare of inftitutions for the benefit of the poor and afflicted. Thefe inftitutions were planned by benevolence, and benevolence ftill prompts the fupport of them. It is the defire 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 thefe inftitutions will often be found to be an object of the mind, without reference to the good it does. The mind rejoices in its fuccefs, without thinking of the benefit which will refult from it. As foon as the attention is directed to its beneficial effects, the mind dwells upon them as the ultimate fource of its fatisfaction; but they were not immediately in its view. Whether or not we have been fuccefsful in leading our readers to feel the force of the affertion by this illuftration, we are confident of the fact, that the means of doing good very often themfelves become ends; and that the defire of their fuccefsful furtherance, which was originally felt for them, merely on account of the good known or imagined to refult from them, is at laft felt without reference to that good; though, on the other hand, it would by degrees, though perhaps not very foon, decay, if it were fatisfactorily proved, that the means of the hoped-for-good were, and muft be, wholly inefficacious.

But there would be no end to illuftrations of this law if we were to trace it out in all its operations. We are continually loving things becaufe ——, and afterwards loving them for themfelves alone. It extends to the love of duty in general, without any reference to particular branches of it. All the pleafurable feelings which thefe produce, and all the tendencies and difpofitions 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 defire and exertion, becaufe parts of it are defired and purfued on their own account; and this haftens the progrefs of a difinterefted love of duty in general. But leaving this out of the queftion, a great variety of confiderations make it an object of choice; and if it be purfued as a means to obtain the object in view with fufficient fteadinefs, and for a fufficient length of time, by degrees it is purfued as an end, and duty is then loved for itfelf.

In oppofition to thefe views, as to the progrefs of the affections towards difinterefteduefs, it may be urged that children are often more difinterefted than perfons who have had fome experience in life. Our ideas on this point we have already had occafion to ftate; and we wifh to refer the reader to them. See Moral *Education*, col. 43.

No one can, with juftice, think lefs highly of the exertions of difinterefteduefs, becaufe it can be fhewn to arife from a meaner origin. Ought we not rather to admire the height which has been gained by a fteady ufe of the general means of worth, and by a right employment of the difcipline of Providence? Is his conduct lefs lovely, who has gone through the trial, and brought from it difinterefteduefs which prompts to efforts of the nobleft kind for the good of others? The opinion that the mind is originally difinterefted, may be pleafing in fome points of view; but in others it is the contrary: it diminifhes the value of the character where it exifts, for conftitutional difinterefteduefs could have no more merit than the poffeffion of good fight; and it damps the efforts of the mind to acquire difinteretteduefs. Thofe who find themfelves deficient, who difcover feelings which difinterefteduefs cannot approve, have, on the principles which we have been aiming to illuftrate, the beft encouragement in their endeavours to transfer their affections from felf. Thefe principles lead, too, humbly and gratefully to acquiefce in every means which Providence may appoint to difcipline the mind, and to purify it from all that can debafe. In fhort, they point the view to the higheft excellence, and direct to the means of attaining it.

(4) *Habitual Biaffes.*—We now proceed to the laft of thofe laws of affociation which we propofed to notice; and in what we fhall advance on the fubject, we fhall make a free ufe of Mr. Stewart's Elements.

The leading feature of the operations of the affociative power is, that when two or more ideas are prefented to the mind together, or in clofe fucceffion, they become connected with one another, or blended together; fo that the one, when recalled to the view of the mind, is accompanied with the other. But we muft not limit its exercife to this operation: it not only connects ideas, when they are thus prefented together to the mind, but is the caufe of the introduction of ideas with one another, which have never before been prefented together to the mind. An object, which has never before been prefented to the mind, may excite numerous ideas or trains of ideas; while another may continually occur, without exciting a fingle idea. And the fame object will affect different perfons differently, fo that in the mind of one it will excite trains of thought, while in another it will only produce a momentary impreffion; and in different perfons, too, the fame object will excite different trains of thought; and in the fame perfon, at different times, different effects will be produced. Now all this depends upon the habitual or accidental biaffes to particular kinds of connections, produced either by the original tendencies of the mental conftitution, or, more ufually, by the particular culture of the individual's mind, owing to direct inftruction, or to the effect of circumftances, operating without any intention either on his part or on that of others.

The earlieft bond of union between objects of thought is their being prefented to the mind together, or in clofe fucceffion, through the medium of fenfation. This is owing to the objects of fenfation being connected in time or place; or, in other words, owing to the relation of contiguity in time and place exifting between thefe objects. This caufe of connection among our ideas is what neceffarily has the earlieft efficacy in forming thofe connections; becaufe it does not prefuppofe, as every other does, the exiftence of other ideas in the mind, or the exercife of attention to other relations which exift among them. Children affociate ideas almoft entirely by this bond of union: perfons of uncultivated minds, in the fame manner, ufually have their ideas connected by the fame bond of union; contiguity of time and place of the objects of fenfation producing impreffions on the mind at the fame time, or in clofe fucceffion: and more or lefs it is a connecting link, or caufe of connection, in every one, in every period of life.

We might, *à priori*, calculate upon its high importance in the mental ftructure; and as a matter of fact, it is the foundation of all experience and philofophy, and, at the fame time, the fource of numerous prejudices. It is the fource of numerous prejudices, by leading us to expect continued conjunction in time or place, where the conjunction was

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 examining 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 *a b c d*, &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 A B C D, &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 *a b c d*, &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."

The

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: henceforwards, 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 whoſoever 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

much alike, and yet not the fame, that there muft be both a great general refemblance among mankind in refpect of their mental pleafures and pains, and alfo many particular differences.

Some degree of fpirituality, that is, that ftate of mind in which the pleafures and pains are not fenfible, is the neceffary confequence of paffing through life; and the fenfible pleafures and pains muft be transferred by affociation more and more every day, upon things which of themfelves afford neither pleafure nor pain.

Let the letters *a*, *b*, *c*, *d*, *e*, &c. reprefent the fenfible pleafures, and *x*, *y*, and *z*, the fenfible pains, fuppofing them to be only three in number; and let us fuppofe all thefe, both pleafures and pains, to be equal to each other in degree. If now the ideas of thefe fenfible pleafures and pains be affociated together, according to all the poffible varieties, in order to form mental pleafures and pains, it is plain that pleafure muft prevail in all the combinations of feven or more letters; and alfo that when the feveral parts of thefe complex pleafures are fufficiently blended by affociation, the pains which enter into their compofition will no longer be diftinguifhed feparately, but the refulting mixed and complex pleafures will appear to be pure and fimple ones, equal in quantity to the excefs of pleafure above pain, in each combination. Thus affociation would convert a ftate, in which pleafure and pain are both perceived by turns, into one in which pure pleafure would alone be perceived; at leaft would caufe the beings, who were under its influence to an indefinite degree, to approach to this laft ftate nearer than by any definite difference. Now, though the circumftances of mankind are not the fame with thofe here fuppofed, yet they bear a great refemblance to them, during that part of our exiftence which is expofed to our obfervation: for our fenfible pleafures are far more numerous than our fenfible pains; and though the pains are in general greater than the pleafures, yet the fum total of the latter is probably greater than that of the former; whence the remainder, after the deftruction of the pains by the oppofite and equal pleafures, will be pure pleafure.

The mental pleafures and pains are as real as the fenfible ones; being, in fact, nothing but the fenfible pleafures and pains varioufly mixed and blended together. They are alfo all equally of a factitious and acquired nature; and we muft, therefore, eftimate all of them equally, by their magnitude, permanency, and tendency to produce others.

The fenfible pleafures and pains have a greater tendency to deftroy the body than the mental ones; for they are of a particular local nature, and fo affect the organs which convey them: and the deftruction of any one confiderable part of the body is the deftruction of the whole, from the fympathy of the parts. On the other hand, the mental pleafures and pains, being collected from all quarters, do not much injure any organ particularly, but rather bring on an equable gradual decay of the fyftem. This, however, is upon the fuppofition that they are not exceffive; for exceffive defires or emotions, even if of a refined nature, have a direct tendency to injure the mental fyftem generally, and efpecially to bring on that derangement of it, which is clofely related to infanity, even if it do not bear the name.

Thefe principles afford fome pleafing prefumptions; fuch as, that we have a power of fuiting our frame of mind to our circumftances, of correcting what is amifs, and improving what is right: that our ultimate happinefs appears to be of a fpiritual, not corporeal nature; and, therefore, that death may not ftop our progrefs, but forward us in the purfuit of our true end; that affociation tends to make us all ultimately fimilar; fo that if one be happy, all muft: and, laftly, that affociation may alfo be fhewn, by a direct argument, as well as by this indirect one, to contribute to introduce pure ultimate fpiritual happinefs in all.

5. *Of the Affections, &c.*—We have already faid as much refpecting the nature of the *affections*, *paffions*, *emotions*, and *difpofitions* in general, (fee MORAL *Education*, col. 24.) as we fhould find neceffary for our prefent purpofe; and we folicit the perufal of thofe obfervations in this place. They are followed by a ftatement of the leading principles refpecting the origin and progrefs of the affections, &c.; and though we adduced them, in the article referred to, with a fpecific reference to the proceffes of education, we believe they will be found to include all that it might have been defirable to introduce in the prefent cafe. The remarks and illuftrations founded on thofe principles, which we have fubjoined to them, have a more peculiar application to the immediate object of that article; but we venture to recommend the perufal of them to the ftudent of mental philofophy, as having a clofe connection with his purfuit. Prefuming upon our reader's reference to the account we have given of the nature of our mental feelings, and to the leading principles refpecting them, we fhall proceed to offer fome obfervations refpecting the divifion and claffification of our feelings.

The lateft writer on the arrangement and explanation of the feelings is Dr. Cogan, in his Philofophical Treatife on the Paffions; and his work is the beft which is acceffible, to the Britifh public at leaft. Of his valuable treatife we have already given an ample account under the article PASSION; and we here cite again particular paffages that occur under that article, in order to give our readers a better opportunity of forming a competent judgment of our remarks. Dr. Cogan ufes the term *paffions* with much greater latitude than what we have affigned to it, in the paffage above referred to; and we think he is not fortunate in fo doing. This generic term, *feelings*, limited to *mental* feelings, as diftinct from *fenfations*, might perhaps have fupplied its place, in thofe cafes in which he has employed it in its wideft acceptation. But as to the more limited fenfe, to which he appears to wifh to confine it by his definition, it is not calculated to bring into view thofe extraordinary workings of the mind, to which alone we would limit the term. We agree with him, that the term *paffion* fhould convey an idea of the *paffivenefs* of the mind, when under its influence, as far as it relates to that influence; but we conceive that this paffivenefs is not the prominent feature of a paffion.

But we will quote this philofopher's explanation of paffions, and alfo of emotions; refpecting which laft we have alfo to regret our differing confiderably from him. "The term paffion," he fays, p. 6, "may with ftrict propriety be ufed, and ufed exclufively, to reprefent the *firft feeling*, the *percuffion* as it were, of which the mind is confcious from fome impulfive caufe; by which it is wholly acted upon, without any efforts of its own either to folicit or efcape the impreffion." We fhould have little objection to fuch a limitation of the term, if we had any other to exprefs thofe peculiar ftates of excitement to which we have applied it, and we apprehend more agreeably to its common acceptation. The fact is, that though common language fupplies a confiderable variety of difcriminating terms for the purpofes of mental philofophy, and particularly for the department of intellect, we ftill want feveral to mark the various fhades and diverfities of feeling, which are now, to the deftruction of all accuracy, claffed under one or two general heads, and diftinguifhed only by their generic appellation. A great deal will be effected when thofe terms, which we already

already have, become more fettled and limited in their application.

But to proceed with Dr. Cogan's explanation of the term *emotions*. "The ftate of abfolute paffivenefs, in confequence of any fudden percuffion of mind, is of fhort duration. The ftrong impreffion, or vivid fenfation, immediately produces a re-action correfpondent to its nature, either to appropriate and enjoy, or to avoid and repel the exciting caufe. This re-action is very properly diftinguifhed by the term *emotion*. The fenfible effect produced at the firft inftant, by the caufe of the paffion, greatly agitates the frame: its influence is immediately communicated to the whole nervous fyftem; and the commotions excited in that, indicate themfelves both by attitudes and motions of the body, and particular expreffions of countenance. Thefe effects are fuch univerfal concomitants, that no very important change in the ftate of the mind can take place, without fome vifible change of a correfpondent nature in the animal economy. Emotions, therefore, according to the genuine fignification of the word, are principally and primitively applicable to the fenfible changes and vifible effects which particular paffions produce upon the frame, in confequence of this re-action, or particular agitation of mind." The term, *emotions*, therefore, Dr. Cogan, though he more commonly employs it in a much lefs exceptionable fenfe, clearly regards as denoting "the external marks or vifible changes produced by the impetus of the paffions upon the corporeal fyftem;" but he ftates that it "is fometimes expreffive of lively fenfations," or rather feelings, "which do not produce vifible effects in any degree proportionate to their feelings;" and that it "is frequently employed to mark the firft impreffion which particular objects make upon fufceptible 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 vifible effects of inward feelings, yet that this is only becaufe they are regarded as the figns or confequences of mental emotions; and that the concomitance of the ufual vifible effect is fo far from being effentially neceffary, that in many individuals of ftrong feelings, placed under habitual reftraint as to the expreffion of them, the moft powerful internal emotions have little or no perceptible external effect. To entitle feelings to the appellation of *emotions*, we conceive that they muft arife 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 muft be accompanied with fome degree of excitation. When the excitement is very powerful, and the caufe painful, the emotions produced might be more appropriately termed *agitations:* we fhould fpeak of the emotions of forrow, the agitations of defpair; the emotions of maternal folicitude, the agitations of terror, &c. *Rapture* denotes a ftrongly excited ftate of mind, producing lively emotions, arifing from a pleafurable caufe.

The arrangement of our feelings muft be in a great meafure determined by the object in view. If this be, to take the feelings as they are, in their compound ftate, and to arrange them fo as to fhew their relationfhip and tendency to affect one another, having in view the phenomena rather than the caufes of them, we fhould be inclined to give a decided preference to Dr. Cogan's elegant, and, in feveral refpects, fatisfactory claffification: but if the object be to trace them to their fources, in order to fhew how they are generated, directly or indirectly, from the relics of fenfations, and how they are modified by the various combinations of them, which, as has been already obferved, is of the higheft moral importance, Dr. Hartley's arrangement muft have the preference, having been exprefsly formed with that fpecific view.

The outline of Dr. Cogan's arrangement (fee the article PASSION) is thus ftated by himfelf (p. 53.): "When the nature of the exciting caufe is more accurately afcertained, it will be found to refpect either the *felfifh* or the *focial* principle: hence arife two important diftinctions, forming two different claffes. In each clafs, the predominant idea of a *good*, and the predominant idea of an *evil*, will conftitute two different orders. The leading paffions and affections under each order point out the *genera*. The complicated nature of fome of the paffions, and other contingent circumftances, may be confidered as conftituting *fpecies* and *varieties* under each characteriftic *genus*." Befides the feelings which he thus arranges, (comprehending, with one remarkable exception, all which can with accuracy be termed either paffions or affections,) there is a clafs of feelings, exerting their influence indifcriminately in paffions of the moft oppofite characters, which with great propriety he terms *introductory emotions:* thefe are the feelings of *furprife*, excited by the apparent novelty of the object, or by the unexpectednefs of its introduction; of *wonder*, arifing from apparent intricacy or embarraffment; and of *aftonifhment*, arifing from what is vaft and incomprehenfible. We agree with Dr. Cogan, that the popular, as well as philofophical ufe of the term *emotions*, renders it peculiarly appropriate to thefe feelings; and we feel it neceffary to add to our account of emotions in MORAL *Education*, that the term is employed to denote fimilar ftates of excited feeling, whether or not introduced by the exercife of the affections: and this extenfion of the term is requifite for the employment of it in connection with fome of the objects of tafte, as we think it is ufed by Mr. Allifon. At the end of the laft preceding paragraph but one, we have endeavoured to exprefs ourfelves with lefs limitation.

Although we have already given a concife fketch of Dr. Cogan's claffification under the article PASSION, to which head the plan upon which this Cyclopædia is conducted led us naturally to refer it, we fhall here, with a view to the more convenient introduction of our remarks on this part of his fyftem, be under a neceffity of retracing part of the ground which has been occupied by a preceding article. The importance of the fubject renders it needlefs to make an apology to our readers for a repetition, without which the difcuffion of this interefting branch of mental philofophy would have been partial and incomplete. The definitions, unlefs otherwife intimated, will, we truft, be found to be a correct reprefentation of at leaft the fubftance of thofe given by Dr. Cogan.

Clafs I.—Feelings relating to *Self-love*. *Order* 1.—Feelings excited by the idea of *good* (1) in *poffeffion*. *Joy* is the vivid delight arifing from the immediate reception of fomething peculiarly grateful to the mind, and ufually depending upon a fudden impulfe. *Gladnefs* is an inferior degree of joy. *Cheerfulnefs* is an emotion of ftill gentler influence, often infpired by very trivial circumftances in perfons of a lively difpofition, and free from anxious care. [Here, befides an employment of the term *emotion*, which very little accords with Dr. Cogan's own explanation of it, we have to obferve, that *cheerfulnefs* is rather a *ftate of mind*, than an *emotion;* though it may occafionally be attended with emotions peculiar to itfelf, and ftill more frequently predifpofes to pleafing emotions: it appears to us peculiarly to denote that tranquil healthful frame of mind, in which it is alive to the gentler feelings of pleafure, and is free from all tendency to gloomy or otherwife painful trains of of thoughts.] *Mirth* is a higher degree of cheerfulnefs, generally excited by what is facetious or ludicrous. [This feeling may in many cafes have a near alliance to cheerfulnefs ; but the wildeft mirth is often found where cheerfulnefs is utterly unknown.] If the good be not tranfitory or evanefcent, we remain under the influence of contentment, fatisfaction, or complacency. *Contentment* expreffes the acquiefcence of the mind in the portion of good we poffefs. *Satisfaction* denotes a pleafing ftate of mind, exceeding that communicated by fimple contentment. *Complacency* (p. 66.) is full and continued fatisfaction, connected with a confiderable degree of approbation, arifing from the perception of fome kind of excellence. Dr. Cogan's remarks here are peculiarly interefting and valuable. *Pride* is that exalted idea of our ftate, qualifications, or attainments, which exceeds the boundaries of juftice, and induces us to look down upon inferiors with fome degree of unmerited contempt. *Vanity* is that fpecies of pride, which, while it prefumes upon a degree of fuperiority in fome particular articles, fondly courts the applaufe of every one within its fphere of action, feeking every occafion to difplay fome talent or fuppofed excellence : (fee MORAL *Education*, col. 38.) *Haughtinefs* is an overt act of pride, manifefted by fome action or expreffion, indicative of unmerited contempt of others. *Arrogance* indicates itfelf by fome particular claims to precedency, or marks of diftinction and refpect from thofe whom pride confiders its inferior in ftation or character, or by impertinent pretenfions to an equality with fuperiors.

" Thefe indications of falfe complacency," continues Dr. Cogan, p. 72. " in their mildeft influence may be placed with ftrict propriety among the *affections :* upon fudden occafions they rife into *emotions ;* and fometimes, particularly when connected with anger, from a fuppofed infult or neglect, they poffefs every characteriftic of *paffion*." We notice this obfervation, partly as according much more with the explanation we have endeavoured to give of the laft two claffes of feeling, than with Dr. Cogan's own, and partly to add one farther remark on the divifion of our feelings. The term *affection* may be employed to denote any mental ftate in which the mind is *affected* with pleafure or pain by external impreffions, or by its own ideas; and it may fometimes be convenient thus to employ it ; but between this very wide acceptation, and that which we have already ftated in MORAL *Education*, col. 24, and which we know not how to extend, without lofing its peculiar import, there is a term wanting, to denote thofe feelings or ftates of mind, which (though fometimes the rudiments of emotions and paffions) 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, unlefs we ufe the term in its wideft acceptation : pride confifts in too high thoughts of ourfelves ; and for the complex ftate of feeling with which fuch thoughts are accompanied, and which give them habitual influence among our motives to action, we want a generic appellation. Similar remarks might be made refpecting the feelings of contentment, cheerfulnefs, forrow, melancholy, &c. In many cafes the term *difpofition* would anfwer the purpofe ; but our prefent nomenclature is clearly inadequate to difcriminate all the claffes of our feelings.

I. *Order* 1. (2) Feelings relating to *Self-love*, excited by the idea of *good* in *expectancy*. *Defire* is that influential effect which the perception of good or evil produces within us, in confequence of which we feek to obtain the one and avoid the other. *Wifhes* are inactive defires, in cafes where no expectations can be formed, no efforts made. A wifh may refer to *paft* fcenes or to *impoffibilities*, where defire is totally inapplicable. [Dr. Cogan's view of the *varieties* of defire is too brief for much abridgment : it includes fome of the religious feelings.] *Hope* is the encouragement given to defire ; the pleafing expectancy that its objects fhall be obtained.

I. *Order* 2. Feelings relating to *Self-love*, which are excited by the idea of *evil*. (1) Feelings arifing from actual loffes and difappointments, which clafs under the head of forrow. *Sorrow* expreffes a mental fuffering under the privation of fome good which we actually poffeffed, or concerning which we entertained a pleafing expectation. *Grief* is fometimes confidered as fynonimous with forrow ; and in this cafe we fpeak of the *tranfport* of grief : at other times it expreffes more filent, deep, and painful feelings, fuch as are infpired by domeftic calamities. When the mind is very deeply impreffed with a fenfe of calamity, for a continuance, and the attention cannot by any means be diverted from it, the fubject is in a ftate of *melancholy*. Sorrow is often diverfified by being blended with other feelings. Sometimes it affumes the appearance of *difcontent* and *diffatisfaction ;* the one, chiefly produced by an humiliating comparifon of our fituation with thofe of others ; the other by a partial accomplifhment of our ardent wifhes. Where the difappointment is great, efpecially when referred to the agency of others, diffatisfaction becomes *vexation* or *chagrin ;* all implying irritation as well as forrow. *Impatience* is alfo a mixture of forrow and anger, under the immediate fenfation of fomething irkfome, or at the caufes of unpleafant delay. *Repining* is forrow united with fome degree of refentment, where the mind dares not break forth into ftrong expreffions of anger. *Patience* is a calm acquiefcence in a ftate in which we experience uneafinefs or fuffering. *Refignation* adds a fubmiffive difpofition refpecting the intelligent caufe of our uneafinefs. *Humility* is a degree of habitual forrows, or painful apprehenfions, concerning our moral or intellectual deficiencies.

We obferve here the influence of too great a defire to generalife in the claffification of our feelings. Humility may fometimes be nearly allied to forrow ; but it furely is not neceffarily fo. He who is confcious of having fpared no exertions in the cultivation of his mind, may feel a tranquil humility in contemplating his own inferiority, without any difcontent or forrow ; the pious mind may take delight in contemplating its infinite inferiority, to the great object of its adorations ; and fo on. *Humility* is the difpofition which leads us to think lowly of ourfelves : where it is a fteady influential difpofition, it is productive of tranquil emotions, fometimes even of fatisfaction at the fuperiority of others : where it is attended with the confcioufnefs of wrong caufes of inferiority, forrow muft blend with it ; but an humble fenfe of our own intellectual and moral qualities is fo clofely allied to contentment, and fo effectually preferves us from the painful and uneafy emotions of pride, that humility, in its habitual character, is more nearly related to happinefs than to mifery. *Humiliation* feems moft correctly to ftand for that feeling which Dr. Cogan denominates humility. (On humility, as oppofed to pride and vanity, fee PHILOSOPHY, *Moral*.) In the fubfequent divifion, Dr. Cogan fpeaks of his having arranged *remorfe* under the head of forrow. There is a remarkable deficiency of that and the related feelings, (at leaft in the fecond edition, to which alone we have the power of referring,) and we will endeavour to fupply it. *Penitence* denotes the forrow we feel at

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the confcioufnefs of paft tranfgreffions or neglect of duty When the feelings of penitence poffefs fo much influence in the mind, as to excite it to fteady refolutions of amendment, and to effectual efforts after reformation, both in the affections and conduct where wrong, they may be denominated *repentance*. *Contrition* feems to exprefs a more permanent ftate of forrow at the recollection of paft fins and failures, in which the mind is deeply humbled, and the fpirit 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 affurance. It is clofely allied to humility; and may often be confidered as a mixture of humility and penitential forrow. *Remorfe* is the corroding uneafinefs and diftrefs of mind, which accompanies the recollection of glaring breaches of duty, which have been followed by irreparable injuries, efpecially to the welfare of others. It does not neceffarily lead to repentance; where it does, the hope which this infpires, foothes and reduces the feelings to contrition.

I. *Order* 2. (2) Feelings arifing from *felf-love*, relating to *apprehended* evil. The generic feeling of this divifion is *fear*, produced by the immediate apprehenfion of fome impending evil, either of lofs or difappointment. *Confternation* is a ftrong foreboding of tremendous evils which are likely to follow misfortunes already experienced; and it chiefly refers to alarms excited by fome general calamity of incalculable extent. *Abject fear* feems to be infpired chiefly by the idea of an irrefiftible power in its caufe. *Terror* roufes to defend or efcape. *Dread* is a degree of permanent fear; an habitual and painful apprehenfion of fome remote evil. *Defpair* is the permanent fear of evil, without any mixture of hope. *Remorfe* (Dr. Cogan fays) "has been already placed under forrow; but whenever it is connected with a fear of punifhment, it deferves a place under this paffion alfo, which greatly increafes its agonies." *Cowardice* is that habitual difpofition which difqualifies for oppofing dangers and difficulties. *Pufillanimity* is terrified at mere trifles, or imaginary dangers. *Timidity* is a lefs reproachful term, employed when there is fome apology from fex, tender years, or feeblenefs of frame. *Doubt*, confidered as a feeling, and diftinct from fimple deliberation, is that comfortlefs ftate which is occafioned by the uncertainty of an event, and the predominancy of fearful apprehenfion refpecting it. *Irrefolution* reprefents the mind as fluctuating between hope and fear, in cafes where it ought to determine. *Shame* is a painful fenfation occafioned by the quick apprehenfion that reputation and character are in danger. *Modefty* may be deemed an habitual folicitude; not to offend againft any fpecies of decorum. [This folicitude is the confequence of the feelings of modefty, not modefty itfelf. We do not however know how to improve upon our bafis.] In oppofition to fear are *fortitude*, which expreffes that firmnefs of mind which refifts dangers and fufferings; *courage*, which is active fortitude; and *intrepidity*, which denotes a courage perfectly undaunted.

I*. *Order* 2. (3) Feelings arifing from the *immediate perception* of evil, relating to the conduct which appears to deferve reprehenfion. *Anger* is a ftrong paffion or emotion, impreffed or excited by a fenfe of injury received, or in contemplation. Anger in the excefs of its violence is termed *rage*. *Wrath* is a violent and permanent anger. *Refentment* is a lower degree of wrath. *Indignation* is refentment, againft conduct which appears peculiarly unworthy. (See alfo Clafs II. Order 2. (2.) *Peevifhnefs* is a flighter degree of anger, perpetually recurring to irritable perfons from trifling caufes.

Clafs II. Feelings derived from the *focial principle*. *Order* 1. Thofe excited by *benevolence*, in which *good* is the predominant idea. (1) Refpecting *good defires* and *difpofitions*. *Benevolence*, or *good-will*, is the love or defire of the good of others. *General benevolence* relates to all beings rendered capable of enjoyment; *philanthropy* to the whole human race indifcriminately. *Affection*, in the moft limited fenfe of the term, denotes the habitual attachment and benignant difpofitions, which the mind experiences in connection with the domeftic relations, various degrees of confanguinity, and particular friendfhips. *Sympathy* is an inward feeling, which harmonifes with the condition and feelings of its object. *Compaffion* is a benevolent forrow, at the fufferings or approaching mifery of others. *Mercy* is that dignified compaffion which induces us to fupprefs refentment, to pardon offences, or mitigate punifhment, as far as difcretion may admit. *Commiferation* denotes fympathy for forrows, for which there is no apparent remedy. *Pity* is nearly allied to commiferation and compaffion; but it is more frequently applied to particular circumftances in the ftate of the object, rather than his immediate feelings. *Generofity* prompts us to beftow favours which may require facrifices from us, but are not called for by any particular pretenfions on the part of the object of them. *Liberality* is a fpecies of generofity, chiefly applied to free donations, or to fubduing unfavourable prepoffeffions refpecting the opinions of another. *Charity* in its original import is fynonimous with *love*; it fometimes expreffes a difpofition to favourable judgments of others; at other times it denotes beneficence to the poor. *Condefcenfion* defignedly waves fuppofed perfonal advantages to relieve an inferior from painful feelings.

II. *Order* 1. (2) Feelings derived from *good opinion*. *Gratitude* is a pleafant affection, excited by a lively fenfe of benefits received or intended, or even by the defire of being beneficial. *Thankfulnefs* refers to verbal expreffions of gratitude; yet, "a heart full charged with thankfulnefs," is equally correct and expreffive. *Admiration* is that act of the mind, by which we difcover, approve, and enjoy fome unufual fpecies of excellence, whether intellectual or moral. [We doubt whether Dr. Cogan is borne out by the recent ufage of our beft writers, in this reftriction of the term. He intentionally leaves the more ancient ufage, which gave it nearly the latitude which its derivation allowed; and it is well to give greater precifion to the ufe of terms; but the word appears to be juftly applied to excellence of every fpecies, even where there is no explicit reference to intellectual or moral qualities; we admire a beautiful profpect, without reference to the wifdom of him who caufed its beauty. And with the *difcovery* of the excellence admired, *admiration* has nothing to do. We would define it to be a lively pleafurable feeling, arifing from the perception of excellence.] *Efteem* is the value we place upon fome degree of worth. It is higher than fimple *approbation*, which is a decifion of the judgment. *Refpect* is that favourable impreffion, which the goodnefs of a character has made upon the perfon contemplating it, united with a fhare of good fenfe. *Approbation* is the feeling attending the perception of any valuable moral quality. *Efteem* is the affection entertained towards an individual, whofe character is marked by thofe virtuous and amiable difpofitions which have no neceffary connection with the higher qualities of the underftanding. The judgment may approve; but its decifion is not itfelf approbation; this is more properly the feeling confequent on the approving decifion. *Refpect* relates to the higher moral qualities, which indicate confiderable ftrength of underftanding. *Veneration* is a higher degree of refpect, in which the mind appears to be more forcibly ftruck with

wifdom,

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 divested 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 rivalship 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 conduct, 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 ufe the terms paffions and affections as fynonimous; and he employs them with a latitude which we cannot confider as by any means expedient. Refpecting the latter object, we fhall have an opportunity of fpeaking under the different claffes. We fhall here briefly ftate his arrangement of the general paffions and affections.

As all the paffions arife from pleafure and pain, Hartley obferves, the firft and moft general diftribution is into love and hatred; *i. e.* we may term all thofe affections of the pleafurable kind, which objects and incidents raife in us, *love;* and all thofe of the painful kind, *hatred*. When thefe are excited to a certain degree, they put us upon a variety of actions, and may be termed *defire* and *averfion;* underftanding by this laft word an active hatred. *Hope* and *fear* are the attendants upon defire and averfion. Thefe affect us more or lefs, according to the more or lefs frequent recurrency of the pleafing and painful ideas, the greater or lefs probability of the expected event, the greater or lefs diftance of time, &c.; the power of affociation difplaying itfelf every where in the agitations of mind excited by thefe paffions. *Joy* and *grief* are love and hatred exerted towards an object which is prefent. After thefe are over, and the object withdrawn, there generally remains a *pleafing* or *difpleafing recollection*, which recurs with every recurrency of the idea of the object, or of the affociated ideas, and keeps up the love or hatred. In like manner, the five grateful paffions, love, defire, hope, joy, and pleafing recollection, all enhance one another; as do the five ungrateful ones, hatred, averfion, fear, grief, and difpleafing recollection. And the whole ten, taken together, Hartley confiders as comprehending all the general paffions of human nature.

6. *Of the Will.*—The will is that ftate of mind which is immediately previous to, and caufes thofe exprefs 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 leaft exceptionable we know of. He afterwards fays (prop. 89.) "the will appears to be nothing but a defire or averfion fufficiently ftrong to produce an action that is not automatic, primarily or fecondarily. At leaft it appears to me that the fubftitutions of thefe words for the word *will*, may be juftified by the common ufage of language. The will is, therefore, that defire or averfion which is ftrongeft for the then prefent time." As he confiders all love and hatred, all defire and averfion as generated by affociation, he of courfe refers the will to the fame origin.

The fubject is truly difficult; and is not a little perplexed by the various theories which have been invented refpecting the voluntary powers: and Hartley appears to us far from fuccefsful. Indeed it would probably have been beft to leave the matter entirely to every one's own confcioufnefs, with his firft account of it. The will certainly affumes different complexions, according to the nature of the motives influencing it; fometimes it is a fimple determination of the underftanding, at other times it is the refult of the affections, paffions, &c. The caufes 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 inveftigation equally interefting and important: and we regret that circumftances do not permit us to enter upon it. And to this fuggeftion to the inquirer, we wifh to add another: Whether the feeling termed *defire* is generated by affociation from the relics of fenfation. We have fometimes thought it neceffary to admit a fimple elementary principle in the human mind fuch, that if its intellectual faculties could be fully developed without experiencing any pleafures or pains, a cafe which is of courfe utterly impoffible as man is conftituted, the communication of pleafurable feeling would immediately excite defire. But, upon more mature reflection, we are decidedly inclined to believe, that, aided by the exercife of the underftanding, the operation of the affociative power on the relics of fenfations, is fully adequate to the production of *defire*. Our doubts have been fimilar, and alfo our prefent views, refpecting *belief*. We would attempt an analyfis of thefe principles of our mental conftitution, but find our materials as yet too imperfect; and we refer to the fubject chiefly to excite to it the attention of thofe who take an intereft in fuch fpeculations. When Newton made his immortal difcoveries refpecting the grand phyfical principle of nature, it muft have appeared to his immediate fucceffors that there was little more to be done in natural philofophy, fo far as refpects the direct phenomena of attraction; thofe who know any thing of the progrefs of aftronomy fince that period, and particularly of the extent of the application of the law of gravitation to the apparent irregularities of the planetary motions, muft perceive that the field opened by Newton affords abundant room for the exercife of the moft vigorous intellect: and in the infinitely varied and complicated phenomena of mind (important as is the difcovery of the grand law occafioning or affecting them all, and extenfive as is Hartley's application of it), there is ftill fcope for the unremitting exertion of the higheft powers of the underftanding, to obferve, to analyfe, and to explain them. But we will proceed from what we think he has not fully inveftigated to his *practical* obfervations, in which his principles always fhine refplendent. We fhall here extract, without alteration, the remarks of that nature from his 89th propofition. The reader, who is unacquainted with his Obfervations, will perceive in them the ufual characteriftics of his ftyle; great fimplicity feldom rifing above neatnefs, and feldom failing to reach it, and perfpicuity fcarcely ever interrupted, except by that compreffion and profundity of thought which require a conftant effort of clofe attention till the mind is familiarized to his inveftigations.

"Since the things which we purfue do, when obtained, generally afford pleafure, and thofe which we fly from affect us with pain, if they overtake us, it follows that the gratification of the will is generally attended or affociated with pleafure, the difappointment of it with pain. Hence a mere affociated pleafure is transferred upon the gratification of the will; a mere affociated pain upon the difappointment of it. And if the will was always gratified, this mere affociated pleafure would, according to the prefent frame of our natures, abforb as it were all our other pleafures; and thus, by drying up the fource from whence it fprung, be itfelf dried up at laft: and the firft difappointments, after a long courfe of gratification, would be intolerable. Both which things are fufficiently obfervable, in an inferior degree, in children that are much indulged, and in adults, after a feries of fuccefsful events. Gratifications of the will without the confequent expected pleafure, and difappointments of it without the confequent expected pain, are particularly ufeful to us here. And it is by this, amongft 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 difappointments, and the only earneft and medium for obtaining lafting happinefs.

"We often defire and purfue things which give pain rather than pleafure. Here, it is to be fuppofed, that at firft they afforded pleafure, and that they now give pain on account of a change in our nature and circumftances. Now, as the continuance to defire and purfue fuch objects, notwithftanding 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 checquer a ſtate of deſire with miſery. For the ſame reaſons, ſtates of averſion are checquered 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 theopathetic 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, *à 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 relics 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 relics 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

of the contagioufnefs obfervable in mental as well as in bodily difpofitions. It is alfo to be remarked that green, which is the moft agreeable to the organ of fight, is the moft general colour of the vegetable kingdom, that is, of external nature; but at the fame time with fo many varieties, that it lofes little or none of its effect in producing pleafure, which it would do if it were all of the fame tint. Thofe perfons who have already formed high ideas of the power, knowledge, and goodnefs of the Author of nature, with fuitable affections, generally feel the exalted pleafures of devotion upon every view and contemplation of his works, either in an explicit and diftinct manner, or in a more fecret and implicit one; hence part of the general indeterminate pleafures here confidered, is deducible from the pleafures of theopathy.

The above may be confidered as the principal fources of the beauties of nature to mankind in general. Inquifitive and philofophical perfons have fome others arifing from their peculiar knowledge and ftudy of natural hiftory, aftronomy, and philofophy in general; for the profufion of beauties, ufes, fitneffes, elegance in minute things, and magnificence in great ones, exceed all bounds of imagination; and new fcenes, and thofe of unbounded extent, feparately confidered, ever prefent themfelves to view, the more any one ftudies and contemplates the works of God.

Upon the whole the reader may fee that there are fufficient fources for all thofe pleafures of imagination which the beauties of nature excite in different perfons; and that the differences which are, in this refpect, found in different perfons, are fufficiently analogous to the differences of their fituations in life, and of the confequent affociations formed in them. Thofe who are clofely attentive to what paffes within them, may alfo, when contemplating the beauties of nature, frequently difcern the relics of many of the particular pleafures here enumerated while they recur in a feparate ftate, and before they coalefce with the general indeterminate aggregate; and this verifies the account here given. It is alfo a confirmation of it, that an attentive perfon may obferve great differences in the kind and degree of the relifh which he has for the beauties of nature in different periods of his life; efpecially as the kind and degree will be found to agree in the main with the foregoing account. To the fame purpofe it may be obferved, that thefe pleafures do not cloy very foon, but are of a lafting nature when compared with the fenfible ones; fince this follows naturally from the great variety of their fources, and the evanefcent nature of their conftituent parts.

(2) *Of the Pleafures and Pains of Ambition.*—The opinions of others concerning us, when expreffed by correfponding words or actions, are principal fources of happinefs or mifery. The pleafures of this kind are ufually referred to the head of honour, the pains to that of fhame. We are here to enquire by what affociations it is brought about that men are folicitous to have certain particulars concerning themfelves made known to the circle of their friends and acquaintance, or to the world in general; and certain others concealed from them; and alfo why all indications that thefe kinds of particulars are made known, fo as to produce approbation, efteem, praife, &c. or diflike, cenfure, contempt, &c. occafion fuch exquifite pleafures as thofe of honour, or fuch intenfe pains as thofe of fhame. Thefe particulars may be claffed under four heads: *external* advantages or difadvantages; *bodily* perfections or imperfections; *intellectual* accomplifhments or defects; *moral* ones, that is, virtue or vice. We fhall, as before, felect the analyfis of one of thefe claffes of the feelings of ambition.

The intellectual accomplifhments and defects which occafion the feelings of ambition, are fagacity, memory, invention, wit and learning; and their oppofites, folly, dulnefs, and ignorance. Now it is evident that independent of the intrinfic value of the former clafs, and difadvantage of the other, the circumftance of their being made known to others, refpectively produces certain privileges and pleafures, or fubjects to inconveniences and pains. It follows, therefore, that every difcovery of this kind to others, alfo every mark or affociate of fuch difcovery, will, by affociation, raife up the relics of thofe privileges and pleafures, or inconveniences and pains refpectively; and thefe being gradually blended together, and united with thofe with which each repetition of the producing caufe is accompanied, afford in each inftance a peculiar compound pleafure or pain, which, by the cuftom of our language, has the word *honour* or *fhame* refpectively connected with it.

This general account will apply to each of the four claffes of the feelings of ambition; but the feelings of honour or fhame connected with this particular clafs, require a more minute analyfis. A great part, perhaps the greateft, is derived from the high ftrained encomiums, applaufes, and flatteries, paid to talents and learning, and the outrageous ridicule and contempt thrown upon folly and ignorance, in all the difcourfes and writings of men of genius and literature; thefe perfons 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 alfo to be obferved, that, in the education of young perfons, and efpecially of boys and young men, great rewards are conferred, in confequence of intellectual abilities and attainments, and great punifhments follow negligence and ignorance; which rewards and punifhments being refpectively affociated with the words expreffing praife and cenfure, and with all their other circumftances, transfer upon praife or cenfure compound vivid relics of thofe pleafures and pains.

In like manner all the kinds of honour and fhame, by being expreffed in words and fymbols which are nearly related to each other, enhance each other; thus, for inftance, the careffes which are given to a child, when he is dreffed in fine clothes, prepare him to be much more affected with the careffes and encomiums beftowed upon him when he has been diligent in getting his leffon; and, indeed, it ought to be remarked, that the words and phrafes of the parents, governors, fuperiors, and attendants, have fo great an influence over children, when they firft come to the ufe of language, as inftantly to generate an implicit belief, a ftrong defire, or a high degree of pleafure. Unlefs very improper treatment has been practifed, they have at that early period no fufpicions, jealoufies, recollections or expectations of being deceived or difappointed; and therefore a fet of words expreffing pleafure of any kind which they have experienced, put together in almoft any manner, will raife up in them a pleafurable ftate, and the oppofite words a painful one. Whence it is eafy to fee, that the language expreffing praife or blame muft inftantly, from the mere affociations connected with the feparate words, put them into a ftate of hope and joy, or of fear and forrow. And when the foundation is thus laid, praife and blame will keep their influences, from the advantages or difadvantages attending them, though the feparate words fhould lofe their particular influences, as they manifeftly do in our progrefs through life.

The honour and fhame arifing from intellectual accomplifhments, do often, in learned men, after a time, deftroy in a great meafure their fenfibility in refpect of every other kind of honour and fhame; which feems chiefly to arife from their converfing much with books and learned men,

men, fo as to have a great part of the pleafures which they receive from fuch intercourfe clofely connected with the encomiums on abilities and learning, and to hear all terms of honour applied to them, and the keeneft reproach and the moft infolent contempt caft upon the contrary defects. And as the pleafures which raillery, ridicule, and fatire afford to the by-ftanders, are very confiderable, fo the perfon who is the object of them, and who begins to be in pain upon the firft flight marks of contempt, has this pain much enhanced by the contraft, the exquifitenefs of his uneafinefs and confufion rifing in proportion to the degree of mirth and infolent laughter in the by-ftanders; fo that it happens that very few perfons have courage to ftand the force of ridicule, but rather fubject themfelves to confiderable bodily pains, to loffes, and to the anxiety of a guilty mind, than appear foolifh, abfurd, fingular, or contemptible to the world, or even to perfons of whofe judgment and abilities they have a low opinion.

(3) *Of the Pleafures and Pains of Self-intereft.*—Self-intereft may be diftinguifhed into three kinds; *grofs* felf-intereft, or the purfuit of the means whereby the pleafures of fenfation, imagination, and ambition are to be obtained, and their pains avoided; *refined* felf-intereft, or the explicit, deliberate, feeking for ourfelves of the pleafures of fympathy, theopathy, and the moral fenfe, and a like explicit endeavour to avoid their pains; and *rational* felf-intereft, or the explicit purfuit of our greateft happinefs, without any partiality to any particular kind, or direct or indirect means of happinefs.

The love of money may be confidered as the chief fpecies of grofs felf-intereft, and in an eminent manner affifts in unfolding the mutual influences of our pleafures and pains, with the factitious nature of our intellectual ones, and the doctrine of affociation in general, as well as the particular progrefs, windings, and endlefs redoublings of felf-love. For it is evident at firft fight, that money cannot naturally and originally be the object of our faculties; no child can be fuppofed to be born with a love of it; yet we fee that fome fmall degrees of this love rife early in infancy; that it generally increafes during youth and manhood; and that at laft in fome old perfons it fo ingroffes and abforbs all their paffions and purfuits, as that from being confidered as the reprefentative ftandard and means of obtaining the commodities which occur in real life, it fhall be efteemed the adequate fymbol and means of happinefs in general, and the thing itfelf, the fum total of all which is defirable in life. But we have already faid fo much on the origin and progrefs of this affection, (fee Div. IV. 2. (3), that we fhall here only attend to the checks which, in the courfe of life, ufually prevent the love of money from acquiring that power, which, without fuch reftraint, would overcome all the particular defires on which it is founded.

Firft, then, it is checked by the ftrong defires of young perfons, and others after particular gratifications; for thefe defires, by overpowering their acquired averfion to part with money, weaken it gradually, and confequently weaken the pleafure of keeping it and the defire of obtaining it; all which are clofely connected together in this view; notwithftanding that the laft, *viz.* the defire of obtaining, and confequently (in an inverted order) the pleafure of keeping, and the averfion to part with, are, in another view, ftrengthened by the defires of particular pleafures to be purchafed by money. And this contrariety of our affociations is not only a means of limiting certain paffions, but it may be confidered as a mark fet upon them by the Author of nature, to fhew that they ought to be limited even in this life, and that they muft ultimately be annihilated every one in its proper order. Secondly, the infignificance of riches in warding off death and difeafes, and, in many cafes, fhame and contempt alfo, and in obtaining the pleafures of religion and the moral fenfe, and even thofe of fympathy, ambition, imagination, and fenfation, firft leffen their value in the eftimation of thofe who reflect, and afterwards affign to them a very low rank among the means of happinefs. Thirdly, the eager purfuit of any apprehended fource of happinefs, fuch as fame, learning, &c. leaves little room in the mind for avarice or any other foreign end.

Thefe confiderations not only account for the limitation fet to the love of money, but for the various apparent inconfiftencies and peculiarities obfervable in it in different individuals. Thus profufenefs, with refpect to fenfual and felfifh pleafures, is often joined with avarice; covetous perfons are often rigidly juft in paying, as well as exacting, and are fometimes generous where money is not immediately and apparently concerned; they have alfo moderate paffions in other refpects, and for the moft part are fufpicious, timorous, and complaifant; and the moft truly generous, charitable, and even pious perfons are highly frugal, fo as to put on the appearance of covetoufnefs, and even fometimes and in fome things to border upon it. We alfo fee why the love of money muft in general grow ftronger with age, and efpecially if the particular gratifications, to which the perfon was moft inclined, become infipid or unattainable; why frequent reflections upon money in poffeffion, and the actual viewing of large fums, ftrengthen the affociations by which covetoufnefs is generated; and why children, perfons in low life, and indeed moft others, are differently affected towards the fame fum of money in different forms, gold, filver, notes, &c.

The love of money is univerfally deemed a more felfifh paffion than the purfuit of the pleafures of imagination, honour, or fympathy; yet all are generated by affociation from fenfible pleafures, having their origin in felf; all in their feveral degrees tend to private happinefs, and all are in certain cafes purfued coolly and deliberately from the profpect of obtaining private happinefs by them. The reafons why the love of money has in fo peculiar and decided a manner the fhame of felfifhnefs connected with it, appear to be as follow. The pleafures which it produces are nearly, and in general completely, of a folitary nature, and fhun participation. As far as money is deemed a means to the accomplifhment of fome ufeful purpofe, it ceafes to be defired on its own account, and then its pleafing affociations are communicable; but the love of money, as an end, is exclufive to the individual poffeffor. 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 pleafures of fympathy, on the other hand, confift in doing good to others; thofe of ambition are fcarcely attainable in any other way; and thofe of imagination are not only capable of a very extenfive communication, but are moft perfect when enjoyed in company. Farther, a regard to felf frequently recurring muft denote a pleafure felfifh; fo that if any, even of the moft generous pleafures, and fuch as at firft fight have no immediate relation to felf-intereft, be purfued in a cool deliberate way, not from the mere impulfe of prefent inclination, but from the opinion that it will afford pleafure; they muft be referred to felf-intereft. Now money has fcarcely any other relation to pleafure, than as an evident means; fo that after it has acquired the power of pleafing inftantaneoufly, the intermediate fteps and affociations muft frequently appear; and hence it forces on the mind a more conftant 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 conveniencies 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 theopathetic 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 viſible 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 recurrency 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 muſt languiſh by frequent recurrency, 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 which

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 displeasing 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.

Fifthly:

Fifthly: The hopes and fears of a future life are themfelves pleafures and pains of a high nature. When a fufficient foundation has been laid by a practical belief of religion, by thoughts of death, by the lofs of friends, by corporeal pain, by worldly difappointments and afflictions, for the formation of ftrong affociations of the pleafures of thefe hopes with duty, and the pains of thefe fears with fin, the repetition of thefe affociations will at leaft make duty itfelf a pleafure, and convert fin into a pain, and give luftre and deformity to all their refpective appellations. And thefe affociations will gradually become fo ftrong, that the exprefs recollection of the hopes and fears of another world will vanifh from the view of the mind.

Sixthly: All meditations upon God, and all the expreffions of the feelings of our minds towards him, by degrees transfer all the perfection, greatnefs, and gloriousnefs of his natural attributes upon his moral ones, that is, upon moral rectitude. By thefe means we fhall learn to be merciful, holy, and perfect, becaufe God is fo; and to love mercy, holinefs, and perfection, wherever we fee them.

Hence it appears that all the pleafures and pains of our nature, thofe of fenfation, imagination, ambition, felf-intereft, fympathy, and theopathy, as far as they are confiftent with each other, with the conftitution of our minds, and with the courfe of the world, produce in us a moral fenfe, and lead to the love and approbation of virtue, and to the fear and abhorrence of vice. This moral fenfe, therefore, carries its own authority with it, inafmuch as it is the fum total of all the reft, and the ultimate refult from them. When it has advanced to confiderable perfection, a perfon may be made to love and hate merely becaufe he ought; that is, the pleafures of moral beauty and rectitude, and the pains of moral deformity and unfitnefs, may be transferred, and made to coalefce almoft inftantaneoufly. After this profound analyfis of the moral fenfe from Hartley, it may appear like prefumption to refer to MORAL *Education*, III. The view there may, however, perhaps be ferviceable to fome, in connection with the early cultivation of it.

8. *Intellectual Perceptions or Ideas of Confcioufnefs.*—We have now fhewn the means by which a vaft variety of complex ideas, whether notions or feelings, are generated by the affociative power from the fimple relics of fenfations, or from thefe varioufly combined; and Hartley is of opinion, that by fimilar means are formed all the notions and feelings of the mind. We have ourfelves expreffed a fimilar opinion in MORAL *Education*, col. 21; but there is one clafs of ideas which we do not feel able to refer to the operation of the affociative power on the fimple ideas of fenfation, or any combinations of them. We reflect upon what paffes within us, and we perceive not only objects of thought, but certain operations of the mind upon them by which they are varioufly modified. We can not only direct the mind's eye to thefe 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 paffing, but we can recall notions of them long after they have ceafed; we can reafon about them, and, what is more, we can think of them, and, without their recurrence, can retrace impreffions derived from attending to them when they were going on. And, in like manner, with refpect to the various feelings and ftates 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 ftates of mind have been introduced; we can remember how the mind was affected by them; and can form recollections of them, which may be almoft entirely deftitute of the pleafure or pain which made part of them; in other words, we can form notions of them, which can be recalled, diftinct from the feelings or ftates of mind themfelves. Senfations, and the combinations of their relics, may be properly confidered as furnifhing the *occafions* for thefe notions which the mind forms by attention to its own ftates and operations; but the notions could never, as far as we can perceive, have been formed without fuch exercife of reflection, by any operation of the affociative power on ideas of fenfation, or the moft complex compounds of ideas derived from them. The term intellectual perception aptly expreffes the power of the mind to perceive the operations of feeling and intellect; and as the term perception is in common ufe to exprefs not only the power, but the refult of its exercife, we might conveniently denote the notions we form of our mental ftates and operations, by the term *intellectual perceptions;* we think it better, however, to term them, in reference to an appropriate fignification of the term confcioufnefs, already adverted to, *ideas of confcioufnefs.*

The readers of Locke will at once perceive that we here refer to a clafs of thofe ideas which that philofopher ftiles *ideas of reflection;* and we fhould not have departed from his nomenclature, if we had not thought it unneceffary to apply the term to many of thofe notions which he refers to this clafs of our ideas, and to avoid error from the extent already given to his term, we prefer the employment of another.

Hartley is eminently fuccefsful in the analyfis of the mental *feelings;* it appears to us that he has eftablifhed the derivation of them all from fenfation by the agency of the affociative power. Refpecting this grand clafs of our ideas, he has left nothing for future inquirers but to purfue the method he has adopted; to trace the various modifications of feeling to their lefs complex feelings, and to fhew how thefe arife from the relics of fenfible pleafures and pains; to trace out the influence of external circumftances, corporeal temperament, and the operations of intellect upon them, and their mutual influence upon each other. Refpecting the notions of the underftanding, a great deal yet remains to be done. Hartley has given a clue to the formation of a great variety of them; and has fhewn the application of his principles to a fufficient number to prove their great extent and importance; but after repeated reflection we feel compelled to admit that the ideas of the underftanding which we have fpoken of under this head, cannot be referred to fenfations as their origin, though, without fenfations, they could not have exifted, fince there would otherwife have been nothing to call forth the operations of the mind from attention to which thofe notions are derived.

Thefe ideas of confcioufnefs are obvioufly fubject to the general operations of the affociative power. They can be connected with other ideas, fo as to be introduced among our trains of thought agreeably to the common principles of affociation; and combinations of thefe ideas can be formed, fo as to produce general, or abftract, notions of various mental ftates or operations, including the common qualities in which they agree.

With refpect to our more refined and complicated notions, there is a wide field for highly important analytical inquiry; to fhew from what impreffions their rudiments are formed, and by what proceffes they have been combined and modified. Much is done in the formation of our notions by the unintentional exercife of the affociative power, and by what may be termed accidental impreffions derived from external objects; but much muft alfo be referred to the voluntary exercife of the intellect.

V. *Of the Motive Power.*—In our general view of the primary mental faculties, we ftated 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 aſſociative 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 aſſociative 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.* whenſoever 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 aſſociative 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 decomplex 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, 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 one

one grand means of afcertaining the dates of facts; for as this diminifhes (other things being equal) in proportion to the period which has elapfed fince the reception of the ideas, and the formation of the affociations, if the vigour of thefe be diminifhed, we refer them to a more remote period, in proportion to that diminution; and if by any caufe it be kept up, the diftance of time appears diminifhed. Thus it is, if any interefting event, the death of a friend, for inftance, have been often recollected or related, till we come to make oral or mental calculations, it appears to have happened but yefterday, as we term it. However, from this circumftance, we are often apt to confound events, as to the order of time, referring them to more recent or remote periods, according to the ftrength and vigour of the ideas and affociations, or the contrary. In general we judge of the period of events by affociated circumftances, particularly by vifible permanent memorials. And hence it happens, that illiterate perfons have often great difficulty in affigning periods to events with any tolerable accuracy. Our readers, when they take fuch things into account, and confider how difficult it muft in moft cafes be for illiterate perfons, who have frequently changed their employments, to refer fuch changes to any fpecific dates, will not feel unwilling to admit, that the prefumption formed againft the reputed murderers of Mr. Steele, in confequence of their incorrect ftatements, as to their places of employment four years before their trial, fhould have weighed very little in the decifion againft thofe unhappy men.

We diftinguifh a new place, perfon, &c. from one which we remember, in a manner fimilar to that in which we diftinguifh recollected ideas, and thofe of imagination; by the greater vividnefs of the impreffion, and the ftrength and readinefs of the affociated circumftances. If we doubt whether we have before feen a perfon who is newly introduced to us, we try to recall fome affociated circumftance, fuch as the time and place where we may be fuppofed to have feen him; and if this prove erroneous, we immediately infer, that our doubt arifes from fome refemblance which he has with fome one whom we then or there faw, or with fome one whofe face is familiar to us.

The memory of children is imperfect, becaufe the elementary rudiments of memory are not fufficiently fixed by the retentive power, nor their ufual groups fufficiently formed in the mind. They are alfo imperfect in the ufe of thofe words, and other fymbols, which fo materially aid the recollection; and in particular they are found very deficient in arranging facts in the order of time, judging moft frequently from the vividnefs of their recollections, and not having the ufe of thofe denotements of time, on which the memory principally depends for accuracy in this branch of recollection. In old perfons, whatever be the part of the fyftem on which the retentive power depends, that power is moft materially diminifhed, as alfo the fenfitive power, while the affociative power has, in their habitual direction of it, been ftrengthened in its operations. Hence new impreffions can fcarcely be received, and feldom are retained; while the parts which are received and retained excite old trains of affociations, rather than continue thofe which were recently impreffed. When old perfons relate the incidents of their youth with great precifion, it is rather owing to the recollection of many preceding recollections and relations, than to the recollection of the thing itfelf.

Memory depends greatly upon the ftate of the brain. Concuffions and other diforders of the brain, excefs in fenfual pleafures, and the ufe of fpirituous liquors, impair it; and it is recovered by degrees, as the caufes which affected the brain are removed. In like manner, dreams which happen in a peculiar ftate of the brain, *viz.* during fleep, vanifh as foon as vigilance, a different ftate, takes place; but if they be recollected immediately upon waking, and thus connected with a ftate of vigilance, they may be remembered.

When a perfon defires to recollect a thing that has efcaped him, fuppofe the name of a vifible object, he recalls the vifible idea, or fome other affociate, again and again by a voluntary power, and thus at laft brings in the required affociation and idea. But if the defire be very great, it changes the ftate of the mental organs, and has an oppofite effect; fo that the defired idea does not recur till all has fubfided, and perhaps not even then.

The excellence of memory confifts partly in its ftrength and accuracy of retention, partly in the readinefs of recollection. The former principally depends on the ftrength and accuracy of perception in attention to our fenfations, and partly upon the affociative faculty; the latter depends entirely upon the ftrength and peculiar biaffes of the operations of that power. The intellectual faculties depend greatly upon the memory; hence, though fome perfons may have ftrong memories with weak judgments, yet no man can have a ftrong judgment with a weak original power of retaining and remembering. Before we conclude our view of this faculty, we beg leave ftrongly to recommend to our younger readers, efpecially if they poffefs a philofophic caft of mind, an attentive perufal of the very ufeful and interefting chapter of Dugald Stewart on this fubject, particularly thofe parts which relate to the improvement of the memory; and to thofe in particular, who are in any way concerned in the work of education, we hope we fhall be excufed, when we recommend the perufal of the feventh divifion of INTELLECTUAL *Education*, on this faculty. See MEMORY and MNEMONICS.

VII. *Imagination.*—In the ufe which Mr. Stewart makes of the term imagination, it includes the fancy, and (as he himfelf ftates) is in no refpect a diftinct power, but compounded of feveral others. "It includes," he fays, "*conception* or fimple apprehenfion, which enables us to form a notion of thofe former objects of perception or of knowledge, out of which we are to make a felection; *abftraction*, which feparates the felected materials from the qualities and circumftances which are connected with them in nature; and *judgment* or tafte, which felects the materials and directs their combination. To thefe powers we may add, that peculiar habit of affociation to which I formerly gave the name of *fancy;* as it is this which prefents to our choice all the different materials which are fubfervient to the efforts of imagination."—"This," he obferves in another place, "is the proper fenfe 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 fuch an appropriation of the term. In the Hartleyan nomenclature, however, it is ufed indifcriminately with fancy, in the fenfe in which Mr. Stewart feems to employ the latter term.

The recurrence of ideas, fays Hartley, efpecially vifible and audible ones, in a vivid manner, but without any regard to the order obferved in paft facts, is afcribed to the power of imagination or fancy. Every fucceeding thought is the refult either of fome new impreffion, or of an affociation with the preceding. It is impoffible, indeed, to attend fo minutely to the fucceffion of our ideas, as to diftinguifh and to remember for a fufficient time, the very impreffion or affociation which gave rife to each thought or conception; but we can do this as far as it can be expected to be done, and in fo great a variety of inftances, that we have full right to infer it in all. A *reverie* differs from imagination only

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 gayer caſt to the ideas of a patient who laboured under reverie. The ſtudy of Taſſo 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. II.) 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 comparifon with another: and this is therefore properly to be regarded as a diftinct act of the mind. The paper we are writing upon is rectangular; and if we form a conception of it, we have the fame appearance as the original fenfation prefented: but the mind cannot, with any degree of propriety, be faid to *judge*, when it merely forms that conception, or receives the correfponding fenfation. As foon 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 fome years ago propofed by the prefent highly refpectable profeffor of moral philofophy at Glafgow, to give the appellation *intellectual perception* to the *power of the mind*, by which we *perceive relations fubfifting among the various objects of thought*. Whether that philofopher ftill retain the appellation, or the precife views which he then took of the fubject, we have not had the opportunity of afcertaining; but our prefent inveftigations lead us to regard them as very judicious. He then confidered fenfation, memory, and intellectual perception, as the three primary faculties of the mind: employing the appellation memory in a wider fenfe than is ufually given to it, fo as to make the affociation of ideas in reality a branch of memory. In this we cannot agree with him. As to the appellation, and the difcrimination of the power from the other faculties of the mind, and the importance which he attached to it, we fee more and more reafon to adopt his views. Still we think it more convenient and accordant with the reft of our plan, to employ the more cuftomary appellation *judgment*, as being a term of greater latitude. That it has been defined fo as to baffle every effort to know from the definition what operation of the mind was intended by it, we are aware; and alfo that it is often ufed very loofely; but the laft circumftance is in our favour: and we wifh to include under it three operations of the mind; 1ft, the attention to different objects of thought, confidered as different, with a view to afcertain their mutual relations or connections; which is appropriately termed *comparifon:* 2dly, the difcerning of the relation which is the object of the mind; which is an operation of the *intellectual perception:* and laftly, the confequent affociation of the ideas, as bearing the obferved relation, which is, in the narroweft fenfe, the *judgment*. The firft may be to a certain degree voluntary: the fecond depends upon the culture, extent, acutenefs of the difcernment, or intellectual perception, and cannot be faid to be voluntary any more than our fenfations are; the laft is a procefs which, like every other cafe of affociation, may be made more efficacious and permanent by voluntary effort, by directing the attention to it, &c. but is not in itfelf a voluntary operation.

We would by no means be underftood as intending to affert that becaufe the intellectual perception is to be regarded as an effential 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 affociation, the *perceptions* of the fame *external* objects greatly vary in different individuals (fee INTELLECTUAL *Education*, II.), it cannot be furprifing that the *intellectual perception*, or the *difcernment of relations* among the objects of *thought*, fhould alfo vary greatly. We do not therefore compare it with *fenfation*, in which the fimple effect of external impreffions is invariable, except in the degree of intenfity, and cannot differ in different periods of life, or ftates of mind, or progrefs of mental culture. The perceptions of relations, even the moft common, (fuch as thofe of refemblance or difference,) vary greatly in readinefs, correctnefs, and extent, in different individuals, and in the fame individual at different periods of life. It is fufceptible of great improvement by proper cultivation. It depends for its exercife upon the memory: and its vigour and correctnefs depend upon the degree of habitual and difcriminative attention given to the various objects of thought. The more refined relations can only be difcerned among the objects of thought, when the nature of the relations themfelves is underftood: and this often involves fome extenfive proceffes of the affociative power in connection with the general cultivation of the underftanding; and the facility and correctnefs with which the mind difcerns fuch relations, depends greatly upon the purfuits 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 *propofition*. Every propofition expreffes a connection exifting in the mind of the fpeaker between the ideas denoted by the terms of the propofition, as bearing to each other the relation declared by the propofition: but it is, we apprehend, no uncommon error to fuppofe that every propofition expreffes a judgment, arifing from a direct act of judging. Paffing by thofe numerous cafes in which the act of judging has once taken place, but is no longer neceffary, there is a variety of others continually occurring, where the propofition expreffes no more than that the idea denoted by the predicate makes part of the complex idea of the fubject, either univerfally, or at that particular time. *Milk is white* is a propofition; but if we fuppofe a perfon, who has often feen milk, to ftate it for the firft time, we apprehend no mental procefs takes place to which we can juftly give the appellation of judging. There is no comparifon, difcerning, confidering, and deciding as to the coincidence of the ideas denoted by *milk* and *white;* he merely expreffes a fimple fact: if he has the fubftance before him, he tells you what he fees; if he thinks of it, (forms a conception of it,) he tells you what he recollects.

When a perfon is fomewhat practifed in obferving what paffes within him, the greateft difficulty he has to encounter is to feparate the proceffes of language from thofe of fimple thought; and thofe who are acquainted with the writings of fome of the beft mental philofophers, will fee abundant reafon to believe, that in various inftances they have either not attended to the diftinction between them, or have been unfuccefsful in detecting the actual procedures of the mind. The fact is, as we have before obferved, thought is more or lefs continually accompanied with words, even where it is not communicated to others. Where the object of the mind is fomething of which it can form diftinct or indiftinct conceptions, or confifts of mere feelings, words are not neceffary; but where the proceffes of reafoning or inveftigation are concerned, it is probably in the experience of all thinking perfons, that thefe proceffes are conftantly introducing the conceptions of *words*, either as objects of fight or of hearing. This may be peculiarly the cafe with thofe who are much employed in the communication of their thoughts; for fince it is only by clothing them in words that they can communicate them, they can fcarcely fail to be more accuftomed to think in words, much as they would fpeak in words, than he who confines his fpeculations to himfelf. At all times, however, it contributes greatly to the clearnefs of thought, to exprefs it in words; but if, as is indifputably the cafe, efpecially in mental inveftigations, we find words fail us, when we endeavour to communicate the nice difcriminating features of thought, it muft alfo be allowed that there are proceffes of thought befides thofe 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 not 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 realiſe 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 *hearer'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

We perceive here a wide field for interefting inveftigation; not involving mere verbal diftinctions, though thefe are often of the utmoft importance to the progrefs of knowledge; but refpecting the real procedures of the underftanding in the acts of judging and reafoning; but circumftances do not permit us to enter upon it.

We feel fatisfaction in perceiving, that the views to which our examination of this fubject has led us, in feveral refpects agree with thofe ftated by Condillac, in his Cours d'Etude Grammaire, part i. chap. 3. We fufpect, that he was led to them by the hypothefis, which he early adopted, that the judgment, the reflection, the paffions, and all the faculties of the foul, are nothing but fenfations under different modifications; but though the foundation is clearly erroneous, his remarks, as far as they go, are very judicious. We fay as far as they go, for he does not appear to have confidered any other cafes, but thofe which refpect our perceptions merely. If in the formation of thefe, or our complex notions of any kind, the underftanding has not been concerned, we do not perceive any operation of the judgment connected with the propofition ftating the fact; the exercife of the judgment, if exercifed at all, precedes the affirmation or negation.

We have before faid, that, in the popular fenfe, the term *judgment* is ufed more extenfively than in the philofophical acceptation (as referring to a particular power or act of the mind) it can be well employed. It is often ufed with as much latitude as *underftanding*. We fpeak of the folidity, the accuracy, the clearnefs, &c. of the judgment, or of the underftanding, with little or no difcrimination; but it will probably be found that the two words are often diftinguifhed juft as the words *underftand* and *judge*. The underftanding conveys lefs 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 fay, that a good underftanding and found judgment are not infeparably connected. In the wide fenfe of the term, judgment is applicable to every act of the mind, by which an opinion is formed, and confequently includes not only judgment, ftrictly fo called, but extends to the whole round of affociations which refpect the objects of the underftanding. Still, even there, the communication of the judgment by language, and the judgment itfelf, are two diftinct operations of the mind; and fhould in all cafes be kept diftinct by the mental philofopher. In this fenfe, as moft accordant with our then object, we employed it in Intellectual *Education*, VIII. In that divifion of the article, we have introduced fome remarks refpecting the leading excellence of the jugdment, *viz. difcrimination*, to which we beg leave to refer the reader.

Thofe operations of the underftanding which are denominated *reafoning*, clearly are of the fame nature with judgment. Where the relation or connection fubfifting between two objects of thought is fhewn by confidering their mutual relation or connection with one or more others, there is an act of reafoning; and the term is ftrictly applicable wherever one truth is inferred from another. In a variety of inftances it is difficult to fay whether a judgment is formed by any procefs of reafoning or fimply by intuition; but it is clear, that a variety of truths, which are intuitively evident to the cultivated mind, require diftinct proceffes of judging in others. And on the other hand, that truths appear intuitively evident, which have in reality been the fubject of previous examination, but by familiarity are become fo affociated with the feeling of belief, that it is difficult to fuppofe they have ever been otherwife.

We fhall here notice one other clafs of the operations of the underftanding, which may with propriety be called *inveftigation*, that by which truth is perceived and difcovered. The exercifes of the underftanding, when in the purfuit of truth, continually involve operations of reafoning; they depend moft clofely upon the difcrimination of the judgment; they imply, what indeed this ftate always implies, the exercife of abftraction; and yet there is fomething beyond all this neceffary. It confifts in tracing out the proofs on which any pofition depends, in determining their refpective weight as evidence in difcovering the general principles agreeable to which particular phenomena have been produced, or the caufes operating to produce any known effect and their refpective influence. Mr. Stewart (Outlines, p. 58.) gives the denomination *invention* to thefe procedures of the underftanding. "The procefs of the mind," he fays, "in difcovering media of proof for eftablifhing the truth of doubtful propofitions, and alfo the procefs by which we bring new truths to light, is properly called *invention*."

We prefer our own appellation, becaufe it is a lefs fufpicious one. The term *invention* feems mifapplied in reference to the difcovery of truth; though we willingly admit, that in various proceffes of inveftigation, the invention is frequently exercifed. We do not recollect, that this philofopher has furnifhed, in his writings, any clue to thefe proceffes of the underftanding; and we are inclined to think, that no one has thrown fo much light upon the actual procedures of the mind in the difcovery or afcertainment of truth, as Hartley has in his 76th, 77th, and 78th propofitions, particularly the 77th. It contains a fund of profound and important obfervations, the value of which cannot be affected by their having among them a few opinions which muft be regarded as mere fpeculations; they are the fpeculations of a mafter mind, intent upon inquiries of an interefting nature; and contemplating with pleafure, what he confidered as important views refpecting the attainment of that, which indifputably was with him the firft object,—truth. One fuch fentence has furnifhed Mr. Stewart, on more than one occafion, with an appeal to common fenfe againft Hartley, which appears to have had great fhare in finally clofing his own mind againft the reception of the leading principles of Hartley's Philofophy, and even againft the admiffion of the real importance and profundity of many of his obfervations, which, we fhould have imagined, muft have fecured that great philofopher the refpect of every candid inveftigator into the laws of the mind, whatever be the fyftem he has adopted.

Our readers muft here allow us to digrefs fomewhat from our main object, to confider Mr. Stewart's modes of demolifhing the Hartleyan philofophy. In his account of the life and writings of Dr. Reid, we perceive indications of the low eftimation in which he holds the inveftigations of Hartley. He there claffes him with Darwin; and throws out various infinuations againft him as a mere theorift, who, and fome others, form an exception to the progrefs of the philofophical world towards the inductive plan of ftudying human nature. And he fpeaks of the "*reveries* of Hartley," which, he fays, have for a while been called from oblivion by the chemical difcoveries which have immortalized the name of Prieftley. We think it was profeffor Robifon who fpoke of Hartley as an *idiot*. Mr. Stewart is nearer the truth. There certainly are in Hartley's works fome fpeculations, which may be termed reveries of a philofophical underftanding, if we choofe fo to reprefent them; and he has blended with his grand principles, a theory refpecting the phyfical caufes of thought, which, however ingenious and plaufible, affords but little infight into the phenomena of

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thought. In a few inftances he has expreffed himfelf with incorrectnefs refpecting ideas, fo as to appear to refer them to the material organization, when his fyftem clearly referred only the occafions of thought to matter, and the ideas themfelves to the fentient principle in man ; and he has fometimes ufed the term to denote *ftates* of mind or even *operations* of mind. We are of opinion, too, that he has in a fmall number of cafes carried too far the application of the grand law of affociation ; and, in particular, that he has too much neglected the re-action of the fentient principle on the mental organs ; or perhaps more correctly, the effects produced on the operations of the affociative power by the exercife of the underftanding. Though in his leading inveftigations we profefs ourfelves his humble followers, becaufe we deem them alike important and juft, we are not infenfible of the faults of his great work, and are ready to leave him wherever we fee reafon to believe that he leaves human nature. But after every detraction from the merits of his work, which the moft rigid *juftice* can make, we regard it as a treafure of comprehenfive and judicious obfervations and accurate and profound inveftigations refpecting the phenomena of the human mind, of unrivalled excellence and importance.

Dr. Johnfon, we are told, valued this work next to the bible, and the writer of this article does the fame. Its value cannot be fully appreciated except making it the guide in obfervation and reflection on human nature, fimilar to thofe which led the author to his conclufion refpecting moral and mental truth ; and our own admiration of it arifes in proportion to our acquaintance with the proceffes of thought and the phenomena of affection.

" The authors (fays Mr. Stewart, § 81.) who form the moft confpicuous exceptions to this gradual progrefs, confift chiefly of men, whofe errors may be eafily accounted for, by the prejudices connected with their circumfcribed habits of obfervation and inquiry ;—of phyfiologifts, accuftomed to attend to that part alone of the human frame, which the knife of the anatomift can lay open ; or of chemifts who enter on the analyfis of thought, frefh from the decompofitions of the laboratory ; - carrying into the theory of mind itfelf (what Bacon exprefsly calls) ' the fmoke and tarnifh of the furnace'." If this obfervation had not been fo fituated that it muft be inevitably referred to Hartley in connection with Prieftley and Darwin, we fhould have believed that a philofopher who evinces fo much good fenfe and general candour as Mr. Stewart, could not have involved him in this cenfure. Such particulars of his life are before the public as fhould have prevented it altogether. His education obvioufly was of that regular judicious kind, which was calculated to give a due fcope to the exercife of the underftanding ; and his great talents very early difplayed themfelves. He was originally intended for the church, and he proceeded for fome time in his thoughts and ftudies towards that object, but was prevented from entering upon it by fome confcientious fcruples ; and he then devoted himfelf to the medical profeffion, in which he made himfelf eminent by his fkill, integrity, and benevolence. He had been from his youth, and ftill continued, in the purfuit of thofe branches of knowledge which peculiarly tend to expand and ftrengthen the underftanding ; and lived in intimacy with fome of the moft learned and intelligent men of his age, fuch as Law, (afterwards bifhop of Carlifle,) Butler, Warburton, Jortin, Hales, Smith, &c. There was in fact every thing to bring his mind into that ftate in which the perception of truth is moft eafy ; for with his habits of patient perfevering inveftigation and obfervation, correct and penetrating underftanding, an extenfive acquaintance with the moft important branches of human knowledge, he united thofe 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 immerfed in worldly purfuits or contentions, and therefore his life was not eventful or turbulent, but placid and undifturbed by paffion or violent ambition. He was free from fenfuality, intemperance, pride, oftentation, envy, and every other branch of fordid felf-intereft ; 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 fome years before that period his mind had been directed to enquiries and obfervations, which formed the germ of his fubfequent inveftigations. His work was not completed till about fourteen years afterwards ; and after it had lain by for two or three years more, it was publifhed in 1749, when he was little more than forty-three years of age. His mind was for many years conftantly 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 fuggeftions 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 philofophical world, or even that it would be much read or underftood ; but at the fame time he did entertain an expectation, that at fome diftant period his philofophical principles would be adopted. Prefent appearances favour his opinion. About two or three years ago, a *fifth* edition was publifhed of the original work ; and befides them, two editions have been fold of Dr. Prieftley's abridgment.

We have been led to this account of Hartley, to affift in counteracting the effect of Mr. Stewart's contemptuous expreffions, and (one muft fay) unfounded ftatements and infinuations refpecting that great philofopher. We have been repeatedly reminded by them of thofe excellent obfervations on *candour in controverfy*, which are to be found in Mr. Stewart's Outlines, p. 240, two or three fentences of which we will quote, and leave to the reader's own reflection. " He who is confcious of his own inventive powers, and whofe great object is to add to the ftock of human knowledge, will reject unwillingly any plaufible doctrine, till after the moft fevere examination ; and will feparate with patience and temper the truths it contains, from the errors that are blended with them. No opinion can be more groundlefs, than that a captious and difputatious temper is a mark of acutenefs. On the contrary, a found and manly underftanding is in no inftance more ftrongly difplayed, than in a quick perception of important truths, when imperfectly ftated and blended with error ;—a perception which may not be fufficient to fatisfy the judgment completely at the time, or at leaft to enable it to obviate the difficulties of others, but which is fufficient to prevent it from a hafty rejection of the whole from the obvious defects of fome of the parts."

In a fubfequent part of the account of Reid, Mr. Stewart quotes the paffage from Hartley, which we referred to at the commencement of thefe remarks. We will quote it ourfelves, and then fhew in what manner it has been quoted by Mr. Stewart. After fome highly important obfervations refpecting the nature of evidence, and on the conduct of the underftanding in the inveftigation of truth, Hartley continues, p. 350, " Thefe fpeculations may feem uncouth to thofe who are not converfant in mathematical inquiries ; but to me they appear to caft light and evidence upon the

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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 parté." 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 Raiſonner, 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 reduire 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 farther 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 acccompliſhed 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 ſpecioușneſs 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 ſituations 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 acquaintance 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 ſpecioufneſs 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 *ſpecioufneſs* 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.

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Mr. Stewart may think (and his implicit admirers may think alfo) that he has demolifhed the whole fabric of the Hartleyan philofophy at a blow; but in our apprehenfion the only way to effect it, is by fhewing either that Hartley has given an erroneous view of our mental phenomena, or that he erred in applying a univerfally acknowledged principle to the explanation of them. We are fatisfied that his fyftem has been fubjected to much longer and clofer examination than Mr. Stewart feems to have given it, without any refult unfavourable to its *general* truth and importance; and that as long as human nature continues as it is, it muft retain its truth and its fundamental importance.

We are the more confirmed in the conclufion that Mr. Stewart has not yet given the proper Hartleyan theory a due examination by the following paffage, p. 129, "His ultimate aim, in this part of it, is precifely the fame with that of the fchoolmen, when they attempted to explain, by the hypothefis of certain *internal fenfes*, how the *fenfible fpecies*, received from external objects, are fo refined and fpiritualized as to become, firft, objects of memory and imagination; and, at laft, objects of pure intellection. Such reveries are certainly not entitled to a ferious examination in the prefent age." The writer of this article may obferve, on the fimilarity between the Hartleyan doctrine and that of the fchoolmen, that it had previoufly ftruck his own mind, and convinced him that their opinions, though mixed with error, were founded on actual obfervation on what paffed within them. Their error lay in their hypothefis refpecting the *nature* of fenfations. Fanciful, however, as this hypothefis is, it is in our apprehenfion decidedly preferable to that which fuppofes that the mind thinks without any object of thought.

As to the originality of Hartley's principles, it is to us of little confequence, provided they are true; but it cannot be doubted by thofe 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 paffage from Hume, which he regards as anticipating Hartley's conclufions, by reprefenting "the principles of union and cohefion among our fimple ideas as a kind of *attraction*, of as univerfal application in the mental world as in the natural." But the works of Hartley manifeft no acquaintance with the Treatife on Human Nature; and if he had feen it, though he might have derived from it fome valuable extenfions of the connective exercife of the affociative power, the particular expreffion which Mr. Stewart quotes could have afforded no aid to him refpecting the compofition of ideas. Mr. Hume, however, appears to have had a glimpfe of the truth refpecting the formation of the moft complex ideas from the fimple elements of fenfations. Mr. Stewart alfo quotes a paffage from Smith's Harmonics, which clearly implies that he had fome notions fimilar to Hartley's hypothefis of vibrations; and obferves that the work was printed in 1749, but that the preface is dated 1748. Hartley's work was finifhed a confiderable time before; and when it is recollected that Smith and Hartley were intimately acquainted with each other, it is at leaft probable that Smith's mind was directed to the fubject by the inveftigations of Hartley, and that he indirectly refers to them. We fhould not have entered upon the fubject of this paffage, but from a "wonderful coincidence," noticed by Mr. Stewart, (p. 130.) "between Hartley's theory and that of Condillac concerning *the transformation of fenfations into ideas*. Condillac's earlieft work, which was publifhed in 1746, three years before Hartley's Obfervations on Man, is entitled Effai fur l'Origine des Connoiffances. *Ouvrage ou l'on reduit à un feul principe toute ce qui concerne l'entendement humain.* This *feul principe*," adds Mr. Stewart, "is precifely the *affociation of ideas*;" and he quotes an expreffion from the preface, which, infulated, gives fome countenance to the opinion. But thofe who know that in that work (i. 2. § 3.) he fpeaks of the affociation of ideas, (*le liaifon des idées,*) as having no other caufe than the attention we have given them when prefented together, and that he traces, as we have elfewhere ftated, every thing to *fenfation*, muft feel convinced that Mr. Stewart is here alfo in an error. We muft mention, however, that he exprefsly difclaims all infinuation of the fufpicion of plagiarifm; but his mode of ftatement will lead others to entertain it: and we therefore farther obferve, that we have no reafon to fuppofe that Condillac's work was foon known in England; that at any rate, Hartley's work was completed two or three years before its publication in 1749; and that the inveftigations of Condillac are altogether of fo different a character from thofe of Hartley, that we doubt whether the Englifh philofopher could have derived any material aid from them in his refearches. In faying this, we by no means wifh to fpeak with difrefpect of Condillac's works, of which, as far as our acquaintance with them extends, we have been led to think highly, from the good fenfe and perfpicuity which runs through the whole. Where he theorifes, we often leave him; where he gives us the refult of actual attention to the operations of the mind, his obfervations generally are juft and important.

Thefe remarks have expanded far beyond our original intention, and we fhould much fooner have brought them to a clofe, if the ftatements which have led to them had proceeded from a writer of lefs real eminence than Mr. Stewart. Though not to be placed upon a par with feveral portions of his Elements, his Philofophical Effays are in many refpects valuable, and generally interefting. We had not the opportunity of confulting this work, till by far the greateft part of this article was prepared for the prefs, or we fhould probably have made fome ufe of it in a way more grateful to our feelings than we have now done. The reader will find in that work fome very juft animadverfions on Horne Tooke's principle, that the import of a word is to be fought in its origin; and on other points connected with language, Mr. Stewart has advanced various judicious obfervations, which, however, muft in general be familiar to thofe who have been accuftomed to apply the principles of Hartley to the phenomena of language. And the Hartleyan can fcarcely fail to feel aftonifhment, when he fees Mr. Stewart ftating (p. 158.), in unqualified terms: "Many authors have fpoken of the wonderful *mechanifm of fpeech;* but none has hitherto attended to the far more wonderful mechanifm which it puts into action behind the fcene." He cannot but wonder that Mr. Stewart fhould have forgotten the concife, yet moft comprehenfive and profound obfervations of Hartley (fee VIII. 3.); and the reader of Condillac will be compelled to fuppofe that the philofopher's memory was as treacherous on this point, as when he reprefented his views of *attention* as original, though the leading obfervations he makes on the fubject are diftinctly ftated at large, in the Effai fur l'Origine, part 1. fect. ii. ch. 2, &c.; and in different parts of the Art de Penfer in the Cours d'Etude.

We fhould feel great fatisfaction, if circumftances permitted us to bring together the valuable obfervations on the nature of demonftrative reafoning, and on the proceffes of the mind in reafoning, which are to be found in different parts of Condillac's work; and in offering fuch remarks on them as might ferve to illuftrate and extend them: but it is not practicable; and we fhall merely recommend his work

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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 acceptation 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 attention 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 leaft would have been very confufed. We can go very far with thofe who contend that general ideas would not exift 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 fame faculties which now produce them, might have produced them without the powers of *communication;* and there appears no reafon why the deaf and dumb child may not form a general idea of men, or horfes, or fire, or any object of a fimilar 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 claffifications of objects from circumftances which are not calculated to ftrike the mind of the common obferver. When left to itfelf, before habits of reflection are formed, the mind will be neceffarily attracted by the moft prominent *fenfible* features of refemblance, and the objects would become affociated by that bond of union; and in very many cafes this would differ in different individuals; but it is indubitable that we may acquire fuch a command over our affociations, that we may be able to combine objects in our minds which have no cuftomary tendency to fuch combination, by a more factitious connection; and that by the requifite culture of the mind, certain connecting principles are either difcovered or confirmed, which could not have been of any force in a more early period of mental progrefs. In the firft of thefe cafes the affociation is voluntary, and if there were not fome apparent benefit refulting from it, or fome circumftances calculated to produce it in the mind, it would foon give place to a more natural union. So far, however, as any general idea is formed, its production is accomplifhed agreeably to the principles we have ftated. In the fecond the operation of the mind is moft ufually involuntary; when voluntary, the obfervations on the firft ceafe to apply.

It is obvious that the fewer and more diftinct the circumftances which are comprehended in the general notion of a clafs of objects, the more clear and definite will be the general notion itfelf. And it appears worthy of notice, and tends to confirm the account given of the formation of our general ideas, at leaft thofe of vifible objects, that the greater the variety fubfifting among the individuals or fubordinate fpecies comprehended under the general idea, (or, more properly, which poffefs that quality, or combination of qualities, which compofe the general idea,) the lefs 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 fides, formed from the relics of impreffions derived from every triangle we have feen; 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 fhall be reprefentative of all others without poffeffing the peculiarities which conftitute it an individual, yet the circumftances of its having three fides is fo definite, and our attention is fo thoroughly confined to it, that the peculiarities of the triangle are not unfrequently totally out of confideration; and if, owing to fome particular affociations, the triangle on fuch occafions were not ufually the fame, we fhould afterwards be unable to fay what kind of a triangle had been in the view of our minds.

To ftate the fact refpecting *conception* (which fee) more generally; if we attempt to form a conception of any object, it muft, from the very nature of a conception, be individual, —reprefentative, perhaps, of a numerous clafs, but ftill poffeffing thofe peculiar features which conftitute individuality. It may not be improper to fuggeft that the want of attention to the difference between a notion and *conception* may have, in fome meafure, mifled thofe philofophers who have denied the exiftence of general notions. "The bufinefs of conception," fays Mr. Stewart, "is to prefent us with an exact tranfcript of what we have felt or perceived;" and admitting the truth of this, a conception is that tranfcript fo prefented. We fhall not enter into the enquiry, whether conception be a diftinct faculty of the mind; we may, however, ftate 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 fpecies does from genus; that in fact without the aid of the affociative faculty, and with retention alone, every idea would be merely a conception. For *the recollection of an individual fenfation, or group of fenfations, whether feldom or frequently received,* is a *conception;* but when a number of fenfations poffeffing common features, but in others differing, are received into the mind, the ideas they form there by the laws of affociation, coalefce with one another; thus conftituting thofe complex ideas or notions, which never from their nature can be conceptions, but which yet may be diftinct, and when words are ufed to denote them, the fubjects of reafoning.

Almoft an infinite variety of the fenfations we receive, are prefented to our view fo conftantly connected with others, that however much it may be in the power of the mind to attend to them in a feparate ftate, it is impoffible to form a conception of them feparately: but, on the other hand, there is a confiderable number of qualities remote from mere fenfation, belonging to an extenfive range of individual objects, which may be confidered by the mind feparate from thofe 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 fenfible, and thofe which we might call more purely intellectual, that in the former cafe, the conceptions being ufually clear, and frequently very vivid, are very eafily brought up by the affociative power; and the circumftances of diftinction being few, and merely fenfible, are, from their very nature, calculated to produce a conception; and fo little do we poffefs any real abftractive power, that it is in moft cafes impoffible to do this without introducing the conception of the whole object: on the other hand, the circumftances of diftinction in the cafe of *intellectual notions* are lefs definite; they are frequently extremely numerous, and are feldom capable of exciting conceptions, and confequently they do not readily call up any particular individual object to which the general term is applicable. We acknowledge that very much, in thefe latter refpects, depends upon the peculiar circumftances of the cafe, or upon the habits of the individual. If a perfon had been remarkably ftruck with an act of juftice, or of difinterefted benevolence, for inftance, it is probable that, while the vividnefs of the impreffion lafted, he would never be able to think of thofe qualities without the particular fact being recalled into the mind; and if he poffeffed a lively imagination, or had been prefent at the performance of it, he would form an immediate conception of the whole fcene: or if a perfon were not much in habits of fpeculation, he would univerfally think of fome example of the action poffeffing thofe qualities. But thefe circumftances, though they tend to illuftrate the operation of the affociative power, do not in any way militate againft the general truth of the above remarks.

The remarks we have made on the fubject of abftraction or or generalization, have been, in a confiderable degree, feparate from any medium of communication ; or at leaft fuppofing it not already formed. If every perfon were left to form his own claffifications, language, in very many inftances, would be of little utility ; becaufe the fame features of refemblance would not operate in the fame way upon different individuals. But the procefs of the mind, when language is formed, is fomewhat different ; becaufe in this cafe it is reftrained, and has not the fame unbounded liberty of forming its affociations. The mind of the child is not left to claffify objects ; but thefe objects are prefented to it already claffed, owing to the fame word being ufed to exprefs them, and it is very interefting to obferve the efforts of the young mind in finding out fome features of refemblance between the objects which had previoufly been prefented to it with the fame name. The two following facts will explain our meaning ; and perhaps contribute to illuftrate the fubject. A boy of about two years and a half old, who was remarkably fond of looking at watches, was fhewn a hunting watch, and told what it was. He repeatedly looked at both fides with great attention, and appeared very greatly perplexed. Some features of refemblance to other watches which he had feen muft have ftruck him ; but he could not find the *face*, which appeared hitherto to have been his chief criterion. At laft he put it to his ear ; and perceiving that the found was the fame as in other watches, he was fatisfied. If he had then left it, the *ticking* would probably have been the only feature of refemblance which would have fatisfied him, at leaft till he had feen a watch when down ; but the face was fhewn him, and he would doubtlefs have that feature of refemblance fixed ftill more ftrongly in his mind than it was before. This fact was noticed feveral years ago : the following we have juft obferved, and we ftate it without comment. A child between fix and feven years of age had been told, while looking over the plates in Chandler's Hiftory of Perfecutions, that *perfecution* means, " putting perfons to death, or doing any other harm to them, becaufe they do not believe the fame as we do." Some days after, while again looking at the plates, (which have in many inftances, we doubt not, furnifhed the rudiments of the abhorrence of perfecution and love of religious liberty, feldom, however, without adding a tinge of Proteftant bigotry,) fhe afked what perfecution meant. Her father, who had been prefent at the former explanation, expreffed fome furprife at her inattention or forgetfulnefs : fhe made no reply, but fome minutes after, fhe faid, " Papa, on the beach at ——— it is faid, Whoever throws any rubbifh on the beach, fhall be *profecuted* as the law directs." It did not require a father's obfervation to fee that the defect of memory and attention was merely imaginary, and that the little girl's mind had been puzzled by a *verbal* fimilarity, where fhe perceived no fimilarity in the mode of application. It was more difficult to explain *profecution ;* but it was attempted, and the circumftance gave an opportunity of impreffing the importance of attending to *words*, and obferving the difference between them when fpoken or written, or, in more familiar language, learning to *fpell* well.

We had propofed to enter at fome length, in this divifion, into the confideration of Mr. Stewart's theory refpecting the operation of the mind in thofe 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 muft fall to the ground when the nature of the mind is duly confidered, and which confeffedly derives no evidence from memory, and as far as we can fee, can derive no known juftification from *confcioufnefs*. We beg our readers' attention to what we have faid on the fubject in our firft divifion, and in other parts of this article, and fhall here only fubjoin a few additional facts and obfervations.

The following ftatements we take as we find them in the Morning Chronicle of Dec. 27, 1813. " Shakfpeare fays of lady Macbeth, when walking in her fleep, her eyes are open, but her fenfe is fhut. This, it appears, is not always the cafe. Sometimes the eyes continue, even in fleep, to prefent objects to the mind which engage its attention ; as in the cafe of Johannes Oporinus, a printer, who being employed one night in correcting the copy of a Greek book, fell afleep as he read, and yet ceafed not to read till he had finifhed not lefs than a whole page, of which, when he awoke, he retained no recollection. Theory of Dreams, p. 62." We do not fpeculate upon the fact, becaufe the particular points in queftion are not detailed with fufficient precifion ; but they feem to us in no way at variance with the ftatement of our great mental dramatift, if, as we take for granted, he meant that the lady's mind was *unconfcious* of the impreffions made upon her fenfes, though thefe might ftill direct her bodily motions. The writer of this article has a perfectly diftinct recollection of a fact which happened refpecting himfelf when a boy. He was reading one evening to fome friends, in a work which did not call for much attention, the words, modes of expreffion, &c. being fufficiently familiar. He remembers that his mind gradually wandered from the book, and by degrees he not only loft all thought of what was going on, but fairly fell afleep : his eyes were open, but his fenfe was fhut. He afterwards found, that he had for fome time been reading indiftinctly, but intelligibly, till at laft fleep fo far overcame the mufcular action requifite for the erect pofture, that he nodded and awoke. The fact amufed him, and was fixed in his memory long before he began to reafon about the proceffes of the *mind* in fuch cafes. He wifhes to lead the attention of the reader to another fact. He has more than once obferved, after glancing over a page in fome book, for the purpofe 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 difcovered fome *fingle* word, which he could have no doubt from the circumftances of the cafe had, by its impreffion on the external organ, excited the train he was confcious of, though it had not itfelf excited the notice of the mind. It muft, however, be added, that he has alfo been able at other times, to trace an indiftinct recollection of having actually perceived the word in queftion.

On referring to Dr. Reid's truly excellent Effay on the Will, which contains a great variety of important obfervations, with the value of which we were not before acquainted ; or we fhould have referred to them in a more appropriate fituation, we find that we agree with him on this queftion more than Mr. Stewart does. " A man (he fays, ch. 3.) *fees not what is before his eyes, when his mind is occupied about another object.* In the tumult of a battle, a man may be fhot through the body, without knowing any thing of the matter, till he difcover it by the lofs of blood or of ftrength." In the following paffage (ch. 1.) we fee the rudiments of what we would term the *doctrine of motives.* " If the mind were always in a ftate of perfect indifference, without any incitement, motive, or reafon, to act, or not to act, to act one way rather than another, our active power, having no end to purfue, no rule to direct its exertions, would be given in vain. We fhould either be altogether inactive, *and never will to do any thing*, or our volitions would be perfectly unmeaning and futile, being neither wife nor foolifh, virtuous nor vicious." The former we think would have been the cafe. We muft add one more extract, from a former part of the chapter, which we think overturns

turns the foundation of his theory refpecting the intellect. "Every act of the will muft have an object. He that wills, muft will fomething; and that which he wills is called the object of his volition. *As a man cannot think without thinking of fomething*, nor remember without remembering fomething, fo neither can he will without willing fomething. Every act of will, therefore, muft have an object; and the perfon who wills, *muft have a conception*, more or lefs diftinct, of what he wills." In writing this effay, Dr. Reid feems to have left himfelf to the guidance of his own found judgment, and accurate obfervation and reflection, qualities which his works often difplay. In his theory about perception, &c. he was mifled by a miftaken idea, that it was the *only* means of oppofing opinions which his good fenfe and moral and religious principles, convinced him were unfounded in truth and human nature, and which he perceived leading to dangerous confequences. "The difcovery (he himfelf fays) 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 obferve, that Condillac (Effai fur l'Origine des Connoiffances humaines, fect. ii. ch. i. § 6—9.) in defending the opinion, that we have always a confcioufnefs of external impreffions, though often fo flight that it does not affect the memory, brings forward two hypothefes only befides his own, to account for the phenomena on which it is founded. The firft is, that when the mind is engroffed with fome interefting object of perception, the brain is in fuch a ftate of general excitement, that this is not affected by the external impreffions from other objects. The fecond is, that though every impreffion on the external organs of fenfation is communicated to the brain, or common fenforium, and *confequently* produces a *perception* in the mind, yet cafes may occur in which the mind does not notice them. The fuppofition is obvioufly abfurd; and the philofopher adds, "I here declare in favour of Locke, for I can form no idea of fuch a perception; I fhould be as well pleafed for any one to fay, I perceive without perceiving." Of courfe the inftant the mind becomes *confcious* of the change in the fenforium, produced by any external impreffion, the confcioufnefs of it makes it a perception, or, more accurately, a fenfation. But it is clear, that Condillac begs the queftion, by ufing the term *perception*, which neceffarily implies *confcioufnefs*. (See PERCEPTION.) The opinion advanced in this article is altogether a diftinct cafe, *viz.* that fenforial changes are *not* neceffarily attended with confcioufnefs; and this is we think the only other fuppofition, and is fully borne out by evidence. It may be eafily made to appear ridiculous by half-ftating it, or by over-ftating it; and we doubt not Tucker would do it, as he has done with Hartley's doctrine of fecondarily automatic motions, in an amufing paffage, which we cannot find to refer to, reprefenting a long train of affociated motions, originating in fenfible vibrations, and going on without will or underftanding. If Hartley had feen it, he would probably have merely faid, that his theory was unaffected by it. Such at leaft is the fact.

3. *On Words, and the Ideas affociated with them.*—Words may be confidered in four points of view; *firft*, as impreffions upon the ear; *fecondly*, as the actions of the organs of fpeech; *thirdly*, as impreffions made upon the eye by characters; *fourthly*, as the actions of the hand in writing. We learn the ufe of them in this order; for children get an imperfect knowledge of the meaning of the words of others; then learn to fpeak themfelves; then to read; and laftly, to write. Now it is evident, that in the firft of thefe ways, many fenfible impreffions, and external feelings, are affociated with particular words and phrafes, fo as to give thefe the power of raifing the correfponding ideas; and that the three following ways increafe and improve this power, with fome additions to the ideas and variations of them. The fecond is the reverfe of the firft, and the fourth of the third. The firft afcertains the ideas belonging to words and phrafes in a grofs manner, according to their ufage in common life. The fecond fixes this, and makes it ready and accurate. The third has the fame effect as the fecond, and alfo extends the fignifications of words and phrafes, by new affociations, and, in particular, by affociations with other words, as in definitions, defcriptions, &c. The advancement of the arts and fciences is chiefly carried on by new fignifications given to words in this third way. The fourth, by converting the reader into a writer, helps him to be expert in diftinguifhing, quick in recollecting, and faithful in retaining, thefe new fignifications of words. The action of the hand is not, indeed, an effential in this fourth method, compofition by perfons born blind having nearly the fame effect; it is, however, a common attendant on compofition, and has a confiderable ufe deducible from affociation, at the fame time making the analogy between the four methods more confpicuous and complete.

Hence it appears, that words and phrafes muft excite ideas in us by affociation; and it further appears, that they can do it by no other means, fince all the ideas which any word excites, are deducible from fome of the fources abovementioned, moft ufually from the firft or third; and becaufe words of unknown languages, terms of art not yet explained, barbarous words, &c. have either no ideas connected with them, or only fuch as fome fancied refemblance, or prior affociation, fuggefts. It deferves to be remarked here, that articulate founds are, by their variety, number, and ready ufe, peculiarly fitted to fignify and fuggeft, by affociation, both our fimple ideas, and our complexions formed from them.

We now proceed to defcribe the manner in which ideas are affociated with words, beginning with childhood.

Firft, then, the affociation of the *names of vifible objects*, with the impreffions which thefe objects make upon the eye, feems to take place more early than any other, and to be effected in the following manner. The name of the vifible object, the mother for inftance, 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 fo than when upon any particular one. The word *mamma* is alfo founded in an emphatical manner, where the child's eye is directed to his mother with earneftnefs and defire.

The affociation, therefore, of the found *mamma*, with the vifible impreffion of the mother on the retina, will be far ftronger than that with any other vifible impreffion, and thus overpower all the other accidental affociations; and thefe will alfo themfelves contribute to the fame end, by oppofing one another. And when the child has acquired fo much voluntary power over his motions, as to direct his head and eyes towards his mother, upon hearing her name, this procefs will go on with accelerated velocity; and thus, at laft, the word will excite the vifible idea readily and certainly. The fame affociation of the vifible impreffion of the mother with the found *mamma*, will by degrees overpower all the accidental affociations of this vifible impreffion with other words; and, at laft, be fo clofely confirmed, that the vifible impreffion will excite the audible idea of the word. This, however, is not to our prefent purpofe; but it is a procefs which takes place at the fame time with the other, and contributes to illuftrate and confirm it. Both together furnifh a coma 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 tasting, 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 syllables 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 the paffions, do not, for the moft part, raife up in us any degree of the paffions themfelves, but only the ideas of affociated circumftances. We are fuppofed fufficiently to underftand the continued difcourfes into which thefe words enter, when we form true notions of the actions, particularly the vifible ones, attending the feelings denoted.

Eleventhly: the names of *intellectual* and *moral* qualities and operations, ftand for a defcription of thefe qualities and operations; and therefore, if dwelt upon, excite fuch ideas as thefe defcriptions in all their particular circumftances do. But the common fentences into which thefe words enter, pafs over the mind too quick, for the moft part, to allow of fuch delay. They are acknowledged as familiar and correct, and fuggeft certain affociated vifible ideas, and nafcent internal feelings, taken from the defcription of thefe names, or from the words which are ufually joined with them in difcourfes 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 fubftitutes for them. The fame holds in common life, in numberlefs inftances. Such words fometimes fuggeft the *words* of their definitions, fometimes the *ideas* of thefe words, fometimes a particular fpecies comprehended under the general term, &c. But whatever they fuggeft, it may be eafily feen that they derive the power of doing it from affociation.

Laftly: there are words ufed in *abftract fciences* which can fcarcely be defined or defcribed by other words, fuch as identity, exiftence, &c. The ufe of thefe muft therefore be learned, as that of the particles is. Indeed children learn their firft imperfect notions of all the words confidered in this and the laft three paragraphs, chiefly in this way; and come to more precife and explicit ones only by means of books, as they advance to adult age, or by endeavouring to ufe them properly in their own deliberate compofitions.

After the foregoing obfervations, which Mr. Stewart would hardly term *reveries*, Hartley adds the following remark, which may leave on the reader's mind a favourable impreffion of his humility and caution; and we quote it verbatim.

"This is by no means a full or fatisfactory account of the ideas which adhere to words by affociation. For the author perceives himfelf to be ftill a mere novice in thefe fpeculations; and it is difficult to explain words to the bottom by words; perhaps impoffible. The reader will receive fome addition of light and evidence in the courfe of this fection; alfo in the next, in which I fhall treat of propofitions and affent. For our affent to propofitions, and the influence which they have over our affections and actions, make part of the ideas that adhere to words by affociation; which part, however, could not properly be confidered in this fection." The term *idea* feems to be ufed here with too much latitude; and it is to fuch cafes that Mr. Stewart, forgetful of his own excellent maxims on candour, feems principally to have attended. We do not wifh to apply the term in any inftance to *ftates* or *operations* of the mind. Feelings, or complex ideas, produced by thofe ftates or operations either in the way of recollection, or of actual affociation at the time of paffing, may, in the Hartleyan nomenclature, be termed ideas; and it is probably to thefe that Hartley really refers. But to proceed.

From the foregoing train of reafoning, the following inferences may be drawn.

(1) Including under the head of *definitions*, defcription, or any way of explaining a word by other words, excepting that by a mere fynonimous term; and for the fake of brevity, excluding for the prefent from the head of ideas, the vifible idea of the character of a word, and the audible one of its found, and alfo all ideas which are either extremely faint, or extremely variable; words may be diftinguifhed into the four following claffes: 1, fuch as have ideas only; 2, fuch as have both ideas and definitions; 3, fuch as have definitions only; 4, fuch as have neither ideas nor definitions.

It is difficult to fix precife limits to thefe four claffes, fo as to determine accurately where each ends, and the next begins; and if we confider thefe things in the moft general way, there is perhaps no word which has not both an idea and a definition; that is, which is not occafionally attended with fome one or more internal feelings, and which may not be explained, in fome imperfect manner at leaft, by other words. However, the following are fome inftances of words which have the faireft right to be placed in their refpective claffes.

The names of fimple fenfible objects are of the *firft* clafs. Thus, *white*, *fweet*, &c. excite ideas, but cannot be defined. Words of this clafs ftand only for the ftable parts of the refpective ideas, not for the feveral variable particularities, circumftances, and adjuncts, which here intermix themfelves.

The names of natural bodies, animal, vegetable, or mineral, are of the *fecond* clafs; for they excite aggregates of fenfible ideas, and at the fame time may be defined by an enumeration of their properties and characteriftics. Thus, likewife, geometrical figures have both ideas and definitions. The definitions, in both cafes, are fo contrived, as to leave out all the variable particularities of the ideas, and alfo to be more full and precife, than the ideas generally are in the parts, which are of a permanent nature.

Algebraic quantities, fuch as roots, powers, furds, &c. belong to the *third* clafs; and have definitions only. The fame may be faid of fcientifical terms of art, and of moft abftract general terms, moral, metaphyfical, and vulgar. However, mental feelings are apt to attend fome of thefe even in paffing flightly over the ear, and thefe feelings may be confidered as ideas belonging to the refpective terms. Thus the very words *gratitude*, *mercy*, *cruelty*, *treachery*, &c. even feparately taken, affect the mind; and yet, fince all reafoning upon them is to be founded on their definitions, it feems beft to refer them to this third clafs. With the opinions given in this paragraph we cannot fully agree, as the reader will perceive from our remarks on generalization, VIII. 2.

Laftly, the particles *the*, *of*, *to*, *for*, *but*, &c. have neither definition nor ideas, as thofe terms have juft been limited.

(2) It will eafily appear, from the obfervations here made upon words, and the affociations which adhere to them, that the languages of different ages and nations muft bear a great general refemblance to each other, and yet have confiderable particular differences; whence any one may be tranflated into any other, fo as to convey the fame ideas in general, and yet not with perfect precifion and exactnefs. They muft refemble one another, becaufe the phenomena of nature, which they are all intended to exprefs, and the ufes and exigencies of human life to which they minifter, have a general refemblance. But then, as the bodily make and genius of each people, the air, foil, and climate, commerce, arts, fciences, religion, &c. make confiderable differences in different ages and nations, it is natural to expect, that the languages fhould have proportionable differences in refpect of each other.

In learning a new language, the words of it are at firft fubftituted for thofe of our native language; that is, they are

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 recurrency 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 beforementioned 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 ſcientifical. 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 common 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 ſcientifical 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

like it taken from induction and analogy. This is the foundation of the rational affent. 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 affent grow for a long time after the rational is arifen to its height; or, if the practical affent arifes in any confiderable degree without the rational, which is often the cafe, it will generate the rational. Thus the fanguine are apt to believe and affert what they hope to be true; and the timorous what they fear.

(5) There are many fpeculative abftract propofitions in logic, metaphyfics, ethics, controverfial divinity, &c. the evidence for which is the coincidence or analogy of the abftract terms, in certain particular applications of them, or as confidered in their grammatical relations. This caufes the rational affent. As to the practical affent or diffent, it arifes from the ideas of importance, reverence, piety, duty, ambition, jealoufy, envy, felf-intereft, &c. which intermix in thefe fubjects, and thus, in fome cafes, add great ftrength to the rational affent, in others deftroy it, and convert it into its oppofite.

On the whole it appears that rational affent has different caufes in propofitions of different kinds, and practical affent in like manner: that the caufes of rational are different from thofe of practical: that there is, however, a great affinity and general refemblance in all the caufes: that rational and practical affent exert a perpetual reciprocal influence on each other: and, confequently, that the ideas belonging to affent and diffent, and their equivalents and relatives, are highly complex, unlefs in the cafes of very fimple propofitions, fuch as mathematical ones. For befides the coincidence of ideas and terms, they include, in other cafes, ideas of utility, importance, refpect, difrefpect, ridicule, religious affections, hope, fear, &c. and bear fome grofs general proportion to the vividnefs of thefe ideas.

From the preceding ftatements the following inferences may be deduced. *Firft:* when a perfon fays, 'I fee and approve of what is right, I follow what is wrong,' it fhews that the rational and practical affent are at variance; that they have oppofite caufes; and that neither of thefe has yet deftroyed the other. *Secondly:* the rational and practical faith in religious matters are excellent means of producing each other. *Thirdly:* vicious men, that is, all perfons who want practical faith, muft be prejudiced againft the hiftorical and other foundations for rational faith in revealed religion. *Fourthly:* it is impoffible any perfon fhould be fo fceptical as not to have the complex ideas denoted by the words affent and diffent affociated with a great variety of propofitions in the fame manner as in other perfons; juft as he muft have the fame ideas in general affixed to the words of his native language, as other men have. An univerfal fceptic, therefore, is no more than a perfon who varies from the common ufage in his application of a certain fet of words, *viz.* truth, certainty, affent, diffent, &c.

We fhall clofe this divifion with the remarks on evidence, given by Hartley, in propofition 87; referring to the original thofe readers who wifh to fee how he illuftrates or proves them, by the employment of fimple mathematical expreffions, and who are difpofed to enter into his highly important and interefting obfervations refpecting the afcertainment of truth, and the advancement of knowledge; and alfo the application of his principles to the feveral branches of fciences.

Firft: if the evidences adduced for any propofition, fact, &c. be dependent on each other, fo that the firft is required to fupport the fecond, the fecond the third, and fo on; that is, if a failure of any one of the evidences renders all the reft of no value, the feparate probability of each evidence muft be very great in order to make the propofition credible, and this holds the more, in proportion as the dependent evidences are more numerous.

Second: if the evidences of any propofition, fact, &c. be independent on each other; that is, if they be not neceffary to fupport each other, but concur, and can, each of them, when eftablifhed upon its own proper evidences, be applied directly to eftablifh the propofition, fact, &c. in queftion; the deficiency in the probability of each muft be very great, in order to render the propofition perceptibly doubtful; and this holds fo much the more, as the evidences are more numerous.

Third: the refulting probability may be fufficiently ftrong in dependent evidences, and of little value in independent ones, according as the feparate probability of each evidence is greater or lefs. Thus the principal facts of ancient hiftory are not lefs probable practically now, than ten or fifteen centuries ago; nor lefs fo then, than in the times immediately fucceeding, becaufe the diminution of evidence in each century is imperceptible. And for the fame reafon a large number of weak arguments proves little.

Fourth: it appears likewife, that the inequality of the feparate evidences does not produce much alteration in thefe remarks. In like manner, if the number of evidences, dependent or independent, be great, we may make great conceffions as to the value of each. Again, a ftrong evidence in dependent ones can add nothing, but muft weaken a little; and after a point is well fettled by a number of independent ones, all that come afterwards are in one fenfe ufelefs, becaufe 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 fatisfactory independent evidences as poffible into view; that if one fail in its effects, from peculiar circumftances, another may fupply its place. And it will be of great ufe to purfue thefe and fuch like deductions, both mathematically and by applying them to proper inftances felected from the fciences, and from common life, in order to remove certain prejudices, which the ufe of general terms and ways of fpeaking, with the various affociations with them, is apt to introduce and fix upon the mind. It cannot but affift us in the art of reafoning, thus to analyfe, recompofe, and afcertain our evidences.

The length of this article, (for which the importance of the fubject, and the variety of topics difcuffed in it, will we hope obtain the reader's excufe,) renders it neceffary, for the convenience of reference, to fubjoin a brief outline of its leading fubjects.

Introductory Remarks.

- Definition of mental philofophy.
- Motives to the ftudy of it.
- Object of this article.
- Proper conduct of our inveftigations in this branch of fcience, and the mental requifites for fuccefsfully purfuing it.
- The leading principle of Dr. Reid's philofophy inconfiftent with fact.
- Confideration of fome of Reid's ftrictures on Locke.
- Platonic and Ariftotelian fyftems refpecting ideas.
- Reid's arguments againft the fuppofed fyftem of Locke, do not militate againft the principles of this article.
- Reid's principles, founded on mere verbal diftinctions, are inefficacious againft Berkeley's hypothefis, or altogether groundlefs.

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 and

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 claſs of actions and diſpoſitions poſſeſſes 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

 our

our duty, and the fanctions with which it is attended of inestimable value, (even to thofe who might have been able to fatisfy themfelves of a future life by confiderations folely derived from the frame of man, and the common courfe of providence,) yet our own conviction, confirmed by every re-examination of the fubject, is, that the moral principles of the fcriptures are precifely fuch as would have been eftablifhed, independently of revelation, by an accurate and enlightened acquaintance with the laws of the human frame, and a judicious and comprehenfive view of the confequences of human actions. Not that it is at all probable, that fuch a moral fyftem as the Hartleyan rule of life, for inftance, would have been devifed by unaided human inveftigation. There is a wide difference between the *perception* and judicious *application* of a truth, and the *difcovery* of that truth; and though it is comparatively eafy for the enlightened underftanding, fetting out with a fatisfactory conviction of an important moral truth, to fhew its foundation and importance, fo as to fatisfy the lefs rigorous and comprehenfive mind, yet, without that conviction, the effort would feldom be made; and the doubts and difficulties attending the inquiry would often damp the ardour and perfeverance of the philofopher, or the intricacies of it would miflead him, and bring him to conclufions in direct oppofition to the principle from which he fet out. The moft acute philofophers of antiquity were conftantly at a lofs, when they came to inquire into the grounds and obligations of virtue; and they repeatedly derived from their fpeculations, opinions which were hoftile to the foundeft views of human nature; and we have not been without inftances in later times, where men of vigorous minds, unfettered, as they believed, by any prejudices, and daring to embrace what they fuppofed to be truth, even if they found her in the haunts of vice, and decked out in all her harlotry;—men, too, whofe writings indicate an ardent love of virtue, and prove their obligations (little acknowledged, and perhaps fcarcely perceived by themfelves,) to the Chriftian fyftem of duty;—having purfued their fpeculations without the reftraint of any fixed points of morality, have derived, even from principles wearing the marks of true excellence, and only erroneous by their extravagant extenfion, conclufions alike hoftile to the precepts of the gofpel, to the plain fenfe of mankind, and to the actual condition of human nature. On one of thefe conclufions we fhall have occafion hereafter to offer fome remarks; and we fhall only add in this connection, that even if the philofopher were himfelf fuccefsful in afcertaining the grounds, obligations, and extent of any moral principle, yet he would feldom fucceed in cafes of any intricacy, and efpecially in oppofition to the felfifh paffions, to convince the lefs comprehenfive mind, unlefs it were under the general influence of the belief that the principle itfelf, or thofe which are directly affected by it, are certainly true, becaufe they are fanctioned by the authority of God.

If there be fatisfactory reafons for the conviction, that the frame of nature owes its origin to a Being infinitely wife, powerful, and good, *he* muft act moft wifely, who, in his inveftigations into the reafons of what he fees, prefumes that it has a wife and good end, if he could but find it out, and fets himfelf with humility and caution to difcover it: and if that conviction be a good one, then muft fuch a mode of enquiry be moft conducive (as Hartley has well remarked) to the difcovery of truth. And following up the fame principle of inveftigation, we may add, that if the moral philofopher fee reafon for the conviction, that the Chriftian fyftem of duty has the exprefs fanction of divine authority, he will act moft wifely, if he prefume that its precepts have a folid foundation and wife and good ends, and by the aid of his own experience and obfervation, 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 juft one, he will neceffarily be more fuccefsful in the afcertainment of important truth, than he could poffibly be, if he purfued his fpeculations without fuch fixed points or fundamental principles, even if he brought to the inquiry an equal degree of vigour of mind and clearnefs and foundnefs of underftanding, and, what is not lefs important, equally juft and comprehenfive views of human nature, and equal love of truth and duty. We muft ftate it, however, as our full and decided conviction, that fuch juft and comprehenfive views of human nature would never have been afcertained, *à priori*, from the known laws of our frame; and that it was only a *religious* philofopher who would have traced out what Hartley has done, from the experience of other religious perfons and from his own.

Such is our foundation; if any philofophical enquirer who does not poffefs the conviction of the wifdom, goodnefs, and moral adminiftration of the Supreme Being, fhould look into thefe pages, we apprehend he will fee little to fatisfy him. To enter into the proof of thofe principles is out of our prefent province; and to the real philofopher, we can, with complete fatisfaction, recommend the firft, and, if he choofe to go further, the fecond chapter of the fecond volume of the Obfervations on Man. If the ftudy of that work, and of Paley's Natural Theology, do not remove his doubts and difficulties, we can only advife him to act upon the *poffibility*, to fay no more, that there may be a ftate of endlefs exiftence hereafter, and if fo, a ftate of retribution; and to bear in mind, that fince the nature of that exiftence muft be of infinitely greater importance than any prefent good or evil, it is the part of true wifdom fo to regulate his conduct and difpofitions, that fhould he enter into that new ftate of being, though through the weaknefs of the human underftanding (for which gracious allowance will affuredly be made by Him who "knoweth our frame,") he has widely erred on fubjects of the higheft moment, he may obtain the approbation of having faithfully ufed his lower degree of intellectual and moral light.

It may be expected by fome, that becaufe we have reprefented our moral views as Chriftian morality, we fhould enter into the confideration of the duties peculiarly Chriftian, arifing from the poffeffion of the Chriftian fyftem of faith and practice, and derivable from no other fource; this, however, we fhall not do: not that we think it *altogether* out of our province, but becaufe the preceptive part of morals is not our immediate object; becaufe the duties which are peculiarly Chriftian, (though they may be fhewn to be accordant with the frame of the mind and the circumftances of man,) can be afcertained only from the fcriptures; and becaufe the confideration of thofe duties would involve difcuffions of a directly controverfial nature, which are unfuitable to the defign of this work. We are not among thofe who think the diftinctions of Chriftian belief unimportant. Religious error in its direct, or its indirect effects, on ourfelves or on others, muft be prejudicial: religious truth, taken in all its bearings, (the whole truth, and nothing but the truth,) muft be beneficial; and we are fully fatisfied, that indifference as to the peculiarities of religious belief, moft commonly leads to indifference to religious truth altogether. But, in our apprehenfion, there is fomething beyond and above them; fomething in which every Chriftian who underftands his religion

ligion 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 *compulſion;* 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 unſkilfully 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 supersedes 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,

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we fay we are *obliged* to ufe thefe means in order to obtain thefe ends. This fimple and truly excellent view of obligation is taken, with a little alteration, from Mr. Belfham's Elements, fect. 4. It feems to have been derived from Gay's Preliminary Differtations, fect. 2; but with great improvement. In its prefent form it beft accords with our object.

Obligation differs from *compulfion.* The former refpects *voluntary* actions, the latter *involuntary.* Compulfion always implies fome 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 fatisfy the laws of honour be the end, the payment of his debts is the neceffary means; if this obligation do not operate with fufficient ftrength as a *motive,* he will be compelled to do it, againft his will, by the law.

Obligation by no means implies an *obliger.* I may be obliged by reafon, by intereft, by convenience, by honour, by confcience, &c. as well as by the authority of another. Authority is one, but not the only, fource of obligation. Paley's opinion, that "a man is faid to be obliged, when he is urged by a violent motive refulting from the command of another," (feparate from the very objectionable expreffion *a violent motive,*) is by far too limited an account of obligation.

Moral obligation refpects thofe actions which are denominated virtuous or vicious; we are *obliged* to perform the one, and to abftain from the other, becaufe this is the *neceffary means,* in order to effect a certain end. That is to fay, unlefs we do practife virtue and abftain from vice, we cannot obtain the end which wifdom points out as deferving purfuit.

As has been remarked of obligation in general, there may be *various fources* of moral obligation; thus, a perfon may be obliged to the performance of his duty, by the laws of God, the dictates of his confcience, his greateft happinefs on the whole, and fo on. Whatever can be fhewn to be the *ultimate* obligation, that is, that to which all others may be reduced, will then furnifh the moft general *criterion* of duty; we do not fay the *beft,* for that we think a different one. (See Div. III.) Thus, if it appear that the *ultimate* obligation to virtue is the agent's *greateft happinefs on the whole,* then we fhould fay, that *virtue* is that quality of an action, or affection, or of the characters by which it tends to the greateft happinefs of the agent on the whole. In other words, a certain character of action or difpofition, is a neceffary means to a certain end; that end may be various, according as we go back more or lefs remotely; fuppofe the remoteft end to be the greateft happinefs of the agent on the whole, then it follows, that the *tendency* to produce that end, is, philofophically fpeaking, the moft general criterion by which we are to afcertain whether or not it is *obligatory;* and to this tendency may be given the denomination of virtue.

Many fources of obligation have been pointed out by different philofophers. That is, to the queftion, Why ought I to act in a certain way, which we call virtuoufly, many anfwers have been given. Some of the moft important are the following.

It is agreeable, fay fome, to the *eternal and neceffary fitnefs of things.* This, in a great meafure, leaves the diftinction between virtue and vice, indefinite and arbitrary; for it depends upon the *perception* of a fitnefs or unfitnefs, which can only be afcertained by inveftigations, whofe conclufions will neceffarily, and often widely, differ in different individuals. Befides, as it has with fome juftice been afked, what are thofe moral fitneffes fit for? If the fitnefs or unfitnefs of actions mean any thing different from their tendency to produce happinefs or mifery, the expreffion is unintelligible. We may fafely ufe the expreffion, for there are certainly a beauty and propriety in virtue, a fuitablenefs to the nature and condition of man, which increafe in our eftimation as virtue itfelf gains an influence in our breafts; but ftill, when we fpeak of it as a fource of moral obligation, 'we find the queftion returning, Why ought I to act agreeably to the fitnefs of things?' The principal fupporters of this view of moral obligation are, Grotius, Balguy, and efpecially Clarke. To a certain extent, it is alfo defended by the advocates of the next opinion.

Some whofe own confirmed habits of virtue probably were in fome meafure the caufe of the opinion, have maintained, that virtue carries in itfelf its own obligation,—that *the underftanding at once perceives* a certain action, *to be right,* and that *therefore* it *ought* to be performed. It is objected with great juftice to this fyftem, that it leaves the matter where it found it; for the queftion recurs, why am I obliged to perform an action which my underftanding reprefents to me as right? Again you tell me, my underftanding reprefents fuch an action as right, that is, obligatory; and therefore I am obliged to perform it. I may afk, *why* does your underftanding reprefent this as right? If you fay, becaufe the mind is fo conftituted by its Maker, you refer me to a kind of infallible judge within, whofe dictates, neverthelefs, are very different in different perfons.—Befides, if the *perception* of right conftitutes obligation, we muft admit that perfons fometimes do right in performing wrong actions. Felton believed that he did what was right, that in fhort 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 wifdom to endeavour to cultivate the moral powers, and then leave the actions entirely, (except in extreme cafes,) to their fuggeftions. But to ftate that an action is obligatory, *becaufe* the underftanding, or the moral fenfe, (for it comes to the fame thing,) reprefents it as right, is to fanction, as virtuous, fome of the moft injurious actions; for fome of the moft injurious actions have been performed by thofe who thought it right to perform them. The fact appears to be, that the advocates for this fyftem, having fpent much of their lives in cultivating their moral perceptions, and finding them, in their prefent ftate, always correct, have acquired the habit of acting implicitly upon them, and hence (not remembering their lefs perfect ftate) have judged, that becaufe certain actions were reprefented by the moral perception as right, *therefore* they were obligatory. This is a fufficient obligation, where perfons have done their beft to enlighten their confciences, generally, and in the particular point of difficulty, but not otherwife; and the queftion ftill recurs, *why* is this action obligatory? This fource of moral obligation was maintained by Cudworth, Butler, Adams, and Price; men whofe writings difplay talents of the firft order for profound inveftigation; and whofe errors are the errors of confirmed moral worth, viewing their own minds rather than the actual condition of human nature, and unacquainted with fome of the grand principles of the mind, which would have led them to different conclufions. Perhaps the works of Butler and Price do not fuit the tafte of the prefent age; but the intelligent reader can fcarcely rife from the ftudy of them, without moral and intellectual benefit.

An action is obligatory, fay others, becaufe it is agreeable to the *moral fenfe.* The obfervations under the laft head have anticipated what might be made here. When we analyfe the grounds of our moral feelings and fentiments, (fee PHILOSOPHY, *Mental,*) we cannot but perceive, that they

they cannot be fafely made the infallible rule of our conduct; ftill lefs can they furnifh the ground of obligation. It cannot, however, be too ftrongly impreffed upon the mind, that correct dictates, and the exaction of implicit obedience to thofe dictates, conftitute the perfection of the confcience. Enlighten and obey it, is a maxim of true wifdom. Lord Shaftefbury and Dr. Hutchefon are the principal fupporters of this theory. Adam Smith's hypothefis nearly coincides with it. See Belfham's Elements, p. 428.

It is clear, then, that we do not reach the ultimate obligation by faying that it is agreeable to the eternal fitnefs of things, to the perceptions of the underftanding, to the dictates of the moral fenfe; but when we add, it is agreeable to the will of God, we feem incapable of advancing further. We furely are obliged to perform the will of God, by every confideration. Moft true, and yet we are not come to the remoteft obligation. Even, in the fentence we have juft ufed, we have, without intending it, referred to one beyond it. Under the moral adminiftration of an all-wife and gracious being, there cannot be a doubt, that obedience to his commands is the higheft wifdom: but why? It is a queftion that admits of an anfwer, and may therefore be put, though reverently: why am I *obliged* to do the will of God? And the anfwer is obvious. Obedience to the commands of a benevolent God muft be productive of the agent's greateft happinefs on the whole. Not that it is neceffary frequently to take this into confideration; for when we have afcertained that we are walking furely, we may walk fafely without that degree of attention which, before fuch afcertainment, might have been neceffary. To obey the will of God in all things is the higheft point of wifdom; and the confequences of obedience we may leave to him with perfect fecurity. It muft be well with thofe who fear him. For references to the writers who have deduced all moral obligation from the Deity alone, fee Thomas Cooper's Tracts, Effay on Moral Obligation, where will be found an acute examination of the foregoing and other views of moral obligation. See alfo Belfham's Elements at the end. Mr. Belfham has extended the examination to the moral fyftems of Paley, Gifborne, and Godwin.

Every queftion, Why is any one obliged to perform a certain action? gives us an ultimate anfwer; becaufe it tends to the agent's greateft happinefs 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 wifdom undoubtedly directs, that in order to attain the higheft degree of moral excellence, we fhould leave our own happinefs out of confideration,—and though the human mind is fo conftituted, that difinterefted benevolence, founded upon and fupported by piety, would lead an individual who has attained it, to obey the will of God and feek to promote the welfare of mankind, even if his underftanding were convinced that he fhould thereby entail upon himfelf confequences highly prejudicial to, or deftructive of happinefs on the whole,—yet it does not appear that there could be any proper *obligation* to any conduct in oppofition to the agent's happinefs on the whole. If felf *muft* be annihilated, it is becaufe felf-annihilation, or felf-oblivion, is neceffary for the attainment of the higheft poffible happinefs. 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 laft be refolved into this moft remote one: that no one, if he had his choice, would accept of exiftence but upon condition of a preponderance of happinefs; that happinefs is the end of the whole creation, though the means by which it is to be obtained are not always in themfelves confidered productive of happinefs; and that revelation affumes this as the ultimate fanction of all its requifitions. This view of moral obligation is ably defended by T. Cooper in the firft of his tracts: his ftatements, however, are fometimes deficient in that reverence which fhould ever be maintained to the Supreme Being; there is an occafional vaguenefs, or rather inaccuracy, in his expreffions; and in fome inftances we fee more indications of acutenefs than of folidity. It is lefs exceptionably and more compendioufly confidered and maintained in Mr. Belfham's Elements. It is ftated by Cooper (p. 86.) to have been entertained by Cumberland, Puffendorf, Gay, Law, Turnbull, Rutherforth, Clayton, Johnfon, and others; Belfham adds Browne and Gifborne; and Paley (fee b. ii ch. 2.) may evidently be arranged among them. On this and every other point of morals, however, our decifion muft be founded on fomething more fecure and fatisfactory than human *authority*.

Here, then, we come to the ultimate, or (as we fhould prefer faying) the *remoteft* obligation of virtue; and from this point we fhall proceed, till it appears that the ends of human exiftence will be beft anfwered by refting at a fomewhat nearer and equally ftable ground of obligation. And we cannot forbear anticipating the conclufions from the next divifion, by obferving, that it will clearly appear, from carefully confidering the laws of our mental frame and the circumftances 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 confcience,) fhould be our primary aim, fince he will be moft happy, in whom thofe principles exift with the greateft ftrength and vigour. The *ultimate obligation*, the *beft rule*, and the *immediate motive*, of duty, are three diftinct confiderations. If it appear that to make the will of God our *rule* of duty, is the *beft* way to promote our own worth and happinefs, as well as the worth and happinefs of others, this muft be our *beft rule*: we may, neverthelefs, be acting in perfect confiftence with this rule, when we are exerting ourfelves for the good of others, or impofing reftraints upon our felfifh inclinations, with an explicit intention to promote the welfare of others, or to follow the dictates of confcience, without, for the time, any direct reference to the will of God as fuch; benevolence, or a fenfe of duty, is in this cafe our *immediate motive*. The remoteft obligation in this cafe, is the fame as before; but we can feldom find it neceffary, even in theory, to revert to it as the ultimate obligation; for if God is juft and good, obedience to his will muft be productive of our greateft good on the whole. He is perfectly juft and good, and therefore, in the actual ftate of the cafe, and we need think of no other, the will of God may, with the utmoft propriety, be affumed, not only as the nobleft *motive*, and the beft *rule*, but alfo as the *foundation*, and even (with very little departure from logical correctnefs, and with greater accordance with the feelings of the man who is accuftomed to employ this rule) as the *ultimate obligation* of duty. He perhaps perceives, when he comes to difcriminate nicely, that he *may* go one very fhort ftep farther; but religious obedience and his greateft good, appear to him fo infeparably connected as caufe and effect, that they make a part of one complex idea; fo that when he is acting under a fenfe of religious obligation, he feels a fecurity, if he think at all about it, that he is effectually promoting his own greateft happinefs on the whole. But he wifhes to feel and act as little as may be with an explicit regard even to this higheft fpecies of felf-intereft, as a primary confideration; and therefore when he has come to the will of God, he cheerfully refts with that, as *his* fartheft obligation.

II. *Confideration of the Primary Purfuits of Man.*—According

cording to the plan propofed near the beginning of this article, we fhall now proceed to confider what fhould be made our primary purfuits in life, in order to obtain the greateft degree of happinefs on the whole; in other words, according to the fecond inquiry at the end of our introductory obfervations, what are thofe affections and claffes of conduct which poffefs the quality which renders them obligatory upon a reafonable being like man. In anfwering this inquiry, the third will, alfo, in a confiderable degree, receive an anfwer, *viz.* what are the beft means for the culture of thofe affections, and the proper direction of our conduct.

In this divifion we fhall make a free and almoft continual ufe of Hartley's Rule of Life. We do not think it neceffary to make any point of ftating where we extract or abridge from him, or where we leave him; thofe who are acquainted, or who may be led by what we here ftate to an acquaintance with that part of his Obfervations, will eafily perceive what we owe to him; and to others it would be ufelefs. We do ourfelves pay no regard to his authority, farther than where it appears to us he has reached moral truth; and we afk for no one's adoption of any ftatement he may find here, *becaufe* it is Hartley's; but we fhall deem ourfelves happy, if our prefent labours fhould lead any to cultivate an intimate acquaintance with that invaluable treafury of moral principles.

Hartley's Rule of Life follows the arrangement of the pleafures and pains in the firft part of his Obfervations; and we fhall purfue the fame order. It was greatly with a view to this, that we entered fo much into his analyfis of the mental pleafures and pains in our preceding article (PHILOSOPHY, *Mental*, IV. 7.), and we muft beg the reader to refer, under each clafs, to the correfponding fection there. The primary divifion of the pleafures and pains is into the fenfible and the mental or intellectual; and thefe laft are divided by Hartley into thofe of 1. IMAGINATION; 2. AMBITION; 3. SELF-INTEREST; 4. SYMPATHY; 5. THEOPATHY; and 6. Thofe of the MORAL SENSE.

1. *Eftimate of the Pleafures of Senfation.*—The firft pleafures and pains of the human being are obvioufly thofe of fenfation, and they form one fource of enjoyment, and ftill more of fuffering, during the whole of life. It is from thefe that the whole round of mental or intellectual pleafures and pains is compofed. (See PHILOSOPHY, *Mental*, II. IV.) To eftimate the value of thefe pleafures in their uncompounded ftate, take the extreme cafe, that any one purfued them as a primary object, laying afide all reftraint from the virtues of temperance and chaftity; he would foon deftroy his bodily faculties, thus rendering the objects of the fenfible pleafures ufelefs; and he would precipitate himfelf into pain, difeafes, and death, evils of the firft magnitude in the eyes of the voluptuous. This is a plain matter of obfervation, verified every day by the fad example of loathfome, tortured wretches, that occur which way foever we turn our eyes in the ftreets, in private families, in hofpitals, in palaces. Pofitive mifery, and the lofs even of fenfible pleafure, are too infeparably connected with intemperance and lewdnefs, to leave room for doubt even to the moft fceptical. The fenfual appetite muft therefore be regulated by, and made fubfervient to, fome other part of our natures, elfe we fhall mifs even the fenfible pleafure which we might have enjoyed, and fhall fall into the oppofite pains, which are, in general, far greater, and more exquifite than the fenfible pleafures.

The fame conclufion alfo follows from the fact, that inordinate indulgence in fenfual gratifications, deftroys the mental faculties, expofes to external inconveniences and pains, is totally inconfiftent with the duties and pleafures of benevolence and piety, and is all along attended with the fecret reproaches of the moral fenfe, and the horrors of a guilty mind. Such is the conftitution of our frame, that the formation of mental feelings and affections cannot be altogether prevented; but an inordinate purfuit of fenfible pleafures converts the mental affections into a fource of pain, and impairs, and cuts off, the intellectual pleafures.

The fame thing may be inferred from the fact, that the fenfible pleafures are formed firft, and the mental pleafures from them, by the affociative power. Now it is a general principle in the order of nature, that the prior ftate, or means, is lefs perfect and important than the pofterior ftate, or the end. Hence the fenfible pleafures cannot be of equal value and dignity with the mental, to the generation of which they are made fubfervient. 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 fatisfactory.

Further, the mental pleafures are more confiftent with the gentle gradual decay of the body, than the fenfible pleafures, becaufe, as they are formed from the combination and coalefcence of many fenfible pleafures, they more affect the fenfible fyftem at large; while the fenfible pleafures principally affect the particular parts of the fyftem to which they belong, and therefore, when indulged to excefs, they injure or deftroy their refpective organs, before the whole body comes to a period.

Laftly, the duration of mere fenfible pleafure is neceffarily very fhort, and cannot, even when free from guilt, afford any pleafing recollections; whereas one of the principal pleafures of our nature, is, and muft be, the pleafures of reflection and confcioufnefs. In like manner the evident ufe and reftriction thereto of one of the chief fenfible pleafures to preferve life and health, with all the confequent mental faculties, and executive bodily powers; of the other to continue the fpecies, and to generate and enlarge benevolence, make the fubordinate nature of both manifeft in an obvious way.

2. *Regulation of the Purfuit of the Pleafures of Senfation.*—The foregoing remarks prove that the pleafures of fenfation ought not to be made the primary purfuit of life, but require to be regulated and reftrained by fome foreign regulating power. That they fhould be fubmitted to the precepts of benevolence, piety, and the moral fenfe, may be proved by fhewing, 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 pleafures of fenfe fhould be made entirely fubfervient to health of body and of mind, fo that each perfon may beft fill his place in life; beft perform the feveral relative duties of it; and as far as in him lies, prolong his days to their utmoft period free from great difeafes and infirmities. All gratifications, therefore, which tend to produce difeafes of body or irregularities of mind, are forbidden by benevolence; and the moft wholefome diet, as to quantity and quality, enjoined by it. It alfo moft ftrictly 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 chaftity and temperance. The precepts of piety are to the fame purpofe, whether they are deduced from our relation to God, as our common Father and Benefactor, who wills that all his children fhould ufe his bleffings fo as to promote the common good; or from the natural manifeftations of his will in the immediate pleafures and advantages arifing from moderate refrefhment, and the manifeft inconveniences and injuries caufed by excefs in quantity or quality; or from his revealed will, by which temperance in all fenfible pleafures is commanded, and intemperance feverely threatened. In like manner the moral fenfe abfolutely directs to the fame moderation, whether it be derived explicitly from the foregoing rules of benevolence and piety, or from ideas of decency, rational felf-intereft, the practice of wife and good men, the difgufting nature of the difeafes confequent on intemperance, the odioufnefs and mifchief of violent paffions, &c. It is evident, therefore, that all thefe guides of life lead to the fame end, *viz.* great moderation in fenfible enjoyments, though they differ fomewhat in their motives, and in the commodioufnefs of their application, as a rule in the particular occurrences of life.

By this fteady adherence to moderation, we are no lofers, even with refpect to fenfible pleafures themfelves; for by thefe means our fenfes and bodily powers are preferved in their beft ftate, and as long as is confiftent with the neceffary decay of the body; and this moderation, and its beneficial confequences, directly tend to infpire the mind with perpetual fecurity, cheerfulnefs, and good will, and with gratitude to the Giver of all good. In the common intercourfe of life, affociated circumftances add greatly to the pleafures of fenfation: thus the pleafure of receiving a thing from a friend, or fharing it with a friend, fociality and mirth at the time of enjoyment, &c. greatly enhance the gratifications of tafte. Much more then will the pure and exalted pleafures of piety and benevolence increafe thefe pleafures.

We are then great gainers on the whole, by religious moderation as to fenfible pleafures; ftill more fo as to the fenfible pains and fufferings which the intemperate bring on themfelves. Thefe are of the moft exquifite kind, and often of long duration, efpecially when they give intervals of refpite; they impair the bodily and mental powers fo as to render moft other enjoyments infipid and imperfect; they difpofe to peevifhnefs, paffion, and murmuring againft Providence; and are attended with the pangs of a guilty mind.

On the whole, the proper method of avoiding the fenfible pains, whether the refult of excefs, or fuch as occur in the daily difcharge of the duties of life, and of obtaining the fenfible pleafures in their beft and moft lafting ftate, is not to aim at either directly, but in every thing to be guided by the dictates of benevolence, piety, and the moral fenfe. It is evident that luxury, felf-indulgence, and an indolent averfion to perform the duties of a man's ftation, not only bring on grofs bodily difeafes, but previoufly to this, often produce fuch a degree of anxiety and fearfulnefs in minute affairs, as to make perfons inflict upon themfelves greater torments than the moft cruel tyrants could inflict. There are cafes, however, in which perfons are obliged, from a fenfe of duty, from benevolence, from adherence to true religion, &c. to forego pleafure, and to endure pain; and this where there is no probability of a recompence in this life. Here the hopes of futurity lend their aid, and the prefent pleafure which thefe afford, is in fome cafes fo great, as to overpower, and almoft to annihilate, the oppofite pains.

3. *Rules refpecting the Pleafures of Senfation.*—"The only rule with refpect to our diet," fays Dr. Prieftley in his Inftitutes, "is to prefer thofe kinds, and that quantity, of food, which moft conduce to the health and vigour of our bodies. Whatever in eating or drinking is inconfiftent with, and obftructs this end, is wrong, and fhould carefully be avoided; and every man's own experience, affifted with a little information from others, will be fufficient to inform him what is nearly the beft for himfelf in both thefe refpects, fo that no perfon is likely to injure himfelf through mere miftake."

It is fufficiently obvious, that it is the benevolent affections which give the chief value and higheft intereft to the fenfible pleafures, arifing from the intercourfe of the fexes; and it alfo appears that thefe pleafures were defigned by the great Author of our frame to be one chief means of transferring our affection and concern from ourfelves to others. If, therefore, this great fource of benevolence be corrupted or perverted, the focial affections depending on it will alfo be perverted, and degenerate into felfifhnefs or malevolence. Thefe confiderations, of themfelves, point to marriage as the only juftifiable mode of indulging the focial paffions.

Unreftrained promifcuous intercourfe would produce the greateft evil public and private. By being unreftrained, it would deftroy the health and prevent the propagation of the fpecies; by being promifcuous, it would be ineffectual to promote the tender and benevolent charities, either between the individuals themfelves, or towards their offspring, and would produce endlefs contentions among mankind. Now though fcarcely any known nation has allowed of fuch entire licentioufnefs, yet the evils arifing from any great degree of it are fo abundantly obvious and important, that they have almoft univerfally led to fome fuch regulation of fexual intercourfe as that of marriage, and prove its neceffity for the well-being of fociety.

Further, to ufe the words of Paley, already cited under the article MARRIAGE, whofe excellent remarks on this fubject we fhall freely employ as fuits our purpofe, the public ufe of marriage inftitutions alfo confifts in their promoting the production of the greateft number of healthy children, their better education, and the making of due provifion for their fettlement in life; and their promoting the private comfort of individuals, and particularly of the female fex. It may be true, all are not interefted in this laft reafon; neverthelefs it is a reafon to all for abftaining from any conduct, which tends in its general confequence to obftruct marriage: for whatever promotes the happinefs of the majority is binding upon the whole.

Thefe confiderations prove that the reftraint of marriage inftitutions is an effentially important obligation. It may be violated by vagrant concubinage, or by cohabitation limited to a fingle individual. The former will be the object of the next paragraph; the latter cannot be placed upon the fame footing with it in feveral refpects: but as it can anfwer the primary public ends of marriage in only a few cafes, 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 difcountenances marriage, and confequently in the prefent ftate of fociety countenances fornication, it follows that it is immoral. "Laying afide the injunctions of the fcriptures," fays Paley, "the plain account of the queftion feems to be this: it is immoral, becaufe it is pernicious that men and women fhould cohabit, without undertaking certain irrevocable obligations, and mutually conferring certain civil rights; if, therefore, the law has annexed thefe rights and obligations to certain forms, fo that they cannot be fecured or undertaken by any other means, which is the cafe here, (for whatever the parties may promife to each other, nothing but the marriage ceremony can make their promife irrevocable,) it becomes in the fame degree immoral, that men and women fhould cohabit without the interpofition of thefe forms."

With refpect to the crime of fornication, it is to be obferved that promifcuous concubinage tends greatly to difcourage marriage, and therefore to defeat the feveral beneficial purpofes fpoken of in the preceding paragraph. The reader

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 sorest 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 cloys, 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 inconveniencies. Vanity, moroseness, and envy, are too generally the painful and injurious concomitants of an overweening 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, though

though apparently different from each other, are, in reality, to be confidered as antecedent and confequent, dogmatifm being frequently followed by fcepticifm. And as religious knowledge, to be properly cultivated, requires that the foil fhould be prepared by the benevolent and pious affections, and no kind of learning being of itfelf fufficient to give this preparation, if attention to the purfuit of literature or of fcience be fo inordinate as to fupprefs the growth of thefe affections, religion itfelf will be treated as incomprehenfible, abfurd, uncertain, or incredible.

It is, however, difficult to reprefent juftly, what is the genuine confequence of the purfuit of the mere pleafures of the imagination; their votaries being alfo generally actuated by motives of ambition; but, as will be feen hereafter, this does not invalidate any of the foregoing remarks.

It is juftly obferved by Dr. Percival, that the endlefs progreffion of knowledge, is apt to give the love of it an inordinate afcendancy over every other principle; and as this paffion does not, like the love of virtue, temper its particular exertions, by preferving a due fubordination of the powers which it calls into action, the wildeft extravagancies of emotion and of conduct, have been difplayed by thofe who have fubmitted to its uncontrouled dominion.

Further, we have reafon to fuppofe that the pleafures of imagination ought not to be made our chief end and aim, becaufe in general they are the firft of the intellectual pleafures, come to their height early in life, and decline in old age. There are fome few, indeed, who continue devoted to them through life; fo there are fome to the pleafures of fenfation; but both are irregularities which cannot be confidered as indications of the defigns of Providence refpecting thefe pleafures. Hence the analogous argument refpecting fenfation, § 1, is applicable to thefe pleafures alfo. Like every other part of the great machine, they have their ufe, but it is a fubordinate 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, exactnefs, truth, fimplicity: they lead to a knowledge of many important truths refpecting themfelves, the world in general, and its Author: they habituate to invent and to reafon; and when the focial, moral, and religious affections begin to be generated in us, we may make a much quicker progrefs towards the perfection of our natures by having a due ftock, and no more than a due ftock, of knowledge in natural and artificial things, of a relifh for natural and artificial beauty.

5. *Regulation of the Pleafures of Imagination.*—As the pleafures of imagination are manifeftly intended to affift in generating and augmenting the higher orders of benevolence, piety, and the moral fenfe, fo thefe laft may be made to perfect and improve the former.

(1) Thofe parts of the *arts and fciences* which infpire us with devout affections, and enable us to be moft ufeful to others, abound with the moft and greateft beauties. Thus the ftudy of the fcriptures, of natural hiftory, and natural philofophy, of the frame of the human mind, &c. when undertaken with pious and benevolent intentions, lead to more interefting and furprifing truths, than any ftudy intended for mere private amufement.

Further, fince the world is a fyftem of benevolence, and confequently 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 labyrinths of nature. In the purfuit 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 feek for benevolent purpofes, and he will find the right road, and by a due continuance in it, attain to fome new and valuable truth; whereas, every other principle and motive for examination, being foreign to the great plan upon which the univerfe is conftructed, muft lead to endlefs mazes, errors, and perplexities. Again, it is to their tendency to the increafe of happinefs, that almoft all truths owe their luftre. Hence thofe whofe minds are under the influence of benevolence, will have the higheft gratification which the perception of thofe truths can produce.

Laftly, the pleafures of the imagination point to devotion in a particular manner, from their unlimited nature. All the pleafures derived from beauty, both natural and artificial, begin to fade and languifh after a fhort acquaintance with it: novelty is a never-failing requifite; we look down with indifference upon what we comprehend eafily, and feel the wifh to aim at fuch things as are but juft within the compafs of our prefent faculties. To what inference does this tendency to prefs forwards, this endlefs grafping after infinity, neceffarily lead us? Is it not that the infinite Author of all things has fo formed our faculties, that nothing lefs than himfelf can be an adequate object for them: that nothing finite, however great and glorious, can afford full and lafting fatisfaction: that as nothing can give us more than a tranfitory delight, if its relation with God is excluded, fo every thing, when confidered as the production of his infinite wifdom and goodnefs, will gratify our utmoft expectations, fince, in this view, we may reft fatisfied that every thing has numerous ufes and excellencies, and that in the courfe of nature the leaft and vileft, according to common apprehenfion, bear a proper part, as well as thofe whofe prefent fuperiority over them appears indefinitely great.

In fine, then, and then only, is fcience a worthy object of purfuit as a leading object, when it is purfued with juft 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 ufefulnefs to our fellow men, and by its enabling us to raife our minds from fenfe 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: purfued as an end, it will engrofs the affections, and more honourable and more fafcinating than the fordid or fenfible pleafures, it will by degrees become a more dangerous and obftinate evil than thofe.

The foregoing remarks more particularly refpect the pleafures arifing from the purfuit of the objects of the underftanding; and we think it will be defirable to offer fome obfervations on thofe arifing from the elegancies and amufements of life, from wit, mirth, and humour, and from the polite arts. A great part of thefe we fhall collect from Hartley's 57th and following propofitions on thofe fubjects.

(2) By the *elegancies of life* are to be underftood, the artificial beauties of houfes, gardens, furniture, drefs, &c. There is in them, as in moft other things, a certain middle point, which coincides with our duty and our happinefs; while all great deviations from it incur the cenfure of criminality, or at leaft of unfuitablenefs and abfurdity. It is impoffible for any one exactly to judge for another on thefe points; but a few general principles may be of ufe refpecting them.

Againft the immoderate purfuits of the elegancies of life it may be urged; 1. That vanity and oftentation, and the *unlawful* pleafures of property, are almoft infeparable from the purfuit of thofe elegancies, and often engrofs all to themfelves. 2. The profufion of expence attending them is inconfiftent with charity to thofe who are in want of our fuperfluities. 3. The beauties of nature are far fuperior to all

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, ſitting looſe to them, and purſuing them without eagerneſs or exceſſive devotement 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 attention. 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-forwards 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 nenessary 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 for 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.

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, and

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 exterior

exterior ftimulus, fimply by the impulfe of the affection. Rational felf-intereft will at times be prefent to the mind, even of thofe who have advanced higheft in the fcale of prefent excellence; and in the early ftages of the moral progrefs, may be called in as a moft ufeful auxiliary, and important fupport: but even this muft be made fubordinate to the cultivation of thofe affections, which are only perfect as they approach difintereftednefs.

On the fubject of this head, we wifh to refer our readers to Dr. Prieftley's fermon on the duty of not living to ourfelves.

We fhall conclude this head in the words of Dr. Reid, with a few alterations. Though a fteady purfuit of our own real good may, in an enlightened mind, produce a degree of virtue which is entitled to fome approbation; yet it can never, while the mind refts with this explicit regard to felf, produce the nobleft kind of virtue which claims our higheft love and efteem. We account him a wife man who is wife for himfelf; and if he profecute his end through difficulties and temptations, his character is far fuperior to that of the man who, having the fame end in view, is continually ftarting out of the road from an attachment to his appetites and paffions, and doing every day what he knows he fhall heartily repent of having done. Yet after all, this wife man, whofe thoughts and cares are all centered ultimately in himfelf, who indulges even his focial and divine affections, only with a view to his own good, is not the man whom we cordially efteem, nor who poffeffes the noble elevation of mind which commands our admiration. Our cordial efteem and admiration are due, and are given only to him whofe foul is not contracted within itfelf, but embraces a more extenfive object; who loves religion, not for her dowry only, but for her own fake; whofe benevolence is not felfifh, but generous and difinterefted; who, forgetful of himfelf, has the common good at heart, not as a means only, but as an end; who abhors what God and confcience condemn, however attractive its appearance; who choofes without hefitation what God and confcience approve, though furrounded with tenfold dangers. Such a man we efteem the perfect man, compared with whom, he who has no other aim than good to himfelf, is a mean and defpicable character. To ferve God, and be ufeful to mankind, without any concern about our own good and happinefs, is probably beyond the pitch of human nature. But to ferve God, and be ufeful to men, merely to obtain good to ourfelves, or to avoid ill, is imperfect fervice, and not of that liberal nature which true devotion and real virtue require.

Though we might be apt to think that he has the beft chance for happinefs, who has no other end of his deliberate actions but his own good, yet a little confideration will fatisfy us of the contrary. A concern for our own good is not a principle that, of itfelf, gives any enjoyment; on the contrary, it is apt to fill the mind with fear, and care, and anxiety. And thefe concomitants of this principle often give pain and uneafinefs, which counterbalance the good they have in view. We may compare in point of prefent happinefs, two imaginary characters; the firft, 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 fecond, of the man who is not indifferent with regard to his own good, but has another ultimate end, perfectly confiftent with it, a difinterefted love of goodnefs for its own fake, or a regard to duty as an end. Comparing thefe two characters in point of happinefs, that we may give all poffible advantage to the felfifh principle, we fhall fuppofe the man who is actuated folely by it, to be fo far enlightened as to fee it his intereft to live foberly, righteoufly, and pioufly in the world, and that he follows the fame courfe of conduct, from the motive of his own good only, which the other does, in a great meafure, or in fome meafure, from a fenfe of duty. The one labours for hire, without any love to the work, the other loves the work, and thinks it the moft noble and the moft honourable he can be employed in. In the firft it is mortification and felf-denial to which he fubmits only through neceffity; to the other it is victory and triumph in the moft honourable warfare. It ought further to be confidered, that though wife men have concluded that virtue is the only road to happinefs, and the commands of a benevolent Creator neceffarily lead us to confider it as fuch, yet he who follows it only as a means to an end, and who obeys God only for the fake of the rewards he has attached to obedience, would, in all probability, be continually wandering from the direct path, and feeking for happinefs where it was not to be found. The road to duty is fo plain, that the man who feeks it with an upright heart cannot greatly wander from it; but the road to happinefs, except where that confidence in the Supreme Being is formed, which fuppofes the pious affections to have become, in fome meafure, difinterefted, 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 whofe happinefs is his primary care; but he who, with perfect refignation, leaves the care of his happinefs to his Maker, while he purfues with ardour the road of his duty. This gives an elevation to his mind which is real happinefs; inftead of care, and fear, and anxiety, and difappointment, it brings peace and joy. It gives a relifh to every good we enjoy; it fmooths the brow of diftrefs, calms the perturbed mind, and makes the pillow of fuffering and of death the reft of happinefs. See Active Powers, eff. iii. p. iii. ch. 4.

11. *Eftimate of the Pleafures of Sympathy.*—We have now proceeded through, and examined all the inferior fources of happinefs. We have feen that if any of them be made the primary object of purfuit, happinefs cannot be obtained; and that the greateft degrees of thefe pleafures are to be obtained, not by making them our primary object, but fubmitting ourfelves to the guidance of piety, benevolence, and the moral fenfe. We might hence alone regard the inference a juft one, that the affections of benevolence and piety, and thofe actions to which they prompt, fhould be made by us our primary object. We fhall feel our ground more fure, when we enter into the pofitive arguments for the conclufion; and we now proceed to afcertain what rank the benevolent affections fhould have, in our rule of life. And it will appear that the cultivation of thefe affections, and the conduct to which they prompt, fhould be made a primary object of purfuit, from the following confiderations.

Benevolence *improves the inferior pleafures*, by limiting and regulating them, as we have already feen in the preceding fections.

Again, the pleafures of benevolence unite and *coincide with thofe of piety and the moral fenfe.* That benevolence unites with piety is obvious, for by the love of the good we are led to love the fource of goodnefs; and back again from the love of God to the love of all that he has made. The pleafures of benevolence are one principal fource of the moral fenfe, and the moral fenfe in its turn improves and enforces them entirely.

The pleafures of benevolence are *unlimited* in their extent. In order to fhew that the pleafures of fenfation do not deferve our primary attention, an extreme cafe was taken of a perfon who actually made them his primary object: in the fame way fuppofe a perfon to take all opportunities of ex-

 ercifing

ercifing his benevolent difpofitions, making it his ftudy, pleafure, and conftant employment either to promote happinefs or to leffen mifery. Now it is very obvious that he would have a very large field for exercife, no lefs than the whole round of domeftic and focial relations. And if his benevolence were pure, and regulated by the dictates of piety and the moral fenfe, he might in general expect fuccefs. And from the experience of thofe who have made the trial, it does not appear that the relifh for its pleafures languifhes, as in other cafes, but gains ftrength by gratification; and they continue to pleafe in reflection. The reafon of this is obvious from the law of affociation; for fince they are, in general, attended with fuccefs, and are confiftent with, and productive of, the feveral inferior pleafures, when thefe are purfued in their due degree, and are alfo further increafed by the moral and religious pleafures, they receive frefh addition upon every gratification, and therefore increafe perpetually, not perhaps in vividnefs, but in extent as well as fteadinefs, when the affections are cultivated as they ought to be.

The pleafures of benevolence are *felf-confiftent*. All may fhare them without diminifhing their mutual happinefs. Harmony and mutual co-operation prevail among the benevolent; and benevolent actions have a tendency to excite correfpondent actions indefinitely. By degrees, when benevolence has arrived at its due height, all the fenfibilities of the individual for himfelf, will be more or lefs transferred upon others, by his benevolence and compaffion for them. And in like manner, when our moral fenfe is fufficiently eftablifhed and improved, and we are capable of being influenced to perform what is fit and right, by the confideration that it is fo, our imperfect fenfibility for others tends to diminifh (by being compared with it) our exorbitant attachment to ourfelves; at the fame time that compaffion takes off our thoughts from ourfelves. And benevolence to a fingle perfon may become equal to felf-intereft by this tendency of felf-intereft to increafe benevolence, and reciprocally of benevolence to leffen felf-intereft, though originally felf-intereft was indefinitely greater than benevolence; and thus we may learn to be as much concerned for others as for ourfelves, and as little concerned for ourfelves as for others. It is not often that benevolence is thus heightened: perhaps, in the ftricteft fenfe, it can never reach this height in the prefent ftate; but let us take the cafe 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, happinefs greatly preponderates. If the benevolent individual, though he do not fee this balance of happinefs clearly, yet has fome comfortable general knowledge of it, he muft be a great gainer in the whole by his benevolence, becaufe thus he has a fource of conftant gratification in the perception of fuch a preponderance of happinefs among thofe in whofe happinefs he has learned to rejoice in fome meafure as in his own.

It will confirm our belief that the cultivation of benevolence fhould be made a primary purfuit of life, if we recollect that *its pleafures lie open to all* kinds and degrees of men; fince every man has it in his power to benefit others, and fince we all ftand 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 pleafures, for intellectual accomplifhments, and, in no fmall degree, for moral culture; and we are unable to fubfift with comfort fingly, or even in very fmall focieties, and this may be confidered as a mark of the fuperior excellence of man's focial pleafures. All the tendencies of the events of life, ordinary and extraordinary, of the relations of life, of the various pleafures which have been enumerated, to connect us together, to connect accidental affociations, and thofe forced upon us by the common fituation of man, and his fituation in fociety, into permanent affections, prove the fame thing. So great, indeed, is this tendency, that two men without claims to the title of benevolent, can fcarcely become familiarly known to each other, without receiving fome good-will, complacency, compaffion, and tendernefs for each other. Further, we love, efteem, and affift the benevolent more than others: fo that a benevolent action not only excites the receiver to a grateful return, but alfo the by-ftander to approve and reward: and benevolence receives a hundred fold even in this world. "But," fays the excellent Hartley, "it would be endlefs to purfue this. Benevolence is, indeed, the grand defign and purport of human life, of this probationary ftate; and every circumftance of human life, duly confidered, muft and does point to it directly or indirectly."

And as it is now eftablifhed that benevolence is a primary purfuit, it follows *that all the pleafures of malevolence are excluded*, as direct obftacles to our happinefs. The lower pleafures may all be made confiftent with, and even fubfervient to, benevolence, by its limitations and power; but thofe of malevolence are quite incompatible with it. As far as malevolence is allowed, benevolence muft be deftroyed. There is, however, this exception; where wifhing evil to fome, difpofes us to be more benevolent on the whole, (as in the cafe of what is called a juft indignation againft the vicious,) it may fomewhat aid the moral progrefs in the lower ftages of benevolence. But it is exceedingly dangerous to encourage fuch a difpofition of mind, by fatire, invective, or difpute, however unworthy the opponent may be; for foftered, it will foon wear the features of ill-will, will foon become rank malevolence.

We muft not only forego the pleafures of malevolence, but patiently and refolutely endure the *pains of benevolence*, particularly thofe of compaffion. But we fhall not be lofers on either of thefe accounts. The pleafures of the moral fenfe which refult from thefe virtues, will, in the firft cafe, compenfate for what we forego; in the laft over-balance what we endure. Befides, mercy and forgivenefs are in themfelves pleafures; and, in the event, productive of many others: and compaffion generally leads us to fuch conduct as makes the afflicted to rejoice, and increafes our difpofition to rejoice with them.

As benevolence is thus fupported by many direct arguments, there are many fimilar and oppofite arguments to prove that *malevolence is the bane of human happinefs;* that it occafions mifery to the agent as well as to the fufferer; that it is indefinitely inconfiftent with itfelf, and with the courfe of nature; and that, confequently, it is impoffible that it fhould fubfift for ever. Now all thefe become fo many indirect arguments for benevolence, and urge us to make the cultivation and exercife of it, one of the fupreme pleafures and ends of our lives.

In order to make this appear more fully, we have only to take a furvey of human life, the reverfe of what we have already attended to. Injuries are increafed by mutual injuries, till at laft mutual fufferings oblige both parties to defift: the courfe and conftitution of human nature give numberlefs admonitions to forbear; and the hand of every man, and the power of every thing, is againft the malevolent. So that if we fuppofe a number of beings purely malevolent, and confequently to have an indefinite number of enemies, they would firft ceafe from their enmity on account of their mutual fufferings, and become purely felfifh, each being his own fole 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 abovementioned 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

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petty ſuggeſtions of ſelf, which crowd themſelves in various ways into our mind, and by leading to doubt, and then, aided by inclination, to diſobey, 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

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confider the application of our Saviour's rule as neceffarily directing us to grant it, becaufe, if in the fituation of the individual foliciting it, we might reafonably wifh for fuccefs. But it may fo happen, that by attending to his requeft, we may deprive ourfelves of the power of difcharging more imperious duties to others: we may be prevented from paying our debts, or from contributing as we ought to the welfare of thofe who have ftronger claims upon us. Their claims muft alfo be taken into account; but we muft take care, that fuch calculations be not made under the bias of felfifhnefs; and that, under the pretence of juftice, we do not ftifle the feelings of compaffion and good-will. The doublings of felf-love are fo numerous and intricate, that he who has the fincere and earneft defire to do his duty, will be cautious where the promptings of intereft or indolence, or other perfonal 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 reafonably expect that he will do more harm by fuch neglect, than he can do good in other ways; but we fhould alfo remember, that this maxim is often the prompting of felf-love, to excufe our covetoufnefs or our indolence; and where the good to others is prefent and certain, and the good to our narrow circle of domeftic relations is diftant 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 juftice, the reader will find an interefting paffage from Mr. Stewart's Outlines, in IV. § 1.

(6) Perfons in the near relations of life, benefactors, dependents, and enemies, feem to have, in moft cafes, a prior claim to ftrangers. General benevolence arifes from the cultivation of the particular fources of it. The root muft therefore be cherifhed, that the branches may flourifh, and the fruit arrive at perfection. Some remarks on a theory directly oppofing this rule, will be found in IV. § 2.

(7) Benevolent and religious perfons have, all other circumftances being equal, a prior claim to the reft of mankind. Natural benevolence itfelf teaches this, as well as the moral fenfe. Two reafons ftrongly enforce this rule; in the firft place, we thus contribute towards the promotion of goodnefs; we add fomething to the ftrength of the motives which there are, even in the prefent life, for fteady adherence to the practice of duty. If it be our aim to remove mifery without difcrimination, we fhall in fome inftances break down the barriers of virtue; we cannot remove all; let our efforts, therefore, be fo directed, that they may be as beneficial as poffible; and it is obvious, that they will be moft effectual, where they contribute to difcourage vice in all its fhapes. If indolence be fecure of relief from that preffure which it places upon itfelf, indolence will be increafed; if the appearance of mifery be the only paffport to our affiftance, vice will be continually receiving encouragement. But it is not merely with a view to the relief of actual mifery that difcrimination is important; it is equally important with refpect to the extenfion of the means of doing good. We may confidently expect, that all the opportunities and powers we can commit to others, will be moft ferviceable in the hands of thofe whofe habits are formed upon the model of benevolent piety. In all cafes, however, efpecially while our benevolence is in its infancy, we are in fome meafure to be guided by its mere impulfe. It is one important confequence of doing good to others, that we do good to ourfelves, we cultivate our benevolence, and with it cultivate our happinefs. But that benevolence will be found to reft upon the fureft footing, which is made to prompt to exertions which in no way interfere with the moft extenfive interefts of mankind.

(8) Since the concerns of religion, and a future ftate are of infinitely more importance than thofe which relate to this world, it fhould be our moft earneft 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 lefs, employ their talents. Here no effort can be altogether thrown away; at leaft no effort will be prejudicial; and even if to others they fhould be ufelefs, their effects will return to our own bofoms.

(9) We ought to pay the ftricteft regard to truth, both in our affirmations and promifes. There are very few inftances where veracity of both kinds is not evidently conducive to the public good, and falfehood in every degree pernicious. It follows, therefore, that in cafes where appearances are otherwife, the general regard to truth, which is of fo much confequence to the world, ought to make us adhere inviolably to it; and that it is a moft dangerous practice to falfify, pretended or real, as is often done, from falfe delicacy, falfe fhame, and other fuch difingenuous motives, or even from thofe which border upon virtue. The harm which thefe things do, by creating a mutual diffidence, and difpofition to deceive, is exceedingly great; and in fcarcely any inftances to be counterbalanced by the prefent good effects affigned as the reafon for this practice. On the fuppofed reftrictions of this duty, fee hereafter, IV. § 3.

(10) Obedience to the civil magiftrate, and to the laws of the community, is a fubordinate general rule of the greateft importance. It is evidently for the public good, that every member of a ftate fhould fubmit to the governing power, whatever that be. Peace, order, and harmony, refult from this, taken on the whole: confufion and mifchief of all kinds from the contrary. So that, though it may, and muft be fuppofed, that difobedience in certain particular cafes will, as far as the fingle act and its immediate confequences are confidered, contribute more to the public good than obedience, yet as it is a dangerous example to others, and will probably lead the perfon himfelf into other inftances of difobedience afterwards; difobedience becomes, in every cafe, upon the whole, of a tendency deftructive of the public welfare. We ought, therefore, in confequence of this rule, to refpect all perfons in authority; not to pafs hafty cenfures upon their actions; to make candid allowances on account of the difficulties of government, the bad education of princes, and of perfons of high birth; and of the flattery and extraordinary temptations with which they are furrounded; to obferve the laws ourfelves, and to promote the obfervance of them where the penalties may be evaded, or are found infufficient; to look upon property as a thing abfolutely determined by the laws, fo that, though a man may, and ought to recede from what the law would give him out of compaffion, generofity, love of peace, view of greater good upon the whole, &c.; yet he muft never in any way evade, ftrain, 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 muft fubmit to the punifhment whatever it be.

This rule obvioufly does not extend to thofe extreme cafes, where the people at large, (for whofe benefit all power fhould be exercifed, and on whofe will it muft eventually depend,) fee reafon to refift the exercife of ufurped or arbitrary power, to change one line of fovereigns for another, or to place the exifting monarch under thofe reftrictions, which may prevent the abufe of his authority. In making fuch refiftance, however, it fhould be clear, that the propofed change will meet with at leaft the concurrence of of the great bulk of the people, that the probabilities of fuccefs are adequate to juftify the rifks which muft be run, and that the advantages to be gained will be fuch as to counterbalance the immediate evils; evils which muft often check the ardour of enlightened and difinterefted patriotifm, and fhould be ferioufly weighed, not only in the more extenfive cafes, but even in thofe which merely refpect the reformation of real or fuppofed abufes. The mafs of fuffering, and of moral evil produced when force muft be employed to throw off an oppreffive yoke, is utterly incalculable; and, on the whole, more is generally to be effected by the gradual diffufion of knowledge and of found views of the nature and ends of political eftablifhments, which muft eventually, (and often much more rapidly than could be expected before hand,) fet a complete bar to all injurious encroachments on civil liberty.

Nor does this rule extend to thofe important cafes where the rights of confcience are concerned. If the laws of the civil magiftrate require any thing which the law of God forbids, they muft be neglected, or difobeyed, without hefitation.

Intimately connected with this fubject is one point, to which we muft briefly advert, *viz.* honefty with refpect to the public revenue. Many who have a real principle of genuine uprightnefs in other refpects, are loofe in their practice in this; and it is, we fear, a mournful truth, that by the frauds and falfehoods which they have employed in connection with the revenue, great numbers have had their moral principles weakened, if not altogether perverted. How much fuch practices have a tendency to diminifh mutual confidence, it is unneceffary to fay. If we know that a man defrauds the revenue, contrary, it may be, to his own folemn declaration, we may hope, and perhaps fee reafon to believe, that he will not defraud or deceive in the common tranfactions of life; but our ftrong confidence that he will not muft be greatly fhaken. The preffure of national burdens cannot indeed but be deeply felt by individuals; but we ought ever to bear in mind, when we are difpofed to aim to leffen its effects on ourfelves, by unlawful concealment, or falfe declarations, &c. that we are thereby throwing an undue weight upon the more confcientious, and that we cannot do it without (as far as it is known or fufpected) leffening the confidence of others in us, and loofening the bonds of fociety, nor without weakening our own moral principles; and even if we fhould fatisfy ourfelves, that, in the particular inftance, we have equity, if not law on our fides, yet that we cannot employ our fuppofed right without fraud, if not deliberate falfehood, and perhaps even perjury. As long as we have the power of curtailing thofe expences which refpect fhow and luxury, or, at moft, mere convenience, we have no plea of real neceffity: and, after all, our pleafures and our pride are commonly our heavieft taxes.

Refpecting thofe frauds on the public revenue, which come under the general head of fmuggling, they cannot be too much deprecated. They almoft folely refpect articles of luxury, on which the fame remark may be made as above; and, at any rate, fmuggled goods cannot be purchafed, without directly encouraging frauds and falfehood in others, and affifting to train up a fet of defperate perfons, who are thus prepared to make fociety in any manner the fubject of their lawlefs prey: they cannot be purchafed without increafing the burdens of the confcientious, nor without injury to the fair dealer. The direct tendency of fome of our revenue laws is, in various ways, to weaken the reftraints of duty; and the evil, for which individuals cannot be altogether anfwerable, fhould not be increafed by their own violations. If thefe remarks fhould meet the eye of any one of thofe refpectable fenators, who are concerned for the morality as well as prefent interefts of the people, we earneftly folicit him to take into confideration the ftate of thofe laws in this particular point of view. We doubt not he will find that, in fome cafes, even the truly upright man, who is anxious to make no declaration but what is ftrictly true, can fcarcely avoid departures from the exact truth, which are extremely painful to his own mind; and that thofe who are but little under fuch reftraint, are continually led, by the forms and oaths of the cuftom-houfe, to breaches of truth, fanctioned by an appeal to God, which cannot fail to loofen the influence of an oath in all cafes, and prepare the way for perjury in its worft forms. The effect of the whole, in its various ramifications, is a degree of moral injury which can fcarcely be calculated: and while we experience heart-felt delight (not, however, unmixed with pain from prefent difappointment) at contemplating thofe exertions, which are defigned to bring our penal law to a correfpondence with the only juftifiable ends of punifhment, we fhould be difpofed to place upon a level with them, efforts of the fame enlightened, comprehenfive, dignified, perfevering nature, directed to the reformation of our revenue laws, where they unneceffarily affect the morals of the people.

Other rules, fays Hartley, befides the ten foregoing, might be affigned, or thefe expreffed in a different way. I have put down thofe which appear to be, in fact, the chief principles of focial conduct to wife and good men. They muft all be fuppofed to influence and interpret each other. Let a man only diveft himfelf as much as poffible of all felfifh regards, and love his neighbour as himfelf, and God above all, and he will generally find fome point, and that without much difficulty or perplexity, in which all thefe rules unite to produce the greateft good, upon the whole, to all perfons concerned.

Though our plan and limits will not allow of our entering at length into the duties arifing from the particular relations of focial life, yet we deem the obfervations of Hartley, on the fubject of the parental relation, fo important, that we fhall make an abftract of his leading ftatement. The principal duty of the parental relation is the giving of a right education, or the imprinting fuch affociations on the minds of children, as may conduct them fafe through this world to a happy futurity. In the latter refpect there can be no doubt, becaufe religion muft on all hands be allowed to be the one neceffary thing; and, in the courfe of thefe inveftigations refpecting the primary purfuit of life, it appears that it contributes as certainly to give us the maximum of happinefs in this world, at leaft the faireft profpect of it, as to fecure it in the next: fo 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 perfuafion of this point, or to a falfe tendernefs or opinion on the part of a parent, by which he is led to believe that the object does not require, in the cafe of his child, frequent corrections and reftraints, with perpetual encouragements and incentives to virtue, by reward, example, advice, books, converfation, &c. If due care were taken from the firft, little feverity would ordinarily be neceffary; but in proportion as this is neglected in the firft years, a much greater degree of care, with high degrees of feverity, both bodily and mental, become abfolutely neceffary to preferve from mifery both here and hereafter. Affectionate parents fhould, therefore, labour from the earlieft dawnings of underftanding and defire, to check the growing obftinacy of the will; to curb all fallies of paffion; to impress the deepeft, moft amiable, reverential,

and

and awful impreffions of God, a future ftate, and all facred things; to reftrain anger, jealoufy, and felfifhnefs; to encourage love, compaffion, generofity, forgivenefs, gratitude; to excite and even oblige to fuch induftry, as the tender age will properly admit. For one principal end and difficulty of life is, to generate fuch moderate, varying, and perpetually actuating motives, by means of the natural fenfible defires being affociated with, and apportioned to, foreign objects, as may keep up a ftate of moderate cheerfulnefs, and ufeful employment, during the whole courfe of our lives; whereas fenfual, blind, and uninformed defire preffes violently for immediate gratification, is injurious to others, and deftroys its own aims, or, at the beft, gives way only to fpleen and diffatisfaction.

14. *Eftimate of the Pleafures of Theopathy.* — We now proceed to the important inquiry refpecting the theopathetic affections, what regard they claim from us in the formation of the rule of life. And here it appears that the love of God fhould be our primary purfuit, and ultimate end, becaufe it regulates, improves, and perfects all the other parts of our nature, and affords a pleafure fuperior in kind and in degree to all the reft.

We have already feen the influence of the precepts of piety on the four inferior claffes of human pleafures, thofe of fenfation, imagination, ambition, and felf-intereft; but the precepts of piety are thofe which teach us what homage of our affections and external actions ought to be addreffed to the Deity, in a direct and immediate manner. Now all the affections, enjoined by thefe precepts, terminate ultimately in the love of God, which, therefore, may be ufed in the fame fituations in which the term precepts of piety has been employed.

But in addition to this, it is obvious in a fhorter way. The perpetual exertion of a pleafing affection towards a Being who is infinite in power, knowledge, and goodnefs, and who is alfo our friend and father, cannot but enhance all our joys, and alleviate all our forrows. A fenfe of his prefence and protection will reftrain all actions which are exceffive, irregular, or hurtful; will fupport and encourage us in all fuch as are of a contrary nature; and will infufe fuch peace and tranquillity of mind, as will enable us to fee clearly and act uniformly. The perfection, therefore, of every part of our natures muft depend upon the degree in which the love of God, and a conftant fenfe of his prefence, have obtained poffeffion of the mind.

With refpect to the fupport and regulation afforded by piety to benevolence, it may be obferved that the love of our fellow men can never be free from partiality and felfifhnefs, until we are able to view all things in the relation which they bear to God. If the relation to ourfelves be made the point of view, our profpects muft be narrow, and the appearance of what we do fee, diftorted. When we confider the fcenes of vanity, folly, and mifery, which prefent themfelves to our view from this point; when we are difappointed in the happinefs of our friends, or feel the refentment of our enemies, our benevolence will begin to languifh, and our hearts fail us: we fhall complain of the corruption and wickednefs of that world which we have hitherto loved, with a benevolence merely human; and fhew, by our complaints, that we are ftrongly tinctured with the fame corruption and wickednefs. This is generally the cafe with young and unexperienced perfons in the beginning of a virtuous courfe, and before they have made advances in piety. The difappointments which human benevolence meets with, are fometimes apt to incline us to call the divine goodnefs in queftion. But he who is poffeffed of a full affurance of this, who loves God with his whole powers, as an inexhauftible fountain of love and benevolence to his creatures, at all times and under all circumftances, as much when he chaftifes as when he rewards, will learn thereby to love enemies as well as friends, the finful and miferable as well as the holy and happy; to rejoice and give thanks for every thing he fees and feels, however irreconcileable to his prefent fuggeftions; and to labour as an inftrument under God, with real courage and conftancy, for the promotion of virtue and happinefs.

In like manner the confcience or moral fenfe requires a perpetual direction and fupport from the love of God to keep it fteady and pure. When men ceafe to have a due regard for God, having fome other end beyond which they do not look, they are very apt to relapfe into negligence and callofity, and to act without any virtuous principle. And, on the other hand, if they regard him with flavifh fear, they fill their minds with endlefs fcruples and anxieties about the lawfulnefs of trivial actions.

Thus the love of God regulates, improves, and perfects all the other parts of our nature: but further it affords a pleafure fuperior in kind, and in degree, to all the reft of which our natures are capable.

(1) The love and contemplation of God in fome meafure render us partakers of the divine nature, and, confequently, of the perfection and happinefs of it. Our wills may thus be united to his will, and therefore rendered free from difappointment: we fhall, by degrees, fee every thing as God fees it, that is, fee every thing which he has made to be good. Though this can only be the cafe in part in the prefent world, yet it is well known that there have been thofe who have fo far reached this perfection of our nature, as to acquiefce, and even to rejoice in the events of life, however apparently afflicting; to be freed from fear and folicitude; and to receive their daily bread with conftant thankfulnefs. And though the number of thefe happy perfons may have been comparatively fmall, and the path be not frequented and beaten, yet if the defire be fufficiently earneft, it is in the power of all to arrive at the fame ftate, by fufficient earneftnefs and conftancy in the ufe of the appointed means.

(2) The love of God may be confidered as the central affection to which all the others point. When men have entered fufficiently into the ways of piety, the ideas of the Supreme Being recur more and more in the whole courfe and tenor of their lives, and, by uniting with all their thoughts and feelings, overpower all the pains, and augment and connect with themfelves all the pleafures of the mind. Every thing beautiful and glorious brings in the ideas of God, mixes with them, and coalefces with them; for all things are from God, he is the only caufe and reality, and the exiftence of every thing elfe is only the effect and proof of his exiftence and excellence. Let the mind be once duly imbued with this truth, and its practical applications, and every thing will afford exercife for the devout affections. Add to this their unlimited extent, their purity, and perfection, and it cannot but be acknowledged that they muft be far fuperior to all the reft both in kind and in degree.

(3) The objects of other pleafures are frequently removed. No time, no place, no circumftance of life can deprive us of this. Our hearts may be directed towards God in the greateft external confufion, as well as in the deepeft filence and retirement. All the duties of life, when directed to God, become pleafures; and by the fame means every the fmalleft action becomes the difcharge of the proper duty of the time and place. Thus time is turned to

to its beft advantage: thus every fituation and event of life may be converted into a fource of prefent comfort and future felicity.

(4) When the love of God is thus made to arife from every object, and to exert itfelf in every action, it becomes of a permanent nature, fuited to our prefent frame, and will not pafs into deadnefs or difguft, as our other pleafures do from repeated gratification.

We fhould be glad if our limits would allow of our laying before our readers a view of thofe means which are pointed out by Hartley, for the culture of the theopathetic affections, of *faith*, *fear*, *gratitude*, *hope*, *truft*, *refignation*, and *love:* we muft, however, content ourfelves with referring to his 72d propofition on this fubject; and to his important rules in the 73d propofition, concerning the manner of expreffing them in prayer, and other religious exercifes; and fhall only add the following obfervations, derived from the 73d.

There cannot be a more fatal delufion, than to fuppofe, that religion is nothing but a divine philofophy in the foul; and that the foregoing theopathetic affections may exift and flourifh there, though they be not cultivated by devout exercifes and expreffions. Experience, and many plain obvious reafons, fhew the falfehood and mifchievous tendency of this notion; and it follows from the theory of affociation, that no internal difpofitions can remain long in the mind, unlefs they be properly nourifhed by proper affociations, that is, by fome external acts. This, therefore, among others, may be confidered as a ftrong argument for frequent prayer.

In fection 10, (entitled Eftimate of the Pleafures of Self-intereft,) we referred to Dr. Prieftley's fermon on the duty of not living to ourfelves; we fhall here copy a few paragraphs from it, which the reader will perceive to bear clofely upon this, and upon the 10th fection, and for which, if not before familiar to him, we perfuade ourfelves we fhall have his thanks.

"Every day paffed in the fteady and earneft difcharge of a man's known duty, will pafs with uniform cheerfulnefs and alacrity. And in the glorious animating profpect of a future happy ftate of mankind, on which, in a humble truft and confidence in the affiftance and grace of God, he has fpent all his cares, and exerted all his powers, that joy will fpring up in his heart here, which will hereafter be unfpeakable and full of glory.

"If troubles and perfecutions arife on account of our adhering to duty; if we be oppofed in the profecution of laudable undertakings, or fuffer in confequence of undertaking them; the true piety of a perfon who habitually lives to God, and not to himfelf, is capable of converting them all into pure unmixed joy and tranfport. Then the human mind roufed to the moft intent exertion of all its faculties, burdened with no confcioufnefs of guilt, referring itfelf abfolutely to the difpofal of its God and father, diftrufting its own powers, and confiding in the infinite power, wifdom, and goodnefs of God, acquires a fervour of fpirit, a courage, fortitude, and magnanimity, tempered with the moft perfect ferenity, and the greateft prefence of mind, that is fufficient, and more than fufficient, to bear a man through every difficulty, and even to convert all pain into pleafure. His highly agitated ftate of mind, in thofe trying circumftances, is almoft pure rapture and extacy.

"What the extraordinary exercifes of devotion are able to do upon extraordinary occafions, the habitual moderate exercife of piety will be able to do in the ordinary courfe, and the common troubles of our lives; fo that it may not only be compared to a ftrong cordial, to be applied when the mind is ready to faint under adverfity, but to that food which is the daily fupport of our lives.

"To have God always in our thoughts, is not poffible in this world. Prefent objects, to the influence of which we are continually expofed, muft neceffarily engage a great part of our attention; and worldly objects, by continually engroffing our thoughts, are apt to become of too great importance to us. We grow anxious about them, and our minds are haraffed and fatigued with a conftant and clofe attention to them. Now, it is when the mind is in this ftate, or rather tending towards it, that the benign influences of devotion are, in the ordinary courfe of our lives, the moft fenfibly felt; when the mind, looking off, and above, all worldly objects, and deeply impreffed with a fenfe of the infinite power, wifdom, and goodnefs of God, unburdens itfelf of every anxiety, and cafts all its cares upon its heavenly father; and when the preceding tumult and diforder of the paffions only ferve to augment that unfpeakable joy, fatisfaction, and confidence, with which a deep fenfe of the prefence and providence of God infpires the foul.

"The relief a benevolent mind feels from communicating its troubles and cares to an intimate friend, in whofe wifdom and integrity he can confide, though of the fame nature, is but a faint image of what the truly pious foul feels in the delightful feafons of the devout intercourfe which he maintains with his God.

"This is a perpetual fource of joy and fatisfaction to a truly devout mind, which the wicked, thofe perfons who live to themfelves, and not to mankind, or to God, intermeddle not with. Not even an idea of that fweet tranquillity, exalted joy, and calm fortitude, which true devotion infpires, can be communicated to another who hath had no experience of it himfelf. This is true of thofe things of which St. Paul fays that the natural man cannot comprehend them, and that they are foolifhnefs to him, becaufe they are fpiritually difcerned.

"I would be no advocate for enthufiafm. The fervour of devotion cannot always be kept up. That is inconfiftent with the condition of our nature, and far from being neceffary in our prefent ftate; but that cheerful ferenity and compofure in which moderate acts of devotion leave the mind, is an excellent temper for entering upon, and perfevering with fpirit and alacrity in any ufeful and honourable undertaking."

This religious philofopher then proceeds, in reference to the general object of his difcourfe, in the following words.

"The fum of this practical doctrine, fuggefted by revelation, and confirmed by reafon and obfervation, is, that *no man can be happy who lives to himfelf;* but that true happinefs confifts in having our faculties wholly engroffed by fome worthy object, in the purfuit of which the ftrongeft and beft of our affections have their full play, and in which we enjoy all the confiftent pleafures of our whole nature; that though a regard to our greateft happinefs be of excellent ufe, particularly about the beginning of our progrefs towards perfection and happinefs, in bringing our inferior appetites and paffions into due fubjection to the fuperior powers of our nature, yet that felf-love, and a regard to ourfelves, is very apt to grow too intenfe, and is, in fact, the caufe of a great deal of the ufelefs anxiety, perplexity, and mifery which is in the world; and that therefore it ought to be our care, that our minds be engroffed as much as poffible by other objects; and that even motives to virtue which turn our attention frequently upon ourfelves fhould be ufed with caution, for fear of feeding that vanity and felf-conceit which we ought to ftudy every method of repreffing, as the greateft bane of true religion, being moft oppofite 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

(3) Grofs felf-intereft fometimes excites perfons to external acts of benevolence, and even of piety; and though there is much hypocrify always in thefe cafes, yet an imperfect benevolence or piety is fometimes generated in this way. However, one cannot but condemn this procedure in the higheft degree.

(4) As refined felf-intereft arifes from benevolence, piety, and the moral fenfe; fo converfely it promotes them in various ways. But then, as it always checks their growth in various other ways, it cannot, in many cafes, be allowed; and is, upon the whole, rather to be condemned than approved. More favour may be fhewn it, where it reftrains the vicious pleafures of fenfation, imagination, and ambition.

(5) Rational felf-intereft excites us to all the proper methods of checking the laft-named vicious pleafures, as well as grofs and refined felf-intereft, and producing in ourfelves the virtuous difpofitions of benevolence, piety, and the moral fenfe. This part of our progrefs is extremely to be approved, and efpecially the laft branch of it.

(6) The virtuous difpofitions of benevolence, piety, and the moral fenfe, and particularly that of the love of God, check all the foregoing ones, and feem fufficient utterly to extinguifh them at laft. This would be perfect felf-annihilation, and refting in God as our centre. And upon the whole we may conclude, that though it be impoffible to begin without the pleafures of fenfation and the felfifhnefs founded upon them, or to proceed without the other intermediate principles, and particularly that of rational felf-intereft; yet we ought never to be fatisfied with ourfelves, till we arrive at perfect felf-annihilation, and the pure love of God.

III. We now proceed to the third object propofed, *viz.* to ftate what *criterion of virtue and fundamental principle of duty*, we deem, from the foregoing views, moft fuitable to the moral condition of human nature, and moft likely to lead to its higheft excellence.

We have already ftated, (near the clofe of our *firft* divifion,) that the *ultimate obligation*, the *beft rule*, and the *immediate motive* of virtue, are three diftinct confiderations; and we apprehend, that owing to this diftinction not being kept fufficiently in fight, much confufion has arifen in moral inveftigation.

On the worth and purity of our motives, depends entirely the value of any action as far as the individual himfelf is concerned: and that rule of duty muft be the beft, which is itfelf the beft *guide* of duty, and at the fame time is the moft likely to lead to thofe motives, which, in proportion as they have the chief actuating influence in the mind, exalt it towards the higheft point of human excellence. The beft rule of duty will of courfe fupply the beft *criterion* of virtue, in other words, the beft teft by which to determine whether an action or difpofition is entitled to the denomination of virtuous.

Though we fet out with the pofition, that the agent's greateft happinefs on the whole is the remoteft obligation of virtue, yet it is clear, from the foregoing confiderations, that this is not a motive on which the mind can reft without checking its moral progrefs. It cannot be made a primary motive, without defeating its own end (fee II. 10.) It is equally clear, that an habitual regard to one's own greateft happinefs on the whole, as the fole end of actions and difpofitions, would be continually mifleading us from that path, by which alone we can reafonably expect to reach the object. It cannot, therefore, be made the criterion of virtue.—When it is once afcertained, that a ftrict regard to the dictates of piety, benevolence, and the moral fenfe, are the beft means of promoting our greateft welfare, we have nothing to do but to obey them, with the fecurity, (if we think at all about it) that thus all will be well for us. To fhew that a certain courfe of conduct is our duty, is a good way of proving that it will promote our greateft happinefs 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 difcharge our duty, that we can obtain happinefs in a ftate of retribution. That, therefore, cannot be made a criterion of duty, for which duty does itfelf afford the beft criterion.

From the confiderations in the foregoing paragraph it neceffarily follows, that the tendency to promote the agent's greateft happinefs on the whole, though it has been fhewn to be the remoteft fource of obligation, cannot be the beft criterion of virtue, any more than the beft motive to the practice of it. Indeed it would be abfurd to employ that as the mode of judging refpecting our duty, which duty, as well as a regard to our own greateft happinefs, requires to be made only a fubordinate motive to the difcharge of it, and which in the higheft ftages of moral excellence will be entirely left out of fight as a motive.

On this ground, we cannot accord with Mr. Belfham's ftatement 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 happinefs of the agent, or what completely coincides with this, under the government of perfect wifdom and benevolence, to the greateft general good; and all diftinctions between what is commercially, legally, politically, &c. right, and what is morally or theologically right, are groundlefs, abfurd, and in practice highly pernicious." The laft part of the paragraph is unexceptionable and important; the pofition, which we have put in italics, in the unlimited and unqualified way in which it is expreffed, is erroneous, and liable to great and injurious perverfion. The effect of an action or affection on the ultimate happinefs of the agent, muft itfelf be dependent on the will of God: that will muft undoubtedly fpring from infinite benevolence and perfect rectitude; but a rule, which is itfelf dependent upon another, cannot be the *only* rule of right, and from what we have already ftated, it cannot be the beft.

It may often be convenient to employ fome one of the extenfive criteria of virtue as, in fact, a means of applying the moft general and beft criterion: juft the fame as in order to apply the moft general rule of benevolence, we find it convenient to employ fome rules of lefs extent as means of judging what benevolence really requires (fee II. 13.); but no quality or effect of virtue can be admitted as the ultimate or even the beft 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 fpecies of virtue, or which cannot itfelf be made a primary motive to the performance of it. If any criterion of virtue can be laid down which is felf-confiftent, univerfal, invariable, authoritative, eafily applicable, itfelf excellent as a motive, and perfectly and obvioufly confiftent with the remoteft obligation, that muft be the *beft* criterion or rule of duty.

Thefe principles completely exclude all confiderations founded folely on a regard to our own prefent welfare; all views of individual intereft, utility, expediency, &c. If the tendency of virtue to our own greateft happinefs on the whole, is not the beft criterion of virtue, its tendency to more limited degrees of happinefs cannot. The tendency of virtue to promote our prefent welfare is often a good guide; and as a fubordinate rule may be admitted with advantage. In one point of view it is even fuperior to the tendency of virtue to promote our greateft happinefs on the whole;

whole; becaufe of this we can decide but imperfectly, and only by taking the will of God into account: the prefent effects of virtue are often obvious to all poffeffed of any tolerable degree of experience and good fenfe. But as the prefent effects of virtue are often in oppofition to immediate intereft and pleafures, and its moft valuable influence on human happinefs cannot be thoroughly difcerned except by the virtuous themfelves, they cannot furnifh more than a fubordinate teft of duty, and are at the fame time in oppofition to the higheft, fo far as they tend to fix the mind upon themfelves as motives.

The tendency of virtue to promote the good of others, though, perhaps, in a greater or lefs degree, directly or indirectly, an invariable quality of virtue, yet is far from being eafily applicable, except to thofe branches of virtue which do not immediately refpect our fellow creatures: it is often remote, indirect, and fubordinate. Befides, if this tendency were affumed as the teft of virtue, it would have little authority; it would carry with it little obligation, in thofe branches of felf-regulation and piety which do not obvioufly affect the interefts of others. The conformity of actions and difpofitions to *benevolence*, is an excellent and extenfive criterion of duty; but we are feeking for that which may be truly called THE *criterion* or rule of duty. Benevolence has a great advantage over the preceding rule, becaufe it cannot too much operate as a motive; it often has a powerful influence in the exercife of the perfonal virtues, and when fupported by the views of religion, muft always appear to be confiftent with the individual's own higheft welfare: but it will not appear to include every fpecies of duty without a greater degree of moral comprehenfion, than can be expected before a high degree of moral worth has been acquired.

Nor can a conformity to *juftice* be juftly deemed the criterion of virtue; not even in the fenfe in which it is taken by the author of Political Juftice, (b. ii. ch. 2.) who, as Mr. Belfham obferves, (Elements, p. 442.) makes it exprefs "benevolence under the direction of wifdom." A difpofition to render unto *all* their due, will, in a variety of cafes, perfectly coincide with benevolence, and contribute to prevent the erroneous directions of this affection; and the conformity to juftice may with great advantage be made a criterion of focial virtue, but no farther. Juftice as a criterion of duty in general is more defective than benevolence; becaufe benevolence has more influence over the difpofitions, and will operate more extenfively as a motive, in thofe cafes of duty which are not directly focial, and where juftice does not appear to afford any direction, except through the medium of benevolence. Godwin does, indeed, "affume the term *juftice* as a general appellation for all moral duty," (clearly by this and his fubfequent ftatements excluding from the clafs of moral duty, the divine and perfonal virtues); and he defines juftice (p. 127.) to be "that impartial treatment of every man in matters that relate to his happinefs, which is meafured folely by a confideration of the properties of the receiver, and the capacity of him that beftows:" but he afterwards (p. 150.) gives a much more comprehenfive 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 happinefs." According to this, together with his previous theory, virtue is juftice in action, fpringing from benevolence in principle: but it is clear that even this cannot reach the virtues which refpect God and ourfelves; becaufe though benevolence may prompt to them, it cannot be faid, with any propriety, (nor, we imagine, would Godwin have intended to fay,) that they are a branch of juftice, efpecially as he has himfelf defined it.

If the conformity of actions, &c. to the dictates of the *moral fenfe*, to the perceptions of the *underftanding*, and fo on, be made the criterion of duty, it muft, from the very nature of thofe mental principles or powers, as we find them actually exifting in the human mind, be an unfteady, ever varying guide. The directions of the well cultivated underftanding, or of the well regulated confcience, efpecially of the latter, are often a good means of judgment; but it is only when they accord with the directions of a ftill higher and more authoritative principle; and they do not, therefore, poffefs thofe qualifications which would entitle them to be made the ultimate criterion of duty.

Still lefs can the congruity, fitnefs, propriety, beauty, &c. of actions or difpofitions, be made more than one criterion of moral worth. The perception of thefe qualities depends upon the correctnefs and extent of the underftanding and the moral powers; and they are, therefore, more exceptionable than the foregoing as criteria of duty.

The fact is, the idea affociated with the term *virtue*, or *rectitude*, or *moral worth*, is fo exceedingly complex, formed of fo many notions and feelings, that no definition can directly include them all. All that can be expected from a definition is, that it fhall include every object to which the term can juftly be applied, and exclude every other: but in fuch a cafe as this, at leaft, it is in vain to look for one which fhall bring into view all the affociated circumftances. Thefe will depend upon the mental and moral character of the individual, upon his experience and obfervation, &c. And it is owing to inattention to this circumftance, that fo many definitions have been given, in reality, effentially defective, though, through the unobferved influence of other views, not excluding in the minds of thofe who have laid them down, claffes of human conduct and difpofitions which are certainly a part of moral excellence, but to which thofe definitions do by no means extend.

Paley's definition (vol. i. p. 41.), which is copied from Gay's Preliminary Differtations, is peculiarly defective, yet at the fame time redundant. "Virtue," he fays, "is the doing good to mankind, in obedience to the will of God, and for the fake of everlafting happinefs. According to which definition," he continues, "the good of mankind is the fubject; the will of God, the rule; and everlafting happinefs, the motive of human virtue." Paley had good reafon to be pleafed with Mr. Gay's Differtations; for they contain many judicious and valuable obfervations on the foundation of morals; but thofe who read them fubfequently to their ftudy of the Hartleyan philofophy, can fcarcely fail to be ftruck with the progrefs which has been made in moral and mental inveftigation fince the author wrote; and if Paley's acquaintance with the principles of mental fcience had been more precife and extenfive, it may reafonably be fuppofed that his clear judgment would have framed a definition much more fatisfactory than the one he has adopted. In the firft place, what he terms the *fubject* of virtue is radically defective; it excludes, becaufe it does not include, the perfonal and divine virtues; and yet, in the very next page, he fpeaks of the divifion of *virtue* into the duties towards *God*, towards other men, and towards *ourfelves*. It is clear, neverthelefs, that Paley's definition does not include reverence, gratitude, chaftity, temperance, &c. Next, his mode of ftating his *rule* is inaccurate. If it is faid that we do a thing *in obedience* to the will of another, it is obvioufly 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 expreffion ftands, 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,

&c.

&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 *conſiſtent* 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 preſerved, 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

cafes in which the laws of God fail of application, yet from thefe fources the mind fincerely defirous of knowing and doing the will of God can feldom be at a lofs to difcover what it really is.

(3) The will of God confidered as a rule of duty is an *invariable* principle. As far as we are left to afcertain the will of God from inferior and fubordinate rules, this rule muft, in fome meafure, partake of their uncertainty: but with the laws of God to aid and guide us, to prevent confined experience and an erroneous confcience from mifleading us, it is extremely feldom that there can be any difference of opinion as to duty, where the will of God is honeftly employed as the ftandard. If utility be made the criterion of virtue, or rule of duty, greater or lefs degrees of experience, greater or lefs freedom from the perverting influence of felfifh feelings, will lead to widely different conclufions, if not with refpect to the juftnefs of the grand principles of duty, at leaft with refpect to the extent and application of them. If the dictates of confcience (unlefs it be trained by the very rule of which we are fpeaking) be fixed upon as the guide of duty, we fhall find them varying in extent, in correctnefs, and in power, through the influence of fafhion, of prejudice, of ignorance, of prevalent opinions, and examples. But he who fets out with the will of God as his rule of duty, has a fixed principle which will not bend to the reafonings of the philofopher, to the opinions of the multitude, or to the promptings of paffion. If, indeed, we do not feek for that as a *primary* principle of duty, we may fometimes be led to fuppofe that conduct to be directed by the will of God which is really inconfiftent with it: but the more we feek for the guidance of that principle, humbly, fincerely, and earneftly, the more we fhall find it; and the more we find it, the more firm, fteady, and invariable, muft our views of duty become, for the will of God itfelf muft be invariable. And here we would obferve

(4) That by taking the will of God as our rule of duty, our ideas of duty gradually become clear and comprehenfive, and this to a degree which cannot be generally, at leaft, expected, where we reft in any fubordinate 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 fo far as we make it our rule, our views would be confined to our own little fphere, we fhould judge of actions and difpofitions only, or principally, in the relation they bear to perfonal happinefs; and, leaving out of view the intricacies and perplexities in which we fhould be continually involved, our notions of duty (unlefs ftill guided by the rules of revelation) would be as narrow and contracted as the principle on which they are founded. The fame thing may be obferved, though to a lefs extent, as to rules of duty founded upon utility and confcience, unlefs ftill further guided by the rules of revelation: fo far from expanding as we proceed, our views would ufually become limited by difficulties and objections, which, in the commencement of our moral inveftigations, we had overlooked. But fix upon the will of God as the rule of duty, with an impreffive conviction upon the mind that his will muft be right and good, we fee more and more clearly the tendency of obedience to promote the welfare of his rational creatures: one moral truth ferves as the bafis for another: as we advance difficulties leffen: we fee things more as they would be viewed by us if we could take the whole into account and forget their relation to ourfelves: and we learn to view duty in its whole extent, where other rules would leave deficiencies; we learn to view actions and difpofitions without that undue reference to their *immediate* confequences, to which the fubordinate rules of duty muft too generally confine us. From this we are led to obferve

(5) That the will of God, confidered as a rule of duty, is in an eminent degree *a fafe* guide. Several eminent moralifts have made general expediency the criterion of virtue; and the author of Political Juftice, (whofe moral fpeculations, though in fome cafes interefting and valuable, often fhew the folly of leaving the will of God as our chief guide,) maintains, that morality "is nothing but a calculation of confequences, and an adoption of that mode of conduct, which, upon the moft comprehenfive view, appears to be attended with a balance of general pleafure and happinefs." But it is plain that beings who cannot fee the confequences 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 fubordinate rule of duty they muft be continually mifled by their ignorance and felfifh prejudices. The true plan undoubtedly is, to afcertain, as far as we can, what is our duty, taking the will of God as our rule and guide; and then to purfue it without thinking too much on the particular confequences of our obfervance of it. "The happinefs of the world," as bifhop 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 thofe which he has directed." Even benevolence will fometimes do harm, unlefs 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 ourfelves admitted that there is one ground of obligation beyond it, which is brought into view by that definition of virtue, which makes it confift in its tendency to promote the ultimate happinefs of the agent; and it is to be allowed, that we may afk with reverence, Why fhould we obey the will of God? But the anfwer is plain and obvious:—Becaufe, under the government of an infinitely wife, good, and powerful being, obedience to his will muft fecure our greateft welfare. When once afked, it is a queftion which never need be afked again. Its anfwer is a felf-evident and neceffary truth. We may fay, 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 whofe 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 fecurity that we are doing what is wife and right; what, in fact, is beft for others and for ourfelves. And we muft again obferve, that if we make the tendency of our actions, &c. to our own ultimate happinefs the criterion of virtue, we have no more fure and general guide as to that tendency than the will of him, upon whom our ultimate happinefs depends; fo that take whatever view of it we will, we come to the fame conclufion.

(7) It is impoffible for any one, who regards the fcriptures as the authentic records of divine revelation, to hefitate 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 exprefs declarations of the fcriptures, the examples they prefent to our imitation, and the views they unfold as to the relations in which we ftand to God, all point to this truth. This to the Chriftian muft be decifive; and to him, and to every one who agrees in the foregoing views of human nature, it muft appear an important confideration in favour of the fame pofition.

(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.

1. *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

for it arifes from thofe feelings of envy and jealoufy which provoke little minds to depreciate the merit of ufeful difcoveries. He who is confcious of his own inventive powers, and whofe great object is to add to the ftock of human knowledge, will reject unwillingly any plaufible doctrines, till after the moft fevere examination; and will feparate, with patience and temper, the truth they contain from the errors that are blended with them. No opinion can be more groundlefs, than that a captious and difputatious temper is a mark of acutenefs. On the contrary, a found and manly underftanding is in no inftance more ftrongly difplayed, than in a quick perception of important truth, when imperfectly ftated and blended with error;—a perception which may not be fufficient to fatisfy the judgment completely at the time, or at leaft to enable it to obviate the difficulties of others; but which is fufficient to prevent it from a hafty rejection of the whole from the obvious defects of fome of the parts." "The effects of controverfy on the temper, although abundantly fenfible even in the folitude of the clofet, are more peculiarly adverfe to the difcovery of truth in thofe difputes which occur in converfation; and which feldom anfwer any purpofe, but to rivet the difputants more firmly in their errors. In confequence, indeed, of fuch difputes, the intellectual powers may be fharpened, and original hints may be fuggefted; but few inftances are to be found, in which they do not miflead the difputants to a ftill greater diftance from truth than before, and render their minds ftill more inacceffible to conviction."

2. *Remarks on a Moral Principle in Godwin's Political Juftice.*—Following Hartley, we formerly ftated, as a good general rule of benevolence, that perfons in the near relations of life, benefactors, &c. appear to have, in moft cafes, a prior claim to ftrangers. This rule will lead us to avoid all thofe opinions which attempt to found univerfal benevolence upon the ruin of the more confined charities. However fpecious they may appear, they muft be falfe, becaufe they counteract the moral improvement of man, by checking it at its origin. We particularly refer to thofe which Godwin has advanced in his work on Political Juftice. His moft general principle is, that every individual exertion fhould be fo directed, as to produce the greateft poffible fum of good to the fpecies; and hence he infers that if we have the power to fave the life, or increafe the happinefs of one or two human beings, we owe our exertions to him who is ufeful, and perhaps extenfively ufeful to fociety, in preference to him who is an ufelefs and perhaps injurious member of fociety. The claims of felf are excluded by the general principle. "What magic," fays Godwin, "can there be in the word *my* which fhould change its operation?" Hence the claims of the confined charities ought not to oppofe the deductions from the general principle. Hence it is not our bufinefs, in the direction of our benevolent exertions, to confider the relation in which the individual ftands to us; but that in which he ftands to fociety. Not is he my parent, relative, friend, or benefactor; but is he a worthy or a worthlefs member of fociety?

Godwin's errors are the more injurious, becaufe they are apparently on the fide of benevolence; they refult from the inaccurate extenfion and application of principles which in themfelves are indifputable. Whenever private intereft interferes with the public good, private intereft is to be facrificed; and this, whether our own immediate good is the object, or the good of thofe who are intimately connected with us, by fome of the natural bonds; that is, thofe which arife in the mind by the laws of our conftitution. That the conduct dictated by the confined charities is to yield to what is really for the general good, cannot be difputed; but that we are in all cafes to act totally independently of a regard to thofe confined charities, is a pofition which will not bear the teft of experience, nor of the mental conftitution of man.

In the firft place, general benevolence never could arife in the human foul but through the medium of the more limited affections. Love to others is founded on feelings originally perfonal, then it embraces the narrow circle of our immediate friends and acquaintance, and then, perhaps, there is little difficulty in extending it to thofe who bear with us the relation of children to the great parent of mankind. But before we can form the defire to do good to *all* men, we muft have formed the defire to do good to *fome* men; and though the defire of doing good to fome, may be of that confined nature which would fometimes lead to the promotion of their aggrandizement and happinefs, at the expence of thofe of others, yet the confined charities form too important a part in the great fyftem, to be on this account rejected, as not being on the whole fafe guides. We may lop off the excrefcences, but it would be folly to deftroy the root.

But, fecondly, 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 vividnefs, which, by their frequent recurrence and particularity, the more confined affections can. Hence the removal of mifery would be left to thofe who had thus cultivated the extenfive affections, and confequently the means of removing it muft be moft materially diminifhed.

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 cafes of immediate urgency, merely by the confideration of the utility of the individual to fociety, our lives would be a continual feries 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 ftrike our attention, and force us to obferve them. The filent efficacy of example, and private exertions to remove mifery, and ftill more to remove or prevent vice, the parent of mifery, are in general known only to him who feeth in fecret. Even in cafes where much is obvious, what diverfity fhall we find in opinion; and where the co-operation of individuals for the benefits of others is neceffary, how improbable that they fhould have formed the fame ftandard.

But admit that the cafes are clear, that the perfon whom we are about to leave to death, (which is a fuppofition of Godwin's,) is obvioufly and decifively a lefs important member of fociety than he whom we attempt to fave;—if we violate none of thofe feelings which rife up in the human frame altogether independently of the will of the individual, there can be no hefitation: but fuppofe that our intended conduct will violate them. Let it firft be confidered, that thofe feelings are not only neceffary to the culture, nay, even to the formation of individual benevolence, but to the good order, perhaps to the very exiftence, of fociety. Take the ftrongeft cafe; fuppofe the filial and parental affections to be annihilated, and it is abfurd to juftify and lay down as juft, that conduct which, if not counteracted by the eternal laws of our frame, would lead to fuch annihilation, if that annihilation itfelf be not an object of defire; fuppofe thefe affections annihilated, and the heart fhrinks from the picture. The claims of the helplefs infant upon the parent would be rejected; and if enlarged views of duty to fociety did not induce the parent to think that he had better remove from exiftence a being who would be a burden to others and himfelf,

felf, and who probably would not be educated fo as to be wife and happy, there would arife conftant difcouragements which would effectually prevent thofe fteady, uniform, endeavours to cultivate the mental and moral powers, which are neceffary to attain the object; and if the evil did not foon eradicate itfelf, man, if he exifted, would gradually fink to the level of the brute. But if the parental affections did not exift, neither would thofe of the filial relation. Yet by thefe it is that the rudiments of general good-will are formed in the infant breaft: with thefe it is that the being who is to love all mankind begins his career of love: thefe are the fource of that ardent difinterefted benevolence which carries the individual out of himfelf, which leads him to forget himfelf and all his immediate interefts, and view only the good of others. Can it be fuppofed that this highly cultivated benevolence is in oppofition to that more confined affection from which it fprung? We fee it modifying its direction, but never annihilating it. On the contrary it may juftly be affirmed, that the confined affections become more inwrought in the frame, as univerfal benevolence becomes more and more a feature of the mind: and it muft, for univerfal benevolence is but only the fum total of all the confined affections, extended by the hand of piety. It is perhaps an invariable truth that we love *fome* more in proportion as we love *all* more.

Wherever the claims of the confined affections are in direct oppofition to the dictates of the enlightened confcience, there can be no room for doubt, though we ought to be careful that our departure from their claims not only is, but if poffible, fhall appear to be, demanded by thefe dictates; but even in cafes which, independently confidered, are obvious, we are to take into confideration the evil that will refult from a breach of thefe affections. For this purpofe we fhould confider what would be the confequence if our conduct became general: and next the tendency of human conduct to fuch extenfion. There are fome affections which not all the efforts of philofophy could fucceed in eradicating: vice may do it, and heedlefs levity; but the calm exertion arifing from a view to utility never could. We refer to the parental affections. Hence though we might condemn the parent who left his fon to perifh in the flames, while he endeavoured to fave the life of Fenelon, and fhould require ftrong proof that the parental affections exifted in him, in their due force; yet we fhould doubly condemn the fon who in fuch a cafe left his father to perifh.

Godwin's principles, if carried to their full extent, would deftroy fociety. We prefume that the ardour of general benevolence mifled him, and that in his wifh to make its dictates paramount in the human breaft, he forgot, or rather did not obferve, that he was endeavouring to counteract the moft effential laws of the human frame. It is one of thofe numerous inftances in which an acquaintance with the human mind is neceffary: had Godwin attended to its laws, it is reafonable to hope that he never would have given a theory to the world, which even a flight acquaintance with its practicability and effects fhould have configned to oblivion.

On the Obligation of Truth.—We fhall in this fection offer fome confiderations on a fubject of no fmall importance, and which has been the fource of fome very erroneous and injurious principles; we mean the reftrictions which eminent moralifts have admitted to the duty of truth.

A *lie* is *a falfehood told with a defign 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 leffened or increafed by the motive; but nothing more. We may call it by the mild appellations, *untruth, falfehood, departure from truth,* &c.; but the nature of the thing is not altered. A falfehood told with the defign to deceive is a lie. The expreffion a *departure from truth* does not appear invariably to imply any *intention* to deceive; a *breach of truth,* according to common ufage, always does. *Veracity* expreffes the difpofition to adhere ftrictly to truth: it is uprightnefs in our words. A *departure from veracity* always implies an intention to deceive; and ftill 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 leffened by mild expreffions refpecting it. And, on the other hand, moral diftinctions are often confounded, by giving to things, in themfelves harmlefs, 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 fuch is not the real ftate of the cafe, that affertion is a lie; but the narratives themfelves are not lies. In like manner the exaggerations too common in converfation, and thofe falfehoods which folely arife from unfortunate mental habits, without any intention to deceive, and thofe expreffions of complaifance which, though not true in their ftrictly literal fenfe, are fo in the way in which they are almoft univerfally interpreted, thefe ought not to be called lies. We do not fay that they are altogether free from moral culpability; but it is not that of intentional deception. The exaggeration, or the expreffion of complaifance, 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, (fee Intellectual *Education,* col. 31.) depends upon the degree in which the individual has been negligent in his endeavours to check, or to correct, fo injurious a habit: in itfelf confidered it has no moral quality.

We have given the only definition of a lie which appears precife and intelligible; and it is accordant with the ferious ufe of the term in common language. We fear that Paley has contributed to caufe great incorrectnefs of expreffion, and even great laxity of principle, on this fubject; and we are led to enter fomewhat more fully into it from this circumftance. When we fee that eminent writer expreffing himfelf fo loofely as to fpeak of thofe falfehoods which are not criminal as not being lies, and laying down as a maxim that falfehoods are not criminal, "where the perfon to whom we fpeak has no right to know the truth," we feel apprehenfive of the confequences, and fhould rejoice to be able to correct his views by thofe principles of morality which our rule of duty appears to us decidedly to prefcribe on the fubject.

Paley does, indeed, qualify a little the random pofition we have quoted from him, by adding, "or, more properly, where little, or where no inconvenience refults from the want of confidence in fuch cafes," and his illuftrations are cafes of an extreme nature; but he ftill founds the obligation of truth upon a balance of known or fuppofed advantages, or even of conveniencies; and his authoritative decifions on this point have, we doubt not, often led to departures from truth, where an unbiaffed judgment muft have fhewn at once what was the way of duty.

This is a period of inquiry and fpeculation; and there are few who have opportunities of mental culture, who do not meet with difcuffions and difficulties, which the religious man of plain underftanding might decide at once by an appeal to the fcriptural rule of life, but which puzzle the reafoner who prefers fome other bafis of duty than the will of God, and ftill more miflead the confciences of thofe

 who

who want juftification or excufe for their own half-acknowledged violations of duty. And there are cafes in common life, where thofe who are accuftomed to think of the confequences of their actions, and rightly judge that they may thus often obtain important affiftance in knowing the will of God, are apt to lay too much ftrefs upon the *immediate* confequences, where their way would otherwife be clear. And the worft of all is, that thefe fpeculative difficulties, and thefe fuppofed excufable departures from a clear and acknowledged rule of duty, are continually leading to other departures which are obvioufly wrong; and this particularly among the young, and thofe whofe views of duty are not yet fettled, and their habits confirmed. The influence, too, of authority is great, efpecially where it accords with the previous difpofitions, and with the prefent interefts. And it is peculiarly injurious, where we look up with juft refpect to the moralift who fanctions fuch departures,—refpect founded upon his eminent ufefulnefs, and upon the general correctnefs of his principles, united with an interefting and convincing method of proof and illuftration. And with refpect to example, a lie is a definite thing: and the young and uninformed can ufually judge as correctly as to the fact, as perfons of the moft cultivated underftanding; while at the fame time they cannot enter into the force of thofe nice difcriminations and plaufible reafonings, by which fuch perfons bewilder themfelves, and perfuade themfelves that they are excufable in violating an exprefs rule of duty. It has often in fuch cafes been, we doubt not, the inference,—"If another is excufable in lying, in order to prevent fome mifchief, or to produce fome good, why may not I? and if this exprefs law of God may be broken, when fome good is to be obtained, or fome evil to be fhunned, why may not another?" The ftate of the matter is, that the *extreme* cafes in which the obligation of truth has been fuppofed to ceafe, 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 difcuffion: but when an exception is admitted to a rule of duty, unlefs it can fo be well defined, as to form itfelf a rule, there is no knowing where to ftop. The fhades of diftinction in cafes of moral conduct are often fo much blended, that it requires a very difcerning eye to perceive their limits; and all know that when felfifh feelings of eafe, of pleafure, or of profit, are concerned, they never fail to throw a film over the eye of the underftanding, and greatly obfcure its power of difcrimination. Thofe fuppofed exceptions to truth which are of an extreme nature, feldom fail to lead the fpeculative philofopher to others in which the way of duty feems to the Chriftian moralift perfectly clear: and thefe again at leaft furnifh excufes, and fometimes imaginary juftification, for departures from truth in which thofe who judge by the ftandard of revelation can fee nothing but guilt.

It may perhaps make our way clearer, if we come to the more direct confideration of the cafes of real or fuppofed difficulty, and attend a little to fome fundamental pofitions which fhould have great influence in all our inquiries refpecting duty.

(1) General rules of duty are abfolutely neceffary for the moral welfare of man; and, therefore, whatever tends to weaken the influence of any fuch rule, is in itfelf confidered an evil. To perceive the neceffity of general rules of duty in the prefent condition of human nature, it is fimply requifite to confider what would be the ftate of things without them. We fhould then be under the neceffity of calculating in every cafe that comes before us, on which fide the good or evil attending the propofed action preponderates. In fact, our lives muft then be a feries of mere calculation, and the active employments of life muft be interrupted or altogether neglected. We fhould be obliged to decide, in numerous cafes of continual occurrence, without poffeffing the means of judging as to the confequences of our actions. The great mafs of mankind would be left without any guide. All would be left under the influence of emotion, prejudice, and felf-love; and no confiftency or regularity could be expected in the moral conduct of men. We are not unfrequently unable to trace completely even thofe confequences of actions which are immediate and apparent: ftill lefs thofe which gradually arife in the filent lapfe of time. The confequences of actions may laft, when the agents have long finifhed the journey of life. Our actions may influence others: our deviations may directly or indirectly produce more extenfive deviations, of which we fhall have, and can have, no knowledge. Perhaps there is fcarcely an important action of our lives, the confequences of which are confined to ourfelves, or even to our own fphere of obfervation. Befides, 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 fcarcely poffible that we fhould avoid the influence of heated feeling; and we fhould feldom poffefs that abftraction of mind, which would enable us to leave the prefent out of confideration, and view with calmnefs and impartiality the real tendencies of our actions. The cafes are innumerable in which intereft or paffion paints in vivid colours the courfe to which they prompt; and throw into the back ground, and render almoft imperceptible the dangers which fhould induce us with fteady firmnefs and perfeverance to avoid it. From thefe confiderations taken together, it may be regarded as indifpenfably neceffary, that there fhould be general rules for directing the moral conduct; and from this it immediately follows, that every deviation from a general rule of duty muft, in itfelf confidered, be an evil.

(2) In confidering the confequences of departing from a rule of duty, we muft not confine ourfelves to the *immediate* confequences; but muft alfo take into account the ill effects arifing from the limitation of the rule itfelf, the tendency of one limitation to furnifh ground for another, the tendency of one departure from the rule to lead on to another, to weaken its authority in our own minds, to weaken its authority in the minds of others, and fo on.

(3) *Expediency* muft always give way to *right*. *Expediency* particularly refers to the temporal confequences of actions, efpecially to thofe which actually come within the fphere of our own obfervation; and, of courfe, our views of it muft depend upon the comprehenfion of our minds, and upon the extent of our experience and obfervation. *Right* takes the whole into confideration, and refts moft on eftablifhed principles of duty, particularly thofe derived from the divine law. As foon as a perfon has by any means fatisfied his mind refpecting the will of God, in any particular cafe, he then knows what is right for him. Expediency is peculiarly the fubject of prudence; right, of duty. Though it is often the part of duty as well as of prudence to do that which is moft expedient; yet where expediency appears to oppofe a clear rule of duty, we ought not to hefitate in our choice. The right, purfued aright, muft always prove, under the government of wifdom and benevolence, the moft expedient.

(4) Where the rules of duty are not only agreeable to the dictates of confcience, and to thofe conclufions which are drawn from an extenfive confideration of the external and internal confequences of actions, of the frame of man and the courfe of Providence; but are alfo fanctioned by the

the exprefs authority of revelation, they ought not to be violated, except in cafes of abfolute neceffity; that is, where, after a ferious deliberate examination, they appear to us to interfere in their direction. In fuch cafes, (which, however, are very rare, even in our prefent ftate of knowledge as to duty, and which in all probability will hereafter altogether difappear,) we muft, to the beft of our abilities, balance the importance of their directions, and decide by the refult. According to the old maxim, we muft, of two evils, choofe the leaft.

(5) If ever the rules of duty appear to interfere in their directions, we muft be confiderably guided by the comparative importance of the rules themfelves. In forming the comparifon, we muft take into account, not merely the confequences of the particular cafe, but alfo the ftrength and univerfality of their obligation; the confequences which would follow from their being generally neglected, and the common tendency to fuch neglect; and alfo the nature of the confequences, whether they affect the religious and moral welfare of ourfelves and others, or refpect temporal interefts merely; and again, we muft confider whether the rules are clear and definite, or whether they are by their nature indeterminate; becaufe, 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 confequent ill effects on the minds of others, will ufually be lefs in the latter cafe than in the former. Some may perhaps think, that if all thefe calculations are to be made in cafes of duty, the way of duty muft be indeed difficult and perplexed. The fact is, we are fpeaking of cafes which, if the mind be under the guidance of religion, are of rare occurrence. An humble devout heart is the beft preparation for knowing our duty. The wifeft among the fages of antiquity has well faid, "truft in the Lord with all thy heart, and lean not to thine own underftanding; in all thy ways acknowledge him, and he fhall direct thy paths."

(6) It appears to us a clear and important moral principle, (founded, in a great meafure, on the foregoing confiderations,) that the violation of any rule of duty is wrong unlefs it is right; that is, unlefs it be required by fome other rule, which, in the particular cafe at leaft, requires the preference as more urgent and important. For inftance, obedience to parents is a clear and pofitive duty; and where no higher duty interferes, difobedience 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 difobey, but it would be wrong to obey. With refpect to the rules of duty, there is, we apprehend, no middle courfe. If no higher rule interferes with the operation of that which refpects our own cafe, it is our duty to obey it; if a higher rule does interfere with it, it is our duty to neglect it. In every cafe of moral conduct, there is but one right courfe; every other muft be wrong. Not that all the rules of duty are of equal importance; ftill lefs that there are no degrees of right and wrong, as far as refpects the motives; but that our actions, to have any moral character at all, muft 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, becaufe 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 fcale of moral worth. He only who knows the fecrets of the heart, can know, with certainty, in any cafe of departure from duty, whether it arofe from blamelefs ignorance, from a miftaken defire to do right, from benevolent feelings, or from weaknefs and timidity, from the promptings of intereft, from directly criminal difpofitions. Where actions are right, we fhould not readily admit fuppofitions tending to lower the worth of them; where they are in themfelves indifferent, we fhould be cautious in affigning wrong motives to them; and even when wrong, we ought readily to admit and fuggeft what will palliate the culpability of the offender; but we fhould never allow ourfelves, through the feelings of candour, to confound the diftinctions between right and wrong; and, without pretending to afcertain the merit or demerit of the agent, it is often neceffary to decide refpecting the rectitude or immorality of his conduct, both with a view to our own guidance, and as a direction and warning to thofe around us. Ignorance is an excufe for departures from duty, only where it is unavoidable. If it arife from the want of a fincere defire to feek and find the true path, or from an indifpofition to fee the truth, becaufe the truth will probably condemn; ignorance partakes of the criminality of thofe fources of it, and is refponfible for its confequences. And the true way to acquire ftability and confiftency of conduct, is to enlighten the confcience beforehand, to form judicious fteady principles of action, and to fubmit to their guidance without allowing the immediate confequences to enter much into our calculations. Such a principle, we are fatisfied, is what we have already ftated; that the violation of any rule of duty is wrong, unlefs in the circumftances of the cafe it is required, by fome more immediately urgent and higher rule; that is, unlefs in thofe circumftances it is right.

The application of the foregoing moral principles to the difficulties of veracity, is fufficiently obvious; but a general view of it may abridge the particular confideration of them. There may be cafes in which benevolence feems to lead to a violation of truth. It is our duty to do good as we have opportunity, and therefore, the cafuift may fay, fince in this particular cafe, the good to which benevolence points is great and important, the neceffity urgent, and the ill confequences of a breach of truth are flight, here benevolence ought to fufpend the obligation of truth, and here *falfehood* is a *duty*. The genuine feelings of uprightnefs and fincerity can fcarcely bear fuch a combination of terms; and yet falfehood cannot be otherwife than wrong, unlefs it be abfolutely right. But let us not decide by mere feeling, left when the defire of felf-juftification turns the fcale, principle fhould be forgotten. The falfehood muft be an evil, as a violation of a pofitive rule of duty, exprefsly enjoined, and ftrongly fanctioned by the revealed will of God. It muft be an evil, becaufe that rule is of the utmoft confequence to the temporal and fpiritual welfare of mankind; for words are the grand medium of all the influence we have over the happinefs of others, and mutual confidence is neceffary to this influence, not only in cafes of prefent intereft, but in thofe which are moft clofely connected with our eternal well being. It muft be an evil, becaufe that rule is clear and intelligible; admitting of but one meaning, and that perfectly precife and definite; becaufe the rule is univerfal in its application, in no cafe made to depend upon confequences, but abfolute in its injunctions, and in no cafe inconfiftent with itfelf; becaufe the rule is upheld by the authority of the confcience, where this is enlightened by Chriftianity, and cannot be flighted without neglecting its dictates; becaufe the rule is fo ftrict, precife, and extenfive, that fcarcely any exception can be imagined, which, if allowed to be right, will not juftify others; and thefe juftify or palliate others, and fo on, thereby weakening its authority and its value, and making way for thofe baneful effects which

which neceffarily arife from the common neglect of it, in proportion to that neglect; becaufe the obligation of this rule is fuperior to that of the other rules of focial duty, inafmuch as they require truth, and therefore it has their obligation to fupport it; and at the fame time it has an obligation of its own. In moft cafes benevolence clearly enjoins a ftrict adherence to truth, and in like manner does juftice; and juftice never fets any limit to its obligation; this of itfelf would make truth a duty; but befides this, its authority refts on the ftrong declarations of the confcience, and upon the more fteady unvarying declarations of the law of God, and therefore, upon its powerful and all-important fanctions.

Againft all this, he who is determined to adhere to duty cannot, with any confiftency, place any felfifh interefts;—no one at leaft can fuppofe that the greateft worldly interefts can *outweigh* the obligation. But the limits which appear fometimes to be fet to it by benevolence, have coft many a perplexity and many a ftruggle; and too probably many a departure from truth, and we doubt not many a bitter pang of remorfe when the mind ceafed to be guided by the impulfe of feeling, and when the confcience has become enlightened by a fteady principle of religious duty: for though we cannot but fuppofe that he who knoweth our frame will make every allowance for our wanderings from the narrow path of duty which not felfifh anxiety, but real, though not enlightened, benevolence has produced, yet piety, whenever it gains its full fway in the heart, will make it feel its weaknefs, if not prefumption, in fuppofing that the good of the creature might lawfully be fought by means which the all-wife Creator hath forbidden. The commands of God muft be a better guide for promoting the welfare of mankind, than thofe affections which, though implanted by him to excite to promote it, are capable of a wrong direction, and clearly require the fupport and guidance of a higher principle. Benevolence, confidered as a *rule* of duty, never can be inconfiftent in its directions, becaufe it requires us to do the *greateft* good in our power; and pious benevolence muft always feel a confidence, that this will be beft accomplifhed by a fteady adherence to that courfe of duty which infinite wifdom and benevolence has prefcribed: but benevolence, as it refers to our own *feelings*, is often inconfiftent in its directions, and may miflead us;—it may dwell upon fome fuppofed good or means of good, when fome other ought in the eye of reafon to be the end propofed;—it may be directed to one object, when, if our comprehenfion were enlarged, we fhould give the preference to another; and, (what is moft to be apprehended,) where not completely placed under the direction of piety, it muft often be fubject to the capricious inconfiftencies and partialities arifing from felf-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, unlefs they interfere for the time with fome higher principles; nor fhould we be too fcrupulous in our calculations, left we lofe means and opportunities which cannot be recovered; but wherever our feelings prompt us to facrifice fo important a principle of duty as truth, in order to do fome fuppofed good, let benevolence reprefent that it is not immediate good, or temporal interefts alone, which are to be taken into account, but future evils alfo, and the fpiritual well-being of others and ourfelves; and if even their confcience is undecided, let piety fay, whether in the departure from an acknowledged, ftrict, exprefs, unlimited rule of duty, we can hope for the approbation of him who feeth the heart. One whofe noble facrifices to a fenfe of duty will ever endear his memory to all who know and can appreciate their value, (we refer to the excellent Lindfey,) has well faid, " God does not want our finful acts;" and one whofe authority muft rank high with the Chriftian, has taught us not to do evil that good may come. Obedience to the will of God muft in all cafes be beft for frail erring man.

We once more return to the fame point, if any cafe 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 fuch a departure ceafe to be wrong, and contrary to duty. We can admit of no exception to a rule of duty, which we cannot make itfelf a rule of duty; and to fo clear and definite a rule as that of truth, no exceptive rule can be admitted, which is not itfelf perfectly clear and definite.

The chief exceptions to the obligation of truth which have been admitted by different moralifts, are, where falfehood is fuppofed to be important to the fpiritual welfare of others,—in the conduct of wars,—in cafe of immediate danger to our life or the lives of others,—in intercourfe with thofe who do not poffefs the ufe of reafon, or who have not yet acquired it,—and in the fick chamber.

1] It is rather fingular, that in what is, in fome points of view, the ftrongeft cafe, where the benefit to be gained, or the evil to be avoided, refpects the fpiritual welfare of others, it is almoft univerfally allowed that no violation of truth is admiffible. What were once termed *pious* frauds, are now pretty generally confidered as *impious* frauds. It is a great and good end, to promote the moral well-being of a fellow creature,—to communicate to him thofe views and principles, which will preferve him from vice, and raife him in the fcale of moral worth; and there can be no doubt that this is our duty as far as our influence extends; but we here fee clearly that we are not to employ unlawful means to promote a lawful end, even though that end be important in the higheft degree. It is true, increafed experience and enlightenment give us now the means of perceiving, that, in reality, the evil furpaffes the good; and that the good, if not in the individual cafe, yet, generally fpeaking, is beft accomplifhed by employing only the weapons of truth,—is even greatly impeded by employing thofe of fraud and falfehood; but this could not be perceived when fuch departures from truth were practifed by fome of the Chriftian fathers, and even applauded by them. They had, however, the exprefs rules of revelation to guide them, as we have; and the immorality of their conduct confifted, not in the intentions, and in the end propofed, but in fetting up their weak judgments in oppofition to the commands of God, and doing evil that good might come. We have referred to this cafe, not becaufe any enlightened Chriftian can now hefitate in believing, that he is forbidden by duty to endeavour to promote the caufe of Chriftian truth and practice by means which are inconfiftent with that fimplicity and fincerity which the Gofpel requires; but becaufe fuch means were once, by great and good men who were heartily devoted to that caufe, confidered as allowable and even juftifiable,—that we now fee that they were wrong,—and that this fhould teach us great caution in admitting of any fpecious exception, fince the beft ends will not fanction bad means. It fhould be an invariable principle, that unlefs duty *requires* the violation of truth, duty forbids it.

2] With refpect to the falfehoods employed in the conduct of war, we have but little to fay. War is in all cafes an evil. It may fometimes be a neceffary evil; but in all it is a great one; and in no view greater than as foftering the evil paffions, and cultivating the vices of men. In many circumftances, deceit in actions is a part of the fyftem of warfare;

warfare; and if war itfelf be ever juftifiable, we fuppofe that ftratagems in the conduct of it, not involving any breach of faith, muft alfo be fo. But there is a clear and well-defined diftinction between fuch ftratagems and lying; and the horrors of war would be greatly increafed and prolonged if falfehoods alfo were employed to deceive. Befides, it would alfo deferve confideration, if the queftion were not already decided by a general fenfe of expediency, that the employment of falfehoods, while in a ftate of warfare, would not be confined to it. The foldier would not make thofe nice diftinctions which the general might have endeavoured to make, to fatisfy himfelf 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 practifed by thofe whofe general conduct from any circumftances excites our admiration, whether obferved by ourfelves, or read of in the pages of hiftory, have a great and direct tendency to confound moral diftinctions in our own minds, to weaken our abhorrence of what is wrong, and to lead to the practice of it. It is not poffible for any man to know, when he departs from duty, when the ill confequences ftop.

3] Cafes have occurred where a perfon has preferved his life by a breach of truth. In fuch cafes we muft leave the culpability of the individual to the decifions of him who alone can fully appreciate the moral worth of actions; our examination merely concerns his conduct. If it be right to preferve life by falfehood, it muft 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 fuch circumftances, followed truth at the certain rifk of his life. As far as his conduct is known, it neceffarily tends to produce a fteady love of duty, a decided attachment to principle; as far as the conduct of the other is known and regarded as juftifiable, it tends to weaken the fenfe of the obligation of a virtue, which is of the firft importance to the well-being of fociety.

We confine ourfelves to the cafe of fimple falfehood to preferve life. If, farther, there be a defertion of fome important principle, there are few who can hefitate. The difciple of him who came to bear witnefs to the truth, and who bore it in the midft of fuffering and of death, cannot but regard it as the indifpenfible duty of every one, who believes he poffeffes Chriftian truth, to ftand by it at any rifk. It was by this noble determination in the breafts of the early confeffors and martyrs, that Chriftianity made its way in the world: it was by the fame noble determination in the minds of the firft reformers and their followers, that Chriftianity has been freed from its groffeft corruptions. But if, in fuch cafes, we perceive at once that truth is not to be violated, it is only becaufe we fee the good confequences of adherence to it in a more obvious and ftriking light. The prefent evil is the fame as in the cafe where there is no further defertion of principle, than what is implied in the fimple defertion of truth; and the folly and bafenefs of it in the one cafe, fhould make us feel great hefitation in fuppofing it to be right in the other; and if it be not right, we muft pronounce it wrong.

But let us try to trace the confequences a little. Suppofe a perfon in fuch a dreadful fituation, that a lie appears to be the only means to fave his life. If he have been habitually accuftomed to regard a lie with abhorrence, it is extremely improbable that he will be able to tell one in fuch circumftances, with that firmnefs and freedom from embarraffment, which will make it effectual. But allow that he has the requifite prefence of mind, (which by the way would ufually enable him to obtain the end without falfehood,) what are the effects of fuch violation of truth on the murderer, on himfelf, and on others. The highway-robber, for inftance, would take for granted, that if one man may juftly lie to fave his life, another will feel at liberty to do the fame to fave his money; and though, in the particular inftance, confidence has been obtained, yet in proportion as this exception to truth is admitted as right, fo will that confidence be deftroyed in other cafes, which is often fo neceffary to the prefervation 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 fociety, where now they are contented with fimple robbery. Thus the probable effect of lying to fave life would, perhaps, univerfally be, to make even truth unavailing to fave it. But farther, very few inftances occur in which the fuccefsful lie does not weaken the individual's general refpect for truth: but fuppofing that this ill confequence does not follow, and that the individual, being under the influence of a ftrict regard for truth, has merely departed from it in this extreme cafe, becaufe in this extreme cafe, and this alone, he thought it juftifiable,—can the limit, which is thus broken down from the laws of duty, be removed to any place a man may choofe? If one may juftly lie to fave his life, why may not another to fave that which he values more than life, his reputation? why may not a third lie to fave that on which the comfort of life depends? Indeed, when once we allow exceptions to the rules of duty, which are not rendered neceffary, (in other words right,) by the obligation of fome higher duty, there is no knowing where to ftop. The property, which to one may appear as valuable as his life, and for which he thinks that he may juftly violate truth, may be a mere trifle to another: but if one may lie to prevent the lofs of a thoufand pounds, why may not another? and if for a thoufand, why not, in correfponding cafes, for a hundred? and fo on: if one may juftly lie to preferve his reputation, or any other poffeffion which he values, or thinks he values, as much as his life, why fhould another be culpable who does the fame to acquire it?—Inftances continually occur, in which men rifk their lives to defend their property, or even a comparatively fmall portion of their property; and yet fome fuppofe that it is juftifiable to avoid fuch rifk, where truth muft for this purpofe be violated. If it be, then truth is not to be regarded as of the fame value as money. But, indeed, there is no end to the difficulties and inconfiftencies in which we muft be involved in this and every other cafe of moral conduct, by departing from the plain ftraight forward path of duty. If any one fhould be expofed to a trial fo fevere as what we have been confidering, let him call to mind, that there is fomething more valuable than life and every external means of comfort,—the approbation of our own hearts, and the prefent and final approbation of Him, who is greater than the heart: let him call to mind, that there is fomething more terrible than death, the anguifh of a wounded fpirit, and that which alone need render death terrible, the confequences which are to follow it.

It may indeed be faid, that no one but he who has a confcience in fome good meafure void of offence, could be without that dread which would prevent him from adhering to the ftrict line of duty at a rifk involving not only life, but interefts of infinitely more importance. We allow it: but our confideration here is, what is the ftrict line of duty in fuch a cafe; and what courfe a man of uprightnefs, veracity, and fortitude, ought to purfue, and would purfue, under the ftrong influence of religious principle and regard to the dictates of confcience; and we fuppofe, that he would in fuch a cafe think he had nothing to do but to do his

his duty, and humbly leave his own interefts, and the interefts of thofe whom he held moft dear, in the hands of a gracious and all-wife Providence.

4] With refpect to education, we feel confident that the ftricteft truth and fincerity 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 progrefs, the feeds of truth or falfehood are to be fown. Implicit confidence in the word of a parent, is of the utmoft confequence 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 intercourfe with his child, will fome time or other have caufe to lament his weaknefs and his folly. The habit of truth cannot be begun too early; nor is there any effectual method of producing it as a permanent, confiftent, actuating principle, but by ftrongly impreffing the mind with an abhorence of falfehood, by making its ill confequences perceived and felt, and by calling in (on fuitable occafions, and in proper degrees) the authority of the divine commandments and the aid of religious principle in general: and all this cannot poffibly be done with fuccefs, if truth do not ftrictly regulate the words of thofe by whofe inftruction, and difcipline, 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 repreffing a more prying curiofity, and efpecially by acquiring their confidence, we may make our children not only fubmiffive, but *fatisfied* without knowing every thing that we know: but falfehood they fhould *never* be told. See MORAL *Education*, III. 13.

It really ought to make us extremely fufpicious of every fuppofed reftriction to the duty of truth, to recollect, that once it was thought *right* to lie in order to promote the fpiritual welfare of others; and that, even till very lately, it has been reprefented by Chriftian moralifts as at leaft allowable in our intercourfe with children. In the former cafe the folly of fuch conduct is now univerfally admitted; and, in the latter, we truft that religious parents, at leaft, fee more and more what wifdom and duty alike require from them. The heathen poet has given them a noble maxim, "The greateft reverence is due to a child;" teaching us, that in no cafe fhould we do or fay in the prefence of children, what will tend to weaken their fenfe of duty and difpofition to practife it: and fhall it be fuppofed, that thofe who are enjoined to bring up their children in religious obedience, can be juftified in loofer principles of morality?

5] After what has been advanced, efpecially in reference to the general principle, we think it cannot be neceffary to fay much on a cafe of common occurrence, but in moft inftances of very eafy decifion; we mean, in our intercourfe with the fick. If, in fuch circumftances, the immediate advantage to be gained appear to require a breach of truth, we fhould call to recollection that it cannot be obtained but by the violation of a ftrict, and moft important rule of duty; and if, after this, we cannot reft fatisfied without confidering confequences, let it be taken into account that, in the particular inftance, every fuch departure from truth muft, as far as it is difcovered, which it commonly is, directly tend to weaken that confidence which is peculiarly neceffary to preferve the mind calm and tranquil, and in its place introduce a haraffing and injurious fufpicion; and alfo to weaken confidence in the other exercifes of the domeftic relations; that it contributes greatly, and almoft inevitably, and far beyond ufual eftimation, to leffen the regard to truth in thofe around us; that there can be no reftriction to fuch departures, and that in proportion as they become frequent, they muft defeat their own purpofe, and at any rate muft often make truth unavailing where it is of the utmoft confequence for peace of mind, and even for the continuance of life.

We cannot poffibly fee the whole refult of our actions; and without perplexing ourfelves too much with the difficulties of particular cafes, it is beft to go on, without the wavering of uncertainty, fatisfied that all we have to do, is to exercife ourfelves to that prudence and felf-control which will make the confequences of truth as little injurious as poffible. If there are any extreme cafes of the above defcription, where a departure from it becomes our *duty*, it muft be included in the clafs which we are about to confider.

We have proceeded thus far, not without difficulty, but with fatisfaction. We have not been without the apprehenfion that we fhould appear to ftrain the principles of duty too far; and are well aware that if we really did fo, we fhould do injury, rather than fervice to its caufe. We can only fay that we have allowed this apprehenfion its full influence. We have examined the fubject at different intervals, and with various degrees of experience; and our ideas remain radically unchanged, and our conviction in the juftnefs of them in feveral inftances more fatisfactory. With refpect to the cafes of moft conftant occurrence, we have no difficulty remaining; with refpect to the extreme cafe (ftated in No. 5,) there it appears to us that every felfifh intereft is to be given up; but it is only becaufe we deem this an inevitable confequence from principles which appear to us indifputably true. If any bias has exifted refpecting it, it has been what we have above ftated. If we faw reafon to think it right, we fhould willingly give it up, as being, in appearance, little calculated for actual practice. But we fee no line which can be drawn to exclude it from the general obligation; which will not, at the fame time, exclude thoufands of inftances in the daily occurrences of life, where, neverthelefs, no doubt can exift in the mind of any one whofe confcience is at all guided by our rule of duty. We are farther fatisfied that the admiffion of the exception would, in almoft all inftances, defeat its own purpofes; and we know that it is a principle of Chriftianity that our prefent interefts are never to be placed in competition with our duty; and we fee that benevolence requires this as well as religion.

6] After deliberate re-examination, however, of our own difficulties, in thofe cafes where a departure from truth may be neceffary for the prefent welfare of others, we think we perceive a rule which may guide us, fo as to fuit the actual condition of human nature, without leading us too far. When confidering it for their own fatisfaction, we entreat our readers to apply our principles. If thefe exclude it, let the cafes it includes remain among the difficulties of duty which we have at prefent no means of fatisfactorily removing. Feeling ourfelves the force of the obfervations ftated in different parts of this fection, it is with much hefitation that we propofe, as a reftrictive rule, that wherever the evil attending a ftrict adherence to veracity affects *others*, and is otherwife *unavoidable*, and *abfolutely irremediable* there, and, as it appears to us, there only, we fhould do *right* to depart from it. This limit *feems* to be required by benevolence in fuch cafes as thefe; where, by departing from veracity, we could fave the life of a perfon who, we had reafon to believe, was in a ftate utterly unfit for death; or, of an excellent parent on whom a young and numerous offspring abfolutely depended for fupport and for training up in the way of duty; or where, by fuch means, we could prevent an irretrievable injury to the moral purity of one whofe chaftity was yet unftained. And if it be really required by benevolence 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 have reaſon 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 indiſpenſible 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 unavoidahle;—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*, *Leibnitzian*, *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, Socrates, 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

was born either at Lemnos or Athens. He refided at Rome in the reign of Severus, and was employed by the emprefs Julia to compile a life of the famous philofopher Apollonius of Tyana. He wrote likewife a work entitled "Icones," being a collection of defcriptions in a florid but pure and elegant ftyle. His nephew, who flourifhed in the time of Heliogabalus, wrote the lives of the fophifts. The beft edition of the works of Philoftratus is that of Leipfic, in 1709.

PHILOTERA, in *Ancient Geography*, a town in the vicinity of the Troglodytes, placed by Ortelius on the Cimmerian Bofphorus, in the environs of Caucafus.—Alfo, the name of a town placed by Polybius on the lake of Tiberias.

PHILOTHEUS, in *Biography*, a celebrated patriarch of Conftantinople in the 14th century, was a native of Greece, who embraced the religious life in the monaftery at mount Sinai: he afterwards became abbot of the monks at mount Athos, and before the year 1354, was made archbifhop of Heraclea. In the following year, upon the depofition of Calliftus from the patriarchate of Conftantinople, he was raifed to that dignity, which, however, he was obliged to quit to make room for Calliftus, when he was reftored to favour. Upon the death of that prelate, in 1356, the emperor John reftored Philotheus to his former dignity, and ever afterwards treated him with diftinguifhed 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 fpoken of by Cantacuzenus, as a perfon who was highly refpected for the fanctity of his life, and for the eloquence with which he was gifted.

PHILOXENUS, a dithyrambic poet of Cythera, lived at the court of Dionyfius of Syracufe, who banifhed him to the ftone quarries for cenfuring his verfes. He died at Ephefus 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 mufic are ftigmatized by Plutarch.

PHILOXERUS, in *Botany*, from φιλος, *a lover*, or *friend*, and ξηρος, *dry*, or *burnt up*; alluding to its native climate, and favourite places of growth. Brown Prodr. Nov. Holl. v. 1. 416. Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Amaranthaceæ*, Brown.

Eff. Ch. Calyx in five deep fegments. Corolla none. Stamens five, combined at the bafe into a fmall entire cup, fhorter than the germen. Anthers of one cell. Stigmas two. Capfule membranous, fingle-feeded, without valves.

Obf. This genus is next akin to GOMPHRENA, and, according to Mr. Brown, differs from LITHOPHILA only in the number of *ftamens*, and the equal *perianth*; fee thofe articles.

The name is well contrived to keep in view its analogy with the latter genus, whofe reputed natural order, as well as its generic defcription, given by Swartz, require correction. The fpecies of *Philoxerus* have oppofite *leaves*; fhort denfe terminal *fpikes*; and three *bracteas* to each flower. We prefume 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 folitary. Calyx woolly. Leaves linear, revolute. Stem erect.—Found by Mr. Brown, in the tropical part of New Holland.

2. Ph. *diffufus*. Br. n. 2.—Spikes ftalked, folitary. Calyx very fmooth. Leaves lanceolate, downy on both fides. Stem proftrate, woolly.

3. Ph. *vermicularus*. (Illecebrum vermiculatum; Linn. Sp. Pl. 300. Gomphrena vermicularis; Swartz. Obf. 101. Willd. Sp. Pl. v. 1. 1322. Amaranthoides humile curaffavicum, cepeæ foliis lucidis, capitulis albis; Herm. Parad. 15. t. 15. f. 2.)—Spikes feffile, folitary, ovate. Calyx fmooth. Leaves linear, fpatulate, fmooth. Stem creeping. —Native of the fandy fea-fhores of the Weft Indies, and South America.

4. Ph. *brafiliana*. (Gomphrena brafiliana; Linn. Sp. Pl. 326. Willd. Sp. Pl. v. 1. 1322. Jacq. Ic. Rar. t. 346.) —Leaves elliptic-oblong. Spikes aggregate, feffile or ftalked. Bracteas pinnatifid. Stem erect.—Native of the Brafils. Much larger than any of the foregoing. *Stem* bent, afcending, three feet high, fomewhat fhrubby. *Leaves* drooping, four or five inches long, acute, fmooth, with downy ribs. *Spikes* numerous, crowded, partly ftalked, ovate, white, briftly. *Bracteas* and *calyx* pinnatifid and fringed.

Thefe two laft fpecies are referred hither at the fuggeftion of Mr. Brown. See GOMPHRENA.

PHILPOT, JOHN, in *Biography*, an Englifh divine, was born in Hampfhire, and educated in New college, Oxford. He became a zealous reformer in the reign of Edward VI., and was made archdeacon of Winchefter. At this period he was fo inflamed with zeal for orthodoxy, that having been engaged in a difpute with an Arian, he fpit in his face, to fhew the great deteftation which he entertained againft that herefy. He afterwards wrote a treatife to juftify this unmannerly expreffion of his zeal, faying that he was led to it, to relieve the forrow he had conceived from fuch horrid blafphemy, and to fignify how unworthy fuch a mifcreant was of being admitted into the fociety of any Chriftian. In the reign of Mary, Philpot fell into the hands of people as zealous as himfelf, but more powerful, and, being a Proteftant, was condemned to the flames. He fuffered in Smithfield in 1555. Hume's Hift.

PHILTER, PHILTRE, *Philtrum*, in *Pharmacy*, &c. a ftrainer, or *filter*; which fee.

PHILTER, Φιλτρον, formed of φιλεω, *I love*, is alfo ufed for a drug, or preparation, or charm, which it is pretended will excite love.

Philters are diftinguifhed into true and fpurious: the fpurious are fpells or charms, fuppofed to have an effect beyond the ordinary laws of nature, by fome magic virtue; fuch are thofe faid to be given by old women, witches, &c.

The true philters are fuppofed to produce their effect by fome natural and magnetical power. There are many enthufiaftic authors, who believe in the reality of thefe philters; and allege matter of fact in confirmation of their opinion: among the reft is Van Helmont, who fays, that, upon holding a certain herb in his hand for fome time, and taking afterwards a little dog by the foot with the fame hand, the dog followed him wherever he went, and quite deferted his former mafter.

He accounts for the phenomena of love tranfplanted by the touch of an herb; by afferting, that the heat communicated to the herb, not coming alone, but animated by the emanations of the natural fpirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the fpirit 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.

Naturalifts afcribe an effect, fomewhat of kin to that of a philter, to cantharides taken inwardly: thefe, it is true, tend to excite love, or rather luft; but it is luft in the general, not determined to any particular object; and they do it no otherwife than by irritating the fibres of the nerves and mufcles,

mufcles, by whofe action the emiffio feminis is effected. See Filter.

PHILTRATION, or Filtration. See Filtration.

PHILYCA, in *Botany*. See Phylica.

PHILYDRUM, received that appellation from fir Jofeph Banks and Dr. Solander, in allufion to the watery fituations in which it delights; the word being compofed of φιλεω, *to love*, and ὑδωρ, *water*. Willdenow unaccountably prints it *Phylidrum*.—Gærtn. 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. Rofcoe Tr. of Linn. Soc. v. 8. 342. t. 20. f. 5. Lamarck Illuftr. t. 4. (Garciana; Loureir. Cochinch. 14.) —Clafs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Rofcoe. *Junceæ?* Brown.

Gen. Ch. *Cal.* none: unlefs the bractea be taken for a fheath. *Cor.* Petals two, inferior, vertical, oppofite, divaricated, ovate, withering. *Stam.* Filaments three, combined at their lower part, inferted into the bafe of the upper, or outer, petal, fhorter than the corolla; the two lateral ones leafy, jagged, abortive, (fometimes diftinct, very rarely furnifhed with anthers, *Brown*); the perfect one linear, abrupt, pointlefs; anthers of two feparate oblong lobes, parallel, united to the upper part of the filament in front. *Pift.* Germen fuperior, ovate, compreffed; ftyle thread-fhaped, erect, rather longer than the filament, embraced by the lobes of the anther; ftigma dilated, capitate. *Peric.* Capfule oblong, with three furrows, of three cells and three valves, the partitions from the centre of the valves. *Seeds* cylindrical, numerous, inferted horizontally, in feveral rows, into the inner margins of the partitions.

Eff. Ch. Calyx none. Petals two, oppofite. Barren filaments two, leafy. Anther two-lobed, embracing the ftyle. Capfule fuperior, of three cells and three valves. Seeds numerous.

Obf. Mr. Brown has, with great judgment, pointed out the collateral affinity, at leaft between this very fingular genus and the no lefs puzzling, hitherto mifunderftood, *Burmannia*, as well as their common relationfhip, in fome degree, to *Xyris*. They are all extremely curious, and *Philydrum* in particular betrays fome odd affinities, which render its natural order highly problematical. We ftill incline moft to our excellent friend Rofcoe's opinion on this fubject; the ftructure of the ftamens and anther, the prefence of barren filaments, with the pofition of the ftyle, being fo very like the *Scitamineæ*, and fo unlike every thing elfe.

1. Ph. *lanuginofum*. Woolly Philydrum. Gærtn. v. 1. 62. Willd. n. 1. Ait. n. 1. Brown. n. 1. Curt. Mag. t. 783. (Garciana cochinchinenfis; Loureir. Cochinch. 15.) —Bracteas, flowers, and capfules woolly. Lobes of the anthers fpiral.—Gathered by Loureiro in watery places in Cochinchina, as well as near Canton; by fir J. Banks about Endeavour river; by Dr. White and Mr. Brown, at Port Jackfon, New South Wales, as well as by the laft mentioned botanift in the tropical part of New Holland. It is faid to have been introduced by fir J. Banks into the ftoves at Kew in 1801; but was firft 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 purplifh and woolly. *Leaves* fword-fhaped, long and narrow, entire; the radical ones largeft; the reft fheathing, alternate. *Spikes* long, terminal, folitary, erect, fimple, many-flowered, woolly. *Bracteas* ovate, long-pointed, reflexed while the flower is expanded, then again erect, as at firft. *Flowers* yellow, without fcent, expanding about an inch. Mr. Brown obferved the lobes of the *anthers* in this fpecies to be fpiral. The *feeds* are rough with tubercles, and crowned each with a cup-like border.

2. Ph. *pygmæum*. Dwarf Philydrum. Brown n. 2.—Bracteas, flowers, and capfules fmooth. Lobes of the anthers kidney-fhaped.—Difcovered on the fouth coaft of New Holland, by Mr. Brown, who, befides the differences indicated in the fpecific character, found the *feeds* fmooth or even, and deftitute of a terminal crown.

PHILYRA, in *Natural Hiftory*, a name given to the fubftance on which fome of the moft 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 publifhed, which is written on this fubftance.

PHIMOPOLIS, in *Ancient Geography*, a town of Thrace, at the mouth of the Euxine fea. Pliny. Ptolemy.

PHIMOSIS, or Phymosis, from φιμοω, *to tie up*, in *Surgery*. When the opening of the prepuce is fo much contracted that this part cannot be drawn backward fufficiently to uncover the glans penis, the complaint is termed by furgeons *phymofis*. The difeafe often arifes from a thickening of the cellular fubftance of the prepuce, brought on by fome kind of irritation. It moft frequently owes its origin to a chancre; in many inftances, it is an effect of gonorrhœa, or of fimple inflammation and excoriations beneath the prepuce. The latter part is often feverely inflamed, and prefents an anafarcous appearance, occafioned by the extravafation of ferum.

Numerous fubjects are born with a contraction of the aperture of the prepuce, and the cafe is then called a *natural* or *congenital* phymofis.

Sometimes, in adults, and particularly in old perfons, the prepuce contracts fo much, without any evident caufe, that its cavity becomes filled with urine during the act of making water, and great pain is the confequence.

In cafes where the opening is exceedingly fmall, and the diforder is either congenital, or has occurred without obvious inflammation, it is by no means an uncommon circumftance for calculi to be formed under the prepuce. Thefe fometimes refemble in fhape the glans, on which, as it were, they are moulded.

When the phymofis is congenital, and has exifted a long while, it frequently happens, that in confequence of inflammation, adhefions have taken place between the glans and the prepuce, and, in this event, it may not always be in the power of the furgeon to effect a cure. The poffibility of doing fo muft depend, in a great meafure, upon the extent and firmnefs of the adhefions. According to Richerand, it is feldom practicable to deftroy them, after the patient has attained the age of puberty.

In fome cafes, a phymofis is productive of very bad confequences, efpecially when it is accompanied with chancres behind the glans; for as the latter part is fituated between the fores and the orifice of the prepuce, it frequently hinders the pus from finding its way outward; confequently, there is an accumulation of matter behind the corona glandis; and this kind of abfcefs produces ulceration on the infide of the prepuce. When the matter has made its way out, the glans often protrudes through the opening, throwing the whole prepuce to the oppofite fide.

No operation ought to be practifed on children for the natural phymofis, unlefs preffing inconvenience fhould immediately arife from the malformation. The conftriction generally goes off, as fuch fubjects approach the adult ftate.

When a phymofis originates from the irritation of a chancre, a gonorrhœa, or excoriation beneath the prepuce, the beft 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.

PHLASMA, from φλαω, *to bruise*, in *Surgery*, a contusion.

PHLEBOCARYA, in *Botany*, from φλεψ, φλεβος, *a vein*, and καρυον, *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 φλεψ, 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 Amsterdam garden, without knowing any thing of the plant, or even the entire fruit to which it belonged. Jussieu 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, 202. t. 43. f. 2. *Ph. indica*.

PHLEBORRHAGIA, from φλεψ, *a vein*, and ρεω, *to flow*, in *Surgery*, bleeding from a vein.

PHLEBOTOMUS, a lancet, or fleam for bleeding.

PHLEBOTOMY, from φλεψ, *a vein*, and τεμνω, *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 philosophers call *water*.

Phlegm makes the fourth of the chemical elements, or elementary principles. But the term is now litttle used.

Phlegm, φλεγμα, in *Medicine*, called by the Latins *pituita*, seems to be derived from φλεγω, *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 dropſical 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 φλεγμα 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, φλεγμασια, 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 *Phlegmaſiæ;* 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 ſynonimous with *œdema* and *anaſarca*, or dropſy 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 Dèpôts laiteux," 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 laiteux dans le Baſſin et aux Extrémités inferieures." (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 laiteuſe*, 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 Swieten, 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, aad 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 dropſical 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 thofe who were delivered on the fide, it appears that the greater number were affected on that fide 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 moft healthful, as well as thofe who have laboured under chronic difeafes; the ftrong and the weak, the lean and the corpulent; the fedentary and the active; the young and the middle-aged; after the firft or any other labour, and whether the labour be natural or preternatural. It happens at all feafons of the year indifcriminately; 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 fometimes occurs in both the lower extremities, in the fame or in different lyings-in, it never attacks the fame limb more than once.

In a fubfequent publication on the difeafe, Mr. White ftates more ftrongly, that the limited fwelling of the labium pudendi on one fide only, is to be confidered as conftituting the principal diagnofis of the phlegmatia dolens. The fwelling is fo exactly confined, he fays, to the labium pudendi of that fide, that if a line were drawn from the navel to the anus, it would be found never to go beyond that line, in the fmalleft degree; and this pathognomonic fymptom, he adds, is never wanting in any cafe whatever. "About nine times out of ten it attacks one fide only, and the limits are fo exactly drawn, that in no cafe whatfoever does the fwelling rife higher than the loins and the hypogaftric region, nor fpread wider than the fpine and linea alba; and this is fo conftantly and invariably the cafe, that it may be confidently faid, *fo far fhalt 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 ftate of the fwelling has led modern authors in general to confider the difeafe as principally feated in the lymphatic veffels and glands. The exact ftate of thefe 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, fpeaking conjecturally, and none of them appearing to make out an hypothefis fatisfactory in all its parts. Mr. White confiders the fwelling of the limb to be occafioned by an obftruction in the trunks of the lymphatic veffels, and the confequent detention and accumulation of the lymph in the limb. This obftruction, he conjectures, may be occafioned by inflammation in the trunk or trunks of thefe veffels, brought by preffure during parturition, or by actual rupture of them. Mr. Trye is of opinion that the origin of the obftruction is feated folely in the lymphatic glands in the groin, which are inflamed, and therefore incapable of admitting the tranfit of the lymph through them. To this fuppofition, however, it is juftly objected, that inflammation in the inguinal glands is extremely apt to terminate in fuppuration; whereas fuppuration does not occur in phlegmatia dolens: not to mention, that a tendernefs and enlargement of thefe glands, though occafionally obferved in this difeafe, is not always prefent, is often very flight, or does not exift at all until the complaint is confiderably advanced.

Dr. Hull, in an able and learned treatife on this difeafe, after a confideration of the unfatisfactory nature of thefe theories, propofes another explanation of the feat and phenomena of the complaint. He confiders it as confifting of a peculiar inflammation, feated in the mufcles, cellular membrane, and interior furface of the fkin, and producing a rapid effufion of ferum and coagulable lymph from the exhalants into the cellular membrane of the limb. The exquifite pain, tendernefs, and heat of the limb, as well as the feverifhnefs which accompanies it, he thinks, are thus fatisfactorily explained, independently of any primary affection of the lymphatic fyftem, which may be involved in the progrefs of the difeafe.

On the whole, this appears to afford the moft rational explication, both of the fymptoms of the difeafe and of the mode of its occurrence. Dr. Hull remarks, that, under the increafed irritability and inflammatory diathefis connected with pregnancy and the puerperal ftate, various caufes may excite this fort of inflammation, efpecially in the lower extremities, in which a great determination of blood has taken place during the latter months of utero-geftation; fuch as contufions, or even violent exertions of the lower portions of the abdominal mufcles, or thofe of the pelvis and thighs, cold and moifture, fuppreffion or diminution of the lochia or milk, inducing a plethoric ftate, too much or too ftimulating food, too early walking or much ftanding, &c. As the difeafe feldom takes place before the twelfth or fourteenth day after delivery, and fometimes confiderably later, it is certainly more probable that it fhould be occafioned by fome caufe fubfequently applied, than by any injury fuftained at the time of parturition.

Of the Cure of Phlegmatia dolens.—The different views which have been taken of the nature of the difeafe by different practitioners, have neceffarily led them to propofe different methods of treatment. Mr. White juftly obferves, that the mode of cure muft be varied with the different ftages of the diforder. The *firft ftage*, which may be called the inflammatory, he recommends to be treated in the antiphlogiftic method; but as he confiders the inflammation not as the original difeafe, but as fecondary or a fymptom only, occafioned by the diftention of the lymphatic veffels and glands; fo he deems it neither neceffary nor prudent to wafte the patient's ftrength by large evacuations. He advifes the ufe of laxative medicines and glyfters, for the purpofe of keeping the bowels open; the application of blifters to the upper part of the thigh, with the view of evacuating fome of the effufed fluids and relieving irritation in the part originally affected; and the adminiftration of opiates internally, together with the external ufe of anodyne fomentations, and of the warm and vapour bath, for the purpofe of alleviating the pain. At the fame time, he prefcribes cooling diaphoretic medicines, with acidulated drinks, fruit and cool air, in order to moderate the general feverifh difpofition. In the *fecond ftage*, when the violence of the pain abates, and the fwelling and tenfion of the groin, labium, and upper part of the thigh begin to leffen although fome degree of feverifhnefs remains, he recommends a fuller diet, and a more tonic medicine, with an occafional fmall dofe of calomel. He advifes alfo, that gentle friction fhould be employed upon the limb, with warm oil, and that the patient fhould ufe 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 laft ftage, may be faid to take place, when the pain and fever have entirely left the patient, and no complaint remains except the fwelling of the limb, and fome degree of debility. He then prefcribes the cinchona, with or without chalybeates, together with fea-bathing, or the cold-bath at home, where a refort to the fea is inconvenient. He recommends alfo embrocations with camphorated fpirit, or diftilled vinegar, dipping the limb in cold water, gentle friction upwards, the ufe of a calico bandage, carefully and properly applied, and exercife on horfeback; and confiders much walking as injurious in every ftage of the difeafe.

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 evacuants, 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 Meursius, 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 Elysium, &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 develope the facts which had been thus disguised by the poets. See TARTARUS and TITANS, and also CUMÆ and *Cumæan* SIBYL.

PHLEOS, in *Botany*. See PHEOS.

PHLEUM, φλεον, or φλεως, 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,

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. Em. 11, 12.)—β 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 loweſt 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, ſpicâ brevi, denſâ, et veluti villoſâ; 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*. Briſtly 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 κατζούλιων*, 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; Hudſ. 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. Hoſt. 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. *Boehmeri*. 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. Hoſt. Gram. Auſtr. v. 2. 26. t. 34. Ehrh. Phytoph. n. 61. (Gramen typhinum, ſpicâ conoide ſtriatâ, culmo violaceo; Barrel. 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 ball, 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. *Michelii*. 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. Hoſt. Gram. Auſtr. v. 2. 26. t. 35. Gramen typhinum junceum perenne; Barrel. 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, Anguſhire. *Root* perennial, tufted,

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. phalaroideum*, 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; Hudſ. 23. Sm. Fl. Brit. 62. Willd. Sp. Pl. v. 1. 328. Ait. Hort. Kew. v. 1. 138. Engl. Bot. t. 222. Knapp. t. 4. Dickſ. 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. Michelii* 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. Obſ. 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; Retzius 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. *tenue*. 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; Hoſt. Gram. Auſtr. v. 2. 27. t. 36. *Schrad.* Gramen typhinum, longiſſimâ 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 Hoſt 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 Oſſerv. 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 *Crypſis* 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,

drical, fpiked *panicles*. We apprehend however that Schrader mifapplies to his *C. fchoenoides*, 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 fpecies. See CRYPSIS.

Ph. *Gerardi*, Jacq. Ic. Rar. t. 301. Willd. Sp. Pl. v. 1. 355. Schrad. n. 7, ftill remains in difpute. Jacquin reprefents it with a bivalve *corolla*, which Schrader confirms. Yet we have found in our fpecimens, gathered on mount Cenis, only a fingle valve to that part, which accords with the account of Villars, who had examined living wild plants. Hence we have judged this grafs to be an *Alopecurus*, which is confirmed by the dorfal awn of the *corolla*, omitted by Jacquin indeed, but properly defcribed in Schrader. This awn is effential to an *Alopecurus*, but quite unexampled in *Phleum:* and we are perfuaded our able friend laft mentioned has for once depended on a lefs important, and, as it feems, variable mark, in preference to the more effential. The cultivated plant perhaps acquires an inner valve, in confequence of luxuriance. Our opinion of this plant is ftrengthened by *Alopecurus anguftifolius*, Fl. Græc. t. 64, and *lanatus*, Prodr. Fl. Græc. v. 1. 43, which have every character of their genus, and yet are fo clofely akin to this reputed *Phleum*, (*Gerardi*,) that no greater violence could be done to nature than to disjoin them.

PHLEUM, in *Agriculture*, the title of a genus of graffes, fome of which have been found ufeful in the field. It is the cat's-tail-grafs.

PHLEUM *Nodofum*, the knotty cat's-tail-grafs, which is faid by fome to be a fine exuberant grafs fit for dairy paftures and where cow hay is required, as it affords rich milk, and cows are fond of it; but horfes and fheep are faid to reject it in favour of the poas, though not in other cafes. It is found in the dry hilly paftures in moft places.

PHLEUM *Pratenfe*, the meadow-cat's-tail-grafs. This is coarfe and late, but anfwers beft in moift foils and fituations. When kept well fed down, it is faid to be ufeful on the moift loamy foils where the fubftratum is of the clayey marle kind. It is afferted to furnifh 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-grafs. It is wholly rejected by fome as unworthy of cultivation, though others think well of it.

PHLIAS, in *Ancient Geography*, an ifland fituated in the environs of Ætolia.

PHLIUS, or PHLIUNTE, *Staphilica*, a town of Sicyonia, on the river Afopus, S.W. of Theranda. It was confiderable in the time of Paufanias, though it had fuffered much during the war of Achaia. In the midft of this place was a brazen goat, to which the inhabitants paid great refpect. This worfhip, without doubt, began, when the country, thinly inhabited, found itfelf expofed to the deftruction and lofs of their vineyards by the ravages of the wild goats, with which the mountains abounded. The Phliufians having loft fight of the original inftitution of this worfhip, pretended, that the conftellation of the goat, or Capra, afforded nourifhment to their vines, and that from this circumftance originated the worfhip of the goat. They pretended that their town was the centre, or "Omphalos" of the Peloponnefus. The town and citadel were adorned with many monuments. Ganymede or Hebe, for thefe were names of the fame divinity, had a temple in this place, which was regarded as a facred afylum. They had here alfo a temple of Ifis, who was regarded as the protectrefs of navigation.

PHLIUS, a maritime town of the Peloponnefus, in the Argolide, fituated between Nauplia Navale and Hermoine. Here were a cavern and a labyrinth. Ptolemy. Strabo.

PHLOGIDIAUGIA, formed from φλογιζω, *I inflame*, and αυγη, *tranfparence*, in *Natural Hiftory*, the name of a clafs of inflammable foffils, of a pure texture, and in fome degree tranfparent.

Of this clafs are the fulphurs, orpiments, zornics, and amber.

They are by this name diftinguifhed from the phlogifcieria. Hill.

PHLOGINOS, the name of a ftone found in Egypt, and called by fome *chryfitis*, from its colour refembling gold.

PHLOGISCIERIA, derived from φλογιζω, and σκιερος, *opaque*, the name of a clafs of foffils, the characters of which are, that the bodies contained in it are inflammable, of a coarfe and impure texture, and not pellucid.

The bodies of this clafs are divided into two general orders, and under thofe, into five genera. Thofe of the firft order are fuch as are found loofe, and in detached maffes: thofe of the fecond, fuch as are found conftituting whole ftrata. The genera of the firft order are ambergris, jet, and the afphalta; and thofe of the fecond, cannel and common coal.

PHLOGISTON, a term given by the old chemifts to what was conceived to be the principle of inflammability. Every fubftance capable of combuftion was fuppofed to confift of a certain incombuftible part, called a bafe, united to phlogifton, and the phenomena of combuftion were occafioned only while the phlogifton was prefent. Sulphuric acid, for inftance, was confidered as a fimple body, which, when united with phlogifton, conftituted fulphur. On the other hand, the fulphur, during combuftion, loft its phlogifton, and became fulphuric acid. The metals were confidered as earths united to phlogifton, while the oxyds were confidered as fimple bodies. To conceive the true meaning to be given to this imaginary body, we have only to conceive it prefent where oxygen is abfent, and *vice verfâ*. Nothing more was wanting to fhew the fallacy of the phlogiftic theory, than weighing the products in which it was fuppofed to be prefent. When a body was faid to have combined with phlogifton, it became juft fo much lighter as was equal to the oxygen now to be feparated, and the contrary. See COMBUSTION.

The procefs of combuftion, to an account of which we have juft referred, is unqueftionably one of the moft ftriking, as well as the moft familiar of natural phenomena. It has for ages engaged, and ftill engages, the attention of philofophers. We fhall endeavour to ftate, as briefly as poffible, the three hypothefes of modern times on the fubject. The firft is the phlogiftic theory of Stahl, which fuppofes that all inflammable bodies, or fuch as throw out light and heat during their combuftion, contain a portion of fubftance that is at once intangible and imponderable: this is the phlogifton to which they owe their inflammability. While a body is burning it parts with its phlogifton, which combines with the furrounding air, and by this means it is reduced to an afh, or, if it be a metal, to a calx or oxyd: both the afh and the oxyd differ from the original fubftances, whether they be wood, coal, iron, &c. in being merely deprived of their phlogifton. Hence, referring to metal for an example, in order to reduce an oxyd to the metallic ftate, it is neceffary to unite it with fome inflammable fubftance, as charcoal, which yields it phlogifton.

The difcovery of dephlogifticated air, or oxygen gas, by Dr. Prieftley, gave rife to the theory of Lavoifier. This philofopher demonftrated, that in all cafes of combuftion the inflammable fubftance 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.

PHLOGONIÆ, 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 *pyropoligonia*. See PYRICUBIUM, &c.

PHLOGOSIS, in *Medicine*, from φλογιζω, *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 synonimous 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 *phlegmone*, 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 φλομος, our *Verbascum*, Mullein, of which last several kinds are distinctly to be ascertained in Dioscorides. The name is scarcely an alteration of φλογμος, *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 Mulleins, 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 Gymnospermia*. 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;

 style

ftyle the length and pofition of the ftamens; ftigma cloven, acute, its upper fegment fhorteft. *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, compreffed, bearded, notched; lower about as long, three-cleft; the middle fegment largeft. Lobes of the anthers divaricated. Upper fegment of the ftigma fhorteft.

Obf. The Linnæan *Phlomis* is much leffened by the feparation of Leonotis and Leucas from it, fee thofe articles. What remains is a very natural genus, chiefly inhabiting warm funny countries in the fouth of Europe, of which Linnæus knew eight or nine fpecies, and to thefe a few have been added, either by fubfequent difcoveries, or by enquiries into what were already publifhed. *Leucas* is almoft entirely a tropical genus, and downy or hoary rather than villofe or woolly in its habit.

1. Ph. *fruticofa.* Shrubby Phlomis, or Jerufalem Sage. Linn. Sp. Pl. 818. Sm. Fl. Græc. Sibth. t. 563, unpubl. (Verbafcum Matthioli; Ger. Em. 767.)—β. Ph. latifolia capitata lutea grandiflora; Dill. Elth. 316. t. 237. γ. Ph. armeniaca; Willd. n. 5. (Ph. orientalis, angufto et longiore folio, flore luteo; Tourn. Cor. 10. Herb. Tourn.)—Leaves oblong, obtufe, foft, and denfely woolly, crenate. Bracteas lanceolate. Calyx-teeth horizontal. Stem fhrubby. Native of dry rocky fituations, efpecially near the fea, in Spain, Sicily, Crete, Greece, and the Archipelago. It has, ever fince the time of Gerarde, been a hardy fhrub in our gardens, flowering in June and July, and diftinguifhed by its hoary denfely woolly afpect, a peculiar foapy fcent when touched, and terminal whorls of large, golden, woolly-headed *flowers.* The *ftem* is ufually four or five feet high. *Leaves* various in fize and breadth, obtufe, but by no means "roundifh," as Linnæus defines them. Whether the large handfome variety figured by Dillenius, our β, may not be entitled to the rank of a fpecies, we do not feel quite certain. The γ appeared to us, in Tournefort's herbarium, a flight variety only of the common kind, though profeffor Willdenow has made it a fpecies.—*Ph. fruticofa* is doubtlefs the φλομος αγρια, or Wild Mullein, of Diofcorides, clearly enough defcribed by him.

2. Ph. *purpurea.* Purple Phlomis. Linn. Sp. Pl. ed. 1. 585. Syft. Nat. ed. 10. 1101. Willd. n. 2. Ait. n. 2. Sm. Spicil. 6. t. 7. (Ph. fruticofa lufitanica, flore purpurafcente, foliis acutioribus; Tourn. Inft. 178. Barrel. Ic. t. 405.)—Bracteas lanceolate, acute, fpinous. Angles of the calyx acute; teeth erect, fpinous. Leaves moft woolly beneath. Stem fhrubby.—Native of Spain and Portugal. Sometimes feen in gardens, where it is a humble hardy fhrub, flowering in fummer; but the authority of Plukenet for its having been cultivated here about 1661, refers to the following fpecies. Every part is fmaller than in the foregoing, and the *corolla* is of a fine light purple. *Leaves* refembling thofe of Sage, efpecially their upper furface; but the under is more woolly and white. The *calyx-teeth* are large and fpinous, fpreading but little.

3. Ph. *italica.* Italian Phlomis. Linn. Syft. Nat. ed. 10. 1102. Sm. Spicil. 6. Willd. n. 3. (Ph. purpurea; Linn. Sp. Pl. ed. 2. 818, defcr. Mill. Ic. t. 202. Verbafcum fubrotundo falviæ folio; Bauh. Pin. 240. Pluk. Phyt. t. 57. f. 6.)—Bracteas lanceolate, obtufe, without fpines. Calyx abrupt, unarmed. Leaves woolly on both fides. Stem fomewhat fhrubby.—Native of Italy and Portugal. Frequent in gardens. This was confounded with the laft by Linnæus, as it feems to be in the new edition of Hort. Kew. though diftinguifhed in Donn's Hort. Cant. Nothing can be more diftinct, as the abrupt unarmed *bracteas* and *calyx*, and more woolly *leaves*, abundantly prove. The *calyx* is correctly drawn by Plukenet. Miller's figure is lefs exact, and perhaps doubtful.

4. Ph. *Niffolii.* Niffolian Phlomis. Linn. Sp. Pl. 819. Willd. n. 4. Ait. n. 3. Mill. Ic. t. 204.—Bracteas fetaceous, minute. Calyx-teeth erect, oblong, obtufe, unarmed. Leaves woolly on both fides; the lower ones deeply heart-fhaped; 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. *Bracteas* certainly prefent, though fo fmall and flender as to be buried in the furrounding ftellated 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 fyn. (Verbafcum anguftis falviæ foliis; Ger. Em. 767.)—Leaves linear-lanceolate, hoary; the floral ones dilated at the bafe. Bracteas fetaceous, clothed, like the calyx, with long fimple hairs.—Native of Spain, Portugal, and the fouth of France, on dry open hills. It is rare in our gardens, and kept in the greenhoufe, where it blooms about July. The *ftem* is fomewhat fhrubby. *Leaves* moft hoary beneath; the floral ones gradually fhortened, and extremely dilated at their bafe. *Flowers* yellow, remarkable for the copious, long, fimple, filky hairs, which clothe their *bracteas* and *calyx*. When Linnæus wrote that "the *flowers* are fcarcely bigger than the *calyx*," he feems to have adverted to the *floral leaves*, which in his fpecimen 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-fhaped, obfcurely crenate, denfely woolly; floral ones ovate. Bracteas fetaceous, clothed, like the calyx, with long compound hairs.—Found by Cavanilles on hills in Spain, growing along with *Ph. purpurea.* The *ftem* is herbaceous. *Leaves* very thick and woolly on both fides, fnow-white, heart-fhaped, acute, finely crenate, on longifh woolly *ftalks*. *Flowers* pale orange, in numerous whorls, accompanied by feffile ovate *leaves*, lefs denfely woolly than the proper foliage. *Bracteas* 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-fhaped, crenate, downy beneath. Bracteas in three deep, awl-fhaped, fpinous fegments, the length of the calyx.—Native of Greece and the north of Africa. Miller cultivated it, but his plants were killed by the froft of 1740. Dr. Sibthorp reftored this fine plant to the Oxford garden. The *root* is perennial, and furvives our ordinary winters in the open ground. *Stem* herbaceous, three feet or more in height, erect, ftraight, quadrangular, hairy. *Leaves* heart-fhaped, dark green and hairy above, more woolly, and paler, beneath; the radical ones a fpan long, on ftalks of a ftill greater length. *Flowers* dull purple, large, in feveral denfe leafy whorls. *Calyx* fpinous. The deeply three-cleft narrow *bracteas* conftitute an important character. The information of Desfontaines, that the fynonym of Tournefort belonged to a very different plant, induced us in the Prodr. Fl. Græc. to transfer that fynonym to the next fpecies; but Ventenat has afferted that fuch information was founded in error, and we here correct our miftake.

miſtake. We are certain of the plant of Linnæus and Sibthorp.

8. Ph. *lunarifolia*. Honeſty-leaved Phlomis. Sm. Prodr. Fl. Græc. Sibth. n. 1379; excluding Tournefort's ſynonym.—Leaves heart-ſhaped, crenate, downy beneath. Bracteas 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 *bracteas*, 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. Bracteas 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. *Bracteas* 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, ſubtùs incano, flore minori purpuraſcente; Amm. Ruth. 41.)—Leaves oblong-lanceolate, ſerrated towards the point; rough above; downy beneath; the upper ones entire. Bracteas 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 ſerrated; all green and rough above; clothed with hoary ſtellated pubeſcence beneath. *Flowers* purple, in numerous whorls. *Calyx* hoary; ſometimes rather hairy. *Bracteas* in three deep awl-ſhaped ſegments, like thoſe of *Ph. 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, ſerrated; rough above; downy beneath. Bracteas 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 *bracteas* 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, ſingularly 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 *bracteas* 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 laciniated. 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. *Bracteas* 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. Bracteas 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*. *Bracteas* 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, ſuavè rubentibus, villoſiſſimis; Amm. Ruth. 39.)—Radical leaves heart-ſhaped, downy; floral ones lanceolate, ſerrated. Bracteas 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 ſerrated. The *bracteas* 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 *Ph. 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. fruticoſa); 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 STEPHANOMATICON, 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 Cæſarienſis. Ptolemy.

PHLOX, in *Botany*, an American genus of plants, on which Linnæus has, apparently with great impropriety, beſtowed an ancient Greek name. Neverthеleſs, the aſſociation of ideas which ſeems to have induced this meaſure, may well excuſe it. The φλοξ of Theophraſtus is ſuppoſed by Dodonæus to be the *Viola tricolor*; but moſt critics have referred it to ſome kind of *Lychnis*, or *Agroſtemma*; and the name, which is ſynonimous 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 λυχνις, 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. *Rotaceæ*, 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, ſalver-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 ſtamens; 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 ſalver-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. ſibirica*, 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 Panicled Phlox. Linn. Sp. Pl. 216. Willd. n. 1. Ait. n. 1. Mill. Ic. t. 205. f. 2. (Lychnidea folio ſalicino; Dill. Elth. v. 1. 205. t. 166. f. 203.)—Leaves lanceolate, flat, rough-edged. Stem ſmooth. Corymbs panicled, 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 ovato-lanceolate, ſmooth in every part. Stem very ſmooth. Cluſter panicled.—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. *pyradimalis*. 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. Malmaiſ. t. 107.)—Scyons creeping. Leaves obovate, ſomewhat ſpatulate.—Found by the late Mr. J. Fraſer 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. Fraſer 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, flowery, perennial kind, of which the ſpecies cultivated are; the panicled 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 inceeaſed 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 whioh, 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

Some of the plants afford ornament in the borders, clumps, and other parts of pleafure grounds; and thofe 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 φλυω, among the *Ancients*, a merry and burlefque imitation of fome grave and ferious piece; particularly a tragedy travelted into a comedy.

The phlyacographia was the fame thing with the *hilarodia*, or *hilarotragedy*.

There were feveral kinds of phlyacography, which had their feveral names. See Salmafius on Solin.

The parodies which have been made of fome parts of the beft poets, as the Virgil Travetty of Scarron and Cotton; the Rival Queens of Cibber, from the Rival Queens of Lee; and fome pieces of operas, the mufic of which is applied to low and ridiculous words, are comprehended under the notion of phlyacographies.

PHLYCTÆNÆ, φλυκταιναι, in *Medicine*, and fometimes *Phlyftanæ*, from φλυω, *I am hot*, feem to have fignified, in the writings of the ancients, all fmall, inflamed elevations of the fkin, containing a fluid, fuch as puftules, veficles, blains, &c. By the tranflators of the Greek writers, the term is generally rendered *puftules*. *Phlyctænæ* are now, however, generally confidered to be *veficles*, that is, fmall elevations of the cuticle, containing a *watery* fluid, and not *pus*. Hippocrates fpeaks of phlyctænæ in one or two places, as containing a thin fanious humour, of an acrimonious quality. (Progn. ii. 60. Epid. l. ii. fect. i. 5.) And fome writers have called thofe veficles only phlyctænæ, which have a livid bafe.

PHLYCTÆNÆ alfo denote little ulcerous veficles, arifing fometimes on the adnata, and fometimes on the cornea of the eye, like fo many little bladders full of water: they are popularly called *blifters in the eyes*.

They appear like grains of millet; and, when produced by a fharp corroding humour, occafion violent pain: the puftules on the adnata are red; thofe on the cornea are blackifh, if near to the furface; but whiter, if deeper. They are cured by difcutients and driers.

PHLYCTIS, more commonly ufed in the plural, *phlyctides*, from the fame root, fignifies fmaller veficles, which ufually clufter together upon a circular inflamed bafe, the contained ferum being fometimes clear and pellucid, and fometimes milky, whey-like, or pearl-coloured.

PHLYSIS, a term ufed by the ancients to exprefs an eruption on the fkin, from a redundance of humours.

PHLYSTÆNÆ. See PHLYCTÆNÆ.

PHLYZACIUM, φλυζακιον, from φλυω, or φλυζω, *fervere*, *ebullire*, *to be hot*, or *to bubble*, a hot and inflamed puftule on the fkin. (See Celfus, De Medicinâ, lib. v. cap. 28. § 15.) In attempting to eftablifh a more definite nomenclature for the difeafed appearances of the fkin, Dr. Willan appropriated the term *phlyzacium* to one of four varieties of puftules, and defined it in thefe words: "a puftule commonly of a large fize, raifed on a hard circular bafe, of a vivid red colour, and fucceeded by a thick, hard, dark-coloured fcab." See Willan on Dif. of the Skin, p. i; and Bateman's Practical Synopfis of Cutan. Difeafes, p. xxi.

PHOBEROS, in *Botany*, φοβερος, *formidable*, in allufion to the thorns.—Loureir. Cochinch. 317.—Clafs and order, *Icofandria Monogynia*. Nat. Ord. . . .

Gen. Ch. *Cal.* Perianth inferior, permanent, in ten ovate, concave, fpreading fegments; five alternate ones twice the fize of the others. *Cor.* none. *Stam.* Filaments near 100, capillary, inferted into the bafe of the calyx, longer than its fegments; anthers very fmall, nearly ovate. *Pift.* Germen fuperior, roundifh; ftyle thick, the length of the ftamens; ftigma thickifh. *Peric.* Berry ovate, flefhy, fmooth, of one cell. *Seeds* about four, nearly ovate.

Eff. Ch. Calyx inferior, in ten fegments. Corolla none. Berry of one cell, with about four feeds.

1. Ph. *cochinchinenfis*. Lour. n. 1.—Whole ftem prickly. Flower-ftalks terminal.—Native of Cochinchina, where it forms impervious hedges. *Stem* fhrubby, woody, ten feet high, erect, covered with long, ftraight, awl-fhaped, axillary, folitary *prickles*. *Leaves* alternate, ovate, flat, hard, fmooth, fomewhat ferrated. *Stalks* terminal, each bearing many white *flowers*.

2. Ph. *chinenfis*. Lour. n. 2.—Lower branches prickly, barren; upper unarmed, flowering.—Native of China, where hedges are made of it, like the foregoing. *Stem* fhrubby, woody, erect, eight feet high. *Branches* fpreading; the lower ones only armed with long, ftraight, moftly folitary prickles. *Leaves* partly fcattered, partly oppofite, ftalked, ovate, entire, flat, fmooth. *Flowers* pale, many together, on lateral *ftalks*, from the upper *branches*. *Berry* flefhy, fmall, ovate, with few *feeds* in its folitary cell.—Such is Loureiro's account, the only information we have refpecting thefe plants. He cites under the 2d Oxyacantha javanica; Rumph. Amboin. auctuar. 39. t. 19. f. 3. This author fpeaks of the fruit as unwholefome, caufing vertigo, and the wounds caufed by the thorns are faid to be dangerous. The plant ferves for hedges in Java. Rumphius mentions a fpecies or variety with longer fpines, which makes formidable walking-fticks for thofe who go abroad by night.

PHOBOS, FEAR, in *Mythology*, was perfonified by the Greeks, and reprefented with the head of a lion. See FEAR.

PHOCA, the *Seal*, in *Zoology*, a genus of the clafs and order Mammalia Feræ. The generic character is as follows: the fore-teeth are acute; the fix upper teeth are parallel, the outer ones are larger; the lower fix are parallel, diftinct, equal, and rather obtufe; the tufks are twice as long, acute, robuft, folitary, the upper are remote from the fore-teeth, the lower form the grinders. There are five or fix grinders which are narrow and tricufpidate. There are nineteen fpecies, befides varieties. This is a dirty, quarrelfome tribe, eafily tamed, and polygamous; the flefh is fucculent, tender, and fat; the fkin is ufeful; the animals inhabit and fwim under water; they crawl on land with difficulty, becaufe of their retracted fore feet, and united hind feet; they feed on fifh and marine productions, and fwallow ftones to prevent hunger, by diftending the ftomach.

Species.

URSINA; Urfine Seal. The fpecific character of this is; head with external ears. It inhabits Kamtfchatka, New Zealand, and the adjacent iflands; fwims impetuoufly in large families; copulates on fhore; is fearlefs, biting at whatever is thrown at it; the old ones live by themfelves, and grow very fat; each has a peculiar ftone for its bed, which it never deferts; the males fight fiercely for their females and ftations; their combat is fingle and fair, two never fighting againft one; when grieved it fheds tears abundantly. This is one of the larger feals, growing to the length of eight feet, and weighing feven or eight hundred pounds. The female is much lefs. Though they lie by thoufands on the fhore, each family keeps itfelf feparate from the reft, and is fometimes fo numerous as to

amount

amount to above an hundred. Urfine feals are feen from June to September, during which time they breed and educate their young. In September they quit their ftations on the iflands, and return, fome to the Afiatic, and fome to the American fhore; but are generally confined to a fpace in thofe feas between lat. 50° and 56°. They are fo tenacious of life, as to live a fortnight after receiving fuch wounds as would inftantly deftroy almoft any other animal.

Leonina; Bottle-nofed Seal. The body of this is brown; the head is crefted on the fore part. It has two teeth in the lower jaw, a little projecting; the eyes are large; the whifkers 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 ftretched back; with a tail between, two inches long. There is a pretty good fpecimen of this fpecies in the Britifh Mufeum, which formerly belonged to the Royal Society. It inhabits the feas about New Zealand, the ifland of Juan Fernandez, and the Falkland iflands. During the breeding feafon they are feen in great numbers attending their young on the fhore; they bring two young at a birth: the females are exceffively fierce during the time of rearing their young; towards evening both the male and female fwim out a little way to fea, the female bearing the young on her back, which it is faid the male frequently pufhes off, in order to oblige them to effay their fwimming powers. On the arrival of thefe animals on the breeding iflands, they are faid to be fo exceffively fat as to refemble fkins of oil; the tremulous motion of the blubber being plainly perceivable beneath the fkin. A fingle feal of this fpecies has been known to yield a butt of oil, and to be fo full of blood, that what has run out has filled two hogfheads. The flefh is eatable.

Jubata; Maned Seal. The neck of the male is covered with a mane of loofe floating hair. It is of a reddifh colour; the young more dufky, in the female more vivid; it is larger than the P. leonina, being about twenty-five feet long, and fometimes weighing 1600lbs. The animals of this fpecies inhabit the Penguin and Seal iflands, near Cape Defire, on the coaft of Patagonia, and are found within the Magellanic ftraits, and on the Falkland iflands, but they have not been difcovered in any other part of the fouthern hemifphere, or in any other place nearer than the fea between Kamtfchatka and America. They live in families diftinct from the Urfine and other feals, though their manners are nearly the fame. The males utter a fnorting found, and occafionally roar like bulls; the voice of the females refembles that of calves, and the young bleat like lambs.

Vitulina; Sea Calf. The head of this fpecies is without ears; the neck is fmooth; the body is brown. There are three other varieties.

(1) *Botnica*, in which the nofe is broader; the claws longer; the colour more obfcure.

(2) *Sibirica;* colour filvery. It inhabits the lakes of Baikal and Oron.

(3) *Cafpica;* the colour of this is various.

Whifkers undulate; the eyes have a nictitant membrane; the cryftalline humour is globular; the tongue is bifid. The legs are fo very fhort as to be fcarcely perceptible; and the hinder ones are fo placed as to be only of ufe to the animal in fwimming, or but very little to affift it in walking; being fituated at the extremity of the body. When thefe animals collect together in great numbers on the fhore, they diffufe a very ftrong and difagreeable fmell, a fact that is noticed by Homer, who reprefents Menelaus relating his adventure on the ifle of Pharos, where he was conftrained to lie for a time among a flock of feals, difguifed in the fkin of one of thefe animals. The ftructure of the feal is fo fingular, that, as Buffon obferves, it was a kind of model on which poets formed their tritons, firens, and fea-gods, with a human head, the body of a quadruped, and the tail of a fifh. The feal is poffeffed of a confiderable degree of intelligence, and may be tamed, fo as to become perfectly familiar with thofe to whofe care it is committed; and even to exhibit tricks and gefticulations. The feal is fuppofed to be a very long lived animal. Like other quadrupeds, they have various inflexions of the voice, according to the paffions with which they are infpired. They are faid, however, to differ from them in this, that they delight in thunder ftorms, and at fuch periods to fit on rocks and contemplate with feeming delight the convulfions 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 fpecies has obtained the name of Monachus, or cowled feal, from the loofenefs or width of the fkin behind the neck, which, when the animal is placed on its back, folds like a monk's cowl. It inhabits the Mediterranean, about the coaft of Dalmatia, growing to the length of more than eight feet. The head is fmall, the neck longer than that of the common feal; the orifices of the ears not larger than a pea; the hair is fhort and rude; the colour is dufky, fpotted with afh-colour; the toes on the fore feet have nails; but the hind feet refemble fins, and have no nails. This fpecies is fully and accurately defcribed in the 4th vol. of the Berlin Tranfactions.

Grenlandica; Harp Seal. Head fmooth, without ears; body grey; a lunulate black mark on the fides. It inhabits Greenland and Newfoundland; it is highly efteemed on account of the excellence of its fkin, and the quantity of oil which it yields.

Hispida; Rough Seal. Head fmooth without; body pale brown, rough, with briftly hairs. It inhabits Greenland and Labrador, feeds on fhrimps and fmall fifh; it often fleeps on the furface of the water; the flefh is red and naufeous; it is only about four feet long. A variety is much larger, and weighs perhaps 500lbs.

Cristata; Crefted Seal. Head on the fore part crefted; body grey. This fpecies is alfo diftinguifhed by a ftrong folded fkin on the forehead, which it can at pleafure draw over the eyes and nofe, to defend them againft the ftones and fands raifed and fcattered in ftormy 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 fouthern parts of Greenland and Newfoundland; and in the latter it is called the hooded feal.

* Barbata, or Great Seal. Head fmooth, without ears; the body is blackifh. This is fimilar to the common feal, but grows to about the length of twelve feet, it having been fhot in the north of Scotland of that fize. Even when fo young as to be without teeth it is upwards of feven feet long, whereas the common feal is at its full growth when it has arrived at the length of fix feet. It is found in the northern feas. The fkin, which is thick and very ftrong, is ufed by the Greenlanders for thongs for their feal fifhery. The young ones, when firft brought forth, are quite white.

Pusilla; Little Seal. Head fmooth, with the appearance of ears. It inhabits the Mediterranean fea, Chili, and Juan Fernandez, and is about twenty-eight inches long.

Chilensis. Snout and ears longifh, toes five on each foot. It inhabits about the coaft of Chili.

Mutica; Long-necked Seal. Body flender, without claws on the fore feet.

Australis. Ears fhort and pointed; the body is cinereous; hairs tipt with dirty-white; nofe fet with ftrong, black briftles; the upper fore-teeth are tranfverfely furrowed; the lower longitudinally; tufks with a fmaller fecondary tooth on each fide; grinders conic, with a fmall procefs on one fide near the bafe.

Testudo; Tortoife Seal. Head refembling a tortoife; neck flender. It is faid to inhabit many European fhores; the fpecies is, however, but little known.

Fasciata; Ribbon Seal. Body blackifh; neck, fide, and haunches with yellow ftripes refembling harnefs. It inhabits the Kurile iflands, and is covered with fhort, fine, gloffy, black hair.

Laniger: Leporine Seal. It has four fore-teeth in each jaw; the upper lip is thick, with long thick whifkers; the fur is foft and uneven; the feet have nails, and its length is about fix feet and a half. It inhabits the White fea, Iceland, and the Frozen ocean.

Punctata; Speckled Seal. Body, head, and limbs fpeckled. It inhabits the feas of Kamtfchatka, and the Kurile iflands.

Maculata; Spotted Seal. Body fpotted with brown. It inhabits the Kurile feas, and is very fcarce.

Nigra; Black Seal. Hind legs peculiarly formed. It is found on the coafts of the Kurile feas; but the ftructure of its legs has not been accurately afcertained.

Dr. Parfons derives the generic name *phoca*, from φωκη, or, according to Dr. Charleton, from βωκη, fignifying a noife or kind of grunting made by thefe animals. He alfo reduces to this genus the *manati*, the *foil* or *feal*, and the *walrus* or morfe. Phil. Tranf. vol. xlvii. 109, &c.

PHOCÆA, in *Ancient Geography*, a town of Afia Minor, belonging to the Ionians, fituated on the fouthern coaft of the gulf of Cumæ, N. of the mouth of the Hermus. It had two ports. Its inhabitants had a very extenfive commerce along the Mediterranean; and they founded feveral colonies, and among others that of Marfeilles.

PHOCÆNA, or Porpesse. See Delphinus.

PHOCAIS, in *Ancient Geography*, a territory of Afia, towards the mouth of the Caicus, on the coaft of Mitylene, according to Thucydides.

PHOCARIA, an ifland of the Ægean fea, upon the coaft of Attica. Pliny.

PHOCARUM Insula, an ifland on the coaft of Arabia. Strabo.

PHOCAS, in *Biography*, Roman emperor of the Eaft, 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 fome fedition. On the intelligence of this revolt, the people of Conftantinople broke out in an infurrection, and Maurice was obliged to retire into Afia. Phocas foon after entered the capital, and with his wife was crowned by the patriarch. At the public games which he exhibited on the occafion, a tumult arofe, in which he was reminded with threats that Maurice was ftill alive. The death of that unfortunate emperor, with that of his five fons, foon followed. The reign of the infamous Phocas was full of bloodfhed and cruelty, fo that he has been juftly ranked among the moft deteftable of tyrants. At length he became an object of terror to his own fon-in law, Prifcus, who entered into a correfpondence with Heraclius, exarch of Africa, for the purpofe of effecting a revolution. Phocas was, by the arts of Prifcus, kept ignorant of his danger till it was too late for effectual oppofition. Deferted by his guards and domeftics, he was feized in his palace, ftripped of his imperial robes, and carried to the galley of Heraclius, who had been proclaimed emperor. After fuffering a variety of infults 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. Hift. Gibbon.

PHOCEAS, in *Ancient Geography*, a town of Sicily, in the territory of Leontium. Thucydides.

PHOCENSES, a people of Greece, between Ætolia and the ifthmus of Corinth.—Alfo, a people of Phocæa, and alfo of Italy, in Etruria. Strabo.

PHOCION, in *Biography*, an Athenian commander, one of the moft virtuous characters of antiquity, was of humble defcent, but received a liberal education, and imbibed under Plato, and other philofophers, thofe elevated principles of conduct which governed his whole life. As he wifhed to ferve his country equally in council and the field, he cultivated the talents adapted to both. He firft ferved under Chabrias, a diftinguifhed commander, but of an impetuous temper. Phocion gained his efteem and moderated his violence. He contributed to the naval victory near Naxos, in the year 377 B. C.; and being afterwards fent in a fingle veffel among the iflands to demand their contributions, he conducted himfelf with fo much prudence, that he brought back with him all the fhips and money at which they were affeffed. In the war with Philip of Macedon he obtained a complete victory, and on this occafion he gave a fignal proof both of his wifdom and humanity. Before the battle he freely fuffered thofe to depart who had no inclination to fight, left their cowardice in action fhould difconcert the reft; and after the victory he releafed his prifoners, 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 unftable character of the Athenian democracy, and the talents and refources of Philip, not to be convinced that a protracted war muft be fatal to his country; hence he was the conftant oppofer of thofe orators, who never ceafed to urge the people to hoftilities, and to difcountenance all propofals for accommodation. The pure patriotifm and integrity of Phocion were founded on their only folid bafis, contentment with a little. Amidft the higheft honours, his mode of living was as fimple and frugal as that of any common citizen. He poffeffed a little farm, and was not afhamed to perform domeftic 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 difplay before her of all her jewels and other finery, "My ornament," faid 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 zealoufly promoted the meafure; and, affembling a body of volunteers, marched thither, and was joyfully received; and having rebuilt its walls, left it in a ftate of fecurity, as a valuable acceffion to the ftrength of Athens. When Philip entered Phocis, with the intention of invading Attica, Phocion not confiding in the alliance with the Bœotians meditated by Demofthenes, was defirous of an accommodation; but he was over-ruled, and the fatal battle of Cheronea proved the juftnefs of his apprehenfions. The death of Philip was celebrated with great rejoicings at Athens by Demofthenes and his party, but Phocion difcouraged fuch 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 houshold 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 Epicnemidian 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 Arachosia, 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 Bysadium.

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 (*Phamauh*), 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 Tigranocerta; 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 Syrophœnice. Phœnice 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 Phœnice, Palestine, and Syria, were promiscuously used for each other, and particularly the two former. Stephanus Byzantinus says, that Phenice and Palestine are the same. Syria, in its largest extent, sometimes comprehended Phœnice and Cœlesyria. 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 Jamnia 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 so 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 Orthosia 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 Phœnice, 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 Judea on the S., and by the Mediterranean on the W. Ptolemy, as we have already said, reckons the river Eleutherus the boundary of Phœnice to the N., but Pliny, Mela, and Stephanus, place it in the island of Aradus, lying N. of that river. On the coast of Phœnice, and S. of the river Eleutherus, stood the following towns; Simyra, Orthosia, Tripolis, Botrys, Byblus, Palæbyblus, Berytus, Sidon, Sarepta, Tyrus, Palætyrus. Sidon may be properly called the metropolis of Phœnice. For an account of the principal towns of Phœnice, see their respective names. In the midland Phœnice Ptolemy reckons the following towns, *viz.* Arca, Palæbyblus, Gabala, and Cæsarea farea Paniæ. This province was confiderably extended in the times of Chriftianity; when being confidered as a province of Syria, it included not only Damafcus, but Palmyra alfo.

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 fea on this coaft formerly produced a quantity of fuch fifh as yielded great profit to Tyre in particular: fuch was the murex, with which was dyed the choiceft purple; and on the fhore was a fand with which the firft and beft glafs was made, as a ftaple manufacture of this country. Although this country has been long defolate, it exhibits fome remains of its ancient fplendour, more efpecially at Tyre, Sidon, Byblos, &c. which fee refpectively.

The Phœnicians were, without doubt, defcendants of the Canaanites: though, in procefs of time, their blood was intermixed with that of foreigners, from the natural courfe of their commerce with other countries. Many ftrange families muft have fettled among them, who could confequently have no claim to this remote origin, how much foever they have been called Phœnicians, and reckoned of the fame defcent with the ancient proprietors. Bochart indeed infinuates (vid. Phaleg. lib. iv. cap. 34.) that the Canaanites were afhamed 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 fuccefs waged againft them by the Ifraelites, becaufe 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 Affyrians. Heidegger alfo conjectures, that they were afhamed of their anceftor Canaan. As to the etymology of their name, learned writers have fuggefted a variety of conjectures. The mythological hiftorians have traced it to a pretended Phœnix, fon of Agenor, or to a Phœnix, faid to be the fon of Neptune and Libya. Others have derived it from Φοινιξ, or the palm-tree, with which Phœnice is faid to have abounded. Scaliger pretends that the name of Phœnician was formed from *Pinkkas*, or *Pinnhas*, meaning a perfon who infpires confidence, which as he fuppofes was given to Canaan by the Sidonians. The learned Bochart feems to have approached nearer to truth in his conjecture. According to him, thefe people had, in ancient times, been called the children of Anak, or "Beni-Anak:" the *beth* being foftened, Beni-Anak was changed into "Phenak," in the plural "Phenakim," from which the Greeks formed "Phœnices." We learn from fcripture, that the fpies fent by Mofes found in Hebron and its environs a people called "Anakim," or "Enakim:" and that thefe Canaanites were diftinguifhed by their ftature and ftrength: of courfe, the other Canaanites who claimed the honour of defcent from them were alfo denominated "Anakims."

M. l'Abbé Mignot, in his elaborate difcuffion of this fubject, (Mem. Acad. Belles Lettres, tom. xxxiv. &c.) thinks that it is not neceffary to recur to the word "Beni;" becaufe the Egyptians always prefix the article *phe* to words, fo that inftead of "Enakim," they would read "Penakim," or "Phonacim:" and the Greeks becoming acquainted in their firft maritime expeditions on the coaft of the country with this word, formed from it Φοινικες, and the Latins "Phœnices."

It has been prefumed 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. Thefe new Canaanites he fuppofes to have been the Orientals whom authors have diftinguifhed by the appellation of "Egyptian Shepherds," and who, after having been driven from the country which they had once poffeffed, returned again to Paleftine. Accordingly he fuppofes thefe "Shepherds," of whom we fhall have occafion to fpeak in another article, were the progenitors of the Phœnicians. The kings of the Thebaid, and other princes of Egypt, formed a league againft them, and carried on a war, which was long and cruel; till at laft the king Mufphar Muthofis obliged them to withdraw into a canton, which contained 10,000 arouræ or Egyptian acres. The Shepherds fortified this place and encompaffed it with walls for the fecurity of their poffeffions. Thummofis or Thetmofis, at the head of 480,000 men, befieged this place; but defpairing of fuccefs, he treated with the befieged, and granted them permiffion to retire, with their whole property, to any place they might choofe, without being purfued or difquieted in their march. The Shepherds accordingly quitted Egypt, and purfuing their route through the defert, arrived in Syria, and fettled in the country which was afterwards called Judea. This departure of the Shepherds from Egypt is faid to have taken place before the arrival of Jofeph in that country, *i. e.* in the year 1728 B.C. This fragment of ancient hiftory throws great light, according to the abbé Mignot, on the Egyptian allegories. The fynchronifm 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 againft Ofiris is an allegory, under which is veiled the hiftory of the war of the Phœnicians or Canaanites againft the Egyptians. Typhon was the brother of Ofiris; and he correfponds to the Canaanites, who were defcended from Canaan, the brother of Mizraim, and who might be called the brethren of the Egyptians, according to Eaftern ufage: but although brethren they were not born in Egypt, which the fable fufficiently indicates, by the different colour which it gives to Typhon, who was red. The Egyptians, compared with the Canaanites, were almoft black. According to the fable, the war between Typhon and Ofiris was long, and terminated by the retreat of Typhon from Egypt, thus characterifing the expulfion 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 fuppofed to have been allegorical; for, according to Plutarch, (De If. and Ofir.) he had two fons, Judæus and Jeralymus; the meaning of which is, that he entered into Syria, and fettled in the country of Canaan, fince occupied by the Jews, and in which was the city of Jerufalem. According to the abbé Mignot, the commencement of the reign of Salatis, the firft Shepherd king, may be fixed to the year 2078 B.C., and their departure to the year 1793, before the fame era. The Phœnician Shepherds re-entered the country of Canaan, from which, about three centuries before, they had departed for Egypt, and fettled towards the fouth; and, according to Juftin (lib. xviii. c. 3.) they eftablifhed themfelves in the vicinity of the lake of Affyria, *i. e.* the lake Afphaltites; but multiplying there they were under the neceffity of extending their borders, and taking poffeffion of the territory of the fea-coaft, which the firft inhabitants of the country had left vacant; and fome of them fettled in the neighbourhood of the Jordan. Their arrival in Paleftine was the caufe which induced fome 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 Erythræans, 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 Φοινικες 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 *Chryſor*, 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 Chryſor of the Phœnicians and the *Phta* 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 ὑψιστος, 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, Iſus, called alſo *Chronos*, *Bethylus*, *Dagon*, and *Atlas*. The wife of Chronos was *Aſtarte*, ſuppoſed to be the ſame divinity with Derceto or Atergates, worſhipped at Aſcalon. Cronos had ſeven daughters, called Artemides and Titanides, and two male children, Pothus or Cupidas, and Eros or Love. Cronos had another wife, called *Rhea*, 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 Dioſcuri, 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*, *Melicarthus*, *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

that none of the nations included under the vague name of Paleftine and Syria, ufed that rite, except the Jews: that if the Phœnicians anciently had that cuftom, they afterward neglected it, and at length wholly laid it afide. They abftained from the flefh of fwine.

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 ufed in Arabia, Syria, &c. Their language was a dialect of the Hebrew, the fame with that of the ancient Canaanites, and their letters, or characters, were the fame or very like to thofe of the Samaritans. Their alphabet confifted of the fame number of letters with the Hebrew alphabet ; the forms of their letters were larger ; but they were more conformable to thofe of the more ancient Greek infcriptions. The Phœnician character varied in its figure according to the different cantons in which it was ufed. The character of Palmyra more nearly refembled the Hebrew ; that of Carthage or the Panei, 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 Afia ; it paffed into Africa by means of the Carthaginians; it was in ufe in Sicily and Spain before the Romans conquered thofe countries ; Cadmus brought it among the Greeks ; it was adopted by the Etrufcans ; and at length received among all the nations of Europe. Towards the E., it had been for a long time in ufe in Perfia, 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 fome have alleged, that it was the inevitable confequence 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 aftronomy are fuppofed to have taken their rife among them, or were brought by them to great perfection ; from them thefe excellent fciences fpread into Greece, together with their letters. They were addicted from the beginning to philofophical exercifes of the mind ; infomuch, that a Sidonian, named Mofchus, taught the doctrine of atoms before the Trojan war ; and Abomenus of Tyre is faid to have puzzled Solomon by the fubtlety of his queftions. Phœnice continued to be one of the feats of learning, and both Tyre and Sidon produced their philofophers in later ages ; fuch were Boethius and Diodatus of Sidon, Antipater of Tyre, and Apollonius of the fame place, who gave an account of the writings and difciples of Zeno.

Manufactures and Arts.—The glafs 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 fkill in working metals, in hewing timber and ftone, and in a word, for their perfect knowledge of what was folid, great, and ornamental in architecture, the reader need only be reminded of the large fhare they had in erecting and decorating the temple at Jerufalem under their king Hiram. Their fame for tafte, defign, and ingenious invention was fuch, that whatever was elegant, great, or pleafing, in apparel, veffels, or toys, was diftinguifhed, by way of excellence, with the epithet of "Sidonian."

Commerce and Navigation.—As merchants they may be faid to have engroffed all the commerce of the weftern world ; and as navigators, they were the boldeft, the moft experienced, and greateft difcoverers, of ancient times : indeed they had, for many ages, no rivals. In planting colonies they exerted themfelves fo much, that, confidering their habitation was little more than the flip of ground that lay between mount Libanus and the fea, it is furprifing how they could furnifh fuch fupplies of people, and not wholly depopulate their native country. Their vicinity to Syria, which had a very confiderable and regular trade with the more eaftern regions, induced them to traffic in foreign commodities ; for here they found productions of the natural growth of that foil, and many choice and ufeful commodities brought from the Eaft, which their own fmall country could not fupply : and having probably been fhewn 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, foon eclipfed their mafters in that art. The Phœnicians affected no empire but that of the fea, and feemed to aim at nothing but an unmolefted enjoyment of their trade. This they extended to all the known parts to which they could reach ; to the Britifh ifles, commonly underftood by the Caffiterides ; to Spain, and other places in the ocean, both within and without the ftraits of Gibraltar ; and, in general, to all the parts of the Mediterranean, the Black fea, and the lake Mæotis. In all thefe parts they had fettlements and correfpondents ; and thus they exercifed the great branches included under the term trade, *viz.* importation, exportation, and tranfportation, in full latitude. Befides this maritime commerce, they had an inland trade in Syria, Mefopotamia, Affyria, Babylonia, Perfia, Arabia, and even India, which was of no lefs extent, and which may ferve to give us an idea of the wealth of thefe people, and how defervedly their merchants are mentioned in fcripture as equal to princes. (If. xxiii. 8.) Their country, though fmall, was the great ftorehoufe that contained every thing which could adminifter to the neceffities or luxuries of mankind, which they diftributed to others as they judged would be beft for their own intereft. Their own commodities were, as we have obferved already, the purple of Tyre, the glafs of Sidon, and the exceeding fine linen made in their own country ; thefe and other curious pieces of art, in metals and wood, feem to have been the chief, and almoft only commodities of Phœnice itfelf. Their territory was fo fmall, 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 fhipping, and they had excellent means for providing themfelves with fhips. Their larger embarkations were of two forts, round fhips, or gauli, and long fhips, gallies, or triremes. When they drew up in line of battle, the gauli were difpofed at a fmall diftance from each other in the wings, or in the van and rear ; and their triremes were contracted together in the centre. In order to difcourage other nations from engaging in commerce, they practifed piracy, or pretended to be at war with fuch as they met when they thought themfelves ftrongeft. This was a natural ftroke of policy in people who grafped at the whole commerce of the then known world. At Tyre was the famous fifhery already mentioned, which contributed fo much to enrich that city. In connection with the navigation of the Phœnicians, we might mention their voyages in the fervice of Solomon ; and the long voyage which fome of them are faid to have undertaken in the fervice of Necho, king of Egypt, round Africa, failing out of the Red fea, and returning by the way of the ftrait's mouth, in which they employed three years.

Hiftorical Revolutions.—Phœnicia, as we have already obferved, was divided into feveral fmall kingdoms, of which fome were confined within the narrow bounds of one city, and

and its territory. Of all the kings of Phœnicia, thofe of Sidon, Tyre, and Arad, feem to have been the moft powerful and wealthy, and they certainly make the moft confpicuous figure in hiftory; but their fucceffors, and the years of their refpective reigns, are involved in obfcurity and uncertainty, and interrupted by fo many chafms, that it is not poffible to give a regular detail of their tranfactions. For fuch an account as authentic hiftory furnifhes, we refer to the refpective articles, *Sidon*, *Tyre*, and *Arad*.

After a variety of viciffitudes, Phœnicia fell under the power of the kings of Babylon. Nabopolaffar, whofe reign commenced in the year 626 B.C., became mafter both of Paleftine and of Egypt. Tyre, after a refiftance 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 confiderable time governed by judges. Geroftratus was the laft of thefe magiftrates; and when he died in the year 554 B.C., the Tyrians fent to Babylon for another governor. Merbal was appointed, with the title of king, and reigned four years. He was fucceeded 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 himfelf mafter of the Perfian empire. At this time Phœnicia comprehended the whole coaft from the vicinity of Aradus northwards to the frontiers of Egypt. It now became one of the provinces of Perfia, and without making any confpicuous figure in hiftory, it fuftained itfelf by its commerce. When Phœnicia at a fubfequent period was joined to Syria, it was governed by prefidents or rulers fent from Rome. Phœnicia was afterwards one of the provinces which Antony abandoned to Cleopatra; but after the death of both thefe, Auguftus, who paffed into Paleftine with Herod, granted to him feveral towns of Phœnicia. This province was one of the fcenes in which the apoftles and followers of Jefus Chrift preached the doctrines of Chriftianity; but the hatred of the Jews againft the Chriftians excited great troubles: the whole country was in arms, and the Jews revolted againft the Romans, till at length Jerufalem was taken by Titus. The fucceeding emperors diftinguifhed fome of the towns of Phœnicia by their attention. Tyre, among others, received from Adrian, and alfo from Severus, the title of Metropolis; fo 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 diftinct parts: one was called "Maritime Phœnicia," or fimply "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, Porphyrion, Paneas, and Sylaminum. Phœnicia of Libanus had for its metropolis Damas, to which were fubordinate Laodicea, Abila, Heliopolis, Jabrunda, Palmyra, Emifa, Danaba, Evaria, Comoara, Cotada, and Sarracene. Chriftianity flourifhed for fome time in this province, till at length the Arabs gained poffeffion of it; and Phœnicia, having embraced a new worfhip, was governed by different dynafties of Arabian princes.

Phœnice, one of the names which, according to Pliny, was given to the ifle 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; noftrils linear; feet four-toed, palmate, the membranes femicircular on the fore part; the hind toe is not connected with the others. There are two fpecies mentioned by Gmelin. The birds of this genus combine the characters of the Anferes and Grallæ. They have long legs and neck; the bill is large; the upper mandible carinate above, and toothed on the edge; lower compreffed, tranfverfely furrowed; the noftrils are covered with a thin membrane.

Species.

Rubra, or Common Red Flamingo. This is fpecifically defcribed 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 fix feet; it feeds on aquatic infects and fifh; perpetually twifts its neck about when eating, fo that the upper mandible touches the ground; it makes its neft on hillocks in fhallow water, on which it fits with the legs hanging down, like a man fitting upon a ftool; it lays two white eggs; is very impatient of cold; the flefh is good, efpecially the tongue; it changes its colour with its age, being the firft year of a white afh, the fecond rofy, the third full fcarlet; tongue covered with about twelve papillæ, which are hooked backwards, and cartilaginous at the tip. The young ones run about with great fwiftnefs, but are unable to fly till they have attained nearly their complete growth. They fubfift chiefly on fmall fifhes, ova, and water infects; and frequent during the day the borders of rivers and lakes, withdrawing at night to the high grounds, and lodging amidft long grafs. Flamingoes are extremely fhy, and are faid almoft always, unlefs in the breeding feafon, to keep together in flocks, having a centinel ever vigilant at his poft, by whom the flighteft approaching danger is announced, by intimations which produce immediate flight. Their flefh is thought by fome 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 reddifh fkin; head fubcrefted.

PHŒNICOPUS Gallinula, a name by which fome authors have called a bird, more ufually known by the name tringa.

PHŒNICUM, in *Ancient Geography*, a town of Arabia Felix, upon the coaft of the Elanitic gulf, between Hippos and Ahaunathi. Ptolemy.

PHŒNICURUS, in *Ornithology*, a fpecies of *Motacilla;* which fee. See alfo Motacilla *Erithacus* and *Suecica*.

PHŒNICUS Mons, in *Ancient Geography*, a mountain of Afia Minor, in Lycia. According to Strabo, it was alfo called Olympus.

Phœnicus *Portus*, a port of the Peloponnefus, in Meffenia, near the promontory Acritas, fouth-weft of Colonis.—Alfo, a port of the fea, on the eaft coaft of Sicily, near the promontory Pachynus. Ptolemy.—Alfo, a port of the nome of Libya. Ptol.—Alfo, a port on the fouthern coaft of the ifle of Crete. Ptol.—Alfo, a port of Afia Minor, on the coaft of Lycia, two miles from the town of Patara. Livy.—Alfo, a port of Afia Minor, on the coaft of Ionia, at the foot of the promontory Mimas.

PHŒNICUSA, or Phœnicodes, one of the feven Æolian ifles of the ancients, called *Felicuda*, fituated towards the weft, to the eaft of the ifle of Ericufa. It took its name, according to Strabo, from its production, which was the phœnix or palm-tree. See Felicuda.

PHŒNICUSSÆ, a town of Afia, in Syria, which belonged to the Phœnicians.—Alfo, the name of two iflands, placed

placed by Steph. Byz. on the coast of Africa, in the gulf of Carthage.

PHŒNIGMUS, φοινιγμος, in *Medicine*, from φοινιξ, *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, Nosol. Method., class x. gen. 32.

PHŒNIX, Φοινιξ, 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*, φοινιξ 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 *phœniceus* or *puniceus*, from the hue of the sheath when arrived at maturity; which etymology seems to us the more probable, as *puniceus* is sometimes made synonimous 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. Lamarck Illustr. t. 893. Gærtn. t. 9.—Class and order, *Dioecia 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. *Pist.* 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.

Eff. 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. Matth. 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. *puſilla*, Lour. Cochinch. 614. Gærtn. 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.

Phœnix, 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.

Phœnix, φοινιξ, among the *Ancients*, a muſical inſtrument, not unlike the *cithara;* which ſee. See alſo Phænix.

Phœnix, 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 hinge 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 φωλεω, 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 Campeachy. 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.

Teredula. 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. Tranſ. vol. lv. p. 1, &c.

PHOLIDIA, in *Botany*, from φολις, φολιδος, *the ſcale of a fiſh or ſerpent;* alluding to the ſcalineſs of the corolla. Brown Prodr. Nov. Holl. v. 1. 517.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Myoporinæ*, Br.

Eſſ. 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 ſouth coaſt of New Holland. A ruſh-like ſhrub, with oppoſite awl-ſhaped *leaves*. *Stalks* ſingle-flowered, axillary, ſolitary, without *bracteas*. *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 φολις, *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 covered with ſcales, but with a tough mucilaginous matter 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 anaſarca, 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 Mareotide, 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, Φωνικα, 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 *direct*, *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 ſinging, 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 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 ſtentorophonicon, 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 Achæans; called alſo *Phorbas*.

PHORBANTIA, an iſland on the coaſt of Sicily. Ptolemy.

PHORBANTIUM, a mountain of Theſſaly, in the Trazena. Steph. Byz.

PHORBEIA, φορβεια, 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 roch 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 φορμος, *a baſket* or *pannier*. Forſter's plant ſerves for ſimilar purpoſes in New Zeeland. 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; Gærtn. t. 18.)—Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Coronariæ*, 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 Zeeland Flax. Forſt. Prodr. 25. Linn. Suppl. 204. Cook's Voyage, v. 2. 96. t. 96. J. Mill. Ic. t. 2.—Native of New Zeeland 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 Pſyttalia. 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 action of light, Mr. Davy propofed to name it "phofgene." Phil. Tranf. for 1812, part i.

PHOSPHATS, are falts formed by the phofphoric acid, with the different faline bodies. See the refpective bafes, as POTASH, SODA, &c.

PHOSPHITES, falts formed by the phofphorous acid combining with the bafes of falts.

PHOSPHOLITE. See APATIT.

PHOSPHORI, or *Phofphorefcent Subftances*, may be diftributed into three claffes. The firft comprehends thofe which require a previous expofure to the folar or other light, in order to become luminous; on which account they are called "folar phofphori." See PHOSPHORUS.

The fecond clafs includes thofe which, without any neceffary previous expofure to light, become luminous when moderately heated; thefe, by way of diftinction, may be denominated "phofphori from heat." Thefe differ from the former in that, after having been continued at any particular temperature till their luminoufnefs is exhaufted, they are incapable of becoming again luminous, except at a greater heat than that to which they were firft fubjected. The range of temperature at which thefe bodies become luminous, commences at about 400° Fahr., and terminates at the loweft vifible red heat. In fome the light is almoft momentary; in others it remains many minutes. The intenfity 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 gafes. The following fubftances are arranged by Mr. T. Wedgwood, according to the brilliancy of their light. See Phil. Tranf. vol. lxxxii. p. 28.

The moft phofphorefcent of all fubftances by heat, is that variety of the blue fluor of Derbyfhire, which when fcraped or ftruck emits a fetid bituminous odour; it glows, when moderately heated with a pale emerald green light, fufficiently intenfe to be very vifible even in day light. To the fecond rank belong the common fwine-ftone, the common blue fluor, and red felfpar, all of which, as well as thofe that follow, exhibit a white or reddifh light. The third clafs includes the diamond, the ruby, carbonated barytes, chalk, colourlefs calcareous fpar, fea-fhells, granite, and white fluor. The fourth clafs comprehends white fand, carbonated magnefia, heavy fpar, flint, white marble, quartz, porcelain, and earthen ware. The fifth clafs includes moft of the metals, fulphat of potafh, borax, white paper, white linen, fawduft, and afbeftos. Under the fixth and laft clafs are comprehended oil, wax, fpermaceti, and butter when nearly boiling. To exhibit with the greateft effect the luminous property of thefe bodies, the harder ones fhould be coarfely pulverifed and fprinkled in a dark room on the furface of a thick metallic plate, heated below rednefs. A very ftriking exhibition of the phofphorefcence of the fetid blue fluor may be made by heating fome oil in a clear flafk till it becomes luminous, and then dropping in about a teafpoonful of pulverifed fluor; at the inftant when this latter comes in contact with the hot liquid, a bright flafh of green light is given out, which may be renewed for many times, by repeatedly fhaking the veffel. Moft of the fubftances above mentioned, are phofphorefcent alfo by friction. Sir H. Davy has alfo obferved, that if fluor be heated till it ceafed to become luminous, it is ftill capable of producing light by collifion; and it is obferved, that certain other bodies, as tremolite, and a particular variety of blende, give out much light even from the fcratch of a pin.

The third clafs of phofphorefcent fubftances, confifts of thofe which, belonging to the animal and vegetable kingdoms, emit light fpontaneoufly at the common temperature, without the neceffity of previous expofure to light: thefe may be denominated "fpontaneous phofphori." Animal fubftances exhibit this appearance before the commencement of putrefaction; and it ceafes when the putrefaction is complete. Among thofe who have directed their attention to this fubject, we may reckon Boyle, Canton, and Dr. Hulme. See LIGHT.

PHOSPHORIA, Φωσφορια, in *Antiquity*, a feftival in honour of Phofphorus or Lucifer.

PHOSPHORIC ACID, in *Chemiftry*. This acid is found in combination with lime, foda, and ammonia in animal fubftances, and is alfo a component part of feveral minerals. It may be obtained, but not in a ftate of purity, from the bones of animals. For this purpofe, the bones are firft burned to whitenefs in a red heat, and then reduced to a fine powder. This powder is decompofable by the fulphuric acid, by which means the phofphoric is fet free in the liquid form, while the fulphat of lime is infoluble. This liquid, however, is found not to contain the phofphoric acid pure, but combined with fome lime. Hence this procefs is not reforted to for getting pure phofphoric acid. The following is unobjectionable.

Into fome hot nitric acid project fmall bits of phofphorus, 'till no more effervefcence takes place. The nitric acid is decompofed, giving the whole of its oxygen to the phofphorus, while the nitrogen which conftitutes the effervefcence efcapes in the form of gas. A thickifh fluid refults from this procefs, which, when evaporated in a platina crucible, ftill thickens till it is raifed to a red heat. On cooling it affumes the folid form, and is tranfparent like glafs. This is the pure phofphoric acid, which in this form is alfo called phofphoric glafs. It poffeffes all the effential properties of an acid. It has a fharp acid tafte, and changes vegetable blues to red.

Its affinity for water is fuch that it foon deliquefces in the air, exhibiting the fame vifcid oily appearance which it poffeffed before evaporation. It has no fmell, not being volatile at lefs than a red heat, when it exhales in the form of white fmoke.

In the ftate of glafs its fpecific gravity is 2.516, which will be lefs in the liquid form as it contains more water.

It diffolves readily in water, producing heat, though much inferior to that produced by the combination of the fulphuric acid with water; a proof that the former has lefs attraction for water.

This acid is known to confift of 1 atom of phofphorus to 2 of oxygen. The atom of phofphorus 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 fubftance.

It is not decompofed in the cold by any of the inflammable bodies, the alkaline and earthy bafes excepted. Charcoal, zinc, and iron decompofe it, when affifted by a ftrong heat in a clofe retort, fetting the phofphorus free. It is in this way that phofphorus is obtained. In its dilute ftate it acts on feveral of the metals, as zinc, tin, and iron. They are firft oxydated by the water, when hydrogen gas is evolved. The acid then combines with the oxyd, forming falts, which are defcribed under their refpective bafes. It combines with the alkalies, earths, and the reft of the metallic oxyds.

The experiments of Lavoifier and Dalton agree in making the proportion of oxygen to be what has been already ftated. The former chemift 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 blowpipe. 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 reſidue 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, Φωσφορος, formed from φως, *light*, and φερω, *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 foſſile, vegetable, or animal.

The foffile are, though very different in degree, fome forts of earths, white fand, limeftones, ftalactites, and feveral other figured ftones, ifland cryftals, flints, fome fpecies of agates, white arfenic; but no fort of metals, metallic or fulphureous bodies, as jet, amber, except the before-mentioned arfenic.

On the other hand, falts imbibe light, provided they are divefted of every metallic principle; otherwife not, though as pellucid as poffible. For this reafon none of the vitriols will imbibe light; but other falts will though with a confiderable difference as to quantity; for fal gem and rock falt imbibe very little; fea falt, if dry, and in cryftals, much more; and, in like manner, fal ammoniac, fal catharticum, and nitre yet more. This power is weak in the natron of the ancients, and alum; but brighteft of all in borax.

In the vegetable kingdom we find very few phofphori; that of dry rotten wood is weak and not lafting; it appears chiefly upon the edges and inequalities of the furface. But this is moft remarkable in the rotten wood of the firtree, and fome others, where, in the dark, you fee fhining fpots as big as tares; whereas in full light the whole furface appears alike. Some few bars are luminous, but not confiderably fo; but no fruits, feeds, or their meals. Cotton, and the cryftals of tartar, appear very bright, but fine loaf-fugar appears the moft luminous of all both without and within; gums and refins retain no light.

There is a vaft variety of phofphori in the animal kingdom, fuch as the bones and teeth; to thefe may be added the fhells of fifh, egg-fhells, the human calculus, bezoar, and thofe parts of animals in which the terreftrial principle is very predominant. But where there is a confiderable quantity of oily matter, as in the hoofs, horns, and feathers, no light is manifeft, or at leaft in a fmall degree. Light is vifibly retained by the fkins of feveral living animals. Water cannot be made to imbibe light, though ice does exceedingly well, and efpecially fnow.

Beccarius propofes fome queries concerning the natural phofphori, of which the firft is, in what and how great a light the object ought to be placed? He tried different phofphori, in different degrees of light, and found them imbibe moft light from the fun itfelf; next in quantity when the fky was clear; and the leaft in foggy weather. Thefe experiments fhould be made in the open air, and not in a houfe with the glafs-windows fhut; becaufe many bodies appear luminous when the light has come directly to them, which will not have that appearance when the light has paffed through the glafs. He laftly tried what light they would imbibe from very bright flame, and found that alabafter itfelf, which is faturated more than any fubftance by the fun's rays, imbibed exceedingly little. The next query is, how long thefe bodies fhould remain in the light to be fufficiently faturated? Four or five feconds were found the utmoft length of time required for that purpofe. The other query is, how long the received light will continue in thefe phofphori? It does not laft the fame time in all; but continues more or lefs, from two feconds to eight, in proportion to the ftrength of the phofphorus, and the quantity of light received.

But that which, of all natural phofphori, has occafioned the greateft fpeculation, is the

Phosphorus, *Barometrical*, or *Mercurial*. M. Picard firft obferved, that the mercury of his barometer, when fhaken in a dark place, emitted light; with this circumftance, that in fhaking the mercury with rapidity, fometimes above, and fometimes below its equilibrium with the air, the light was only feen when below it, where it appeared as if adhering to the upper furface.

But this light is not found in the mercury of all barometers; which occafions a great difficulty.

M. Bernouilli, upon examining the circumftances of this phenomenon, invented a folution of the fame; he imagines, that upon the mercury's defcending, the vacuum in the tube increafing, there iffues out of the mercury to fill up this excefs of vacuity, a very fine fubtile matter, before difperfed throughout the pores of this mineral; and that, at the fame time, there enters through the pores of the tube another fine matter: thus, the firft matter emitted from the mercury, and collected over its furface, ftriking impetuoufly againft that received from without, has the fame effect with Defcartes' firft element againft the fecond; that is, it produces the motion of light.

But why, then, is not the phenomenon common to all barometers? To this he anfwers, that the motion of the fubtile matter out of the mercury may be weakened, and prevented, by any heterogeneous matter collected on its upper furface, into a kind of pellicle, fo that the light fhould never appear, but when the mercury is perfectly pure. This reafoning feemed confirmed from the experiments of feveral barometers, which he made according to this plan; but the Royal Academy of Sciences, repeating experiments with barometers made after the fame manner, did not meet with the fame fuccefs; the light being found in fome, but not in others.

M. Homberg, therefore, conjectured, that the difference confifted in the different qualities of the quickfilver: in fome, he obferved, they ufed quick-lime to purify it; in others, fteel-filings. The mercury, then, rifing in the diftillation, and paffing through the lime, might take away fome parts thereof, capable, by their extreme fmallnefs, of lodging in its interftices.

Hence, as quick-lime always retains fome fiery particles, it is poffible, in a place void of air, where they fwim at liberty they may produce this luftre.

Mr. Haukfbee has feveral experiments on the mercurial phofphorus. Paffing air forcibly through the body of quickfilver, placed in an exhaufted receiver, the parts were violently driven againft the fide 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 fame manner in the common air, yet that a very fine medium, nearly approaching to a vacuum, was not at all neceffary.

And, laftly, from other experiments he found, that mercury inclofed in water, which communicated with the open air, by a violent fhaking of the veffel wherein it was inclofed, emitted particles of light in great plenty, like little ftars.

By including the veffel of mercury, &c. in a receiver, and exhaufting the air, the phenomenon was changed; and, upon fhaking the veffel, inftead of fparks of light, the whole mafs appeared one continued circle of light. Farther, if mercury be inclofed in a glafs tube, clofe ftopped, 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 raifing fucceffively its extremities, that the mercury might flow from one end to the other, one fees a light creeping in a ferpentine manner all along the tube; that is to fay, the mercury is all luminous. The mercury, being made to run along the tube afterwards

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° 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 reſcorch 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 torrified, 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 gums, as myrrh, gum tragacanth, and others, they appear luminous, though different 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 diveſt them of their acid, and their light etherial 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 478. in vol. xliv. 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

called the *Bononian* and *Hermetic* phofphorus, to which clafs others of a fimilar kind may be reduced.

Phosphorus, *Burning*, in *Chemiftry*, is a fimple inflammable fubftance.

The difcovery of this phofphorus was firft made in 1677, by one Brandt, a citizen of Hamburgh, in his refearches for the philofopher's ftone. Brandt communicated the fecret to one Kraaft, of Drefden, but withheld it from Kunckel; upon which this chemift, knowing that urine was the fubftance employed, fucceeded in his attempts of making phofphorus; accordingly, this phofphorus is commonly called *Kunckel's* phofphorus, after his name. A fimilar phofphorus was alfo made by Mr. Boyle, after having feen a piece of it in the hands of Kraaft, who brought it to London in 1679, in order to fhew it to the king and queen of England; having been only informed that this phofphorus was produced from fome matter belonging to the human body. Kraaft, indeed, told Stahl, that he had communicated the procefs for making it to Mr. Boyle; but this is fuch an imputation on the integrity and honour of our Englifh philofopher, as can by no means be admitted on the teftimony of a man, who had been treacherous to Kunckel, who traded in the fecret of making phofphorus, and after felling it to many perfons, publifhed the procefs for making it in the Mercure Galont, for June 1683. Kunckel, and a German chemift called Godfreid Hantkwitz, to whom Boyle communicated the method of preparing it, were the only perfons who made it in any confiderable quantities.

M. Hellot, in his Memoir upon this fubject, Ac. Paris, 1737, enumerates all the proceffes for making it, that were in ufe foon after the difcovery of it; *viz.* that pubblifhed by Mr. Boyle in 1680, in the Phil. Tranf. N° 196. (fee Phil. Tranf. Abridg. vol. iii. p. 346.); that of Kraaft; that of Brandt, in a collection of experiments and obfervations of Dr. Hooke, publifhed by Dr. Derham in 1726; that of M. Homberg, in the Ancient Memoirs of the Academy, in 1692; and thofe found in the works of feveral chemifts, particularly of Theickmeyer, Hoffmann, and Niewentyt. However, the operation continued in a great degree a fecret till the year 1737, when a ftranger came into France, and obtained a reward from the miniftry for communicating his procefs, which was executed by Meffrs. Hellot, Du Fay, Geoffroy, and Duhamel. Since the publication of M. Hellot's Memoir, the operation has been no longer a fecret; though feldom executed, becaufe it was rather curious than ufeful, and both troublefome and expenfive.

The folid phofphorus was formerly prepared from urine in the following manner. Evaporate a good quantity of urine of beer-drinkers to the confiftence of honey; cover it up in an earthen veffel, and fet it three or four months in a cellar to ferment and putrefy. Mix two parts of fand, or powder of pot-fherds, 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. Diftil it in a naked fire, in a reverberatory furnace; at firft gently; after two hours, augment the fire gradually, till all the black fetid oil be drawn off. Raife the fire to the higheft degree; upon which white clouds will come into the receiver, and fix, by little and little, on one fide, in form of a yellowifh fkin; and another part will precipitate to the bottom in powder. Keep the fire thus violent for three hours, till no more fumes arife. Let all cool, and unloofe the veffels; and, throwing more water into the receiver, fhake all well about, to loofen what fticks to the fides. Pour the whole into a glafs veffel, to fettle.

The volatile falt will now diffolve in the water, and the phofphorus and oil will fink to the bottom; then pour off the water, and gathering the remaining part together, put it into a glafs veffel, with a little frefh water, and digeft it in a fand-heat, ftirring it from time to time with a wooden fpatula.

By this means, the phofphorus will feparate from the oil, and fink to the bottom: pour off the oil, and make up the phofphorus, while hot, into fticks for ufe.

Boerhaave gives us other ways of preparing phofphorus. Recent urine, he obferves, digefted three or four days in a tall glafs, with a heat no greater than that of a healthy man, grows ruddy, fetid, and cadaverous; this digefted urine, being put to diftil in a retort, yields a clear, fetid liquor, then a yellow volatile falt, which evaporated to the confiftence of a fapo, and mixed with four times its weight of dry fand, and the diftillation continued in a covered retort, there fucceffively comes over, by greater and greater degrees of fire, a fetid brown oil, blueifh fumes, and, finally, a grofs fhining matter, which finks in water, and is the folid phofphorus.

To make it more eafily, and to the beft advantage, it may be proper to take a fufficient quantity of human urine, afforded by a perfon not much given to drink wine, and exhale it away in an open veffel to a rob, or the confiftence of honey; then fet it to putrefy for half a year, and, upon diftillation, it will afford a large proportion of falt, after which, if fix times its own quantity of fand, or brick duft, be added to the remainder, and the diftillation be continued, as in the cafe laft mentioned, the phofphorus will fall into the water. Or it may commodioufly be prepared, by fuffering the rob of urine to digeft for two years in an open veffel in the open air; during which time, a flimy, feculent, unctuous, earthy matter, will fall to the bottom; which, being frequently wafhed with pure water, wherein it will not diffolve, will leave a white matter behind it, neither of an alkaline, acid, faline, or terreftrial, nor fcarcely of an unctuous nature: and this is of itfelf a proper matter for the making of phofphorus by diftillation with fand.

In order to preparing the phofphorus, and indeed moft of the other preparations of urine, the firft ftep is to reduce that liquor to the confiftence of a rob or thick extract; thofe who have worked on this fubject fufficiently know how abominably naufeous and difagreeable a tafk this is. The operator alone is not the perfon who is almoft poifoned by it, but the whole neighbourhood is affected; and it is well known, that our Godfrey, who ufed to prepare large quantities of this fubftance, was always obliged to keep a houfe in the fields to perform this part of the procefs in.

There is an eafy and excellent method propofed by Stahl for the performing of this troublefome bufinefs, by means of condenfation by cold or freezing. There needs no more than to expofe the proper quantity of urine to fome frofty nights in winter; or at any time of the year to our icehoufes, or other places where ice is preferved all the year round. The froft will, in this cafe, affect a large part of the urine, but not the whole; and the liquid part being feparated from the folid ice, it will be found that the watery parts alone have fuffered the freezing, and that all the unctuous and faline ones are left behind in the unfrozen part, which is, by repeated freezings of its yet remaining aqueous parts, at length reduced to that fort of rob which is required for all the purpofes of diftillation, and that without any trouble or offenfivenefs, either to the operator or any body elfe. The power of condenfation by freezing in this manner, extends to wine, vinegar, and all fermented liquors;

liquors; but it operates differently on the feveral different ones, and is to be regulated according to their natures. The natural cold of our climate is feldom too great for any of the liquors we defire to condenfe; that is, it is never fo great as to condenfe the whole into ice. It often is not fufficiently great to condenfe the aqueous part, even after ever fo many repetitions. In this cafe, it may be proper to bring in the ufe of the common freezing mixtures, made with ice, or fnow and falt. To fuit the artificial degree of cold, in thefe cafes, requires care and experience, and is almoft as nice a point as the fuiting of the degrees of heat in the operations of chemiftry.

In 1743, Mr. Margraaf publifhed, in the Memoirs of the Academy at Berlin, a new and excellent procefs for obtaining more eafily and expeditioufly, and at lefs expence than had hitherto been done, a confiderable quantity of phofphorus. In his procefs, a kind of plumbum corneum is previoufly prepared, by diftilling a mixture of four pounds of minium with two pounds of powdered fal ammoniac; the refiduum after the diftillation, or the plumbum corneum, is to be mixed with nine or ten pounds of extract of putrefied urine, boiled to the confiftence of honey. This mixture is to be made flowly in an iron cauldron fet upon the fire, and by frequently ftirring 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 diftillation the heat is only to be raifed fo as to make the matter red-hot. After the diftillation a black and friable refiduum is left, from which the phofphorus is to be extracted by a fecond diftillation, and a ftronger heat. Before it is expofed to another diftillation it may be tried by throwing fome of it upon hot coals. If the matter has been well prepared, a fmell of garlic exhales from it, and a blue phofphorical flame is feen undulating along the furface of the hot coals. This matter is to be put into a good earthen retort, capable of fuftaining a violent fire, and which may be fecured with a covering of clay and hair. Three quarters of the retort are to be filled with the matter which is to yield the phofphorus. It is to be placed in the common furnace for diftillation with a retort; excepting that inftead 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 fix inches, according to the fize of the furnace, and the height from eight to nine feet. This apparatus, which Mr. Beaumé ufes, is neceffary for raifing a fufficient heat, and for the convenience of throwing in a fufficient 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 fize, pierced with a fmall hole, and half full of water. For this purpofe ordinary fat lute may be bound on with ftrips 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 paffes ought to be well ftopped with furnace-earth. Laftly, a fmall wall of bricks is raifed betwixt the furnace and the receiver, to guard this veffel againft heat as much as is poffible.

All thefe preparations being made the evening before the diftillation is to be performed, we are then capable of proceeding to this operation, which is very eafy. The retort is to be heated by flow degrees during an hour and a half; and then the heat is to be increafed till the retort be red-hot, and the phofphorus begin to pafs in luminous vapours: when the retort is almoft of a white-red heat, the phofphorus paffes in drops, which fall and congeal in the water at the bottom of the receiver. This degree of heat is continued till no more paffes into the receiver. When a retort contains eight pints or more, this operation continues about five hours.

Mr. Margraaf's apparatus is fomewhat different from that above defcribed. He divides the whole quantity of matter from which the phofphorus is to be obtained into fix fmall retorts, which he places in a furnace that he defcribes. The advantage of this divifion is, that if any accident happens to one retort, the whole matter is not loft; and as the retorts are fmaller, a lefs heat is required. If, indeed, much phofphorus was to be made, this practice would be fafe and excellent; but Macquer affirms, that the method above defcribed of Mr. Beaumé is very convenient when a large quantity of phofphorus is not wanted, and that he has never feen it fail.

Phofphorus does not pafs pure in this diftillation, but is blackened by foot or coal, which it carries along with it: it may be eafily purified, and rendered white and fine by a fecond diftillation or rectification. This rectification is made in a fmall glafs retort, to which is adjufted a fmall receiver half full of water. A very gentle heat is fufficient, becaufe phofphorus once formed is very volatile: and as the fuliginous matters with which it is foiled were raifed merely by the violence of the heat, they remain at the bottom of the retort in this diftillation, and the phofphorus paffes very pure.

The phofphorus is then ufually divided into fmall cylindrical rolls, for the conveniency of ufing it. This is done by putting it in glafs tubes immerfed in warm water. This very gentle heat is fufficient to liquefy the phofphorus, which is almoft as fufible as fuet. It takes the form of the glafs tubes, from which it may be taken out when it is cold and hardened. That it may be more eafily taken out of the tubes, thefe muft be fomewhat of the form of fruftums of cones. All thefe operations ought to be made under water, to prevent the inflammation of the phofphorus.

Phofphorus is now ufually procured by the following procefs. Calcine a quantity of bones till the whole of their inflammable matter is confumed, which will be indicated by their whitenefs. After they are reduced to a fine powder, let 100 parts, by weight, be mixed with 500 parts of water, in a veffel of ftone ware, or any other which fulphuric acid will not act upon. To the above mixture add, by degrees, 40 parts of fulphuric acid, conftantly ftirring the mixture with a ftick or a glafs rod. After the effervefcence has fubfided, let the mixture ftand for a day or two, then decant off the clear liquor, which is to be preferved. Let the refiduum be agitated with a quantity of frefh water, and thrown upon a filtre, adding the clear liquor which runs through to that decanted in the firft inftance. Let more water be poured upon the filtre till it comes through taftelefs. This being added to the laft, the whole will contain a fuper-phofphat of lime, with great excefs of acid. In order to feparate the phofphoric acid from the lime, the nitrat of lead is to be added. Phofphat of lead precipitates in the ftate of white powder, while the lime is diffolved in the nitric acid. The phofphat of lead being very ponderous, may be feparated by decantation and repeated wafhing. 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 feldom fitted for this procefs, being very liable to crack. The clay of which they are formed fhould be mixed with coarfely powdered crucibles, to render the texture of the fubftance when baked more open. The outfide muft be coated with white lead and flint, to form a glazing during the diftillation of the phofphorus. Without this precaution the vapour of the phofphorus would efcape through the pores of the veffel. The retort, with its contents, muft be placed in an air-furnace, with a flit in the fide to admit the neck of the retort. The fuel fhould be well burnt coaks, and the fire raifed very gradually. The neck of the retort fhould be luted to an adopter, which is fitted to a glafs receiver, previoufly filled with azotic gas. A fmall tube fhould proceed from another opening in the receiver, terminating in a pneumatic trough. This ferves to carry off the elaftic fluids which are difengaged in the procefs. During the firft ftage of the procefs carbonic acid is difengaged, which is afforded by the carbon combining with the oxygen of the phofphoric acid and the oxyd of lead. The charcoal always contains a portion of moifture, which is decompofed by the carbon. In the laft ftage of the procefs, when the phofphorus rifes in the elaftic form, a portion of it combines with the hydrogen of the water, forming phofphoretted hydrogen gas, which takes fire when it comes in contact with oxygen of the atmofphere. This fpontaneous inflammation of the efcaping bubbles, is a certain fign that the phofphorus is coming over. It is feen running down the adopter into the receiver, which contains a fmall portion of water for it to drop into. The mafs which drops into the water is generally of a brownifh, and fometimes a darker colour, and confifts of phofphorus, containing fome carbon, and is otherwife impure. When the apparatus is quite cold, it may be taken out, and placed in a glafs funnel provided with a long cylindrical neck, about one-fourth of an inch in diameter, clofed at one end with a cork. It is firft filled with cold water, fo as to cover the phofphorus. The whole is now immerfed into hot water, which melts the phofphorus which is caufed to occupy the interior of the tube, affuming 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 ftate it is fold. If the phofphorus after diftillation be very impure, it fhould be diftilled a fecond time from a glafs retort, obferving the fame precautions in the receiver as in the firft procefs. After this it may be ftrained through chamois leather under hot water.

The phofphat of lead may alfo be procured by adding nitrat of lead to urine. The latter fubftance contains a quantity of the phofphats of foda and ammonia, each of which give up their acid to the lead, forming phofphat of lead, which falls to the bottom of the veffel in the ftate of an infoluble white powder. This is doubtlefs the cheapeft way of getting phofphorus.

Stahl fuppofed phofphorus to be a compound of muriatic acid with phlogifton; but it was afterwards proved by the refearches of Margraaf, that muriatic acid could not be produced by burning phofphorus, nor could he fucceed in forming phofphorus by treating muriatic acid with inflammable bodies. He found in the courfe of his experiments, what has fince led to the overthrow of the phlogiftic doctrine. The phofphorus gained weight by burning, and he called the fubftance refulting from the combuftion phofphoric acid. Lavoifier, in a fatisfactory manner, confirmed the facts of the above chemift, by burning phofphorus in oxygen gas. The diminution of the oxygen he found juft equal to the increafe of weight in the phofphorus after burning. Hence it was eftablifhed, that phofphoric acid was a compound of phofphorus and oxygen.

Phofphorus, when perfectly pure, is of a pale yellow colour, having fome refemblance to white wax. Like the latter fubftance it foftens by heat, and is fo ductile as to be cut with a knife.

It is called "phofphorus fulgurans" from its corrufcations; and "phofphorus fmaragdinus," becaufe its light is frequently green or blue, efpecially in places that are not very dark.

It is alfo called "folid phofphorus," from its confiftence.

It diffolves in all kinds of diftilled oils; and, in that ftate, is called the "liquid phofphorus."

It may be ground in all kinds of fat pomatums; in which cafe it makes a luminous unguent.

So that the phofphorus fulgurans, fmaragdinus, folid and liquid phofphorus, and luminous unguent, are all the fame preparation, under different circumftances. See FULGURATING *Phofphorus*.

The fpecific gravity of phofphorus is about 1.77; the fufing point is 90° Fahr.; and it affumes the form of vapour at a little fhort of 600°.

When phofphorus 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 denfe white fumes are produced, fo as ultimately to nearly obfcure the flame. If the combuftion be made in a veffel, the fumes adhere to its fides, and become liquid, by attracting moifture from the atmofphere. A portion of red matter is left after the burning has ceafed, which is probably a compound of phofphorus and carbon. The liquid which is formed upon the fides of the veffel has an acid tafte, and confifts of phofphoric acid, water, and probably a fmall quantity of phofphorus which has efcaped combuftion. When phofphorus is burnt in pure oxygen, the light produced is of fuch dazzling fplendour as to give pain to the eyes. The combuftion is by this means complete, and if the oxygen is in fufficient quantity, the whole is converted into phofphoric acid.

Lavoifier found that 100 grains of phofphorus took up 154 grains of oxygen, fuppofing the atom of oxygen to be 7, hydrogen being 1, agreeably to the numbers of Dalton. And confidering the phofphoric acid as an atom of phofphorus with two atoms of oxygen, we have $\frac{154}{100} = \frac{14}{9.1}$. Dalton has fixed the atom of phofphorus at 9. From thefe data the atom of phofphoric acid will be $9 + 2 \times 7 = 23$.

When phofphorus is expofed to the air in fmall bits, it gives out a white fmoke for fome time, and is ultimately changed into a clear vivid oily liquid, which has an acid tafte. In this procefs it combines flowly with oxygen, and confifts of one atom of phofphorus with one of oxygen, or $9 + 7 = 16$. When phofphorus is made to undergo flight combuftion, by melting it over the interior of a phial, with the prefence of fmall quantities of air, the phofphorus affumes a reddifh colour. By this change it is found to take fire with much greater facility, fo much fo that this procefs is reforted to in the conftruction of the common fire bottles.

From this and other facts it is probable that an oxyd of phofphorus exifts with lefs oxygen than is contained in phofphorous acid. It doubtlefs is conftituted by 2 atoms of phofphorus to 1 of oxygen, or $2 \times 9 + 7 = 25$. See PHOSPHOROUS and PHOSPHORIC *Acids*.

The action of the acids upon phofphorus is treated under the refpective acids, but what has been omitted under OXYMURIATIC *Acid*, we fhall introduce here.

The muriatic acid does not act upon phofphorus when the acid is in the gafeous form, but when prefented in combination with fome other bodies, it forms very curious combinations, which have been little noticed. We are indebted

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 Thenard, 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° Fahrenheit with oxygen, it detonates with violence,

violence. It alfo explodes in oxymuriatic gas with a white flame. This chemift fuppofes its fpecific gravity to be about 12, hydrogen being 1.

When heated in potaffium, its volume is doubled, and the gas produced is pure hydrogen. When fulphur is fublimed in it, the volume is doubled, and fulphuretted hydrogen gas produced.

He found that 3 in volume of this gas took up more than 5 of oxygen. He concludes its compofition to be nearly 2 of hydrogen to 10 of phofphorus, by weight. According to Dalton's numbers it will confift of an atom of phofphorus to 2 of hydrogen, or $9 + 2 = 11$. If its volume be doubled by taking away its phofphorus, which is the cafe in the experiment with potaffium, its fpecific gravity will be increafed by 1 compreffed into $\frac{1}{2}$, which will give a fpecific gravity equal to 2: this added to 9, the weight of the phofphorus, will give $9 + 2 = 11$, which is very near to fir Humphry's experiment. In the experiment where it combines with the fublimed fulphur, the volume is doubled, and two atoms of fulphuretted hydrogen are formed, one of which being equal to the original volume, will make the fpecific gravity of this gas equal to that of fulphuretted hydrogen, which is about 14, hydrogen being 1. The mean of thefe will be $\frac{11 + 14}{2} = 12.5$, which comes very near to fir Humphry's ftatement of the fpecific gravity, and ftrongly confirms the reft of the facts relative to it.

The oxygen required for its total abforption will be 28 to 11 by weight, and $\frac{28}{11} \times \frac{12}{14} = \frac{24}{11}$, or 2 to 1 by meafure nearly. This is obtained by multiplying their ratios of weight by the inverted ratio of their fpecific gravities.

Phofphorus combines with fulphur by melting them together in a glafs tube, from which oxygen is excluded. The compound is more fufible than either of the elements. Sir Humphry Davy found that a compound of thefe bodies in the proportion of 3 of fulphur to 4 of phofphorus, is fufible at 40° Fahrenheit. When folid, its colour was of a yellowifh-white. Thefe bodies, like all others, muft produce moft 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 phofphorus to 1 of fulphur, or $18 + 13 = 31$. The moft remarkable properties poffeffed by thefe compounds are their increafed fufibility, and their taking fire at a lower temperature than phofphorus. This latter property has been taken advantage of in making the common fire-bottles. Their proportions for this purpofe are generally about 2 phofphorus and 1 fulphur. This is nearly 3 atoms of phofphorus to 1 of fulphur, which would be 3×9 to $13 = 27$ to 13.

Dr. Prieftley has made many experiments with phofphorus, in different kinds of air; and has found, that it fmoked and gave light in the acid air, juft as it would have done in common air confined, without being fenfibly wafted for twelve hours, and with a very inconfiderable diminution of the bulk of the air; in alkaline air it gave no light and made no lafting change in its dimenfions; in nitrous air, it gave no light, nor did it leffen its power by diminifhing common air, and the phofphorus remained unchanged; and after having remained a day and two nights in vitriolic acid air, it produced no fenfible effect, and gave no light.

Dr. Fordyce has fuggefted the following eafy method of reducing phofphorus to powder: take phofphorus of urine two drachms; put it into a four-ounce phial; pour upon it three ounces of water; heat it gently by immerfion in warm water, till the phofphorus melts; fhut the phial with a cork; take it out of the water, and fhake it brifkly till it be cold; and the phofphorus will be found in powder. A receiver may be lined with this powder by adding a very fmall quantity of water to it, and then making the powder to adhere to its internal furface, by gently inclining and turning the receiver round. Macquer's Chem. Dict. art. *Phofphorus*, and Prieftley's Experiments and Obfervations on Air, &c. Phil. Tranf. vol. lxi. part ii. p. 504, &c.

Phosphorus, *Properties of Solid.* 1. With this phofphorus 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 fmoke. This is occafioned by the oxygen of the atmofphere combining flowly with the phofphorus.

If the letters written with this phofphorus are warmed by the fire, they prefently become dark lines, which continue upon the paper like ink.

2. A little piece, rubbed between two papers, takes fire inftantaneoufly, and if care be not taken in the management of it, there is danger of burning the fingers, the phofphorus being exceedingly inflammable.

3. Its burning is very vehement, and penetrates deeper into the flefh than common fire; and it is very difficult to be extinguifhed.

Dr. Slare, in order to determine whether air contains the pabulum of flame, as fome have fuppofed, placed a large piece of phofphorus in a receiver; but upon exhaufting it, he found that it became more luminous, and that upon admitting the air it returned to its former ftate. This property was alfo afcertained by feveral experiments of Mr. Haukfbee.

M. Caffini happening to prefs a piece in a cloth between his fingers, the cloth immediately took fire; he endeavoured to put it out with his foot; but his fhoe caught the flame, and he was obliged to extinguifh it with a brafs ruler, which caft forth rays in the dark for two months after.

The folid phofphorus ceafes to fhine and never fpoils, provided it be kept in a phial full of water; but if any part of it emerge, it will fhine, though the glafs be hermetically fealed; and will continue fhining in a large glafs without water for feveral days, with very little diminution of its light or weight; and even when immerfed in water, it will fometimes make very bright and vigorous corrufcations in the air; that in form of an unguent, does not keep fo well; and the liquid phofphorus worft of all.

The liquid phofphorus is beft made by digefting in horfedung, a little bit, or fome fcrapings of the folid kind, for two days, in oil or effence of cloves, oil of turpentine, or the like. After the diffolution, the oil will be fo impregnated with it, that, upon opening the bottle, the matter will appear on a flame.

Phosphorus, *Experiments with Liquid.* By wafhing the face, hands, or the like, with liquid phofphorus, Dr. Slare tells us they will be made to fhine very confiderably in the dark, and the luftre thereof will be communicated to adjacent objects, yet without any offence to the fkin.

As foon as the candle is brought in, the fhining difappears, and no change is perceiveable.

This phofphorus emits frequent flafhes like lightning, even when clofe ftopped, efpecially in warm water. Hence Mr. Boyle takes occafion to draw a parallel between lightning and phofphorus. Phil. Tranf. Abr. vol. iii. p. 348, &c. Haukfbee's Phyfico Mech. Exper. p. 122. In fome cafes animal fweat, which is fimilar to urine, has been obferved to be phofphoraceous, without any preparation. An inftance of this kind is related of a perfon who ufed to eat great quantities of falt, and who was a little fubject to the gout, after fweating with violent exercife. Stripping himfelf in the

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. Cæſarienſia, 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 Vicenzo 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 effervefcing 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 Baldwin'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, *cochleatim*, 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 baſon; 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

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 blowed 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 ſpungy and porous; the fire was then ſuffered to go out, and the crucible placed in the corner of the elaboratory 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 fmell of fulphur, and the matter in the bottom of the crucible is found fhattered to pieces; but all the pieces are regular parallelopipeds, as was the original mafs.

It is to be obferved, that the Bern-ftone, and others of the fame kind, which only fhine in the dark, and that only for a few minutes, when firft taken out of the fire, are, properly fpeaking, endued with no other luminous quality than that of a burning coal; but their light, having been generally unobferved, and requiring darknefs to fhew it, has obtained for them the fpecious title of *phofphori*.

PHOSPHORUS, *Canton's*, is an artificial phofphorus, the method of preparing which was difcovered by the late ingenious Mr. Canton, and publifhed in the Phil. Tranf. for 1768, vol. lviii. p. 337, &c.

This is much fuperior to any fingle natural fubftance, and has the advantage of being very eafily and cheaply prepared. The procefs is as follows: calcine fome common oyfter-fhells, by keeping them in a good coal fire for half an hour; let the pureft part of the calx be pulverized, and fifted; mix with three parts of this powder one part of the flowers of fulphur; let this mixture be rammed into a crucible of about an inch and a half in depth, till it be almoft full; and let it be placed in the middle of the fire, where it muft be kept red-hot for one hour at leaft, and then fet by to cool: when cold, turn it out of the crucible, and cutting, or breaking it to pieces, fcrape off, upon trial, the brighteft parts; which, if good phofphorus, will be a white powder, and may be preferved by keeping it in a dry phial with a ground ftopple. The quantity of light which a little of this phofphorus gives, when firft brought into a dark room, after it has been expofed for a few feconds, on the outfide of a window to the common light of the day, is fufficient to difcover the time by a watch, if the eyes have been fhut, or in the dark, for two or three minutes before. By this phofphorus celeftial objects may be very well reprefented; as Saturn and his ring, the phafes 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 phofphorus. And thefe figures appear to be as ftrongly illuminated in the night, by the flafh from a near difcharge of an electrified bottle, as by the light of the day. This phofphorus receives no injury from being expofed to the direct rays of the fun, which is the cafe of fome of the more delicate kinds, as Beccarius has remarked, and Lemery fuppofed with all. However, it cannot be expofed to moifture without lofing its property of imbibing and emitting light, and alfo its whitenefs. Mr. Canton found, that it was more affected by mixture with fpirit of wine than with ether. It had been long known, that heat promotes the expulfion of the light, which has been formerly imbibed by thefe phofphori. Mentzel, who wrote foon after the difcovery of Baldwin's phofphorus, afferted, that it had the property of becoming luminous by heat only; the fame fact was obferved by M. du Fay; but the principle on which it depended was difcovered by Beccarius, M. Margraaf, and Mr. Canton, independently of one another. Beccarius was firft of opinion with Mentzel, that the light was produced by heat; but finding by repeated trials, that, without previous expofing to the light, heat had no effect, he relinquifhed that opinion. M. Margraaf fell at firft into the fame miftake with Beccarius; but he afterwards obferved, that the phofphorus would not fhine by being placed upon a hot furnace, unlefs it had been expofed to the light two or three days before. Upon the whole, he concludes, that the light is held in this fubftance by attraction, and afterwards expelled by heat. Mr. Canton alfo, without any knowledge of the obfervations of Beccarius and Margraaf, found by a variety of experiments, that, when his phofphorus had imbibed light, and had emitted all that it could in the common ftate of the atmofphere, it would emit more upon the application of heat, but that a continuance of the fame degree of heat would only make it luminous for a certain time. Whence he infers, that there is a ftrong attraction between light and the particles of natural bodies: and that the ftrong vibrations into which heat throws them, compels them, as it were, to quit their hold of each other; and the light, which this phofphorus gives, by being heated to a certain degree, appears to be caufed by its throwing off adventitious particles, and not by any of its own; fince its light will decreafe, and be entirely gone, before the phofphorus be hot enough to fhine of itfelf, or to emit particles of light from its own body. Lemery and Mufchenbroeck have obferved, that the Bolognian phofphorus imbibes lefs light when hot than cold; becaufe it appears lefs bright when carried into a dark room; but this circumftance is accounted for by Mr. Canton, by its parting with its light fafter when hot than when cold, and, therefore, parting with more in the time of the conveyance from one place to another: and this, he alfo fays, feems to be the caufe why the Bolognian phofphorus never appears fo bright after it has been illuminated, and, confequently, in fome meafure heated, by the direct rays of the fun, as after it has been only expofed in the fhaded open air to the common light of the day. However, there is reafon to imagine, that the fame degree of heat, which difpofes the phofphorus to throw off the light after it has been imbibed, muft likewife render it indifpofed to receive it. For an account of the refult of Mr. Canton's experiments on this fubftance in favour of the materiality of light, fee LIGHT.

PHOSPHORUS, *Wilfon's*, a fubftance belonging to the clafs of folar phofphori, which Mr. B. Wilfon difcovered, and which is one of the fimpleft and moft powerful of all the phofphori belonging to this clafs. The method of preparing it is as follows: Select twenty oyfter-fhells, the thicker the better; then take from a fire that is brifkly burning, moft of the flaming coals, but not all of them; ftrew the fhells over the furface, and replace the coals that have been taken off. In about an hour's time take out the calcined fhells, breaking them as little as poffible; and after expofing them for a few minutes to the light, they will be found to have acquired a high degree of phofphorefcence, glowing in the dark, in a very beautiful manner, with moft of the prifmatic colours. If the fhells are fufficiently heated in a clofe crucible, they will exhibit prifmatic colours, chiefly blue and green, though not fo bright as by the former method. If the calcination is effected in an iron crucible, all thofe parts of the fhells that are in contact with the fides of the crucible will glow with a red light. The contact of inflammable matter, and particularly charcoal, with the fhells during calcination, appears very much to contribute to the brilliancy of the phofphorus: hence it is, that if the fhells are calcined in a crucible in contact with thin plates of fteel, the phofphorus 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 ufe of, the intenfity of the colours, efpecially the blue, green, and red, is far greater than in thofe produced by fteel.

The colour of the light, in moft phofphori that have been prefented to the light, and that are then carried into the dark, is white or reddifh-white; but in Wilfon's phofphorus, not only white colours, but all thofe of the prifm make their appearance, fometimes being all united in a fingle fpecimen, at other times each piece exhibiting only one or two colours. In every fpecies of folar phofphorus, the light, after having been extinguifhed, may be increafed for any number of times, without the fmalleft apparent diminution of brilliancy, by fimple expofure for a few feconds to the light. If the phofphorus be moderately heated, when it is prefented to the light, its luminoufnefs will be very fenfibly augmented. If a common box fmoothing-iron, heated as ufual, be placed for half a minute on a fheet of dry white paper, and the paper be then expofed to the light, and afterwards examined in a very dark clofet, the whole paper will be luminous, and the part on which the iron box had ftood will be much more fhining than the reft. It is obferved that the variation of the temperature produces remarkable effects on phofphori, *after* having been expofed to the light. If a thin glafs tube be filled with Canton's or Wilfon's phofphorus, and as foon as it is brought into a clofet 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 lefs luminous than the other; and if the freezing mixture has been fufficiently powerful, it will be entirely extinguifhed. The luminous property in this cafe is fufpended, and not exhaufted: for as the dark part of the tube begins to acquire the temperature of the furrounding 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 feem to follow, that at a very low temperature the prefent clafs of folar phofphori would ceafe to exift. As cold retards, heat quickens the emiffion of light from phofphoric fubftances. If the tube juft mentioned be dipped half way into boiling water, the immerfed part will exhibit a great increafe of luftre, which in a minute or lefs time will be fucceeded by total darknefs; while the unheated part will fhine for a much longer time, though with lefs fplendour. If any one of thefe phofphori, kept in the dark till it is totally extinguifhed, be placed, without being again expofed to the light, in the warm hand, its luminoufnefs will for a fhort time be renewed; and if, when the hand fails to produce the effect, it be placed in boiling water, a further emiffion of light will take place; and, finally, it may be entirely exhaufted of its light, by being placed on a metallic plate, heated nearly to rednefs. Hence it appears, that there are two caufes of the extraordinary brightnefs exhibited by folar phofphorus, when ftrongly heated immediately on being introduced into the dark room: in the firft place, there is a greater quantity of light actually given out; and, fecondly, the whole is difcharged in perhaps a twentieth of the time in which even a part would be exhaufted at the common temperature.

Two theories have been propofed, in order to account for the origin of light in thefe fubftances. One theory afcribes it fimply to the folar light, which they had previoufly imbibed; and the other attributes it to the inherent light of the phofphorefcent fubftance itfelf. The advocates of the firft theory allege, that previous expofure to the light is neceffary to the phofphorefcence of thefe fubftances, and that the period of its greateft brilliance is the moment of its being placed in the dark, where it regularly and rapidly diminifhes till it becomes extinct. Beccaria's experiment is alfo urged in favour of this theory: he found that thofe phofphori, which in the ufual circumftances emit a white light, give out coloured rays in the dark, correfponding to thofe which they receive from the fun, with the interpofition of a plate of coloured glafs. The accuracy of this fact has been doubted. Du Fay's experiments, made before thofe of Beccaria, tend to a directly oppofite refult; the light emitted by the phofphorus being of the fame tint, whatever was the colour of the glafs through which the rays paffed to the phofphorus. Others have failed in repeating Beccaria's experiments. Mr. Wilfon, in particular, had made many experiments in reference to this point, which, with their refults, he has detailed in his Treatife on Phofphorus. His facts would lead us to conclude, that the phofphorefcent light is not merely that which was previoufly imbibed from the fun; and yet they do not prove that it is properly inherent in the phofphoric fubftance itfelf.

The folar phofphori may be excited not only by the rays of the fun, but by any other light that is fufficiently powerful; and thofe phofphorefcent fubftances which are moft brilliant, in confequence of expofure to the light of day, are moft eafily 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 moft fenfible kinds of phofphori. The light of a fingle candle, or the momentary flafh from the explofion of a little gunpowder, or from an electrical difcharge, are fufficient to render Wilfon's phofphorus, when well prepared, very vifibly luminous. It is not very certainly known what is the effect of the different gafes on the luminous property of thefe bodies. Aikin's Dict. of Chem. and Min., art. PHOSPHORUS. See LIGHT.

PHOSPHORUS, *Fæcalis*, a very fine kind of phofphorus, 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 fame quantity of roach alum grofsly powdered; put the mixture into a fmall iron ladle, capable of holding about a pint; fet it over the fire in a chimney, and it will melt together, and become as fluid as water; let it boil gently over a fmall fire, continually ftirring it with an iron fpatula till it is dry; it will then be difficult to ftir, but it muft be kept ftirring about, and all the lumps it runs into muft be broken, and what adheres to the fides of the ladle ftirred in and blended with the reft; this muft be continued till it is perfectly dry, and the ladle muft be now and then taken from the fire, and the matter ftirred about in it, that it may now grow red-hot. When the whole is thus perfectly dried, it will ftill be in little lumps, and when cold it muft be rubbed to powder in a metal mortar; it muft then be put into the ladle, and fet over the fire again; it will then become a little moift again, and run into clods and grumes, but it muft be again ftirred 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 firft or preparatory operation finifhed.

Take two or three drams of this powder, put it into a fmall matrafs, capable of holding an ounce and a half of water, and which has a neck fix or feven inches long; put a paper ftopper lightly into the neck of the matrafs; then take a fmall crucible of three or four fingers breadth high, put two or three fpoonfuls of fand into it, then fet the bottom of the matrafs on the fand, and take care that no part of it touches the fides of the crucible; fill up the reft of the crucible with fand, and let the whole body of the matrafs be covered with it; then fet the crucible in one of the common little earthen furnaces, and make a charcoal fire about it; for the firft 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 matrafs is red-hot; then pile up more charcoal

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 matraſs; 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 matraſs 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 matraſs 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 matraſs.

When the operation has been well performed, and the matter is in powder in the matraſs, pour out a ſmall quantity of it on a piece of paper, and immediately ſtop the matraſs 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 matraſs, 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 matraſs: from this it may be eaſily ſeen alſo, that the matter cannot be emptied out of the matraſs 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 matraſs 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 its 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 matraſs 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 matraſs on a ſand-furnace, but give it no greater heat than that the hand can bear to lie upon the matraſs. 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 matraſs 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

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. Tranſ. 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 φερω, *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 Heſchelius 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 myrobibla. 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 Leipsic in 1808, by Godfrey Hermann, from two MSS., both of them extremely inaccurate.

PHOTOMETER, or *Measurer of Light*, as the name, derived from φως, *light*, and μετρω, *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 opaque body be interpofed, the two fhadows it will produce muft differ in blacknefs or intenfity in the fame degree. For the fhadow formed by intercepting the greater light will be illuminated by the fmaller light only, and reverfely, the other fhadow will be illuminated by the greater light: that is, the ftronger light will be attended with the deeper fhadow. But it is eafy, by removing the greater light to a greater diftance, to render the illumination it produces at the common furface equal to that afforded by the lefs. Experiments of this kind may be conveniently made by faftening a fheet of white paper againft the wall of a room; and placing the two candles or lights intended to be compared, fo that the ray of light from each fhall fall with nearly the fame angle of incidence upon the middle of the paper. In this fituation, if a book or other object be held to intercept part of the light which would have fallen on the paper, the two fhadows may be made to appear, on feparate furfaces, and alfo a third or perfect fhadow, 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 fhadows near the upper angular point of the perfect fhadow have the fame intenfity, the quantities of light emitted by each will be as the fquares of the diftances from the paper. By fome experiments made in this way, in the year 1785, Mr. Nicholfon (fee his Journal, vol. i.) was fatisfied that the degree of illumination could be thus afcertained, to an 80th or 90th part of the whole.

Count Rumford, in his " Account of a Method of meafuring the comparative Intenfities 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 ftands in a darkened room; let a fheet of clean white paper be equally fpread out, and faftened upon the wainfcot or fide of the room, at the fame height from the floor with the lights, and let the lights be placed over-againft this fheet of paper, at the diftance of fix or eight feet from it, and fix or eight feet from each other, in fuch a manner, that a line drawn from the centre of the paper, perpendicular to its furface, fhall bifect the angle formed by lines drawn from the lights to that centre; in which cafe, confidering the fheet of paper as a plane fpeculum, the one light will be precifely in the line of reflection of the other.

This may be eafily performed, by actually placing a piece of a looking-glafs, fix or eight inches fquare, flat upon the paper, in the middle of it, and obferving by means of it the real lines of reflection of the lights from that plane, removing it afterwards as foon as the lights are properly arranged.

When this is done, a fmall cylinder of wood, about a quarter of an inch in diameter, and fix inches long, muft be held in a vertical pofition, about two or three inches before the centre of the fheet of paper, and in fuch a manner, that the two fhadows of the cylinder correfponding to the two lights may be diftinctly feen upon the paper.

If thefe fhadows fhould be found to be of unequal denfities, which will almoft always be the cafe, then that light whofe correfponding fhadow is the denfeft, muft be removed farther off, or the other muft be brought nearer to the paper, till the denfities of the fhadows appear to be exactly equal; or in other words, till the denfities of the rays from the two lights are equal *at the furface of the paper*; when, the diftances of the lights from the centre of the paper being meafured, the fquares of thofe diftances will be to each other as the real intenfities of the lights in queftion at their fources.

If, for example, the weaker light being placed at the diftance of four feet from the centre of the paper, it fhould be found neceffary, in order that the fhadows may be of the fame denfity, to remove the ftronger light to the diftance of eight feet from that centre, in that cafe, the real intenfity of the ftronger light will be to that of the weaker as 8^2 to 4^2; or as 64 to 16; or 4 to 1; and fo for any other diftances.

It is well known, that the intenfity of any quality proceeding from a centre in ftraight lines in all directions, like the light emitted by a luminous body, at any given diftance from that centre will be as the fquare of that diftance inverfely; and hence it is clear, that the intenfities of the lights in queftion at their fources, muft be to each other as the fquares of their diftances from that given point *where their rays uniting, are found to be of equal denfity*. For putting $x =$ the intenfity of B; if P reprefents the point where the rays from A and from B meeting, are found to be of equal denfity or ftrength, and if the diftance of A from P be $= m$, and the diftance of B from the fame point $P = n$; then, as the intenfity of the light of A at P is $= \frac{x}{m^2}$, and the intenfity of the light of B at the fame place $= \frac{y}{n^2}$, and as it is $\frac{x}{m^2} = \frac{y}{n^2}$ by the fuppofition, it will be $x : y :: m^2 : n^2$.

That the fhadows being of equal denfity at any given point, the intenfities of the illuminating rays muft of neceffity be equal at that point alfo, is evident from hence, that the total abfence of light being perfect blacknefs, and the fhadow correfponding to one of the lights in queftion being deeper or fainter, according as it is more or lefs enlightened by the other, when the fhadows are equal, the intenfities of the illuminating rays muft be equal likewife.

In removing the lights, in order to bring the fhadows to be of the fame denfity, care muft be taken to recede from, or advance towards the centre of the paper in a ftraight line, fo that the one light may always be found exactly in the line of reflection of the other; otherwife the rays from the different lights falling upon the paper, and confequently upon the fhadows, at different angles, will render the experiment fallacious.

When the intenfity of one ftrong light is compared with the intenfities of feveral fmaller lights taken together, the fmaller lights fhould be placed in a line perpendicular to a line drawn to the centre of the paper, and as near to each other as poffible; and it is likewife neceffary to place them at a greater diftance from the paper than when only fingle lights are compared.

In all cafes, it is abfolutely neceffary to take the greateft care that the lights compared be properly trimmed, and that they burn clear and equally, otherwife the refults of the experiments will be extremely irregular and inconclufive.

To afcertain by this method the comparative denfities, or intenfities of the light of the moon, and of that of a candle, the moon's direct rays muft be received upon a plane white furface, 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 furface; when the fhadows of the cylinder correfponding to the moon's light, and to that of the candle, being brought to be of equal denfity, by removing the candle farther off, or bringing it nearer to the centre of the white plane, as the occafion may require, the intenfity of the moon's light will be equal to that of the candle *at the given diftance of the candle from the plane.*

To afcertain the intenfity of the light of the heavens by day or by night, this light muft be let into a darkened room through a long tube, blackened on the infide, when its intenfity 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 vabluable collection of facts eſtabliſhed by means of it, we refer to Leſlie'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 acuminated 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. Therſites 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, PHRANZES, 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 mafter of the wardrobe to his fucceffor John, and alfo to Conftantine, the laft emperor of the Eaft, by whom he was fent ambaffador to the courts of Georgia and Trebifond, for the purpofe of negociating a marriage for the young fovereign. When the Turks took Conftantinople, Phranza with his family were made flaves. In a few months, he and his wife were ranfomed; but his two children, a fon and a daughter, were feized for the feraglio, and loft to their unhappy parents. After this, Phranza became domeftic to prince Thomas, brother of the deceafed Conftantine, who employed him in various embaffies. He affumed the monaftic habit before his death, which took place at an advanced age. At the requeft of fome noble Corcyreans, he drew up a chronicle of the affairs relating to Conftantinople and the Morea, to moft of which he had been an eye-witnefs. This work is brought down to 1461; but though there are many MSS. of the Greek original extant in libraries, it has been publifhed only in the Latin verfion, or abftract of Pontanus, which, according to Gibbon, is very deficient in accuracy and elegance.

PHRASE, Phrasis, Φρασις, of φραζω, *I fpeak*, in *Grammar*, an elegant turn or manner of fpeech, peculiarly belonging to this or that occafion, this or that art, or this or that language.

Thus we fay, an Italian phrafe, an eaftern phrafe, a poetical phrafe, or a rhetorical phrafe.

A few elegant phrafes, pertinently applied, are an ornament of difcourfe; but, if they come too thick, they have an ill effect, and make the ftyle favour of affectation.

Phrase is fometimes alfo ufed for a fhort fentence, or fmall fet or circuit of words, conftructed together.

In this fenfe, father Buffier divides phrafes into *complete* and *incomplete*.

Phrafes are *complete*, where there are a noun and verb, each in its proper function; *i. e.* where the noun expreffes a fubject, 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 confifting of feveral words, without affuming any thing, and which might be expreffed in a fingle word.

Thus, *that which is true* is an incomplete phrafe, which might be expreffed in one word, *truth*: as, that which is true fatisfies the mind, *i. e.* truth fatisfies the mind.

Phrase, *Phrafe*, Fr., in *Mufic*, denotes the continuance of an air or harmony, which forms, without interruption, a fenfe more or lefs complete, and which is terminated by a cadence more or lefs perfect. In melody the phrafe is conftituted by the air; but in harmony, it is a regular feries of concords, united together by diffonances expreffed or underftood.

Phrafe is frequently ufed as fynonimous with *paffage*, in mufic. It is in the invention of mufical phrafes, in their proportion and texture, that the true beauties of mufic confift. A compofer who accents and phrafes his paffages well, is, according to Rouffeau, a man of wit. Upon this principle, Haydn's mufic is full of *bons mots*. A finger who feels, who marks and accents his phrafes well, is a man of tafte; but he who only fees crotchets and quavers, keys, meafure, and intervals in mufic,—in fhort, who only fings in time and tune, however ready and certain he may be, if he feels not the accents and phrafeology of what he executes, is nothing more than a vulgar ballad-finger.

PHRASEOLOGY, Phraseologia, Φρασεολογια, a collection of the phrafes, or elegant expreffions, in any language.

PHRAT, the name anciently given to the river *Euphrates*; which fee. Phrat is mentioned in fcripture, and is faid to have two derivations from the Hebrew, *phar* or *pharatz*, to fpread, and *pharah*, to produce fruit or flowers. Vincent.

PHRATRIARCHUS, Φρατριαρχος, among the Athenians, a magiftrate that prefided over the *phratria*, or third part of a tribe. He had the fame power over the phratria, that the phylarchus had over the tribe.

PHREATA, in *Ancient Geography*, a town of Cappadocia, in Garfauria. Ptolemy.

PHREATIS, or Phreattium, in *Greek Antiquity*, a court pertaining to the civil government of Athens, which was fituated upon the fea-fhore in the Piræus, and derived its name απο τȣ φρεατος, becaufe it ftood in a *pit*, or, as others fuppofe, from the hero Phreatus. The caufes heard in this court were fuch as concerned perfons that had fled out of their own country for murder, or thofe that fled for involuntary murder, and had afterwards committed a deliberate and wilful murder. The firft perfon that was tried in this place was Teucer, upon a groundlefs fufpicion, that he had been acceffory to the death of Ajax. The criminal was not permitted to come to land, or fo much as to caft anchor, but pleaded his caufe in his bark; and, if found guilty, was committed to the mercy of the winds and waves, or, as fome fay, fuffered there condign punifhment; if innocent, he was only cleared of the fecond fact, and, according to cuftom, underwent a twelvemonth's banifhment for the former. Potter's Gr. Antiq. vol. i. p. 111.

PHRENES, Φρενες, in *Anatomy*, the diaphragm.

It was thus called by the ancients, from φρην, *mind*; becaufe they imagined this to be the feat of the rational foul. Hence,

PHRENESIS, Phrensy, or *Diftraction*. See Phrenitis and Paraphrenitis.

PHRENETIC Nerves, called alfo *diaphragmmatic* and *ftomachic nerves*, in *Anatomy*, are nervous branches derived from the cervical nerves, which, joining in a trunk, run through the mediaftinum undivided, till, arriving near the diaphragm, they again divide, and fend off divers branches, fome into the mufcular, 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 φρην, *the mind*, fometimes written *phrenefis*, *a phrenfy*, or a diforder of the underftanding, (*fapientiæ ægritudo*, as Pliny denominates it, Hift. Nat. lib. vii. cap. 51.) has been underftood, however, in a limited fenfe from the time of Hippocrates; namely, as a continued ferocious delirium, accompanied by an acute fever, and arifing from inflammation of the brain, or its membranes. In the language of modern nofologifts, *phrenitis* fignifies 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 φρενες, *the diaphragm*, in which organ the mind was anciently fuppofed to be feated. See Paraphrenitis.

The fymptoms which characterife acute inflammation of the brain are a vehement fever, a violent deep-feated pain in the head, a rednefs and turgefcence of the face and eyes, intolerance of light and noife, continued watchfulnefs, and an impetuous and fierce delirium. (Cullen, Firft Lines, § 293.) Some writers, indeed, have attempted to eftablifh a diftinction, as in the inflammations of other vifcera, between the affections of the invefting membranes, and of the fubftance of the brain; and have maintained that the fymptoms juft enumerated were peculiar to inflammation of the membranes, whilft fome degree of coma, inftead of wakefulnefs,

fulnefs, characterifed the inflammation of the cerebrum itfelf. The fact is, in this, as in other vifceral inflammations, that both parts of the organ are commonly involved in the difeafe; but it is probable that the fymptoms are more violent, in proportion to the predominant affection of the membranes; and more obtufe and chronic, as the malady prevails more extenfively in the parenchyma or fubftance.

But, in truth, the fymptoms of inflammation of the common fenforium, the centre of fenfation and voluntary motion, are not always fo fimple and uniform as the figns of a fimilar affection of other organs. The other parts of the body, which are fo intimately connected with the fource of the nervous power, and fome of which are linked to it by direct and particular fympathies, are neceffarily more or lefs involved in the derangements of the brain. Inftead of a mere local difeafe, therefore, this inflammation becomes more peculiarly a general affection of the fyftem. Hence it is juftly remarked by moft writers on the fubject, that pure idiopathic phrenitis is a very rare difeafe, at leaft in this climate; in other words, that the congeries of fymptoms, conftituting the nofological character of the local inflammation above laid down, very feldom occur without great modifications. It fometimes puts on merely the ordinary character of common continued fever, when diffection has demonftrated not only the exiftence of inflammation, but of fuppuration in the brain. Indeed fo common is its occurrence in this form, though to a lefs degree than is followed by the fuppurative procefs, that an ingenious writer has attempted to prove, that all idiopathic fevers are, in fact, cafes of inflammation of the brain (fee Clutterbuck on Fever); an opinion which we have difcuffed at length under its proper head. (See FEVER.) It is univerfally admitted, however, that, except where external mechanical violence has been fuffered, a pure idiopathic phrenitis is rarely obferved; but that a fecondary or fymptomatic inflammation of the brain, of a lefs determined character, is frequently the refult of other difeafes, and then partakes more of an atonic or paffive form; arifing, for inftance, during the progrefs of general fever from any caufe, or from metaftafis in gout, rheumatifm, eryfipelas, and other acute diforders. It is juftly remarked, indeed, by an intelligent writer, that whenever the velocity of the circulation is much increafed, there muft always be, from the nature of the circulation in the head, a tendency to this complaint, or to congeftion in the larger veffels: hence headache, fuffufion of face, inflammation of the eyes, bleeding from the nofe, and other fymptoms denoting preternatural diftenfion of the veffels of the head, are among the moft frequent fymptoms of continued fever of the more acute kind. Wilfon on Febrile Difeafes, vol. iii. chap. 6.

Hiftory of the Symptoms.—Phrenitis often makes its attack with a fenfe of fullnefs in the head, flufhing of the countenance, and rednefs of the eyes, the pulfe being full, but in other refpects natural. As thefe fymptoms increafe, the patient becomes reftlefs, his fleep is difturbed, or wholly forfakes him. Sometimes it comes on with tremors of the limbs, and intolerable pains of the hands, feet, and legs; fometimes with ftupor and rigidity of the whole body; and fometimes with anxiety, and a fenfe of tenfion in the breaft, which is often accompanied with palpitation of the heart. Sometimes, again, the ftomach is early affected, (by its clofe fympathy with the brain,) and naufea, and a painful fenfe of weight in that vifcus, fometimes heart-burn and vomiting, are among the earlieft fymptoms.

The pain in the head foon becomes confiderable, and fometimes very acute. The feat of it is various: fometimes it feems to occupy the whole head; fometimes, although more circumfcribed, it is deep-feated and ill defined; and, in other cafes, it is felt principally in the forehead or occiput. The rednefs of the face and eyes generally increafes with the pain, and there is often a fenfe of heat and throbbing in the head, the countenance acquiring a peculiar fiercenefs.

Thefe fymptoms, for the moft part, do not laft long, before the patient begins to talk incoherently, and to fhew other marks of delirium: fometimes, however, delirium does not come on till the fifth, fixth, or feventh day. It gradually increafes till it often arrives at a ftate of phrenfy. The face becomes turgid, the eyes ftare, and feem as if ftarting from their fockets, tears, and fometimes even blood, flowing from them; and the patient fometimes refembles a furious maniac, from whom he is principally to be diftinguifhed by the fhorter duration of his complaint.

We fhould, *à priori*, expect in phrenitis confiderable derangement in the different organs of fenfe, which fo immediately depend upon the ftate of the brain; and fuch is the fact. The eyes are incapable of bearing the light, and falfe vifion, particularly that termed *mufcæ volitantes*, or floating motes and flafhes of light feeming to dart before the eyes, are frequent fymptoms. The hearing is often fo acute, that the leaft noife is intolerable: fometimes, on the other hand, the patient becomes deaf; and it has been even obferved, that the deafnefs and morbid acutenefs of hearing fometimes alternate. Affections of the fmell, tafte, and touch, are lefs obfervable.

The pulfe is not always fo much difturbed at an early period, as might be expected from the violence of the other fymptoms, compared with what is obferved in idiopathic fevers. In many cafes, however, the fever runs as high as the delirium, and the pulfe is harder than in common fever; indeed the hard and fmall pulfe is often one of the beft diagnoftics of the complaint: it is fometimes, though rarely, intermitting. The refpiration is generally deep and flow, fometimes difficult, now and then interrupted with hiccup, feldom humid and frequent, which laft is a very unfavourable fymptom. The deglutition is often difficult, fometimes convulfive. The ftomach is frequently oppreffed with bile, which is an unfavourable fymptom; and complete jaundice, the urine and fkin being tinged yellow, fometimes fupervenes. Inftead of a fuperabundance of bile, however, there is fometimes a deficiency of it, which feems to afford even a worfe prognofis. The fæces being of a white colour, and a black cloud in the urine, have been regarded as fatal fymptoms. The black cloud in the urine is owing to an admixture of blood; when unmixed with blood, the urine is generally pale.

Among the moft unfavourable fymptoms of phrenitis the following may be enumerated; namely, tremors of the joints, convulfions of the mufcles of the face, grinding of the teeth, fudden changes of the colour of the face from florid to pale, involuntary tears, a mucous difcharge from the nofe, 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, profufe fweat of the head, neck, and fhoulders, paralyfis of the tongue, general convulfions, much derangement of the internal functions, and the fupervention of the fymptoms of other vifceral inflammations, particularly of peripneumony. If the delirium changes to coma, and the pulfe at the fame time becomes weak and the deglutition difficult, the approach of death may be generally expected.

With refpect to the *caufes of phrenitis*, we have already obferved that it is a rare difeafe in our temperate climate, but is more frequently obferved in warm latitudes. The

predif-

predifpofition feems to confift in the irritability of youth, and of the fanguine temperament, as well as in a paffionate temper of mind. The exciting caufes are fuch circumftances, internal and external, as tend to produce an accumulation of blood in the head; among which are the direct influence of a vertical fun in tropical climates, or long expofure to it in hot weather in more moderate heats, efpecially under great bodily exertions; violent fits of anger; intoxication; concuffion, fracture of the fkull, or other mechanical violence; long and intenfe exertion of the mind; certain narcotic poifons, miafmata, and perhaps contagion.

The appearances which are obferved on diffection after death vary confiderably in different inftances, according to the actual feat of the inflammation, and to the duration and violence of the difeafe. Sometimes the *dura mater* is found reddened by a number of extremely fine veffels, filled with florid blood, which pafs between it and the cranium; but this membrane, when inflamed, exhibits lefs of this crowded ftate of veffels than many other membranous parts, which are naturally more vafcular. Sometimes a layer of coagulable lymph is found adhering upon its under furface, like an adventitious membrane; and fometimes adhefions are formed to a confiderable extent between it and the other membranes of the brain. It is not unufual, when the dura mater has been inflamed, efpecially in confequence of fome external violence, for fuppuration to take place, and pus to be found covering a portion of the membrane. Inflammation of the *pia mater* is more difficult to diftinguifh for a contrary reafon; namely, that in its natural ftate it is crowded with a great number of minute veffels: when inflamed, however, thefe fmall veffels are much more numerous, are filled with a florid blood, and form by their anaftomofis a beautiful network: at the fame time, there is a ftronger adhefion between the under furface of the membrane and the brain than ufual. It very rarely happens, that any layer of coagulable lymph is formed in the inflammation of the *pia mater*, which is fo very common in that of the *pleura* and the *peritonæum*. When the *pia mater* is inflamed to a high degree, pus is formed, and is fometimes found diffufed over the whole furface of the brain. When inflammation has exifted in the fubftance of the brain, it is rarely found extended over any large portion of it, but is rather confined to one or more diftinct fpots. In this ftate of difeafe the inflamed portion becomes of a red colour, although this is feldom very intenfe. When cut into, the colour is found to arife from a great many fmall veffels, which are filled with blood; and the part inflamed has no peculiar hardinefs, but yields nearly the fame fenfation to the touch, as it would do in a healthy ftate. If the inflamed portion be upon the furface of the brain, the membranes in the neighbourhood are alfo commonly inflamed. Inflammation of the brain frequently advances to fuppuration, and abfceffes are formed in it. When thefe are of a large fize, the weight of the pus breaks down the ftructure of the neighbouring parts, and they look fimply as if they had been deftroyed, or very much injured by the preffure. When the abfceffes are fmall, there is an ulcerated appearance of the cavities in which the pus is contained. Portions of the brain become gangrenous occafionally, efpecially after violent injuries of the head; but this appearance is extremely rare, where inflammation of the brain has originated from any other caufe. See Baillie's Morbid Anatomy, chap. xxiv.

The cure of phrenitis muft be conducted upon the fame general principles as that of other acute vifceral inflammations; and from the particular importance of the organ inflamed, the antiphlogiftic and evacuant plan muft be purfued with the utmoft vigour and expedition.

Blood-letting is to be confidered 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; inafmuch as a large quantity of blood can ufually be procured from the veffels immediately connected with the inflamed organ. When this advantage can be obtained, it fhould never be overlooked. It is advifable, therefore, to open the temporal artery, or the jugular vein, and to take a large quantity of blood, according to the violence of the fymptoms, and to the age and ftrength of the patient. Some authors recommend the opening of the artery, and fome (efpecially Dr. Cullen and Hoffmann) prefer the fection of the jugular vein. The frantic ftate of the patient fometimes renders either of thefe operations difficult, otherwife perhaps the choice is of little importance. We have feen a few inftances, in which a free bleeding from the temporal artery was followed by the moft fpeedy and permanent relief, where the phrenitis had followed intoxication and a metallic poifon. Dr. M'Bride recommends that the blood-letting be carried to the extent of producing fyncope or fainting; and when that effect follows, the relief is perhaps more generally complete; it is, however, rather a precarious rule of practice, and moft practitioners prefer the fafer mode of repeating the blood-letting at a fhort interval, than pufhing it fo far.

The effects of the blood-letting, in diminifhing the morbid determination of blood to the head, fhould be feconded by all other means in our power. The application of *cold* to the fcalp, fuch as wafhing it, after fhaving, with cold water, vinegar and water, or with æther and fpirits, (which laft produce a great degree of cold by their rapid evaporation) is often exceedingly beneficial. To affift in leffening the flow of blood to the head, the patient fhould be kept as near the erect pofture as can be borne. At the fame time, every irritation, efpecially thofe of light and noife, of which the inflamed fenforium becomes peculiarly fufceptible, fhould be carefully withdrawn. Some writers, efpecially of the old fchool, have recommended warm bathing to the lower extremities, and the application of blifters and rubefacients to them, for the purpofes of revulfion. But Dr. Cullen juftly regards them as very ambiguous remedies, which are likely to be productive of injury by increafing the general excitement of the circulation. It has been propofed to immerfe 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 fufficient experience has fcarcely been obtained to warrant the recommendation. *Blifters* have been generally applied over the fhaven fcalp, after the excitement has been fomewhat reduced by blood-letting; but, on the whole, the active abftraction of heat, by means of the cold and evaporating fluids, above-mentioned, feems to afford a more decided relief.

In addition to thefe direct means of diminifhing the inflammatory action in the head, the indirect effect, which is produced by copious evacuations from the bowels, obtained by the ufe of *purgatives*, is of great importance, and fhould be carefully attended to. Even fyncope itfelf has been produced by profufe evacuations from the inteftines, which implies the complete influence over the circulation in the brain, which fuch operations produce. The free ufe of cathartic medicines, therefore, fhould be reforted to in all cafes of phrenitis; and if a fpontaneous diarrhœa fhould fupervene, the practitioner will be careful not to check it.

As in all other cafes of inflammatory fever, every external fource of excitement fhould be carefully excluded; the apartment fhould 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 foft and moift ftate of fkin, and diminifhing febrile action.

When phrenitis occurs as a fecondary affection in common fever, or by metaftafis, it feldom affumes that violent character which idiopathic phrenfy puts on; and confequently it demands a lefs vigorous treatment. Neverthelefs the principles of the treatment muft be the fame. The removal of the determination of blood to the head muft be attempted by the fame meafures, ufed in a more moderate degree. Thus the more local evacuants, fuch as bleeding by leeches applied to the temples, by cupping and fcarifying the neck, and the application of cold, and of blifters to the fhaven fcalp, muft be reforted to, and repeated according to the violence of the fymptoms. The bowels fhould be evacuated by moderate cathartics, and fimilar diet and regimen fhould be adhered to as in the more acute fpecies. And it fhould be cautioufly obferved, that, even fhould fymptoms of typhoid fever fupervene, yet while there is evident congeftion in the brain, with flufhed face, ferrety eyes, delirium, or coma, wine and all other ftimulants muft be withheld, as having a direct tendency to aggravate the fymptoms, and to accelerate the fatal termination of the difeafe. See Fever. See Wilfon on Febrile Difeafes, vol. iii. chap. 6. Cullen's Firft 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 poffeffion, according to Diodorus Siculus.

PHRICODES, from φρικη, *horror*, *fhivering*, in *Medicine*, a fever defcribed by the ancients, of a remittent, femitertian form, in which the paroxyfms are not only ufhered in by fhiverings, 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 Ruffia, in the government of Viborg, on the N. coaft 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 Afia, on the confines of the Colchide and Iberia, according to Strabo; who fays that, in his time, it was called Ideeffa, and that it was well fortified.

PHRIXUS, a town of Afia Minor, in Lycia. Steph. Byz.—Alfo, a port of Afia, in the Thracian Bofphorus, near its mouth in the Euxine fea. Steph. Byz.—Alfo, a river of the Peloponnefus, in Arcadia, which received the waters of the Erafinus, and ran into the fea between Temenium and Lerna, according to Paufanias.

PHROLICHINO, in *Geography*, a lake of Ruffia, in the government of Irkutfk; 60 miles N. of Bargazinfk.

PHRONTIS, a word ufed by Hippocrates as the name of a peculiar diforder of the general nature of the melancholy affections. In this cafe the patient, he fays, feels, as it were, a thorn pricking the abdominal vifcera; he is extremely reftlefs and uneafy, and always avoids light and company. He dreads being touched, and becomes timorous and afraid of every thing; he is molefted with troublefome dreams, and imagines that he frequently fees fpectres and frightful objects.

PHRUGUNDIONES, in *Ancient Geography*, a people of European Sarmatia, near the fource of the Viftula, between the Sulones and the Avarini. Ptolemy.

PHRURÆSUM, mountains of Africa, in the interior of Mauritania Cæfarienfis, S.E. of the mountains Malæthubolus. Ptolemy.

PHRURI, a people of Scythia, in the vicinity of the Cafpian fea.

PHRURIUM, a promontory on the S. coaft of the ifle of Cyprus, near Curtum, and N.E. of the promontory Curias. The term denotes a fortrefs.—Alfo, a town of India, on this fide of the Ganges, placed by Ptolemy in the interior of the territory belonging to the Arvarni.

PHRYGANEA, in *Entomology*, a genus of infects of the order Neuroptera. The generic character is, mouth with a horny fhort curved mandible; four feelers; three ftemmata; the antennæ are fetaceous, longer than the thorax; wings equal, incumbent, the lower ones folded. There are fifty-five fpecies, divided into two fections. The genus Phryganea confifts of infects, which, in point of habit or general appearance, bear a confiderable refemblance to fome of the Phalænæ, (which fee,) and particularly to thofe belonging to the divifion entitled Tineæ. They may be diftinguifhed from moths by their feelers, as well as by the ftemmata fituated at the top of the head. The Phryganeæ proceed from fix-footed aquatic larvæ of a lengthened fhape, refiding in tubular cafes, which they form by agglutinating various fragments of vegetable fubftances, particles of gravel, &c. Thefe cafes are lined within by a tiffue of filken 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 fix fhort and flender legs; on the upper part of the back, in moft fpecies, is fituated an upright papilla or procefs, ferving as a kind of prop or ftay, preventing the cafe from flipping too forward during the time the animal is feeding. The perfect infects are feen in a fummer's evening floating in the air in large maffes, and are eagerly devoured by fwallows. The Phryganeæ are eafily diftinguifhed from the fmaller moths by their wanting the fpiral tongue.

A. *Tail with two truncate Briftles.*

Species.

Marginata. Wings immaculate; body brown, with yellowifh fpots on the head, fides of the abdomen yellowifh. It is a large infect, and found in Germany. The thorax is grooved on the back; briftles of the tail yellowifh, annulate with brown, and as long as the abdomen.

* Bicaudata. Wings reticulate; body brown, with a yellowifh line on the head and thorax. It inhabits this country and other parts of Europe.

* Nebulosa. Wings pale cinereous; body brown. It inhabits alfo this and other countries in Europe.

Viridis. Wings greenifh-hyaline, immaculate; body greenifh. This is a fmall infect, and inhabits Germany. The antennæ are green tipt with black; the head and thorax are green, the latter faintly margined with black; the abdomen and legs are greenifh.

B. *Tail without Briftles.*

Species.

* Reticulosa. Wings fub-ferruginous, reticulate with black; body black. An inhabitant of Europe, as is alfo the next.

* Striata. Wings teftaceous, with darker nerves.

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 phryganeæ, 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 *Cadew-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 phryganea, 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.

* Rhombica. 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 yellow-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 phryganeæ 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 shanks paler; antennæ moderate. It is found in various parts of Europe, but not in England.

Wæneri. 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 suture, 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 tipt with brown.

Fasciata. Wings pale-yellow, with four white bands, one entire, the others composed of spots.

STRIGOSA. Teftaceous; lower wings with a long white ftreak towards the tip.

MACULOSA. Wings brown, hairy, fpotted with white, two of the fpots folitary towards the tip at the outer margin.

LACINIOSA. Teftaceous; wings with three white bands united at the bafe, and each divided at the tip, with an oblique fpot in the middle.

ATOMARIA. Teftaceous; wings grey, with numerous whitifh folitary and confluent dots.

TESTACEA. Wings and body brown-teftaceous; lower ones whitifh.

INCONSPICUA. Brown; antennæ and fore-feelers long; wings grey, glabrous at the tip; legs yellowifh.

CILIATA. Black; wings fubteftaceous, fringed, the veins at the margin very much branched, the four fore-legs teftaceous.

ANNULATA. Brown; antennæ long, annulate with white; wings fringed at the inner and hind margins.

PHRYGANICUS, in *Botany*, a term ufed by Diofcorides, and many other of the ancient Greeks, to exprefs fuch herbaceous plants as have hard and woody ftalks; fuch are the garden-thyme, and feveral others of that kind. They alfo call thefe plants *xylodes*, ξυλωδες, and ξυλωιδεα ϖα.

PHRYGES, or PHRYX, in *Ancient Geography*, a river of Afia Minor. It difcharged itfelf into the Hermus, gave its name to Phrygia, and feparated this province from Caria, according to Pliny.

PHRYGI, a people of Illyria, in the vicinity of the Ceraunian mountains. Strabo.

PHRYGIA, a country of Proconfular Afia, concerning the name of which there are two different opinions: the one afcribing it to the country, whence it paffed to the people; and the other attributing it to the people, who gave it to the country. According to the former opinion fome have derived it from the river Phryges or Phryx (now Sarabat;) others from Phrygia, the daughter of Afopus and Europa, an etymology which is founded in mere fable. Bochart fuppofes, that this tract was called Phrygia from the Greek verb φρυγειν, to burn or parch, which, according to him, is a tranflation of its Hebrew name, derived from a verb of the fame fignification. This etymology bears relation to the nature of its foil, which was dry in many parts of it, and which, in its mountains, exhibited traces of volcanos. Another opinion afcribes the name of Phrygia to Phryges, the people who inhabited it; and it is faid that they had at a former period borne the name of Bryges or Breges; and thefe, according to Strabo, were the fame people: Herodotus fays, that whilft they remained in Europe they were called Breges, but after their paffage to Afia, their name was changed into Phryges.

With regard to the boundaries of Phrygia, Strabo informs us, that thofe of the Phrygians and Myfians were diftinct; but that it was fcarcely poffible to afcertain them. He adds, that the Trojans, Myfians, and Lydians, are all, by the poets, blended under the common name of Phrygians, which Claudian extends to the Pifidians, Bithynians, and Ionians.

Phrygia Proper, according to Ptolemy, was bounded on the north by Pontus and Bithynia; on the weft by Myfia, Troas, the Ægean fea, Lydia, Mæonia, and Caria; on the fouth by Lycia; and on the eaft by Pamphylia and Galatia. It lies between the 37th and 41ft degrees of N. lat., extending in longitude from 56 to 62 degrees. Phrygia is commonly divided into the *Greater* and *Leffer*, called alfo Troas; but this divifion did not take place till Troas was fubdued by the Phrygians; and hence it is more confidered by fome Roman writers as a part of Phrygia, than Bithynia, Cappadocia, or any other of the adjacent provinces. In fubfequent ages, the Greater Phrygia was divided into two diftricts or governments, one called Phrygia Pacatiana, from Pacatianus, who, under Conftantine, bore the great office of the præfectus prætorio of the eaft: the other Phrygia Salutaris, from fome miraculous cures faid to have been performed there by the archangel Michael.

This country, as well as the whole of Afia Minor lying in the 5th and 6th northern climates, was, in ancient times, highly celebrated for its fertility. It abounded in all forts of grain, being, for the moft part, a plain country covered with a deep rich foil, and plentifully watered by fmall rivers. In fome parts it furnifhed bitumen and other combuftible fubftances. Having large plains and pafture grounds, it was well ftocked with cattle. The air was anciently deemed very pure and falubrious, though it is now, in fome parts, thought to be extremely grofs, as a great part of the country lies in an uncultivated ftate. The moft remarkable cities in Phrygia Major were the following, *viz.* Apamea or Apamia, the metropolis of all Phrygia, till the above-mentioned divifion of Conftantine took place: this is commonly called Apamea Cibotos.—Laodicea, now Efkihiffar, feated on the banks of the river Lycus, not far from Apamea; the inhabitants of which carried on a very confiderable trade in wool, which was much admired for its foftnefs, and who were reckoned the moft wealthy people in Afia Minor. Laodicea was one of the feven churches mentioned in the Apocalypfe; but at prefent only its ruins are to be feen. At Efkihiffar, as it is now called, there are ftill to be feen four theatres of white marble, as entire as if they had been lately built; near one of them is an infcription in honour of the emperor Titus.—Hierapolis, famous for its mineral waters, which, according to Strabo, when expofed to the air, petrified in the fpace of a year, and yet poffefs fuch a virtue as to render the fields watered by them to be exceeding fruitful, and to afford a prefent remedy againft innumerable diftempers. Near this city was a deep cavern, which was always overfpread with a thick fog, and which exhaled fuch a peftilential ftream, that it ftifled 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-kalafi, and fome veftiges of its ancient magnificence may be ftill feen in heaps of ruins and fine pillars.—Gordium, fituated on the borders of Phrygia towards Cappadocia.—Coloffe, now Chonos, on the S. fide of the Meander.—Sipylus, the refidence of king Tantalus, and hence called Tantalis.—Synnada, noted for its marble quarries; built by Conftantine the Great, and declared the metropolis of Phrygia Salutaris, after his divifion took place. Befides thefe, and other cities of lefs note, there were fome in later times of no fmall account; fuch as Saqua, Chara-Chifar, Cillexuga, Einegiol, &c. taken by the Ottomans from the Chriftian princes, at the firft rife of the Ottoman empire.

The rivers of this country are the Mæander, now Madre or Mendre, which rifes in the hill Celænæ, paffes through Phrygia, divides Caria from Lydia, and after, as it is faid, 600 windings, by which it feems to flow back to its fountain-head, empties itfelf into the Archipelago between Priene and Miletus.—Marfyas, rifing near or at the fpring of the Mæander, and rufhing down from a confiderable height between rugged rocks, and after flowing through the town of Celænæ, in the fame channel with the

the Mæander, feparating into two branches, which form thefe two rivers; Marfyas purfuing a direct courfe with an incredible rapidity, and near Apamea being again received into the Mæander. Sangarius or Sangaris, fpringing from the hill Dindymus, wafhing Phrygia and Bithynia, and difcharging itfelf into the Black fea.—Phryx or Phryges, (which fee.)—Hermus, celebrated by the poets for its gold fands, which rifes near Dorylæum, and falls into the Archipelago near Smyrna.—Myfias, Orga, Olrima, &c.

The Phrygians claim high antiquity; but their origin is uncertain. Jofephus and St. Jerom fuppofe that they are defcended from Togarmah, one of the fons of Gomer. Herodotus, Strabo, Pliny, and Euftathius deduce their origin from the Brygians, a people of Macedonia, who, paffing into Afia Minor, were called Phrygians. Bochart agrees with thofe who trace their origin to Gomer, the eldeft fon of Japhet. Whatever was their origin, they were fuperftitious, voluptuous, and effeminate, without prudence, and fo fervile in their temper, that they could be induced to comply with their duty only by ftripes and ill ufage. This character, under which they are defcribed, gave rife to feveral trite and well-known proverbs: "Phryges feró fapiunt;" "Phryx verberatus melior;" &c. Their mufic was fuited to their effeminate temper, and tended, as fome have faid, to enervate the mind. The Phrygians are faid to have been the firft inventors of divination by the finging, flying, and feeding of birds. Their government was monarchical, and they were for fome time under one fovereign. But fome time before the Trojan war, this country was divided into feveral petty kingdoms, and feveral princes reigned at the fame period. Apollodorus mentions a king of Phrygia, who was contemporary with Ilus, king of Troy. Cedrenus and others fpeak of Teuthrans, king of a fmall part of Phrygia, whofe territories were ravaged by Ajax, and his daughter Tecmaffa carried away captive by the conqueror. Homer mentions Phorcys and Afcaneus, both princes and leaders of the Phrygian auxiliaries, that came to the relief of Troy. Tantalus was king of Sipylus, and he is faid to have been no lefs famous for his great wealth, than infamous for his avarice, and other deteftable vices. It is alfo reported, that with a view of appeafing internal difcords, the Phrygians confulted 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 Afia Minor, which was the place of refort for merchants and traders from all parts of Greece, Italy, and the neighbouring iflands. From Syncellus we alfo learn that the Phrygians were for fome time mafters of the fea, and none but trading nations ever prevailed in that element. The country produced many rare and ufeful commodities, which afforded confiderable exports. They had a fafe coaft, convenient harbours, and other advantages which warrant our concluding that they carried on a confiderable trade. Of their laws we have no knowledge; and in favour of their learning it may be alleged, that, as they enjoyed the fovereignty of the fea, they muft have had a competent fkill in geography, geometry, and aftronomy; to which we may add that they had a more than ordinary knowledge of mufic.

It has been the opinion of fome writers, that the Phrygian language bore a great refemblance to the Greek, but others have alleged to the contrary. The few Phrygian words which have been tranfmitted to us, are carefully collected by Bochart and Rudbeckius. Strabo alfo fays, that it is difficult to difcover any fimilitude between the barbarous words of the Phrygian language and the Greek. The Egyptians looked upon the Phrygian tongue as the moft ancient language of the world: but other nations, and particularly the Scythians, will not admit this fact.

The ancient Phrygians were much addicted to fuperftition. They had many idols: but their principal deity feems to have been Cybele. (See CYBELE.) They alfo worfhipped feveral other idols, *viz.* Bacchus, Adagyus, and the Cabiri. In folemnizing the feftivals of their gods, and on other occafions, they had dances and fongs, which they called "lityerfes," from Lityerfes, fon 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 whofe names are recorded were, Nannacus, Annacus, or Cannacas, who is the firft king mentioned in hiftory, Midas, Marcis, 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 ftate till Crœfus was conquered, and all Lydia was reduced by Cyrus.

PHRYGIA *Minor*, or *Leffer Phrygia*, was divided into two parts, the maritime, called "Hellefpontiaca," and the Mediterranean, termed "Epictetus." The former borrowed its namo from the Hellefpont, and extended along the coaft from the town of Percote to the promontory Lectum or Lecton, oppofite to the N. fide of the ifland of Lefbos. 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 alfo the greater and leffer Myfia. Epictetus, or the inland part of Phrygia Minor, extended to the neighbourhood of mount Olympus, in the greater Myfia. This part at firft belonged to Prufias, king of Bithynia, who yielded it, by agreement, to Eumenes, king of Pergamus, whence it was called Epictetus, that is, acquired. However, thefe 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 fmall extent. In general it may be faid, that Phrygia Minor, as comprehending both the Hellefpontiaca and Epictetus, was bounded by the Propontis on the N., by the Ægean fea on the S., by Myfia Minor on the E., and the Hellefpont on the W. On the fea-coaft were the cities of Percote, Abydus, Arifba, Dardanum, Rhetum, Sigeum, Troy or Ilium, Lariffa, Colonæ, Alexandria, and Troas.

Of the rivers that watered Troas, or Phrygia Minor, we need only mention the Scamander and Simois, which fee refpectively. The only mountain of this country that deferves notice was mount Ida, being a ridge of hills extending from the city of Zeleia, near the borders of Myfia Minor, to the promontory Lectum.

The foil of this diftrict was anciently reckoned extremely fertile; and it has even now figns of fertility, though in a great meafure neglected and uncultivated. Modern travellers defcribe the Afiatic coaft of the Hellefpont, as a moft beautiful and fertile tract of land; the hills being covered with vineyards and olive plantations, and the vales productive of all forts of grain.

The inhabitants of Leffer Phrygia, or Trojans, fo called from Troy, the metropolis of that country, were undoubtedly a very ancient people; but authors are not agreed about their origin. Some reprefent them as by defcent Samothracians; others fay they were Greeks; fome again derive them from the ifland of Crete, whence they fuppofe Phrygia Minor

Minor to have been peopled; others fay, that they were defcended from the Arcadians, and there are writers who maintain that they originally came from Italy, in which opinion Virgil concurs.

Bochart thinks that Leffer Phrygia was planted by Afhkenaz, Gomer's eldeft fon, becaufe fome appellatives of lakes, rivers, iflands, cities, and men of that country, bear a refemblance to this name. But the blood of the firft inhabitants of this country, whoever they were, was mixed in procefs of time with that of foreigners, namely, of Myfians, Samothracians, Greeks, and Cretans, who fettled among them, and were reckoned of the fame defcent with the ancient proprietors.

As to their government, it was unqueftionably monarchical and hereditary; for from Dardanus to Priam, the father was conftantly fucceeded by the fon, or the elder brother by the younger. Their country was at firft parcelled out into feveral fmall kingdoms: but the fovereigns of all thefe were, in length of time, either expelled or made tributary by the Trojan kings; infomuch that Strabo enumerates nine fmall kingdoms, or principalities, fubject to Troy, befides the ifland of Lefbos. On this account the Trojan war was fo protracted; becaufe all thefe countries were to be fubdued before Troy could be invefted. Of their laws no particular fyftem remains. Their religion was fubftantially the fame with that of the inhabitants of Greater Phrygia. Their principal deities were Cybele, "the grand-mother of the gods," as they ftyled her, Apollo, Minerva, and Pallas, (fee PALLADIUM,) Venus, and Apollo Sminthius. The Trojans are celebrated as one of the moft polite and civilized nations of thofe days; and in the reigns of their later kings they rofe to a very confiderable pitch of fplendour and magnificence. Their language was probably the fame that was fpoken by the inhabitants of Greater Phrygia. Their trade can only be gueffed at from their fituation, 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 neceffaries of life, as we may conclude from their having fupported two very confiderable armies for many years. Their fettlements in Thrace, Peloponnefus, Sicily, Italy, Egypt, and Africa, afford fufficient proof, that they applied themfelves at an early period to trade and navigation, which, moft probably, were the fources of the riches, fplendour, and power, in which they far excelled all the neighbouring ftates.

Troas, or Phrygia Minor, was, in all probability, governed by kings before the reigns of Teucer and Dardanus; but the Trojan hiftory of that period is either fabulous or uncertain. Teucer, as fome fay, was the firft fovereign; he was the fon 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 Teucria; and the inhabitants were denominated Teucri. He was fucceeded by Dardanus, who extended the boundaries of his kingdom by confiderable acquifitions, 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 fucceeded by his fon Erichthonius, who after a long, honourable, and profperous reign of 46, as fome fay, or according to others, 75 years, left the kingdom of Phrygia in a flourifhing condition. Tros, the founder of Troy, was his fucceffor, from whom Phrygia Minor borrowed the name of Troas, as its metropolis did that of Troy. He was fucceeded by his fon Ilus, who drove Tantalus out of Afia, and annexed his kingdom to the crown of Phrygia; and having enacted many ufeful laws for the regulation of public affairs, he died in the 40th year of his reign. On the death of Ilus, his fon Laomedon was placed on the throne; he built the citadel of Troy, but having treated Jafon and the Argonauts, who had landed on the coafts of Troy, in an inhofpitable manner, Hercules, who was one of them, avenged their caufe by taking Troy, and afterwards killing Laomedon. Podazers, his only furviving fon, was his fucceffor. In his reign happened the war which terminated in the capture of *Troy*, which fee; the city of Troy being utterly ruined, and moft of the inhabitants of Troas put to the fword. Some writers fay, that the neighbouring Phrygians and Lydians poffeffing themfelves of that country, fettled there; and that Troas from that time began to be called Phrygia; others are of opinion, that Æneas, having gathered together the fcattered remains of the Trojans, rebuilt the city; and that his defcendants, and the defcendants of Hector, reigned there till the country was fubdued by the Lydians, who became fo powerful as to over-run all Afia Minor. If the Trojans had any kings of their own, after their city was deftroyed by the Greeks, they probably made but an indifferent figure, fince they are not even named in hiftory. Anc. Un. Hift. vol. iii.

PHRYGIAN MODE, in *Mufic*. See *Grecian* MODE. This mode and its effects are fo frequently mentioned in ancient authors, that we muft collect into a point its pretended properties. The Phrygian mode is one of the principal and moft ancient modes of the Greek mufic. Its character was ardent, fierce, impetuous, vehement, and terrible. So that, according to Athenæus, trumpets and other military inftruments, founded in the Phrygian mode. All this, however, might be faid of our trumpets in founding the charge, fignals of battle, and even in playing marches; and that our kettle-drums and fide-drums are beaten in the Phrygian mode; in which all mufic feems at prefent tranfpofed by the eternal din of double drums and trumbone.

PHRYGIAN *Stone*, *Phrygius Lapis*, in *Natural Hiftory*, the name of a ftone defcribed by the ancients, and ufed in their time in dyeing; probably from fome vitriolic or aluminous falt contained in it, which ferved to enliven or fix the colours ufed by the dyers.

It was a light fpungy mafs, refembling a pumice, and the whiteft and lighteft were efteemed the beft. Pliny gives us an account of their preparing it for ufe for dyeing, which was by moiftening it with urine, and then heating it red-hot, and fuffering it to cool again: this calcination was repeated three times, and the ftone was then fit for ufe; and Diofcorides recommends it in medicine after burning; he fays it was drying and aftringent.

PHRYGIANS, PHRYGES, or PHRYGASTES, as St. Epiphanius calls them, in *Church Hiftory*, were a branch of the Montanifts; fo called from Phrygia, a country where they abounded.

They efteemed Montanus their prophet; and looked on Maximilla and Prifcilla as great propheteffes.

This fpirit of prophecy, or rather enthufiafm, was their diftinguifhing character. See CATAPHRYGIANS.

PHRYMA, in *Botany*, a Linnæan name, whofe meaning or derivation nobody has ventured to guefs, nor can we throw any light upon the fubject. Linn. Gen. 303. Schreb. 399. Willd. Sp. Pl. v. 3. 179. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 431. Juff. 117. Lamarck Illuftr. t. 516. Gærtn. t. 75. (Leptoftachia; Mitchell Eph. Nat. Cur. v. 8. 212.)—Clafs and order, *Didynamia Gymnofpermia*. Nat. Ord. *Perfonatæ*, Linn. *Labiatæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cylindrical,

drical, ftriated, gibbous at the bafe on the upper fide, two-lipped; its upper lip narrow, and longeft, with three awl-fhaped converging teeth; the lower obtufe, cloven. *Cor.* of one petal, ringent: tube the length of the calyx; upper lip fhorteft, nearly ovate, emarginate, ftraight; lower larger and more fpreading, three-cleft, the middle fegment moft prominent. *Stam.* Filaments four, two at each fide, the upper ones fhorteft; anthers roundifh, approximated, in the throat of the corolla. *Pift.* Germen oblong; ftyle thread-fhaped, the length of the ftamens; ftigma obtufe. *Peric.* none, except the permanent, furrowed, clofed calyx. *Seed* folitary, oblong, nearly cylindrical, with a furrow at one fide.

Eff. Ch. Calyx two-lipped, five-toothed. Seed folitary.

1. Ph. *leptoftachya.* Slender-fpiked Phryma. Linn. Sp. Pl. 838. Suppl. 277. Amoen. Acad. v. 3. 19. (Circææ foliis, amaranthi ficuli Boccone fpicâ, floribus parvis purpureis propendentibus, herba Floridana; Pluk. Amalth. 59. t. 380. f. 5.)—Leaves ovate, ferrated. Calyx of the fruit deflexed.—Native of clofe woods in North America; "from Canada to Carolina." *Michaux.* It is faid to have been fent to Kew in 1802, by the late Mr. Maffon, and is marked as a hardy perennial, flowering in July and Auguft. The herbage refembles a *Verbena* or *Veronica*, and the *flowers*, difpofed in long flender terminal fpikes, are too fmall and unattractive to obtain much favour. It is to be wifhed however that a good figure of fo little known a plant and genus might be given to the public.

2. Ph. *dehifcens.* Splitting Phryma. Linn. Suppl. 277. Willd. n. 2. (Buchnera cuneifolia; Linn. Suppl. 288. Willd. Sp. Pl. v. 3. 335. Thunb. Prodr. 100.)—Leaves wedge-fhaped, fharply toothed at the fummit. Calyx of the fruit erect, fplitting lengthwife. - 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 miftake, though he juftly objected to its being a *Phryma.* We muft rely on Thunberg's authority in fuppofing it a *Buchnera.* The *ftem* is fhrubby, much branched, of humble growth. *Leaves* oppofite, ftalked, wedge or fan-fhaped, flefhy, rough with minute points or briftles; terminating in about feven ftrong fharp teeth. *Clufters* terminal, folitary, fimple, three or four inches long, of numerous *flowers*, which Linnæus the elder has very carefully defcribed on his fpecimen before us, as follows. "*Calyx* of one leaf, cylindrical, with five angles; abrupt, with five teeth; finally fplitting along one fide. *Corolla* of one petal; tube cylindrical; limb in five, nearly equal, fmall, rounded fegments. *Stamens* two long and two fhort. *Germen* fuperior, oblong; ftyle fhort; ftigma fimple. *Seed* (rather *capfule*) almoft as long as the calyx, obfcurely quadrangular, compreffed, fmooth, rugged in the upper part; abrupt at the bafe; of two cells. *Seeds* folitary, fomewhat club-fhaped." The fewnefs of the *feeds* is the chief objection to our confidering this plant as an indubitable *Buchnera.* Perhaps it ought to conftitute a new genus, but its habit clofely agrees with the Linnæan *Buchnera cernua*, an imperfect fpecimen of which is actually laid into the Linnæan herbarium as a nondefcript *Phryma.* We are unacquainted with the number of its *feeds.*

PHRYNICUS, furnamed *Arrhafius*, in *Biography*, a Greek fophift or orator, was a native of Bithynia, and flourifhed in the reigns of Marcus Antoninus and Commodus. Two works are attributed to him, *viz.* "Apparatus Sophifticus," 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 beft edition of this work is that of Pauw in 1739. Of the fame name were a compofer of a tragedy, the difciple of Thefpis, and a comic poet, who flourifhed about a century later.

PHRYNIUM, in *Botany*, a name borrowed by Willdenow from the ancient Greeks, whofe φρυνιον was fo called from φρυνη, *a red kind of land toad*, reputed venomous, to which the plant in queftion, being armed with fpines, was thought to be hoftile. Our *Phrynium* is a fmooth herb, growing in damp fhady places, and rather affording fhelter 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.)—Clafs and order, *Monandria Monogynia.* Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Brown Prodr. Nov. Holl. v. 1. 307.

Gen. Ch. *Cal.* Perianth fuperior, of three awl-fhaped, erect, equal leaves. *Cor.* of one petal, tubular; its limb in feven fegments; the three outermoft acute, nearly equal, reflexed; the four innermoft obtufe, erect, unequal. Nectary a long, channelled, upright lip. *Stam.* Filament folitary, awl-fhaped, fhort, united to the bafe of the nectary at one fide; anther oblong, irregular, fimple. *Pift.* Germen inferior, ovate, triangular; ftyle thick, fhort, fcarcely exceeding the ftamen; ftigma concave, bent towards the anther. *Peric.* Capfule bluntly triangular, of three cells. *Seed* folitary, ovate, fmooth.

Eff. Ch. Calyx of three leaves. Inner fegments of the corolla four, obtufe, unequal. Stamen awl-fhaped. Anther fimple. Style thick, fhort, inclined towards the anther. Capfule with one feed.

Obf. It appears by the defcriptions of authors, for we have not feen the fruit or germen, that the latter is of three cells, with the rudiments of three feeds, 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 moift fhady places in Cochinchina China, and the coaft of Malabar. *Root* perennial, knotty, creeping horizontally. *Stem* none. *Leaves* radical, on long, fimple, upright fmooth *ftalks* four feet high, ovate-oblong, acute, entire, flat, fmooth, coriaceous, a foot long, obliquely furrowed. *Flowers* white, in a large feffile hemifpherical *cyme*, from a lateral cleft below the middle of the *leaf-ftalk*, accompanied by two large *bracteas*, embracing feveral fmaller ones, each common to many *flowers.* Loureiro obferves that the *germen* is generally abortive, and that the *leaves* are ufed for wrapping up cakes, in the oven, to give them an agreeable tafte as well as colour. The young unfolded *leaves* are infufed in rum or arrac, with thrice as much water, to make vinegar.

This may perhaps not be the only fpecies of its genus. We have two nondefcript plants gathered at Sierra Leone, by Dr. Afzelius, which that excellent botanift judged to belong to *Phrynium.* Their *inflorefcence* however feems to be terminal, and we are rather more inclined to refer them to *Thalia*, or perhaps *Maranta.*

PHRYNUM, in *Zoology.* See RANA *Bufo.*

PHTHALEON, in *Ancient Geography*, a town of Greece, upon the Pegafean gulf.

PHTHAS, in *Mythology*, a name given among the Egyptians to the Greek Vulcan, whom they confidered as the Supreme Divinity, or at leaft as an attribute of that active principle, or intelligent power, eternally united, in their opinion, with the chaotic mafs, by whofe energy the elements were feparated, and bodies were formed, and who continually prefides over the univerfe, and is the efficient caufe of all effects. For this we have not only the autho-

rity

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 Ramestas, 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 τω πρωτω Θεω, the supreme deity. Brucker's Phil. by Enfield, vol. i. Savary's Travels in Egypt, vol. i.

PHTHEMBUTI, in *Ancient Geography*, a nome of Egypt, the capital of which was called "Tava" by Ptolemy.

PHTHENOTES, a nome of Egypt, the capital of which was Butos. Ptolemy.

PHTHIA, a port of Africa, in Marmarica, between the great Chersonesus and Paliurus.—Also, a town of Asia, in the vicinity of the Euxine sea.

PHTHINTHIA, a town situated in the interior of Sicily. Ptolemy.

PHTHIOTIS, a country of Greece, in Thessaly; it lay to the S.E. near Magnesia.

PHTHIRA, or Phthiro, a mountain of Asia Minor, in Caria. Steph. Byz. and Suidas.

PHTHIRIASIS, φθειρίασις, in *Medicine*, from φθειρ, *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, coloratior, vestimentorum laxior, magis cinerea." These pediculi are bred abundantly among the inhabitants of sordid dwellings, of gaols, and work-houses, &c. and in such situations prey upon persons of all ages indiscriminately. There is, however, also a peculiar state 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 Alcmæon 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 thefe a perfon not diftinguifhed by any merit or virtue, Eunus, a fugitive flave, who was author of the war in Sicily, called the "fervile war," and who was taken and carried prifoner to Rome, died likewife of this ficknefs." (See Plutarch's Life of Sylla; alfo, Plin. Hift. Nat. lib. xxvi. cap. 13, who, fpeaking of phthiriafis, obferves, "quà Sylla dictator confumptus eft.) Herod, Ennius, and by fome Plato is faid alfo to have been deftroyed by the loufy difeafe.—In more recent times, Amatus Lufitanus has affirmed, that he was witnefs to the cafe of a gentleman, who perifhed miferably in this difeafe: "for fo univerfally did thefe infects fwarm over his body, that two negro fervants were entirely employed in collecting bafkets full from his perfon, and carrying them to the fea." Amat. Lufit. Contur. iii. Cur. 58. See alfo Foreft. Obf. Med. lib. viii. obf. 14. Johan. Schenck. Obf. Med. lib. v. obf. 2.

The mode in which pediculi are generated being now well afcertained, and fuch fatal fwarms of them being altogether unknown in modern experience, we can fcarcely give credit to thefe accounts. They are not only in all probability much exaggerated, but have actually originated in miftake. We have fhewn in a former article (fee INSECTS *infefting the human body*), that the *larvæ* or grubs of feveral winged infects, efpecially thofe of the common fly (Mufca domeftica, Linn.), and of the black beetle (Tenebrio molitor), not unfrequently breed, both in the internal paffages, and in external wounds, of the human body. And in warm climates, the flies are fo numerous about the perfons of the fick, that the utmoft care is requifite to prevent the generation of larvæ from the eggs which they depofit, not only in fuperficial wounds, but in the noftrils, mouth, gums, &c. fometimes even penetrating to the brain itfelf, and producing death. (See Dr. Lempriere's Obfervat. on the Difeafes of the Army in Jamaica, vol. ii. p. 182.) In the fame way maggots are fometimes generated in the patches of cutaneous eruptions, as defcribed by profeffor Murray of Göttingen in the cafe of leprofy. (See his Obf. de Vermibus in Lepra obviis. p. 25.—See alfo Bateman's Pract. Synopfis of Cutaneous Difeafes, p. 21. and Edin. Medical and Surg. Journal, for January 1811, p. 41.) From this view of the fubject, therefore, little doubt can remain, that the fatal cafes of antiquity, above alluded to, occurring in the warmer regions of Europe, were in reality cafes of ulceration, arifing from fcurvy or fome other cachectic condition, which afforded a nidus for the breeding of the maggots of flies, and were not true inftances of the morbus pedicularis.

The generation of lice, however, in connection with the prurigo of elderly people, though not fatal, is frequently a very troublefome and obftinate malady, and many external applications have been reforted to from ancient times to deftroy thefe loathfome and irritating parafites. But the deftruction of them is commonly a mere alleviation; fince their reproduction is extremely rapid. A decoction of the feeds of ftavefacre, or of the cocculus indicus, or the powder of either of thefe fubftances, alone or mixed with lard in the form of an ointment, are very effectual deftroyers of the pediculi of the head, and even of the body-lice. The mercurial ointments, fuch as that of the white precipitated oxyd, are alfo very efficacious in the fame inftances. For the *morpiones*, or crab-lice, as they are called from their round and flattened form, which fix themfelves firmly in the fkin, about the pubes, axillæ, and in fact on every part of the trunk and extremities where there is hair, are inftantly and completely deftroyed by inunction with the common blue mercurial ointment. The fpike-oil, as it has been called, which is the effential oil of lavender, mixed with oil of turpentine, has been deemed the moft efficacious poifon for thefe morpiones: its virtue depends perhaps principally upon the oil of turpentine, which is doubtlefs the moft ready inftrument of deftruction to all the infect tribe. Sir Edward Wilmot is faid by Dr. Heberden to have ufed, with complete fuccefs, in a cafe of morbus pedicularis, a compofition fomewhat fimilar to the fpike-oil; *viz.* of rectified oil of turpentine, and fpirit of wine, each four ounces, camphor fix drachms. A folution of the corrofive muriate of mercury in fpirit is alfo often efficacious in the pedicular prurigo of the body, and tends to remove the pruriginous affection of the fkin, which feems to give rife to the tendency to generate lice. It is to be obferved, however, as a matter of caution, that none of thefe pungent ftimulating fubftances can be applied to the fkin, without inflicting extreme pain, unlefs its furface be unbroken: for where the cuticle is abraded by fcratching, or by the breaking of puftules and veficles, or by the formation of rhagades or chaps, the irritation and fmarting excited by them is intolerable, and is followed by confiderable inflammation.

PHTHIRION, in *Botany*, a name ufed by fome authors for the *pedicularis*, or red rattle.

PHTHIROPHAGI, in *Ancient Geography*, the name of a people who inhabited the coafts of the Euxine fea. Mela.

PHTHISIS, in *Medicine*, from φθιω, *to corrupt*, fignifying corruption or *emaciation* in general, is commonly limited to that fpecies of emaciation, which arifes from a difeafe of the lungs; whence the epithet *pulmonalis* is ufually conjoined with it, denoting *pulmonary confumption*. See CONSUMPTION.

PHTHUTH, in *Ancient Geography*, a river of Africa, in Mauritania Tingitana. Ptolemy.

PHU, in *Botany*, a name by which fome authors call the great garden valerian.

PHUCAGROSTIS, φυκαγρωστις, from φυκος, *a fea-weed*, and αγρωστις, *grafs*, a name which has been applied to the *Zoftera*, or Grafs-wrack. Cavolini, an eminent Neapolitan naturalift, has given it a temporary adoption, to diftinguifh one of the genera, of which he has found feveral confounded under *Zoftera*. His *Phucagroftis* is, however, well fhewn by Mr. Konig, in Ann. of Bot. v. 2. 92, to be itfelf the true Linnæan *Zoftera*; and the name is, moreover, inadmiffible, as being compounded of two already eftablifhed, *Agroftis* and *Fucus*; in which refpect it is no lefs faulty than the *Calamagroftis* of fome writers.

PHUMANA, in *Ancient Geography*, a town of Afia, in Babylonia, in the vicinity of Arabia deferta, according to Ptolemy, who marks it between Chuduca and Coefa.

PHUPHAGENA, a town of Afia, in Leffer Armenia, in the interior of the country towards the mountains between Arana and Mardara, according to Ptolemy.

PHUPHENA, a town of Afia, in the interior and near the mountains of the Leffer Armenia, between Ifpa and Arana, according to Ptolemy.

PHUSIANA, a town of Afia, in the interior of Affyria, between Gomara and Ifone, according to Ptolemy.

PHUSIPARA, a town of Afia, in Leffer Armenia, between Cienica and Eufimara. Ptolemy.

PHUT, a country and river of Africa, in Mauritania Tingitana. Pliny.

PHYCIS, in *Ichthyology*, the name of a fpecies of blennius, called *tinca marina*, or fea-tench: the leffer hake of the Britifh zoology.

PHYCIS is alfo a name given by Artedi, after Ariftotle, Pliny, and the reft of the ancients, to a fifh nearly allied to to the genus of the *blenni*, and called by fome *trebius* and *fuca;* and, according to Rondeletius, the *tinca marina* of the Italians. Salvian, however, denies that it is the tinca marina, and the matter is yet undecided among the writers on this fubject.

PHYCITES, in *Natural Hiftory*, the name given by the ancients to a ftone which had the impreffion of a fea-plant of the fucus or alga kind; probably in the manner in which our black coal flate is frequently found to contain the impreffions of fern and other vegetables.

PHYCTEUM, in *Ancient Geography*, a town of Greece, in the Peloponnefus.

PHYCUS, a promontory and fortrefs of Africa, in Cyrenaica, between Aptuchi Fanum and Apollonia. Ptolemy.

PHYCUSSÆ, iflands of Libya. Steph. Byz.

PHYGELA, a town of Afia Minor, in Ionia. Mela and Pliny.

PHYGETHLON, in *Surgery*, a carbuncle, or a phlegmon attended with confiderable heat, pain, rednefs, &c.

PHYLA, in *Botany*, a genus of Loureiro's, named by him from φυλη, *a tribe*, or *company*, becaufe a confiderable number of flowers are produced from one common calyx. Loureir. Cochinch. 66.—Clafs and order, *Tetrandria Monogynia*.

Gen. Ch. *Common Calyx* ovate, imbricated, of numerous, crowded, fpatulate, pointed leaves, containing many flowers. Perianth inferior, of two lanceolate, concave, erect leaves. *Cor.* of one petal, tubular, irregular; limb fhort, fpreading, in four nearly equal fegments, the uppermoft emarginate. *Stam.* Filaments four, fhort, in two rows below the mouth of the tube; anthers roundifh, two-lobed. *Pift.* Germen fuperior, roundifh; ftyle fhort; ftigma thickifh. *Peric.* none. *Seeds* folitary, naked, covering a thread-fhaped, naked, common receptacle.

Eff. Ch. Common calyx imbricated; proper of two leaves, inferior. Corolla four-cleft, irregular. Anthers roundifh, within the tube. Seed folitary.

1. Ph. *chinenfis*.—Native of China, where it is called *Lien fuen*. The *ftem* is herbaceous, annual, creeping, with afcending branches. *Leaves* oppofite, ovato-lanceolate, pointed, fmooth, ferrated towards the point only. *Flower* pale violet, lateral, on a long folitary ftalk. The author fufpected an affinity between this plant and *Protea*, guided, as it feems, by the artificial characters only, by which many an honeft man, fetting a falfe ftep in the beginning, has, like Gulliver's Laputian mathematicians, been led widely aftray. Nothing indeed can lefs accord with *Protea*, than the plant indicated by the above defcription, which we ftrongly fufpect to be no other than *Verbena nodiflora!* In that cafe however the *feeds* fhould have been defcribed two to each *flower*.

PHYLACA, in *Ancient Geography*, a place in the Peloponnefus, where is the fource of the river Alpheus. Paufanias.—Alfo, a town of Epirus, in the Moloffide. Livy. —Alfo, a town of Macedonia, in Pieria. Ptolemy.

PHYLACISTÆ, among the *Ancients*, officers to whofe keeping the flaves in prifons and work-houfes were committed.

PHYLACTERY, φυλακτηριον, fignifying a *memorial* or *prefervative*, in *Ecclefiaftical Hiftory*, a flip of parchment, wherein was written fome text of holy fcripture, particularly of the Decalogue; which the more devout people among the Jews inclofed in leather cafes, and bound with thongs on the forehead, and on the left arm. (See FRONTAL.) On thefe phylacteries were written thirty paffages out of Exodus and Deuteronomy. The phylacteries for the head had four cavities, into each of which was put one of the four following fections 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 fections are put.

They derived their name from φυλαττω, *I keep*, either becaufe they were fuppofed to preferve the law in memory, or rather, becaufe they were looked upon as a kind of amulets or charms to keep them from danger. They were called תפלין, *tephillin*, by the Jews. The Pharifees, in order to maintain an appearance of greater fanctity, or to attract notice by their oftentation, wore broader phylacteries, and larger fringes to their garments than the reft of the Jews. (Matt. xxiii. 5.) Some authors have inferred from Exod. xiii. 9. and Deut. vi. 8. that thefe phylacteries were of divine inftitution. But thefe paffages may be taken in a figurative fenfe, 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 Pharifees, but with this difference, that thofe of the latter were larger than the others.

PHYLACTERY, in the general, was the name given by the ancients to all kinds of charms, fpells, or characters, which they wore about them, as amulets, to preferve them from dangers or difeafes.

The primitive Chriftians alfo gave the name phylacteries to the cafes wherein they inclofed the relics of their dead.

PHYLARCHUS, φυλαρχος, among the Athenians. The phylarchi were magiftrates, who had each of them the government of a tribe committed to his charge; and their bufinefs was to take care of the public treafures belonging to each tribe, to manage all their concerns, and call them together as oft as any thing happened that required the prefence of the whole body.

PHYLATERIA, a name given by fome botanical authors to the *polium*, or poly-mountain.

PHYLICA, in *Botany*, an ancient Greek name, occafionally written either φυλικη or φιλυκη; but to what it properly belongs, commentators have not determined. Theodore Gaza fuppofed it our Holly, *Ilex Aquifolium*. It is acknowledged to have been a tree or fhrub with evergreen leaves, and poffibly the name may have originated from φυλλικος, *leafy;* in which fenfe it is well applied to the prefent Linnæan genus, confifting of fhrubs 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. Juff. 381. Lamarck Illuftr. t. 127. Gærtn. t. 24.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Dumofæ*, Linn. *Rhamni*, Juff.

Gen. Ch. *Cal.* Common receptacle of the fructification fcaly, collecting the flowers into a difk. Perianth fuperior, of one leaf, in five deep fegments, turbinate, villous internally, permanent. *Cor.* none, except five minute, pointed, vaulted, converging fcales, one at the bafe of each fegment of the calyx. *Stam.* Filaments five, minute, under the five fcales; anthers fimple. *Pift.* Germen inferior, roundifh; ftyle fimple; ftigma obtufe. *Peric.* Capfule roundifh, three-lobed, with three cells and three valves. *Seeds* folitary, roundifh, gibbous at one fide, angular at the other.

Eff. Ch. Perianth in five deep fegments, turbinate. Scales five, covering the ftamens. Capfule inferior, of three cells. Seeds folitary.

All the known fpecies of *Phylica* are natives of fouthern Africa, chiefly about the Cape of Good Hope. Linnæus defines fix only in *Sp. Pl.* ed. 2, but the 14th ed. of *Syft.* *Veg.*

Veg. 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 awlshaped *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 Lusitanica, 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 angustis subtùs 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 panicled. 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 folio subrotundo subtùs 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 panicled. 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*, insomuch 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.

PHYLLACHNE, 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 husk*. Forst. Gen. t. 58. Linn. Suppl. 62. Schreb. 672. Mart. Mill. Dict. v. 3. Swartz in Sims and Konig's Ann. of Bot. v. 1. 286. t. 5. Juss. 422. Lamarck 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 αμφορευς, *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 fpecies is now a *Xylophylla.* Pliny has a *Phyllanthes*, 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. Juff. 386. Lamarck Illuftr. t. 756. Gærtn. t. 108. Clafs and order, *Monoecia Monadelphia.* Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juff.

Gen. Ch. Male, *Cal.* Perianth of one leaf, bell-fhaped, coloured, in fix deep, ovate, obtufe, fpreading, permanent fegments. *Cor.* none, except the calyx be taken for fuch. *Stam.* Filaments united into a column; anthers three, two-lobed.

Female, on the fame plant, and in the fame fituation, as the male, *Cal.* Perianth as in the male. *Cor.* Petals none. Nectary a border with 12 angles, furrounding the germen. *Pift.* Germen fuperior, roundifh, with three blunt angles; ftyles three, fpreading, cloven; ftigmas obtufe. *Peric.* Capfule roundifh, with three furrows, three cells, and fix elaftic valves. *Seeds* folitary, roundifh.

Eff. Ch. Male, Calyx in fix deep fegments. Corolla none. Filament columnar. Anthers three.

Female, Calyx in fix deep fegments. Petals none. Nectary a border with twelve angles. Styles three. Capfule three-lobed, with fix elaftic valves.

Obf. Willdenow defcribes *Ph. obovatus* with fix anthers.

Much uncertainty has exifted, and does ftill exift, refpecting the plants that ftrictly belong to this genus. Linnæus has but fix fpecies in the 2d edition of Sp. Pl. and feven in the 14th ed. of Syft. Veg. He always confidered *Phyllanthus* as having three feparate ftamens, but this is certainly a miftake, at leaft as far as we have been able to examine. Willdenow has augmented the genus to 36 fpecies, and he wifhes to unite with it the whole of *Xylophylla*, Willd. Sp. Pl. v. 1. 1500, making feven fpecies more. We conceive the latter propofal to be inadmiffible, and thefe genera are kept diftinct in the recent edition of Hort. Kew. though placed next to each other in the *Monoecia Monadelphia.* This laft point will be confidered hereafter, when we come to Xylophylla. Nine fpecies of *Phyllanthus* are enumerated as cultivated in the Britifh collections, where they are moftly ftove fhrubs, chiefly remarkable for their delicate pinnate foliage, refembling fome *Mimofæ*, and turning red in decay. Many of them, however, have fimple *leaves.* The *flowers* are fmall, greenifh, axillary, copious, on fhort flender ftalks. Very few of the fpecies are figured in any botanical works, and none in our periodical ones. We fhall enumerate a few fpecies.

Ph. *obovatus.* Annual Carolina Phyllanthus. Willd. n. 3. Ait. n. 1. (Ph. carolinenfis; Michaux Boreal-Amer. v. 2. 209.)—Leaves fimple, obovate, bluntifh. Flowers axillary, ftalked, in pairs. Stem branched, round, erect. Native of North America. It was introduced in 1803 by Robert Barclay, efq. to whom the gardens are indebted for feveral of the more curious, though lefs oftentatious, American plants, overlooked by vulgar collectors and admirers. The prefent is a hardy annual, flowering in July and Auguft. *Stem* much branched. *Leaves* ftalked, alternate, not an inch long, entire, fmooth; bright green above; paler beneath. *Stipulas* fmall, membranous. *Flowers* fmall, greenifh, one male, the other female. *Capfule* fcarcely fo big as hemp-feed.

Ph. *bacciformis.* Berry-fhaped Phyllanthus. Linn. Suppl. 415. Willd. n. 25. Konig 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 female, folitary; the lower male, three together.—Native of Tranquebar. *Root* annual. *Stems* numerous, fpreading widely, befet with numerous leafy *branches. Leaves* broadly elliptical, hardly an inch long. *Stipulas* awl-fhaped. *Flowers* green. Mr. Konig has fhewn the miftake of M. Ventenat, in fuppofing this the true *Agyneia impubes* of Linnæus, who is thereby vindicated from the abundance of errors in the defcription, with which the learned, not uncandid, Frenchman rather too haftily charges him. The *Agyneia* in queftion is figured in the above Ann. of Bot. t. 7. f. 4.

Ph. *Emblica.* Shrubby Eaft 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; footftalks round, downy. Flowers aggregate. Stem fhrubby. Native of the Eaft Indies; long cultivated in our ftoves. No time for its bloffoming is marked in the Hort. Kew. but we had a flowering fpecimen from Mr. Salifbury's collection in 1788. The *leaves* are elegantly tinged with red. We can hardly believe them to be really pinnate and floriferous, but fhould rather confider as *branches*, what are termed their common *footftalks*, and from the lower part of which copious axillary tufts of little yellowifh *flowers* come forth. The *fruit* is as large as an ordinary goofeberry, and is figured under the name of *Emblica*, in Gærtner t. 108. It does not appear to be more pulpy than that of other fpecies.

Phyllanthus, in *Gardening*, furnifhes plants of the evergreen exotic tree and fhrubby kind: the fea-fide laurel, of which the fpecies cultivated are, the annual phyllanthus (P. niruri); the great-leaved phyllanthus (P. grandifolia); and the fhrubby phyllanthus (P. emblica).

Method of Culture.—Thefe plants, where feeds can be procured from their native fituations, may be raifed in that way. They fhould be fown in pots filled with light earth, and plunged in a hot-bed; and when the plants have acquired fome growth, they fhould be planted out into feparate pots filled with the fame fort of mould; being replunged in the hot-bed, due fhade and water being given, until they become perfectly rooted; after which they fhould be conftantly kept in the bark-bed of the ftove, and have the management of other plants of the fame tender fort.

They may alfo fometimes be raifed by planting out flips, or by layers managed in the fame way as thofe from feeds.

They afford a fine variety in their beautiful foliage, and the flowery kinds have a fingular effect in their flowers.

PHYLLAUREA, 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 diftinct genus; Lour. Cochinch. 575. We greatly doubt the propriety of the meafure, and the name is certainly inadmiffible.

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 Philofophia Botanica, reckoned among the poetic names, familiar in ancient ftory, like *Hyacinthus*, *Narciffus*, &c. But in his Hortus Cliffortianus, he mentions having particularly chofen this appellation for the plant which now bears it, becaufe the beauty of the fhrub chiefly confifts in its leaves. *Phyllis* would have been more peculiarly appofite for any fhrub or tree producing an exuberant foliage fuddenly from naked branches, like the Almond, into which the unfortunate Thracian queen was fuppofed to be metamorphofed.

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. Class and order, *Pentandria Digynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* Perianth superior, obsolete, of two minute leaves. *Cor.* Petals five, lanceolate, obtuse, revolute, scarcely connected at the base. *Stam.* Filaments five, shorter than the corolla, capillary, flaccid; anthers simple, oblong. *Pist.* Germen inferior, obovate; style none; stigmas two, awl-shaped, downy, reflexed. *Peric.* none. Fruit oblong, somewhat turbinate, obtuse, angular. *Seeds* two, parallel, convex and angular at the outer side, flat at the inner, broader upwards.

Eff. Ch. Stigmas rough. Calyx of two leaves. Petals five. Seeds two.

Obs. Linnæus remarks that the stigmas resemble those of the grasses, the elm, and *Tetragonia*. He seems originally to have had, like Boerhaave, who called this plant *Bupleuroides*, an idea of its affinity to the umbelliferous order; but he has justly referred it subsequently to his *Stellatæ;* so that what regards the inflorescence in his Genera Plantarum is entirely misplaced.

1. Ph. *Nobla*. Bastard Hare's-ear. Linn. Sp. Pl. 335. (Valerianella canariensis frutescens, Simpla nobla dicta; Dill. Elth. 405. t. 299. Bupleuroides; Walth. Hort. 11. t. 6.)—Native of the Canary islands, 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 *stem* is shrubby, two or three feet high, with round smooth leafy *branches;* the lower part of a light corky aspect. *Leaves* opposite, on stalks, elliptic-lanceolate, acute, entire, smooth, two or three inches long. *Stipulas* between the footstalks, oblong, erect, strongly toothed and glandular, especially the upper ones. *Panicle* terminal, leafy, oblong, smooth, of numerous small green *flowers*. *Fruit* the size of a grape-stone.

This is the only known species of its genus, *Ph. indica*, Sp. Pl. 336, being struck out by Linnæus in his Mantissa altera, 349.

Phyllis, in *Gardening*, contains plants of the shrubby, evergreen, exotic kind, of which the species cultivated is the bastard-hare's-ear (P. nobla).

Method of Culture.—The plants may be increased by sowing the seeds in the early spring months, as about March, in pots filled with light earth, and plunged in a hot-bed; and when the plants have attained some growth, they should be planted out in separate pots, replunging them in the hot-bed, due shade being given till they become well rooted. In the summer season they should be set out in a sheltered situation, so as to have the morning sun, and be frequently watered. In the winter they must be well sheltered from frost, but have as much air as possible in mild weather.

In the second year, when the plants are shaken out of the pots and placed in a proper situation in the open ground, they flower better, and afford more perfect seeds, than when kept in pots.

They may also be raised by cuttings planted out in the summer season.

New plants should be raised every two or three years, as they do not last long.

They afford an agreeable variety among other evergreen plants of the greenhouse kind.

PHYLLITIS Marina, in *Natural History*. See Hart's *tongue*.

PHYLLOBOLIA, φυλλοβολια, in *Antiquity*, a custom that prevailed among the ancients to strew flowers and leaves on the tombs of the dead. The Romans adopted this custom from the Greeks, and added likewise wool. See Burial.

The phyllobolia was also used on occasion of a victory obtained at any of the public games; when not only the victors, but likewise their parents, were strewed with flowers and leaves.

PHYLLODES, in *Botany*. See Phrynium.

PHYLLOMA, so named by Mr. Ker in Curtis's Magazine, from φυλλον, *a leaf*, and λωμα, *a fringe* or *border*, alluding to the coloured toothed margin of the leaves. Ker in Curt. Mag. v. 38. 1585. Class and order, *Hexandria Monogynia*. Nat. Ord. *Coronariæ*, Linn. *Asphodeli*, Juss.

Gen. Ch. *Cal.* none. *Cor.* Petals six, oblong, nearly erect, equal, cohering by their claws; three of them internal. *Stam.* Filaments six, inserted into the receptacle, thread-shaped, erect, equal, rather shorter than the corolla; anthers oblong, incumbent. *Pist.* Germen superior, roundish, three-lobed; style awl-shaped; stigma simple. *Peric.* Berry tough, spherical, depressed, with three furrows, and three cells. *Seeds* numerous in each cell, in two rows, horizontal, oblong, angular, polished.

Eff. Ch. Corolla of six 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 species, said to be a native of the island of Bourbon. M. Richard is mentioned as having sent it to Kew in 1766. There is a fine specimen of this plant in the stove at Chelsea, which flowers in the spring, and often ripens fruit. The *stem* is shrubby, several feet high, and probably forming, in its native country, a small and thick tree, with all the appearance of an arborescent *Aloe*. *Leaves* a yard long, succulent, smooth, taper-pointed, green, with a dull red, strongly toothed, or jagged, edge. *Common flower-stalk* axillary, compressed, similarly coloured, but not toothed, at the edges; *partial* ones alternate, round, spreading, red. *Flowers* numerous, racemose, each scarcely an inch long, of a tawny yellow. *Bracteas* solitary, taper-pointed, red. *Fruit* purplish-black, nearly the size and shape of a bullace plum.

The even *filaments*, and numerous *seeds*, well distinguish this, as a genus, from *Dracæna*. Its habit is like *Aloe*, but their characters are sufficiently different. We retain the excellent original specific name, as far preferable to *aloiflorum*, and certainly requiring no alteration.

PHYLLOS, in *Ancient Geography*, a country of the Peloponnesus, in Arcadia, according to Statius in his Thebaid.

PHYLLUS, a town of Thessaly, in which Strabo has placed a temple of the Phyllæan Jupiter.

PHYLOBASILES, φυλοβασιλεις, among the Athenians, magistrates, who, with respect to particular tribes, had the same office that the *basileus* had with respect to the commonwealth.

They were chosen out of the eupatridæ or nobility, had the care of public sacrifices, and other divine worship peculiar to their respective tribes, and kept their court in the portico called *basileion*, and sometimes in the *bucoleian*.

PHYMA, φυμα, from φυομαι, *to grow*, as plants from the earth, a term used by the ancients to denote almost every species of external and superficial tumour, arising without any obvious external injury. It comprehends, therefore, boils, glandular enlargements, cutaneous tubercles, and even large inflamed pustules, or small abscesses. 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 thrauſtum*, 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*, φυσαλις of the Greeks, from φυσα, *a bladder*, an old name, applied by Linnæus to the *Alkekengi* of ſome preceding writers, the bladdery 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. Lamarck Illuſtr. t. 116. Gærtn. t. 131. (Alkekengi; Tourn. t. 64.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Luridæ*, Linn. *Solaneæ*, 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.

Eſſ. 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 fœtid 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 greenhouſe 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 excuſe 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 umbilicated, 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 Pharmacopeia 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 naturaliſed 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. *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. *Anthers* yellow.

Ph. *proſtrata.* Trailing Winter-cherry. L'Herit. Stirp. 43. t. 22. Willd. n. 17. Ait. n. 14. Andr. Repoſ. 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. ſomnifera); the flexuous Italian winter cherry (P. flexuoſa); the tree-like phyſalis, or winter cherry (P. arboreſcens); and the Curaſſavian winter cherry (P. curaſſavica).

In the firſt ſort 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 ſorts, alſo by parting the roots; the ſixth, ſeventh, eighth, and ninth, likewiſe by cuttings.

In the firſt ſort, 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 ſorts, 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 ſorts 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 ſorts are curious ornamental plants in the borders, clumps, and other parts of pleaſure-grounds, and the four beſt ſhrubby ſorts 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° 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 finn-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 laminæ, 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 Φυσαλος 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 Perſoon'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 *Sphærocarpus*, which properly belongs to one of the *Hepaticæ*, as we propoſe to ſhew in its proper place. Perſoon'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.

PHYSCA, or Physce, in *Ancient Geography*, a town of the

the Lower Mœfia, between the mouths of the rivers Axiàcùs and Tyras. Ptolemy.

PHYSCÆ, a town of Macedonia, in Mygdonia, between Bærus and Terpillus. Ptolemy.

PHYSCELLA, a town of Macedonia, on the gulf Mecybernæus, according to Pliny and P. Mela.

PHYSCIA, in *Botany*, from φυσκη, *a bladder*, alluding to the concave or inflated receptacles, or fhields, of fome fpecies; fee LICHENES, n. 20.

PHYSCONIA, in *Medicine*, probably from φυσκη, *an inflated bladder*, a term ufed by the nofologifts to exprefs every fpecies of abdominal tumour, which is hard, not fonorous like tympanites, nor fluctuating like dropfy, nor produced by pregnancy. Under the appellation of Phyfconia a great variety of morbid enlargement in the abdomen is, therefore, neceffarily included; fuch as fcirrhous, fatty, and other tumours of the omentum, morbid growth connected with the ovaria, or uterus, with the inteftines or mefentery, with the liver, kidnies, &c. As thefe tumours are, in fact, extremely different in their nature and origin, the method of treatment appropriate to each can only be determined by an inveftigation of each variety; but it muft be acknowledged, that, as they refult from actual organic change in the ftructure of the parts difeafed, little that is effectually curative is within the reach of art. See Sauvages, Nofol. Meth. clafs x. genus 8.

PHYSCUS, in *Ancient Geography*, a town of Afia Minor, upon the coaft of the Doride, over-againft the ifland of Rhodes, according to Diodorus Siculus. Strabo fays that it had a port. It was called Phyfcia by Steph. Byz. and Phufca by Ptolemy.—Alfo, a port of Afia 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 fame name.—Alfo, a town of Greece, in the country of the Locri Ozoli. Plutarch.—Alfo, a port of the ifland of Rhodes.—Alfo, a river of Afia, in the vicinity of Affyria.—Alfo, a mountain of Italy, in Magna Græcia, near Crotona.

PHYSETER, the *Cachalot*, in *Ichthyology*, a genus of animals of the clafs and order Mammalia Cete, of which the generic character is, teeth in the lower jaw, and none in the upper. The name phyfeter is of Greek origin, and is derived from the verb φυσαω, *to blow*. It has this name from its quality of taking in a great quantity of fea-water, and then blowing it out again with great force and violence. There are four fpecies in the Linnæan fyftem by Gmelin, which are as follow.

Species.

* CATODON; leffer Cachalot. It has no dorfal fin; but a fiftula or fpiracle on the fnout. It is about 25 feet in length; inhabits the Northern fea, and has been found on the coaft of Scotland. The head is round, and the mouth fmall. In its general ftructure is very nearly allied to the macrocephalus, to be next defcribed, but the mouth is fmaller.

* MACROCEPHALUS; blunt-headed Cachalot. This has no dorfal fin, but the fiftula is on the neck. This is one of the largeft fpecies of whales, often meafuring fixty feet. The head is of an enormous fize, conftituting 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 fharpifh form, fitting as it were into a longitudinal bed or groove. The teeth that are vifible are fituated only in the lower jaw, and, when the mouth is clofed, they are received into fo many correfponding holes or cavities in the upper; they are numerous, rather blunt, and of a conical form, with a flight bend or inclination inwards. The front of the head is very abrupt, defcending perpendicularly downwards, and on its top, which has been improperly termed the neck by fome authors, is an elevation or angular prominence containing the fpiracle, which appears externally fimple, but is double within. The head is diftinguifhed or feparated from the body by a tranfverfe furrow or wrinkle. The eyes are fmall and black; and the ears or auditory paffages extremely fmall. About the middle of the back is a kind of fpurious fin or dorfal tubercle, of a callous nature, not moveable, and fomewhat abrupt or cut off behind. The tongue is of the fhape of the lower jaw, clay-coloured externally, and of a dull red within. The throat is fmall; 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 whitifh beneath. It fwims very fwiftly, and is faid to be a violent enemy to the white fhark. (See SQUALUS.) The Greenlanders ufe the flefh, oil, tendons, &c. in the fame manner as they do thofe of the Narwhal. (See MONODON.) This fpecies of whale is reckoned difficult to catch, being very tenacious of life, and furviving feveral days the wounds that it receives from its purfuers. It has a vaft cavity within the upper part of the head, in which fpermaceti is found. This, when frefh, is nearly fluid; but when expofed to the air it concretes into opaque maffes. The celebrated perfume ambergris is found in maffes in the inteftines, being the fæces of the whale when it is fick. (See AMBERGRIS.) The three varieties of this fpecies are; 1. Black; back gibbous. Found in European feas. 2. Blackifh-afh, with a gibbous back, which inhabits the coafts of New England, and is from fixty to feventy feet in length. 3. Whitifh, with a fmooth back. This laft is found in Davis's ftraits, is only about fifteen feet long, of a yellowifh-white; teeth a little incurvate, compreffed, rounded at the tips.

* MICROPS; Sharp-nofed Cachalot. The dorfal fin of this fpecies is long; and the upper jaw is longer than the lower. There are two varieties; in the *firft* the teeth are fharp and hooked; it is about feventy feet long, is of a dark tawny colour: has forty-two teeth round, a little compreffed; dorfal fin long and fharp: in the fecond the teeth are fharp and ftraight; this is from eighty to one hundred feet in length; the upper parts are blackifh, 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 yellowifh; the tongue fmall and acute; the teeth are fet in the jaw like a faw. This fpecies fwims fwiftly, and is faid to be a great enemy to the porpoife, which it purfues and preys upon.

* TURSIO; High-finned Cachalot. This fpecies is particularly diftinguifhed by the great length and narrow form of its dorfal fin; the teeth are flat at the tip. This is faid to be fometimes one hundred feet in length; at a diftance the dorfal fin has the appearance of a maft of a fhip. It inhabits the Northern ocean.

PHYSIC, or PHYSICK, φυσικη, the art of healing, properly called *medicine*.

The word is formed from φυσις, *nature;* becaufe medicine confifts principally in the obfervation of nature.

For the rife, progrefs, divifion, &c. of phyfic, fee MEDICINE.

PHYSIC, *Hermetical*. See HERMETICAL.

PHYSIC, *Bachelor of*. See BACHELOR.

PHYSIC *Nut*, in *Botany*, the name of a fpecies of the jatropa. See CASSADA.

PHYSICAL, φυσικος, fomething belonging to, or really exifting in nature.

In this fenfe we fay, a phyfical point, in oppofition to a mathe-

mathematical one, which laft only exifts in the imagination. Or a phyfical fubftance, or body, in oppofition to fpirit, or metaphyfical fubftance, &c.

PHYSICAL or fenfible horizon. See HORIZON.

PHYSICAL *agent, caufe, certitude, concrete, continuity, evidence, fate, good, liberty, neceffity, part, perfection, poffible, predetermination, premotion, qualities,* and *quantity.* See the feveral fubftantives.

PHYSICAL *Education*, is that branch of education which refpects the care and culture of the bodily powers, confidered in reference to their fubferviency to the mental powers, and the influence of the ftate of them upon the mind. As we have already obferved in EDUCATION, the organs of fenfation muft have vigour and fenfibility, in order to bring the fyftem of thought and feeling into its due ftate of perfection, both as to comprehenfivenefs and vigour, and as to proper direction: and much of intellectual improvement and moral culture depends upon the ftate of the mufcular and nervous fyftem in general. The education of the human being, as far as refpects thefe objects, may be termed *phyfical;* and by phyfical education, therefore, we underftand that feries of means by which the external organs of the mind, the organs of fenfation, and the mufcular and nervous fyftem, fo far as the mind is directly concerned in their operations, are to be preferved in a found and healthy ftate, and improved in activity and vigour.

When we confider the influence of the body on the mind in its greateft extent, we are fully aware that whatever affects the health and vigour of the body, may, with ftrict propriety, be regarded as an object of education; and in this point of view, the whole treatment of infancy, childhood, and youth, in refpect to health, whether its continuance or reftoration, might properly come under the head of phyfical education. But in the article above referred to, we expreffed our intention not to encroach upon the fcience of pathology; it would lead us into a field by far too extenfive 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 difeafes of infancy and childhood, which will operate by way of caution and prevention; but we ftrongly recommend her not in general to undertake herfelf the management of thofe difeafes, but to obtain good medical advice. We do not doubt that the parent who has a tolerable acquaintance with the nature of the bodily conftitution, and has had the advantage of much experience and obfervation, will often be the beft phyfician for her children: but there are few who would not be benefited by the advice of others in all cafes which may permanently affect the health; and, in general, by far the fafeft and beft way is, early to call in that aid which medical fkill may fometimes effectually afford, without tampering with the conftitution by the ufe of powerful remedies, or even of common ones too frequently. Still, however, we are fatisfied that the judicious mother may derive from books much important information refpecting 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 reafon to believe of great value, *viz.* Underwood on the Difeafes of Children. In mentioning this, we are at the fame 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 fubject, to the mother's fhare in early education, we feel aftonifhed that the moft important objects of female education are fo much neglected. Were they generally educated with a fpecific view to their afterwards filling fome of the moft important relations of domeftic life, the next race, or, at fartheft, that which follows, would be, without example, wife and good. If fuch were the views adopted in education, it would then be a primary object to cultivate their *underftandings;* to give them folidity, accuracy, and comprehenfivenefs of judgment; and to ftore 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 greateft probability of being vigorous, healthy, and active in their bodily powers, and lay the beft foundation for intellectual and moral excellence. A woman may not be a wife or mother, but fhe can fcarcely fail, if properly prepared for thofe relations, to be led, in fome way or other, to fill fituations in life, bearing confiderable refemblance to them in their effects on the improvement and happinefs of others.

In MORAL *Education*, col. 1—3, we have referred to the intimate connection which exifts between the cultivation of the moral and intellectual powers. In fact, neither can be neglected without ferious injury to both; though the influence of moral education upon the culture of the underftanding, is decidedly the greateft and moft extenfive. Phyfical education, in like manner, bears a clofe connection with the other branches; and, indeed, it lies at the foundation of both. But it can feldom, if ever, be neceffary to make it an object *altogether* independent of the culture of the mind; and if purfued folely in reference to the animal health and ftrength, there is no doubt that the feeds of their deftruction will often be fown, by the very means which are employed to promote them. This is a truth which may, at firft fight, appear rather paradoxical; but we leave it, with full confidence, to the confideration of the judicious obferver, who will find it more particularly true with refpect to boys. We are perfectly difpofed to admit that the care of the bodily health fhould 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 beft accomplifhed: but then it fhould be purfued with a view to thofe ends; and if it be not, it will itfelf, in all probability, defeat its own purpofe. An unreftrained mind in a vigorous body cannot fail to be eventually a flave of the body. In fubfequent periods of education, mental and moral culture may, and muft be, the leading objects; but they too will, in a confiderable degree, defeat their own ends, if purfued without reference to the bodily health and vigour. We would by no means intimate that debility of body, or extreme phyfical fenfibility, is *neceffarily* attended with ill effects on the moral and intellectual fyftem. Under judicious management, they often have led to high degrees of moral worth, and have not prevented very great progrefs 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, meannefs, &c.; or, on the other, that extreme infenfibility which will either fpeedily confume the powers of body and mind, or fink into felfifhnefs of the moft injurious kind, becaufe 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 fyftem. Whatever be the nature of the organifation upon which fenfation, retention, affociation, memory, and imagination depend, it is indifputable, that it is moft intimately connected with the material organifation which is connected with any of the operations of the mind. As far as the judgment depends on thefe fubordinate powers, this alfo muft be affected by whatever affects them. Taking the term in its wideft fenfe, the

memory

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 organiſation, the varieties of which, if we may judge from external appearances, 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 developement 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 predominancy. 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* PHILOSOPHY, 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 strongly 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, bearing 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, distemperature 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 developement 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 degreee 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 quicklime to abſorb carbonic acid from the atmoſphere, is one principal cauſe of its ſalubrious 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

water.

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 ſevereſt 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 dependance 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 frequent 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 exercife of any kind. Indeed there are few conftitutions, unlefs they have gone through the proceffes of hardening to an uncommon degree, which can avoid being injured by this common practice. The intenfe degree of cold produced by evaporation, may be perceived by pumping on the hand, fo as to have only an occafional ftream of water upon it in different parts: if the hand were kept ftill in water at the fame temperature, much lefs cold would be experienced. In like manner, if the lower extremities be placed in warm water, and the water be gently agitated, fo as to expofe part of the wet furface of the leg to evaporation, this part will be found very cold, while the reft is very warm. Thofe who are much accuftomed to obferve their fenfations, may perceive that even when the water is ftill, if there be fufficient warmth to produce evaporation, the part of the leg immediately above that which is immerfed, feels colder than the reft, nearly as though there were a ring of metal round it. Perhaps, however, the effect may be moft completely perceived, by firft ftanding a little before a quick fire, and then fufpending clofe before one a piece of damp flannel; if fufficiently near, and the heat fufficiently ftrong to produce a rapid evaporation, the cold produced (in other words the lofs of heat) will be very fenfibly felt, and might be made evident by the employment of a thermometer.

By attention to this principle, parents will take care, if their childrens' clothes are wet, that they either keep in fome degree of exercife till they are dry, or have them removed; that their fkin is well dried after wafhing or bathing; that their linen is properly aired (not warmed, except for weakly children) before it is put on; and that no clothes fhould be put to dry in the room in which they live. Inattention to this laft circumftance, in the nurfery particularly, is a common caufe of chill and colds among infants. When we confider, however, how little injury is experienced by alternations of heat and cold in the hands, or by their expofure to damp, how little, too, where the feet are continually expofed to them without the protection of fhoes and ftockings, and how frequent the circumftances in real life where fome confiderable expofure muft be experienced; it is clear that caution fhould not be carried too far; the only point is *that the hardening fyftem be introduced by degrees*, and that thofe degrees be determined by the previous ftate of the fyftem, *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 foolhardinefs.

We referred in a preceding paragraph to the injurious influence of the eafterly and north-eafterly winds in fpring. Thefe are not only cold, but extremely dry; and by their drynefs alone they muft act as powerful refrigerants on moift furfaces. Their effect in producing this diminution of heat is proved by the following obfervations of the late accurate and ingenious Dr. James Hutton of Edinburgh. "I ufed to amufe myfelf in walking in the fields, by obferving the temperature of the air with the thermometer, and trying its drynefs by the evaporation of water. The method I purfued was this: I had a thermometer, included within a glafs tube, hermetically fealed; this I held, in a proper fituation, until it acquired the temperature of the atmofphere; and then I dipped it into a little water, alfo cooled to the fame temperature. I then expofed my thermometer, with its glafs cafe thus wetted, to the evaporation of the atmofphere, by holding the ball of the thermometer, or end of the tube, in which the ball was inclofed, towards the current of the air, and I examined how much the evaporation from that glafs tube cooled the ball of the thermometer which was included. During the fummer feafon, in the dryeft weather that I could find, I never funk the thermometer in that manner, to the beft of my remembrance, above two, three, or four degrees. But in a cold eaft wind in the fpring, I once funk it between nine and ten degrees. It was, I believe, about the month of March or April; the fky was cloudy above, and no funfhine, and the wind was cold to the feeling, fteady blowing, but not ftrong." Hence we perceive, that the fuperior drynefs of the air in March makes moifture evaporate fafter than the fuperior heat of the fummer air: and this is independently of all funfhine. It is evident the furfaces along which the dry cold air paffes in breathing, muft be affected in the fame manner as the furface of the wetted glafs tube; and thefe furfaces thus cooled, will be ready to be thrown into intenfe action by the rays of a powerful fun in a fheltered fpot, or befide a brifk fire at home. Beddoes.

If circumftances require expofure to the external air in fuch circumftances, before the general fyftem is properly hardened, a fimple expedient which Dr. Beddoes recommends to adults, where there is a difpofition to catarrh, may be employed with great advantage; *viz.* to place a fufficient number of folds of gauze or muflin over the mouth and nofe; it will not only warm the air before it enters the refpiratory paffages, but likewife give it moifture when the air is dry as well as cold. There are probably few travellers who have not experienced the beneficial effects produced by faftening their comforters over the lower half of the face.

II. *Cleanlinefs, Bathing.*—We perfuade ourfelves that it cannot be requifite, in the prefent day, to urge upon parents the neceffity of the ftricteft attention to the cleanlinefs of their children. The old maxim, "cleanlinefs is next to godlinefs," has a degree of truth, in a moral as well as phyfical point of view, which it may require fome experience in life to perceive, but which obfervation will completely prove to all who will not abfolutely clofe their eyes to what paffes without them. A want of cleanlinefs is almoft univerfally united with carelefsnefs and indolence. It renders the body fufceptible of infection, while the contrary practice affords the greateft fecurity againft virulent difeafes. There can be no reafonable doubt that cleanlinefs is one grand caufe why the rich efcape fo much more than the poor from infectious fevers; and that their prevalence and virulence among the poor, are, in a great meafure, to be attributed to the want of it in their perfons and in their dwellings, &c. Perfonal cleanlinefs, and cleanlinefs in the apartments in which children live, fhould be moft ftrictly enforced; and fuch a regular fyftem fhould be early adopted, as may fecure this moft defirable end. No day fhould pafs, except when the bodily health is materially interrupted, without a complete wafhing, not only of the extremities, but of every part of the body; and if this cannot fafely be done with cold water, it is extremely feldom that it may not with cool or tepid water. Children fhould be early accuftomed to wafh themfelves, but it fhould be under careful infpection till they have completely formed the habit of doing it thoroughly; and when this is done, it will be as unpleafant to them to omit it, as to fome it appears to be to make themfelves clean. When paft the early periods of childhood, it will often be impracticable to carry on the fyftem of univerfal wafhing; but it fhould be made as general as poffible, and for the purpofe of cleanlinefs, as well as of invigoration, the bath fhould be employed as frequently as domeftic circumftances, or the ftate of the conftitution will allow: with refpect to the former, by fuitable management they might generally be made to bend to the latter.

Bathing certainly ought to be regarded as having a powerful efficacy on the fyftem; and if its effects appear to be 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 aspersion 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 those 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 satisfied 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 difturbs, and fometimes wholly interrupts the actions on which life immediately depends." The 12th chapter is one which cannot fail to be very interefting to the general reader. It is entitled "Of the difeafe that arifes from drinking cold liquids, or ufing the cold bath after fevere exercife;" and contains many remarks, which the claffical ftudent will find of advantage to him in his refearches. Into thefe we muft not enter, but confine ourfelves to our prefent object; including, however, fome pofitions more immediately refpecting the ufe of cold water internally. The general fact is, 6. That the fatal effects proceeding from drinking cold water, in cafes where the fyftem has been extremely heated by bodily exertion, have occurred in circumftances, "where the fyftem, after having been much heated and enfeebled by fevere exertion, is lofing its preternatural heat from profufe fweating, and in general alfo from the ceffation of the exertions, by which this heat was originally produced. Here two powerful caufes combine to cool the body; and if, under their operation, a fudden application of cold is made either to the ftomach or the furface, the living power will, we know, refift it faintly, and the fatal confequences be accounted for." Dr. Currie then gives a number of cafes, which fhould be read by the parent to his children, as foon as they are capable of fully underftanding them, and afterwards brought back to their memory, as circumftances direct; and the fame by the tutor to his pupils. And the parent and preceptor fhould be acquainted with one fimple remedy, which, in cafes where the injury has not been too great, may prove effectual in reftoring vital heat, namely, "the application of a bladder filled with water, heated to 110° or 115°, to the pit of the ftomach." 7. "There is no fituation in which the application of cold to the body, whether to the furface or the ftomach, is fo fafe, or in general fo falutary, as when the heat of the body, from whatever caufe, is preternaturally great; provided that the body is not already in a ftate in which it is rapidly parting with this heat, and no difeafe has taken place in the general fenfibility, or in the ftructure 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 fteadinefs of the fenfation of heat, and the tenacity with which the preternatural heat is actually retained. With this obfervation, however, muft be connected another, "that the heat preternaturally accumulated by exercife is held with lefs tenacity than even the heat in intermittents. It is diffipated by the perfpiration that exercife occafions; and is fpeedily loft, when to profufe perfpiration is added a ftate of reft. It is then that a large draught of cold liquid is efpecially dangerous. But while the preternatural heat is fuftained by continued exertion, cold liquids may be taken *in moderate quantities*, without producing any injurious effects. They may even, I apprehend, be drunk copioufly, without producing fuddenly the fatal effects already defcribed: but in copious draughts, they are found oppreffive to the ftomach during exercife, and excite languor, naufea, and fometimes vomiting." Dr. Currie afterwards explains the difference between the influence of water taken into the ftomach and ufed externally; which arifes, he obferves, partly from the weight and bulk of the fluid, particularly oppreffive under the conftant action and agitation of the voluntary mufcles, and partly from the evaporation from the furface being promoted by the immediate accefs of external air. To thefe muft be added another fimple confideration, 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 ftomach; and this is of obvious importance. "With thefe exceptions," he adds, "the operation of cold liquids on the ftomach, and on the furface of the body, are analogous in the cafe of preternatural heat produced by bodily exertion, as in all other cafes of preternatural heat. As it is fafe to drink cold water, in proportion as the heat from exercife is great and fteady; fo alfo is it fafe, according to this ratio, to pour it on the furface, or to immerfe the body in the cold bath." 8. "In the earlier ftages of exercife, before profufe perfpiration has diffipated the heat, and fatigue debilitated the living power, nothing is more fafe, according to my experience, than the cold bath. This is fo true, that I have for fome years conftantly directed infirm perfons to ufe fuch a degree of exercife before immerfion, as may produce fome increafed action of the vafcular fyftem, with fome increafe of heat; and thus fecure a force of re-action under the fhock, which otherwife might not always take place. The popular opinion, that it is fafeft to go perfectly cool into the water, is founded on erroneous notions, and is fometimes productive of injurious confequences. Thus, perfons heated, and beginning to fweat, often think it neceffary to wait on the edge of the bath till they are perfectly cooled; and then plunging into the water, feel a fudden chillinefs that is alarming and dangerous. In fuch cafes, the injury is generally imputed to going into the water too warm; whereas in truth it arifes from going in too cold. But though it be perfectly fafe to go into the cold bath in the earlier ftages of exercife, nothing is more dangerous than the practice, after exercife has produced profufe fweating, and terminated in languor and fatigue: becaufe, as has already been repeated more than once, in fuch circumftances, the heat is not only finking rapidly, but the fyftem parts more eafily with the portion that remains."

From the preceding obfervations it is obvious, that the cold bath fhould only be employed where the fyftem has ftrength to ftand the fhock; and then its effects can fcarcely fail to be beneficial, in invigorating the fyftem, and preparing it to refift the influence of external cold. We recollect the cafe of a youth, of about 17, by no means of robuft habit, and very liable to colds, who never was fo little fubject to them as during the winter, in which he perfevered in the ufe of a cold fpring water bath every other day. A walk of about half a mile to the bath prepared him for it: he undreffed as quickly as poffible, plunged once into the bath, and when well rubbed and quickly dreffed, on his walk home, he had the moft pleafing fenfations of vigour and activity. As the fyftem fhould be properly prepared for the excitement of cold bathing, we deem it an important precaution, at leaft for weakly children, not to employ it fafting. After a full meal, it can feldom fail to be injurious; but no time can be better than an hour or two after an early moderate breakfaft. If this cannot be made convenient, a partial breakfaft may anfwer the purpofe. We obferve this caution of experience given alfo by other writers on the fubject. "I fee no fenfe," fays Dr. Beddoes, "in the common notion, that it is beft to bathe with an empty ftomach. I would not recommend the cool bath to a perfon full gorged; but it is defirable that the ftomach fhould be in a ftate of gentle activity, as well as the external furface of the body."

Till the fyftem has acquired confiderable vigour, the cold bath fhould be employed folely with a view to its effects. Children, if the commencement of it is managed with caution, fo as not to excite terror, will foon learn to like it, and would willingly ftay in it. In fummer, when the water has been expofed to the air, fo as to acquire its temperature, this may be allowed, but rather fparingly. When boys learn

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 hardineſs 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° or 55°. 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

except

except in fummer, we can fee no reafon why warm worfted or even woollen ftockings fhould not be ufed inftead of the cotton clothing too frequently prevalent. If the feet are kept warm, the body will be ufually found to take care of itfelf. Of courfe this and every other remark muft be employed with judgment; but we are fatisfied from obfervation and experience that it is the grand point. There can be little doubt that the general prevalence of flight dreffes in winter, together with the abfurd changes which are too often practifed from warm garments in the morning to flight clothing in the evening and heated apartments, conftitute one grand caufe of the unhealthinefs of that clafs of the female fex, who, unhappily for themfelves, live in the walks of fafhion. The general principle fhould be, to accommodate the drefs fomewhat to the feafon. Hardinefs fhould be fought, rather by exercife, air, general attention to temperature, &c. than by fparing clothing. When it is acquired let experiments be tried; till then, parents will do well to give their children fuch clothing as, without being heavy, cumberfome, or heating, may prevent chillinefs, both when engaged in domeftic and even fedentary occupations, and when expofed to a cold atmofphere without. As to the employment of flannel under the linen, we think it of great fervice where there is a confiderable tendency to chillinefs and even to perfpiration, provided it does not increafe that tendency. But it fhould be as thin as poffible; it fhould be frequently changed, and accompanied with a conftant attention to the invigorating fyftems. And certainly it is not fo defirable to begin a habit fo difficult to break without judicious medical advice. Whatever additional clothing is employed for winter fhould be left off with caution, and not till the mild weather of fpring, (if fuch there be in our climate,) is fairly fet in. A real fpring day has often tempted to leave off the winter clothing, and the piercing chill of the next day has caufed ferious injury. One further caution appears neceffary; after great perfpiration, unlefs the conftitution is very ftrong, the damp clothing neareft the fkin fhould be removed, and the fkin well rubbed with dry flannel or rough linen.

From the firft period of infancy the limbs fhould be allowed full play; and no excufe can juftify the parents who, from a regard to the fhape of their children, employ tight clothes, either about the body or the extremities. Modern fafhion here, however, fo much coincides with the found dictates of phyfical education, that we need not enlarge upon it. There has fcarcely been any improvement in drefs more important than the ufe of loofe trowfers and fufpenders, by which the weight of the lower parts of the drefs is fuftained by the fhoulders, inftead of throwing it, as we recollect it to have been, upon the hips, affifted by a tight bandage round the waift. Tight fhoes and tight garters (which, if employed at all, fhould always be below the knee,) impede the circulation, and are followed by confiderable injury to the lower extremities. In fact, the rule fhould be, to have every part of the drefs not fo loofe as to be cumberfome, but perfectly eafy: and whenever children complain of uneafinefs from their clothes, they fhould at once be rectified. No trouble or expence will in fuch cafes be thrown away: there is nothing pays better in the long run than early care in the department of phyfical education. If half the pains and expence were employed in making drefs convenient and healthy, that are now given to appearance, it would anfwer every purpofe.—We need fcarcely add, that in the female drefs the fame principle fhould be obferved; and except in cafes where, from medical advice, a different plan may be thought neceffary, nothing fhould induce a mother to allow her daughters any article of clothing whatever, which does not give full and free play to the exercife of their mufcles, or of the internal functions of the fyftem. In the eye of reafon that parent has much to anfwer for, who permits her daughters to ufe any article of drefs caufing compreffion about the waift; much in refpect to the health of the individual; much, too, as it refpects the health of her children, if fhe fhould be a mother, and her capacity to bring them into the world.

Attention to neatnefs and fimplicity of drefs fhould be produced, in the firft inftance, by parental care; and afterwards enforced by parental example and inftructions. This is one of the external habits, which contribute greatly to the moral and even to the mental health.

IV. *Beds, Sleep.*—In the earlieft periods of infancy it may probably, in many cafes, be neceffary to employ warm foft beds, at leaft during the winter feafon; but the fooner they can be difpenfed with the better. There cannot be a doubt that foft beds have a very enervating effect upon the fyftem: and that fo far from contributing to the proper growth of the fpine and limbs, they have a great tendency, by yielding confiderably in parts, to produce diftortion. The mattraffes on which they lie fhould not, however, be fo hard as not to yield at all. If hair mattraffes, (which muft be the beft,) are not eafily procured, they may be filled with wool or cotton flocks; the head fhould not be much raifed; the child fhould be induced to lie fometimes on one fide, fometimes on the other, and as little as poffible we apprehend on the back. A moderate curvature of the body feems preferable to abfolute ftraightnefs.

It does not appear undefirable to protect the *head* of the bed, efpecially if there be any danger of a current of air round the room; but nothing more than this. The habit of drawing the curtains clofe round the bed is highly prejudicial in confining the impure air, and producing an injurious degree of warmth. Proper provifion fhould be made for moderate warmth, but care muft be taken not to exceed it. "When young people," fays Dr. Beddoes, "complain of unrefrefhing fleep they fhould be examined in the night, and waked without compunction if found too warm. The bed clothes fhould then be thrown off, or if the dry heat be confiderable it will be beft to walk up and down the room in a drefs which fhould be contrived for guarding the hands and feet from chill, while it fuffered the trunk of the body to be freely ventilated." This may appear a precaution of fome danger, as well as difficulty; and referring to an unhealthy ftate of the fyftem, fhould not perhaps be adopted without medical advice; but on the following there can be no difference of opinion: "Whenever a perfon of feeble habit feels heated in a morning let him rife without a moment's delay." The heat of the bed is often increafed confiderably above that falutary point which at once imparts refrefhment and vigour, and then produces fever, languor, and inactivity.

We have already ftated in Div. I. that the bed fhould be raifed from the ground, fay 18 or 20 inches. As to the quantity of fleep, it muft vary greatly with peculiarities of conftitution. 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 fummer, however, lefs will be defirable; for the cool of the evening affords a valuable time for exercife, and the early morning air fhould not be loft. The middle of the day will then be found the beft for reft, in circumftances which will not produce too much heat.

"There is an intemperance in fleep very neceffary to be guarded againft, becaufe extremely apt to creep upon young people,

people, efpecially in this cold climate, where it gives a fmart pain to jump out of a warm bed into the winter air; therefore, this is a piece of hardinefs which cannot be inculcated too early by all the means conducive thereto, whether advice, injunction, or fhame. While under the eye of parents or mafters, they may be kept conftantly to a certain hour, which will make it the eafier for them to perfevere afterwards, when gotten from under that controul; if no diforder or accident intervene, they will need no more than one nap, which cuftom will have brought to terminate of itfelf juft at the ufual hour; and then if they turn upon the other ear to take a fecond, they fhould be taught to look upon it as an intemperance, not at all redounding to their credit. But this fecond nap is not fo bad as lying awake, than which nothing tends more to foul the blood, to fharpen the juices, to exhauft the fpirits, to unbrace the folids, to heat the blood, to ftupify the underftanding, to deftroy hardinefs, and to produce other inconveniences of very mifchievous confequence. Let them feek their amufements elfewhere, but referve the bed as a place appropriated to fleep and ficknefs; for if it were poffible to live without either of thofe fufpenfions of the enjoyments of life, nobody would ever think of making a bed a part of his furniture." To make early rifing pleafant and habitual, the firft employments of the morning fhould be pleafant in themfelves or their confequences.

The practice fhould be early begun, and afterwards adhered to as conftantly as circumftances will permit, of fleeping fingly. Separate beds are of no fmall fervice to the phyfical health; they are of effential importance to the moral health. To prevent departures from this plan, the beds of children and youth fhould be made as narrow as their comfort will allow, that they may not be ufed by two, without real inconvenience. If to this feparation can be added that of rooms, no doubt the caufe of morality muft be greatly promoted; and this fhould be done wherever practicable, unlefs parents have full confidence in the delicacy of their children.

It may be worth while adding here, that fuddenly awaking young children has often a very injurious mental and moral effect. Their firft fenfations fhould be pleafant, and we admire the principle upon which that mother proceeded, who always awoke her children with a fong. Montaigne tells us, that his father always had him awakened by the found of a mufical inftrument.

V. *Care of the Shape.*—The reft of bed is peculiarly neceffary for children and growing youth, in order to afford a due degree of relaxation to the bodily fyftem; 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 fhould be encouraged to lie down once or twice in the day, on the carpet or on pallets, in fuch a pofture as may afford the greateft degree of relief to the mufcles and joints. "When the leaft tendency to become awry is obferved, they fhould be advifed to lie down on a bed or fofa, for an hour, in the middle of the day for many months; which generally prevents the increafe of this deformity by taking off for a time the preffure of the head, neck, and fhoulders on the fpine of the back; and it at the fame time tends to make them grow taller. Young perfons, when nicely meafured, are found to be half an inch higher in the morning than at night; as is well known to thofe who enlift very young men for foldiers. This is owing to the cartilages between the bones of the back becoming compreffed by the weight of the head and fhoulders on them during the day. It is the fame preffure which produces curvatures and diftortions of the fpine in growing children, where the bones are fofter than ufual." Darwin on Female Education, p. 76.

Some remarks which might be applicable here will be found in Div. III., refpecting the freedom which fhould uniformly be an object in drefs; and we fhall not therefore quote fome good obfervations to that purpofe, which we obferve in Darwin, but muft add his laft fentence. "A wife fafhion of wearing no ftiff ftays, which adds fo much to the beauty of young ladies, has commenced fince the above was written; and long may it continue." We are grieved to hear that this excellent cuftom is now (1814) very much laid afide; and that our fafhionable young ladies have returned to the follies of their grandmothers, increafing the injurioufnefs of their method, by making the preffure more partial. Report fays, that even gentlemen now wear ftiff ftays. To them the injury is lefs, but not trifling. But this folly can only extend among thofe whom nothing but experience can cure of folly.

"All other methods of confining or directing the growth of young people fhould be ufed with great fkill, fuch as back-boards, or bandages; and their application fhould not be continued too long at a time; left worfe confequences fhould enfue than the deformity they are defigned to remove. Of thefe the ftocks for the feet of children, for the purpofe of making them turn their toes quite out, and the frame for preffing in their knees, as they ftand erect, at the fame time, I fufpect, when carried to excefs, to be particularly injurious, and to have caufed an irrecoverable lamenefs in the hip-joint. Thefe, therefore, fhould be ufed with proper caution, fo as to give no pain or uneafy feels, or not ufed at all." (Darwin, p. 78.) "Inftead of ftocks, (fays the editor of Parent's Friend, p. 56.) I would advife, that a ftraight line be drawn on the floor of the fchoolroom, from one end to the other, and that floping lines be drawn alternately on each fide of it at equal diftances. Thefe lines fhould form angles of about 30 degrees (we fhould fay 40° or 45°) with the centre line, and the children be daily accuftomed to walk on it, placing their feet behind the floping lines, fo that the infide edge of the foot may exactly coincide with them. This would teach them to turn out both feet equally in walking, which they feldom do, and would give a regularity and fteadinefs to their gait, without which no one can be faid to walk well.

"By confinement in a fchool room for many fucceffive hours, and that without being fuffered to vary their pofture, fome of the more active and lively children are liable to gain tricks of involuntary actions, as twitchings of the face, reftlefs gefticulations of the limbs, biting their nails, &c. which are generally at firft occafioned by the want of fufficient bodily exercife to expend the fuperfluous animal power, like the jumping of a fquirrel in a cage; but are alfo liable to be caught by imitation of each other. To prevent this kind of deformity, children fhould be fuffered to change their attitudes and fituations more frequently, or to walk about as they get their leffons." (Darwin, p. 100.) The reader will find fome ufeful obfervations on this fubject in the chapter on Attention in Edgeworth's Practical Education.

VI. *Diet*, &c.—Under this head we fhall not find it neceffary to enter much into particulars. The food of children and youth fhould be nourifhing but not ftimulating; and as plain as can be. If their appetite be not pampered, or laid under unnatural reftraint, it will generally be their fafeft 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 diforders of repletion are lefs injurious in their confequences than the difeafes arifing from the

the want of fufficient nourifhment. Nature has many ways of relieving itfelf when overcharged; but long fafting is extremely hurtful to young people; and a child who is often pinched with hunger ftands little chance of becoming a ftrong man. "The ftomach (fays Dr. Rufh) is like an idle fchool-boy, when it has nothing elfe to do, it is always doing mifchief." When children rife an hour and half or two hours before breakfaft, we think it very defirable that they fhould be allowed a piece of bread and a draught of milk or water foon after rifing; we have perceived confiderable injury arifing in the weakly ftomach by early fafting. When they have gained fome degree of robuftnefs, this may be eafily given up. It is highly defirable that the ftomach be brought to the capacity of enduring great irregularity in the time of taking food; but in the early periods of invigoration, confiderable if not minute regularity in the principal meals is very beneficial. When children faft too long they often do not know how to eat. In fuch circumftances, a fmall quantity of warm liquid will reftore the difpofition to eat, better than dry food. The principal meal fhould be fufficiently early in the day to allow of their taking out-of-door exercife after it. Perhaps it will generally be found, that about one o'clock is the beft time for this; but it does not appear that a nearer approach to the common hour of dinner can be attended with any ferious inconvenience, if the previous time be properly arranged for it. Though children fhould not get the habit of lounging at their meals, any more than at other things, yet they fhould not be hurried at them; but fhould be induced to eat their food flowly in order that they may mafticate it properly.

We fully agree with Dr. Beddoes on the great defirablenefs of employing animal food in early childhood and ever after. Some fpeculatifts have indeed attributed the prevalence of confumptive complaints, as well as fuicide, in our ifland, to our free ufe of animal food; but it appears probable, in the firft place, that much more animal food is eaten in countries where this fatal malady occurs lefs frequently than with us; and, in the next place, that a free ufe of animal food, inftead of being objectionable, is highly advantageous as a fecurity againft its attacks. The falutary agency of animal diet in preventing the developement of fcrofula is now generally known; and the miftakes of thofe parents, who imagined that, by confining their children to a vegetable diet, they were purifying their blood, while in reality they were ftarving them into fcrofula, are now generally recognized and avoided. (Stock's Life of Beddoes, p. 168.) Cafes may occur, when animal food may be injurious; and thefe may require at leaft a temporary fufpenfion of it; but much more injury is done by a fpare or poor diet, than by a reafonably full meal of plain nourifhing food. Once a day cannot be too often for a meal in which meat fhould form a chief ingredient; and we need fcarcely fay, that its proper nourifhing effects will be moft experienced, where it is full-grown and not over-dreffed. With plenty of air and exercife, warm clothing, and moderate temperature, there is little room to be apprehenfive of injury from plenty of milk and meat. On the contrary, the beft effects on the health and vigour of the fyftem may be expected.

Profeffor Hufeland tells us, that thofe parents who accuftom their children to drink water only, render them a fervice, the value and importance of which will be fenfibly felt through life; and we fully agree with him. No beverage can be more wholefome, and we will even venture to fay on the whole more nutritious, than good fpring water. Thofe who have any acquaintance with animal and vegetable phyfiology, will not be furprifed at the laft part of this affertion. But if we leave out of view its nutritious qualities, and confider it merely as a beverage free from the noxious qualities which forcibly prefent themfelves to the minds of thofe who connect the future periods of life with the prefent, and which muft induce them to fhun the early employment of ftimulating liquors of any kind, it is invaluable. It would amply repay the parent to give up the ufe of every ftimulating beverage with his meals, for the fake of example to his children, and with a view to produce that habit of early temperance which cannot be too foon acquired. We have known the fips of wine and of ale, which many would think mere trifling indulgences, produce a propenfity to the ufe of ftrong liquors, which has been attended, even at eight or nine years of age, with intoxication. And it fhocks us to fee parents fo regardlefs 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 lefs,) a glafs of unmixed wine, and even urge them to drink it. Thefe fame perfons would be themfelves averfe to give their child half the wine glafs of brandy, and yet the quantity of alcohol differs little in the two cafes. Wine fhould be referved for a medicine; and there may be times, even in childhood, in which, when diluted, it may thus be ufefully employed. But in fuch cafes, with a view to the future, no pains fhould be taken to render it palatable. The true way to prevent an early tafte for ftimulating liquors of any kind, is not to make them the fubject of direct prohibition, but to keep children out of the way of them, and to accuftom them to fimple food and drink. Where the ftomach of a child is not unnaturally excited, there will be little difpofition to the ufe of fermented liquors. But if drinking them be made the fubject of boafting, or even of expreffions of lively pleafure, in the prefence of children, our precautions may be eafily rendered ineffectual. If a parent finds it neceffary to introduce to his table vifitors who will be thus carelefs of the moral welfare of the young about them, let his children take their meals in a feparate room, till he has acquired fuch power over their minds as to prevent the mental poifon from operating. Then it may be beft for him to let them be expofed to it. They muft eventually; and it is better that this fhould be done before the mind is likely to be fo 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 fubject of converfation, at leaft let not children be expofed to the impreffions of the fcene. Thofe 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 ftages, till life has been prematurely cut off by its poifonous effects, when the age of manhood had fcarcely been reached,—will think no inftance of felf-denial or of prudential caution unreafonable, to prevent the poffibility of fuch evils in their own families. Whether we confider it in its prefent and future beneficial effects on the bodily organs, (the digeftive, biliary and nervous fyftems,) or in its great tendency to promote the culture of felf-controul as it refpects the corporeal defires, the habit of temperance cannot be too early begun or too fteadily purfued. Its phyfical, mental, and moral influence, its influence on health and happinefs, entitle it to a high rank among the virtues of life. At firft it will be a mere habit, formed only by parental care and influence; but as the child advances towards maturity of underftanding, every judicious means ſhould be employed, to give it the obvious and impreſſive ſanctions 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 recollected 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 precautions, 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

little

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 engage 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 anticks, 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 conducted

ducted with propriety, and not carried to excefs, (by over-heating or over-exerting the fyftem, or by encroaching upon the part of the night which health requires to be fpent in bed, an hour or two before midnight,) we think a falutary amufement, 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 excefs.

It has been propofed to make *gymnaftics* a part of the regular bufinefs of education. A tame fpiritlefs exertion of the body is worth little. Some good may be done by it; but what fhould be the object of the parent, is voluntary active exercife, in which the whole foul is for the time engaged. The formal walk, even in the fields or on the fea-fhore, however much it may pleafe, by contraft from fedentary amufement, and which it will do only in proportion as that amufement has been kept within its due limits, cannot have nearly the fame beneficial influence on the body, or on the mind, as the lively fportive exercife which healthy children will take of themfelves. A troop of boys or girls, turned into a field to find amufement for themfelves, and left at full liberty, except that of tranfgreffing the bounds which mental or bodily health prefcribes, will do for themfelves, that which no one elfe can do for them; they will be gaining life and vigour, mufcular activity, and, what often is intimately connected with it, mental activity. Still we are difpofed to allow, that regular attention to gymnaftics fhould make a part of the fyftem of education; but then the regularity of the managment of it fhould be kept out of fight as much as poffible. The parent or the tutor may plan and lead to the execution, but the execution, and, as much as poffible, the plan, fhould originate in, or at leaft 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 fhould not be brought into view. In fact children teach themfelves beft; and the infpecting, controling, directing power of the older friend fhould feldom be the direct object of obfervation. He may notice in filence, and give hints from what he has feen, which will do every thing that is neceffary. Conftraint deftroys the very life and foul of play. From what we have feen of an octavo volume, entitled "Gymnaftics for Youth," tranflated from the German, we think that the parent, (under which general appellation we ufually include the tutor or parental friend,) may derive fome ufeful hints to aid him in the great and important object of bringing the mufcular fyftem into full vigour and activity. We muft by no means omit the valuable chapters on Toys and Machines, in Edgeworth's Practical Education, which every reader of this article probably has accefs to. And from extracts which we have feen from Parkinfon's Dangerous Sports, we expect that valuable cautions may be derived from it, deferving the attention of the judicious parent.

We would not have the prohibition of dangerous fports carried too far. Thofe whofe confequences may be, and efpecially thofe whofe confequences will probably be, fatal, or the injury irremediable, fhould be abfolutely prohibited, and the difpofition to avoid them produced by confiderations of prudence and benevolence. Forced exertions beyond the ftrength, blows on the head, ftomach, &c. injury in the eyes from any caufe,—thefe, and all others coming under the above defcription, fhould be the fubject of frequent caution. But in real life occafions continually occur, in which pain muft be borne, or in which fome degree of rifk muft be run; and that education muft be radically defective, which does not fow the feeds of fortitude and prefence of mind. Nothing will teach thefe qualities but expofure to pain and fome degree of danger. We do not mean a voluntary direct expofure; but we would check that exceffive caution on the part of the parent, which fhuns prefent fuffering at the expence of future ftrength of mind. The benumbing influence of fear injures beyond calculation; and though we have no wifh to fee foolhardinefs, which is bold becaufe it is unacquainted with the real extent of the dangers it runs into, we do always rejoice to fee in a lad firm endurance of pain, and active boldnefs, under the guidance of fome little prudence and ingenuity in extricating himfelf from rifk, without paying more attention to the danger than is neceffary to efcape from it. Cowardice is fo often, we might fay fo conftantly, the fource of meannefs, and all its accompanying vices, and (even where the moral education has checked thefe) is fo often a bar to valuable exertions for the good of others, that every indication of it fhould lead to proper methods to eradicate it. Some may fuppofe that all that is neceffary is to give ftrength and health. So far from fortitude being a neceffary attendant upon thefe, we have feen reafon to confider it as a more conftant companion of activity of mind, united with lefs robuftnefs of body. Activity is the grand point; this will lead a boy into rifks, (we do not mean of fatal accidents, but of fuch as for the time may be painful,) and the fame activity will often fuggeft expedients to efcape from them; and the more this is done in early life, the more felf-command and prefence of mind will be practicable, when neceffarily expofed to great and imminent danger. Prefence of mind, as Mifs Edgeworth has well obferved, is, in reality, abfence of mind, as far as the danger is concerned: on that it does not dwell, but upon the expedients of efcaping it. And it muft 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 fhould not receive too much fympathy. All that is neceffary for their relief fhould be done, at leaft in the earlieft ftages of education; but the little mind fhould be excited to bear its pain, by pleafantry, or even raillery, by appeal to fhame, by turning the attention from it, in fhort by any and by various methods, thofe being felected which experience has fhewn to be moft effectual for the individual. After the firft period of childhood, their accidents fhould receive very little direct attention; the parent will obferve, but the obfervation need not be made to excite their notice. He fhould be ready to ftep in where neceffary, but in common cafes leave them to act for themfelves. Indeed this is one grand object in education, to enable the individual to act for himfelf, when the great bufinefs of life depends upon his own wifdom and exertions.

When the dread of pain (even where the mind is unfupported by fympathy, or not ftimulated by the dread of fhame) is in a confiderable degree fubdued, or made inactive, (in other words, when fortitude has been acquired,) there is only one thing more requifite for effectual prefence of mind, and that is a knowledge of the beft methods of efcaping danger, a readinefs of invention, and the adoption of means to ends. Thefe are more intimately connected with the culture of the imagination and the underftanding. To produce them, the young fhould often be led to confider what is beft to be done in accidents of different kinds. "What would you do if your clothes were on fire?" we would afk a girl old enough to underftand and to act. "What would you do if your brother fell into the water, or fell down and broke his arm?" are queftions which would lead to ufeful converfations with a boy. When occurrences of of this nature are mentioned, the mind of an intelligent youth may be fet to confider what fhould have been done, and then compare it with what was done. Where this turn is given to the inventive powers, highly ufeful refults might be expected, not only when in actual danger, but in providing againft the accidents of human life for others. Newton Bofworth's little book, entitled Accidents of Human Life, will furnifh fome ufeful hints; and it would be well to keep a common-place book for this exprefs object, which might be ftored with facts of actual occurrence, and with fuggeftions as to probable cafes in future. An acquaintance with the ftructure and functions of the body, with chemiftry, and with mechanical philofophy, cannot fail to be of great ufe for this object, and attention to them with this object in view, will be of fervice in others. Our readers will find fome hints which may be of fervice in INTELLECTUAL *Education*, Div. V; and ftill more towards the clofe of Mifs Edgeworth's chapter on Attention. The excellent little dialogue in Evenings at Home, called Prefence of Mind, well deferves the perufal of parents as well as children.

To any one who fairly confiders the way in which the bodily and mental faculties are developed, it will appear abundantly clear, that exercife is as much required for the one as for the other; and as the mental progrefs fo much depends upon the health of the body, even if that be to be regarded as the primary object, this muft on no account be neglected. "Exercife is neceffary for health, bodily and mental," fhould be the fundamental maxim of every fyftem of education private or public. It is a law of our natures, againft which no one can offend with impunity; and fuch arrangements fhould be adopted in every fchool, and in every domeftic plan, that it may be fully and effectually obeyed. Sedentary employments fhould be frequently relieved by active mufcular exertion. It is a bad thing for the mind to be kept on the ftretch too long; and, therefore, fedentary amufements are often neceffary; but fedentary amufements fhould only be reforted to where active fports cannot be had. Bodily activity is almoft an effential requifite for mental activity, and indifputably for the full enjoyment of health. If from any circumftance the fchool hours exceed two or at moft three hours at one time, let a break be made at fome convenient place for "a good batch of play." Little will be loft by it for the time; much will be gained for the future. Exercife 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, ftill let it be had within.

When children have been fitting fo long, that they feel indifpofed to bodily exertion, there is no doubt they have fat too long.—"Like every other organ, the palate and the ftomach, when left inactive and unirritated, lofe their original faculties. Repeated fafting is fatal both to appetite and to digeftion. Sedentary occupations," we would fay too long continued, and difproportioned to the age and degree of mufcular maturity, "gradually deftroy the defire, and impair the power, to exert the mufcles, more particularly while they are forming."—"To debar children from giving loofe to thefe inclinations, by indulging which, they knit their finews, fwell their mufcles, and harden the whole againft the viciffitudes of air, is a kind of feverity neither indifferent to them or to thofe about them, for the prefent or for the time to come."

It really appears fomewhat unneceffary to dwell upon this fubject 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 (Eff. iii.) we obferve, that in his plan for a girl's fchool, which we think in many points very judicious, (though clearly formed more with a view to *weakly* children, than could in general be defirable for girls and ftill lefs for boys,) he lays down the following precept: "under twelve years of age it fhould be an invariable rule, that the hours of application fhould never exceed thofe of amufement and exercife." The principle is a good one; and it fhould not much be departed from, till the period when application becomes voluntary and pleafant; and then fome portion of the hours for *amufement*, we do not include thofe of *active exercife*, may be added to thofe of application. We are inclined to think that, in general, for boys between ten or eleven and fourteen, nine hours fleep, eight hours work, and feven for meals, exercife, and amufement, is a good divifion. Thofe, who fee reafon to adopt our views in INTELLECTUAL *Education*, efpecially under the heads of *Attention* and *Memory*, will be of opinion, that Dr. Beddoes' plan is in thefe points radically defective. It affords ufeful hints, but it cannot be followed, we apprehend, and at the fame time mental *vigour* be obtained.

But while we fay this, we muft add, that we deprecate, as he does, exceffive mental exertion in children. The phyfical fyftem muft be the firft object. If the order of nature be reverfed, the mind will eventually fuffer for it, as well as the body. It would often be eafy for the fkilful parent to make a child a prodigy; but the judicious parent never will attempt it. Premature and luxuriant growth of mind will feldom, if ever, be found to fpring from a vigorous root. It will be viewed by thofe, who know the laws of human nature, as a difeafe; and fuch it will generally prove, even in the eftimation of the mere fuperficial obferver. We do not doubt, that many have funk into an early grave, through the unnaturally rapid developement of their faculties, and the exceffive excitement of mental and phyfical fenfibility, which is ufually the caufe or effect of it: and ftill more have had the progrefs of their bodily health and ftrength impaired; their minds have funk into a ftate of ftagnant liftleffnefs; and the promife of early genius has been completely difappointed, and followed by a train of phyfical and mental and moral evils, which fhould ferve as a beacon to the vain or the unwary.

Though this article is expanding beyond our wifhes, we cannot forbear prefenting our readers with another extract from Search. The Light of Nature may not be acceffible to many; and this paffage is truly important, and deferves to be carefully weighed by every parent.—"Nor is it enough to reftrain fleep within due bounds, if the waking hours be fuffered to dream away in a torpid indolence not much different from fleep. It is of great fervice, even to the health, to cultivate a fpirit of activity, continually exerting itfelf in fome exercife either of body or mind. The former is more neceffary for the animal machine, and for that reafon deferves to be particularly regarded for fuch as are deftined to follow fome fedentary profeffion, that they may be inured by early cuftom never to fit ftill with their hands before them in the intervals of bufinefs, but to move brifkly in their common actions, and daily to practife fuch 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 ufelefs to the body; there being fuch an intimate connection between the groffer and finer organifations, that irregularities in the one, will not fail to produce their like in the other. There are fome who love to fit in a corner, building caftles in the air, mufing upon improbabilities foothing to their fancy, and wifhes of what can never happen, or perhaps upon fomething that has vexed them, or the imaginary dread of mifchiefs never likely to befall them; though this may feem an intenfenefs of thought when the mind is rather too bufy than too remifs, it is in reality not an activity, but paffivenefs bound down to an object rifing mechanically in the imagination. Tempers of this caft have a perpetual liftleffnefs and dilatorinefs, they apply to nothing readily, they do nothing currently, but want to put off every thing another minute, even their meals, their diverfions, and their beloved nightly repofe. Such ftagnation of thought, become habitual, muft inevitably introduce a like ftagnation of the vital juices, fret and wafte the fpirits, generate fearfulnefs and melancholy, and impair the health more than will be eafily imagined.

"This mifchief then deferves an early attention to obviate, the more becaufe difficult to be difcovered in its beginnings; for we cannot penetrate into the thoughts to fee what paffes there: but before grown inveterate, it will fhew itfelf in the actions, or rather in the inertnefs of difpofition; and then no time fhould be loft to cure it, nor any means omitted that can be devifed to teach children to find an iffue for their thoughts by running them in current trains, and to take pleafure in making good difpatch of every thing, as well in their tafks as their amufements.

"Neverthelefs it muft not be forgotten, that there is a contrary extreme, which urges to make more hafte than good fpeed; a continual hurry and agitation, never fatisfied but when in motion; an impatience to do things before the proper time, and eagernefs to difpatch them at once by a violent exertion; an over-folicitude for the fuccefs of meafures, and a vexation upon any rub happening to fall in their way. This temper likewife is unfavourable to the health; for mifchief will enfue upon precipitating the circulation of blood and animal fpirits, as well as upon retarding it. A calm and fteady alertnefs, flowing in one uniform tenour, always brifk and lively, never anxious nor trepidating, is the defirable point to be purfued: therefore, we muft fo labour to cure one evil, as not to incur another; and keep an eye upon Scylla, while we endeavour to fteer clear of Charybdis. I know it is a difficult matter, perhaps impoffible, to hit exactly the golden mean; but we fhall come the nearer, by being apprifed of dangers on either hand: though I think the former is the greater, the more frequently fallen into, and harder to be cured. The beft that can be done muft be by diligence in watching the approaches of either, and applying the proper remedy as foon as they are perceived."

In what we have faid, we wifh to be underftood as referring, unlefs otherwife expreffed, to girls as well as to boys. We are fully fatisfied that there is a conftitutional difference in the fexes, which is perceptible even from infancy; and that the parent, who fhould train up her daughters to all the moft robuft exercifes of boys, would find that fhe had carried the matter too far. But we are alfo fatisfied, that this conftitutional difference is unneceffarily and moft injurioufly carried beyond all the bounds of nature, in the common modes of educating girls. We recommend to mothers, efpecially, fome remarks on this fubject in Reflections on the prefent Condition of the Female Sex, by Prifcilla Wakefield; a writer who has contributed well to ftore the children's library with works containing really ufeful information. "How often," fhe fays, (we quote from Parent's Friend,) "has our anxiety for the delicacy of the complexion, or the apprehenfion of her becoming a romp, reftrained a girl from the indulgence of enjoying either air or exercife, in a fufficient degree, to fecure her from that feeble, fickly, languid ftate, which frequently renders her not only capricious, but helplefs through the whole courfe of her life. There is no reafon for maintaining any fexual diftinctions in the bodily exercife of children. If it is right to give both fexes all the corporeal advantages which nature has given to enjoy, let them both partake of the fame rational means of obtaining a flow of health and animal fpirits, to enable them to perform the functions of life."—"Employment fhould be contrived, on purpofe to induce them to pafs a large portion of their time in the air; nor fhould they ever be permitted to fit within long at a time. A mere walk fcarcely fupplies fufficient exercife to produce a quick circulation; fomething, therefore, more active fhould be adopted. Running races, trundling a hoop, fkipping with a rope, battledore and fhuttlecock, ball, jumping, dumb bells, fwinging, and many other amufements of the like nature, are fuitable for the purpofe, and may with equal propriety be practifed by both fexes, being by no means incompatible with delicacy of perfon and manners. Let it never be forgotten, that true delicacy confifts in a purity of fentiment, and is as much fuperior to its fubftitute, external manners, as a real gem to one that is artificial."

VIII. *Exercife of the Senfes.*—It is certainly poffible to have eyes, and yet not fee; and to have ears, and yet not hear. This, however, is in general more owing to the fluggifhnefs or inattention of the mind, than to the imperfection of the external organs of fenfe. Impreffions on the organs of fenfe, which, if the attention of the mind were actively directed to them, would convey clear, vigorous, and well-defined fenfations, may either excite a mere partial or fleeting notice, or pafs away without any fenfation whatever. See *Mental* PHILOSOPHY, Div. I.; and in connection with other topics of this divifion, the reader will probably find fome advantage in confulting Div. II. alfo.

In INTELLECTUAL *Education* we have endeavoured to mark the diftinction, which is too feldom obferved, between *fenfations* and *perceptions*; and we fhall not enter upon the fubject again. The reader will find the firft four divifions of that article bear clofely upon what may well be termed the mental proceffes of perception, and we beg leave to refer him to them for this purpofe. Dr. Reid, in his Effays on the Intellectual Powers, has a diftinct chapter on the improvement of the fenfes (Effay II. chap. 21.); but from the views which that philofopher took of the nature of perception, it might be expected, and it is accordingly the fact, that he fays but little on the improvement of the *fenfes* properly fo called: it is principally on the improvement of the perceptive power. The philofophical reader may, however, find it worth while to confult that chapter; and the judicious, but inexperienced mother will alfo derive much ufeful information from the fecond and third letters in Mifs Hamilton's fecond volume.

That the perceptive power is fufceptible of very great improvement, by proper exercife and culture, there can be no doubt; but fome may doubt whether this is the cafe with refpect to the bodily organs of fenfation. When it is confidered, however, that improvement, as the confequence of due exercife, is the grand law of our phyfical and intellectual powers, it might be inferred that the external organs are, by the fame means, fufceptible of improvement, in furnifhing correct and vivid fenfations. And when it is confidered that even well-formed healthy infants indicate little fenfibility of fight and hearing for many days; that there are manifeft and great differences in the animal tribe, in the powers of fenfation; that even where there is the power of vigorous attention, children greatly differ in the correctnefs and vividnefs of their fenfations; that thofe who are accuf-

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tomed to obferve objects of a certain clafs, not only have much more ready and accurate perceptions, but even can at once difcern, where fenfation only is concerned, what very clofe attention will fcarcely enable another to fee; that thofe who are deprived of one of the three organs of intellectual fenfation, acquire a peculiar fufceptibility, not only of perception, but of fenfation from the others; and that at the period of natural decay, and even earlier, there is a great diminution of the power of fenfation; it appears to us fcarcely to be doubted, that the bodily organs of fenfation are fufceptible of great variation and improvement in the fame individual.

Even if this fhould ftill be regarded as matter of theory, it is obvious that no effort in endeavouring to improve the fenfes can be loft: for by the fame means we fhall be effectually improving the faculty of perception. And, on the other hand, whatever means are taken to exercife the perceptive power, thefe will, upon the above principle, cultivate alfo the organs of fenfation. The exercife of the bodily organs, and accurate attention to the impreffions upon them, are, in fact, the only direct means by which this laft object can be effected. The indirect means are of indifpenfible importance, and will do much towards rendering the direct means of real efficacy: we refer to thofe means by which the bodily health, vigour, and activity, are to be obtained. The exercife of bodily vigour, and efpecially of bodily activity, not only has the effect of ftrengthening the nervous fyftem generally, and of giving it a *healthy* fenfibility, but it furnifhes conftant exercife for the organs of fenfation. The ufeful playthings of childhood and youth, and their employment out of doors, are continually calling thefe organs into activity; and that agility in mufcular movements, with which health and activity are fo often attended among the young, and which contributes fo much to give bodily dexterity, is peculiarly ferviceable in calling into play the power of fenfation alfo. Dexterity does of courfe imply the quick and vigorous fenfation, and accurate attention to it, and the ready affociation with it of the appropriate mufcular movement; and where it is exercifed, there the organs of fenfation muft alfo be exercifed. In fhort, wherever and however the attention is directed to the objects of perception, whether in the way of fimple obfervation, or of comparifon and difcrimination, the correfponding organ of fenfation is undergoing a proper culture.

Hence a great deal may fafely be left to the mere influence of external objects, provided the attention is pretty fteadily and frequently led, directly or indirectly, to the perceptions. A child who obferves much, muft acquire quicknefs of perception; a child who obferves accurately, muft acquire accuracy of perception, and confequently muft acquire quicknefs and accuracy of fenfation. But there are few cafes in a judicious education, in which all will be left to this indirect exercife. During the plays and employments of childhood and youth, various means may be devifed of calling the fenfes into activity, and directing the attention to them. In the book which we before referred to, "Gymnaftics for Youth," there are fome ufeful fuggeftions refpecting the method of artificially exercifing the fenfes, which we think may be ferviceable to fome of our readers, and which we fhall give in the form in which we find them in the "Parent's Friend."

"Befides the natural exercife of the fenfes, I think it might be poffible, by artificial means, to increafe the power of each fenfe, in the fame manner as hundreds of deaf and blind perfons, who fupply, to an aftonifhing degree, the lofs of one fenfe by the zealous cultivation of another. Accordingly, in exercifes of this kind, fometimes the eyes fhould be covered, fometimes the ears prevented as much as poffible from hearing, fometimes the reft of the fenfes kept as free as may be from impreffions. When children have acquired confiderable readinefs by the natural exercife of the fenfes, in their eighth or tenth year perhaps, I confider it as a very pleafing and ufeful occupation to exercife them artificially in the following manner." Though the author fpeaks of the age of feven or nine as a proper time for the artificial exercife of the fenfes, it is obvious that it may be begun with advantage at a much earlier period. In fact, it can fcarcely be begun too early. But, throughout, it fhould be conducted as little as poffible in the way of a formal bufinefs. The exercife of the mufcles, and the exercife of the fenfes, fhould be made as interefting as poffible, and feldom employed except in the way of amufement.

(1) "*Exercife of the Touch.*—The much greater promptitude of the fight and hearing, evidently leads us to neglect the fenfe of feeling; whence I am induced to think, that this deferves our greateft attention. The eyes are to be previoufly covered, and then let the perfon fo blindfolded difcover perfons by feeling their faces or hands; diftinguifh coins; tell what a perfon writes in the palm of the hand with a pencil or point of a fkewer; diftinguifh the leaves of all kinds of trees and plants with which he is acquainted; eftimate the degree of heat, air, and water according to the thermometer; diftinguifh plates of polifhed metal, of fimilar figures, by their fpecific heat; eftimate the weight of various fubftances in pounds, ounces, and the fmaller weights; tell all kinds of wood, and the different productions of the loom; eftimate the number of leaves in a book and tell the pages; among a number of leaves of the fame kind of paper, feparate the blank, written, and printed; write; eftimate the length of various fticks in feet and inches, the fuperficies of a table, the folid contents of fubftances of regular figures, and the capacities of different veffels; mould eafy figures, mathematical for example, in clay or wax, paying attention to the fize as well as the form; make pens, and cut out various objects; diftinguifh all kinds of fubftances put into his hand, as chalk, fealing-wax, &c.: let him endeavour to feel infcriptions in relievo, as upon large coins.

(2) "*Exercife of the Sight.*—Let him eftimate every relation of magnitude as it exifts in nature; length, breadth, height, depth, fuperficies, folidity, and diftance: both in the great, as yards, furlongs, miles; and in fmaller dimenfions, as feet, inches, lines. The conjecture fhould always be compared with actual meafurement. This will at the fame time afford a pleafing mode of practically acquiring the art of menfuration. On fultry days, for which more violent gymnaftic exercifes are not fo well adapted, I have often had recourfe to thefe, and found that young perfons very foon acquire a confiderable readinefs in them. It is above all things neceffary to imprint as deeply as poffible on their minds accurate ideas of the different meafures. When this is done, they will foon learn the art of applying them in all directions, and thus meafure with the eye. Let him draw all kinds of mathematical figures without compaffes or ruler, divide lines into a given number of parts, cut meafures of feet, inches, and lines upon fticks, copy mathematical figures in perfpective from models, draw fchemes for them, cut them in paper, and put them together. All this muft afterwards be examined by mathematical inftruments, and the errors corrected. Let him take for a pattern a picture, on which are many different fhades of colour; compound every fhade in it from the feven primary colours, and lay them all down upon paper; or let him merely declare of what colours each fhade is compofed. Let him eftimate 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 baſon, 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 developement 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 exiſts into the channel of benevolence and piety,—fortitude with reſpect to perſonal pains,—patience with reſpect to perſonal privations,—and the habit of ſelf-controul 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

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 controul; 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 controul. 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

 eye,

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; aud 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 fœdum viſuque hæc limina tangat Intra 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 ſeduloufly (yet without any formal precepts,) endeavour to prevent all breaches

breaches of that decent perfonal referve of which we have fpoken; for inftance, at the times of bathing, wafhing, attending to the calls of nature, &c. We do not want to fee affected fqueamifhnefs, often hiding real indecency; but genuine delicacy and purity. And he will alfo obferve, (with this fpecific object in view, *viz.* to keep the fexual defires as near as poffible within the limits of nature refpecting time and ftrength,) thofe rules which common prudence and experience fuggeft, refpecting fimple diet, active exercife, early rifing, &c.

But we will fuppofe a cafe in no degree uncommon; that no communication has been made to a youth refpecting the evil we have already alluded to, and that his father, or a parental friend, fee reafon 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 hefitation what courfe to purfue? Can there, then, be a doubt as to the neceffity of opening his eyes to his fituation? It muft be done with prudence; but we know it may be done with fuccefs; and we know, too, that the refult may be earneft affectionate gratitude for the communication, and heartfelt fatisfaction at having been the means of preferving a fellow creature from the moft ferious calamities.

Whether the communication fhould be in converfation or by letter, muft be decided by the circumftances of the cafe; we have known each tried. On the whole we fhould prefer opening the fubject by converfation. It will then be more eafy to perceive whether the caution had been neceffary, and to what degree. After fome interval, a paper might be put into the hands of the youth, containing a brief, but diftinct, and impreffive ftatement of the dreadful confequences of the practice; and fome fimple cautions to aid in checking the tendencies of the mind to it. If this produced its proper effect, it would fcarcely be neceffary, for a confiderable interval, to revert to the fubject; but then it might, at leaft, be expedient. It is, however, by no means defirable to bring it frequently forwards; for though it may be treated as a moral difeafe, yet there muft be a feeling of delicacy (or perhaps we fhould fay of fhame) attending it, which could not be worn off without ferious injury; add to which, the efficacy of the reprefentations made would leffen by too much repetition. Thofe external indications which furnifhed the firft ground for apprehenfion, muft, however, be the guide in determining the fubfequent fteps. The difficulty is in the commencement. And we fhould add, that in the firft converfation every means fhould be employed, to prevent all converfation on the fubject with others; it fhould be abfolutely confined to the individual and his friend.

The parent or tutor may take every preventive caution, (exclufive of direct communication,) may do every thing that enlightened prudence would fuggeft to preferve ftrict perfonal referve, and keep off the contagion of evil example; and all this completely, and in itfelf confidered fuccefsfully; and yet without preventing the evil. Many inftances have been known of its commencement without any communication with others, and by circumftances in fome fenfe accidental. We are fully fatisfied, taking every thing into account, that it would be beft to *forewarn* every boy who poffeffed a tolerable fhare of good fenfe and moral fufceptibility. Numerous inftances have occurred, in which this practice has been begun and perfevered in, till the mifchief was almoft, if not altogether, irretrievable, without the individual's having been fully fenfible of the criminality, and but little of the moft injurious confequences, of "this fpecies of flow fuicide."

For the mode of commencing the fubject after there were decided grounds of apprehenfion, we can give no fpecific directions. We can only fay, that it muft be done at a fuitable time; when the mind feems open; when nothing has occurred to excite fufpicion as to the motives; and with that cautious referve which may give an infight into the real ftate of the cafe. Then is a time to give a faithful reprefentation of confequences, &c. A paper for the purpofe already fuggefted, might be of fome fuch nature as the following, which may affift in the firft ftages alfo.

We would begin by mentioning, (without of courfe the flighteft perfonal allufion,) fuch cafes as had occurred to our own knowledge, where lofs of fight, total lofs of mental and bodily health, and premature death, had followed the continuance of it; and where extremely debilitating involuntary emiffions had fucceeded the habitual practice of it, even where it had been abandoned. We would then felect fuch compreffed ftatements from books of authority, (and we have feen Tiffot often referred to, and in Dr. Beddoes's fourth Effay will be found a ftriking cafe, which will urge every confiderate parent to early communication,) refpecting the common effects of this wafte of a fluid defigned to anfwer fuch important ends in the animal economy, and the early and exceffive lofs of which muft weaken the whole nervous and digeftive fyftem, impair the faculties of the mind, and furrender the wretched victim of fenfuality to the miferies, infirmities, and decrepitude, of extreme yet infirm old age. We would inform him that it would fubject him to convulfions, epileptic fits, palfy, infanity, impotency, tabes dorfalis, corporal emaciation and decay, and partial or even total blindnefs or deafnefs; and that where the progrefs to thefe calamities had been checked in time, the mental and bodily faculties are ufually fo injured by any long continuance of it, as to become incapable of any valuable exertion. We would farther tell him, that the bare ftatement of the natural and neceffary effect of this deftructive practice, was fufficient to fhew the will of God refpecting it, even if it do not appear to be exprefsly forbidden in the fcriptures. That it is included in ftrong expreffions of a more general nature, (fuch as Rom. xiii. 12—14. 1 Cor. iii. 16, 17. 2 Cor. vii. 1. Gal. v. 19—21. 1 Pet. ii. 11., and efpecially 1 Cor. vi. 9—10.) there can be no doubt; and at any rate that God has forbidden it by the ufual courfe of providence. That its moral effects in deftroying the purity of the mind, in fwallowing up its beft affections, and perverting its fenfibilities into this depraved channel, are among its moft injurious confequences; and that they are what render it fo peculiarly difficult to eradicate the evil. That in proportion as the habit ftrengthens, the difficulty of breaking it of courfe increafes; and that while the tendency of the feelings to this point increafes, the vigour of the mind to effect the conqueft of the habit gradually leffens. We would tell him, what we remember a medical profeffor faid, that whatever might be faid in newfpapers refpecting the power of medicine in fuch cafes, nothing could be done without abfolute felf-controul, and that no medicines whatever could retrieve the mifchiefs which the want of it had caufed. And that the longer the practice was continued, the greater would be the bodily and mental evils it would inevitably occafion. We would then advife him to avoid all fituations in which he found his propenfities excited, and efpecially, as far as poffible, all in which they had been gratified; to check the thoughts and images which excited them; to fhun thofe affociates, or at leaft that converfation, and thofe books, which have the fame effect; to avoid all ftimulating food and liquor; to fleep cool on a hard bed; to rife early, and at once; and to go to bed when likely to fall afleep at once; to let his mind be conftantly occupied, though not exerted to excefs; and to let his bodily powers be actively employed, every day, to a degree which will make a hard bed the place of found repofe. Above all, we would urge him to imprefs 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 finfulnefs and moft injurious effects; and to cultivate, by every poffible means, an habitual fenfe of the conftant prefence of a holy and heart-fearching God, and a lively conviction of the awful effects of his difpleafure.

When entering into the world, where temptations of a different nature will neceffarily occur, we would, before his leaving the roof of the parent, then enter into other branches of moral reftraint. On this point, however, we have had an opportunity of faying enough already; fee *Moral* PHILOSOPHY, II. I. 2. 3. to which we refer the reader.

At the clofe of MORAL *Education*, after a reference to the fuggeftions we have now brought forwards, we expreffed our intention to introduce in this article "a comparative view of the advantages and difadvantages of public and private education." Since this feries was commenced, we have, at different times, paid fome attention to the fubject; but ftill without the ability to draw up fuch a view as would prove fatisfactory to the reader or to ourfelves. We fhall once more defer it, and hope to offer it under the head of SCHOOLS.

Since the former part of this article was fent to the prefs, we have had an opportunity of hearing Syer's Treatife on the Management of Infants ftrongly recommended by a profeffional man, as a truly excellent work; and we think it our duty to mention it for the benefit of our readers. On the fubject of this laft divifion, fome ftriking obfervations will be found in a fingular work, entitled "The firft Lines of a Syftem of Education, according to Philofophical Principles."

PHYSICIAN, a perfon who profeffes the art of preventing and curing difeafes. At prefent the appellation is ufually limited to perfons who poffefs the degree of doctor, or bachelor of medicine, and who do not practife chirurgical operations; fince cuftom has introduced this divifion into medical practice.

The profeffion of curing difeafes, however, is very far from being confined to thefe two claffes, phyficians and furgeons: for, in modern times, both thefe claffes are greatly outnumbered by the apothecaries, or difpenfers of medicines, who have, in the courfe of years, gradually become medical advifers, and have undertaken both the counfel and management of the fick, and the manipulation of remedies. Or perhaps the divifion may have originated by an oppofite progreffion, in proportion as men of liberal education and enlarged views took up the inveftigation of the human conftitution, and by carrying the principles of fcience to the mere art, at once augmented the utility of the profeffion, and gave dignity to the purfuit. The acquirements which are neceffary to form the accomplifhed phyfician, are, indeed, not comprifed within a fmall compafs, and are therefore only to be attained by a careful cultivation of the underftanding for a feries of years; for without the preparatory and collateral information, the mere medicinal knowledge will, in general, lead but to a blind routine in the fteps of the mafter, 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 hiftory of the progrefs of medical opinions and improvements having been already detailed. See MEDICINE, *Hiftory of*.

All the works of nature are fo intimately connected, that no one part of them can be well underftood, by confidering and ftudying it feparately. In order, therefore, to be qualified for the practice of phyfic, a variety of branches of knowledge, feemingly little connected, are neverthelefs neceffary. The early ftudies of an individual deftined to the profeffion, fhould be of that liberal nature which tend to enlarge the views, and to cultivate the reafoning faculty, and a talent for obfervation; for that quicknefs of perception and readinefs of refource fo neceffary in the emergencies which often prefent themfelves in practice, can only be perfected by a clear and methodical arrangement of ideas and an extenfive knowledge.

Independently of the improvement of the faculties and the refinement of tafte, which are derived from the ftudy of the ancient languages, the fources of a phyfician's information muft be very limited, if he is not mafter at leaft of the Latin tongue, which has been the univerfal language of the learned in Europe for fo many ages, and ferves as the medium of communication between all nations on the fubjects of fcience. The labours of the ableft medical philofophers of Italy, Germany, and France, can only be participated through the medium of that language. The fame actual neceffity may not exift for a knowledge of the Greek language: but an acquaintance with that copious, expreffive, and harmonious tongue, in which fome of the oldeft, and fome of our beft authors have written, particularly Hippocrates, the father and founder of medicine, could fcarcely be difpenfed with, even if almoft all the medical terms of art were not derived from it. Ignorance of this language muft therefore impede the progrefs of the medical inquirer; nor can it be deemed becoming a phyfician to be in the daily ufe of terms, to the original of which he is a ftranger. The progrefs of medicine and the collateral fciences in France, which during the laft half century has been recorded in the vernacular language, renders a knowledge of that tongue now indifpenfible; and an acquaintance with the German is daily becoming the key to much valuable knowledge.

Thus prepared with the means and inftruments for acquiring information, the phyfician muft deem a knowledge of the following fciences effential to his profeffion. The neceffity of a previous knowledge of *anatomy*, or of the ftructure 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 courfe and infertion of every mufcle, fo neceffary to the furgeon, who is employed to divide and remove different parts by the knife, is fcarcely requifite to be retained in the recollection of the phyfician. To him a correct knowledge of the fituation, appearance, ftructure, and connection of the more important organs is, however, not to be difpenfed with. The beft anatomifts, like the beft mechanifts of watches and other machines, will be beft able to replace or remove what is morbid or deranged, *i. e.* will be neceffarily the beft *operating furgeons;* but it is obvious that the perfon beft acquainted with the ftructure of parts, not to be approached by mechanical means, is not neceffarily the greateft adept in afcertaining their difeafes, which are learnt from a knowledge of *fymptoms* only, nor of curing them by the indirect operation of medicines.

For the purpofe of afcertaining the feat and nature of the difeafes 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 indispensibly 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 constitues 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 n 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 foundaa foundation that real *experience* can be built. Experience does not confift in *feeing* a great number of difeafes: for if it were fo, the beft phyfician in the world would be an old nurfe in a large hofpital, who fees the daily and hourly progrefs of every fpecies of malady. Yet how contracted the views, how limited the refources of fuch a perfon! how mechanical and unvarying are the few rules of practice which are thus acquired! Yet fuch is, in fact, the fum of the *experience* which a whole life of practice affords to thofe who prefume to enter the profeffion of medicine, without that preliminary education, which alone fits the mind for *obfervation*, the only foundation of true experience. A perfon 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 fhip, in a certain courfe, with little knowledge of the principles of navigation; or he may make a dial without any acquaintance with aftronomy, or fpherical trigonometry: fo he may be taught, behind the counter of an apothecary's fhop, half a dozen apozems for the cure of a cough or a diarrhœa. But order fuch a navigator to fteer a new courfe, or fuch a diallift to take a new afpect; and from a total deficiency in the *firft principles* of their refpective arts, they are altogether unable to fucceed. Still more difficult is it to be fuccefsful in the cure of difeafes, without a knowledge of firft principles; becaufe the circumftances of difeafes are perpetually varying; and the fame fymptom, a cough or diarrhœa for inftance, are indicative of very different ftates of difeafe, and will be materially injured in one inftance by the very remedy which proved curative in another. (See COUGH.) Throughout the practice of medicine, indeed, a refort to general principles is perpetually neceffary, fince no two cafes of difeafe are exactly fimilar. Many difeafes, it is true, are obvious in their caufes, appearances, and treatment, and, if not actually mifmanaged, have a natural tendency to terminate in health; but on the other hand, many ferious maladies affume at firft a common form, and it requires no little fagacity to trace them in the bud, and no little knowledge to obviate their fatal confequences.

It is not, however, enough to poffefs knowledge; but the mind fhould be able at once to bring in review the knowledge which it retains, and fhould be ready and active in its application. It is often neceffary to adopt at once a plan, and to purfue it with active decifion: it is neceffary to weigh contending difficulties, and at once to feize the path where the feweft or leaft important appear, or where the inconveniencies are counterbalanced by the advantages. It is not always eafy for the obfervers to eftimate the value of fuch decifion in the phyfician; for this rapidity is often equally the offspring of ignorance: becaufe no difficulty can be experienced by thofe who are not able to anticipate confequences; and doubt, the confequence of different refources contending for fuperior eligibility, can fcarcely be felt by thofe who have no plan at all. Phyficians are called on, in general, to act with this prompt decifion; and to hefitate is ufually accounted a mark of ignorance. A man muft have merited the confidence of the world before he can claim time for confideration, and his reputation muft be firmly eftablifhed, before he can own himfelf at a lofs. This neceffary readinefs of refource is partly owing to habit and experience, but principally to a methodical arrangement and clear diftinct views of the knowledge treafured in the mind. The able and experienced phyfician, who can at once comprehend the object to be attained, will, at the fame moment, perceive the various methods by which it can be effected, and he has only to chufe the moft convenient and the beft adapted to the habit or idiofyncrafy of his patient. In his progrefs new views will probably open, and the foundeft judgment is fhewn in fteering between the oppofite extremes, of varying the plan according to the variety of fymptoms, or obftinately perfifting in it, notwithftanding every change of appearances. The firft is pleafing to common obfervers, as it fhews a diligent attention; but it is a proof of weaknefs and indecifion. The laft, perhaps the moft venial error, is the effect of too great confidence; and, unlefs accompanied with extenfive knowledge which dictated the firft opinion, and an acute fagacity in difcerning the effects of medicines, is fcarcely lefs injurious.

It feems obvious, then, that a complicated art, like that of medicine, can only be acquired by the union of extenfive information, with diligent obfervation, and that much evil is likely to enfue where it is practifed without thefe qualifications. Abfurd as is the notion of univerfal remedies, or of any given remedy for any one difeafe nominally the fame, the extent of quackery feems, however, to be increafing, partly from the revenue which government derives from it, but very much alfo from the acknowledged imperfection of the medical art in the hands of fo many half-qualified practitioners. To conclude, however, in the words of that able and eftimable phyfician before quoted; "On the whole, it will appear, that a phyfician, who underftands the principles of his profeffion, who has an extenfive acquaintance with every branch of natural knowledge connected with it, who properly applies his knowledge, and who has genius and attention equal to others, muft have a great advantage, as a practical phyfician, over one who is ignorant of the principles of medicine, and of the fciences connected with it. Genius and fenfe are, indeed, the peculiar gift of heaven, and cannot be acquired by the moft extenfive learning, or the greateft efforts of induftry. But with thefe affiftances, genius and fenfe are capable of the higheft improvements." Gregory's Lectures, before quoted, p. 87. See alfo Parr's London Medical Dictionary, art. *Medicine;* and Percival's Medical Ethics.

PHYSICIANS, *Dogmatical*, called alfo *rational*, among the ancients, were thofe who endeavoured to reduce their knowledge of difeafes to certain principles. The *dogmatic* phyficians were in oppofition to the *empirics*. See EMPIRIC.

PHYSICIANS, *Empirical*, properly fignify thofe who rely upon experience, and are directed by it in practice. An ancient fect of this appellation was oppofed to the *dogmatic* or rational fect; and the principles of both are admirably detailed and criticifed by the elegant Celfus. De Medicinâ, Præf. See EMPIRIC.

PHYSICIANS, *Methodical*, a fect of phyficians of Rome, who refufed to adopt the doctrines either of the dogmatic or empiric fect. See METHODISTS, in *Medical Hiftory*.

PHYSICIANS, *Galenical*, a diftinction affumed by thofe phyficians after the revival of learning, who prefcribed only vegetable medicines, and their preparations. They ftood in oppofition to the *chemical* or *fpagirical* phyficians, who employed the preparations of metals and minerals procured by chemiftry. See GALENICAL.

PHYSICO-MATHEMATICS, includes thofe branches of phyfic, which, uniting obfervation and experiment to mathematical calculation, undertake to explain the phenomena of nature. See *Mixed* MATHEMATICS.

PHYSICS, PHYSICA, φυσικη, derived from φυσις, *nature*, fometimes alfo called *phyfiology*, and *natural philofophy*, is the doctrine of natural bodies, their phenomena, caufes, and effects, with their various affections, motions, operations, &c.

Mr.

Mr. Locke would likewife have God, angels, and fpirits, comprehended under phyfics; but thefe are more ufually referred to metaphyfics.

The immediate and proper objects of phyfics, are body, fpace, and motion.

The origin of phyfics is referred by the Greeks to the Barbarians, *viz.* the Brachmans, Magi, and the Hebrew and Egyptian priefts.

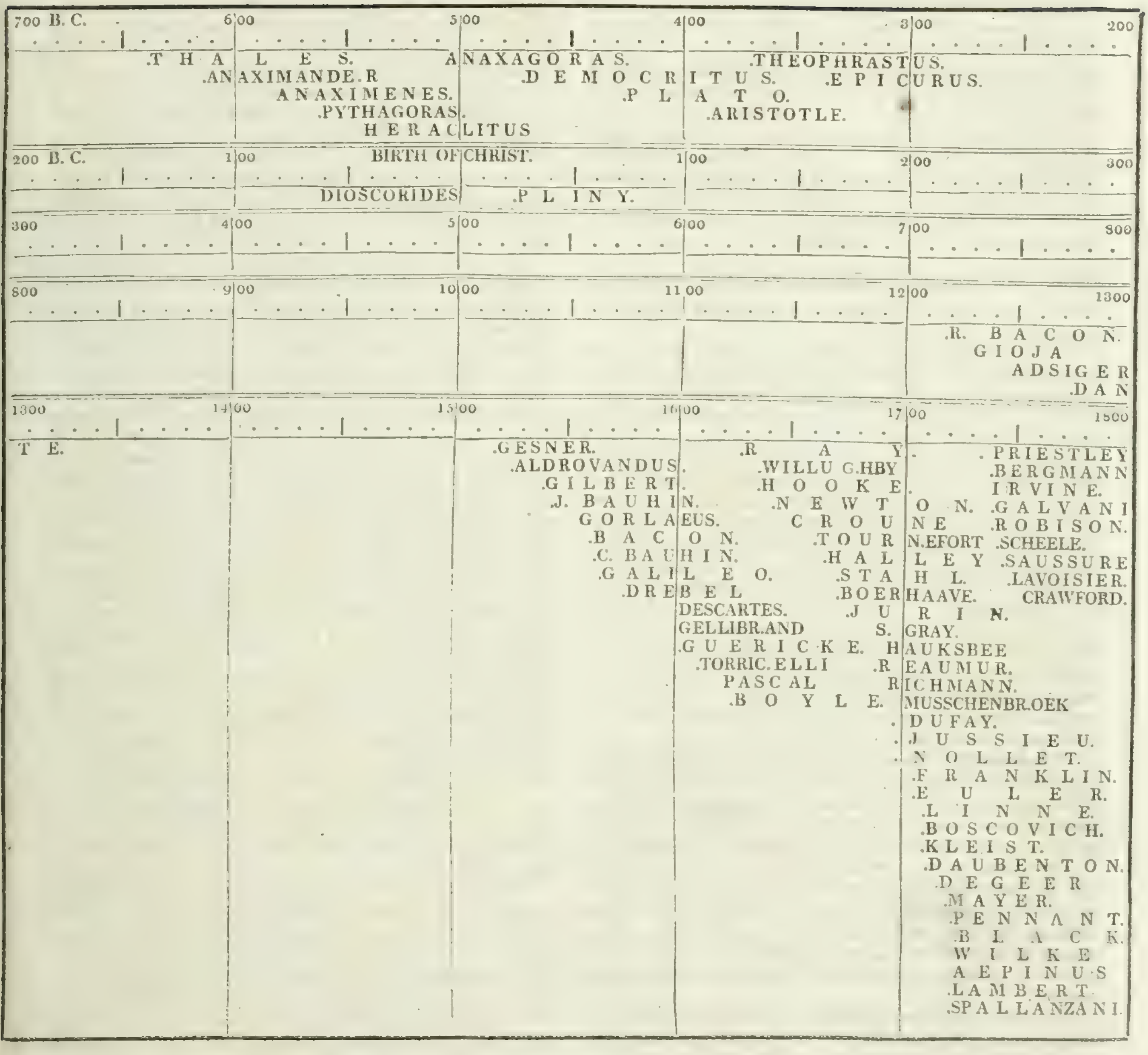
From thefe it was derived to the Greek fages or fophi, particularly to Thales, who is faid to have firft profeffed the ftudy of the phenomena of nature in Greece. He fuppofed water to be the general principle from which all material things are formed, and into which they are refolved: he particularly noticed the properties of the magnet, which had been before obferved to attract iron, as well as the effect of friction in exciting the electricity of amber; and to both of thefe fubftances he attributed a certain degree of animation, which he confidered as the only original fource of any kind of motion. (See THALES.) Anaximander (fee his biographical article) appears to have directed fome 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 explofion or burfting of the clouds, which he feems to have confidered as bags, filled with a mixture of wind and water. The fame erroneous notion was entertained by Anaximenes (fee ANAXIMENES), who compared the light attending the explofion, to that which is often exhibited by the fea, when ftruck with an oar. Pythagoras is faid to have reafoned on phyfical effects in a manner too mathematical and vifionary to entitle him to be ranked among thofe who have inveftigated the minute operations of nature. (See PYTHAGORAS.) For the opinions of Anaxagoras and Democritus, fee their refpective articles. Thales had fuppofed water to be the firft principle of all things, and Anaximenes air. Heraclitus fixed on fire as the bafis of his fyftem, attributing to it the property of conftant motion, and deriving all kinds of groffer matter from its condenfation in different degrees. (See HERACLITISM.) It is obferved by Bacon, in his effay on the opinions of Parmenides, that the moft ancient philofophers, Empedocles, Anaxagoras, Anaximenes, Heraclitus, and Democritus, fubmitted their minds to things as they found them; but Plato made the world fubject to ideas, which he fuppofed to exift independently of the human mind, and of the external world, and to compofe beings of different kinds, by their union with an imperfect matter. Ariftotle made even ideas, as well as other things, fubfervient to words; the minds of men beginning, in thofe times, to be occupied with idle difcuffions and verbal difputations, and the correct inveftigation of nature being wholly neglected. Plato, however, entertained fome correct notions concerning the diftinction of denfer from rarer matter by its greater inertia; and it would be unjuft to detract from the extraordinary merit of Ariftotle's experimental refearches, in various parts of natural philofophy, and more efpecially from the information contained in his works on natural hiftory. Ariftotle attributed to fire abfolute levity, and to the earth gravity, confidering air and water as of an intermediate nature. (See PLATO and ARISTOTLE.) For an account of the opinions of Epicurus, fee EPICUREANS. The works of the ancients, though fcarcely any one of their opinions and conjectures was fcientifically eftablifhed on fure foundations, furnifh neverthelefs a variety of detached facts and obfervations, that have either led to modern experiments and difcoveries, or that have been confirmed by them. Such efpecially is the fact recorded by Protagorides of Cyzicum, quoted by Athenæus, who relates, that in the time of king Antiochus, it was ufual, as a luxury, to cool water by evaporation: and alfo the phenomenon noticed by the ancients, that water ufually froze the more readily for having been boiled.

The era of the revival, or perhaps we may juftly fay, of the commencement of phyfical difcoveries, was the 13th century; to which period we may refer the famous Roger Bacon; Hugo Bertius, who is faid to have defcribed the polarity of the magnetic needle, though fome fuppofe that the defcription of it was contained in verfes attributed to Guyot, a French poet, who lived about the year 1180; Gioja of Amalfi, who firft employed the compafs in navigation about the year 1260; Peter Adfiger, who mentions the declination of the needle from the true meridian in a manufcript bearing date 1269 (fee MAGNET); and the poet Dante, who, about the clofe of this century, diftinguifhed himfelf by his philofophical, as well as literary works, and who has given an effay on the nature of the elements. Amongft the philofophers of later date, to whom the fciences, comprehended under the head of Phyfics, are indebted, we might mention Dr. Gilbert of Colchefter, who flourifhed about the clofe of the 16th century, and to whofe writings on magnetifm and electricity we have referred under thofe articles. The change or variation of the declination of the needle, the difcovery of which has been commonly afcribed to Gellibrand, in 1625, muft have been inferred, fays Dr. Young, from Gunter's obfervations, made in 1622, if not from thofe of Mair, or of fome other perfon as early as 1612; for at this time the declination was confiderably lefs 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 reafoning which had prevailed in the fchools, the juft character of a reformer of philofophy: but his difcoveries were neither numerous nor ftriking. In 1620, he propofed an opinion, with refpect to heat, which appears to have been then new, inferring from a variety of obfervations, detailed in his "Novum Organum," that it confifted in "an expanfive motion, confined and reflected within a body, fo as to become alternate and tremulous: having alfo a certain tendency to afcend." A fimilar opinion, refpecting the vibrating nature of heat, was fuggefted, about the fame time, by David Gorlæus, and it was afterwards adopted by Defcartes, as a part of his hypothefis, concerning the conftitution of matter. (See CARTESIANISM.) In the year 1620 Cornelius Drebel invented a method of meafuring the degrees of heat by a thermometer, which, in its firft and imperfect ftate, was a very important inftrument; but it was much improved at the clofe of the century by Dr. Hooke's difcovery of the permanency of the temperature of boiling water; which afforded a correct and convenient limit to the fcale on one fide, as the melting of fnow ferved for fixing a fimilar point on the other. The true courfe of the circulation of the blood was difcovered 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 atmofpheric preffure was difcovered by Defcartes; and Pafcal made feveral experiments which led to the method of determining heights by barometrical obfervations. (See AIR, ATMOSPHERE, and BAROMETER.) We pafs over the obfervations of Gefner and Aldrovandus with refpect to the animal kingdom, and thofe a century later of the Bauhins, on the vegetable kingdom: and alfo of Ray and Willughby, Tournefort and Reaumur; and proceed to mention, that the latter half of the 17th century was rendered a very interefting period in the hiftory 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, Wilſon, 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.



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, hydroſtatics, 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, Φυσιογνωμια, formed from φυσις, *nature*, and γινωσκω, *I know*, the art of knowing the humour, tem-

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 varieties:

varieties: thofe of Zurich are generally meagre, and of the middle fize, and either corpulent or very thin.

To purfue this fubject fomething further, it will be found, that the people of Lapland, and parts of Tartary, are of very diminutive ftature, and of extremely favage countenances, formed by flat faces, broad nofes, high cheek-bones, large mouths, thick lips, peaked chins, and their eyes are of a yellow brown, almoft black, with the lids retiring towards the temples; nor are the females of this difagreeable race more favoured by nature; and each fex is diftinguifhed by the groffeft manners, and minds ftupid beyond credibility; but of all the varieties of the human fpecies, the inhabitants of the coaft of New Holland feem the moft debafed and miferable; thofe are tall and flender, and to add to the deformity of thick lips, large nofes, and wide mouths, they are taught from their infancy to keep their eyes nearly clofed, to avoid the infects which fwarm around them.

Turning to the more favourable fide of this picture of national phyfiognomy, we fhall find the people of Cachemire, the Georgians, the Circaffians, and Mingrelians, erect, noble, and formed for admiration, particularly the females, whofe charms of face and perfon are proverbial.

There are too many local and phyfical caufes for this difference in the external appearance of the inhabitants of the different parts of the world, for enumeration and explanation in fo confined a fpace as that to which we are limited. Profeffor Kant, of Konigfberg, in an effay on this fubject, divides the human race into four principal claffes, into which the intermediate gradations may readily be refolved: thofe are the Whites, the Negroes, the Huns, (Monguls or Calmucs,) and the Hindoos, or people of Hindooftan. Circumftances purely external may be the accidental, but cannot be the original caufes of what is affimilated or inherited: as well could chance produce a body completely organized. " Man," fays the profeffor, " was undoubtedly intended to be the inhabitant of all climates and all foils. Hence the feeds of many internal propenfities muft be latent in him, which fhall remain inactive, or be put in motion according to his fituation on the earth: fo that in progreffive generation, he fhall appear as if born for that particular foil in which he feems planted."

In the opinion of this gentleman, the air and the fun are the two caufes which moft powerfully influence the operations of propagation, and give a lafting developement of germ and propenfities, or in other words, the above powers may be the origin of a new race.

Food may produce fome flight variations; thefe, however, muft foon difappear after emigration, and it is evident, that whatever affects the propagating powers, does not act upon the fupport of life; but upon the original principle, the very fource of animal conformation and motion. It has been obferved, that man degenerates in ftature and faculties the nearer he is fituated to the frigid zone: this feems a neceffary confequence of that fituation, for this obvious reafon; were men of the common ftature in thofe regions of extreme cold, the impelling power of the heart muft be increafed, to force the blood through the extremities, which would otherwife chill, and become totally ufelefs; but as the Creator did not think it ufeful to adopt this mode of preferving the limbs, they have been fhortened, for the purpofe of confining the circulating fluid to the trunk, where the natural heat accumulating, the whole body has a greater proportion of that comfortable fenfation than ftrangers feel when vifiting thofe northern countries.

The propenfity to flatnefs, obfervable in the prominent parts of the countenance of the perfons under confideration, expofed to the effects of cold, is accounted for by that very circumftance; and it appears probable, that their high cheek-bones, and fmall, imperfect eyes are fo contrived, to preferve the latter from the piercing effects of the wind, and the offenfive brilliancy of the almoft eternal fnows. The abbé Winkelman attributes the enormous and difgufting lips of the Negroes to the heat of the climate they inhabit; others account for the blacknefs of their fkin by fuppofing " the furplus of the ferruginous, or iron particles, which have lately been difcovered to exift in the blood of man, and which, by the evaporation of the phofphoric acidities, of which all Negroes fmell fo ftrong, being caft upon the retiform membrane, occafions the blacknefs which appears through the cuticle, and this ftrong retention of the ferruginous particles feems to be neceffary, in order to prevent the general relaxation of the parts."

In pointing out the diftinguifhing traits that difcriminate the natives of different regions, Lavater obferves, that a perfon deeply enamoured of another, and thinking intenfely on the form and pofition of their features, might affume a refemblance of the admired object, though miles of fpace intervened between them; and purfuing his mental dream, he adds, that it is equally probable an individual meditating revenge in fecret, may compofe his countenance into a likenefs of him who was to be its victim. The incorrectnefs of the latter fancy may be expofed by merely obferving that the perfon under the influence of the paffion of revenge, muft bear in his countenance the lines expreffive of that reftlefs affection; now as the object intended to be injured is unconfcious of the fecret machinations againft him, he may at the inftant be engaged in fome benevolent purfuit, or may feel fome internal joy which moulds his features into an expreffion directly oppofite to that of his adverfary, who may have generally feen him thus; for revenge is often aimed by the wicked at the beft of men: confequently, the countenance of a fiend grinning with malice cannot at the fame time beam with a complacency arifing from a fet of features entirely unruffled.

Before we enter upon a defcription of the marks which, according to Lavater, point out the character of the poffeffor, it may be proper to give one or two inftances of the fallacy, and of the truth, of the conclufions drawn from them, in order that our readers may form their own conclufions, as to the folly or propriety of entertaining a propenfity to form a judgment of mankind from the fhapes of their nofes, eyes, foreheads, and chins.

M. Sturtz declared to Lavater, that he " once happened to fee a criminal condemned to the wheel, who, with fatanic wickednefs, had murdered his benefactor, and who yet had the benevolent and open countenance of an angel of Guido. It is not impoffible, adds this gentleman, to difcover the head of a Regulus among guilty criminals, or of a veftal in the houfe of correction." Lavater admits this affertion in its fulleft extent, but his reafoning to reconcile it to his fyftem is by no means conclufive.

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, fuited to the deformity of the mind capable of committing it; without reflecting, that had fuch an index exifted in the countenance of the abhorred object, it is moft probable, his murderous and horrible exterior would have placed mankind fo far on their guard as to detect his intentions. Upon viewing the culprit, we are perhaps furprifed to find that there is nothing particularly indicative of cruelty in the outlines of his face, and we induftrioufly endeavour to force each into the immediate form of our preconceived portrait; this occafions us to read lurking villainy in his eyes, and converts the wrinkles

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 beed 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 verſâ*. 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 eyebones 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 tranſcendant 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;

cefs, as in all human probability the latent feeds of virtue may be roufed into growth by perfeverance, and finally produce the defired fruit.

The eyes of mankind are compofed of various fhades of colour, the moft common of which are grey mixed with white, grey tinged with blue, and fhades of green, orange, and yellow. According to Buffon, the orange and blue are moft predominant, and thofe colours often meet in the fame eye; thofe generally fuppofed to be black are not really fo, and may be found, on attentive examination, and with a proper difpofition of the light, to confift of yellow, a deep orange, or brown, which being violently oppofed to the clear white of the ball, affumes a darknefs miftaken for black. The fame naturalift obferves, that fhades of yellow, orange, blue and grey, are vifible in the fame eye; and when blue, even of the lighteft tint, appears, it is invariably the predominant colour, and may be found in rays difperfed throughout the iris: the orange is differently difpofed, at a trifling diftance from the pupil, is in flakes, and round; but the blue fo far overpowers it, that the eye affumes the appearance of being wholly of that colour. The fire and vivacity emitted by the eye cannot be fo powerful in thofe of the lighter tints; it is therefore in the dark ones alone that we look for the emotions of the foul; quiet and mildnefs, and a certain degree of archnefs, are the characteriftics of the blue. Some eyes are remarkable for the abfence of colour; the iris is faintly fhaded with blue or grey, and the tints of orange are fo light, that they are hardly obfervable: in eyes thus conftituted, the black of the pupil appears too confpicuous, and it may be faid, that portion is alone vifible at a little diftance, which circumftance gives the perfon a ghaftly and fpiritlefs appearance.

There are eyes whofe iris may be faid to be almoft green; but thefe are very uncommon. It would require the pen of an infpired writer to defcribe the aftonifhing variety of expreffion of which the eyes are capable: being fituated near the fuppofed feat of the foul, every fenfation of that invifible fpirit appears to rufh in full vigour from thofe intelligent organs: all the paffions may be feen in them; we fhrink from their indications of anger, we find pleafure with all her train of joys dancing in them, we feel their force in love, and melt into tears upon obferving them fuffufed with the moifture of grief; in fhort, their language is far more powerful than that of the tongue. The tranfitions are fo rapid in the expreffion of the eyes, that it requires very clofe and attentive examination to catch and defcribe the emotions of the mind vifible in them; admitting this fact, it will appear that the phyfiognomift is liable to numerous and egregious errors in drawing his conclufion of propenfities from them. Paracelfus, a man of ftrong genius, and, like Lavater, mifguided in many inftances by enthufiafm, and a kind of fuperftition allied to the ftudy of this art or fcience, pronounced that thofe eyes generally termed black frequently denoted health, firmnefs, courage, and honour; but the grey, deceit and inftability. Thus far probability at leaft accompanies his remarks. It is, however, impoffible to fubfcribe to his affertion, that fhort-fighted perfons are deceitful and crafty, or that thofe who fquint have fimilar propenfities to evil, as it is evident both the peculiarities alluded to are the confequences of injury, and are never found in people whofe organs of vifion are perfect: indeed many inftances might be cited of the actual and known caufe of fquinting and near fight, which frequently occur in adults from extreme anxiety and difeafe.

Small eyes fituated deep in the fockets are faid, by Paracelfus, to indicate active wickednefs, with a mind calculated to oppofe with vigour, and fuffer with perfeverance; and their oppofites, or very large prominent eyes, he conceived, explained the avaricious, covetous, propenfities of their poffeffor; thofe in conftant motion denote fear and care; winking is the mark of forefight, of an amorous difpofition, and quicknefs in projecting; and the eye fearful of looking directly forward, decides upon innate modefty.

Lavater thought blue eyes, in general, fignified effeminacy and weaknefs, and yet he acknowledged that many eminent men have had blue eyes; ftill he was convinced that ftrength and manhood more particularly belong to the brown: in oppofition to this opinion, the Chinefe, who are known to be an imbecile people, rarely have blue eyes; thefe contradictions, it muft be confeffed, weaken the reliance we are inclined to place on appearances during the quiefcent ftate of the eyes, and the indications of their colour. Men intemperate in anger, and eafily irritated, may be found with eyes of all the ufual colours; when they incline to green, ardour, fpirit, and courage, are conftant attendants. People of a phlegmatic habit, but who may be roufed to activity, have clear blue eyes, which never belong to thofe inclined to melancholy, and they rarely belong to the choleric. Benevolence, tendernefs, timidity, and weaknefs, are exhibited by the perfectly femi-circular arch formed by the under part of the upper eye-lid; perfons of acute and folid underftandings have a generous open eye, compofing a long and acute angle with the nofe; and when the eye-lid forms a horizontal line over the pupil, it is a ftrong indication that he who poffeffes it is fubtle, able, and penetrating. Widely opening lids, fhewing the white of the ball under the other colours, may be obferved in the phlegmatic and timid, as well as in the courageous and rafh; but upon comparing thefe marks in the different characters juft mentioned, a very perceptible difference is difcovered in the characteriftics of the eyes; the latter are lefs oblique, better fhaped, and more firm.

The eye-brows are effential in the expreffion of the eyes; in anger they are brought down and contracted; in all pleafant fenfations, and in aftonifhment, they affume a fine arch; in youth they are naturally and regularly arched; the horizontal and rectilinear eye-brows belong to the mafculine bias of the foul; and the above defignations combined fhew ftrength of underftanding, united with feminine kindnefs; thofe that are deranged in their appearance, and the hairs growing in various directions, demonftrate a wild and perplexed ftate of mind; but if the hair is fine and foft, they fignify gentle ardour. The compreffed firm eye-brow, formed of parallel hairs, is a certain proof of profound wifdom, true perception, and a manly, firm habit of thought. There are eyebrows which meet acrofs the nofe; this circumftance gives the perfon an air of ferocious gloom, which is admired by the Arabs, but the ancients, verfed in phyfiognomy, conceived fuch to be the characteriftic of cunning; Lavater, on the contrary, obferves, that he had difcovered them on the moft worthy and open countenances, admitting at the fame time that they may denote a heart ill at eafe. Thofe who think profoundly, and thofe equally prudent and firm in their conduct, never have high and weak eye-brows, in fome meafure equally dividing the forehead; they rather betray debility and apathy, and though men of an oppofite character may be found with them, they invariably fignify a diminution of the powers of the mind. Thick angular eye-brows, interrupted in their lengths, fignify fpirit and activity; and when they approach the eyes clofely, the more firm, vigorous, and decided, is the character; the reverfe fhews a volatile and lefs enterprifing difpofition; when the extremes are remote from each other, the fenfations of the poffeffor are fudden and violent. White eye-brows are demonftrative of weaknefs, in the fame degree that the dark brown are of firmnefs.

The good Lavater confidered the nofe as the abutment, or buttrefs, of the forehead, the feat of the brain, without which the whole face would prefent a miferable appearance; indeed an ugly or difagreeable fet of features is never accompanied by a handfome nofe: but there are thoufands of fine and expreffive eyes where a perfectly formed nofe is wanting: he defcribes this portion of the face as requiring the following peculiarities: "Its length fhould equal the length of the forehead; at the top fhould be a gentle indenting; viewed in front, the back fhould be broad, and nearly parallel, yet above the centre fomething broader; the bottom, or end of the nofe, muft be neither hard nor flefhy, and its under outline muft be remarkably definite, well delineated, neither pointed nor very broad; the fides, feen in front, muft be well defined, and the defcending noftrils gently fhortened; viewed in profile, the bottom of the nofe fhould not have more than one-third of its length; the noftrils above muft 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 fide, or arch of the nofe, muft be a kind of oval; above, it muft clofe well with the arch of the eye-bone, and near the eye muft be at leaft half an inch in breadth. Such a nofe is of more worth than a kingdom." Numbers of great and excellent men have flourifhed in all ages of the world, whofe nofes would fuffer effentially by a comparifon with Lavater's defcription of a nofe, more valuable to the poffeffor than extenfive empire: indeed, he is compelled to acknowledge this indifputable fact, and obferves that he has feen perfons endowed with purity of mind, noble in their conceptions, and capable of exertion, whofe nofes were fmall, and the arches of their profiles inverted; and yet true to his firft principles, he difcovered, or imagined he difcovered, their worth to confift chiefly in the elegant effufions of their imaginations, their learning, or fortitude in fuffering, and this is accompanied with a provifo that the remainder of their form muft be correctly organized.

Nofes arched near the forehead belong to thofe who poffefs the energy to command, are capable of ruling, acting, overcoming, and deftroying; others, rectilinear, are the medium between the extremes above noticed, and are appropriated by nature to perfons who act and fuffer with equal power and patience. Socrates, Laireffe, and Boerhaave, were great men, and had ill-fhaped nofes, and were diftinguifhed for meeknefs and gentlenefs. Were it poffible to attribute a general prevalence of difpofition to a general form of the nofe, individuals of every nation would be found to refemble the Tartars, who have flat indented nofes, the Negroes who have broad, and the Jews who have high arched nofes, in their propenfities, and it muft follow that whatever qualities the phyfiognomift may apply to thofe individuals, muft alfo belong to the whole people whofe nofes bear a refemblance to them; were this particular accurately examined into, it would tend, in a great meafure, to confirm the correctnefs or incorrectnefs of the fcience, as it has hitherto been practifed.

The admirers of this ftudy attribute great powers to the mouth, in expreffing the emotions of the mind; and Lavater expatiates on it with enthufiaftic fervour indeed: "Whoever," he exclaims, "internally feels the worth of this member, fo different from every other member, fo infeparable, fo not to be defined, fo fimple, yet fo various; whoever, I fay, knows and feels this worth, will fpeak and act with divine wifdom." He then proceeds to call it "the chief feat of wifdom and folly, power and debility, virtue and vice, beauty and deformity, of the human mind; the feat of all love, all hatred, all fincerity, all falfehood, all humility, all pride, all diffimulation, and all truth." Granting the benevolent paftor full affent to thefe obfervations on the mouth, it becomes the indifpenfible duty of all men to notice the phyfiognomy, or indications of that organ; in making thofe obfervations, it will be neceffary to examine the lips feparately, and to afcertain when they are clofed, during the moments of perfect tranquillity, whether that operation is performed without a forcible exertion of the mufcles, 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 fides.

The character of the man is proclaimed in the lips, the more firm the latter the more fixed the former; the weak and irrefolute 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 juftly proportioned to the other parts of the face, and the line of which is equally ferpentine on each fide; fuch, though they may denote a tendency to fenfuality, belong exclufively to a character deferving of admiration in moft relations of life.

A mouth, the lips of which are fo thin as to prefent, at firft view, little more than a line, is faid to indicate apathy and quiet, but induftrious when roufed. When this defcription of mouth is raifed at the extremities, vanity or vain pretenfions, affectation, and probably deliberate malice, diftinguifh thofe fo formed. The oppofite of this kind of lips, fwelled into confiderable fize, is a mark of indolence and fenfuality. The "cut through, fharp drawn lip," as Lavater terms fome, has to contend with avarice and anxiety. Lips clofed accurately, without exertion, and handfome in their outline, belong to the exercife of difcretion and firmnefs. Lips with the latter advantage, and the upper projecting, is generally appropriated to the virtuous and benevolent, though there are, without doubt, numberlefs perfons of excellent character whofe under lips project, but in Lavater's opinion, the laft peculiarity implies a well-meaning man, whofe goodnefs confifts rather of cold fidelity than ardent friendfhip. The under lip, hollowed in the middle, denotes a fanciful character. Let the moment be remarked, when the conceit of the jocular man defcends to the lip, and it will be feen to be a litle hollow in the middle.

The mouth remaining naturally clofed, invariably fignifies fortitude and courage. When the latter quality is in operation, the mouth clofes infenfibly; the naturally open mouth makes a difpofition to complain; the clofed, on the contrary, defignates endurance. "Though phyfiognomifts," adds Lavater, "have as yet but little noticed, yet much might be faid concerning the lips improper, or the flefhy covering of the upper teeth, on which anatomifts have not, to my knowledge, yet beftowed any name, and which may be called the curtain, or pallium, extending from the beginning of the nofe to the red upper lip proper. If the upper lip improper be long, the proper is always fhort; if it be fhort and hollow, the proper will be large and curved: —another certain demonftration of the conformity of the human countenance. Hollow upper lips are much lefs common than flat and perpendicular; the character they denote is equally uncommon."

The ancients who ftudied the phyfiognomy of man, fuppofed that diminutive fhort teeth betrayed the weaknefs of thofe who poffeffed them; more modern obfervers contradict this fuppofition, and declare that men of uncommon ftrength have fuch, but they are rarely of that pure white fo neceffary

to

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. Reubens, 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 sanctuary 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 φυσις, *nature*, and λογος, *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 organisation, 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 indispensible 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 to BONE, CARTILAGE, CELLULAR *Subſtance*, CRANIUM, and other anatomical articles.

The Inſtitutiones Phyſiologicæ 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 Phyſiologiæ 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 ſuperſedes the neceſſity of all works previous to that date. The works of John Hunter and of Bichat (his Anatomie Generale, and Recherches ſur la Vie et la Mort), the Syſtem of Phyſiology of Dumas, the Leçons d'Anatomie 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*, φυςκιον, *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 octandra*, Roxb. Coromand. v. 2. 34. t. 165, and probably may be the very ſame plant.

PHYSOCELE, from φυσα, *flatus*, and κηλη, *a tumour*, in *Surgery*, a ſwelling occaſioned by air. See EMPHYSEMA.

PHYSOMETRA, in *Medicine*, from φυσαω, *to inflate*, and μητρα, *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. Noſol. Method. Claſs x. Gen. 14.

PHYSOSPERMUM, in *Botany*, from φυσαω, *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 generical 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 φυτευμα, whatever it may have been, appears to have received that appellation from φυτευω, *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. Lamarck Illuſtr. t. 124. Gærtn. t. 30.—Claſs 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,

are, in many inftances, not free from obfcurity in their characters and fynonyms, as being liable to vary much, according to fhade or expofure of fituation, in the fhape of their leaves, length and figure of their fpikes, as well as in their whole habit and dimenfions. Hence arifes fo much obfcurity in their determination, that though we have examined not a few in their native ftations, and have received fome authentic fpecimens from the authors, who have defcribed them, the difficulty of arranging their fynonyms, and defining their limits, feems rather to grow under our hands. We fhall attempt to correct fome errors, in enumerating a few of the moft certain fpecies. There can be no good reafon for perfevering 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. Hift. v. 1. 304.)—Flowers in a round head, much exceeded by the long, linear, fpreading bracteas. Stem leafy. Leaves linear-lanceolate, toothed, ftalked, rough-edged.—Native of the alps of Switzerland and Savoy.—*Stem* from twelve to eighteen inches high, upright, weak, flender, fmooth, fimple. *Leaves* from one to three inches long, fcattered, narrow, bluntifh, minutely rough at the edges, and befet with glandular diftant teeth. *Flowers* not very numerous, in a perfectly round, folitary, terminal head. *Bracteas* few, one much longer, and more leafy, than the reft. *Style* flender, hairy upwards. *Style* long, three-cleft, revolute.

Ph. *fcorzonerifolium.* Villars Dauph. v. 1. 519. t. 12. f. 2.—Spike cylindrical. Bracteas fhort, reflexed. Stem naked above. Leaves linear-lanceolate, toothed, fmooth.—Native of the mountains of Dauphiny and Italy. We gathered it on the hill called *la Bocchetta*, above Genoa, in 1787. Willdenow confiders this as but a variety of the former, to which he was perhaps led by an affertion of Villars, that it was fent by Allioni as his *Ph. Scheuchzeri.* Here muft have been fome miftake. The two fpecies are effentially diftinct in their inflorefcence, and all the reft of the characters indicated above. The fpike in our Genoefe fpecimens is in feed, and meafures near two inches in length, though only a quarter of an inch in thicknefs. The *ftem-leaves* are moftly feffile, quite fmooth at the edges, numerous about the lower part of the *ftem*, though wanting in the upper. Their teeth are more like ferratures.

Ph. *hemifphæricum.* Grafs-leaved Rampion. Linn. Sp. Pl. 241. Willd. n. 4. Ait. n. 1. Jacq. Ic. Rar. t. 333.—Head roundifh. Bracteas ovate, pointed. Leaves linear, nearly entire, about as long as the ftem.—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 fhelter of a frame, like many other alpine productions, that are fo long buried in fnow in their native ftations. The *roots* are fomewhat creeping. *Stems* from two to fix inches high, afcending or curved, concealed by the numerous, chiefly radical, narrow, fmooth *leaves*, which fometimes overtop them, and whofe graffy afpect characterifes this fpecies. The *bracteas* are feveral, fhorter than the head, broad, taper-pointed, fomewhat membranous, fringed. Two or three of the very earlieft *leaves* are often fhort and fpatulate.

Ph. *comofum.* 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 ftrongly toothed, fmooth, glaucous; the radical ones heart-fhaped.—This beautiful fpecies, fo remarkable for its very glaucous *herbage*, and purple inflated *flowers*, was firft found on mount Baldus. It occurs alfo on the alps of Carniola and the Tyrol, but fcarcely elfewhere. The *ftem* is but three or four inches high. *Leaves* broad, moftly elliptical. No obfcurity attends this plant, of which many figures are to be found in the old authors. We have never feen a garden fpecimen. 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 roundifh. Leaves crenate; the loweft fomewhat heart-fhaped; the uppermoft feffile, ovate, pointed.—Found on the mountains of Italy and Switzerland, as well as on the chalky hills of Suffex and Surry, being the only Britifh fpecies. It flowers in Auguft, and is perennial. The firft or loweft *leaves* only are heart-fhaped; the reft of the radical ones elliptic-oblong; all crenate, veiny, flightly roughifh: the *ftem-leaves* are fcattered, feffile, fmall, lanceolate or ovate, taper-pointed. *Stem* about a foot high, in luxuriant ground twice as much, crowned with a denfe head of numerous dark-blue *flowers*, fubtended by feveral ovate fringed *bracteas.*—Willdenow fubjoins as varieties three fpecies of Villars, which we can fcarcely think belong to *orbiculare*, though we have not had an opportunity of feeing more than two of them. *Ph. lanceolatum*, Villars t. 12. f. 1, we have not feen, but the uniformly ovate *leaves*, all ftalked, indicate a ftrong fpecific difference from our *orbiculare*. *Ph. ellipticum*, t. 11. f. 2, is ftill more different, in its fhort denfe hairinefs, as well as in its oblong blunt upper *leaves*, and long leafy *bracteas*. *Ph. Charmelii*, t. 11. f. 3, is abundantly diftinct from all thefe, in its fmall, violet-like, heart-fhaped, radical *leaves*, rough with minute points, and fupported by capillary *footftalks*, above five times their own length; as well as in its humble *ftem*, bearing many long, narrow, lanceolate or linear *leaves*, and the long narrow *bracteas* which accompany its fmall denfe head of *flowers*.

Ph. *repandum.* Olympian Rampion. Sm. Prodr. Fl. Græc. Sibth. v. 1. 143.—Spike rather lax. Leaves elliptic-oblong, ftalked, wavy, fmooth. Stem perfectly fimple, almoft leaflefs.—Gathered by Dr. Sibthorp on the fummit of the Bithynian Olympus. The *root* is ftrong, woody, and perennial, producing many tufts of *leaves* not unlike thofe of *Globularia nudicaulis*, but lefs coriaceous, and fomewhat wavy at the margin. *Stems* folitary, erect, ftraight, two, three, or four inches high, fmooth, bearing one or two diftant leaves. The *footftalks* are all fringed at the bafe. *Flowers* blue, in a folitary, erect, lax *fpike*, the lower ones often in pairs, and fometimes very remote. *Bracteas* linear-lanceolate, fringed. This fpecies 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, ftalked, crenate, rough. Stem perfectly fimple, leafy, hairy.—Native of the Bithynian Olympus and of mount Caucafus. The *root* is fomewhat creeping. *Stems*, in the wild plant, from fix to twelve inches high, erect, more or lefs rough with hoary denfe hairs, and bearing many elliptic or ovate, ftrongly crenate, roughifh *leaves*, about an inch and a half long, on fringed *footftalks* of various lengths. *Flowers* deep blue, in a terminal bracteated *fpike*, extremely variable in length and luxuriance. In a garden, it feems, the *ftem* becomes fmooth, and the *fpike* racemofe, with ternate *flowers*, which laft character occafionally prefents itfelf likewife in wild fpecimens. Dr. Sibthorp's figure, with about feven flowers, and that in the Botanical Magazine, exhibit the two extremes of the inflorefcence. Our fpecimens account for the appellation of *canefcens*, under which Mr. Loddiges received the plant; and it is much to be wifhed 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, bluntiſh, 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, ſcattered.—Gathered by Tournefort in America. It is very remarkable that ſo great a *corolliſt* 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, campanulæ 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, ſeu Pyramidalis altera; Tourn. Inſt. 113. Petromarula di Candia, overo lattuca petrea; Pon. 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, Iſlington, from whom we obtained a ſpecimen in 1791, there being none previouſly in the Linnæan 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 Cluſius, 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 ſuppoſed 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 φυτὸν, *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. Juſſ. 84. Lamarck Illuſtr. t. 393. Gærtn. t. 77.—Claſs and order, *Decandria Decagynia*. Nat. Ord. *Holeraceæ*, 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. Linnæus having now fixed the place of this genus, amongſt his *Holeraceæ*, not *Miſcellaneæ*, 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. Linnæus 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 Linnæus 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. *octandra*. 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. Sjoorikii, vulgò Jamma Gobó; Kæmpf. 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 Kæmpfer 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. *ſtricta*. 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 *bracteas*, 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. *icoſandra*. 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 bluſh-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. icoſandra); 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, Φυτολογια, compounded of φυτον, *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 Aſmiræa. 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° 35′. E. long. 90° 8′.

PIALITZ, a river of Ruſſia, in the government of Archangel, on the coaſt of the White ſea, near Pialitza. N. lat. 66° 10′. E. long. 37° 44′.

PIALITZA, a town of Ruſſia, in the government of Archangel, on the coaſt of the White ſea; 100 miles N. of Archangel.

PIAL-UL-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° 28′. E. long. 17° 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°. E. long. 8° 27′.—Alſo, a ſmall iſland near the W. coaſt of Sardinia. N. lat. 39° 17′. E. long. 8° 25′.—Alſo, a ſmall iſland in the Mediterranean, near the coaſt of Naples. N. lat. 40° 13′. E. long. 12° 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, Muſquitons, and Ouiatanons, could together furniſh about 1250 warriors, in the year 1780.

PIANKATUNK, a ſmall river of Virginia, which runs E. into Cheſapeak 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° 42′. E. long. 10° 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° 45′.

PIAQUEMINES, a river of Louiſiana, which runs into the Miſſouri, N. lat. 38° 25′. W. long. 91° 37′.

PIARANTHUS, in *Botany*, from πιαρος, *fat* or *thick*, and ανθος, *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. Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ. *Aſclepiadeæ*, 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. Follicles . . . .

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 crimfon tubercles: externally whitifh; the fegments fpreading, 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 fix angles. Flower-ftalks lateral, fhorter than the corolla. Difcovered by Mr. Maffon in the hot fandy region of Karrò in fouthern Africa. He introduced it at Kew fo early as 1774, and it flowers in Auguft and September in the dry ftove. The *ftems* or *branches* form a thick tuft, about a fpan high, of a light green, flightly glaucous; their angles befet with ftrong brown teeth. *Flowers* two or three together, on fhort fimple ftalks, from the fides of the branch, remote from the teeth. *Corolla* about an inch long, flightly fpreading, acute; dark brown within; whitifh, with five purple ribs, without; the edges revolute.

Thefe plants fo precifely accord with various *Stapeliæ* in every point of habit, that we fhould prefume the finglenefs of the crown can afford no legitimate generic diftinction, any more than the difference between five and ten ftamens in *Ceraftium*, the want or prefence of a nectary in *Tilia*, and other fimilar cafes.

PIASANSKOI, Niznei, in *Geography*, a town of Ruffia, in the government of Tobolfk, near the Frozen fea. N. lat. 69° 16′. E. long. 87° 14′.

Piasanskoi, *Verchnei*, a town of Ruffia, in the government of Tobolfk, 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 Spanifh 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 fituated at the diftance of 50 miles N.W. of Chiametlan.—Alfo, a town of Mexico, in the province of Guafteca; 15 miles S. of Panuco.—Alfo, a town of Mexico, in the province of Tlafcala; 55 miles S. of Puebla de los Angelos.

PIASTRE, in *Commerce*. See Piaster, or Piece *of eight*.

Piastre is alfo a money of account and filver coin in Turkey, and the Levant. The piaftre of Aleppo, and of its port, Alexandretta or Scanderoon, is accounted at 80 afpers, or 24 fyainos. The piaftres of Alexandria are valued at 40 medini, each medino being fubdivided into 8 borbi, or 6 forli, or 3 afpers. The piaftre at Algiers is the fame with the *pataca gourda*, which fee. At Grand Cairo accounts are kept, by European merchants, in piaftres of 40 medini; but the Levanters reckon only in medini.

Conftantinople and the whole of Turkey keep accounts in piaftres, commonly called grouch by the Turks, and by the Englifh, dollars. Each piaftre is divided into 40 paras, and each para into three afpers. Thefe are real coins; but the piaftre is alfo fometimes divided into 80, and fometimes into 100 imaginary parts, called afpers or minas. A jux or juck is a fum of 100,000 real afpers: a chife or purfe is 500 ditto. The gold coin, called fequin fonducli, was coined in 1764; 100 of thefe weigh 5415 Englifh grains, and they are about 23 carats fine; it paffed at firft for $3\frac{1}{2}$ piaftres, or 440 afpers, but its price was gradually raifed to four piaftres; and in 1769 moft of them were called in for a new coinage. The dollar or piaftre is a filver coin of 40 paras. By the regulations of 1780, the purfe of 500 piaftres was to weigh $2812\frac{1}{2}$ Turkifh drams, fo that a fingle piaftre weighed $5\frac{5}{8}$ drams, or 277 Englifh grains, and the other pieces in proportion. The ftandard of finenefs was reduced at the fame time to 50 carats (or hundredth parts) of fine filver, and 50 of alloy; which gave the value of the piaftre at $19\frac{1}{4}d.$ fterling, and the other filver coins in proportion. But fince that period the Turkifh have fuffered a deterioration. Dr. Kelly, the author of the Univerfal Cambift, has caufed a piaftre of the lateft coinage to be weighed and affayed, by the king's affay-mafter of the mint, and the report is as follows: weight, 8 dwt. 6 gr. Finenefs, 5 oz. 6 dwt. worfe than the Englifh ftandard. This gives its finenefs 47 carats 2 grains Turkifh, and its value in fterling $13\frac{1}{2}d.$ Venetian fequins pafs at prefent for $9\frac{1}{2}$ piaftres; Dutch, Imperial, and Hungarian ducats, for 9 piaftres; Spanifh dollars, and German rix-dollars or Imperial tallaris (called by the Turks cara grouch) for $4\frac{1}{2}$ piaftres.

Damafcus keeps accounts in piaftres of 80 afpers like Aleppo, and has the fame coins as Conftantinople. Smyrna keeps accounts in piaftres or dollars; which the Englifh and Swedes reckon at 80 afpers; the Dutch, French, and Venetians at 100; and the Turks, Greeks, Perfians, and Armenians, at 120 afpers. This piaftre (called by the Turks grouch) is alfo divided into 12 temins, and 40 paras or medini. Tripoli keeps accounts in piaftres, of 13 grimellini, or 52 afpers. The grimellin is valued at 6 fous Tournois, which makes the piaftre of Tripoli worth 3*s.* 3*d.* fterling. At Tunis accounts are kept in piaftres, of 52 afpers; each afper being divided into 12 borbes.

The affay, &c. of the Turkifh piaftres is as follows:

	Affay.	Weight.	Contents in pure Silver.	Value in Sterling.
	oz. dwt.	oz. dwt. grs.	grains.	s. d.
Piaftre of Muftapha III. (1757)	W. 4 11	0 12 7	161	1 $10\frac{1}{2}$
Piaftre of Abdul. Hamed (1773)	W. 5 2	0 12 7	147.5	1 $8\frac{1}{2}$
Another of the fame period -	W. 4 9	0 12 0	159.6	1 $10\frac{1}{4}$
Double piaftre of Selim (1789)	W. 5 12	0 16 $22\frac{1}{4}$	186.4	2 2
Piaftre of Selim (1801) -	W. 5 6	0 8 0	96.7	1 $1\frac{1}{4}$
Half piaftre -	W. 6 13	0 4 1	35.9	0 5
Piaftre of Crim Tartary (1778) -	W. 6 13	0 10 5	91.9	1 $0\frac{3}{4}$
Piaftre of Tunis (1787) -	W. 6 $5\frac{1}{2}$	0 10 0	96.5	1 $1\frac{1}{2}$

N.B. W. denotes worfe than Englifh ftandard.

The piaftre and other filver coins bear the fame infcriptions as the gold coins, and the fame differences exift in them. The infcriptions on the fingle, double, and half piaftres of Selim of 1789 are fimilar to thofe on the fequin fonducli of this prince, which has on one fide, *Sultan Selim, fon of Muftafa Khan*, and on the reverfe, *Struck at Slambul*, in the year 1203, being the date of the Hegira, which began in 622 of the Chriftian era. The piaftre of Tunis bears on one fide the words, *Sultan of the two lands, and fovereign of the two feas, Sultan Selim Khan, bleft with victory:* and on the reverfe, *Struck at Tunis*, in the year, &c. See Kelly's Univerfal Cambift.

Piastre is alfo the French for a *dollar*; which fee.

PIASTRINE. See Pistereen.

PIAT Sopok, in *Geography*, a clufter of five iflands, among

among the Fox iſlands, in the North Pacific ocean. N. lat. 53° 24′. E. long. 189° 46′.

PIATEK, a town of Samogitia; 15 miles N.N.E. of Miedniki.

Piatek, or *Piontek*, or *Prontko*, a town of the duchy of Warſaw, celebrated for its be r; eight miles N.N.E. of Lenczicz.

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 Tyroleſe, 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° 30′. E. long. 30° 14′.

PIAW, a river of Mexico, which runs into the bay of Honduras, N. lat. 15° 52′. W. long. 85° 50′.

PIAZIDA, a river of Ruſſia, which riſes in lake Piazinſkoi, in the government of Tobolſk, N. lat. 69° 40′. E. long. 89° 14′, and runs into the Kargſkoi ſea, at Verchnei Piazinſkoi. N. lat. 73° 30′. E. long. 87° 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° 23′. E. long. 14° 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 Corſica; 3 miles E.S.E. of La Porta.

PIBERSTAIN, a town of Auſtria; 10 miles W. of Freyſtatt.

PIBGORN, Welſh. See Hornpipe.

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 Pike, in *Commerce*, a long meaſure in Turkey, which at Aleppo is equal to 299.8 French lines, or $26\frac{2}{3}$ 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 $27\frac{9}{10}$th 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 $\frac{3}{4}$th of an Engliſh yard. But in different places it is of different lengths. In the iſle of Cyprus the pic or ell meaſures $26\frac{1}{24}$ Engliſh inches. At Damaſcus it is $22\frac{1}{5}$ Engliſh inches. The Morocco pic, or pic Moriſco is $26\frac{1}{3}$ Engliſh inches; ſo that 108 pics = 79 Engliſh yards. The long pic of Algiers is 24.5 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 ſugar-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° 29′. E. long. 168° 9′.

Pic *Lamanon*, a mountain on the W. coaſt of the iſland of Saghalien, ſo called by Perouſe. N. lat. 48° 40′.

Pic *Martiniere*, a mountain on the W. coaſt of Saghalien, ſo called by Perouſe, 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-*bœuf*, in *Ornithology*. See Buphaga *Africana*.

Pic *de Cayenne, Petit*. See Yunx *Minutiſſima*.

Pic *Noir, &c. &c.* See Picus.

PICA, or Pye, 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 πιναξ, *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° 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 κιττα, *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 *Naſi*, a name given by Cohauſen 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 aſtriction 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 *Braſilienſis*. See Merops *Braſilienſis*.

Pica *Glandaria*, the *Jay*. See Corvus *Glandarius*.

Pica *Glandaria cærulea criſtata*, the *Blue Jay*. See Corvus *Criſtatus*.

Pica *Jamaicenſis*. See Gracula *Quiſcala*.

Pica *Maderaſpatana*, &c. of Ray. See Oriolus *Melanocephalus*.

Pica *Marina*, *Puffin*. See Alca *Arctica*.

Pica *Marina*. See Hæmatopus.

Pica *Papuenſis*. See Todus *Paradiſacus*.

Pica *Papuenſis* of Briſſon. See Muscicapa *Paradiſi*.

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 Braſilian 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 ſhe is fed by the male. There are twenty-ſix genera, divided into ſections.

A. Feet formed for perching: this ſection contains

Buphaga,	Oriolus,
Certhia,	Paradiſea,
Coracias,	Sitta,
Corvus,	Trochilus,
Glaucopis,	Upupa.
Gracula,	

B. Feet formed for climbing, containing

Bucco,	Pſittacus,
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 Flêche, 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 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 Lausnecz, 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. Lasitius 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 feasts 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 Beausobre 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 Lausnecz, in the district of Bechin, and recurring to arms, were defeated by Zisca. Encyclop. art. *Picards*.

Mosheim considers the Picards as deriving their name from that of the *Beghards* (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 *Beghards* (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 Beausobre, 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. Eccl. 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 *Tajassu*; which see.

PICATUM VINUM. See VINUM.

PICAUVILLE, in *Geography*, a town of France, in the department of the Channel; 9 miles N.W. of Charentan.

PICAWEES, 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

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 ritornele 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 *bâton*, 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 begun 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.

PICCINİNI, 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 ponto, 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'Ortenſio," 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 4 reas, and the double pice or fuddea being 8 reas, the rea being $\frac{1}{100}$dth 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 gallon 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 *Peſcentinum*, 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 Æſis, towards the N.W., as far as Truentus. It was bounded to the N. by the Æſis, 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 Æſis, the Miſios, 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 ſays, 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

Vesuvius 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.

PICHMANSKOI, 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 PIPRA *Criſtata*.

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° 28′. W. long. 86° 4′.—Alſo, a ſmall iſland, in the N. part of lake Superior. N. lat. 48° 31′. W. long. 86° 28′.

PICK, among *Miners*, is a tool which they uſe to cut down the clifts 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° 47′. E. long. 166° 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° 47′. W. long. 36° 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

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 Oriolus *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 artichoaks, muſhrooms, aſhen-keys, barberries, 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 hogſhead 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 ſifted 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 dipt 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

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 *pightel*.

PICO, GIOVANNI, of Mirandola, in *Biography*, one of the most extraordinary persons of his time, surnamed the Phœnix, was the third son of Gianfranchesco 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, PICKEERING, 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 duces, 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; ſixiemes, or ſixes, &c. For a tierce they reckon three points, for a quarte four, for a quinte fifteen, and for a ſixieme 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; 28,967,278. 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 Monmort 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 kiliometres, in 22 communes.

PICRA, Hiera. See Hiera.

PICRAMNIA, in *Botany*, ſo named by Swartz from πικρος, *bitter*, and θαμνος, *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.

Eſſ. 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..

Obſ. 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 dipyreno; 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 πικρια, *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. *Perſonatæ*, Linn. *Scrophulariæ*, 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.

Eſſ. Ch. Calyx of four leaves. Corolla ringent. Berry inferior, of two cells.

1. P. *Fel-terræ.* 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.

PICRIDIUM, 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 πικρος, *bitter*, a name for the wild ſuccory, 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. Gærtn. t. 159. (Helmintia; Juſſ. 170. Willd. Sp. Pl. v. 3. 1607. Ait. Hort. Kew. v. 4. 461. Lamarck Illuſtr. t. 648. Gærtn. t. 159.)—Claſs and order, *Syngeneſia Polygamia-æqualis.* Nat. Ord. *Compoſitæ ſemifloſculoſæ*, 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 ſtamens; ſtigmas two, reflexed. *Peric.* none, except the permanent calyx, finally reflexed. *Seeds* ſolitary, ſwelling, obtuſe, tranſverſely furrowed; down feathery, ſeſſile or ſtalked. *Recept.* naked.

Eſſ. Ch. Receptacle naked. Calyx double; the inner equal; the outer lax. Down feathery. Seeds tranſverſely furrowed.

Obſ. 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 alfo is rather peculiar; but we are always on our guard againft the unneceffary multiplication of genera, that fnare to the moft accurate obfervers.

1. P. *echioides.* Briftly Ox-tongue. Linn. Sp. Pl. 1114. Curt. Lond. fafc. 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 ftalked. Leaves wavy.—Native of banks and the borders of fields, efpecially on a clay foil, in England, France and Italy, flowering in June and July. The *root* is annual. *Herb* two or three feet high, branched, bright green, copioufly befet with rigid pungent prickles, of which thofe on the difk of the *leaves* proceed each from a hard tubercle. Lower *leaves* lanceolate; upper heart-fhaped and clafping the ftem. *Flowers* rather large, of a bright golden yellow. The plant abounds with a bitter milky juice; yet Dr. Sibthorp found the leaves in ufe among the modern Athenians, either raw, as an ingredient of their fallads, 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 afperum; Ger. Em. 298.)—Stem rough. Outer calyx many-leaved, fhort, lax. Leaves lanceolate, wavy; the radical ones toothed. Down feffile.—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 Auguft. *Root* biennial. *Herb* corymbofe and widely fpreading, dark green, rough. *Flowers* yellow, with a broader corolla, but fmaller calyx, than the former.

3. P. *japonica.* Japanefe Ox-tongue. Thunb. Jap. 299. Willd. n. 2.—Stem hifpid. Leaves feffile, lanceolate, hairy, toothed. Flowers panicled. Calyx hifpid; the outer one erect.—Native of hills in Japan, flowering in April or May. *Stem* two feet high, hifpid. Lower *leaves* a finger's length, fomewhat ftalked; upper fhorter and feffile, alternate. *Flowers* yellow, panicled, on long, naked, hifpid, compound ftalks.

4. P. *aculeata.* Prickly Ox-tongue. Vahl Symb. v. 2. 89. Willd. n. 3.—Stem very prickly. Leaves elliptic-lanceolate, toothed. Flowers corymbofe. Calyx hifpid; the outermoft lax.—Native of uncultivated hills in Barbary. Perennial. A foot high, rough all over with copious fmall rigid prickles. Vahl defcribes it as differing from *P. echioides* in the want of a five-leaved outer *calyx;* yet he fays there is an outer *calyx*, only all the calyx-fcales are linear-lanceolate. Such is the cafe with every fpecies except *echioides.*

5. P. *pauciflora.* Few-flowered Ox-tongue. Willd. n. 4. Prodr. Fl. Græc. n. 1912.—Stem hairy. Leaves lanceolate, feffile, toothed. Flower-ftalks elongated, fwelling. Calyx hairy; the outermoft lax.—Native of the fouth of France and of Greece. It was raifed in Chelfea garden in 1788, as well as in that of the late Dr. Gwyn at Ipfwich, from feeds 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 lefs branched, fpreading, rough with fhort briftly cloven-pointed hairs, as is all the herbage. *Flowers* yellow, of an ordinary hawkweed afpect, open in the morning only. Villars's figure of his *Hieracium pappoleucum*, Dauph. t. 31, is a very tolerable reprefentation of this plant, as Willdenow has likewife noted; but fpecimens from the author himfelf prove very different from our *Picris.*

6. P. *afplenioides.* 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 fcabra; Scop. Del. Infub. v. 2. 25. t. 13.)—Stem rough. Leaves oblong-lanceolate, obtufe, finuated. Flower-ftalks elongated, fwelling. Calyx rough; the outermoft reflexed.—Native of the fandy fea-coaft of Barbary. Perennial. Much larger than the laft, with blunt, ftrongly finuated, or pinnatifid, *leaves;* and fome of the *feed-down* is ftalked, which greatly invalidates the fuppofed character of *Helmintia*, as a diftinct genus.

7. P. *ruderalis.* Rock Ox-tongue. Willd. n. 6.—Stem hifpid. Leaves lanceolate, with fringe-like teeth. Flower-ftalks and calyx hifpid; the outermoft fpreading. Found on rocks near Prague in Bohemia. *Schmidt.* *Root* perennial, abrupt. *Stems* feveral, fix inches high, erect, befet from top to bottom with axillary, diftant, very hifpid *flower-ftalks.* The *flowers* are fmall, like *Crepis tectorum.* Willd.

8. P. *hifpida.* Hifpid Ox-tongue. Ait. n. 3.—Leaves oblong-lanceolate, nearly entire, feffile, hifpid, as well as the calyx, with hairs barbed at the point.—Native of the Levant. A fpecimen in the Bankfian herbarium, it is faid, fhews this plant to have been cultivated before 1789, in the gardens of England. It is marked as a hardy perennial, flowering in July and Auguft. We have had no opportunity of examining this fpecies, but we greatly fufpect it to be no other than our *pauciflora*, whofe pubefcence anfwers to the defcription, and which we believe was communicated to fir J. Banks, as well as to Kew garden, in 1788 or 1789.

PICRIUM, from πικρος, *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 Hiftory*, a name given by M. Boulley to a peculiar fubftance, which he extracted from the "Cocculus indicus," and to which that fubftance owes its deleterious qualities. It may be obtained by the following procefs. Boil the feeds deprived of their pericarp in a fufficient quantity of water; filter the decoction, and precipitate it by acetate of lead; then filter again, and evaporate flowly to the confiftence of an extract; diffolve this extract in alcohol, and evaporate the folution to drynefs. Repeat thefe folutions in alcohol and evaporation, till the refidue is wholly foluble in alcohol and water. It then confifts of picrotoxine mixed with a little colouring matter; agitate it with a very fmall quantity of water, the colouring matter is diffolved, and the picrotoxine feparates in fmall cryftals. Its properties are as follow: its colour is white, and it cryftallizes in four-fided prifms; its tafte is difguftingly bitter; 100 parts of boiling water diffolve four parts of picrotoxine, one-half of which feparates as the folution cools; the folution does not alter the colour of vegetable blues; alcohol, of the fpecific gravity 0.810, diffolves the third of its weight of this fubftance; a little water throws down the picrotoxine, and the addition of a greater quantity rediffolves the precipitate; fulphuric ether, of the fpecific gravity 0.700, diffolves only 0.4 of picrotoxine; it is infoluble in oil, both fixed and volatile; diluted fulphuric acid does not act upon it; concentrated acid diffolves it, affuming a yellow colour; when heat is applied, the picrotoxine is changed and deftroyed; nitric acid diffolves it without the difengagement of nitrous gas; the folution is yellowifh-green; when heat is applied, the picrotoxine is converted into oxalic acid; but about eighteen parts of nitric acid are requifite to produce this effect:—muriatic, oxymuriatic, and fulphureous acids, do not act upon it:—acetic acid readily diffolves it:—carbonate of potafh precipitates it from this folution unaltered:—potafh, foda, and ammonia, diluted with ten times their weight of water, readily diffolve picrotoxine:—when triturated with potafh, it affumes a yellow colour, but does not emit the odour of ammonia:—

 when

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 empyreumatic oil, and a brilliant bulky charcoal remains behind. Annal. de Chim. vol. 80.

PICTA Toga. See Toga.

PICTAVIENSIS, or Pictonum *Colica*, the *colic of Poictou*, 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 Picto 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 aborigenes, 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 desart; and also those "who scout, or lay waste." Accordingly the "Peithi" and "Peith-wyr" are the terms commonly

commonly ufed by the Welfh poets for the Pictifh people; and on the confines of Wales, thofe Britons who threw off their allegiance to their native princes, and fet up a *regulus* of their own, or adhered to the Saxons, were called "Peithi" or "Picti." Moreover, the Welfh, in order to diftinguifh the northern from the fouthern Picts, called the Caledonian Picts by the appellation of "Gwyddyl Pichli," or "Fichli;" the *p* of the Britifh being often changed into *f*. We may here add, that the Welfh, as Owen obferves, in his Dictionary, apply the term "Brython," and Brythonig, to the Picts, and hence it has been inferred, that the Welfh confidered them as Britons.

Innes, in his "Critical Effay," has given from an ancient chronicle a feries of the Pictifh kings, comprehending forty, who fucceeded one another from Druft, the fon of Erp, A.D. 451, to Bred, the laft, A.D. 843. Thefe Pictifh kings fucceffively governed uncivilized clans, during the rudeft ages. In the third century, they were in a high degree barbarous; but in procefs of time they gained fome improvement from their intercourfe, either civil or hoftile, with the romanized Britons, or Roman armies, and ftill more from the introduction of Chriftianity among them.

The appropriate country of the Picts acquired different names, in fucceffive periods. The mountainous part of it was denominated by the firft colonifts in their native fpeech "Alban," *i.e.* the fuperior height. This appellation, originally applied to the hilly region that forms the weft of Perth, and the north-weft of Argyle, was in fubfequent times extended to the whole country. In the firft century, the Britifh term "Celyddon," literally fignifying the "Coverts," was applied by the Roman authors to the whole country on the N. of the Friths, though the fame name was reftricted by the Roman geographers to the interior highlands, lying northward of Alban: and both thefe appellations were afterwards applied more largely to North Britain. The Pictifh chronicle, from the Pictifh people, called their country "Pictavia." The annals of Ulfter generally mention this country under the name of "Fortruin," derived, with a flight variation, from "Fother," the name of the Pictifh capital. Saxo, the Danifh hiftorian, plainly refers to "Petia," as the name of Pictland; and this "Petia" of Saxo approaches the neareft to the Britifh term "Peith," or "Peithw," which the Britifh people applied to the open country, lying along the eaft coaft, on the northward of the Forth. In the fequel of this article, we fhall merely mention fome incidental circumftances that occur in the hiftory of the Picts. The reign of Bridei was rendered illuftrious by his converfion to Chriftianity, under the inftruction of Columba, in 565. From this epoch, the Picts may be confidered as Chriftians, though this change in the profeffion feems not to have produced any confiderable alteration in their principles, or their cuftoms. About the year 724, a civil war commenced among the Picts, and they were at the fame time expofed to the deftructive incurfions of their enterprifing neighbours, on the north-eaft. The anarchical governments of Norway, Sweden, and Denmark, during the middle ages, produced the pirate kings of the northern feas, and thefe were for a long time the fcourges of the navigators, who failed from every nation, on the European feas. In 839 the Vikingr, as they were called, landed among the Picts, and a bloody conflict enfued, which proved fatal to many of the Pictifh chiefs. Weakened by domeftic ftrife, and by a formidable invafion, the Picts were unable to refift the arms, or to defeat the policy of Kenneth, the fon of Alpin, when he acquired their diftracted government, A.D. 843.

With regard to the *language* of the Picts, it has been obferved, that as they were merely the Cambro-Britons, who appeared at various periods under a new and lafting name, the fpeech of the Britons and of the Picts muft have been the fame. Accordingly Aber-nethy, the metropolis of the Pictifh kingdom, derived from the Britifh language its appropriate appellation, which it retained till the lateft period of the Pictifh government; and upon inveftigation, which we have not room to purfue, it has been found that the moft ancient repertory of Pictifh language is the topography of North Britain. The Pictifh language may alfo be traced in the vernacular language of North Britain even at this day: and the municipal law of that country has even borrowed feveral of its fignificant terms from the Pictifh fpeech. This language of the Britons and Picts has been confidered, by judicious writers, as mafculine, copious, and poetical. Although from not feeing it, in its primitive orthography, it feems to be harfh, in its founds, to the ears of ftrangers, yet, when it is put into verfe, and is read with its genuine pronunciation, it is, like the Greek and the Hebrew, melodious and ftrong. As the Celts were the original fettlers of Weftern Europe, they tranfmitted to their pofterity an energetic paffion, for impofing their own fignificant names on all the prominent objects of nature. In exercifing this peculiar prerogative of firft difcoverers, they difplayed thofe appropriate qualities of their language, which have been remarked; its ftrength and difcrimination, its copioufnefs of epithet, and its frequency of metaphor. In the fubfequent progrefs of the Gothic tribes over Europe, they adopted the names of mountains, rivers, &c. which had been impofed upon them by the Celts who had previoufly occupied the countries of which they took poffeffion; and the Saxons, who fettled in Britain, were prompted, by their poverty of fpeech, to follow the example of their Gothic fathers. The Anglo-Saxons, who, in more recent times, acquired fettlements in North Britain, borrowed many words from the Celts and Britons, and Scoto-Irifh, which have maintained their place, and which give ftrength, copioufnefs, and ornament to the Scoto-Saxon of the prefent times.

The *religion*, as well as the *language*, of the Picts, derived its origin from thofe of the Gauls; and hence we may conclude that the Picts and the Britons were the fame people, as well as from the identity of their fpeech, topography, and monuments. The tenets and the forms of the Pictifh religion were Druid in the fixth century; as we know from a thoufand relics of ftone that ftill engage attention within the diftrict of the Pictifh country. The modes of fepulture were the fame among the Picts as thofe of the Caledonians, and the fepulchral rites of the latter were the fame as thofe of the Britons. Their hill forts, their weapons of war, their ornaments, and their modes of life, were the fame as thofe of the Caledonian Britons, of whom the Picts were the immediate defcendants. That the Caledonians and Picts were the fame people is now univerfally allowed. Buchanan, Camden, Lloyd, Jones, the M'Pherfons, O'Connor, d'Anville, and Stillingfleet, however they may differ in other points, are here all agreed. But fome have afferted, without proof, and againft probability, that the Caledonians were a Gothic colony, who conquered North Britain in fome unknown age. With regard to any Gothic expedition for this purpofe, hiftory is filent. Few queftions 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 queftion; and he concludes with adducing the teftimony 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-steeds, 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 expresly 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 founding 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 sort 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,

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 inconteſtibly, that the art of painting, particularly when employed upon original matter, is more dependant 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 develope 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, of 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 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, 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 action,

tion, he muft neceffarily confound the effential with the ufelefs; the folid, unchanging, and characteriftic forms, with the integuments that encumber them and difguife their action.

It is not, however, in outline alone, that the underftanding of form is requifite to the painter; fince in a ftyle correfpondent to the character which that poffeffes, fhould the fpace it circumfcribes be wrought by the chiaro-fcuro, which comes next in value among the principles of the art, and by which the form fuggefted to the fancy by outline is rounded, made to project from the ground, or from other forms, to obtrude itfelf upon the notice of the fpectator, or recede and fall back from the view. (See CLAIR-OBSCURE.) The paffion or the action which the drawing of the outline prefented, may be in moft cafes greatly affifted by this branch of the fcience of art; as in poetical fcenery, for inftance, and whatever depends upon illumination in tone or degree. Scenes of horror and obfcurity, which participate of the myfterious or fublime; and the enchanting bland effects of ferenity and repofe, alike find in chiaro-fcuro their main ornament and fupport; though colouring, when judicioufly applied and conducted, is that which lends the finifhed perfection of the art, and completes the degree of illufion which is its aim. See COLOURING.

The beft mode of acquiring the practical part of painting, is certainly, in the firft inftance, to copy the works of good painters, under the guidance of an able inftructor. Slight, however, in comparifon with the object, is all that tuition can afford in this matter. The arrangement of the pallette, the preparation of colours, the general principles of their union or oppofition, and confequently the order of their moft agreeable arrangements and moft powerful effects, together with the beft or readieft mode of exercifing the implements of the art, may of courfe be communicated and learnt. The mind may be directed to feek for refinement in tafte of form and colour, and to felect and combine them; but will be taught in vain, unlefs nature has implanted the feeds of difcrimination, of judgment, and of tafte itfelf. And even if fomewhat of this fhould be imbibed, vain is every effort to impart imagination, invention, or the feeling of expreffion: thefe are qualities, improvable, when poffeffed, by exercife and ftudy; but not to be created by the power of man. To thofe who poffeffing them, feel the inclination to ftudy the art of painting, we would fay,—the true mode of learning to rival the fuccefsful efforts of the great mafters, is not by copying fervilely the furfaces of their works; but when the power of execution is in part obtained, endeavour, while copying, to fearch into the principles by which compofitions are arranged, and upon which their execution is effected: wherein confift, and what are the peculiar features of colour, or of handling, that give the character of grace and tafte expreffed in them; and what peculiar traits of imagination moft beautifully and moft juftly develope their fubjects. In inveftigating pictures with views dictated by fuch defires, it will frequently be found, that what appears to fuperficial obfervers mere freaks of fancy, or mere recreation or indulgence of the pencil, is the refult of the moft deeply inventive faculty, and admitted, not for pleafure only, but for the moft important purpofes. Such, to inftance in a work open every feafon to the infpection of artifts by the liberality of the marquis of Stafford, is the little vafe in the middle of Titian's picture of the bath of Diana. To the common obferver it prefents, as intended, a proper accompaniment to the toilette of the goddefs, perhaps a veffel containing perfume, no matter whether difpofed of here or there, provided it were introduced; yet more an ornament than a neceffary adjunct in the compofition: in the eyes of the artift, it is beheld as an inftrument of ineftimable value, in preferving the brilliancy and richnefs of flefh in full, yet juft character, by its own fuperior power of reflection; and producing a brilliant focus to the light of the picture, without attracting the eye too powerfully to itfelf; not to fpeak of its interrupting, by its beautiful form, the too great regularity of the mafs of ftone-work on which it ftands. It fhould 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 difplays; and though the art confifts, abfolutely fpeaking, in that difplay, its value is nothing, if not fupplied with well felected, well arranged materials; and is comparatively of eafy acquirement, as is teftified by every day's experience. We muft not be thought to undervalue the benefit of copying. It feems almoft abfolutely neceffary, under judicious management, to perfect the hand, and fhorten the labour neceffary 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 neceffity of devoting fo much time to one object; as it affords the opportunity of deeper and more folid inveftigation. One thing is certain, that there is no mode of obtaining excellence in painting but by a regular and fteady purfuit. Let the original foundation of genius and talent be as good as it may, nothing fhort of perfevering induftry can raife the fuperftructure. "There is no royal road to the arts," no fhort cut whereby the painter may arrive at the end of his courfe, and efcape the labours of ftudy and exercife; and of this the practice and declarations of the very greateft artifts are fatisfactory proofs. Apelles, it is faid, never allowed a day to pafs without exercifing his art in a greater or lefs degree. The induftrious exertions of the moft able of the Italian artifts are on record: and our own great example, fir Jofhua Reynolds, is a hoft in himfelf: the immenfe quantity of his works amply teftifying his induftry, as well as his attachment to the art. Indeed, without that entire devotednefs which fuperfedes, though it does not exclude, all attention to other objects, it is impoffible to obtain that facility of hand, or intelligence of mind, which reforts to the proper fources for a fupply of materials to fill the canvas, to improve or embellifh a compofition, to fupply deficiencies or correct defects, by a prompt and happy recollection of the moft appropriate objects in form or colour.

The power of execution in painting being fecured, the next ftep is to invent compofitions, and execute the parts from nature; combining them with the principles of the art. Then comes the proof, whether the ftudent has felt in his previous ftudies like an artift, or only as a man poffeffing no higher qualifications for his profeffion, than thofe with which his fellow mortals in general are endowed. Our exhibitions inform us too frequently of the mifguided hopes and labours of numerous claffes; and gratify us but rarely with any profpect of future excellence or originality; manifefting, by the woeful difappointment 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 thofe endowed with tafte and fenfe to feel and practife the art with great ingenuity.

It is an advantage to thofe who are fo favoured, if they endeavour to look forward beyond the fkill exhibited by others.

others, and aim at improving even upon the practice of their predeceffors. They at leaft who hold this courfe are more likely to do fomething meritorious than others, who fear to launch out of the beaten track: and if their works are conducted upon found principles, with elevated ideas, and freedom in execution, though they may fail to obtain the object of their wifhes; yet they have the beft chance of foaring above mediocrity, and the moft reafonable ground to hope for applaufe.

There is, however, a danger attending this ambitious adventure; it is that of miftaking novelty for improvement; of fubftituting the rafhnefs of a licentious imagination, for the corrected and chafte effufion of true well-founded feeling and judgment. Unfortunately we have too frequent reafon to regret, that a man may poffefs great vigour of fancy, unaccompanied by found 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 mafter, than a youth whofe imagination outftrips his reafon: and it not unfrequently occurs in the practice of the art, that the flow but fteady growth of one endowed with a capacity little above the common ftandard, furpaffes in the end the precocity of the former; who, indulging his imagination, plays with the ftore of knowledge early tuition has fupplied, and forgets that the only mode of maintaining the fancy in full force, is by fupplying it with new images; which perpetual recurrence to nature only can produce, and perpetual practice only can fecure. "Invention," it has been faid, "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 monftrous devices; but rather to bring together fuch combinations of natural objects in their pureft forms, as will beft illuftrate the fubject adopted. This is its regulator in the higher clafs of pictures; in others of a lower order, and particularly what is called ornamental paintings, falfe and heterogeneous combinations, beginning at firft in allegory, and afterwards continued, in fpite of their acknowledged abfurdity, merely on account of their beauty of form, allow of all the loofe indulgence of the fancy which the moft vivacious can defire.

When we confider 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; fince the knowledge of them fo evidently increafes the pleafure the art is capable of producing: the more particularly when, among the higher claffes of mankind, it forms fo very conftant and material a fource of their delights, and is fo conftantly alfo a fubject of difcuffion, although arifing from, and pretty generally decided by, fenfation, rather than reafon; and neceffarily fo indeed! "What can we reafon, but from what we know?" Pope has juftly faid, and how can they decide with reafon upon the merits of a work, who are ignorant of the principles upon which it is conftructed? Yet fo much of it is felt to be defirable, that every gentleman and lady conceives it neceffary to learn to draw, regarding the art as worthy of a partial devotion of time: but this is generally effected in fo inferior a degree, as to leave the polifhed learner utterly uninformed of its higher claims, its worthier objects, and its real utility.

To be truly a connoiffeur or a judge of the qualities of painting when exercifed in its higheft ftyle, notwithftanding the impertinent flippancy of thoufands of pretenders, requires a peculiar cultivation of mind; quite as much fo as any other art or fcience requires an initiation into its principles, to be a judge of its effects. Our art, however, appealing to the fenfe of fight, more than to reafon, and producing its effects from the reprefentation of well known objects, has a great advantage over others, in that its end is more eafily comprehended, although the principles which govern its practice are not lefs abftrufe and difficult of application. Moft men, therefore, of good mental capacities, are capable of underftanding and feeling the grand and general points; fuch as of colour, whether it be like that of natural objects, under peculiar circumftances; of expreffion, and if the ftory be fully and clearly exhibited; and of the general effect of the chiaro-fcuro, whether it prefent an agreeable furface to the eye, &c.; but of the fubtleties of arrangement and execution, whereby difficulties arifing from the nature and difunion 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 maffes, without violating the principles of nature: of thefe things, hidden as they are in the myftery of the art, none but an artift can well judge; though a portion of that knowledge may be acquired by fcientific ftudy without practice. No doubt a man being conftantly or frequently in the habit of comparing picture with picture, and both with nature; and reflecting upon the diverfities of each, their beauties, and their defects; may acquire a very confiderable power of difcrimination and judgment in matters of art; and more particularly if he devotes that time, which the regular artift is obliged to employ at his eafel, to a careful inveftigation of nature, and the ftudy of the means and principles of art. A man fo tutored may become able to guide, in many points, the pencil of a good painter: ftill there are many others to which his attention can never be attracted, as they arife only from practice, and confequently can only be known and appreciated by thofe who are engaged in it. Thefe, it may be remarked, muft be of an inferior nature; and true it is they are fo, in comparifon with the great leading and effential features of a picture, whofe fubject is of a grand and heroic character; but neverthelefs they enter into the aggregate, and affift in affording delight to that organ of fenfe through which the art appeals to the mind, and more readily enable it to attract attention.

This valuable art has, in the courfe of the world, been generally regarded as worthy of the greateft honours; and its eminent profeffors of a proportional fhare of eftimation and rewards. Some of the greateft among men have, at different periods, upheld this opinion of its excellence, as its hiftory teftifies (fee PAINTING); but Pericles, at the head of the Athenian republic, was the firft who duly eftimated its value as a national political inftrument; and encouraging it, in conjunction with fculpture and architecture, laid, in part, the bafis of the long continued fame of the city. He fatisfied the people, who murmured at the expence he indulged in in the public works, that by advancing the interefts of the arts, he was promoting their own glory. In tracing the mode in which they were employed, we difcover the principles upon which they act; and which, being founded upon feelings and fentiments of the human heart, muft always produce the fame effect.

It is doubtlefs to the direction in which talent is employed, that we owe its utility, or its power to do mifchief. The love of fame was the firft object of the Greeks, and their leaders therefore very wifely employed every means to maintain fo ufeful a fpirit. In compliance with this, Panænus and Polygnotus were employed by Pericles to adorn the public buildings with paintings, the fubjects of which were the heroic actions of the moft renowned among their countrymen;

trymen; thus perpetuating a record of thofe deeds which excited to emulation, which, appealing to the natural and inftinctive pride of man, in a becoming manner, neceffarily leads, wherever it is ftrongly felt, to great and ufeful conduct. There is no denying that painting is peculiarly adapted to this fpecies of excitement, its effect being full and inftantaneous; as the impreffion made upon the mind by witneffing the exhibition of a fcene of heroifm, of diftrefs, or of delight, is greater than any which can arife from a detail of it in defcription. The intereft in the relation is the weaker, as impreffion fucceeds to impreffion; whereas in the fact, or the reprefentation of it, the whole rufhes upon the fight at once. But then it muft 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 impreffion; therefore the public works of the Greeks in painting, appear to have been conducted upon the moft fimple principles, in order that their whole object and intention might be univerfally embraced.

It is fcarcely credible that, in direct oppofition to this fentiment of the Greeks, any one fhould affert, in this enlightened period, that no inculcation of moral or religious truth can be effected by painting; the more fo, when the works of Hogarth, the moft inftructive of painters, are in our hands, and no one who ever thinks of art at all can plead ignorance of them. An affertion 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, efq. (fee Edinb. Review, Auguft 1810,) and he has gone the length of faying, "that as to conveying moral, religious, or political inftruction in pictures, it is the moft abfurd of all abfurd notions." If the ingenious gentleman means, by the word inftruction, that kind only which properly belongs to painting, and to which, when fpeaking of the art, (if he mean well to its caufe,) he ought to confine himfelf, *viz.* that fudden and unavoidable impreffions of truth, which moft men, not utterly deftitute of fenfe, receive upon the firft fight of a well regulated moral, or poetical compofition; more particularly fuch as, being drawn from common nature, applies common objects to its purpofe, and prefents to the obferver familiar incidents, furely every day's experience is againft him. We would appeal to himfelf, if he has never received the impreffion of difguft at pride; abhorrence of avarice and of fenfuality; difdain of vanity and idle wafte of time, a prudential hint of the folly of extravagance, and of trufting to gay diffipation for the enjoyment of happinefs; from the feries of pictures called The Marriage-a-la-mode by Hogarth. What moral lectures in rhetoric would, or could, more completely illuftrate, in a more univerfally 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 induftrious and idle apprentices, the Rake's and the Harlot's progrefs, &c. &c.; and yet with thefe defigns in his hand, has he rifked fo unjuft and ungenerous a fentiment as his affertion conveys. Ungenerous, becaufe, if true, it can be productive of no good to extend fuch an opinion, and it tends to diminifh the regard which painting has defervedly received from the world, wherever its higheft powers have been engaged; and unjuft, becaufe it is contrary to the acknowledgment of ages, and is upheld by no reafoning at all applicable, and fcarcely tangible; fince, in fupport of it, he only inquires with a fneer, "what *argument* can be drawn in fupport of the idea of a future ftate, from Mr. Barry's picture of final retribution?" Does he not, in this, miftake the ground on which he ought to reafon upon painting? If, by argument, he means its ufual acceptation, a deduction from point to point, till we arrive at a fatisfactory definition of what is virtue and religion, or what is the probable nature of that future ftate of exiftence which man is deftined to partake of: then we anfwer, that no *argument* in proof is expected from the art, none defired of it. The painter's bufinefs was to make that future ftate, the belief of which was already fettled, as engaging as poffible; 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 purpofe? We do not hefitate to fay, that in the point of invention he undoubtedly has. Who, beholding the affemblage of illuftrious characters which he has introduced in that picture, upon a moft judicious ground of reafoning, *viz.* their ufefulnefs to mankind, is not led to ferious reflection, and an ardent wifh to unite with them, to be ranked with the great and good, and emulous to merit fuch exaltation; to fhare their converfation; to receive their inftruction; and to adore in their enlightened fociety, that beneficent Creator whofe incomprehenfible greatnefs and goodnefs made and fuftains the univerfe. Such was, fuch alone could be, the juft object of the painter; and no attempt to prove the fact, whether this "corruptible fhall put on incorruptible" or not; for that the Chriftian reforts to his Teftament, and the heathen and the philofopher to nature. The artift can only exemplify it, and enlarge our confideration of that ftate wherein rational beings may be fuppofed to enjoy the higheft poffible degree of felicity; and in this refpect Mr. Barry is borne out in the opinion he has endeavoured to illuftrate, by the writings of many ingenious divines.

To fay, what indeed is not faid, but muft almoft neceffarily be inferred, that no impreffion could be made upon the mind of an obferver, favourable to virtue and religion by the contemplation of that picture, would be to fay, that he either was incapable of reflection, or that by vice and fenfuality he was become ill fitted to receive fuch impreffions as it is calculated to produce upon well regulated minds; common experience is againft it, and hundreds have left the room where it hangs with as ferious and ufeful emotions, as a fermon on the fubject would produce. Many have expreffed thefe fentiments to the writer of this article; and he himfelf takes his opportunity of paying a grateful tribute of refpect to the memory of Mr. Barry, whilft he acknowledges the lafting impreffion it made upon his mind, when he faw it in early life. Thus although the avowed truifm, that virtuous conduct is the wifeft and beft that man can purfue for his own happinefs, will find no *argument* in the pencil for its fupport; it will have a moft able affiftant, by the exhibition it is capable of affording of its effects. Is the moral or religious effect of painting, when duly appreciated and exercifed, to be denied, when, as we have ftated, fuch works as Hogarth's exift? and is that to take place firft of all in the country where he was born, and exerted his ufeful talents?—He, whofe pencil inculcates fo powerfully the value of good, and the enormity of evil, and by the reprefentation of the common events of life, brings home the fentiments of morality to every mind, and makes fo forcible an appeal to the heart and head of every man poffeffed of ordinary underftanding, be his ftate in life what it may; not, we will venture to fay, to the exception of the learned author himfelf, whofe ungentle fentiment towards the art is the caufe of thefe remarks;—a fentiment whofe object, or whofe effect at leaft, if it have any, can only be to reftrict the pencil from its moft honourable and moft valuable application; and render it a mere inftrument of amufement, or of idle and ufelefs gratification, or worfe.

The appeal of the pencil is not fo much to the underftanding, as to the heart and mind; by that the firft excitement is produced, and thence neceffarily follow reflections, attached to the nature of the images prefented to the eye. Do we not fearfully acknowledge its power to corrupt young minds, and take conftant care to keep improper drawings from their view? What mode of information does it purfue in this cafe, but that of prefenting images of agreeable vices in an engaging manner? And is it allowed to be fo fufficiently potent for the production of evil, that all our care is requifite to counteract or prevent its influence in that refpect, and fhall it be denied any influence in the promotion of good! forbid it reafon, fenfe, and juftice! If the objection to its utility be juft, how fhall we eftimate the wifdom of thofe whom the learned author alluded to fufficiently honours on other occafions; of thofe who employed fculpture and painting as political and religious agents, to ftimulate the ardent minds of the Greeks to heroifm or devotion. The opinions of almoft all ancient authors who have noticed it, are moft decidedly in favour of the utility of the pencil; and thofe of the wifeft politicians among the moderns have been amply illuftrated by the ufe they have made of its powers.

If any thing can moft effectively contribute to ftrengthen the difinclination 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 fo guarded as to be capable of juftification in their author's peculiar view; yet leave an impreffion on the reader, much more widely effective in preventing or deftroying the energies of the art, than he perhaps intended. But Dr. Johnfon is reported to have faid, that "he never could fee any connection between the hiftorical relation of a fact, and a picture of it;" and perhaps the author alluded to may have fome fimilar diverfity from the majority of mankind with regard to moral culture, which prevents him from regarding pictures in a moral or inftructive point of view.

Picture, *Pictura,* a piece of painting, or a fubject reprefented in colours, on canvas, wood, or the like; and inclofed in a frame.

Pictures or paintings in oil are preferved by coating them with fome tranfparent and hard fubftance, as a varnifh, in order to fecure the colours from the injuries of the air or moifture; and to defend the furfaces from fcratches or any damages the painting might receive from flight violence. The fubftances that have been, or may be ufed for this purpofe, are gum arabic, diffolved in water, with the addition of fugar or fugar-candy, to prevent its cracking; glair or whites of eggs, mixed with a little brandy or fpirit of wine, in order to make it work more freely, and a lump of fugar to prevent its cracking; ifinglafs-fize, ufed as either of the former, or mixed with a fourth or fifth of its weight of honey or fugar, and varnifhes formed of gum refins diffolved in fpirit of wine, or oil of turpentine, which laft are called oil-varnifhes.

Paintings in miniature are preferved by plates of glafs, or the talc called ifinglafs, placed before them in the frame. Paintings in diftemper may be rendered more durable, and preferved from foulnefs by varnifhing them with hot fize, boiled to a ftrong confiftence, in which a fifteenth or twentieth part of honey has been diffolved. Crayons muft be preferved in the fame manner with paintings in water colours, by plates of glafs or ifinglafs.

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 fituation till the cement is thoroughly dried. The protuberance of the cement may be eafily reduced with a penknife, and the repaired part properly coloured fo as to correfpond with the picture. When part of the cloth is deftroyed, a piece of canvas fomewhat bigger than the vacant fpace is to be plaftered over on the outfide 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 fame matter, and properly reduced and coloured.

The art of cleaning pictures and paintings is of great confequence in order to their prefervation: in this operation great fkill and care are requifite, fo that the menftruum ufed for taking off any foulnefs may not diffolve the oil in the painting itfelf, or diforder its colours, and that each fort of varnifh with which paintings are coloured may be taken off without injury to the painting. The firft and moft general fubftance ufed for cleaning pictures is water, which will remove any foulnefs arifing from many kinds of glutinous bodies, as fugar, honey, glue, &c. and any varnifh of gum arabic, glair of eggs or ifinglafs, without affecting the oil that holds the colours together. Olive oil or butter will diffolve pitch, refin, and other fubftances of a like kind, without injuring the oil of the painting. Pearl-afhes, diffolved in water, form a proper menftruum for moft kinds of matter that foul paintings; but they muft be very cautioufly ufed, as they will corrode the oil of the painting, if there be no varnifh of the gum refins over it. Soap is of the fame nature, and fhould be cautioufly applied, and only to particular fpots, that elude all other methods. Spirit of wine will diffolve all the gums and gum refins, except gum arabic, and is therefore very neceffary for taking off from pictures varnifhes compofed of fuch fubftances, but it alfo corrodes the oil of the painting. This is alfo the cafe with oil of turpentine, and effence of lemon, fpirit of lavender, and rofemary, and other effential oils. With regard to paintings that are varnifhed with gum arabic, glair of eggs, or ifinglafs, the varnifh fhould be taken off when they are to be cleaned. This may be eafily diftinguifhed by wetting any part of the painting, which will feel clammy, if varnifhed with any fubftance foluble in water. This kind of varnifh may be taken off with hot water and a fpunge, or by gentle rubbing with a linen cloth dipped in warm water. If paintings, on this trial, appear to be varnifhed with gum refins, or fuch fubftances as cannot be diffolved in water, they may, in fome cafes, be fufficiently cleaned by a fpunge with warm water; and any remaining foulnefs may be removed by rubbing the painting over with olive oil made warm, or with butter, which fhould be wiped off with a woollen cloth; and if the picture require farther cleaning, wood-afhes or pearl-afhes may be ufed in the following manner: take an ounce of pearl-afhes, and diffolve them in a pint of water; or take two pounds of wood-afhes, and ftir 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; wafh the painting well with a fpunge dipped in either of thefe leys, and rub gently any foul fpots with a linen cloth till they difappear. If this method fail, recourfe muft be had firft to fpirit of wine, then to oil of turpentine, and if thefe are ineffectual, the effence of lemons; with either of which the foul fpots fhould be flightly moiftened, and the part immediately rubbed gently with a linen cloth. After a little rubbing, if oil of turpentine or effence of lemon has been applied, olive oil fhould be put upon the fpot;

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 ſpunge, 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. Doſſie'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 chiſſel; 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 ſcence.

"——————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-ſward 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, grous, 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 landſcape. 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 *effect*,
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. "Apponat lucro." 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 ſetaceous 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 ſadneſs, and they ſeem to lead a life of labour and reſtleſsneſs. There are nearly ſixty ſpecies mentioned in Gmelin's laſt edition of Linnæus.

Species.

* MARTIUS, or Great black Wood-pecker. The fpecific character is black; cap vermilion. This bird inhabits many parts of Europe, as well as our own country; it is alfo a native in Siberia and Chili; it is found chiefly in the poplar tree; it builds a large deep neft, and lays two or three eggs; it feeds principally on bees and ants, and is about feventeen or eighteen inches long. This bird fpeedily excavates trees, fo as to expofe them to be blown down by winds which would not otherwife have affected them. Under the hole made by it, faw-duft and pieces of wood may fometimes be found in pecks.

LIGNARIUS; White-bellied Wood-pecker. Cap vermilion; body barred with white. This is found chiefly in Chili, and is fomewhat lefs than a blackbird.

PRINCIPALIS; White-billed Wood-pecker. Black; creft fcarlet; a line on each fide the neck and fecondary quill-feathers is white. It inhabits America, from New Jerfey to Brazil; is about fixteen inches long, and makes fpiral holes in the trees.

PILEATUS; Pileated Wood-pecker. Black; creft red, temples and wings fpotted with white. It inhabits the woods of North America, and is eighteen inches long; the female of this fpecies has a brown front. There is a variety of which the belly is obfcurely barred with white.

LINEATUS; Lineated Wood-pecker. This fpecies is black; creft is fcarlet; 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; crefted head and neck blood-red.

MELANOLEUCOS; Buff-crefted Wood-pecker. Black; body beneath, line on each fide the neck, nape and rump white; the hind part of the creft brownifh-yellow. It is found in Surinam.

HIRUNDINACEUS; Leffer black Wood-pecker. Black; cap fcarlet; fhoulders dotted with white. It inhabits North America, and is about five inches and a half long. Two varieties of this fpecies inhabit Cayenne. 1. Middle of the breaft red; belly varied with black and grey. 2. Crown with a red fpot; area of the eyes is white; the hind-head is golden. Of this laft variety the whole head of the female is black; the eye-lids are white.

PASSERINUS; Pafferine Wood-pecker. Yellowifh-olive, beneath barred with brown and whitifh; is about fix inches long, and is found in St. Domingo.

STRIATUS; Rayed Wood-pecker. Black ftreaked with olive, beneath olive; front, cheeks, chin, throat, and breaft 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.

MELANOCHLOROS; Gold-crefted Wood-pecker. Variegated with black and yellow; the creft 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 creft; the middle tail-feathers are black, the lateral ones are barred with tawny and black.

FLAVESCENS; Yellow-crefted Wood-pecker. Black barred with yellow; pendent creft, chin, cheeks, and neck yellow. It is found in Brazil, and is about the fize 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 fpot; the crown, chin, and tail are black; the hind-head is red; the cheeks are whitifh; the belly is yellowifh.

FLAVICANS; Yellow Wood-pecker. Yellowifh, crefted; 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 yellowifh fpots; the creft and lower part of the back yellow; the tail is black.

MULTICOLOR; Black-breafted Wood-pecker. This fpecies is crefted; rufous; beneath pale rufty; head, chin, and neck orange; nape, throat, breaft, and fpots 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 vifits of this bird, the natives are enabled in a meafure to foretell the rigour or clemency of the approaching winter. This fpecies is extremely deftructive to maize fields and orchards. During winter they are very tame, and fometimes come into houfes, as the robin does with us. They are found chiefly in old trees, and the noife which they make with their bills, may, when the air is calm and ftill, be heard at the diftance of a mile and more.

RUBER; the Red-breafted Wood-pecker. Head, neck, and breaft red; back and wings black; belly ochre. It is found at Cayenne.

OBSCURUS; White-rumped Wood-pecker. Dufky, ftreaked and waved with whitifh; beneath it is white; firft quill-feathers black, fecondary white, with two black bars. It inhabits Long ifland, and is nine inches long.

FASCIATUS; Striped-bellied Wood-pecker. The colour of this fpecies is black; the crown, lores, and fub-maxillary band are fcarlet; the belly is ftreaked 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 reddifh-gold; body beneath grey, undulate with brown and white. It is found in Senegal, and is fcarcely larger than a fparrow.

CAPENSIS; Cape Wood-pecker. This, as its name fignifies, is found in the Cape of Good Hope, and is lefs than our lark; it is grey; the back, neck, and breaft are olive; the quill-feathers are dufky; 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 tranfverfely with black and grey; the chin and breaft black; the nape is red, and the rump is white. It is found in North America, and is almoft continually on the ground; it feeds on worms and infects, and when thefe are not to be had, on berries and grafs. When fat it is efteemed excellent food. It migrates to Hudfon's Bay, and it does not climb trees.

CAFER; Gold-winged Wood-pecker. Above brown, beneath claret, dotted with black; wings beneath, and fhafts of the wings and tail, vermilion. It is found at the Cape of Good Hope.

OLIVACEUS; Crimfon-breafted Wood-pecker. This fpecies is olive; neck beneath, breaft and rump pale red; chin, throat, quill-feathers and vent dufky brown; the tail above is black.

CAROLINUS; Carolina Wood-pecker. Cap and nape red; back with black bands; middle tail-feathers white, dotted

dotted with black, the reft black. There are three varieties of this fpecies. 1. Front and cheeks pale brown; belly pale yellowifh-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; fides of the neck from the mouth with a black line.

Undatus; Red-cheeked Wood-pecker. Teftaceous 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 breaft; and under the eyes a black fpot.

Chlorocephalus; Yellow-headed Wood-pecker. Olive, beneath fpotted with white; neck and fubcrefted head yellow; crown red. This is fix inches long.

Miniatus; Red-winged Wood-pecker. Crefted, red, beneath white; throat rofy; bill and tail blue; tail-coverts green. This is nine inches long, and is found in Java.

Malaccensis; Malacca Wood-pecker. Crefted head and fhoulders fcarlet; 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 fhort. 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 ufually four eggs.

* Viridis; Green Wood-pecker. Green; crown crimfon. This is the largeft fpecies found in England, and is full thirteen inches long. Thefe birds are frequently feen on the ground, particularly where ant-hills abound, the population of which they extirpate by their inceffant efforts. This bird will occafionally not be contented with darting its tongue at them fingly, but by the combined exertion of its bill and feet lays open the whole neft, and commits the moft wholefale 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 fpots 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 neft, and lays five or fix greenifh coloured eggs fpotted with black; it is remarkably fond of bees.

Bengalensis; Bengal Wood-pecker. Green; creft 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 fpecies is a little larger, and inhabits Ceylon and China. Its head is marked with numerous white fpots; the back is black, and fcarlet in the middle.

Quadrimaculatus; Blue-throated Wood-pecker. Green; beneath blueifh; crown and rump yellow; throat, quill and tail-feathers black. This is the fize of the Viridis, and is found in Ceylon.

Philippinarum; Philippine Wood-pecker. The fize of the laft, and found in Manila. It is brown-green; crefted; beneath fpotted with white and black; the rump is red; the tail-feathers have two white fpots.

Goensis; Goa Wood-pecker. Green, beneath whitifh; crown and crefted 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 fimilar to the Bengalenfis.

Manillensis; Manila green Wood-pecker. Dirty-green; crown covered with grey; wings and tail blackifh; upper tail-coverts red. It is found in Manila.

Gartan; Crimfon-rumped Wood-pecker. Above grey-brown, beneath yellowifh-grey; wings with dirty fpots; crown and rump red. It is found in Senegal, and is a good deal lefs than the Viridis.

Canus; Grey-headed green Wood-pecker. Cinereous, front obfcurely fpotted with red; back, fhoulders, wing and tail-coverts green; rump yellow; wings and tail brown; chin whitifh. It inhabits Norway, Ruffia, and Siberia.

Persicus; Perfian Wood-pecker. Pale yellow; body above, tips of the quill-feathers, and area of the eyes, ferruginous. It is a native of Perfia.

Semirostris; Half-billed Wood-pecker. Brown-afh, beneath white; head brown, fpotted with yellowifh; upper mandible fhorter. It is only of the fize of a martin.

Pubescens; Downy Wood-pecker. Back longitudinally downy; outer tail-feathers white, with four black fpots. 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 mifchievous to fruit-trees in orchards. As foon as it has pecked one hole in a tree, it makes another clofe to the firft, in a horizontal direction, proceeding till it has made a circle of holes quite round the trunk, fo that the tree frequently dries up and decays.

Villosus; Hairy Wood-pecker. Back fomewhat downy, in a longitudinal direction; the outer tail-feathers are entirely white. It is from nine to twelve inches long. Like the Pubefcens, it is a fad peft to orchards. It inhabits North America, from Hudfon's Bay to Carolina, and it has been feen in the north of England.

* Major; Greater fpotted Wood-pecker. Variegated with black and white; the vent and hind-head are red. This is alfo called the witwall, is nine inches long, and ftrikes with far greater comparative force againft the trees than any of the tribe. It creeps with facility over the branches in every direction; and when any perfon attempts to obferve it on one fide of a branch, it paffes to the oppofite with extreme celerity, repeating this change in correfpondence with every renewed effort of the enemy. It inhabits many parts of Europe, as well as England; here indeed it is lefs frequent than the Viridis, to which it is clofely allied in manners and habits, except that it rarely defcends to the ground in fearch of food. It lays four or five gloffy eggs in the decayed wood, without any formal preparation of a neft.

* Medius; Middle fpotted Wood-pecker. Variegated with white and black, the vent and cap are red. It is doubted if this be a diftinct fpecies, or whether it be not the young of the Major juft defcribed.

* Minor; Leffer fpotted Wood-pecker. This fpecies is alfo variegated with white and black; the crown is red, and the vent teftaceous. It is found in divers parts of Europe and Afia. It has the habits of the Major, but is much more rarely feen. There are two varieties; 1. Crown, nape and fcrag black-grey; body beneath yellowifh, fpotted with black. This is a native of Panay. 2. Hind-head fubcrefted; crown with a crimfon fpot; front, cheeks, and body beneath white. It is found in Ceylon.

Tricolor; Varied Wood-pecker. Black, with white tranfverfe ftreaks; breaft and belly red. It inhabits New Spain.

Canadensis; Canada fpotted Wood-pecker. White; crown, back, fhoulders, 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 deftructive to corn and fruits.

Flavipes; Yellow-legged Wood-pecker. Black, beneath white; legs yellow.

Bicolor; the Encenada Wood-pecker. Varied with grey

Strahan and Prefton,
New-Street Square, London.

grey and white; fides of the crefted head white; quill-feathers brown, fpotted with white. The female bird is totally brown, with a creft.

Cardinalis; Cardinalis Wood-pecker. Black, beneath white, fpotted with black; the crown and hind-head red. Found in Luzonia; and is the fize of the Viridis.

Nubicus; Nubian Wood-pecker. Variegated with white, rufous, and brown; crown black, fpotted with white; hind-head fubcrefted; red breaft, whitifh, with black dots; tail with rufous brown lines. It is found in Nubia, and is feven inches and a half long.

Moluccensis; Brown Wood-pecker. Black, waved with white; beneath whitifh, arrow-ftreaked with brown; quill and tail-feathers brown, fpotted with white. It inhabits the Molucca iflands. There is a variety black-brown, fpotted with white; beneath and head white; crown and fpot beneath the eyes brown. It inhabits India, and is five inches long.

Minutus; Minute Wood-pecker. This, the leaft of all the tribe, is found in Cayenne. It is chefnut-grey; beneath whitifh waved with brown; crown red; hind-head black, fpotted with white.

Tridactylus; Three-toed Wood-pecker. Variegated black and white; three-toed; a variety is alfo variegated black and white; and white beneath. The *firft* inhabits America, Europe, and Sicily: the *fecond* is found in Cayenne.

Picus *Cinereus*. See Sitta *Europæa*, S. *jamaicenfis*, and S. *major*.

Picus *Imbrifactus*, or *Picus Principalis* of Linnæus, the name of an American bird, defcribed by Nieremberg, and called by the natives *quatotomimi*. It is of the fize 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 fmall and red, and has a fine red creft; but the feathers are black on their upper fide; it has on each fide of the neck a broad white line, reaching to the breaft; its legs and feet are of a blueifh colour; it builds in high trees, and is principally found near the fhores of the South fea. It feeds on infects. See Picus.

Picus *Major Leucophæus*. See Cuculus *Vetula*.

Picus *Murarius*, the name of a bird called in Englifh the *wall-creeper*, and improperly ranked among the *pici*, as wanting many of the characters of that genus: and therefore claffed in the Linnæan fyftem under the genus of *certhia*, or creeper. It is about the bignefs of the common fparrow; its bill is black, flender, and long; its head, neck, and back grey; its breaft white, and its wings partly grey and partly red; its tail is fhort and black; its long wing-feathers alfo, and the lower part of its belly, and its legs, are of the fame colour; its legs are fhort, 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 fome parts of France; it is a very lively and chearful bird, and as the common wood-pecker climbs trees and feeds on the infects in their cracks, fo this bird runs up old walls, and feeds on what it finds in the cracks of the ftones.

Picus *Nidum Sufpendens*, a name by which fome authors have called the galbula; a yellow bird of the thrufh kind, very remarkable for its beauty, and for the ftructure and manner of hanging its neft. See Oriolus *Galbula*.

Picus *Salutiferus*, the name under which Nieremberg has defcribed a Mexican bird, called by the natives *huquecholtototl*.

It is of the fize of the common black-bird, and has a long and black beak: its head and a great part of its neck are red; its breaft and belly are grey, and it has a creft of red feathers upon its head. It is of the wood-pecker kind, and has its name from the fuppofed virtue of its feathers, particularly thofe of the creft, in curing the head-ach.

PIDAURA, in *Geography*, a town of the Morea, anciently called "Epidaurus," fituated on the W. coaft 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 fignify a receptacle for preferving potatoes, turnips, and other roots. And when thefe are for potatoes they are ufually formed with dry earth in a dry fituation, being made in the ridge or conical form.

Pies are likewife made ufe of for curing rape-feed, being built in the field with platted ftraw. The form, according to Mr. Marfhall, is that of a corn bufhel, the diameter feven or eight feet, the height three or four feet. This large ftraw bafket-like receptacle is filled with rough feed to the brim, topped up in a conical form with ftraw, and the whole fecured with a coat of thatch. This is moftly done when the markets are bad at the period of thrafhing, as the feed may be preferved any length of time in thefe pies, if there is a fufficiency of pulls among it, and the quantity of feed depofited in them be not too large. It is at prefent a practice feldom employed.

PIECE, in *Commerce*, fignifies fometimes a whole, and fometimes only a part of the whole.

In the firft fenfe we fay, a piece of cloth, of velvet, &c. meaning a certain quantity of yards, regulated by cuftom, being yet entire, and not cut.

In the other fignification we fay, a piece of tapeftry; meaning a diftinct member wrought apart, which, with feveral others, make one hanging.

A piece of wine, of cyder, &c. is a cafk full of thofe liquors.

Piece, *Chimney*. See Chimney.

Piece, *Detached*. See Detached.

Piece, *Eafel*. See Easel.

Piece-*Goods*, in *Commerce*, a name given in India to the various fabrics of manufactured cotton.

Piece, *Mafter*. See Master.

Piece, in *Coinage* and *Commerce*, fignifies fometimes the fame thing with *fpecies*: as when we fay this piece is too light, &c.

Sometimes, by adding the value of the pieces, it is ufed to exprefs fuch as have no other particular name: as a piece of eight rials, a piece of twenty-five fols, &c.

In England, the piece, abfolutely, is fometimes ufed for twenty fhillings fterling, and fometimes for a guinea.

By 6 Geo. II. cap. 25. broad-pieces, of five-and-twenty, or three-and-twenty fhillings value, or any halves or quarters thereof, are called in. And all perfons are forbid to receive or utter them in payment by tale.

Piece *of Eight* denotes the Spanifh dollar or pefo, which in foreign exchanges is valued at 8 reals of old plate or 15 reals 2 maravedis vellon: but in commercial tranfactions within the country, it is reckoned at 15 reals vellon.

As a filver coin, the dollar, or pefo duro, fince the coinage of 1772, paffes for 20 reals vellon, and the half dollar, or efcudo vellon, for 10. This dollar contains 374⅞ troy grains of fine filver, or 405⅓ grains of Englifh ftandard filver; and therefore its value in Englifh filver coin is 4*s*. 4½*d*.; and the half dollar in proportion. The value of the pefo of plate, or dollar of exchange, in Englifh filver coin, is 39½*d*.; but if allowance be made for remedy in coinage, it muft be valued in the dollar at ½ fterling. By the affay aſſay 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 4*s.* $3\frac{3}{4}$*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 eſcutcheon 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 piaſtres 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 *pied 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 Corſica; 12 miles E.N.E. of Corte.

PIEDICORTE, a town of Corſica; 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 Genoeſe, 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 Seſia are the gold mines of St. Maria and Cavavecchia, alſo containing ſilver. Gold is likewiſe found in the mountains of Challend near the vale of Aoſta; and the torrent Evenſon 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, chambranle, 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; 11 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 fortreſs, 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

Th

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 cylindric 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 marquiſate 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, Percé, 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 ſut*, 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 Seleucide 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 Mons, 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 kiliometres, in 18 communes.

Pierre *Buſſiere*, 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 kiliometres, in 10 communes.

Pierre *a l'Oiſſeau*, 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 Bienne.

Pierre *d'Albigny, St.*, a town of France, in the department of Mont Blanc, and chief place of a canton, in the diſtrict of Chambery. The place contains 2714, and the canton 6943 inhabitants, on a territory of 70 kiliometres, 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 kiliometres, 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 Marennes. The place contains 4249, and the canton 9653 inhabitants, on a territory of 135 kiliometres, 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 kiliometres, in 14 communes.

Pierre-*le-Moutier, St.*, a town of France, in the department of the Nievre, 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 kiliometres, 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 kiliometres, in 28 communes.

Pierre *d'Automne*, a French name tranſlated from the Chineſe.

Chinefe. It is the name of a medicinal ftone, famous throughout the Eaft for curing all diforders of the lungs. Many people fuppofe it had its name of the *autumn-ftone*, from its being only to be made at that feafon of the year; but it may be made equally at all times, and the origin of the name is to be farther fearched into.

The Chinefe chemifts, like thofe of all other nations, delight in a fort of gibberifh. A part of this is, the referring the feveral parts of the body to the feveral feafons of the year. The lungs are in this fcheme referred to autumn. This appears in their writings; and thus the ftone for difeafes of the lungs came to be called *autumn-ftone*.

It is a tedious preparation of human urine, and made as follows: they put thirty pints of the urine of a ftrong and healthy young man into a large iron pot, and fet 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 fubftance refembling black mud; they then take it out of the pot, and laying it on a flat iron, they dry it fo that it may be powdered very fine.

This powder they moiften with frefh oil, and put the mafs into a double crucible, furrounded with coals, where it ftands till thoroughly dried again. They finally powder this again, and putting it into a china-veffel, covered with filk cloth and a double paper, they pour on boiling water, which makes its way, drop by drop, through thefe coverings, till fo much is got in as is fufficient to reduce it to a pafte. This pafte is well mixed together in the veffel it is kept in, and this is put into a veffel of water, and the whole fet over the fire. The matter thus becomes again dried in balneo Mariæ, and is then finifhed. Obferv. fur les Coût. de l'Afie, 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 diftrict of Commercy; 7 miles W. of St. Michael. The place contains 660, and the canton 9249 inhabitants, on a territory of $357\frac{1}{2}$ kiliometres, in 27 communes.

PIERREFONTAINE, a town of France, in the department of the Doubs, and chief place of a canton, in the diftrict of Baume. The place contains 1110, and the canton 7889 inhabitants, on a territory of $272\frac{1}{2}$ kiliometres, in 21 communes.

PIERREFORT, a town of France, in the department of the Cantal, and chief place of a canton, in the diftrict of St. Flour. The place contains 1266, and the canton 8905 inhabitants, on a territory of $287\frac{1}{2}$ kiliometres, in 11 communes.

PIERRES SONORES, ftones that have a metalline found, of which mufical inftruments of percuffion are made in China. See CHINESE *Mufic*.

PIERREVILLE, ST., in *Geography*, a town of France, in the department of the Ardèche, and chief place of a canton, in the diftrict of Privas. The place contains 1471, and the canton 7856 inhabitants, on a territory of $147\frac{1}{2}$ kiliometres, in 7 communes.

PIERSZAIE, a town of Lithuania, in the palatinate of Wilna; 60 miles E. of Lida.

PIERUS, or PEIRUS, in *Ancient Geography*, a river of the Peloponnefus, in Achaia Propria, which traverfed the territory of the town Pharæ. Strabo fays that it difcharged itfelf into the Achelous.—Alfo, a lake of Theffaly.—Alfo, a mountain of Macedonia. It is faid that a perfon, named Pierus, eftablifhed on this mountain the worfhip of the Mufes, whence they were denominated "Pierides."

PIES, in our *Ancient Law-Books*. Freres Pies were a fort of monks, fo called becaufe they wore black and white garments, like magpies; the fame, we fuppofe, with thofe fince called Carmelites, who, for a like reafon, were anciently called by the French Freres Barrez.

They are mentioned by Walfingham, p. 124. "In quodam veteri cœmeterio, quod fuerat quondam fratrnm, 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 ufed by the ancients to exprefs the remaining mafs, after the expreffion of any fluid fubftance from among its moft folid parts. Thus the cake remaining in the bag, after the expreffion of oils, is called by this name; but there are inftances of authors calling the expreffed juice, inftead of the refiduum, by this name. Thus Diofcorides calls the expreffed juice of the bay-berries, the *piefma laurinum;* and others, the expreffed juice of rofes, *piefma rofarum*, paying no regard to the rofe-cake left behind.

PIESTER, the name ufed by the ancients for the prefs which they employed in preparing the feveral juices of plants, &c.: hence the word *piefma;* which fee.

PIESTRON, a word ufed by Hippocrates to exprefs a fort of forceps, which he recommends to be ufed in difficult labours, to break the bones of the cranium of the fœtus, when its head is too large to fuffer it to pafs whole. It was alfo called *embryothlaftes*.

PIETANTIA, or PITTANCE, a portion of victuals diftributed to the members of a college, or other community, upon fome great feftivals.

PIETANTIARIUS. See PITANCIARIUS.

PIETERMAN, in *Ichthyology*, the name ufed by fome for a fifh of the cuculus kind, approaching to the nature of the *draco marinus*, or weaver; and more ufually called among authors by its Brafilian name, *niqui*.

PIETISTS, in *Ecclefiaftical Hiftory*, a religious fect that fprung up towards the clofe of the 17th century, among the Proteftants of Germany; feeming to be a kind of mean between the Quakers of England, and the Quietifts of the Romifh church.

This fect originated in the zeal of certain perfons, who, with the beft intentions, endeavoured to ftem 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 fuggeftions of an irregular imagination, and an ill-informed underftanding, or guided by principles and views of a more criminal nature, fpread abroad new and fingular opinions, falfe vifions, unintelligible maxims, auftere precepts, and imprudent clamours againft the difcipline of the church: all which excited the moft dreadful tumults, and kindled the flames of contention and difcord.

The learned Spener was at the head of the firft reformers, who, by the private focieties he formed at Frankfort, with a defign to promote vital religion, roufed the luke-warm from their indifference, and excited a fpirit of vigour and refolution in thofe who had been fatisfied to lament in filence the progrefs of impiety. With this view he publifhed a book, entitled "Pious Defires," in which he reprefented in an affecting manner the diforders of the church, and propofed the remedies that were proper to heal them. The religious meetings above-mentioned, or colleges of piety as they were called, however well defigned in their original eftablifhment, tended in many places to kindle in the breafts of the multitude the flames of a blind and intemperate zeal, whofe effects were impetuous and 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 Leipſic 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 Leipſic 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 Eccl. 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 Acerenza.—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 Leſina.—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 as to the caufe of this phenomenon: fome fuppofe it to be electric, others phofphoric, and others again volcanic. In favour of this latter opinion, it is alleged that there are veftiges of ancient eruptions in the neighbourhood; that fhocks of earthquakes frequently agitate the furrounding mountains; and that fulphureous bubbles are perceivable in the vicinity, which are fo inflammable as to take fire at the approach of a torch, &c. But on the other hand, it is faid, that if the flames of Pietra Mala proceeded from any fuch caufe, the ground over which they hover muft be heated, and its heat increafe if opened, becaufe it would be nearer the fubterranean furnace. On the contrary, the flame in this mountain communicates but little heat when burning, and when extinguifhed leaves the ground cold, and without the ufual veftiges of fire. Hence others have been led to afcribe it to a fort of oily fubftance or petroleum, with which they fuppofe the adjacent earth to be impregnated. But if this were the caufe, it is faid, that the flames, inftead of being increafed, would be diminifhed or extinguifhed by the rains and tempefts of winter, and the crevices which emit the flame muft exhibit fome traces of this oily vapour; but the flame glows with the greateft vivacity in winter, and the foil manifefts no appearance of any oily or bituminous fubftance. The firft of thefe facts is equally decifive againft the operation of the electric fluid and phofphoric exhalations. Whatever be its caufe, the flame illuminates the whole tract around it, and banifhes the horror of night from one of the moft dreary folitudes of the Apennines. Similar phenomena were obferved in or near the fame 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 Hiftory*, a name given by the Italians to the Florentine marble, fo remarkable for its delineations.

This marble is found in thin ftrata, and is full of cracks: in thefe cracks there is ufually found a black mineral matter, which, getting into the fubftance of the ftone a little way on each fide of the crack, forms there various delineations, or the figures of pieces of mofs, bufhes, and the like: the paler pieces of the marble ufually have thefe delineations; the darker coloured having the forms of trees and houfes, or the ruins of old buildings.

PIETRAFEZA, in *Geography*, a town of Naples, in Bafilicata; 7 miles S.W. of Potenza.

PIETRAGRUA, CARLO LUIGI, of Florence, in *Biography*, a mafter of confiderable reputation in his day, compofed two operas for Venice; "Il Paftor Fido," in 1721; and "Romolo e Tazio," in 1722. Profeffors fpeak of Pietragrua in fuch terms as remove all doubt of his merit.

PIETRALBO, or PETRALBO, in *Geography*, a town of the ifland of Corfica; 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, furrounded 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 Mona*, 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. Mauritio*, 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 diftrict of Valognes; 12 miles W. of Valognes. The place contains 1398, and the canton 10,420 inhabitants, on a territory of 170 kiliometres, in 15 communes.

PIEXE-GALLO, in *Ichthyology*, a name given by the Portuguefe to a fifh caught about the fhores of the Brafils, and much refembling our *doree* or *faber pifcis;* more ufually known among authors by its Brafilian name, *abacatuaia*.

PIEXE-*Porco*, a name by which fome authors have called the *monoceros*, or unicorn-fifh of Clufius. The name is Portuguefe, and fignifies hog-fifh, 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 fervice of Auguftus II., king of Poland. According to Quantz, Pifendel had in his youth received inftructions in finging from Piftocchi, and on the violin from Tofelli. Quantz is very warm in his praifes, calling him a profound theorift, a great performer, and a truly honeft man. It was from this worthy concert-mafter, fays he, that I learnt to play an adagio, and to compofe in many parts.

Pifendel had in his youth travelled through France and Italy, where he had acquired the peculiarities in the tafte of both countries, and fo blended them together as to form a third genus, a mixed ftyle of writing and playing, which was half French and half Italian. Influenced by his example, Quantz declares that he always preferred this compound ftyle to that of Italy, France, or the national ftyle of his own country.

PIFFERO, Ital. a flute, fife, or flageolet.

PIG, a fmall animal of the hog or fwine kind. See HOG, and SWINE.

PIG, *Guinea*. See CAVIA *Cobaya*.

PIG-*Nut*, or *Earth-nut*, in *Botany*. See BUNIUM.

PIG-*Nut*. See WALNUT-*Tree*.

PIG-*Cafe*, in *Agriculture*, a fort of narrow cafe or ftall, in which an animal of this kind is confined while it is undergoing the procefs of fattening, fo as not to be able to turn itfelf completely round, by which it is fuppofed to fatten better and more expeditioufly, as well as with a lefs quantity of food in proportion to that which is ufed for equal fized animals fed in other methods.

Thefe cafes are conftructed in feparate divifions, in fuch a manner, that each of them may contain a pig, and fit him as nearly as poffible when he is in it; but he muft not be able to turn himfelf round; there is, however, a fpace left at the bottom of each of them, by which he is enabled to lie down at pleafure, in which cafe his feet pafs through the fpace left. Upon one fide of fuch buildings there is ufually a range of fmall troughs in the walls or boardings, and on the other a row of fliders, which fhut the pigs in. The paving in the bottoms of thefe divifions flopes gently backwards to prevent wetnefs, and no litter is ever employed in them, but they are kept clean and fweet by the ufe of a hoe and broom.

Pig-cafes of this fort are fometimes raifed from foundations laid in the ground, and at others erected upon wheels in in a kind of wooden building, fo as to move about on grafs-land. They are frequently met with in the neighbourhood of Maldon in Effex, and will be more fully noticed in fpeaking of fwine. See SWINE.

PIG-*Stie*, in *Rural Economy*, the name of the place where hogs are kept. Buildings of this kind fhould always be large and commodious. See HOG-*Stie*.

PIG-*Tail*, in *Agriculture*, a provincial term fometimes applied to a fmall ftrip of ground generally in the ftate of grafs.

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° 52′. W. long. 79° 42′.

PIG *Iron*, in the *Iron Works*. Thofe maffes of iron which refult from the firft procefs of extracting from the ore, are called *pigs*, and in this ftate it is called *pig iron*. It is principally ufed to diftinguifh 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 higheft carburet is called N° 1, the next N° 2, and fo on. That containing the loweft dofe of carbon, which is known by its white fracture, and greater hardnefs, is called *forge pig*, becaufe it has been thought the moft fitted for making malleable iron. See the article IRON.

PIGALLE, JOHN BAPTIST, in *Biography*, an eminent French fculptor, was born at Paris in 1714. He was the fon of a carpenter employed about the royal buildings, and fhewed an early fondnefs for modelling, which at length gave him a defire for excelling in the art of fculpture. He fpent three years at Rome in copying after the antique, and on his return ftopt at Lyons, where he met with employment which occupied him a year and a half. Here he finifhed his model of the ftatue of Mercury, which he brought with him to Paris, where it was greatly admired. It was fome time before he met with encouragement; but at length he excited the attention of the minifter, and of Mad. Pompadour, who obtained for him many commiffions. He was admitted into the academy of painting and fculpture in 1744, and having executed his Mercury in marble, he made a Venus for its companion, which was equally the fubject of praife. Both thefe ftatues were prefented by the king to Frederic of Pruffia. Pigalle was employed, in 1756, to execute a maufoleum for marfhal Saxe, which was faid to be the grandeft compofition in fculpture that exifts. This caufed 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 artift he was entirely indebted to ftudy and application: his fkill was rather talent than genius, and his ideas were rather juft than extenfive.

PIGAYA, in *Natural Hiftory*. See PYGAYA.

PIGEON, in *Ornithology*. See COLUMBA.

PIGEON, in *Rural Economy*, a well-known domeftic bird. There are only two diftinct forts of pigeons, the wild and the tame; and the tame rough-footed ones differ not much from the wild, only they are fomewhat bigger, and more familiar: the wild ufually perch upon trees, being more feldom feen on the ground. They are fuch as breed in woods, fea-rocks, &c. and the tame fuch as are bred in dove-houfes.

But the varieties in the tame fort are numerous, and diftinguifhed by a variety of different names, as carriers, croppers, powters, horfemen, runts, jacobins, turbits, helmets, nuns, tumblers, barbs, petits, owls, fpots, trumpeters, fhakers, turners, finikins, &c. from which, when differently paired, are bred baftard pigeons, fuch as are called from the cropper or powter, and the carrier, powting horfemen; from the tumbler and the horfemen, dragoons. Thefe, however, deferve little attention, being only kept for fancy, and not profit, though the fame method is ufed in breeding them.

And there are different forts of runts, one called Spanifh runt; generally of a blood-red or mottled colour: they are very loofe feathered, and large bodied, but breed not fo often as the fmaller forts.

The horfemen are excellent breeders, and are not eafily took; the common Englifh runt is alfo a good fized pigeon, and breeds well.

Alfo the pigeon called the Leghorn is a fort of runt, only diftinguifhed by a little wattle over his noftril: he is a full bodied pigeon, whofe feathers lie clofe to the body, and is an excellent breeder, and generally of a grizzled colour, ermined round the neck.

It may be noticed that thofe who keep pigeons for the purpofe of breeding, fhould have baftard bred pigeons, fuch as powting horfemen, powting dragoons, from a powter or cropper, and a Leghorn; as fuch 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 thofe kinds which are bred in pigeon-houfes, the grey pigeon, inclining to afh colour and black, is the beft; and generally fhews fruitfulnefs by the rednefs of the eyes and feet, and by the ring of gold colour which is about the neck.

In refpect to the time of ftocking there are two feafons in the year at which the pigeon-houfe may be fupplied: the firft is May; for the pigeons having much ftrengthened themfelves during the winter, are in a condition foon to yield profit to the buyer. Secondly, in Auguft, when there are a great number of young pigeons that have been well fed with corn, from the harveft in that feafon. In general pigeons will live about eight years, but they are only prolific for the firft four years; afterwards they are worth nothing, for when they are once paft that age all they do is, to prevent the profit that might be reaped by others that are younger. It is fomething difficult to know how to diftinguifh their age, and requires experience.

And the runts may be diftinguifhed again into greater or fmaller: thofe which are called the Spanifh runts are much efteemed, being the largeft fort of pigeon, but are fluggifh and more flow of flight than the fmaller forts of runts: but the fmaller runts are better breeders, and quicker of flight, for which they are efteemed. As for the colours of their feathers, they are uncertain, fo that a judgment cannot be made of the fort by them.

The next fort which makes the largeft figure, but is not, in reality, the largeft bird, is the cropper, fo called, becaufe they ufually, by attracting the air, blow up their crops to an extraordinary bignefs, even fo as to be fometimes as large as their bodies. This fort is the moft valued, according as it can fwell up its crop. The bodies of this fort are about the bignefs of the fmaller runts, but are fomewhat more flender: this fort alfo is of various colours in the feathers.

The fhakers are of two forts, *viz.* the broad-tailed fhaker, and the narrow-tailed fhaker: thefe are fo called, becaufe they are almoft conftantly wagging their heads and necks up and down; the broad are diftinguifhed from the narrow, in that the broad-tailed fort abounds with tail-feathers about twenty-fix in number; but the narrow-tail 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, court-beck, 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 dragors: 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 finnikin, 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 ſtock 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 aſſafœtida, 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 feeds of any kind. He directs us to be cautious of not letting the firft flight fly to increafe the ftock, but let every one of them be taken; as thefe will come in, in what is called benting time, that is, between feed time and harveft. It is then that pigeons are the fcarceft; and many of the young ones would pine to death through weaknefs during that feafon, and that, at the latter end of every flight, care fhould be taken to deftroy all thofe eggs which were not laid in a proper time. The proper time for the fpring flight is in April and May. After the harveft flight cold weather begins to come on, which injures the old pigeon much if fhe fits late; and the young will be good for nothing if hatched.

And it is very neceffary to pay attention to cleanlinefs 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 fummer time, maggots are foon bred in them; they become putrid, and emit a putrid and unwholefome ftench, very injurious to the inhabitants of the dove-cote. Pigeons are tenacious of their nefts, as appears from the conduct of the wood-pigeon, which will breed for years in the fame tree, and the mother forfakes her neft with regret; but, unable to endure the filth and ftench of her dead offspring, fhe is obliged to quit the eggs fhe has laid for a fecond brood, and the prime of the feafon is loft. Every fummer, immediately after the firft flight, the nefts fhould be all cleaned out, and the dung totally taken away, as it breeds filth. But remember to do this bufinefs early in the morning. The remaining eggs ought likewife to be deftroyed, and a perfectly clean habitation made for the harveft flight of thefe 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 neceffary, either to the building or to the nefts, fhould be done before noon; for if you difturb the pigeons in the afternoon, they will not reft contentedly the whole night; and the greateft part perhaps will not enter the cote until the next day, but will fit moping on the ground; and if in breeding time, either a number of eggs may be fpoiled, or feveral young ones ftarved to death. It is added, that pigeons are fuppofed to be more productive from the breeds being croffed; in proof of which, a few tame pigeons were put into a dove-cote; and the confequence was, that a more early, and a more numerous hatch of young were produced than in any of the neighbouring cotes at the fame feafon. It is alfo farther ftated that thefe birds have a great antipathy to owls, which find their way fometimes into dove-cotes; and there is no getting rid of fuch troublefome guefts but by deftroying them. Rats are terrible enemies to pigeons, and will foon deftroy a whole dove-cote. Cats, weafels, and fquirrels will do the fame. It will be neceffary, therefore, to examine the dove-cote once every week at leaft, very minutely, to fee that there are none of thefe intruders in the houfes where they are kept.

In fome cafes, in order to catch and deftroy pigeons, where they become troublefome to the farmer, it has been directed to take a good number of fmall twigs, and birdlime them well, laying them on the ground where pigeons, &c. frequent, and they will foon 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 fome fheets of thick brown paper, each into about eight parts, making them up into the fhape of a fugar-loaf, and bird-liming the infide of them three or four days before intending to ufe them; putting into each paper, near the bottom, three or four grains of corn, and laying thefe 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 thrufting in their heads to reach it, they get hood-winked by the paper fticking to their heads, which occafions them to take wing, and fly upright till they have fpent themfelves, when they tumble down and may be eafily taken. But the gun is probably the beft method in fuch inftances.

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 fuppofed to poffefs many valuable properties. It is fometimes turned in like other light fubftances in the fpring, and cofts about one fhilling a bufhel, heaped, in fome diftricts, and about a halfpenny a bufhel more bringing to the land; it is ufed alfo as malt duft, and anfwers in all feafons. See Manure, and Top-dressings.

Pigeon-*Houfe*, in *Rural Economy*, a building, or houfe, erected for the purpofe of keeping and breeding of pigeons, &c. It is fometimes called a dove-cote. In order to erect a pigeon-houfe to advantage, it is neceffary, in the firft place, to pitch upon a convenient fituation, of which none is more proper than the middle of a fpacious court-yard, when it is fheltered, and has a fouthern afpect. With regard to the fize, it muft depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too fmall; and as to its form, the round fhould be preferred to the fquare, becaufe rats cannot fo eafily come at them in the former as in the latter. It is alfo much more commodious; as, by means of a ladder turning upon an axis, it is poffible to vifit all the nefts in the houfe, without the leaft difficulty; which cannot be fo eafily done in a houfe of the fquare form. And in order to hinder rats from climbing up the outfide of it, the wall fhould be covered with tin plates to a certain height, as about a foot and a half; which fhould project out three or four inches at the top, to prevent their getting up more effectually. It fhould be placed at no great diftance from water, that the pigeons may carry it to their young ones, in a proper ftate and more conveniently. Where the houfe is covered with boards, they fhould be well joined together, fo that no rain may penetrate through. And the whole building fhould be covered with hard plafter, and white-wafhed within and without. There muft be no window or other opening in the pigeon-houfe to the eaftward; thefe fhould always face the fouth; for pigeons are very fond of the fun, efpecially in winter. Other coverings are better than boards, as will be feen below. In regard to the nefts or covers, they may confift of fquare holes made in the walls of a fufficient fize to admit the cock and hen to ftand in them; the firft range of thefe nefts being placed at a proper diftance from the ground; and thefe nefts fhould be placed in quincunx order, and not directly over one another. Nefts may likewife be formed in other ways, as will be feen below.

It may be noticed that any lord of a manor may build a pigeon-houfe on his land, but a tenant cannot do it without the lord's licence. And that when perfons fhoot at or kill pigeons within a certain diftance of the pigeon-houfe, they are liable to pay a forfeiture.

And it has been remarked in a late practical work, that where pigeons are bred for the purpofe of deriving profit from them, the pigeon-houfe fhould not only be large and roomy, but be placed in fuch a fituation that the pigeons may be fed with convenience, and without being difturbed by the different operations that are conftantly going on about the

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 ftrong 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 practice to makes fquare holes of board for the pigeons to lay and breed in; a neater method is that of employing fmall wicker bafkets open at the top for this purpofe; thefe bafkets may either be compofed of finer or coarfer materials according to the inclination of the builder, or the expence he wifhes to be at. Nefts 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-*Pea*, 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 *Ifland*, 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 Tenneffee, 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*, fties; *b, b, b, b, b, b*, troughs; feparated by ftrips of wood generally into fix divifions, but occafionally into a greater number when the pigs are fmall; *c, c, c, c, c, c*, gates which feparate the fties 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-*ftie* 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, whofe 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 publifhed "Hercules Prodicius," 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 Onerfkoe; 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 depreffed 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 meafure for oil at Naples; 320 pignate being = 16 ftaja = 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 diftrict of Monaco; 20 miles N.E. of Nice. The place contains 2285, and the canton 2285 inhabitants, on a territory of $52\frac{1}{2}$ kiliometres, 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 Clufon, the key of Italy, and fortified; 16 miles S.W. of Turin.

PIGNOLETTI, in *Ichthyology*, a name ufed by many for the *aphyæ cobites*, a fmall fifh of the gobius or fea-gudgeon kind, common in the Mediterranean, and brought to the markets of Rome and Venice. See GOBIUS *Minutus*.

PIGNORIA, LORENZO, in *Biography*, a learned antiquary, was born at Padua in 1591. He was brought up among the Jefuits, and became confeffor to a nunnery, and parifh prieft of St. Lorenzo. A canonry of Trevifo was alfo conferred upon him by cardinal Fr. Barberini. He was in habits of intimacy with many of the moft illuftrious men of his time, and collected a valuable library and cabinet of antiquities. He died of the plague in 1631. His works are highly efteemed; the chief are, "De fervis et eorum apud Veteres Minifteriis;" "Menfa Ifiaca," which is an elaborate commentary upon a famous relic, and three Latin letters to the fenator Domenico Molino. Moreri.

PIGRIN, in *Geography*, a Ruffian fettlement, on the W. coaft of America, in Beering's ftrait. N. lat. 65° 54′. E. long 191° 40′.

PIGRITIA, in *Zoology*. See BRADYPUS *Tridactylus*.

PIGUS, in *Ichthyology*, the name of a fpecies of leather-mouthed fifh, very much approaching to the nature of the carp.

It is of the fame fhape and fize with the common carp, and its eyes, fins, and flefhy palate wholly the fame; from the gills to the tail there runs a crooked dotted line; its back and fides are blueifh, and its belly reddifh; it is covered with large fcales, from the middle of every one of which there rifes a fine, pellucid, and very fharp prickle.

It is a finer fifh than the carp for the table, and is in feafon in the months of March and April. It is caught in lakes in fome parts of Italy, and is mentioned by Pliny, though without a name.

It is a fpecies of cyprinus, according to Artedi, and is diftinguifhed by that author under the name of the cyprinus called *piclo* and *pigus*. He adds, that the tail is forked, and the fcales large; and that in fpring and autumn there grow out of them white pyramidal prickles, which remain about five or fix weeks, and then fall off; the back is of a blackifh-blue, and the belly white, with a faint caft of red. It never grows to more than five or fix pounds; the flefh is well tafted. 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.—Alfo, 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 fifh of the muftela kind, ufually called the *muftela foffilis*, or *pifcis foffilis*, the foffile fifh. See COBITIS *Foffilis*.

This feems very much of the kind of the fifgum fifh, and poffibly is no other than the fame fpecies; and poffibly alfo the pæcilia of Schonefeldt is the fame.

PIKE, an offenfive weapon, confifting of a fhaft of wood, twelve or fourteen feet long; headed with a flat-pointed fteel, called the *fpear*. The general length fixed for the pike by moft princes and ftates was, according to fir James Turner, in his "Pallas Armata," written in 1670 and 1671, 18 feet; but he obferves that few exceeded 15.

The name pike is faid to be derived from a bird called by the French *pic*, by us wood-pecker; whofe bill is faid to be fo fharp as to pierce wood like an auger. Du Cange derives it from the bafe Latin *pica*, or *picca*; which Turnebus fuppofes to have been fo called, *quafi fpica*, becaufe refembling an ear of corn: Octavio Ferraro derives it *à fpicula*. M. Fauchet fays, 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 occafion of that people's renewing the ufe 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 reafon of their readinefs to pick quarrels; called in French *piques*.

The pike was a long time in ufe in the infantry, to enable them to fuftain 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 fubftituted in its place.

It is ftill ufed by fome officers of infantry under the name of fpontoon.

Pliny fays, the Lacedæmonians were the inventors of the pike. The Macedonian phalanx was evidently a battalion of pike-men.

Father Daniel fays, that pikes are not mentioned in the hiftories of France before the reign of Lewis XI. Pikes were introduced into France by the Switzers. The ufe of the pike was abolifhed in France by a royal ordonnance, iffued in the year 1703; and though the exact period when pikes were laid afide in England has not been afcertained, it appears by the "Gentleman's Dictionary," publifhed in 1705, that the alteration of the pike for the mufket muft have taken place fome 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, becaufe it is but eight or nine feet long, and the fpear is fmaller and narrower. See SPONTOON.

PIKE, in *Ichthyology*, a name given by us to the fifh called by authors the *lucius* and *efox*, and by the old Greek writers *oxyrinchus*. See ESOX *Lucius*.

It is faid, that the pike was introduced into England in the reign of Henry VIII. in 1537, when a pike was fold for double the price of a houfe-lamb in February. Befides fifh and frogs, which are its ufual food, it will devour the water-rat and young ducks. It is very fierce and voracious. This fifh is very remarkable for its longevity: we read of one that was ninety years old, and of another, that was not lefs than 267 years old. See *Feeding of* FISH, *Pike*-FISHING, and HUXING.

PIKE, *Land*. See LUCIUS *Terreftris*.

PIKE-*Pearch*. See LUCIO-*perca*.

PIKE, *Sea*. See MERLUCIUS and SUDIS.

PIKE, a provincial word fignifying a fort of ftacklet or load cock of hay, &c.

PIKE, a name given in fome counties to a prong, or what is generally called a fork, ufed for carrying ftraw, &c. from the barn, cocking of hay, &c.

PIKE, a term in the midland diftricts fignifying to glean.

PIKEfering in feveral other particulars. It is a fpecies of CLUPEA; which fee.

The diftinguifhing characters of it are thefe: the body of the pilchard is lefs compreffed than that of the herring, being thicker and rounder; the nofe is fhorter in proportion, and turns up; the under jaw is fhorter; the back is more elevated; the belly lefs fharp; the dorfal fin of the pilchard is placed exactly in the centre of gravity, fo that when taken up by it, the body preferves an equilibrium, whereas that of the herring dips at the head; the fcales of the pilchard adhere very clofely, whereas thofe of the herring very eafily drop off. Pennant.

It is generally found fwimming in vaft fhoals, and is caught in many parts of the Englifh fhores. Its flefh is better tafted than that of the herring. See *Pilchard* FISHERY.

PILCHOWITZ, in *Geography*, a town of Silefia, in the principality of Oppeln; 36 miles S.E. of Oppeln. N. lat. 50° 10′. E. long. 18° 30′.

PILCO MAYO, a town of Peru; 25 miles N.E. of Potofi.—Alfo, a river of South America, which, after a fouth-eaft courfe of about 600 miles, runs into the Parana, by two mouths, between S. lat. 25° 40′ and 26° 20′.

PILE, in *Antiquity*, a pyramid built of wood, whereon were laid the bodies of the deceafed, to be burnt.

PILES, in *Hydraulic Architecture*, are beams of timber, or ftakes of wood, driven firmly into the ground, for various purpofes; as, for forming a firft foundation for buildings, piers of bridges, &c.; in which cafes they are driven quite down into the ground, or are cut off level with its furface, with a view of obtaining a folid bearing for the weight of the ftructure which is to be raifed.

Amfterdam, and fome other cities, are wholly built upon piles. The ftoppage of the breach in the banks of the Thames at Dagenham, was effected by dove-tail piles; that is, by piles mortifed into one another by a dove-tail joint.

Piles are not employed for foundations unlefs the ground is fufpected to be unfound, or when the weight to be borne is exceedingly great. They act to make the foundation folid, by reaching deep into the earth, down to a more fubftantial ftratum than that of the furface. Indeed, the manner of fixing the piles, by driving them by repeated blows of a powerful machine till they will go no farther, enfures that they come to a good bearing. There are inftances of piles being driven down twenty-five feet, before they were thought fufficiently firm.

Piles are alfo ufed for making the faces of wharfs, banks of rivers, piers for the fea, &c. For thefe purpofes they are driven in rows, but only a fufficient depth in the earth to make them ftand firm, and fupport the planking or framing which is fixed againft them. Thefe piles are ufually driven rather in an inclined pofition. For temporary defence againft the water, in laying the foundation of bridges, &c. piles are always required. They are employed in different ways to form an enclofure, or water-tight wall, called a coffer-dam, round the area where the work is to be laid, and from which fpace the water is drawn by pumps. This is the moft difficult of all kinds of piling; becaufe it muft ftand a great height above the ground, have fufficient ftrength to refift the preffure of water, and be perfectly clofe and tight. In navigable rivers detached piles are driven, and very firmly fixed, to mark the enclofures where barges are to lay, and to fender off others from them, as well as to moor them to.

Piles are in general formed of a fquare timber, tapering if the tree happens to be fo, cut to a fharp point at one end, and fhod with iron to enter the ground. The other end was bound by a ftrong iron hoop, to prevent the pile head fplitting by the violence of the blows which drive it down. When they are to be driven quite below ground, fmall trees, if fufficiently ftraight, may be ufed without fquaring; but for coffer-dams fquare piles are always ufed, except that for filling up a row between fuch fquare piles. When they are to touch each other, flat ones, called pile planks, are ufed; 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 flips of wood, which make the joints quite tight. To enclofe an area for a coffer-dam, two rows or walls of piles are ufually driven one within the other, at a diftance ufually equal to the depth of water they are driven in, or if the current is rapid, once and a half. The fpace between thefe is filled with clay, fo as to form a mound or rampart of clay, defended on the outfide and infide by wooden walls of piles. To make thefe walls, large fquare piles are firft driven at a diftance of ten or twelve feet afunder, in the line of the intended range of the dam; horizontal tye beams are then extended from one pile to the next, on the infide, each tye being notched into the piles, fo that its outer edge is in a line with the infide of the groove for the plank piles, which are to be driven down to fill up the fpaces between the piles, and will be guided by thefe tyes to ftand exactly vertical, and in a ftraight line. The firft plank piles are begun to be fixed adjacent to the main piles, and thus they proceed from both ends of the fpace between the piles, till the planks meet in the centre, where the laft plank is inferted, and being formed rather wedge-like, makes all the reft tight. The pile planks are cut inclined, or wedge-like on one fide 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, caufes the pile to approach, and prefs very clofe to its neighbour, and it is chiefly by this means they are made to fit water-tight. The fillets are made by fpiking a ledge or ruler of wood faft upon the edge of one plank, and a groove of correfponding depth and width is ploughed in the edge of the adjacent plank to receive it. Many different machines are ufed to drive piles into the ground; fome of them are worked by a great number of men, who raife a heavy weight a fmall height, and let it fall upon the pile, till, by reiterated blows, they drive it to the required depth. The machine employed is extremely fimple. A long thick plank of wood is fixed up clofe to the pile, having a mortife through the upper end, in which a pulley is fitted; a rope goes over this to fufpend the rammer, which is a large block of hard wood, properly hooped, to prevent it from fplitting. In rifing and falling, it flides againft 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 fecured by guy ropes, in the manner of the maft of a fhip; the end of the great rope which fufpends the ram, has ten or twelve fmall ropes fpliced into it, for as many men to take hold, and work it by; they raife 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 caufe the ram to rebound, they take care to pull the ropes inftantly after the blow, that they may avail themfelves of the leap it makes.

This is the fimpleft form of the machine. Others, inftead of a plank, have two upright beams attached together, at fuch a diftance afunder, 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. Inftead of guy ropes, thefe 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, pullies, or windlass, 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, Belidor, also Desaguliers'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 withinside 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 windlass G, on which the rope *d* winds. On the end of the windlass a cog-wheel, *g*, is fixed, and a pinion upon the axis, *h*, engages its teeth. Motion is given to the spindle *h* 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 *h* endways, which disunites the pinion from the wheel, and then the weight of the follower, F, runs back the windlass 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 *h*, 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. Valoue. 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;

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 fit 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 pullies, 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 parallelifm, 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

ſhewn by the dotted line V, *fig*. 6; then by the rack and pinion *f g*, the ſaw is adjuſted 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 C D, 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 h*; 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 *h*. (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 jambs 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

more one; and the product multiplied by one-fixth of the faid number will be the whole fum required.

In fquare piles, each horizontal courfe is a fquare number, produced by taking the fquare of the number in its fide; and the number of fhot in a fquare pile is the fum of all the fquares, taken from one as far as the number in the fides of the bottom courfe. To find the number, count the number in one fide of the bottom courfe; to that number add one, and to its double add one; multiply the two fums together, then their product being multiplied by one-fixth of the faid number, will give the required number of fhot in the pile.

From the exemplification of thefe rules, it would appear, that when room is wanted, it is moft convenient to ftow the fhot in triangular piles; for on the equilateral triangle, which is lefs than half the area of a fquare of one of its fides, there can be piled a greater number than half of thofe that can be raifed on the fquare: and the height of a fquare pile is fomewhat lefs than that of a triangular one; becaufe a fhot will fink lower in the fpace between four others, than between three others, when they are of equal diameter.

In rectangular piles, each horizontal courfe is a rectangle, the upper one being one row of balls; and every fuch oblong pile may be confidered as confifting of two parts, one a fquare pyramid, and the other a triangular prifm. To find the number of fhot in a rectangular pile, take the difference between the number in length and breadth, in the bottom courfe; multiply the number in breadth, more one, by half the breadth; the product multiplied by the faid difference will give the number in the prifmatic pile; upon the fquare of the breadth, find the number in a pyramidal pile; and the fum of thefe two piles will give the number required. See Caliber.

To Pile *Arms*, in *Military Language*, is to place three mufkets with fixed bayonets in fuch a pofition with regard to one another, that the butts fhall remain firm in the ground, and the muzzles lie clofe together in an oblique direction. This method has been adopted to prevent the injury which was formerly done to mufketry, when the cuftom of grounding the firelock prevailed. Every recruit fhould be taught how to pile arms before he is difmiffed the drill.

Pile, *Pila*, in *Coinage*, denotes a kind of puncheon, which, in the old way of coining, with the hammer, contained the arms, crofs, or other figure and infcription, to be ftruck for the reverfe of the fpecies.

Accordingly, we ftill call the arms-fide of a piece of money the *pile*, and the head the *crofs*; becaufe, in the ancient monies, a crofs ufually took the place of the head in our's.

Hence alfo the game of *crofs* and *pile*.

Some will have it called *pile*, *pila*, becaufe on this fide, in our ancient coins, there was an impreffion of a church built on piles. Scaliger, with more probability, derives it from the old French word *pile*, *a fhip*. Vide prima Scaligerana, in voc. Nummus Raticus, p. 115.

In fome ancient writings, *pila* is ufed to fignify the particular figure, or impreffion of money. Thus Fleta: he who brings an appeal of robbery, or theft, againft another, muft fhew the certain quantity, quality, price, weight, number, meafures, value, and pile.

Pile, in *Heraldry*, is an ordinary, in form of a point inverted, or a ftake fharpened; contracting from the chief, and terminating in a point towards the bottom of the fhield, fomewhat 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 fharpened at the point with fteel.

The pile is borne inverted, engrailed, &c. like other ordinaries; and iffues indifferently from any point of the verge of the efcutcheon. He beareth a pile gules, by the name of Chandois.

Pile, in *Rural Economy*, a fharpened piece of wood driven down into the ground, to protect the banks of rivers, or other fimilar purpofes. It fhould be ftrong, and well driven in. See Pile, *fupra*.

Pile, a provincial word applied to the breaking off the awns of threfhed barley.

Pile *of Grafs*, a blade or fmall bit of grafs.

Pile-*Planks*, are planks whofe ends are fharpened, to drive into any canal or water, clofe to each other, in order to form a ftank, by which the water may be ftopped and difcharged. See *Plate* IV. *Canals*, *fig.* 30.

Pile-*Sheeting* is the fame with *dove-tail piling*.

Pile-*Worms*, are a kind of worms found in the piles of the fea-dikes in Holland. Thefe worms are of various fizes: fome 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 thefe creatures were covered with two hard fhells or hemicrania, which together form a figure refembling an auger, and with which they bore the wood. The beft remedy againft them is, to perforate the piles with many fmall holes, about an inch afunder; then it muft be done over with a varnifh in the hotteft fun; and while the varnifh is hot, brick-duft muft be ftrewed over it; and this being feveral times repeated, the pile will be covered with a ftrong cruft, impenetrable to all infects. See a farther account of thefe creatures in Phil. Tranf. N° 455, fect. 5.

PILEÆ, a name given by fome authors to a genus of echinodermata.

PILENTUM, among the Romans, an eafy kind of chariot, ufed by the Roman ladies at games and religious proceffions.

PILES, in *Surgery*. See Hemorrhoids.

Piles, *Liniment for the*. See Liniment.

PILESGROVE, in *Geography*, a town of America, in New Jerfey, and county of Salem, containing 1756 inhabitants.

PILETTUS, in our *Ancient Foreft 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 fignifies any round thing like a ball. "Et quod foreftarii fui non portabunt fagittas barbatas, fed pilettos." Charta Rogeri de Quincy.

PILEUS, in *Roman Antiquity*, was the ordinary cap or hat worn at public fhows and facrifices, and by the freed-men.

It was one of the common rewards affigned to fuch gladiators as were flaves, in token of their obtaining their freedom. See Rudis.

Pileus *Prefbyteri*, in *Botany*, a name given by fome writers to the euonymus or fufanus, a fhrub which grows in our hedges, and bears a fquare fruit, fomewhat refembling the cap worn by fome orders of priefts.

PILEWORT. See Ranunculus.

PILFUNTE, in *Geography*, a town of Abafcia, on the Black fea; 16 miles S.S.W. of Anakopia.

PILGERRUN, or Pilgrim's *Reft*, a Moravian town of Pennfylvania; 140 miles N.W. of Pittfburg.

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 vifit holy places, and to pay his devotion to the relics of dead faints.

The

The word is formed from the Flemifh *pelgrim*, or Italian *pelegrino*, which fignifies the fame; and thefe originally from the Latin *peregrinus*, a *ftranger*, or *traveller*.

The humour of going on pilgrimage anciently prevailed exceedingly, particularly about the time of the croifades. Pilgrimages were moft in vogue after the end of the eleventh century, when every one was for vifiting places of devotion, not excepting kings and princes themfelves; and even bifhops made no difficulty of being abfent from their churches on the fame account. The places moft vifited were Jerufalem, Rome, Compoftella, and Tours; but the greateft numbers reforted to Loretto, in order to vifit the chamber of the bleffed Virgin, in which fhe was born, and brought up her fon Jefus, 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 fame manner tranfported to Loretto, where a magnificent cathedral is built over it. In this chamber is the image of the bleffed Virgin, almoft covered with pearls and diamonds; and round the ftatue there is a kind of rainbow, formed of precious ftones of various colours. Five hundred thoufand pilgrims have fometimes reforted to this houfe in one year, in order to pay their devotions before this glorious image.

Several of the principal orders of knighthood were eftablifhed in favour of pilgrims going to the Holy Land, to fecure them from the violences and infults of the Saracens and Arabs, &c.

Such were the orders of the knights Templars, the knights Hofpitalers, 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 thofe who are fent with the grand feignior's prefents to the tomb of Mahomet.

So ftrictly is this duty enjoined, and fo neceffary 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 Chriftian. For an account of thefe pilgrimages, fee CAABA, CARAVAN, and MECCA.

PILHANNAW, in *Ornithology*, a name given by the Indians to a bird found in the forefts, on the back of fome of our American plantations.

It is a bird of prey, very large and bold. It is defcribed by Joffelin as four times as big as our gofhawk, 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 eaft coaft of Ruffia, in the Penzinfkoi fea; 272 miles E.N.E. of Ochotfk. N. lat. 60° 10'. E. long. 155° 14'.

PILIMICTIO, a word ufed by feveral authors to exprefs a difcharge of fmall and long filaments, which refemble hairs, among the urine.

PILING. See PALLIFICATION.

PILING-*Iron*, a name provincially applied to a tool ufed in breaking off the awns of barley, and fometimes the tails of oats; an operation which with the farmers is called piling barley, and fometimes faultering 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 Pruffian Lithuania; 64 miles E. of Königfberg. N. lat. 54° 45'. E. long. 22° 57'.

PILKOPEN, a town of Pruffia, in the province of Samland, feated on a mountain, where the ancients placed an idol, called "Pilkob," which they worfhipped; 30 miles N. of Königfberg.

PILKINGTON, a townfhip of England, in Lancafhire, 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 Somerfet, on a point of land at the mouth of the Avon, where it joins the Severn at Kingroad, inhabited chiefly by mariners and pilots, who are employed in navigating veffels up the river, and down the Briftol Channel; 12 miles below Briftol.

PILL, *Pilula*, in *Pharmacy*, a form of medicine, taken dry, refembling a little ball; invented in favour of fuch as cannot well take ill-tafted medicinal draughts; as alfo to keep in readinefs for occafional ufe without decaying.

Extracts, when not too hard, may be formed into pills, without any addition; but they are more generally compofed of either vegetable, or earthy, or metallic powders, combined by means of fyrup into a coherent mafs. Salts may alfo be formed into pills, thofe that are deliquefcent excepted; and when efflorefcent falts are ufed, they fhould be firft freed from the water of cryftallization; becaufe the pills formed with uneffloref ced falts, which are apt to effloref ce, fall into powder as they dry. The maffes, which are kept prepared for the formation of pills, fhould be preferved in covered pots, wrapped in bladders, and occafionally moiftened.

No medicine that is intended to operate quickly ought to be made into pills, as they often lie for a confiderable time in the ftomach before they are diffolved, fo as to produce any effect.

Pills are of various kinds, anodyne, fomniferous, laxative, aperitive, hyfteric, antinephritic, &c.; but they are principally cathartic.

The bafis of cathartic pills is ufually aloes; with which are mixed agaric, turbith, hermodactyls, fenna, rhubarb, colocynth. See EXTRACTUM *Catharticum*.

Pills are ufually wrapped up in leaf-gold, wafer-paper, or the like, to prevent their ill tafte being perceived; but as fimple dry powders, as fubcarbonate of magnefia or ftarch, anfwer all the purpofes of this covering, it is now laid afide.

PILLS, *Compound Aloetic*, are to be prepared, according to the directions of the London difpenfatory, by beating together, into an uniform mafs, one ounce of extract of fpiked aloes, half an ounce of extract of gentian, 40 minims of oil of carraway, and a fufficient quantity of fyrup. The aloetic pills of the Edinburgh Pharmacopeia confift of equal parts of Socotorine aloes in powder and foap, beaten with fimple fyrup into a proper mafs for pills. The pills of aloes and ginger of the Dublin Pharmacopeia are compofed of an ounce of hepatic aloes, a dram of ginger-root in powder, half an ounce of foap, and half a dram of effential oil of peppermint: the aloes and the ginger are rubbed together into a powder, and then the foap and oil are added, fo as to form a mafs. Thefe are ufeful pills, and adminiftered with advantage for obviating the habitual coftivenefs of the fedentary, and of leucophlegmatic habits. The dofe is from grs. x to grs. xv, or more.

PILLS *of Aloes and Affafœtida* of the Edinb. Ph., confift of equal parts of Socotorine aloes in powder, affafœtida, and foap, beaten into a mafs with mucilage of gum arabic. Thefe pills are anodyne and cathartic, and have been found ufeful in dyfpepfia, attended with flatulence. The dofe 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 fpiked aloes, of an ounce

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 Ammoniaret of Copper*, of the Edinb. Ph., conſiſt of ſixteen grains of ammoniaret 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, Pilulæ 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, Pilulæ 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 qnantity 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-feeds powdered, and extract of liquorice, one dram, with fyrup, into a mafs.

Pills *of Squill with Ginger*, of the Dublin Pharmacopeia, are compofed of a dram of powder of fquill, two drams of ginger-root in powder, and ten drops of effential oil of anifeed, beaten together and formed into a mafs with jelly of foap.

Thefe pills are ufeful expectorants in chronic catarrh, dyfpnœa, and afthma; and combined with calomel and digitalis in hydropic affections. As the efficacy of the fquill is much injured by keeping in either form, it is perhaps better that it fhould be always given under the extemporaneous form, except when the tincture is ufed. The dofe is from grs. x to ℈j, given three or four times a day. Thomfon's London Difpenfatory. London Pharmacopeia, 1809.

Pills, *Bechic*, a fort of pills good againft coughs, fo call from the Greek, *βηξ*, *cough*. They are alfo called *hypoglottides*, becaufe left like lozenges to diffolve under the tongue.

Pills *de Cochia*. See Cochia.

Pills *of Colocynth with Aloes*, *Pilulæ e colocynthide cum aloe*, a name given in the late London Pharmacopeia to the purging pill, commonly known by the name of *pilulæ cochiæ minores*.

As this is originally a prefcription of Galen, and the manner of proportioning the ingredients has been altered fince his time; the College have ordered it to be made in this manner: take of colocynth, pulp fliced, fix drams; extract of fpike aloe, powdered, one ounce and a half; fcammony gum-refin, powdered, half an ounce; cardamom-feeds, powdered, a dram; hard foap, three drams; and boiling water two pints. Macerate the colocynth pulp in the water for four days, in a gentle heat; ftrain the folution, and add to it the aloe, fcammony, and foap; then, by means of a water bath, evaporate it to a proper confiftence, conftantly ftirring, and about the end of the infpiffation, mix in the cardamom-feeds. This is the "extractum colocynthidis compofitum," P.L. 1787; "extractum catharticum," P.L. 1745; and "pilulæ Rudii," P.L. 1720. See Colocynthis.

Pilulæ e colocynthide fimpliciores, 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 fcammony, with a confiderable proportion of oil of cloves; and is beat up to a confiftence with fyrup of buckthorn.

Pills, *Compofing*, are made by beating together ten grains of purified opium, and half a dram of Caftile foap; the whole may be formed into twenty pills: and one, two, or three, may be taken as occafion requires, when a quieting draught will not fit upon the ftomach.

Pills, *Fœtid*, are prepared by mixing half an ounce of affa foetida with any fimple fyrup. In hyfteric complaints, four or five pills of an ordinary fize may be taken twice or thrice a day. They will alfo be of fervice to perfons afflicted with the afthma; and they may be made opening, if neceffary, by adding a proper quantity of rhubarb, aloes, or jalap, to the above mafs.

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 Caftile foap, Socotorine aloes, and rhubarb, of each one dram, and making them into pills, with a fufficient quantity of fyrup or mucilage. See Jaundice.

Pills, *Mifaubin's*, a preparation of mercurius calcinatus (oxydum hydrargyri rubrum), fuppofed by Mr. Cavendifh (Phil. Tranf. vol. lxxiv. part i. p. 141.) to be the fame with red precipitate, though differently prepared: thefe pills being difpofed to occafion gripes, it has been ufual to add a fmall quantity of opium, and fome warm aromatic material. The dofe is from half a grain to two grains; five or fix grains are faid to vomit and purge violently.

Pills, *Perpetual*, or *Pilulæ perpetuæ*, are regulus of antimony made up in pills; thus called, becaufe being fwallowed and voided fifty times, they will purge every time with undiminifhed force. See Antimony.

Pills, *Plummer's*. See Plummer's *Æthiops*, and Pills *of Submuriate of Mercury*.

Pills, *Purging*. See Pills *of Aloes*, *Colocynth*, &c. fupra.

Purging pills may be made of Socotorine aloes and Caftile foap, of each two drams, and a fufficient quantity of fimple fyrup. Four or five of thefe will generally prove a fufficient purge. For keeping the body open, one may be taken night and morning. They are reckoned both deobftruent and ftomachic, and will be found to anfwer all the purpofes of Dr. Anderfon'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 fufficient quantity of fyrup of ginger; which may be taken as above.

Pill, *Rudius's*. See Extractum *Catharticum*, and Pills *of Colocynth*, &c. fupra.

Pills, *Soap*, *Pilulæ faponaceæ*, a form of medicine prefcribed in the late London Difpenfatory, and ordered to be made in the following manner: take almond foap, four ounces; ftrained opium, half an ounce; effence of lemons, a dram; foften the opium a little with wine, and beat that and the foap with the effence, till it be reduced to the form of a pill. See Opium, and Pills *of Soap*, &c. fupra.

This is intended to fupply the place of a pill commonly called *Matthew's* pill, and is very happily corrected in regard to the tafte of the foap, by the addition of the effence 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 fufficient quantity of fimple fyrup. Three or four of thefe may be taken twice a day, for invigorating the ftomach, and keeping the body gently open.

Pills, *Strengthening*, are made of foft extract of the bark, and falt of fteel, of each half an ounce. In diforders arifing from exceffive debility or relaxation of the folids, as the chlorofis, or green ficknefs, two of thefe pills may be taken three times a day.

Pill, *Ward's*. See Ward's *Pill*.

PILLAGE, among *Builders*, is fometimes ufed for a fquare pillar, ftanding behind a column to bear up the arches; having a round bafe and capital, as a pillar has.

Pillage *Bay*, in *Geography*, a bay on the S. coaft of Labrador. N. lat. 50° 17′. W. long. 62° 58′.

PILLAR, in *Architecture*, a kind of irregular column, round and infulate; but deviating from the proportions of a juft column.

Pillars are always either too maffive, or too flender, for a regular architecture. In effect, pillars are not reftrained to any rules: their parts and proportions are arbitrary. Such, *e. gr.* are the pillars which fupport Saracenic vaults, and other buildings, &c.

A fquare pillar is a maffive work, called alfo pier, or piedroit,

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° 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 saxea*. Phil. Trans. N° 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 Descr. of the East, vol. i. p. 8. and Phil. Trans. 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 justness, 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 chase 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 riding and breaking horses: in lieu of which they

they dug trenches for working their horfes; the fides of the trenches fupplying the want of walls, and producing in a certain degree the fame effect. The famous Pignatelli, of Naples, having no covered manege, worked his horfes in the open air, and ufed to tie them to a tree, and work them round it. Pluvinal, of France, was one of his fcholars; and returning to France, where he profeffed horfemanfhip, he placed a poft or pillar in his manege, in imitation of Pignatelli's tree, and made the fame ufe of it: to this he foon added another of the fame fize and height; which two pillars were calculated to anfwer purpofes different from thofe for which the fingle pillar had been erected: the two pillars are ftill in ufe, and reckoned an effential piece of furniture in all riding-houfes. The fingle pillar has been long difcontinued, but may be employed to advantage upon certain occafions; efpecially where a horfeman undertakes to *longe* a horfe, without the affiftance of another perfon. It fhould be obferved that no horfe ought to be put between the two pillars till he is well fupplied, and has acquired the firft principles of the union between the legs, which are the natural pillars that every horfeman fhould employ. The horfe fhould be gently worked at firft, that he may not become furious, and he fhould be made to go only from fide to fide by means of the fwitch, or from fear of the chambriere. In a few days, when he is accuftomed to the fubjection of the pillars, try to make him infenfibly go into the cords, and endeavour to get from him a ftep or two exact, and in time of the *paffage* or *piaffer*.

The worft effect of the pillars is the hazard you run of entirely ruining the hocks of your horfe, if you do not diftinguifh very exactly between thefe parts and the haunches. Berenger's Hift. and Art. of Horfemanfhip, vol. ii. p. 60. and 164, &c.

Pillar, *Cape*, in *Geography*, a cape at the weftern entrance of the ftraits of Magellan, which is known by a large gap upon the top; and when it bears W.S.W. an ifland appears off it which has an appearance fomewhat like a hay-ftack, and about which lie feveral rocks. The ftrait to the eaftward of the cape is between feven and eight leagues over; the land on each fide is of a moderate height, but it is loweft on the north fhore, the fouth fhore being much the boldeft, though both are craggy and broken. Weftminfter ifland is nearer to the north than the fouth fhore; and by the compafs lies N.E. from cape Pillar. S. lat. 52° 45'. W. long. 75° 10'.

Pillars, in *Ship Building*, are fquare or round columns of timber, fixed perpendicularly under the middle of the beams for the fupport of the decks.

Pillars, *Ropes of two*. See Rope.

PILLAU, in *Geography*, a fea-port town of Pruffia, in the province of Samland, fituated on a tongue of land that projects into the Baltic, at the entrance of the Frifch Haff, with a good harbour; well fortified, and confidered as the bulwark and key of the kingdom. The ftreets are broad and ftraight; and the houfes are built and furnifhed in the Dutch tafte. This harbour is frequented by foreign fhips, and the town is the refort of people of various nations. The fort is nearly a regular pentagon; the baftions exhibit a grand appearance; and all the edifices belonging to the fortifications are ftrong, handfome, and regular. Here is alfo a magazine for military ftores. In the fort there is a church, ferving for both the Lutherans and Calvinifts, and below the gate of the caftle is a ftone equeftrian ftatue of Frederic William the Great. Over the gate, on one fide of the entrance, ftands the image of Mars, in a bold attitude, looking towards Sweden. The peninfula along which the road from Pillau to Fifchhaufen lies, is called the "Paradife of Pruffia," from its pleafantnefs and fertility. Near the fort is a fine plain, where the Frifch Haff forms a fine femicircular bay, that is frequented by a great number of fwans, fea-mews, wild-ducks, and other water-fowl. On the other fide of the bay lies Alt Pillau or Old Pillau, inhabited by fifhermen; 22 miles W.S.W. of Königfberg. N. lat. 54° 37'. E. long. 19° 55'.

PILLE *of Foddray*, or Pile *Fouldery*, in the county of Lancafter; a defence built on a creek of the fea, called *Pille*, by the idiom of the county, for a pile, or a fort, built for the fafeguard or protection of any place.

This pile was erected there by the abbot of Fourneffe, in the firft year of Edward III. Camd. Brit. Rex. "Dedimus Henrico comiti Northum. infulam, caftrum, pelam, & dominium de Man, &c." Rot. Par. 1 Hen. IV.

PILLEER, in *Geography*, a town of Hindooftan, in Myfore; nine miles N.W. of Dalmachery.

PILLERSTORFF, a town of Auftria, on the river Rufbach; eight miles E.N.E. of Korn-Neuberg.

PILLIBEAT, a town of Hindooftan, in Rohilcund; 28 miles N.E. of Bereilly. N. lat. 28° 36'. E. long. 80° 10'.

PILLORY was anciently a poft erected in a crofs road, by the lord, as a mark of his feigniory, with his arms on it, and fometimes with a collar to tie criminals to.

Pillory, at prefent, is a wooden machine, on which certain criminals, as perjurers, &c. are faftened, and expofed to the public derifion.

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 varioufly affigned by different writers: Spelman derives it from the French *pilleur*, *depeculator*; Cowel from πυλη, *janua*, and οραω, *video*; but the etymology of Du-Cange is the moft probable, who derives it from *pila*, *a pillar*.

In the laws of Canutus it is called *healfchang*. Sir Henry Spelman fays it is *fupplicii machina ad ludibrium, magis quam pœnam*. It was peculiarly intended for the punifhment of bakers who fhould be caught faulty in the weight, or finenefs, of their bread. In old charters it is called *colliftrigium*.

The pillory in Paris is in the middle of a round tower, with openings on every fide. It is moveable on an axis, or arbor; round which the executioner gives the criminal the number of turns appointed in court; ftopping him at each opening, to fhew him to the people. It was intended for feveral kinds of criminals, particularly for fraudulent bankrupts; and all thofe who made a ceffion, or furrender, of their effects to their creditors, were obliged to take fome turns round the pillory on foot, with a green cap on.

PILLOW *of a Plough*, a term ufed by the farmers to exprefs that part of a plough which ferves to raife or fink the beam, and with it the fhare, as the land is to be ploughed fhallower or deeper.

This pillow is a crofs piece of wood, reaching from one of the crow-ftaves, or uprights, to the other; and as they are bored with two rows of holes, this pillow can be flipped 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 bowfprit refts at its coming out of the hull aloft, clofe by the ftem.

PILLVENKEGEN, in *Ornithology*, the name of a bird approaching to the fnipe kind; defcribed by Aldrovand, and fuppofed by fome to be the bird we call the *knot*.

PILNAUD, in *Geography*. See Palnaud.

PILNIKAW, a town of Bohemia, in the circle of Koningingratz; 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.

PILOBOLUS, in *Botany*, from πιλος, *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*.

Eff. 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; Dicks. 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 πιλος, *a cover*, and καρπος, *fruit*. Vahl Eclog. v. 1. 29. Willd. Sp. Pl. v. 1. 1133. Mart. Mill. Dict. v. 3.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumosæ*, Linn. *Rhamni*, Juss.

Eff. Ch. Calyx of five leaves. Petals five. Stamens inserted under the germen. 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 *Prunus*, 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 *pile*, *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*s.* 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

the infufficiency of the pilot, the merchant may charge either the mafter or the pilot; and if he charges the mafter, fuch mafter muft have his remedy againft the pilot. Lex Mercator. 70.

Among the French, pilot is alfo ufed for a fteerfman, or an officer on board a fhip, who always watches her courfe, and directs it.

There are among the French two kinds of pilots; the one a coafting pilot, well acquainted with the coafts, ports, roads, bars, fands, &c., and who commands in fight thereof. The other an officer who makes obfervations, and takes altitudes out at fea; ufes the quadrant and fore-ftaff; and alfo watches the compafs.

The pilot is always the fecond perfon in the fhip, whether it be a man of war, or merchant-man. In the former the captain is the firft, the pilot the fecond. In a merchant-fhip, the mafter is the firft, the pilot after him.

The pilot is alfo the fteerfman, who ftands at the helm, and manages the rudder.

PILOTAGE, money paid for piloting a fhip.

PILOTING, in *Navigation*, is either common or proper: common piloting is that art which confifts in coafting along fhore, or failing within fight of land. Proper piloting is the art of failing to diftant places through the ocean, and out of fight of land. See NAVIGATION, PILOT, and SAILING.

PILOTO, or *Salinas del Piloto*, in *Geography*, craggy rocks on the W. coaft of Mexico, S.E. of Cape Corientes, where are good anchorage, and fhelter from N.W. and W. and S.W. winds, and near which are falt-pits.

PILOT-TOWN, a town of America, in Suffex county, Delaware; fix 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 Chinefe Tartary, near the river Hoang-ho; 300 miles W. of Peking. N. lat. 40° 38′. E. long. 108° 43′.

PILPAY, or BIDPAY, in *Biography*, an oriental philofopher, of whofe country, time, life, or works, little is known with any degree of certainty. According to tradition he was the counfellor and vizier to an ancient king of India, for whofe ufe he compofed his famous apologues or fables. Thefe apologues are in the form of dialogues between two animals of a fpecies very like the European fox. The fame of this work having reached Perfia, Chofroes, the king of that country, is faid to have fent his phyfician into India for the fole purpofe of procuring a copy of it. This phyfician, being permitted to perufe it in the library of the Indian king, tranflated it into the ancient Perfian, and gave it the title of the *royal or auguft book.* Such is the account given of Pilpay, and of the introduction of his fables into Perfia. The work itfelf is thought to contain internal evidence of its having been written at a much later period. It has been tranflated into moft of the modern languages; but the beft European verfion is the French one of M. Galland, publifhed in two vols. 12mo. 1714, with relics of the fables of Lokman. The fame writer publifhed the tranflation of another work attributed to Pilpay, entitled "The Shipwreck of the floating Iflands, or the Bafiliad." Enfield's Hift. Phil.

PILSEN, in *Geography*, a town of Hungary, on the river Ipol; 10 miles N.E. of Gran.—Alfo, a well-built and fortified town of Bohemia, and capital of a circle of the fame name, fituated near the conflux of the rivers Miza and Radbuzo. The circle is rich in fheep; and the cheefe 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 Pilfen; five miles S.E. of Pilfen.

PILSNO, a town of Auftrian 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 diftrict, anciently called "the diocefe of Courland;" 12 miles N.N.W. of Goldingen. N. lat. 57° 5′. E. long. 21° 38′.

PILTEN *Lake*, a lake of Chinefe Tartary, 23 miles in circumference; 25 miles S.W. of Nimgouta.

PILULARIA, in *Botany*, from *pilula*, a little ball, or pill, in allufion to the fhape of its receptacles.—Linn. Gen. 561. Schreb. 754. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 1143. Juff. 16. Lamarck Illuftr. t. 862.—Clafs and order, *Cryptogamia Filices*, or perhaps *Monoecia Polyandria.* Nat. Ord. *Filices*, Linn. Juff.

Eff. Ch. Common receptacle globofe, of four cells and four valves, filled with numerous anthers in the upper part, and numerous piftils 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. paluftris juncifolia; Vaill. Par. t. 15. f. 6. Dill. Mufc. 538. t. 79. Pepper-grafs; Pet. Herb. Brit. t. 9. f. 8.)—This, the only known fpecies 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 *ftem* creeps clofe to the ground, with fibrous *roots* fuppofed to be perennial, and throws up many erect, fcattered or clustered, awl-fhaped, fmooth, fimple branches, two or three inches high, each of which unrolls, in the peculiar manner of genuine ferns, or of fome intermediate plants between ferns and palms, as the *Cycas* and *Zamia*, to which, however widely different in dimenfions, the *Pilularia* is perhaps moft allied. Its little blackifh globular *fruits*, or *receptacles*, refembling pepper-corns, are folitary, and nearly feffile, at the bafes of the branches, and are externally downy. Bulliard's figure is excellent.

PILUM, in *Roman Antiquity*, a maffive weapon, which in charge they darted upon the enemy. It was commonly four-fquare, but fometimes round, compofed of a piece of wood three cubits long, and a flip of iron of the fame length, hooked and jagged at the end.

PILWARA, in *Geography*, a town of Hindooftan, 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 πιμελη, *fatnefs*, becaufe 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 manufcripts of the celebrated Solander, and derived from πιμελη, *fatnefs;* in allufion, as it is fuppofed, to the oilinefs of its little oval feed, like an olive in miniature. As there is a Fabrician genus of infects named *Pimelia*, from their corpulent fhape, we wifh to include the idea of an olive, ελαια, in the above word; writing it therefore with a diphthong, to guard againft ambiguity, either in its fenfe or pronunciation.—Sm. Bot. of New Holl. 31. Mart. Mill. Dict. v. 3. Willd. Sp. Pl. v. 1. 50. Vahl. Enum. v. 1.

v. 1: 305. Brown Prodr. Nov. Holl. v. 1. 359. Ait. Hort. Kew. v. 1. 25. Lamarck Illuftr. t. 9. (Bankfia; Forft. Gen. t. 4.)—Clafs and order, *Diandria Monogynia.* Nat. Ord. *Veprecula*, Linn. *Thymelææ*, Juff. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, funnel-fhaped, coloured; tube thread-fhaped, very long; limb fpreading, in four deep fegments, two oppofite ones exterior; mouth naked and pervious. *Cor.* none. *Stam.* Filaments two, capillary, inferted into the mouth of the tube, oppofite to the outer fegments (*Brown*); anthers roundifh, erect, fimple, of two cells. *Pift.* Germen ovate, fuperior; ftyle thread-fhaped, as long as the tube, inferted laterally into the germen; ftyle capitate, fmall, fmooth. *Peric.* a dry, or flightly fucculent, berry, with a thin coat. *Seed* folitary, ovate, obliquely pointed.

Eff. Ch. Calyx funnel-fhaped, four-cleft, coloured, withering. Petals none. Stamens prominent, inferted into the top of the tube. Style lateral. Stigma capitate, fmooth. Seed coated.

Obf. This genus comes neareft in technical characters to *Pafferina*, from which it differs neverthelefs fufficiently, in having but two ftamens inftead of eight, and, if we miftake not, a conftantly fmooth ftigma, inftead of a hifpid one. (See PASSERINA, GNIDIA, and DAPHNE, for remarks on the generic characters of this tribe.) Forfter originally called the genus before us *Bankfia*; but its fpecies having all been reduced, by Linnæus and his fon, to *Pafferina*, a much finer genus was fortunately chofen to commemorate our illuftrious countryman, and the name which he and his friend Dr. Solander had firft contrived for this, is now retained. Of its numerous fpecies we know not how to give any thing more than a comprehenfive idea, nor can we calculate their number with perfect precifion. Willdenow has only four, confifting of our *linifolia*, firft publifhed in the Botany of New Holland, and the three Forfterian *Bankfiæ*, given as *Pafferinæ* in Linn. Suppl. 226, 227. Vahl has added two. Labillardiere defcribes fix more, from the fouth coaft of New Holland. But Mr. Brown has carried our knowledge of this genus far beyond any preceding writer, as he defines thirty-four fpecies of *Pimelæa* from New Holland alone. In thefe are not included the above three plants of Forfter, nor the *virgata* of Vahl, being natives of New Zeeland only; from which country we are poffeffed of three others, given by fir Jofeph Banks to the younger Linnæus, and hitherto, we believe, entirely nondefcript. Thus the known fpecies may be reckoned to amount to forty-one. Of thefe *linifolia* alone is mentioned in the Hortus Kewenfis, as cultivated in Britain. Mr. Brown divides this genus into five fections, of which we fhall give examples.

Sect. 1. *Leaves oppofite. Flowers in a terminal head. Involucrum (or rather four bracteas) unlike the leaves.* Fourteen fpecies.

P. *cornucopiæ.* Vahl. n. 1. Br. n. 1.—Common bractea of one leaf, funnel-fhaped, with four broad acute fegments. Stem herbaceous.—Gathered by fir Jofeph Banks at New South Wales, in 1770. Mr. Brown has met with the fame in the tropical part of New Holland. This is one of the very few herbaceous fpecies, moft of the genus being fhrubby, with the habit of *Daphne* and *Pafferina.* Every part is fmooth. *Branches* flender. *Leaves* an inch long, more or lefs, elliptic-lanceolate, entire as in all the reft of this natural order, of a fine green, minutely dotted. *Flowers* fmall, greenifh-yellow, with a reddifh flender tube about half an inch long. *Stamens* about the length of the rather unequal limb. The head of *flowers* is encompaffed with four broad, acute, green *bracteas*, about its own length, the two outermoft heart-fhaped at the bottom, and all connected by an inverfely conical bafis, of one leaf, refembling 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.—Bracteas ovate, broad, fmooth on both fides, half the length of the head. Tube of the calyx filky. Leaves linear-lanceolate, or partly fpatulate, ftalked, fingle-ribbed.—Native of New South Wales and the ifland of Van Diemen. *Br.* In England it is a green-houfe fhrub, bearing, from February to Auguft, a profufion of elegant, white, but inodorous, *flowers.* The copious ftraight *branches* are clothed with numerous, fmooth *leaves*, about an inch long, variable in breadth. The globular briftly common *receptacle* remains long after the *flowers* and *feeds* are fallen, furmounted by numerous young flowering branches.

Sect. 2. *Leaves oppofite. Head terminal. Bracteas fcarcely different from the leaves.* Fifteen fpecies in Mr. Brown's Prodromus; to which are to be added the New Zeeland fpecies, all of them, as far as we have feen, anfwering to the character of this fection.

P. *drupacea.* Labill. Nov. Holl. v. 1. 10. t. 7. Br. n. 27.—Leaves oval-oblong, flat, flightly downy beneath; floral ones longer than the head. Tube of the calyx cylindrical, deciduous. Fruit pulpy.—From Van Diemen's land. Above fix feet high. Young *branches* hairy. *Leaves* about an inch and a half long; the floral ones two or four, fometimes larger, fometimes fmaller, than the reft. Befides the ufual terminal head of *flowers*, there are feveral fmall, oppofite, 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, fmooth on both fides; floral ones twice as long as the many-flowered head. Calyx externally filky.—Gathered by fir J. Banks at New Zeeland, in 1769. This feems to be a tall and handfome *fhrub*, fmooth in every part except the *flowers*, which are white, externally filky, with elliptical obtufe fegments. *Leaves* willow-like, three inches long, half an inch wide, on fhort broad *footftalks*; the floral ones four, half the fize of the reft, but full twice the length of the flowers.

P. *lævigata.* (P. lævigata β; ibid.)—Leaves ovate, obtufe, concave, fmooth on both fides; floral ones the length of the head. Calyx and young branches filky.—From the fame country. *Stem* apparently procumbent. Young *branches* numerous, clothed with fine, denfe, rather prominent, white, filky hairs. *Leaves* fcarcely above a quarter of an inch long, perfectly fmooth and naked; the floral ones exactly like the reft. *Flowers* many in each head, the length of the leaves, externally finely filky; their fegments broad and rounded.

P. *villofa.* Ibid.—Leaves imbricated, ovate, acute, concave; fmooth above; very hairy beneath; floral ones the length of the head. Calyx and young branches hairy.—From the fame country. This agrees with the laft in fize, but feems more erect, and differs in the long fhaggy, though fhining, pubefcence of the *flowers*, young *branches*, and backs of the *leaves*.

P. *proftrata.* Vahl n. 6. (P. lævigata α; Banks, H. Linn. fil. Bankfia proftrata; Forft. Gen. t. 4. f. *k*—*n*. Pafferina proftrata; Linn. Suppl. 227. Forft. Prodr. 28.)—Leaves elliptical, obtufe, concave, fmooth on both fides; floral ones the length of the head. Calyx and young branches hairy.—Native of dry hills in New Zeeland. Very like the laft but one, though fmaller in all its parts, with elliptical

elliptical rather than ovate *leaves*, fewer *flowers* in each head, and flightly hairy, rather than denfely filky, young *branches*, as well as *calyx*. It is ftill poffible this and *lævigata* may be varieties of each other, as their original difcoverers thought.

P. *pilofa*. Vahl. n. 4. (Bankfia tomentofa; Forft. Gen. n. 2. Pafferina pilofa; Linn. Suppl. 226. Forft. Prodr. 28.)—Leaves lanceolate, obtufe, hairy beneath; floral ones rather ovate, twice the length of the few, lateral or terminal, hairy flowers.—Found in New Zeeland.—*Stem* erect, woody. *Branches* repeatedly forked, fhort, fpreading, filky. *Leaves* about an inch long; lofing their hairs by age.

P. *Gnidia*. Vahl n. 3. (Bankfia Gnidia; Forft. Gen. t. 4. f. *a—i*. Pafferina Gnidia; Linn. Suppl. 226. Forft. Prodr. 28.)—Leaves ovato-lanceolate, acute, ftalked, rigid, channelled, quite fmooth, as well as the branches. Calyx very hairy.—Found in the fiffures of rocks in New Zeeland, near the coaft, as well as on the loftieft mountains. The copious bright-green *leaves*, about an inch long, have the afpect of myrtle. The floral ones rather exceed in length the denfe heads of copious white *flowers*, whofe outfide is very hairy.

Sect. 3. *Leaves oppofite. Flowers fpiked.* One fpecies only.

P. *fpicata*. Br. n. 30.—Leaves oval, fmooth, as well as the calyx. Spikes naked. Flowers polygamous. *Br.*—Found near Port Jackfon, New South Wales. This is a delicate, fmooth, upright fpecies, whofe *leaves* have the afpect of fome *Hypericum* or *Euphorbia*. The *flowers* are of a yellowifh-green, tipped with purple, and are remarkable for forming a fimple corymbofe fmooth *fpike*, at the fummit of each branch. The fegments of the *calyx* are broad and obtufe; tube very flender, quite fmooth.

Sect. 4. *Leaves oppofite. Flowers axillary.* One fpecies.

P. *argentea*. Br. n. 31.—"Leaves lanceolate, filvery on both fides. Flowers from two to four together, axillary."—Gathered by Mr. Brown on the fouth coaft of New Holland. We have feen no fpecimen.

Sect. 5. *Leaves alternate.* Three fpecies.

P. *curviflora*. Br. n. 32.—Leaves elliptic-oblong; fmooth above; fomewhat filky beneath, like the branches, with depreffed hairs. Heads lateral, of few flowers. Calyx filky; tube curved; limb unequal.—Native of Port Jackfon. We have fine fpecimens from fir J. Banks. This is a humble fhrubby fpecies, with thyme-like fcattered *leaves*. The dried *flowers* are of a dull greenifh-brown; their tube externally very filky; fegments of the limb acute, one of them rather longer than the reft.

P. *gracilis*. Br. n. 33.—"Leaves oblong-linear, taper at the bafe; rather hairy beneath; fome of them oppofite on the branches. Heads lateral and terminal, of few flowers. Calyx filky; tube nearly ftraight; limb equal."—Gathered by Mr. Brown in the fouth part of New Holland.

P. *latifolia*. Br. n. 34.—"Leaves oblong; acute and hairy at the bafe; rather filky beneath. Heads many-flowered, fpiked; either terminal and feffile; or ftalked and oppofite to the leaves. Calyx villous."—Found by Mr. Brown in the tropical region of New Holland. We have feen neither of thefe two laft fpecies.

PIMELIA, in *Entomology*, a genus of the Coleoptera order of infects. The generic character is as follows: antennæ filiform; four feelers; thorax plano-convex, margined head exferted; fhells rather rigid; they are feldom found with wings. There are nearly 120 fpecies enumerated by Gmelin, divided into fections, according as their antennæ are moniliform, or entirely filiform; and thefe are fubdivided according to the fhape and ftructure of the feelers.

A. *Antennæ moniliform at the tip.*

a. *Feelers filiform.*

Species.

Striata. Black, glabrous; fhells with four fanguineous ftriæ. It is a native of India. The body is gibbous; antennæ brown at the tip; fhells united, the four ftreaks meeting at the tip.

Unicolor. Glabrous, black; the fhells are marked with three raifed obfolete 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; fhells with an abbreviated lateral line. It is a native of India.

Globosa. Thorax globular and very fmooth; the fhells are fpinous behind. This is a native of the Cape.

Lævigata. Oblong, black; thorax globular; fhells very fmooth, immaculate. It inhabits Hungary.

Glabrata. Ovate, black; thorax globular; fhells very fmooth, immaculate. This is found in divers parts of Germany.

Hispida. Dull black; body rough, with erect ftiff hairs. It inhabits Alexandria.

Longipes. Black; fhells united, muricate; the legs are long. It is a native of feveral parts of Egypt.

Rustica. Thorax globular; grey; fhells with a fingle raifed angular line. It inhabits the Cape of Good Hope.

Muricata. Black; fhells obtufe, with muricate ftriæ. It inhabits fouthern Europe and the Eaft.

Tuberculata. Black; thorax rough; fhells with fubfpinous tubercles. It inhabits divers parts of Italy.

Variolosa. Black; thorax fmooth; fhells with obtufe tubercles; the legs are long. It inhabits the Cape.

Bi-punctata. Black; thorax globular, with two impreffed dots; the fhells are rugged, with three raifed fmooth ftriæ. This is a native of Italy.

Scabra. Black; fhells rough; the antennæ and legs are brown. This is found at the Cape.

Grossa. Black; fhells rough, with three fmooth raifed lines. It inhabits Barbary.

Angulata. Shells fpinous, with a lateral raifed ferrate line. It is a native of Alexandria.

Echinata. Thorax fpinous at the fides; fhells with raifed fpinous lines. It inhabits the Cape of Good Hope.

Dentata. Thorax glabrous; body black; fhells brown, with three raifed ferrate lines. It inhabits the Cape.

Porcata. Thorax fmooth, polifhed; fhells with three raifed lines, the fpaces between are rough, with raifed dots.

Maculata. Thorax black; fhells cinereous, fpotted with brown, with three raifed lines; the fecond flightly waved. It inhabits the Cape.

Serrata. Thorax variolous, fhells with three raifed lines; the interftices are rugged, and the legs long.

Minuta. Thorax fmooth and dufky; the fhells are cinereous and rough, with three raifed fmooth lines.

Rugosa. The thorax of this fpecies rough; the fhells are rugged, and narrower before.

Spinosa. Thorax margined, fpinous before and behind; the

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.

Collaris. 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.

Leucographa. 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 ſubſerrate. 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.

Aurita. 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.

Silphoides. 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. mortiſaga, 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.

* Mortisaga. 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 obſoletely 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.

Sublævigata. 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.

Serratula. 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.

Helopioides. 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 ſerrate 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.

NIGRITA. 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.

HOTTENTOTTA. 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.

LEUCOGRAPHA. 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° 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 officinal preparations are the following; *viz*. Aqua pimenta, 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 "Pimoliſena," in the environs of this river.

PIMP-Tenure, in *Law*, a kind of tenure mentioned in our old writers, "Willielmus Hoppeſhort, tenet dimidiam virgatam terræ, per ſervitium cuſtodiendi ſex damiſellas ſcil. meretrices, ad uſum domini regis." 12 Ed. I.

PIMPELGONG, in *Geography*, a town of Hindooſtan, in the circar of Kitchwara; 15 miles E. of Saurungpour.

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. Dict.

Dict. v. 3. Sm. Fl. Brit. 331. Ait. Hort. Kew. v. 2. 159. Juſſ. 219. Lamarck Illuſtr. t. 203. (Aniſum; Gærtn. t. 23.)—Claſs and order, *Pentandria Digynia.* Nat. Ord. *Umbellatæ.*

Gen. Ch. *General umbel* of numerous rays; *partial* of ſtill more. *General* and *partial involucrum* 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.

Eſſ. Ch. General and partial involucrum 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. diſſecta.* 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. (Saxifragia hircina minor, foliis ſanguiſorbæ; 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; Hudſ. 127. Fuchſ. 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 ſerrated, 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 ſerrated, 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 γ, as differing from his β.

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. Inſt. 305.)—Leaves twice or thrice pinnate, rounded, obtuſe, crenate. Stem panicled. Umbels and ſeeds downy.—Native of ſandy barren places in Portugal. *Brotero.* Loefling 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 pinnate;

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; Columm. 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 laciniated. Germen 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 panicled. 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 panicled, 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 panicled. 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, zigzag, striated, purplish *stem*, divided into many alternate spreading branches. The *umbels* are disposed in a panicled 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 dress.

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 arrets 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 ftate required for being cut into heads: this is done by fhears, every two rounds of the wire making a fingle head. The next procefs is that of heading the lengths, which is done by the operators or work-people taking up a fingle length, and thrufting it among the heads, and then immediately placing it under a heavy weight or hammer; when receiving the neceffary blow, it is made fecure; and thus the pin is completed in the firft ftate. After this it is to be blanched or whitened, which is accomplifhed by putting the pin in a copper, containing tin and the lees of wine. When this is completed, the pin is in a ftate for fale, at the option of the buyer, either in a loofe ftate, or ftuck in paper for the convenience of the confumer.

Some fuccefsful attempts have been lately made by the well-known manufacturers, Meffrs. Durnford, Francis, and Co., of Gracechurch-ftreet, London, for putting on the heads of this very ufeful little article, with greater expedition and uniformity than had been previoufly done by others. We are not at liberty to difclofe the procefs, which is ingenious, practicable, and expeditious; but to every effort for the improvement of this, and of every other article of Britifh manufacture, we cannot but wifh fuccefs.

The perfection of pins confifts of the ftiffnefs of the wire, and its blanching; in the heads being well turned, and the points filed.

The London pointing and blanching are in moft repute; becaufe our pin-makers in pointing ufe two fteel-mills, (which are alfo occafionally ufed in the country,) the firft of which forms the point, and the latter takes off all irregularities, and renders it fmooth, and as it were polifhed; and, in blanching, ufe block tin, granulated: whereas in other parts they ufe a mixture of tin, lead, and quickfilver; which not only blanches worfe than the former, but is alfo dangerous, on account of the ill quality of that mixture, which renders a puncture with a pin thus blanched very difficult to be cured.

The confumption of pins, and the number of artificers employed in the manufacture of them, are incredible. In Paris alone, there were anciently above one thoufand people employed in it; and after the decline of this manufacture in the city, there have been annually fold above fifty thoufand 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 leaft five hundred workmen employed in the pin manufacture; the whole town being peopled with them. Several thoufand perfons are employed in this manufacture, in various parts of our own country. Eftablifhments of this kind are to be found in the Metropolis, Warwickfhire, Gloucefterfhire, Effex, &c.

Notwithftanding that there is fcarcely any commodity cheaper than pins, there is not any one that paffes through more hands before they come to be fold. They reckon twenty workmen fucceffively employed in each pin, between the drawing of the brafs-wire, and the fticking of the pin in the paper.

Pins are diftinguifhed by numeros; the fmaller called from N° 3, 4, 5; thence to the 14th; whence they are only accounted by two to two, *viz.* N° 16, 18, and 20, which is the largeft fize.

Befides the white pins, there are alfo black ones made for mourning, from N° 4, to N° 10. Thefe are ufually of iron-wire.

Laftly, there are pins with double heads, of feveral numeros; ufed by the ladies to fix the buckles of their hair for the night, without danger of being difturbed by their pricking, &c.

The manufacture of both brafs and iron pins is thought by fome perfons to be in a degree injurious to the pointer; as it is imagined he imbibes, in the courfe of fome years, a quantity of the duft which flies off the wire, and which, in that cafe, muft be pernicious. He is alfo liable, from the conftant preffure of his thumb on the ftones, to a weaknefs in it, which not unfrequently renders him incapable of continuing the operation of pointing.

We are forry to learn that the pin manufacture is lefs profperous than it was fome years ago. This decline is partly owing to the diminifhed confumption of this article by our fair country-women, and of courfe partly to the excefs of the quantity made above the regular demand; which has occafioned to the mafter-manufacturer not only an inconvenience, but a difproportionate return of profit for the capital which it employs. Upon the whole, it is thought, that this ufeful clafs of perfons is decreafing in number; and that there are no very encouraging expectations of the manufacture's foon reviving and flourifhing.

The firft mention of pins that occurs in the Englifh ftatute-book, is found in the ftatute of Richard III. in 1483, prohibiting foreign manufactures; and it appears from the manner in which pins are defcribed in a ftatute 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 prefent ingenious and expeditious manner of making them.

One of the articles of the ftatutes of the ancient pin-makers of Paris was, that no mafter fhould open more than one fhop for the fale of his wares, except on new-year's day, and the eve thereof: this we mention in an age of luxury and profufion, to recollect the agreeable fimplicity of our forefathers, who contented themfelves with giving pins for new-year's gifts.

Hence the cuftom of ftill giving the name *pins*, or *pin-money*, to certain prefents, which accompany the moft confiderable bargains; in which it is ufual to give fomething towards the pins of the wife, or children, of the perfon with whom the bargain is ftruck.

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 forts, as axletree-pins, or bolts, bolfter-pins, pole-pins, fwing-tree-pins, &c. Mufket-pins are fmall pieces of iron or wire that faften the ftock.

Pins, *Belaying*, in *Block-making*, are wooden pins, turned in a lathe, made of afh, 16 inches long, and $1\frac{1}{4}$ diameter at the upper end, which is turned as a handle; is $\frac{2}{7}$ths the length, then fhouldered in to $1\frac{1}{4}$ inch diameter.

Pins *of Blocks* are made of lignum-vitæ, or cocus; and fometimes, for common blocks, of green-heart, a wood which is imported from the Weft Indies. The diameter of the pin is the thicknefs of the fheave, and is turned in a lathe, except the head, which is left eight-fquare, to prevent its turning in the block, and is driven through the holes in the block and fheaves. Brafs, iron, and lignum-vitæ fheaves, that are coaked or plated, have iron-turned pins with fquare heads, and fometimes a hole in the point, for a forelock, to prevent their coming out. After the fheaves are fitted, the infide of the fheave-hole, at the arfe of the block, is gouged hollow, to admit the rope, and anfwer with the fheave; and a fmall neat chamfer taken off the edges. See Block.

Pins, in *Ship Building*, are various, according to their feveral 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 Joam II. in many embaſſies of confidence and honour, figned 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, Πινακια, 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 Baramaul, taken and deſtroyed by the Britiſh in 1790; 14 miles W.S.W. of Darempour.

PINANG, the name of the kernel of the areca 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 areca 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 Cœleſyria, 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 Iſſicus.

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. Giſſ. 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 ufe the fingers inftead of the bow, to make the chords of an inftrument found. There are fome chord inftruments which have no bow, and which are played only by pinching, as the lute, guitar, &c. and fometimes thofe with which the bow is generally ufed 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 thefe alloys fhould not be in lefs proportion than two of copper to one of zinc. This is fcarcely malleable. The proportions in all cafes fhould be definite. In the inftance of thefe 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 fee.

PINCHES, 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 fort of pruning, performed by nipping or breaking off the branches or fprings of a plant, or tree, between the nails of two fingers.

Moft gardeners hold, that pinching contributes to the abundance of the fruit, as well as of the branches; and they fay that young fhoots, thus lopped, are lefs apt to grow black and die, than when cut with a pruning-knife.

The feafon for pinching is chiefly in April or May; fometimes it is alfo practifed in June and July. The fruits it is practifed on, are chiefly melons, cucumbers, &c. Quintiny alfo prefcribes it for fruit-trees.

It is chiefly to be practifed on the large branches towards the top of the plant, or tree, which are ufelefs, and yet confume a great quantity of good fap. It muft rarely be employed on the large branches below; which ought always to be preferved for the winter's pruning, that they may yield others the following year, fit to fill the empty places. Nor muft the operation of pinching be performed on the tender fhoots; becaufe, having only juft fap enough for themfelves, when they come to put forth more branches in the place where they are pinched, the fmall ftock of fap allotted them, being divided, will ftarve 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 inftead of one ufelefs, and, perhaps, hurtful wood-branch, a vigorous tree will put forth two or three at the eyes remaining; and the fap being thus divided, the branches will be lefs, and fit for both wood and fruit.

PINCHING, in the *Manege*, is when, the horfe ftanding, the rider holds him faft with the bridle-hand, and applies the fpurs juft to the hairs of his fides, without pricking him.

If the horfe is impatient under this, and draws himfelf up, and wants to go forward, it is a fign of vigour and mettle. But the purchafer ought to try the thing himfelf on the horfe's back; for the jockies have the art of making the dulleft horfe feem to have mettle in thefe trials. The purchafer muft alfo diftinguifh between the reftleffnefs of the horfe under this treatment that arifes from vigour, and that which arifes from the horfe's being ticklifh, and which goes off immediately.

Pinching is accounted an aid, fpurring a chaftifement or correction.

PINCHUGA, in *Geography*, a town of Ruffia, in the government of Tobolfk. N. lat. 58° 20'. E. long. 96° 54'.

PINCKNEY, an ifland on the coaft of South Carolina.—Alfo, a diftrict, formerly of the upper country of South Carolina, now divided into the diftricts of York, Chefter, Union, and Spartanburgh.

PINCKNEYA, in *Botany*, fo named by Michaux, (we are not refponfible for the orthography,) in honour of one of his friends or patrons in America, probably Mr. Pinkney, once envoy to the Britifh court; but nothing is recorded on the fubject, either in the Flora of Michaux, or in the account of his life, where this tree is mentioned, (fee Sims and Konig's Ann. of Bot. v. 1. 333,) as ufed 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. Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, in five deep acute fegments, one (rarely two) of which is dilated into a large coloured leaf, deciduous. *Cor.* of one petal, funnel-fhaped; tube thrice as long as the ordinary fegments of the calyx, five-fided; limb in five deep, revolute, obtufe, nearly equal fegments, half the length of the tube. *Stam.* Filaments five, awl-fhaped, equal, inferted into the tube near its bafe, fhorter than the limb; anthers oblong, incumbent. *Pift.* Germen inferior, roundifh-oblong; ftyle the length and form of the ftamens; ftigma thickifh, in two obtufe lobes. *Peric.* Capfule globofe, flightly compreffed, with a furrow at each fide, cartilaginous, thin, coated, of two cells and two valves, the partitions from the centre of each valve. *Seeds* numerous, horizontal, oval, depreffed, with a membranous orbicular wing. *Receptacle* central, angular.

Eff. Ch. One fegment of the calyx very large, leafy. Corolla funnel-fhaped, five-cleft. Stamens prominent. Stigma bluntly two-lobed. Capfule 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 Frafer in 1786. It is a greenhoufe plant, flowering in June and July. We are obliged to Mr. Frafer for fine fpecimens in flower and feed. Others are found in the herbarium of the younger Linnæus, which muft have been collected before Michaux vifited America, and we fufpect they were fent by Bartram. This is a very handfome *fhrub*, or fmall *tree*, with oppofite downy *branches*. *Leaves* oppofite, on downy ftalks, oval, acute at each end, entire, a fpan long; naked, but roughifh above; paler and rather downy beneath. *Stipulas* between the footftalks, fmall, acute, deciduous. *Panicles* terminal, corymbofe, many-flowered, downy, as well as the *calyx*, and outfide of the *corolla*. *Flowers* an inch long, pale, ftreaked with purple. Their moft confpicuous part is the large, oval, whitifh, downy, leafy expanfion, which takes the place of one fegment of the *calyx*, as in the firft and fecond fpecies of MUSSÆNDA; fee that article. The *capfule* is as big as a large goofeberry, of a rigid, cartilaginous, but thin texture, with a deciduous fkin. This genus is intermediate between *Cinchona* and *Muffænda*, but feems fufficiently diftinct in its fruit from the former; as it unqueftionably is from the latter, with which the habit moft agrees. The name of *Bartramia* was deftined for it, the original *Bartramia* being a *Triumfetta;* but there is now a very fine and diftinct genus of moffes eftablifhed under this appellation. See MUSCI.

PINCKNEYVILLE, in *Geography*, a poft-town of South Carolina, and capital of Union diftrict, on the S.W. fide of Broad river, at the mouth of Pacolet, containing a handfome work-houfe, a gaol, and a few compact houfes; 75 miles N.W. of Columbia.

PINCOS,

PINCOS, a town of Peru, in the diocefe of Lima; 15 miles S. of Xauxa.

PINCZESTI, a town of European Turkey, in Moldavia; 28 miles S.W. of Jaffy.

PINDA, a fea-port town of Africa, in the kingdom of Congo, on the left fide of the Zaire; 125 miles W.S.W. of St. Salvador.—Alfo, a river of Africa, which runs into the Indian fea, S. lat. 13° 28′.

PINDALA, a town of Hindooftan, in Tellingana; 15 miles S. of Warengole.

PINDAMAHA, a town of Brafil, in the government of St. Paul; 80 miles N.N.E. of St. Paul.

PINDAR, in *Biography*, the moft famous lyric poet of ancient Greece, was a native of Cynofcephalæ, 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 inftructors, he was chiefly indebted to his own exertions and genius for his peculiar excellencies. His chief patrons were Theron of Agrigentum and Hiero of Syracufe, whom he has commemorated in his poems. He celebrated the city of Athens in fuch lofty terms, as greatly to excite the difpleafure of his countrymen the Thebans, who, on that account, impofed a fine upon him, which the Athenians not only doubly repaid, but erected a ftatue to his honour. His reputation was fo great, that we find he was rewarded in the public affemblies of Greece with the prize, in preference to every other competitor; and as the conquerors at Olympia were the fubjects of his compofitions, the poet was courted by ftatefmen and princes. His hymns and pæans were repeated before the moft crowded affemblies in the temples of Greece; and the prieftefs of Delphi declared that it was the will of Apollo that her chief poet fhould receive half of all the firft-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 refpect, even to adoration. His ftatue was erected at Thebes in the public place where the games were exhibited, and, fix centuries after, it was viewed with the utmoft fenfations of pleafure and admiration by the geographer Paufanias. The honours which were paid him while alive were alfo fhared by his pofterity, and as a mark of their high attention and reverence, at the celebration of one of the feftivals of the Greeks, a portion of the victim which had been offered in facrifice was referved for the defcendants of the poet. Even the moft inveterate enemies of the Thebans fhewed a regard for his memory, and the Spartans fpared the houfe which the prince of the Lyrics had inhabited, when they deftroyed the houfes and the walls of Thebes. The fame fort of refpect was likewife paid him by Alexander the Great, when Thebes was reduced to afhes. He died in the public theatre at an advanced age, about the year 440 B.C. The greateft part of his works has perifhed. He had compofed fome hymns to the gods, poems in honour of Apollo, dithyrambics to Bacchus, and odes on feveral victories obtained at the four greateft feftivals of the Greeks, the Olympic, Ifthmian, Pythian, and Nemean games. Of all thefe the odes are the only compofitions extant, admired for fublimity of fentiments, grandeur of expreffion, energy and magnificence of ftyle, boldnefs of metaphors, harmony of numbers, and elegance of diction. In thefe odes, which were repeated with the aid of mufical inftruments, and accompanied by the various inflections of the voice, with fuitable attitudes, and proper motions of the body, the poet has not merely celebrated the place where the victory was won, but has introduced beautiful epifodes, and by unfolding the greatnefs of his heroes, the dignity of their characters, and the glory of the feveral republics where they flourifhed, he has rendered the whole highly beautiful, and in the greateft degree interefting. Horace has called our poet inimitable, and this panegyric will not, perhaps, appear too ftrong, fince fucceeding critics have agreed in extolling his beauties, his excellence, the fire, the animation and enthufiafm of his genius. Horace refers likewife to his pathetic and moral commemorations of departed excellence. It was probably in ftrains of this kind by which he acquired the epithets of *wife* and *divine* from Plato. Dionyfius of Halicarnaffus fpeaks of Pindar as the chief model among the lyric poets of what he denominates "fevere and antique harmony," and he alfo extols his loftinefs, energy, fertility, art, and ftrength of diction mixed with fweetnefs. Quintilian repeats thefe praifes, but Longinus reprefents him as fometimes, when glowing with the brighteft flame, undergoing a fudden extinction; and a more modern critic feems to join iffue with the author of the "Sublime:" fpeaking of his odes, he fays they have indeed thofe characteriftics of fire, rapidity, and variety, for which he is fo much celebrated by the critics of antiquity, but that fire is frequently obfcured in fmoke, and that variety is produced by digreffions fo excurfive, that it is often fcarcely poffible to follow him, and trace their relation to his propofed fubject." The beft editions of this poet are thofe of Heyne, Gr. et Lat. Gotting. 1773, 1798; the latter, which is in octavo, contains the Greek fcholia. Moreri. Bibliogr. Dict.

PINDARIC, in *Poetry*, an ode formed in imitation of the manner of Pindar.

The Pindaric manner is diftinguifhed by the boldnefs and height of the flights, the fuddennefs and furprifingnefs of the tranfitions, and the feeming irregularity, wildnefs, and enthufiafm, of the whole.

Pindar, whence the manner takes its name, was of Thebes: he flourifhed about four hundred and fixty-eight years before Chrift, and was contemporary with Æfchylus. What we have remaining of his is a book of odes, all in praife of the victors at the Olympian, Pythian, Nemæan, and Ifthmian games; whence the firft is entitled, the *Olympians;* the fecond, the *Pythians;* the third, the *Nemæans;* and the fourth, the *Ifthmians.* Pindar is full of force and fire; his thoughts are fententious, his ftyle impetuous, his fallies daring, and frequently running, as it were, at random; he affects a beautiful diforder, which, yet, is faid to be the effect of the greateft art. See the preceding article.

As the fubject which engaged his attention comprehended the praifes of thofe who had gained the prize in the public games, it was neceffarily very barren; and therefore he is perpetually digreffive, and fills up his poems with fables of the gods and heroes, that have little connection either with his fubject or with one another. Many of the hiftories 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 fo obfcure to modern readers, partly from his fubjects, and partly from his rapid abrupt manner of treating them, that, notwithftanding the beauty of his expreffion, our pleafure in reading him is very much diminifhed.

The fuppofed irregularity of his numbers has made feveral of his imitators imagine themfelves Pindaric poets, by the mere wildnefs and irregularity of their verfes. None of our writers feem to have fucceeded in the Pindaric character better than Cowley.

In a Pindaric ode, the plan of the whole ought to be drawn firft, and the places marked out where the elegant fallies

fallies and wanderings may beft be, and how the returns may be juftly made to the fubject. See Ode.

PINDING, a difeafe among lambs which are in the ftate of fuckling. Thefe animals, before they begin to eat grafs, are liable to have a difcharge from the bowels of a tough, glutinous, adhefive quality, which is apt to ftick to the tail and buttocks, and when hardened by the fun, fometimes to glue them together in fo clofe and firm a manner, as to prevent all poffibility of their having any evacuations, and thereby foon to mortify and burft the inteftines. The complaint is difcovered in an eafy manner, by the lambs appearing fwelled and fick, with the upper and middle parts of their tails clofely glued down, and they are as readily cured, by feparating their tails from their buttocks, when the retained excrement will be difcharged with a difagreeable fmell. And the immediate recurrence of it will be prevented by rubbing the parts over with fand, friable clay, mud, or, what is better, a little tallow. But they muft be well looked after for eight or ten days, until they begin to eat grafs, when all danger from thefe obftructions is over. It is faid to be moft dangerous when the ewes are in high condition, and the feafon dry and backward; and feldom or ever to appear when the mothers are lean, and the weather difpofed 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 Afia, in Syria, fituated on the mountains, near the fmall river Singas, on the W. fide of the Euphrates, S.W. of Samofata.—Alfo, 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 Theffaly, extending to the S.W., confecrated to the Mufes. This chain extended alfo towards Epirus, and was inhabited by the Atthamanes, the Æthices, and the Perrhæbians.—Alfo, a town of Greece, in the Doride, placed by Strabo on the banks of a river of the fame name, which difcharged itfelf into the Cephifus. It is alfo called "Ciphus" by fome authors. It was within the territory of this town that the Hellenes, driven from the Hifteiotide by the Cadmæans, went to eftablifh themfelves, according to Herodotus.

PINE, in *Botany*, &c. See Bromelia and Pinus.

Pine, in the *Materia Medica* and *Rural Economy*. Although moft fpecies of fir poffefs in common the fame medicinal properties, and all agree in affording the different products of the turpentine kind, yet fome fpecies produce thefe different articles in greater purity, and in more abundance, than others. From the wild pine, Pinus fylveftris, pinafter, or Scotch fir-tree, is obtained moft plentifully the pix liquida, or tar, and from it may alfo be procured the common turpentine, and the white and yellow refins. The manner in which the tar is procured is by cutting the tree into pieces, and then enclofing them in a large oven conftructed for the purpofe, with a channel at the bottom. A fufficient 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 procefs which is denominated "diftillatio per defcenfum."

Upon an incifion being made into the bark of the Pinus abies, or Norway fpruce fir-tree, a clear tenacious fluid iffues, which concretes into a refinous fubftance, known by the name of "refina abietis." This, after being boiled in water, and ftrained through a linen cloth, is called in the Pharmacopeias "pix Burgundica," or Burgundy pitch. But if the boiling of the native refin is continued till the water is wholly evaporated, and wine vinegar is at this time added, a fubftance is formed, called "colophonium;" which fee. See alfo *Burgundy* Pitch.

Linnæus, and feveral other writers in the Materia Medica, refer the common turpentine to the "pinus fylveftris;" and the "Terebinthina argentoratenfis," or Strafburgh turpentine, to the "Pinus picea," or filver fir-tree; yet upon the authority of Murray, who follows Du Hamel and Haller, Dr. Woodville afcribes the "Terebinthina vulgaris" to the latter pine, which pours out the turpentine fo freely, that it is feldom neceffary to make incifions through the bark for the purpofe.

The "Terebinthina Veneta," or "larigna," as it may be more properly called, (becaufe we are not wholly fupplied with this article by the Venetians,) iffues fpontaneoufly through the bark of this tree, but is more commonly obtained by wounding the bark at the diftance of about two feet from the ground, and inferting in the wood a fmall cannula, through which the turpentine flows into proper veffels, which are placed for its reception.

We may here obferve farther, and more generally, that pitch, tar, refin, and turpentine, are all made from thefe trees by a very familiar procefs. In the fpring time, when the fap is moft free in running, they pare off the bark of the pine-tree, to make the fap 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 refin and turpentine in ufe, and it is generally fold to be ufed in the making of flambeaux, inftead 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 bafket; a great part of this immediately runs through, and this is the common turpentine. This is received into ftone or earthen pots, and is ready for fale. The thicker matter, which remains in the bafket, they put into a common alembic, and adding a large quantity of water, they diftil this fo long as any oil is feen fwimming upon the water; this oil they feparate from the furface in large quantities, and this is the common oil or fpirit of turpentine: the remaining matter at the bottom of the ftill is common yellow refin. When they have thus obtained all that they can from the fap of the tree, they cut it down, and hewing the wood into billets, they fill a pit dug in the earth with thefe billets; and fetting 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 fets the whole quantity of the tar on fire; but if fmall 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 veffels, without adding any thing to it; it is then fuffered to boil a while, and being then let out, is found, when cold, to be what we call pitch. Phil. Tranf. N° 243. p. 291.

In a medical point of view it may be remarked, that the kernels of the nuts of the manured or ftone pine, are of a balfamic and nourifhing nature; good for confumptions, coughs, and hoarfenefs, reftorative, and of fervice after long illnefs.

The leaves and tender tops of pines and fir are ufed for diet-drinks, and allowed to be antifcorbutic and diuretic See Chowder-*beer*.

The refinous exudations of pines or firs are an important branch in the materia medica, and not only ufeful in the prefcriptions of phyficians, but have alfo been thought otherwife wiſe 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 turpentines 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 ſcites. 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 ſtinted 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, inſomuch, 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 ſlaty 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, 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 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 ſcites. In deep, ſub-humid vallies, are to be found thoſe moſt ſtately in this country. They require full ſpace; otherwiſe they become very unſightly, 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) fragrancy.

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 ſhanks; 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

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 outſides, 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 ſawn 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 colour, 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 Suſquehannah, N. lat. 41° 11′. W. long. 77° 22′.

PINE *River*, a river of America, which runs into lake Huron, N. lat. 45° 42′. W. long. 84° 25′.—Alſo, a river of America, which runs into the Wabaſh, N. lat. 40° 15′. W. long. 87° 18′.—Alſo, a river of Canada, which runs into lake Huron, N. lat. 44° 44′. W. long. 80° 26′.

PINE *Iſland*, a ſmall iſland in the gulf of Mexico, near the ſouth coaſt of Weſt Florida. N. lat. 30° 18′. W. long. 88° 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 sought 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 Monarquia 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 Paso 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 Luisa 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° 37′ E. long. 2° 35′.

PINEG, a town of Russia, in the government of Archangel, on the Pinega; 48 miles E. of Archangel. N. lat. 64° 30′. E. long. 41° 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 sive pergatorii*, *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 Acosta, 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 Acosta 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, gross, 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 gross 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 jatropha, 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

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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° 12'. W. long. 80° 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° 30'. W. long. 83° 25'.

PINES, *Bay of*, a bay on the coast of West Florida. N. lat. 30° 20'. W. long. 88° 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° 38'. E. long. 167° 38'.

PINET, ANTHONY DU, in *Biography*, lord of Norroy, who flourished in the 16th century, was a native of Besançon in the Franche Comtè, 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 kiliometres, in 13 communes.

PING-CHAN, a city of Corea; 35 miles S. of Hoang-tcheou.

PING-CHAN-PO, a small island, with a town, near the S. coast of Corea. N. lat. 34° 8'. E. long. 126° 22'.

PING-HAI, a town of Corea; 115 miles S.E. of King-ki-tao. N. lat. 36° 47'. E. long. 128° 41'.

PING-ING, a town of Corea; 40 miles S. of Koang-tcheou.

PING-KING, a city of China, of the first rank, in Koei-tcheou. N. lat. 26° 38'. E. long. 106° 56'.

PING-LIANG, a city of China, of the first rank, in Chen-si. N. lat. 35° 35'. E. long. 106° 18'.

PING-LO, a city of China, of the first rank, in Quang-si. N. lat. 24° 22'. E. long. 110° 4'.

PINGNAVIR, a town of Africa, in Querimba. S. lat. 11° 55'. E. long. 41° 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 rouud 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 interefts of geographical and aftronomical knowledge, having with him, as the companion of his purfuits, the chevalier de Borda, a celebrated engineer and geometrician; the account of their proceedings, obfervations, and experiments, was publifhed in 1778, in two vols. 4to. In 1784, M. Pingrè publifhed his Cometography, or hiftorical and theoretical treatife on Comets, in two vols. 4to., which is his moft confiderable work, and contains calculations of the orbits of all the comets of which an account has been preferved. After a long life fpent in the moft important fervices to the world, he died in the month of May 1796, leaving behind him a high character for integrity, having enjoyed the efteem of the public as well as that of his friends. He was author of many other works befides thofe 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 reftrain pinguedo only to that humid foft kind of fat found in animals, next under the fkin. See ADEPS.

PINGUICULA, in *Botany*, the diminutive of *pinguis*, fat, which alludes to a peculiar appearance of greafinefs upon the leaves; whence arofe the Englifh name of Butterwort, and the French one of Graffette, for the plant in queftion.—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. Juff. 98. Lamarck Illuftr. t. 14. Gærtn. t. 112.—Clafs and order, *Diandria Monogynia.* Nat. Ord. *Corydales*, Linn. according to his own opinion, but we fhould rather have referred it to his *Perfonatæ;* akin to *Lyfimachiæ*, Juff. rather to his *Pediculares;* the flower agrees beft with the latter, the fruit with the former. Its proper place however is in the new order of *Lentibulariæ*, founded by Richard, and adopted in Brown's Prodr. Nov. Holl. v. 1. 429.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, fmall, permanent, ringent; upper lip erect, three-cleft; lower reflexed, divided. *Cor.* of one petal, ringent; its border more or lefs equally five-cleft. Nectary a fpur, elongated from the bafe of the petal behind. *Stam.* Filaments two, cylindrical, curved upwards, fhorter than the calyx; anthers roundifh, clapped clofe to the ftigma. *Pift.* Germen fuperior, globofe; ftyle very fhort; ftigma two-lipped, the upper lip larger, flat, reflexed, covering the anthers, the lower very narrow, erect, cloven, fhorteft. *Peric.* Capfule roundifh or ovate, burfting at the top by two valves, with one cell. *Seeds* numerous, cylindrical. *Recept.* central, unconnected.

Eff. Ch. Corolla ringent, fpurred. Calyx two-lipped, in five fegments. Stigma two-lipped. Capfule fuperior, of one cell, with many feeds.

1. P. *lufitanica.* Pale Butterwort. Linn. Sp. Pl. 25. Engl. Bot. t. 145. (P. villofa; Lightf. Scot. 77. t. 6. Viola paluftris, Pinguicula dicta, lufitanica; Grifl. Virid. 84.)—Nectary obtufe, fhorter than the nearly regular petal. Flower-ftalk hairy. Capfule globofe.—Native of Portugal according to Grifley, whofe plant we have verified. It is found alfo on the borders of bogs in Dorfetfhire, Hampfhire, Devonfhire, and Cornwall, as well as in the weft of Scotland and Ireland. It is perennial, flowering in June and July. Like all the reft of its genus this herb is deftitute of a *ftem*, the *leaves* being radical, fpreading, ovate, obtufe, vifcid, pale with red reticulated veins; their edges involute. *Stalks* feveral, erect, fimple, flightly hairy, three or four inches high, each bearing an elegant little *flower*, whofe limb is of a pale lilac, in five nearly equal, emarginate fegments, the tube yellow, ftreaked with red, hairy at the mouth. *Stigma* very unequally two-lipped, concave. *Capfule* exactly globular. The fhape of the part laft mentioned affords excellent fpecific characters in this genus, but is not uniform enough in all to enter into the generic defcription.

2. P. *cryftallina.* Cryftalline Butterwort. Sm. Fl. Græc. Sibth. v. 1. 8. t. 11.—Nectary obtufe, fhorter than the very irregular fix-cleft petal. Segments of the calyx oblong. Flower-ftalk fmooth at the bafe.—Gathered by Dr. Sibthorp and Mr. Ferdinand Bauer, in watery places near Camandria, in the ifle of Cyprus. Differs from the former in its uniformly glaucous *leaves*, unmarked by red veins, but diftinguifhed by a glandular cryftalline clothing like the ice-plant. The *flowers* are fimilar in colour to *P. lufitanica*, but very different in ftructure; the fegments of their *calyx* being almoft linear, not broadly ovate; and the limb of their *corolla* diftinctly two-lipped, its upper lip fhort, in two divaricated lobes, the lower much broader and longer, in three lobes, the middle lobe deeply cloven. The *germen*, and probably the *capfule*, is globofe.

3. P. *vulgaris.* Common Butterwort. Linn. Sp. Pl. 25. Fl. Dan. t. 93. Engl. Bot. t. 70. (P. five Sanicula Eboracenfis; Ger. Em. 788.)—Nectary cylindrical, acute, as long as the very irregular five-cleft petal. Segments of the calyx oblong. Capfule ovate. Common on the bogs of Europe, flowering with us in May and June. Larger than either of the foregoing. The tube and fpur of the *corolla* are pale purple, but the limb is deep blue, in five rounded fegments, of which the two uppermoft are much the fmalleft, the lower central one the largeft, all of them entire. The vifcid fubftance, found on the leaves, is faid to be ufeful to anoint the dugs of cows when fore or injured; at leaft fuch is the report of old Gerarde, and hence came the name of Yorkfhire 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. Illuftr. 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, obtufe. Capfule ovate.—Native of France and Ireland. It was difcovered by Mr. Drummond, curator of the botanic garden at Cork, in marfhy ground in the weft 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* alfo twice the fize of that fpecies, on ftronger more vifcid *ftalks*. *Corolla* much more equally divided, and particularly diftinguifhed 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. fafc. 2. 71. t. 4. f. 4.—Nectary conical, deflexed, fhorter than the tube of the very irregular five-cleft petal. Capfule oblong, beaked.—Native of the alps of Lapland, Switzerland, and Auftria, flowering in June, earlier in that country than the *vulgaris*, according to Gunner. It is like that fpecies in foliage, but rather fmaller, and effentially different in *fpur* and *capfule*. The *corolla* is white, with a yellow palate; its fegments very unequal, rounded, undivided.

6. P. *villofa.* Little Hairy Butterwort. Linn. Sp. Pl. 25. Fl. Lapp. ed. 2. 12. t. 12. f. 2. Lapland Tour, v. 1.

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 pinguin, 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° 12′, long. 38° 14′ eaſt. It lives much at ſea; the wings act as fins; it burrows on land, and is analogous to ſeals. The name pinguin 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 pinguin, diomedea demerſa of Linnæus, or anſer Magellanicus of Cluſius. And, 3. The red-footed pinguin, 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. lviii. art. 14. See ALCA and APTENODYTA.

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° 33′. W. long. 6° 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 cheſnut 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 ſcoriaceous globule; and with microcoſmic ſalt, it makes a tranſparent opaleſcent glaſs. It conſiſts of

Alumine

Alumine	63.75
Silica	29.50
Oxyd of Iron	6.75
	100.00

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 APHYLLANTHES.

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 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 to 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 fide flightly wrinkled tranfverfely. There is a variety of this fpecies. They are both found in the Indian ocean; the *firft* is about three inches long and four broad; the fhell is triangular, horny. The *fecond* is four and a half inches long, two and a half broad, thinner and more rare.

Nobilis. Shell ftriate, with fcales. There are four varieties of this fpecies. They are found in the Mediterranean, Adriatic, and American feas. The fhell of this fpecies is feven inches and a half long, and three and a half broad: it is brown, the exterior margin rounded; the fcales are larger towards the edges, and near half an inch long; one-half of the valves is ribbed, the other has tranfverfe wrinkles, which at the broader part are croffed with ftriæ.

* Muricata. Shell ftriate, with concave, ovate, acute fcales. This is defcribed and figured in Mr. Donovan's Britifh Shells; it is the P. fragilis of Pennant. It is a native of the European and Indian feas, is from three to nine inches long, and one-third as broad; the fhell is thin, brittle, pellucid, and horny; the outfide is formed with longitudinal ribs, rough with rows of fmall prickles.

Rotundata. Shell with obfolete fcales, the margin rounded. It inhabits the Mediterranean; it is fometimes above two feet long; the fhell is oblong, whitifh, with perpendicular, undulate, parallel wrinkles, and very fine, concave, acute, fcattered fcales on the broader part.

Squamosa. Shell with very fine undulate fcales, and flexuous broad wrinkles; the fmaller end is pointed and naked. It inhabits the Mediterranean, is about thirteen inches long, and half as broad. In colour it is a little chefnut at the larger end, and whitifh at the fmaller one; the external margin is angular.

Carnea. Shell thin, flefh colour, naked, longitudinally grooved; the external margin is acute and rounded. Its habitation is not known; it is fometimes varied with white fpots.

Succata. Shell fmooth, fatchel-fhaped, and a little erect. It inhabits the Mediterranean and Indian feas; is five and a half inches long, and half as broad; the fhell is thin, above it is reddifh, beneath whitifh, above flat, with a rounded margin, beneath gibbous, without fcales, but marked with ten broadifh, longitudinal ftriæ.

Digitiformis. Shell fmooth, tubular, finger-fhaped, incurved, the extreme margin membranaceous. It is a native of India. The fhell is flattifh, oblong, and pellucid.

Lobata. Shell naked, lobed. Found in India. The fhell is of a ftraw colour, with purple ftriæ, membranaceous and heart-fhaped when the valves are open. The lateral lobes rounded and broader, with a fort of nerve from the hinge to the lobes, and from the nerve there are lateral lines.

Vitrea. The fhell of this fpecies is hyaline, with longitudinal ftriæ, the ftriæ with a few fcales, are croffed by other tranfverfe ftriæ at the margin. It inhabits the Indian ocean, but is very rare.

Incurva. Shell narrow, long, naked, carinate, with tranfverfe undulate wrinkles. It inhabits the Indian ocean; pale horn colour, curved at the hinge, and marked with a few longitudinal ftriæ.

Bicolor. Shell thin, inflected at the lateral margin, yellowifh, with black-brown rays; with a few longitudinal ftriæ. It inhabits the Red fea. It is of a horn colour, long, with a few tranfverfe curved ftriæ at the margin, the larger end is rounded.

Exusta. Shell flattifh, horny, with blackifh rays, fpots, and clouds, and many fmooth ftriæ. It is rare, but fometimes found in the fouthern ocean of India.

Vexillum. Shell truncate at the outer margin, dilated, naked, horny, with a few black clouds; longitudinally ftriate on the fore-part, and tranfverfely wrinkled behind. It inhabits India, and is extremely rare. The fhell appears as if it were winged, with a curved lateral margin.

Papyracea. Shell very thin, brittle, horny, with longitudinal ribs, the extreme margin roundifh. This is a native of the Indian ocean: the back of the ribs is fometimes fcaly; in the middle of the fhell is a violet-brown fpot, and a few tranfverfe wrinkles at the lateral margin.

Sanguinea. Shell flattifh, and flightly incurved: it is red, with a few perpendicular fmooth ftriæ. The fhell is three inches long: it is probably a variety only of fome other fpecies.

Bullata. The fhell of this fpecies is very ftraight, thin and perpendicularly ftriate, with tranfverfe fpinous wrinkles at the lower margin. This, like the laft, is thought not to be a diftinct fpecies.

Pinna *Auris*, in *Anatomy*. See Ear.

Pinna *Nafi*, is the fame as ala nafi. See Nose.

PINNACE, a fmall veffel, navigated with fails and oars, and carrying generally two mafts; chiefly ufed as a fcout for intelligence, and for landing of men.

One of the boats belonging to a great man of war, ferving to carry the officers to and from the fhore, is alfo called the pinnace. It refembles a barge, but never rows more than eight oars, whereas a barge properly never rows lefs than ten. Pinnaces are for the accommodation of lieutenants, &c. as barges are for admirals, and captains of fhips of war.

PINNACLE, from *pinna*, or *pinnaculum*, in *Architecture*, the top or roof of a houfe, 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 rife.

Pinnacle *Ifland*, in *Geography*, an ifland in the North Pacific ocean, fo named by Capt. Cook from the termination of its elevated fummit in feveral pinnacle rocks. N. lat. 60° 25′. E. long. 186° 40′.

Pinnacle *Point*, a cape on the S.E. coaft of Alafhka, fo called by Capt. Cook in 1778. N. lat. 55° 10′. E. long. 198° 5′.

Pinnacle *Iflands*, two fmall Japanefe iflands. N. lat. 29° 52′. E. long. 132°.

PINNÆ, *Aculei Pinnarum*, in *Ichthyology*. Every apophyfis, or eminence on the head or body of a fifh, which is fo fharp at the end as to be capable of pricking, is called an aculeus; but the aculei pinnarum in particular are thofe prickly radii or bones, which ferve to fupport the fins; and being carried out beyond the rim of the membrane, end in fo many points.

Thefe aculei are fimple cylindric officles; whereas the other officles, which fuftain the fins, are lefs rigid, and are bent and not prickly; and thefe are not fimple, but are compofed each of two officles, clofely cohering one to another. Many of thefe radii are divaricated at their extremity into two, three, or more branches; thefe, when they are carried out beyond the rim of the membrane, are harmlefs, and are feen to be compofed of two officles, as the body of the radius is. The aculei of the back and belly of all fifhes are fo far of the fame nature, that they never ftand fingle, as fome have fuppofed them to do in particular inftances; but they are always connected one to the other at the bottom by a membrane, though that be ever fo fmall and low, as in fome it is fcarcely vifible. See *Anatomy of* Fish.

PINNA-

PINNAMAQUAM, 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, ſive conſtrictor alæ naſi, and Albinus the depreſſor alæ 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 grallæ; 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 *Phalaropus*, *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 pinnulæ*. 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 *breteſſe*, and *contre breteſſe*.

PINNAW, in *Geography*, a river which runs into the Elbe; 20 miles below Hamburgh.

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 Hamburgh. 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 kiliometres, 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 Auſſig.

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 accordes à Louis XIV. &c.;" "Traités 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 πινειν, *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 hogſhead is $8\frac{42}{100}$ cubic feet; a gallon 231 cubic inches; and a pint $28\frac{7}{8}$ 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 $103\frac{4}{10}$; 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 $46\frac{7}{8}$ Scotch pints, and $18\frac{1}{16}$ 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 $\frac{1}{10}$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 poiſſons, each poiſſon 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° 56′, and W. long. 128° 57′, to Point Disappointment, in N. lat. 52° 5′, and W. long. 128° 50′: it contains many small islands.

PINTCHLUCO River, a large branch of the Chata Uche, the upper part of Appalachicola 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-transom 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 centinel 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 centinel 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 overlaboured degree of finishing.

In his most memorable performance, the history of Pius II., painted in ten compartiments 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, neverthelefs, 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 πίτυς; and it is poſſible that both words had the ſame ſource. De 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 *pinwidden*, 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, *Monoecia Monadelphia*. Nat. Ord. *Coniferæ*, 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.

Eſſ. 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 clapped 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 chaffy concave ſcaly *bracteas* at its baſe, which ſome call a four-leaved *calyx*: females ſolitary, globular, variegated with purple and green, with ſeveral ſerrated, pointed, ſcaly *bracteas*. 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 *Loxiæ*, 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. Mughus, 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 Jacquin thought, the *Mughus* of Scopoli; ſee the next ſpecies.

2. P. *Pumilio.* Mugho, or Mountain Pine-tree. Willd. n. 3.

n. 3. Ait. n. 2. Scop. Carn. v. 2. 247. Lamb. 5. t. 2. (Pinaſter Pumilio; Cluſ. Pann. 15. P. quartus auſtriacus; Cluſ. 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. *Pinea*. 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. ſativa; 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 *bloſſoms* diffuſing a ſhower of ſulphureous pollen on all the neighbouring plants, and the maſſy *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 Matthiolus 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.

liſhed. The *ſtipulas* on the young ſhoots are finely fringed. *Leaves* four or five inches long, apparently erect. Male *flowers* ſpiked; the creſt 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 ſingle out 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 *halepenſis*, 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 *cone*.

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 creſts 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 moſt 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 ſhipping." 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. *Tæda*. 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 ſeeded 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 creſts 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. Tæda* 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 numerouſly 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. Tæda*. 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. Tæda δ; Ait. H. Kew. ed. 1; the β 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.

long, with imbricated orbicular tawny crefts to the *anthers*. *Cone* 10 or 12 inches long, each fcale tipped with a fmall, prominent, rather incurved, fpine. The points of the *leaves* are finely ferrated; their *fheaths* long, fplitting at the top into linear, recurved, jagged fegments. *Stipulas* at the bafe of the fheaths, and not half fo 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 flender, drooping, finely ferrated, with long fheaths. Stipulas entire, deciduous. Cones ovate, with prominent, angular, recurved, minutely-fpinous fcales.—Native of the lofty mountains of Nepaul, in the Eaft Indies, where, according to Dr. Roxburgh, this *tree* grows to the height of 100 feet, bloffoming about the beginning of the hot feafon. It is marked as a green-houfe plant in Hort. Kew. and faid to have been introduced by Meffrs. Gray and Wear, in 1801. Nothing can be more beautiful than the copious tuft of flender, pendulous, rough-edged *leaves*, near 18 inches long, as exhibited in Mr. Lambert's beautiful plate. The male *flowers* are rather capitate than fpiked. *Cones* (of which a folitary perfect fpecimen is given in a fecond impreffion of that plate, inftead of two which prove to belong to a different and undefcribed fpecies, fee p. 91,) ovate, four inches long, diftinguifhed by the unufually prominent recurved points of their *fcales*. The head of this lofty *tree* is faid to be round and fmall, affording little fhade.

17. P. *Strobus*. Weymouth Pine-tree. Linn. Sp. Pl. 1419. Willd. n. 20. Ait. n. 16. Purfh 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, fmooth, longer than the leaves. Creft of the anthers of two minute awl-fhaped briftles. Found on the fides of hills, in a fertile foil, from Canada to Virginia, flowering in May. It is the largeft and moft ufeful of all the American Pines, and the beft timber for mafts, growing, in the ftate of Vermont, to an enormous fize. *Purfh*. The attention which lord Weymouth, afterwards marquis of Bath, gave to the cultivation of this valuable tree, has juftly ftamped it with his name. It is now generally diffufed through every confiderable plantation. Its timber is excellent. The *leaves* are very flender, and differ from all the preceding in growing five from each fheath. In winter they approach the branch in an erect pofture; in fummer they fpread widely. The male *flowers* are diftinguifhed by the peculiar creft of their *anthers*. The long, taper, fmooth, deflexed *cones*, with broad flat fcales, are very peculiar, and, in a green unripe ftate, fingularly elegant.

18. P. *Cembra*. Siberian Stone Pine-tree. Linn. Sp. Pl. 1419. Willd. n. 18. Ait. n. 17. Lamb. 34. t. 23, 24. Pall. Roff. 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. fylveftris, cembro; Camer. Epit. 42.)—Leaves five together. Cones ovate, imbricated. Wing of the feeds obliterated. Creft of the anther kidney fhaped, crenate. Native of the alps of Siberia, Tartary, Switzerland, Italy, &c. In Switzerland it is known by the name of Aphernoufli. Mr. Aiton records it to have been cultivated in 1746, by Archibald, duke of Argyle. Being of extremely flow growth, only very fmall plants of this fpecies are ufually feen in collections. The fineft we have obferved were at Mill Hill; but after the deplorable havock made there by ignorant or negligent poffeffors, we know not whether thefe trees ftill exift. (See COLLINSON.) They were fuppofed to be fixty or feventy years old in 1802, when we faw them in fine flower and fruit, being then but juft arrived at the vigour of their growth, and by no means at full maturity. The afpect of the *tree* is not very handfome. The *leaves* are of a dull hue, fine and flender like the Weymouth pine, with which they agree in number. Male *flowers* copious, capitate; the *anthers* and their rounded crefts tipped with purple. *Cones* ovate, thick, two inches or more in length, purplifh, with a plum-like bloom; their fcales thick, obtufe, with a fomewhat corky furface. *Seeds*, which we have never feen perfected in England, almoft deftitute of a wing, obovate, refembling thofe of *P. Pinea*, like which they are eatable; but their fhell is more eafily broken.

19. P. *occidentalis*. Weft 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, teffellated, fhorter than the leaves; their fcales minutely fpinous. Wing longer than the feed.—Native of the mountains of Hifpaniola, according to Dr. Swartz, who never faw more than one tree of this fpecies, and a nearly deftroyed *cone*. He defcribes it as fifty feet or more in height, with upright uneven rugged *branches*. *Leaves* crowded about the extremities of the branches, five from each fheath, a fpan long, linear-awlfhaped, triangular, with rough, or finely ferrated, edges. *Cones* three inches long, deflexed. Plumier's figure agrees with this account, but it very diftinctly fhews the cone to be not, as Swartz fubfequently fays, imbricated, but teffellated like moft of the firft-defcribed fpecies, each fcale having an abrupt angular termination; whereas in *P. Strobus* and *Cembra*, the only two fpecies befides that have five leaves from one fheath, the fcales of the *cones* are truly imbricated over each other. The *feeds* moreover being, as far as we can judge from Plumier's plate, confiderably winged, differ widely from thofe of *Cembra*; as the whole *cone* does from that of *Strobus*, to which latter fpecies Burmann, the editor of Plumier, moft incautioufly referred his plant.

Sect. 2. *Leaves folitary, fcattered.* ABIES of Tournefort. Eleven fpecies.

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 folitary, quadrangular. Cones cylindrical; their fcales rhomboid, flattened, waved and notched. Common filament fhorter than the bracteas.—Native of mountains in various parts of Europe, as well as the north of Afia, in places watered by alpine rills, where it grows to a lofty height, and makes a magnificent appearance. Though not a native of this ifland, few trees have been more generally or longer cultivated here; its ftately though formal growth, and efpecially the fine colour of its evergreen leaves, rendering it very ornamental. The wood is alfo one of the moft valuable forts of deal, and the forefts of Norway afford it abundantly. Mr. Lambert however informs us, that what is grown in England is moft durable, and particularly efteemed for making ladders. Burgundy pitch is prepared from this fpecies. The height of the tree is from 100 to 150 feet. It flowers in April. The long fweeping fan-like branches, often broken down by loads of fnow, and the effect of boifterous winds, have a grand effect in alpine landfcapes, and have been well employed in the fublime compofitions of Salvator Rofa, and the German engravers. The *leaves* are copioufly fcattered all round the branches, afcending, fomewhat imbricated, each fcarcely an

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 *bracteas* numerous, ſpreading, longer than the common filament or baſis of the *ſtamens;* 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. piceæ 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 bracteas.—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. piceæ 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 bracteas.—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 *bracteas,* 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 bracteas.—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, fructû minimo deorſùm inflexo; Tourn. Cor. 41. Voy. v. 2. 104. letter 17.)—Leaves ſolitary, quadrangular. Cones ovato-cylindrical, pendulous; their ſcales ſomewhat rhomboid.—Gathered by Tournefort, on lofty mountains above the convent of St. John, 25 miles ſouth-eaſt of Trebiſonde. The modern Greeks know this tree by the name of ἐλάτη, 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. *Picea.* 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 *Sueciæ* for *Sueviæ.* 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 *bracteas; 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 Allegany 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 balfam, which fome quacks celebrate as Balm of Gilead, to their own profit, if not to that of their patients. Combined with fome kind of fpirits, it makes a not unpleafant dram. This tree and its foliage are not much unlike the laft, but the above characters clearly diftinguifh it. The full-grown *cones* are of a beautiful violet hue, and exude plenty of candied turpentine or balfam, as does the trunk when wounded.

27. P. *Fraferi.* Double-balfam Fir. Purfh n. 2.—Leaves folitary, flat, emarginate. Cones ovate-oblong, erect, their fcales elongated, reflexed, oblong-wedgefhaped, emarginate, fhort-pointed, toothed. Found on the high mountains of Carolina, by the late Mr. Frafer, by whom it has been introduced into England. Mr. Purfh, who met with the fame fpecies on the Broad-mountains, Pennfylvania, defcribes it as a fmaller tree than the laft, with fhorter more erect *leaves*, and *cones* not one-fourth fo large.

28. P. *taxifolia.* Nootka Fir. Lamb. 51. t. 33. Willd. n. 29. Purfh n. 3.—Leaves folitary, flat, entire. Cones oblong. Anthers of two inflated lobes; their creft minute, reflexed; common filament fhorter than the concave fringed bracteas.—Gathered by Mr. Menzies at Nootka found; "by Mr. Lewis on the banks of the Columbia." *Purfh.* A tall elegant tree, bearing fome refemblance 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 fpecimen, appear very different; and the *cones* are faid by Mr. Menzies to be longer, as well as differently fhaped.

29. P. *canadenfis.* Hemlock Spruce Fir. Linn. Sp. Pl. 1421. Willd. n. 30. Ait. n. 24. Purfh n. 4. Lamb. 50. t. 32. (Abies canadenfis; Mich. Boreal-Amer. v. 2. 206. Mich. Arb. For. v. 1. 137. t. 13.)—Leaves folitary, flat, two-ranked, finely toothed. Cones terminal, ovate, fcarcely longer than the leaves. Anthers capitate, beaked; common filament twice as long as the bracteas.—"Native of the moft northern regions of Canada, and on the higheft mountains, as far as South Carolina, flowering in May. A very elegant tree, growing in fome fituations to an enormous fize; its bark is a fine fubftitute for oak-bark in tanning." *Purfh.* Peter Collinfon records his having introduced this tree, in 1736, to the Englifh collections, and a fine fpecimen of it is, or was, in his garden at Mill Hill. The afpect of the Hemlock Spruce is rather gloomy, partaking more of the yew than of the fir. The male *flowers* are fmall, confifting of very few *anthers*, in a round head on a long common filament. The *cones* are fcarcely an inch long, fmooth, pale, of but few fcales, and hang folitary at the ends of the fmall ultimate branches. The *leaves* are glaucous underneath in this, as well as in four fpecies immediately preceding.

30. P. *lanceolata.* Lance-leaved Chinefe Pine-tree. Lamb. 52. t. 34. Willd. n. 28. Ait. n. 25.—Leaves folitary, lanceolate, flat, fpreading, with taper pungent points. Cones globofe, with pointed fcales.—Gathered by the late fir G. L. Staunton, bart. in the province of Chekiang, China, from whofe fpecimen Mr. Lambert at firft publifhed an uncoloured figure. A coloured drawing, with a diffection of the *cone*, difplaying the *feeds*, each of which is reprefented as encompaffed with an oval wing, was fubfequently fent from Canton by an artift in the employment of the Eaft India Company; by all which Mr. Lambert has profited. Living plants have alfo been brought to Kew in 1804, and are now cultivated in the green-houfes of that and fome other choice collections, but have not yet bloffomed. The afpect of this *tree* or *fhrub*, for we know nothing of its natural ftature, is fo unlike all other pines or firs, that its unripe *cones* were actually fuppofed to be excrefcences, or galls, owing to the attacks of infects. The copious, deflexed, rigid, pungent *leaves*, near an inch and a half long, of a fine green, fpread in every direction; they are entire, but rough-edged, and furnifhed with three ribs. *Cones* about as big as wall-nuts, feffile, rather drooping, almoft globular, of many ovate pointed fcales.

Sect. 3. *Leaves numeroufly tufted from each fheath.* LARIX of Tournefort. Four fpecies.

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 fcales reflexed, jagged. Scales of the female catkin fiddle-fhaped, prominent in the full-grown cone. Native of the alps of Switzerland, Italy, Germany, Siberia, &c., long cultivated very extenfively, and with great advantage in this country, flowering in March and April, before the leaves fully expand, in which ftate it makes an elegant appearance. Mr. Lambert's plates of this and the following are no lefs beautiful pictures, than exquifitely faithful botanical drawings. The fame may indeed be faid of his whole work. The larch is a tree of ftraight and lofty growth, as well as large bulk, with wide-fpreading *branches*, whofe extremities droop in the moft graceful manner. In a wild ftate its form is, of courfe, lefs regular, but more picturefque. The *buds* are alternate, perennial, cup-fhaped, fcaly, each producing annually a pencil-like tuft of very numerous, fpreading, linear, bluntifh, entire, fmooth, tender, bright-green, deciduous *leaves*, about an inch long, with no other *ftipulas* than the fcales of the bud. How many years each bud endures, we have not determined, but certainly above four or five. From fimilar buds fpring feparately, on the fame branch, the male and female *flowers*, the latter only accompanied by a few leaves; but it feems to us, that the male buds become entirely leaf-buds, in the fucceeding feafons. *Bracteas* to each flower numerous, recurved, obtufe, with fine fringe-like teeth, chaffy, red-brown, deciduous. Male *flowers* yellow, drooping, about half an inch long. Common *filament* much fhorter than the *bracteas*; *anthers* crowded, deflexed, inflated, and two-lobed in front, with a fhort recurved point. Female *catkins* erect, larger than the male *flowers*, beautifully variegated with green and pink; one lip of each fcale orbicular; the other much larger, fiddle-fhaped, reflexed, with a prominent, awl-fhaped, green point. This lip becomes erect, and fomewhat enlarged, projecting always beyond the orbicular one, which dilates greatly, hardens, and becomes the feed-bearing fcale of the *cone*. The *cones* are erect, rather above an inch long, ovate; purple when young; reddifh-brown when ripe, light, not ponderous, their fcales fpreading, orbicular, flightly reflexed, and jagged, or cracked, at the margin. Wing of each *feed* 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. Purfh n. 18.—Leaves tufted, deciduous. Cones oblong; the margins of their fcales inflexed. Scales of the female catkin fiddle-fhaped, concealed in the full-grown cone.—Found in low cedar fwamps, from Canada to New Jerfey, flowering in April and May. *Purfh.* It was firft raifed in England by the celebrated P. Collinfon, whofe original tree, one of the treafures of the Mill Hill garden, was cut down about the year 1800, to make a rail, by its fapient poffeffor. The abundance of feeds, which it annually produced, might have

have been a far more lafting fource of profit, as few exotic trees are more worthy of general cultivation. The wood is at leaft equal to the European larch, and the bark excellent for tanning. The habit and *foliage* refemble the preceding, but the female *catkins* are reprefented by Mr. Lambert of a more crimfon hue. The fiddle-fhaped pointed lip of each of their fcales is four or five times as big as the orbicular one, but never increafes after the flowering period; fo that it becomes entirely concealed, in the full-grown *cones*, by the enlarged orbicular lips, that conftitute the proper fcales of the *cones*, and twice exceed it in length. This circumftance did not efcape the excellent Solander, who firft defcribed the prefent fpecies, from Mr. Collinfon's garden. The *fructification* for the moft part agrees with *P. Larix*, infomuch that it is difficult to find fpecific diftinctions. The *cones* however are fmaller, more cylindrical, with rather fewer *fcales*, whofe edges are flightly inflexed, and this, added to the want of the pointed prominences feen in the foregoing, give the full-grown dark purple *cones* a peculiar neatnefs and fmoothnefs of appearance.

33. *P. microcarpa.* Red Larch-tree. Lamb. 58. t. 37. Willd. n. 23. Ait. n. 28. Purfh 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 roundifh, of few fcales; their margins inflexed. Scales of the female catkin oval, concealed in the full-grown cone.—Found about Hudfon's Bay, and on high mountains of New York and Pennfylvania, flowering in May. *Purfh.* Michaux, it feems, has confounded this with the laft, as did Willdenow in his valuable German work on hardy trees and fhrubs, publifhed at Berlin in 1796. This is fimilar to *P. pendula* in general appearance, but the *leaves* are rather fmaller, and the *cones* confiderably fo, being rounder and compofed of much fewer fcales. The male *flowers* are more fhort and tufted, their *anthers* fcarcely projecting beyond the *bracteas*. The pointed lip of each fcale of the female *catkin* affords the moft clear diftinction, being elliptical, not fiddle-fhaped. The copious crimfon *cones*, fully grown but not ripe, make a beautiful appearance in fummer. Such was the ftate of the tree of this fpecies, which Mr. Lambert, in company with the writer of the prefent article, found unprotected in the middle of a pafture at Whitton, near Hounflow, where it had been planted by John duke of Argyle. It had however efcaped injury, and was immediately fecured from further danger. Both thefe American Larches are now in cultivation amongft the nurferymen, and deferve 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 obtufo; Tourn. Inft. 586. Duham. Arb. v. 1. 332. t. 132. Cedrus; Trew Ehret. 1, 28. t. 1, 60, 61. Camer. Epit. 57. C. Libani; Ger. Em. 1352. Matth. Valgr. v. 1. 114.)—Leaves tufted, perennial. Cones ovate, abrupt; their fcales clofe-preffed. Creft of the anthers ovate, flat, erect.—Native of mountains in the Levant, efpecially of the famous Lebanon, from whence feeds were obtained, and plants raifed in the Englifh gardens, towards the latter part of the feventeenth century. Two of the oldeft of thefe venerable guefts remain at Chelfea, and others of fomewhat younger growth at Chifwick, Whitton, Pain's hill, &c. A very large one at Hillingdon was blown down above twenty years ago. The widefpreading fan-like branches, and perennial *leaves* of this fpecies, differ widely from the three foregoing. Its male *flowers* are extremely different, both in their long cylindrical form, and the erect ovate red creft of their *anthers*, more agreeing with fome of our firft-defcribed kinds. The female *catkins* are ovate, dull-purple; both lips of their fcales nearly orbicular, and clofe-preffed. The larger has at its bafe, on each fide, attached to the rudiments of the *feeds*, a pair of combined awl-fhaped proceffes, that might be taken for *ftyles* or *ftigmas*, could any analogous parts be found in other fpecies of *Pinus*. Thefe are, for the firft time we believe, reprefented in a fine plate by Mr. Sowerby, added to Mr. Lambert's work after its original publication. Which of thefe lips changes into each hardened dilated abrupt fcale, of the large ponderous *cones*, we have not had an opportunity of obferving. Something fimilar to the above ftyle-like proceffes of the Cedar, is fhewn in Mr. Lambert's plate of *P. pendula*, at the diffected *fcales* of the full-ripe *cones*; where however it has all the appearance either of pubefcence, or of lacerated fibres.

Sect. 4. *Leaves oppofite.* Agathis. Salis. Tr. of Linn. Soc. v. 8. 311. t. 15. One fpecies.

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 oppofite, elliptic-lanceolate, ftriated.—Native of Amboina, where a fine inflammable refin exudes from the trunk when wounded, and is collected for fome purpofe, not clearly explained by authors. A kind of pitch is alfo faid to be made from this tree, much ufed in the Eaft Indies. Of its botanical hiftory we know little. The elliptic-lanceolate, thick, rigid, oppofite *leaves*, near three inches long and one broad, are widely different from every known *Pinus*, and there is every reafon to fuppofe the *Dammara* conftitutes a diftinct 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, clofe, hard, and woody, as big as a fmall orange, with tumid, teffellated, unarmed *fcales*. Other cones bear fomething like *anthers* at the bafe of each fcale. Living plants of *P. Dammara* were procured by fir J. Banks for Kew garden in 1804, and are kept in the ftove.

Pinus, in *Gardening*, contains plants of the evergreen and deciduous tree kinds, of which the fpecies cultivated are; the wild pine-tree (P. fylveftris); the pinafter, or clufter pine-tree (P. pinafter); the Jerfey pine-treo (P. inops); the American pitch pine-tree (P. refinofa); the Aleppo pine-tree (P. halepenfis); the ftone pine-tree (P. pinea); the torch pine-tree, or three-leaved Virginia pine (P. tæda); the fwamp pine-tree (P. paluftris); the Siberian ftone pine-tree (P. cembra); the Weft Indian pine-tree (P. occidentalis); the Weymouth pine-tree (P. ftrobus); the cedar of Lebanon (P. cedrus); the black larch-tree (P. pendula); the common white larch-tree (P. larix); the filver fir-tree (P. picea); the balm of Gilead fir-tree (P. balfamea); the hemlock fpruce fir-tree (P. canadenfis); the black fpruce fir-tree (P. nigra); the Norway fpruce fir-tree (P. abies); the white fpruce fir-tree (P. alba); and the oriental fir-tree (P. orientalis).

The trunks of the firft fort of thefe afford mafts to our navy, and from them and the branches tar and pitch are obtained, as alfo by incifion, barras, Burgundy pitch, and turpentine.

There are feveral varieties; as the Tartarian, which has a great refemblance to it, but the leaves are broader, fhorter, and their points are more obtufe; they emit a ftrong balfamic odour when bruifed; the cones are very fmall, as are alfo the feeds, fome of which are black, and others white.

The mountain, or mughoe, which has very narrow green leaves, grows fometimes by pairs, fometimes by threes from the fame fheath, generally ftanding erect; the cones are of a middling fize, and pyramidal; the fcales flat, having each 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 the feeds in thefe cafes may be ufeful, as well as fowing them in fhaded fituations.

The young plants in all the forts fhould be kept quite clean, and occafionally refrefhed with water when the feafon is dry, in a very gentle manner, fo as not to difturb the plants.

When they come up too clofe, the plants fhould be thinned out in the fummer, the thinnings being planted out immediately in a feparate bed, in a fhady place, being gently watered as there may be occafion. They fhould be fet out in rows at the diftance of four or five inches, and three or four in the rows. The tender kinds fhould be fheltered during the winter by frames or mats from the frofts, but with the others it is unneceffary.

When the plants have remained in thefe beds a year or more according to circumftances, they fhould be removed into other rows in the nurfery at the diftance of two feet, and one or more in the rows. In this fituation they fhould remain till the periods of their being finally planted out.

The beft feafon for the removal of the plants in all cafes is towards the latter end of March, or the beginning of the following month.

Where it can be done, it is the beft way not to let them remain too long in thefe nurfery fituations, as the plants are always found to fucceed beft when planted out before they have acquired too large a growth.

When large plantations are to be made, it is advifed by fome to raife the plants on a portion of the fame ground, or as nearly fimilar to it as poffible.

It is advantageous when they are to remain, to have a large fize to tranfplant them every two years, as by that means they form better roots, and fuch as fpread out more laterally, and of courfe the plants may be afterwards removed with greater fafety.

In removing the plants, at all times great care fhould be taken to preferve the roots as much as poffible, as well as all the branches, without cutting them.

When they have been finally removed, they require little more trouble, it being only neceffary to keep them perfectly free from weeds, and fupporting the larger forts of plants with proper ftakes; all the forts fhould be fuffered to take their own natural growth; being careful to preferve their tops perfectly entire, to fhoot up as faft as poffible, and to branch out in their own way, as no pruning is wanted, unlefs in the lowermoft branches in particular trees which are thought too low and ftraggling, when thefe may be occafionally trimmed, cutting them clofe to the ftem; but pruning fhould be very fparingly practifed to thefe refinous trees, as lopping the branches contributes to retard their growth as well as impair their beauty. In large foreft plantations, where the trees are arrived to a large growth, it is, however, cuftomary to lop their lower branches gradually for faggots, according as they begin to decay; for where thefe trees ftand clofe, the upper branches generally kill thofe below, fo that the lower tiers decay gradually and fucceffively; in which cafe thefe decaying lower branches may be lopped by degrees in winter.

After the plantations defigned for timber-trees have had eight, ten, or twelve years' growth, it may be proper to begin to thin them; thofe thinned out may ferve for many fmaller purpofes, being careful in thinning to leave a fufficiency of the fineft plants ftanding at proper diftances to grow up for timber.

Thefe trees are all highly ornamental evergreens for the pleafure-grounds.

In regard to the diftribution or arrangement of the trees in the plantations, and mode of planting, thofe defigned for the fhrubbery and for ornamental plantations may be difpofed both in affemblage with other trees, and to form clumps, and continued plantations. Thofe intended as foreft trees fhould generally be difpofed alone in confiderable plantations. The method of planting them is the fame as in other hardy trees; but where large plantations in out-grounds are intended either for pleafure or profit, there will not be any great neceffity for a previous preparation of the foil, with refpect to digging or ploughing, only juft to dig a hole for each tree; the fame rule may alfo be obferved in planting clumps of them in lawns, parks, and other grafs-grounds, the mould being made fine in the bottoms of them. Thofe defigned principally for ornament fhould be difpofed at fuch diftances as that their branches may extend freely every way; as the beautiful difplay of the head is a great merit in thefe trees in fuch plantations; but thofe intended for timber plantations may be put only four or five feet diftant, in order that they may draw one another up ftraight and tall more expeditioufly, and to admit of a gradual thinning after a few years' growth, for poles, &c.

The proper methods of raifing and planting out all the different forts, in the view of affording timber or fhelter in large plantations, may be feen in the new edition of Miller's Dictionary.

PINUS, in *Ornithology*, a fpecies of *Certhia*; which fee.

PIN-YANG, in *Geography*, a city of China of the firft rank, in Chan-fi; 337 miles S.W. of Peking. N. lat. 36° 6′. E. long. 111° 0′.

PIO, ALBERTO, in *Biography*, prince Carpi, fon of Leonello, lord of Carpi, by a fifter of the celebrated Giovanni Pico of Mirandula, was born about the year 1475, and firft ftudied in the univerfity of Ferrara under Pomponazzo. He purfued his ftudies with great ardour at Carpi, whither he had invited feveral learned men, among whom he diftinguifhed Aldo Manuzio as his particular inftructor. After his father's death, he, with his brother Leonello, had a common dominion in the territories of Carpi, with Giberto and other fons of Marco, another branch of the fame family. This divided authority produced diffenfions, which, from 1494 to 1500, occafioned a bloody civil war. After a time, Alberto connected himfelf with the French party, and in 1510 he vifited the court of Lewis XII., and was difpatched by him in a miffion to pope Julius II., and fome circumftances now occurred which led him to believe that it was his intereft to quit the French party, and to join that of the Imperial, the latter being the ftronger in Italy, which he did not hefitate to fay was the motive by which he was governed in his political alliances. He refided a long time at Rome as the emperor's ambaffador at the papal court, and was fingularly efteemed by Leo X., who conferred upon him feveral caftles in Romagna. In the fubfequent wars his principality was frequently taken by different parties, and Alberto was poffeffed and difpoffeffed of the fovereignty. He again adopted the French intereft, which occafioned the final lofs of Carpi, that was transferred by Charles V. to Alfonfo, duke of Ferrara. He was at Rome during its fack in that year; and took refuge with Clement VII. in the caftle of St. Angelo. Being afterwards delegated by the pontiff to Francis king of France, he was very handfomely received by that monarch, and died at his court in 1531, in the 56th year of his age. Notwithftanding the viciffitudes of his life, and his various political occupations, Alberto did not ceafe the cultivation of letters; he was a zealous adherent to the fee of Rome, and gave all the oppofition in his power to the doctrines of the reformers. At this time Erafmus made a confiderable figure in the world, and Alberto fpoke pretty freely of the tendency of his various

rious publications, and what he faid was reported with much aggravation to that celebrated man. In confequence he wrote, in October 1525, a letter to Alberto, acquainting him in a friendly manner with what he had heard, and fubjoining a fhort defence of himfelf. To this Alberto replied in a long epiftle, which, with Erafmus's letter, was afterwards publifhed at Paris. This led to farther difcuffion on both fides, and in one of his letters, Alberto launched out into an examination of all the works and opinions of Erafmus, and of thofe of Luther, and the other innovators of the time. He died, while the work was printing, at Paris, but it appeared in the fame year under the title of "Alberti Pii, &c. tres et viginti libri in locos lucubrationum variorum D. Erafmi Rotter." This work is highly commended by Tirabofchi, who fays "it has none of the fcholaftic barbarifm, but is written with erudition, force, and not without elegance." It fhould be obferved, that he was fuppofed to have been affifted by Sepulveda, and other learned men whom he kept in his houfe. His works have been collected and publifhed in folio at Paris, and alfo at Venice.

PIOBBICO, in *Geography*, a town of the duchy of Urbino; 11 miles S. of Urbino.

PIOBRACH, a Gaelic term, denoting an air played upon the bag-pipe; and now more ftrictly applied to the ancient Highland martial mufic. This air is faid to be peculiarly expreffive. Piobrachs are either fimple or compound; fome of them confift of a march, &c. and are beautifully varied, and highly characteriftic.

PIOMBA, in *Geography*, a river of Naples, which runs into the Adriatic, N. lat. 42° 56'. E. long. 13° 9'.

PIOMBINO, a principality in the central part of Italy, confifting of a fmall portion of the Italian fhore, and the oppofite ifle of Elba, fubject, in the 13th century, to the Pifans, and after feveral revolutions transferred to the family of Appiano, as a detached principality, in 1399. In 1501 it was feized by Cæfar Borgia, but after the death of pope Alexander VI. returned to the houfe of Appiano. In the 16th century the ifle of Elba was repeatedly ravaged by the Turks. The principality recently paffed to the houfe 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 fituated on a peninfula, in a bay of the Mediterranean, called "the gulf of Piombino." Piombino is a fmall neglected town; 33 miles S.W. of Sienna. N. lat. 42° 57'. E. long. 10° 34'.

PIOMBO, Sebastian del, in *Biography*, called alfo *Venetiano*, from Venice, the place of his birth, which occurred in 1485. He was renowned in early life as a mufician, and particularly for his fkill in playing upon the lute. While he was yet in his youth, he abandoned that fcience, and was taught the rudiments of the art of painting by Giovanni Bellini; but as Giorgione da Caftel Franco had juft then exhibited his improved mode of colouring and effect, Sebaftian placed himfelf under his tuition; and in the end acquired a well merited and great renown, both in painting portraits and hiftorical fubjects.

His firft effays were in the former clafs, and they were greatly admired for the ftrength of refemblance, and the fweetnefs and fulnefs of ftyle with which they were executed; and were frequently miftaken for the work of Giorgione. His portrait of Giulio Gonzaga, the favourite of cardinal Hippolito di Medici, is by many writers fpoken of with extreme delight, and called a divine performance, full of life and character. He finifhed his works with great care; folding his draperies with great felicity, and giving great truth and exactnefs of action to the heads and hands.

By the perfuafion of Agoftino Ghizi, a rich merchant of Sienna, he was induced to go to Rome; where the novelty of his ftyle, and his fkill in execution, foon drew him into public notice. He there became an hiftorical painter, and wrought equally well in frefco and in oil. In the conteft of opinion which took place at that time concerning the fuperiority in merit of Raphael, or M. Angelo, Sebaftian gave the preference to the latter, and gained his efteem and fupport. In confequence he was favoured by him on all occafions; and fo highly eftimated, that he ftimulated him to the rafh attempt of rivalling Raphael; particularly by painting a picture in competition with that great man's laft great work, the Transfiguration; which had juft been placed, with great éclat, in the church of St. Pietro à Montorio. The fubject Sebaftian chofe, was the refurrection of Lazarus; for which Michael Angelo is fuppofed to have furnifhed the defign, or at leaft to have confidered and retouched it. The picture is of the fame fize as Raphael's, and, when completed, was placed in the fame Confiftory, and was very highly applauded. The cardinal di Medici fent it to his bifhopric of Narbonne, and it became the property of the duke of Orleans. It is now in England, and in poffeffion of J. Angerftein, efq. who gave 2000 guineas for it to the proprietors of the Orleans collection. Although it is a work of profound fkill, and highly preferves 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 defign, in expreffion, or effect; whatever may be faid of its execution.

Sebaftian continued to exercife his talents, particularly in portraiture, with great induftry and fuccefs, till he obtained the office of Frate del Piombo; when he ceafed to paint for profit; and was henceforward known by the name of Sebaftian del Piombo. He lived in great efteem with pope Clement VII., whofe portrait he painted with great power and fidelity; as well as that of the ingenious fatirift Aretine; and thofe of many perfons of rank and renown. He obtained great praife for having difcovered a mode of preventing oil colours, employed on plaifter, from becoming dark; which he did, by applying, in the firft inftance, a mixture of maftic and Grecian pitch. Having paffed through a life of great honour and emolument to the age of 62, he then fhared in the common fate of human nature, and died in the year 1547.

PIONEER, in *War*, a labourer employed in an army, to fmooth the roads, pafs the artillery along, and to dig lines and trenches, mines, and other works.

Menage derives the word from the Latin *peditones*, a diminutive of *pedites*. Bochart deduces it from the Pæones, a people of Afia, whofe principal employment was to dig the earth in mines, &c.

Moft of the foreign regiments of artillery have half a company of pioneers well inftructed in their bufinefs. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, faws, fpades, and pick-axes. They have alfo a cap with a leathern crown, and a black bear-fkin front, on which is the king's creft 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-Dome, and chief place of a canton, in the diftrict of Riom; 22 miles N.W. of Riom. The place contains 1680, and the canton 8026 inhabitants, on a territory of 170 kiliometres, in 10 communes.

PIONTAK, a town of the duchy of Warfaw; 20 miles E.S.E. of Lenciez.

PIONY, in *Botany*. See Pæonia.

PIORAS

PIORAS *Fort and Village, Old*, in *Geography*, are fituated in the north-weft territory of America, on the weft fhore of Illinois river, and at the fouth end of Illinois lake; 210 miles from Miffifippi river. The ftockaded fort commands a fine profpect of the country to the eaftward of the lake, to the point where the river enters it at the north end; to the weftward are large meadows, and a level country full of fwamps, 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 fifh, and particularly fturgeon and picannao. The Indians, at the treaty of Grenville, in 1795, ceded to the United States a tract of 12 miles fquare at this fort. N. lat. 40° 53'. W. long. 91° 12' 30".

PIORIAS *Wintering Ground*, a tract of land in the Indiana territory, on the fouth-eaft fide of Illinois river, about 40 miles above and north-eaft of the Great Cave, on the Miffifippi, oppofite to the mouth of the Miffouri, and 27 below the ifland of St. Pierre. On a meadow, eaft of the river, many miles long, and five or fix broad, are many fmall 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 furnifh, about 40 years ago, 300 warriors. They occupy the parts near the fettlements in the Illinois country. A tribe of this name inhabit a village on the Miffifippi, a mile above fort Chartres. This tribe could furnifh, about the fame 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 clofely as poffible to the rule of confining our remarks on mufical compofers 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 fignor Piozzi, though ftill living (1814), may be excepted from this rule, as he has long retired from all profeffional concerns, and as we had nothing but good to fay of his talents.

He arrived in England about the year 1777. His voice was not fufficiently powerful for a theatre, or fpacious concert-room; but as a chamber-finger, both his voice and ftyle were exquifite. Previous to the arrival of Pacchierotti in England (1778), fignor Piozzi, who heard him at Milan, gave no *l'avant gout* of his performance, by finging feveral airs after his manner, in a ftyle that excited great ideas of his pathetic powers, and upon which fignor Piozzi feems chiefly, and very judicioufly, to have formed his own manner of finging.

PIP, in *Rural Economy*, a difeafe among poultry, confifting in a white thin fkin, or film, growing upon or under the tip of the tongue, which hinders the feeding. It has been fuppofed to arife from the drinking of puddle-water, or eating filthy meat, by fome; but this is not very probable. It is ufually cured by pulling off the film with the fingers, and wafhing the part with a folution of common falt in pure water. It is fometimes written *pep*.

PIPA, in *Zoology*, a fpeces of *Rana;* which fee.

Pipa, in *Commerce*. See Pipe.

PIPAREA, in *Botany*, a name of Aublet's, of which no explanation is given; but this omiffion is of fmall importance, the genus being almoft equally unintelligible. Aubl. Guian. v. 2. append. 30. Juff. 295.—Clafs and order unknown. Nat. Ord. fuppofed by Juffieu to be akin to *Ciftus*, or perhaps to his *Tiliaceæ*.

Eff. Ch. Capfule triangular, of one cell, and three valves. Seeds one, two, or three, clothed with cottony down, each inferted into a flefhy, white, fringed receptacle, attached to the middle of each valve.

1. P. *dentata*. Aubl. t. 386.—Gathered by Aublet in the forefts of Guiana, bearing fruit in Auguft. A fmall *tree*, whofe *trunk* is four or five feet high, and four or five inches in diameter, with a reddifh, wrinkled, rough bark. *Wood* hard, clofe-grained, whitifh. *Branches* fubdivided. *Leaves* alternate, nearly feffile, ovate, blunt-pointed, crenate, firm, feven inches long at the moft, and three wide; fmooth and fhining above; clothed with fhort reddifh down beneath; their midrib fending off numerous tranfverfe veins. *Stipulas* fmall, awl-fhaped, deciduous, in pairs at the bafe of the fhort *footftalks*. *Fruit* axillary, feffile, either folitary or in pairs, with two little fcales at its bafe, confifting of a thin, brittle, red *capfule*, fpotted with green, about as big as a filberd. The *feeds* are entirely covered with a very fine, pure white, cottony fubftance. Aublet never met with the *flowers*, nor has any fubfequent traveller given any account of this plant.

PIPARS, in *Geography*, a town of Hindooftan, in the circar of Joodpour; 20 miles S.W. of Meerta.

PIPE, a clofe channel for the conveyance of water, or other fluids, is of fuch extenfive ufe in building, &c. as to render the confideration of its materials, and beft means of forming its joints, a matter of importance to architects and engineers, that they may give ftability and durability to their work, at the leaft expence. Water-pipes are made of wood, iron, lead, copper, ftone, or pottery; and each of thefe materials, in different fituations, has its preference.

Wooden-pipes may be procured in all countries at a fmall expence, are eafily made, and joined together; but the great objection is their want of ftrength to refift a ftrong preffure without breaking, and their liability to decay. For water-works they are ufually made of elm, or alder; oak, though far preferable, being too expenfive. They are beft made from fmall trees of the proper fize; and then the bark, being left on, is thought to preferve them. The paffage is bored out by a long auger, turned round by one or two men; whilft the tree is fupported in a convenient pofition on treffels, and bound faft down upon them by ropes, to which weights are attached.

In towns where water-works are eftablifhed, the demand for pipes is fuch as to render this method too expenfive; and machines are ufed to bore them, turned by horfes, water, or fteam-engines. The pipe-boring machine is extremely fimple. A pit is firft dug, fimilar to a faw-pit; on each fide of this a long timber is fixed, and the two being united, at various points, by crofs framing, forms the bed, on which the fledge flides backwards and forwards as great a diftance as the length of the tree which is to be bored. The fledge 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 paffed over it, and drawn exceedingly tight with windlaffes fixed in the fledge. Wedges of wood are ufed to fupport it from rolling fideways, and to raife it up to fuch a height, that the borer will pafs through the centre of the tree. The borer is fixed at the extremity of a fpindle, fupported by bearings, on blocks raifed from the crofs framing of the bed at one end, and which are adjufted, that the line of the borer will be exactly parallel to the bed and fledge: the fpindle is put in motion by wheel-work from the mill, fo as to revolve 30 or 40 times *per* minute. The fledge with the tree is advanced towards the borer by ropes, which are conducted over proper pullies, from each end of the fledge, to the barrel of a wheel, with handles on its circumference, fimilar to the fteering-wheel of a fhip: therefore, a man, by turning

turning the wheel one way, advances the flider, with the tree towards the borer, which penetrates into the end of it; but on turning the wheel in an oppofite 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 fpindle, to employ another of greater or leffer diameter, when the pipes require it. The elm pipes employed in the ftreets of London for the diftribution of water, are made by this means, except fuch trees as are crooked: thefe are bored by hand augers, becaufe they muft 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 fort of auger, and cutting the oppofite end taper, to drive into the conical end of the adjacent pipe, which is hooped to prevent it from fplitting. This method is a very bad one, very foon decaying, even when the taper end is fitted perfectly, becaufe the thicknefs of the wood at the taper part is fo very fmall. In the ufual mode of fitting them, by merely fhaping the conical part with the axe and drawing-knife, whilft the workmen are perhaps over fhoes in mud, and expofed to bad weather, it is fcarcely reafonable to expect them to be very attentive; but the joint is fitted in hafte, and difpatched as quick as poffible: the confequence is, that the conical part being correctly bored, whilft the taper is made to an irregular and more obtufe cone, the joint fits only at a very narrow point; but if well driven, will make a tight fitting at firft, and, when buried, efcapes detection; but in the courfe of a very few years, the vacant fpace round the end of the taper accumulates mud, which haftens the decay of the wood, and the joint fails. From thefe circumftances, the pavement of the ftreets is conftantly broken up, the way impeded, and the fupply of water fufpended. The Society of Arts have, under thefe confiderations, offered a handfome premium, for feveral years paft, to procure a complete remedy for thefe defects. Mr. Hornblower propofed a tool, or bit, to form the taper end of the pipe, with the fame certainty as the cone which is bored. It confifted 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 crofs handle at the end, like an auger, to turn it round by. Near the handle, its fize is fufficiently enlarged to have a mortife, for the admiffion of an iron arm, which can be fixed in it by a wedge. This arm turns down, and carries a fteel knife, the edge of which, by the bending, ftands 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 defcribes the furface of the cone, and cuts away the wood of the pipe to that form; the round rod, being of confiderable length, can flide freely in the plug at the end of the pipe, and allow the cutter to be thruft up, to cut by degrees, till it reduces the taper. The ufe of this tool would enfure the perfect fitting of the joints; but ftill the plan is defective, as before mentioned, from the fmall quantity of wood round the joint. Another kind of joints have, therefore, been propofed: in thefe 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 fhort iron tube, which is made in form of two truncated cones joined at their bafes, and of dimenfions correfpondent with the conical bafes in the ends of the pipes. This plan is very far preferable to the former, both in ftrength and durability; and as the tubes are made of caft-iron, it is not an expenfive one.

Meffrs. Eckhardt and Lyon obtained a patent in 1806, for a method of making wooden pipes by feparate ftaves, resembling a barrel, but of lefs curvature, and greater proportional length, fo as to approach near to a cylindrical form, particularly withinfide. They are to be bound by iron hoops, made faft either by driving them on from the ends, or by fcrewing the hoops together; the lengths are to be joined together, by forming one end of each taper, and enlarging the correfponding ends of others to receive them: the ftaves are to be fitted by tongues, rabbiting, or dovetailing. We have not heard of this method having been practifed to any extent: it would, we think, be very expenfive, and have all the defects of wood pipes; being liable to fpeedy decay, when buried in the ground. And it generally happens, that in their rotten or decayed parts they generate infects and animalculi in vaft numbers; which may always be difcovered in water that has paffed through wood pipes or pumps, which have been long in ufe. Dr. Buchan obferves, that fuch water becomes putrid by the corruption of the animal and vegetable bodies with which it abounds.

Iron-pipes are caft at the iron-founderies of any dimenfions; and for durability and ftrength combined, are greatly fuperior to any other material: they may be procured in lengths of ten feet, and united by nuts and fcrews paffed through flaunches, caft on the ends of them. Moft of the great Companies for fupplying London with water have, within thefe few years paft, adopted caft-iron pipes for their mains, and are daily increafing them, under the conviction that their permanency will compenfate for the firft expence. They are ufually caft in lengths of ten feet, one end with an enlarged focket of fufficient fize to receive the end of the next pipe. As thefe joints cannot be driven clofe, to fit like wooden joints, they require fome cement. To apply this, they firft caulk it, by driving a fmall quantity of hemp down to the bottom of the joint with a blunt chiffel, and then fill the remainder of the focket with iron cement; which is a compofition of borings or turnings of caft-iron, mixed up with fulphur and fal ammoniac. This is moiftened with water, and rammed into the cavity; and the rapid oxydation of the iron borings unites them into one mafs, and at the fame time expands the bulk of the cement, fo as to fill up all the fpace very clofely. The hemp, firft driven into the joint, is only to prevent the cement getting into the pipe, and to keep the water from it till it is fet firmly; after which, the joint is as folid as any other part of the pipe. Another method, much ufed for large pipes, is to have two ears projecting from each pipe at the joint, through which fcrew-bolts are paffed, to draw them clofe together. The joints are fometimes filled with lead run in, whilft melted; and others have ufed the Roman cement to bed the joints in.

Within thefe few years immenfe quantities of iron pipes have been laid in all parts of London, for the conveyance of water, which no fooner became generally known, than great prejudices were excited againft them, under the idea that they would give the water a metallic tafte, which would be injurious to the health of the inhabitants. This is clearly an error, as any one may afcertain, by examining an old ciftern, or veffel of caft iron, which has only had frefh Thames water in it; and they will find it coated with a fort of japan, or fmooth furface of a black colour, which is a very thin oxyd, and does not penetrate any depth: though if the water is of fuch a quality as to produce red ruft, the iron is corroded very faft, but is ftill a very harmlefs mixture. Water having any lime in it, depofits a thin coat or incruftation withinfide iron pipes, and thus completely defends them from corrofion; nor is there any danger, as fome have fuppofed, of this incruftation increafing fo ſo 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 at one end, while the power operates on the other by means of a crank, or other fimilar contrivance. Or, inftead of the pulley, a toothed wheel or pinion is fubftituted, 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 fector, put in motion by the fame power or machinery. A ciftern is placed at fome convenient height above the tube, by means of which, a mixture of water and fand is conveyed into the tube, and forces its way under the faw, when in motion, and caufes it to abrade or grind away the ftone, 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 fand with it under the faw and both are difcharged over the outer edge of the tube, in the form of mud or fludge, and the motion of the tube may be thus continued as long as the moving power is maintained. When any circumftance caufes this to ftop, the tube muft be drawn up by means of the cord and pulley for that purpofe, or the fand will fet faft round the tube, and will not be eafily freed again.

Copper-pipes are too expenfive to be employed except in particular fituations. They are made of copper plate turned up and foldered, and are much ufed in diftillers' work, becaufe they can be tinned withinfide, and then communicate no taint to what paffes through them.

Lead-pipes are univerfally employed for all fmall water pipes, chiefly from the facility of bending them in any direction and foldering their joints. Although fome kinds of water corrode the metal by degrees, this will not produce fo much harm as iron under the fame circumftances, but would be a moft dangerous poifon if it was ufed in fufficient quantities to have any effect at all.

The greateft proportion of the leaden pipes ufed in waterworks, was, till of late years, made of fheet lead wrapped round an iron or wooden core, and the joint foldered up. The expence and trouble of this method was confiderable, and the pipes thus made extremely liable to burft at the joint, particularly if bent with a fudden angle. Thefe defects fuggefted the idea of cafting the lead in the form of pipes, by which means the trouble of previoufly cafting and laminating the lead into fheets would be fpared, and alfo the uncertainty of the foldered joints. Such pipes are caft in an iron mould, made in two halves, forming, when put together, a hollow cylinder, of the fize of the intended pipe. A core, or iron rod, the fize of the bore of the pipe, is adapted to this hollow mould when the halves are put together, and fecured by fcrews or wedges, fo that it exactly occupies the centre of the hollow mould, leaving therefore an equal fpace all round between them. A fpout, or entry for the admiffion of the melted lead, is made by a correfponding notch cut in each half of the mould, and at another place is a fimilar vent for the efcape 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 caft 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 feparated, and the pipe moved along in the mould, fo that only an inch or two of its end remains in the mould, the halves of which are again faftened together with the core between them, and its end entered an inch or two into the firft piece of pipe. The mould is now filled with melted lead, the heat of which fufes and unites it with the end of the firft piece, fo as to double its length. The core is again drawn out a fecond time, and another length caft 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 found.

The method which is now very generally adopted, is to caft the lead in an iron mould, upon a cylindrical iron rod of the fize for the bore of the intended pipe, the lead being three or four times the thicknefs of the intended pipe, and in fhort lengths, which are then drawn through holes in pieces of fteel, in the manner of wire drawing, till the pipe is reduced to the intended thicknefs, and drawn out to the proper length. Another method is to reduce the pipe by repeatedly paffing it through the two rollers of a flatting mill, in each of which a number of femi-circular notches are formed all round, fo that the two rollers, when put together, have a number of circular cavities between them, which gradually diminifh in diameter from one end of the rollers to the other. Drawings of fuch rollers will be found in our plates of *Iron Manufacture*. The pipe is firft rolled between the largeft of thefe cavities, then in a fmaller, and fo on to the laft, which extends the pipe to its proper length, and diminifhes its fubftance to the proper thicknefs, at the fame time by condenfing the metal hardens it, and makes a very ftrong tube with very little metal. Mr. John Wilkinfon of Brofely, the celebrated iron manufacturer, took out a patent, in 1790, for the laft mentioned method, which he practifed on a very extenfive fcale: he was not, however, the original inventor, the fame thing having been propofed, in 1728, by M. Fayolle; fee "Machines Approuvés par l'Academie Royale," vol. v. p. 50. Since the expiration of this patent many manufactories of this article have been eftablifhed, fome employing rollers, and others the draw-bench, for extending the pipes.

We have given a reprefentation of one of the latter machines in *Plate* XL. *Mechanics*. *Figs*. 1 and 2 are fections of the mould for cafting the pipes; A A is the bench, fupported on legs like a ftool in an inclined pofition; B, B, are the two halves of the mould, fitted into each other with double rebates, as fhewn in the fection *fig*. 1, that they may come together correctly, and are held fo by the fcrews D, D, fitted through pieces of iron E, E, faftened to the bench; the halves of the moulds have at each end a flat fide beneath, which refts upon the iron plate connecting the two pieces E, E; F is the core, held in its pofition 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, raifed up to the fame level as the higheft point the metal is intended to run into. The intention of the inclined pofition for the mould is, that the metal may run in at the loweft point of the mould, and expel the air as it rifes, at a vent in the higheft point of the mould, which is *e*. By this means the danger of air-bubbles in the pipe is avoided. The interior furface 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 fpace all round, a circumftance which is effential to form a good pipe, as the fucceeding procefs of drawing will tend to make an error of this kind worfe. The core, F, is feen in *fig*. 2 to have a neck or fmaller part at the end *d*: the treblet or core *a g*, *fig*. 3, upon which the pipe is to be drawn, is of the fame fize, and has a fimilar neck, fo that the pipe, when put upon it, fits it in every part, as is fhewn in *fig*. 3, and the fhoulder of the neck prevents the treblet being drawn through the pipe in the direction from *g* to *a*, as it was put in by the oppofite direction. Beyond the neck the treblet has a notch cut in each fide at *g*, leaving a neck;

a neck; and by this it is feized in a fort of claw belonging to the draw-bench, which is exhibited in *figs*. 4 and 5, the former being a plan, and the latter a fection. In thefe L, M, are two ftrong timbers, bolted to uprights N, O, at one end of each, and to a crofs beam, W, at the other end; the uprights fupport bearings for the gudgeons of a ftrong iron fpindle, which has the cog-wheel, *k*, fixed upon its end, and is turned round by the pinion *l*, receiving a rotative motion from a fteam-engine or water-wheel; P is a roller, fitted on the fpindle fo as to flip round freely upon it; it has two claws affixed into it at one end, which are feized by the ends of an iron bar, *m*, fixed faft upon the fpindle. By this means, when the roller is thruft towards *m*, it is engaged with its arms, and compelled to turn round with the fpindle, but when drawn back from *m*, it is at liberty to flip 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, fo as to draw it backwards or forwards, and by this means engage or difengage it from the fpindle at pleafure; R is another lever on the fame fpindle, to the end whereof a long rod, S, is jointed, and this has feveral handles fixed to it, as fhewn in *fig*. 5, by which it can be moved, and the machine ftopped or put in motion by a man ftanding at any part of the long bench L M; the roller, P, has a pair of fpiral grooves formed on its circumference, for the reception of two chains, *n*, *n*, which wind upon it; the ends of thefe 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 treblet T, alfo fhewn in *fig*. 3; X is a caft-iron frame, fecurely bolted down upon the crofs beam W; it has a notch in its upright fide, which is neareft the roller, to allow the treblet and pipe to pafs through, but at the fame time forms a lodgment for the fteel plate, through which the pipe is to be drawn. The workmen are provided with a great number of thefe plates, one of which is fhewn in *fig*. 6; they are called whirtles: the fizes of the holes through them diminifh very gradually, from the diameter of the rough caft pipe, to the fize to which it is intended to be reduced. The holes through them are made rounding at each fide, as is fhewn in the fection 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 fupport the pipe as it is drawn along.

The procefs of drawing is as follows: the lead pipe being fitted upon the treblet, as in *fig*. 3, is laid upon the rollers in the bench, and the end of the treblet being put through the largeft of the fet of whirtles, its end is hooked into the claws in the carriage *p*, and the whirtle lodged againft the cheeks of the frame X: the rod, S, is now pulled, which engages the roller with the fpindle (fuppofed to be all the while in motion); this winds up the double chains *n*, drawing the pipe through the whirtle, by which it diminifhes its fize and lengthens it out: when the pipe is drawn quite through, the roller is caft off by pufhing the rod S; the treblet is unhooked from the carriage, and pufhed back upon the rollers in the bench to its former pofition; another fmaller whirtle is put on; the carriage is drawn back by hand (the roller turning round on its fpindle), and the pipe is drawn through it as before. In this manner the bufinefs proceeds till the pipe is finifhed.

Sometimes the pipe is drawn through twelve fized whirtles in this cafe; the fecond time, and alfo the laft time but one, it is drawn through a whirtle fuch as Y, *fig*. 6; it is not rounded off at the entrance, but having a fharp edge, it cuts off fhavings from the furface of the lead, making it perfectly fmooth and true: this makes it pafs more eafily through the fucceeding whirtles. Lead pipes are by this procefs drawn out to ten or twelve-feet lengths, three of which are united into one, by what is called *burning*. For this purpofe an iron core is put through one pipe, and entered a few inches into the other: a fmall 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 fuppofed the heat of the lead has fufed the ends of both the pipes; the hole in the bottom is then ftopped by a flider for the purpofe, 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. Thefe joints are very good if the pipe remains ftraight, but are apt to leak if a bend is made at one of them.

In 1804, Mr. Alderfon 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 corrofion of the lead. This he accomplifhed by cafting a lead pipe in the manner above-defcribed, then withdrawing the core, and throwing into the pipe a fmall quantity of powdered rofin. Another core fmaller than the former is next inferted into the centre of the pipe, and melted tin poured in to fill up the fpace. The pipes are caft in a vertical pofition, and the rofin melting by the heat floats upon the furface 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. Alderfon employs rollers to extend them inftead of the draw-bench.

Mr. Bramah's method of making lead pipes is very ingenious; it is performed by a procefs of pumping or forcing the metal, in its fluid ftate, through proper moulds. A boiler or kettle is fitted up over a fire-grate, with flues for the fufion of the metal; in the centre of this boiler a force pump is fixed up, its fuction valve drawing in the melted lead contained in the boiler: the forcing pipe of the pump proceeds through the fide of the boiler, and conducts the lead to the mould, which is fixed on the end of the pipe outfide of the boiler: it confifts of a tube, bored perfectly fmooth and cylindrical, its interior diameter being equal to the outfide of the pipe intended to be made; the end of the mould neareft the boiler expands into a conical mouth, larger than the mould itfelf, and acrofs this wideft part a crofs bar is fixed, to fupport a core or mandrel, of a diameter equal to the bore of the intended pipe, and fituated exactly in the centre of the mould, leaving an equal fpace all round between them: the core is flightly conical, being rather lefs at its extremity, which terminates at the fame length with the external mould. There muft be fufficient openings left at the fides of the crofs bar fupporting the core, to allow the lead to pafs freely by, that it may unite again after paffing the crofs and completely fill the mould. The mould paffes through one of the fire flues furrounding the boiler, that it may be kept fo hot as to procure the lead in its fluid ftate, till it arrives nearly at the point of the mould, which is immerfed in a ciftern of hot water. The operation is fimple: the pump, being worked, forces the lead through the mould, the heat and length of which are fo regulated, that the lead may chill a little before it quits the extremity of the mould, and iffues forth in a folid ftate into the water ciftern, forming a pipe of any length. Mr. Bramah took out a patent for this method in 1797.

Pipes of pottery ware are ufually made of that coarfe kind of brown ftone pot, which is very hard and durable; they can only be made in fhort 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 smoaking 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 *houkar*, 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 *houkar 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 hogsheads = 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 hogshead 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 baril 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 estreats against their lands.

All tallies, which vouch the payment of any sum contained in such accompts, are examined, and allowed, by the chief *secondary 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 4*s.* 4*d.* 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 *Typhle.*

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 Philadelphus 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° 8′. W. long. 81° 15′.

PIPER, in *Botany*, Pepper, is enumerated by Linnæus, among the Greek names of doubtful origin. The Greek πεπερι is generally supposed to have been derived from πεπτω, *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, *bâbâry*, is the evident original of πεπερι.—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. Lamarck 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.

Eff. 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,

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with a clafping bafe: *fpikes* oppofite to the leaves, and moftly folitary. The fecond fection comprifes 60 fpecies, whofe *ftem* is herbaceous, flefhy, jointed, not knotty: *fpikes* either axillary or terminal. The third fection has but two fpecies, diftinguifhed by having no *ftem*. The fourth contains one doubtful fpecies only, *P. pinnatum* of Loureiro, Cochinch. 31, whofe *leaves* are pinnate, *ftem* prickly, and *flowers* unknown, fo that it probably belongs to fome other genus.

We fhall follow Vahl's arrangement, in felecting a few examples.

P. *æquale*. Vahl n. 10. Ecl. Amer. v. 1. 4.—"Leaves elliptic-lanceolate, attenuated, fmooth; equal at the bafe; without dots beneath. Spikes ftraight."—Native of the Weft Indies. We have it from Dr. Swartz. The *branches* are polifhed, fomewhat zigzag, knotty at the joints. *Leaves* four inches long, we fhould rather call them precifely ovate, and pointed, very fmooth, with many lateral curved ribs, fpringing from the main one, and connected by fine interbranching veins. *Spikes* an inch or more in length, exactly cylindrical, obtufe, folitary, oppofite to each leaf, their *ftalks* about the length of the *footftalks*, which is ufually a quarter of an inch.

P. *aduncum*. Hooked Pepper, or Spanifh 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 bafe. Spikes hooked.—Native of the Weft Indies, as well as of the continent of South America. The *leaves* are a fpan long, rough on both fides to the touch, like a fine file, with many ftraight tranfverfe ribs. *Spikes* three inches long, remarkably incurved. *Flowers* regularly whorled. Sloane fays in his Hiftory of Jamaica, v. 1. 135, that the *root* is very famous, refembling ginger in tafte, colour, and fmell, and when frefh not inferior to it.

P. *ariftolochoides*. Lamarck Illuftr. 80. Vahl. n. 43.—Leaves heart-fhaped, acute, dotted with numerous radiating ribs. Footftalks bordered. Spikes axillary, fomewhat aggregate, from a lanceolate fheath. Gathered by Commerfon in the ifland of Mauritius. The *leaves* are the fize and fhape of *Ariftolochia Sipho*; the *ftalks* and *branches* roughifh, but we do not find them villous. *Spikes* fmall, two or more together. This plant is very near Forfter's *methyfticum*, 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. Illuftr. t. 5. Woodv. Med. Bot. t. 187. Ger. Em. 1538.—Leaves broad-ovate, pointed, coriaceous, fmooth, with feven ribs. Joints of the ftem tumid.—Native of the Eaft Indies. Said in Hort. Kew. to have been introduced into the Englifh ftoves, in 1790, by Meffrs. Lee and Kennedy. The three central ribs, in our fpecimens, are combined at the bafe for about an inch. M. Poiret, in Lamarck's Dict. v. 5. 458, juftly remarks that J. Miller alone, in his Illuftr. of the Linn. Syft. has defcribed a *corolla*, or *calyx*, of one leaf, with three notches, in this plant. No perfon has been able to verify this reprefentation, nor is it known whence Miller procured his drawing, unlefs perhaps from his fon, a botanical artift, who vifited India. His plate has always been confidered as a valuable addition to the hiftory of a plant fo imperfectly known to botanifts, and it is pity any uncertainty fhould be attached thereto. Woodville's figure is a copy of Miller's. More than one fpecies perhaps has been confounded under *P. nigrum*, particularly the *fylveftre* of Loureiro, Lamarck, and Vahl n. 45; nor have we materials to clear up this confufion.

P. *Cubeba*. Cubebs. Linn. Suppl. 90. Vahl. n. 61. Willd. n. 3. Gærtn. t. 92. (Piper caudatum; Ger. Em. 1540. Cubeba; Woodv. Med. Bot. v. 4. 165.)—Leaves elliptic-lanceolate, pointed, fmooth, five-ribbed; contracted and unequal at the bafe; the middle ribs combined half way up. Berries on partial ftalks. Native of Sierra Leone, from whence we have fpecimens, gathered by profeffor Afzelius and his companion Borone, in leaf and fruit; fo 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 *ftem* is round, fmooth, zig-zag, ftriated, with rather tumid joints. *Leaves* two or three inches long, and one broad, folitary at each joint, on fhort ftalks; furnifhed with three principal ribs from the bafe, and with two more, which fpring very irregularly and varioufly from the central one, towards the middle of the leaf. The bafe of the *leaves* in the Linnæan fpecimen is more dilated, and vifibly unequal, than in thofe from Sierra Leone, but we fcarcely think it indicates a fpecific difference. The *clufters* are two inches long; partial ftalks half an inch.

The fpecies of Vahl's fecond fection are ufually of humble growth, and a fhining, pellucid, fucculent habit. Such is

P. *obtufifolium*. Blunt-leaved Pepper. Linn. Sp. Pl. 42. Willd. n. 31. Vahl. n. 79. Ait. n. 13. Trew Ehret. t. 96.—Leaves obovate; riblefs beneath.—Native of the Weft Indies. The Linnæan fpecimen came from Jamaica. Vahl confounds with this the *clufiæfolium*, Jacq. Ic. Rar. t. 212, but they are kept feparate in Hort. Kew. The *ftem* is moft fpotted in *obtufifolium*; the *leaves* darker in *clufiæfolium*, with more confpicuous lateral ribs. Thefe fpecies and many others of this fection, want a thorough inveftigation, and a careful comparifon with each other, to be well underftood; neither is the whole genus fo completely fettled as could be wifhed, notwithftanding the labours of Vahl, which have not extended fufficiently to the fynonyms.

Piper, in *Gardening*, contains plants of the herbaceous, fhrubby, perennial, exotic kinds, of which the fpecies cultivated are; the black pepper (P. nigrum); the rough-leaved pepper (P. amalago); the long pepper (P. longum); the intoxicating pepper, or ava (P. methyfticum;) the netted-leaved pepper (P. reticulatum); the hooked-fpiked pepper (P. aduncum); the pellucid-leaved pepper (P. pellucidum); and the blunt-leaved pepper (P. obtufifolium).

On the firft fort Martyn obferves, that "white pepper was formerly thought to be a different fpecies from the black; but it is nothing more than the ripe berries deprived of their fkin, by fteeping them about a fortnight in water; after which they are dried in the fun. The berries falling to the ground when over-ripe, lofe their outer coat, and are fold as an inferior fort of white pepper.

Method of Culture.—All thefe plants may be increafed by feeds, procured frefh from the countries where the plants grow naturally, which fhould be fown upon a good hot-bed in the fpring; and when the plants come up and are fit to tranfplant, be each put into a feparate fmall pot filled with light frefh earth, and replunged into a hot-bed of tanners' bark, fhading them every day from the fun till they have taken frefh root, when they muft be treated in the fame way as other tender exotic plants, admitting frefh air to them daily in proportion to the warmth of the feafon, to prevent their drawing up weak; and when the nights are cold the glaffes of the hot-bed fhould be covered with mats.

They all require the conftant protection of a hot-houfe.

As the ftalks of moft of them are tender when young, they fhould not have much wet, which rots them; and when water is given it muft be with caution, not to beat down

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down the plants; for when that is the caſe they ſeldom riſe again afterwards.

In ſome of the ſorts 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 *Chiapæ*, 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 alſuaden*, 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 tarſi, or the bulbus 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 *Geograghy*, 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 ϖεπερακιον. 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, ſcoriæ, gypſum, ſhorl, 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 Braſilian 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.

PIPERRY, 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 Jaffierabad.—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 Balaſore.

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.

PIPRA, 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-

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feathers brownish. It is larger than the Aureola, to be noticed hereafter.

Cristata; Purple Manakin. Crest pale yellow; body purple. It inhabits Brasil and New Spain, and is three inches and a half long.

Picicitli; 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 Brasil 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 Brasil, and is about three inches and a half long.

Miacatototl; 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 grey-ash; 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.

Serena; 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.

Hœmorrhea; 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.

Pipra, a name given by Aristotle, and other ancient writers, to the *picus varius major*, the great spotted wood-pecker, or witwall.

PIPRAH, in *Geography*, a town of Hindoostan, in Visiapour; 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 kiliometres, in 9 communes.

PIPROW, a town of Hindoostan, in the circar 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, *Syngenesia Polygamia-æqualis*. Nat. Ord. *Compositæ discoideæ*, Linn. *Corymbiferæ*, Juss.

Gen. Ch. *Common calyx* simple, prismatic, of four or five converging, concave, keeled, equal scales. *Cor.* compound, discoid.

difcoid. Florets few, all fertile, uniform, crowded; tube very fhort; limb in five fpreading fegments. *Stam.* Filaments five, very fhort; anthers united into a cylinder. *Pift.* Germen turbinate, with five angles; ftyle thread-fhaped; ftigmas divaricated, tumid. *Seeds* folitary, minute, turbinate, with five angles, abrupt at the fummit. *Crown* or *down* none. *Receptacle* naked.

Eff. Ch. Receptacle naked. Calyx with four or five equal leaves, and as many florets. Seeds five-fided. Down none.

1. P. *trinervis*. Three-ribbed Piqueria. Cavan. Ic. v. 3. 19. t. 235.—Leaves ovato-lanceolate, ferrated, three-ribbed. Panicle fmooth.—Native of Mexico. Seeds were brought from Spain to England in 1798, by the marchionefs of Bute. The plant is biennial, flowering in the greenhoufe in July and Auguft. The *ftems* are herbaceous, four feet high, round, leafy, with oppofite branches, panicled and many-flowered. *Leaves* oppofite, on fhort ftalks, fmooth, like every other part of the plant. *Flowers* very fmall and numerous, white, on capillary, panicled, terminal ftalks. Leaves of the *calyx* four, obovate. *Florets* four.

2. P. *pubefcens*. Rough Piqueria.—Leaves dilated, three-lobed, cut. Panicle corymbofe, downy.—Native of Peru. A fpecimen of this, without any name or mark, was found in the herbarium of the younger Linnæus, amongft a number of Peruvian plants. Its *ftem* feems rather fhrubby, with oppofite, round, leafy *branches*, clothed with fine, fhort, denfe, rufty, rigid down. *Leaves* fan-fhaped, acute, nearly fmooth, varioufly cut, and more or lefs regularly three-lobed, an inch or more in length, on rough *ftalks* about half as long. *Panicle* terminal, corymbofe, denfe, many-flowered. *Calyx-leaves* five, narrower than in the former. *Florets* about five. In other refpects this plant anfwers to the generic character given of the former by Cavanilles. This genus ranges next to ETHULIA; fee that article.

PIQUET. See PICKET.

PIQUETTE, among the *Florifts*, a term ufed for a certain fort of carnations, which have always a white ground, and are fpotted, or, as they call it, pounced with fcarlet, red, purple, or other colours.

PIQUICA, in *Geography*, a town of Peru, in the diocefe of La Plata, on the coaft of the Pacific ocean; 85 miles S.W. of Atacames. S. lat. 27°.

PIQUITINGA, in *Ichthyology*, the name of a fmall American fifh, the ESOX *Hepfetus*, which fee. It feldom exceeds two inches in length; its mouth appears very fmall, but it can at pleafure open it to a great width; its eyes are very large and black, with a filvery iris; it has fix fins befides the tail, which is forked; its head is of a filvery white; its back olive-colour, and its belly and fides are covered with filvery fcales; the fins are all white, and the fide-lines are broad, and very bright and fhining. Marcgrave.

PIRA, in *Geography*, a town of Auftria; fix miles S.S.E. of St. Polten.

PIRA-*Aca*, in *Ichthyology*, a name by which Marcgrave and fome other authors have called the BALISTES *Sinenfis* of others.

PIRA-*Acangata*, the name of a Brafilian fifh, refembling the perch in fize and fhape. It is of a fmall fize, feldom exceeding four or five inches in length; its mouth is fmall; its tail is forked; and it has on the back only one long fin, which is fupported by rigid and prickly fpines; this it can deprefs at pleafure, and fink within a cavity made for it in the back; its fcales are of a filvery white. It is a wholefome and well-tafted fifh. Marcgrave.

PIRA-*Coaba*, the name of an American fifh of the truttaceous kind, much efteemed for the delicacy of its flavour. It grows to about twelve inches in length; its nofe 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 fix white filaments, and is covered all over with filvery fcales. Marcgrave.

PIRA-*Guiba*. See ECHINEIS *Naucrates*.

PIRA-*Jurumenbeca*, the name of a Brafilian fifh, called by many the *bocca molie*. It lives in the muddy bottom of the American feas, and it is a long-bodied not flatted fifh; it grows to a vaft fize, being fometimes caught of nine, and fometimes 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 deprefs the fin at pleafure; its tail is not forked; its fcales are all of a filvery colour and brightnefs. It is a very well-tafted fifh. 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 fee.

PIRA-*Pixanga*, the name of a Brafilian fifh of the turdus or wraffe kind, and called by fome the *gatvifch*. Its ufual length is four or five inches; its mouth is confiderably large, and furnifhed with very fmall and fharp teeth; its head is fmall, but its eyes large and prominent; the pupil of a fine turquoife colour, and the iris yellow and red in various fhades; the coverings of the gills end in a triangular figure, and are terminated by a fhort fpine or prickle; its fcales are very fmall, and fo evenly arranged, and clofely laid on the flefh, that it is very fmooth 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 fpots; thefe are round, and of the bignefs of hemp-feed on the back and fides, and fomething larger on the belly; the fins are alfo fpotted in the fame manner, and are all marked with an edge of red. It is caught among the rocks, and about the fhores, and is a very well tafted fifh. Marcgrave.

PIRÆUS, or PYRÆUS, in *Ancient Geography*, a celebrated and capacious harbour of Athens, about 35 or 40 ftadia 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 fouth by Themiftocles. This was made the port of Athens by the latter commander, who obferving that the ancient port of Phalerum was narrow and inconvenient, conftructed the Piræus, which he made the moft capacious haven in Greece, and conceiving it inexpedient that the port fhould be made a part of the city, becaufe, as he knew that failors are generally diffolute, he was afraid their mixing with the citizens would produce a corruption of manners, he built it at a diftance, and connected it with the city by long walls. The fcite of this port was originally a village of Attica; and in order to render it fecure it was encompaffed by ftrong walls. The whole of its circuit was 60 ftadia, including the "Munychia," which was a promontory near it, and which being naturally very ftrong, was rendered ftill ftronger by artificial fortification. On the walls that joined the Piræus with the city, were erected turrets, which were afterwards converted into dwelling-houfes for the accommodation of the Athenians, whofe large city became in procefs of time too fmall for them. It was after the battle of Salamis, which happened in the firft year of the 75th olympiad, 480 years B.C., and by by which Athens was elevated to a very high degree of glory, that Themiftocles projected the fcheme of conftructing this new harbour. Accordingly in the laft year of the 75th olympiad, 477 years B.C., he explained to the citizens the plan which he had conceived for eftablifhing their power and increafing their wealth. In order the more effectually to fecure their concurrence, after ftating the advantages that would refult to them from the execution of his plan, he requefted them to appoint two perfons of rank and talents, to whom he might freely communicate the whole of his project. The affembly of the citizens appointed Ariftides and Xanthippus, to whom Themiftocles imparted, without referve, his fcheme of rendering the Piræus a fafe and capacious harbour. To thefe he demonftrated how eafily his fcheme might be accomplifhed, if his intentions were kept fecret, and at the fame time informed them how dangerous it would be for the Spartans to be apprifed of his defign. Ariftides and Xanthippus affured the people, that the project of Themiftocles was of the utmoft advantage to the ftate, and yet that it might be performed with the greateft eafe. Neverthelefs the people entertained fufpicions of fome finifter defigns, and recommended Themiftocles's application to the fenate, who having obtained their confent fent ambaffadors to Sparta, intimating how fit it would be for the Greeks to have fome great port, where a fleet might continue in fafety, to watch the defigns of the Perfians. Having thus prepared the Lacedæmonians not to take offence at their firft preparations for enlarging and eftablifhing the harbour of Piræus, Themiftocles took fuch care that every thing was finifhed, and the place in a pofture 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 Eetion and the other to that of Alcinous. Within were three docks or ftations for fhipping, Cantharos, Aphrodifium, and Zea; the firft fo called from an ancient hero, the fecond from the goddefs Venus, who had there two temples, and the third from bread-corn. In this port were alfo five porticos, which, joining together, formed one great arcade, called "Macra Stoa," or the grand portico. There were likewife two large markets or fora, one near the long portico, and one near the city. The walls were formed of hewn fquare ftones, and united without cement, merely by lead and iron, which ferved to hold together the exterior ranges or facings. They were fo wide that loaded carts might pafs upon it in different directions, and their height was about 40 cubits. Thefe long walls were repaired by Conon, deftroyed almoft wholly by Lyfander, the Lacedæmonian, and partly reconftructed by Conon, and perfected by Callicrates, during the government of Pericles.

The Piræus, as long as Athens flourifhed, became the emporium of all Greece. The architect was Hippodamus celebrated for the conftruction of other buildings.

At the Piræus were a theatre, a temple, or chapel, in which were two ftatues, one of Jupiter with a fceptre 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 houfes; and the whole fettlement comprehending Phalerum and the ports of the Piræus, with the arfenals, the ftore-houfes, the famous armoury of which Philo was the architect, and the fheds for 300, and afterwards 400, triremes, refembled the city of Rhodes, which had been planned by the fame Hippodamus. The ports, on the commencement of the Peloponnefian war, were fecured with chains, centinels were ftationed, and the Piræus was carefully guarded.

It was with great difficulty that the Piræus was reduced by Sylla, who demolifhed the walls, and fet fire to the armoury and arfenals. In the civil war it was in a defencelefs condition. Calenus, lieutenant to Cæfar, feized it, invefted Athens, and ravaged the territory. Strabo, who lived under the emperors Auguftus and Tiberius, obferves, that by many wars the long walls had been deftroyed, together with the fortrefs of Munychia, and that the Piræus had been contracted into a fmall fettlement by the ports and the temple of Jupiter the Saviour. This fabric was then adorned on the infide with pictures, the works of illuftrious artifts, and on the outfide with ftatues. In the fecond century, befides houfes for triremes, the temples of Jupiter and Minerva remained, with their images in brafs, and a temple of Venus, a portico and the tomb of Themiftocles, whofe bones were conveyed hither by his friends from Magnefia.

The port of the Piræus has been named "Porto Lione," from its marble lion, and alfo "Porto Draco." The lion has been defcribed as a piece of admirable fculpture, ten feet high, and repofing on its hinder parts. Near Athens, in the way to Eleufis, was another, in a couchant pofture, probably the companion of the former. Both thefe were removed to Venice by the famous general Morofini, and placed before the arfenal. At the mouth of the port are two ruined piers. It is frequented by a few veffels, which are, for the moft part, fmall craft. The buildings are a mean cuftom-houfe, with a few fheds, and by the fhore, on the eaft fide, a warehoufe belonging to the French and a Greek monaftery dedicated to St. Spiridion. On the oppofite fide is a rocky ridge, on which are remains of the ancient wall and of a gateway towards Athens. By the water-edge are veftiges of building; and between the cuftom-houfe and the city on the right hand of the road are traces of a fmall theatre on the fide of the hill of Munychia.

PIRAGUIRI, in *Geography*, a town of Brafil, in the government of Para, on the Xingi; 85 miles S.W. of Curupa.

PIRANHA, in *Ichthyology*, a name given to the American fifh, more commonly known by the name piraya.

PIRANO, in *Geography*, a fea-port town of Iftria, fituated partly on an eminence, and partly on an ifthmus; nine miles S.W. of Capo d'Iftria. N. lat. 45° 37′. E. long. 13° 36′.

PIRAQUIBA, or IPIRAQUIBA, in *Ichthyology*, a name originally Brafilian, by which fome authors exprefs the remora, or fucking-fifh.

PIRATE, PYRATE, *Pirata*, *Rover*, a perfon, or veffel, that robs on the high feas, or makes defcents on the coafts, without the permiffion or authority of any prince or ftate.

The colours ufually difplayed by pirates are faid to be a black field, with a death's head, a battle-axe, and an hour-glafs.

By the ancient common law, piracy, if committed by a fubject, was held to be a fpecies of treafon, and by an alien to be felony only; but now, fince the ftatute of treafons, 25 Edw. III. cap. 2. it is held to be only felony in a fubject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law; but the ftatute 28 Hen. VIII. cap. 15. eftablifhed a new jurifdiction for this purpofe, which proceeds according to the courfe of the common law. The offence of piracy, by common law, confifts in committing thofe acts of robbery and depredation upon the high feas, 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. Aſſer, in the life of king Alfred, tells us, "juſſit naves longas fabricari, impoſitiſque piratis in illis vias maris cuſtodiendas commiſit."

PIRATIAPIA, in *Ichthyology*, the name of a Braſilian fiſh, approaching to the nature of the turdus or wraſſe. Its body is oblong, not flatted, 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. Piſo.

PIRAUGY, in *Geography*, a river of Brazil, S.S.E. of Rio Grande and Point Negro.

PIRAUMBU, in *Ichthyology*, the name of a Braſilian 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 gradually 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 Turſi.

PIRDE, a river of Pruſſia, which runs into the Memel, four miles W. of Tilſit.

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 Panctou.

PIRIPEA, in *Botany*, an unexplained, probably barbarous, name. Aubl. Guian. v. 2. 627. Juſſ. 100.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, 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*. *Bracteas* three, fringed, at the baſe of

of each flower. *Flowers* hardly an inch long, purplifh; the glands at the mouth white. A pretty delicate plant, thought by Juffieu to conftitute a diftinct genus, akin to *Erinus, Buchnera, Manulea, Bartfia*, &c. We have feen no fpecimen. Swartz cites it as a fynonym 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 iflands to a peculiar fpecies of fparrow, which is very common with them. It is much fmaller than our common fparrow, and feeds only on the feeds of the canary-grafs, which is very commonly wild there.

PIRITU, in *Geography*, a fmall ifland in the Caribbean fea, near the coaft of South America. N. lat. 10° 10'. W. long. 65° 26'.

PIRITZ, a town of Hinder Pomerania, which was the firft town of the country that embraced Chriftianity, and alfo the doctrines of Luther; 32 miles N. of Cuftrin. N. lat. 53° 13'. E. long. 15° 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 diftrict 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 Meiffen, advantageoufly fituated on the Elbe for commerce; 11 miles S.E. of Drefden. N. lat. 50° 58'. E. long. 13° 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 fort of canoes, fo large as to carry 40 or 50 men.

PIROM, or Tuicce, an ifland in the Red fea. N. lat. 15°. E. long. 42° 40'.

PIROMALLI, Paul, in *Biography*, an Italian Dominican, who flourifhed in the 16th century, and whofe labours have greatly contributed towards the promotion of Oriental literature, was a native of Calabria. He was fent as a miffionary into the Eaft, and was faid to have converted great numbers of the Eutychians to the Catholic faith. From Armenia he paffed into Georgia and Perfia, and upon his return into Italy by fea, he was taken and carried captive to Tunis. Being ranfomed, he went to Rome, where he gave an account of his miffion, and received marks of favour from pope Urban VIII. By this pontiff he was fent into Poland, with the character of papal nuncio, and is faid to have been very fuccefsful in reftoring union and harmony among the fects in that country. The fame pope employed him in revifing the Armenian verfion of the bible; and afterwards fent him a fecond time into the Eaft, where, in 1655, he was promoted to the bifhopric of Nackfivan, in Armenia. Over this fee he prefided nine years, and then returned to Italy, where he was nominated bifhop of Bifignano, in Calabria. Here he died in 1667. He was author of a "Latin and Perfian Dictionary;" "An Armenian and Latin Dictionary;" "A Grammar of the Armenian Tongue;" and fome treatifes in controverfial divinity.

PIRON, Alexis, a poet and man of wit, was born at Dijon in 1689. He paffed the firft twenty-five years of his life in obfcurity, remote from decent company, and devoted very much to low pleafures. A licentious ode, of which he was the author, obliged him to quit Paris, where, for fome years, he had fupported himfelf by the mechanical labours of his pen as a copying clerk. His firft literary efforts were as a writer for the comic opera, in which inferior ftation he difplayed talents that recommended him to the directors of the Theatre François. His firft effort, entitled "Les Fils ingrats," afterwards changed into "L'Ecole des Pères," was not at all fuccefsful. He next tried his powers in tragedy, and produced his "Callifthenes," and his "Cortes," neither of which has kept a place on the ftage, though containing parts ftrongly written. His "Guftave" was more fuccefsful, though critics thought it too much overcharged with bufinefs; at length, in 1738, he prefented his comedy of "La Metromanie," which raifed him to the height of reputation. He alfo wrote "Les Courfes de Tempe," an ingenious paftoral; feveral odes, poems, tales, and epigrams. In this laft kind of compofition he was particularly happy, as might be expected, confidering that he was the moft famous for repartees and bon mots of any of the Parifian wits. Of thefe feveral are given in the General Biography. He frequently made cauftic remarks upon the French Academy, and afterwards exerted himfelf to obtain admiffion into it, but was excluded by means of the abbé d'Olivet, who revived the memory of his juvenile ode, for which officioufnefs he was recompenfed by a fevere epigram. Piron never forgave the Academy for their rejection of him, and compofed 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 eftimable character. His works were publifhed collectively in feven volumes.

PIROS, in *Geography*, a jurifdiction of Peru, on the fides 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 Hindooftan, in Malwa; 21 miles N.W. of Chanderee.

PIROUETTE, or Pyrouet, in the *Manege*, a turn or circumvolution which a horfe makes, without changing his ground; his haunches remaining firm in the centre, and his fhoulders furnifhing and defcribing the circle. In this action the inner hind leg muft not be lifted from the ground, but turned round in the fame place, like a pivot: while the other three legs and the body of the horfe turn and wheel round it at the fame time.

The word is French, and literally fignifies a whirligig.

Pirouettes are either of *one tread*, or *pifte*, or of *two*. The firft is an entire fhort turn, which the horfe makes upon one tread, and, almoft, in one time; in fuch 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 *piftes*, he takes a fmall compafs of ground, almoft his length, and marks both with the fore part and the hind.

PIRRAWARTH, in *Geography*, a town of Auftria; 14 miles N.N.E. of Vienna.

PIRUZABAD, a town of Perfia, in Mecran; 30 miles S.S.E. of Kieh.

PISA, in *Ancient Geography*, a town of the Peloponnefus, in that part of the Elide called Triphylia, N. of Olympia, and, according to Herodotus, 1485 ftadia diftant from Athens. It was fituated on the right of the river Alpheus, and even after its deftruction the inhabitants of this diftrict bore the name of Pifantins; and here was alfo a fountain called "Pifa." The inhabitants of this town, founded, as it is faid, by one of the grandfons of Eolus, were for a long time

time the moft powerful people of the Elide. Paufanias fays, that vines covered the fcite of Pifa.

Pisa, in *Geography*, a city of Etruria, and capital of a territory, ftands in a fertile plain, bounded by the neighbouring Apennines on the N., and on the S. open to the Tyrrhenian fea. If we may rely on the authority of Strabo, we may trace the origin of Pifa to the period that followed the Trojan war, and thus connect its hiftory with the fate of the Grecian chiefs, and particularly with the wanderings of the venerable Neftor. At all events the

" Alpheæ ab origine Pifæ
Urbs Etrufca folo,"

enjoys the double glory of being one of the moft 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 confiderable, as forming one of the Etrufcan 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 clofed, and the genius of Rome and liberty feemed for ever buried under the ruins and barbarifm of the middle ages. At that period, apparently fo unpropitious, the flame burft forth, and again kindled the flumbering fpirit of Italian freedom. Pifa was not the laft that roufed itfelf to activity; it afferted 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 Corfica and Sardinia, the Saracens on the coaft of Africa, and the infidel fovereign of Carthage, bowed beneath its power. Captive kings appeared before its fenate; the Franks in Paleftine and in Egypt owed their fafety to its prowefs, and Naples and Palermo faw its flags unfurled on their towers. Pontiffs and emperors courted its alliance, and acknowledged its effective fervices, and the glory of Pifa, twenty centuries after its foundation, eclipfed the fame of its Grecian parent, and indeed rivalled the achievements of Sparta herfelf, and of all the cities of Peloponnefus united. During this era of glory, commerce, as well as conqueft, introduced opulence and fplendour into the city; its walls were extended and ftrengthened; its ftreets widened and adorned with palaces, and its churches rebuilt in a ftyle of magnificence, that even now aftonifhes the traveller, and attefts the former fortunes of Pifa. A population of 150,000 inhabitants filled its vaft precincts with life and animation, and fpread fertility and riches over its whole territory. Such was its ftate during the 11th, 12th, and great part of the 13th centuries, after which the ufurpation of domeftic tyrants firft, and next the victories of the Genoefe, broke the fpirit 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 enflaved it to its rival Florence, about the year 1228. While the neighbouring Lucca, not fo glorious but more fortunate than Pifa, ftills retains its opulence and its population. The latter, enflaved and impoverifhed, can count only 15,000 inhabitants within the whole circumference of her walls:—a number which, in the days of her profperity, would have been infufficient to man one-half of her gallies, or guard her ramparts during the watches of the night.

Pifa covers an inclofure of near feven miles in circumference; the river divides it into two, nearly equal, parts; the quays on both fides are wide, lined with edifices in general ftately and handfome, and united by three bridges, the middle one of which is of marble. The ftreets are wide, particularly well paved with raifed flags for foot paffengers, and the houfes are lofty, and of good appearance. Here are feveral palaces, not deficient either in ftyle or magnificence. Among its churches, there is a fingular edifice on the banks of the Arno, called " Santa Maria della Spina," fuppofed to have been built A. D. 1230, and repaired A. D. 1300. fo called from part of our Saviour's crown of thorns faid to be preferved there, fquare, low, and of a grotefque and whimfical, rather than beautiful appearance. It is cafed with black and white marble. This building is a fpecimen of that fpecies of architecture which the Italians call " Gotico Morefco," introduced into Italy in the 11th century, and, as its name feems to import, probably borrowed from the Eaft by the merchants of the commercial republics. We fhall here obferve, that there are in Italy two fpecies of Gothic, the " Gotico Morefco," and the " Gotico Tedefco;" the former may have been imported from the Eaft; the latter feems, as its name implies, to have been borrowed from the Germans. It is thought to be an improvement of the former.

The fineft group of buildings of the above defcription, perhaps, in the world, is that which Pifa prefents to the contemplation of the traveller in her cathedral, and its attendant edifices, the baptiftry, the belfry, and the cemetery. The cathedral is the grandeft, as it is the moft ancient; it was begun in the middle, and finifhed before the end of the 11th century. We fhall reftrict ourfelves to a defcription of the campanile or belfry, which is the celebrated leaning tower of Pifa. It ftands at the end of the cathedral, oppofite to the baptiftry, and confifts of eight ftories, formed of arches fupported 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 fineft marble, add to its beauty; but its grand diftinction, which alone gives it fo much celebrity, is a defect which difparages the work, though it may enhance the fkill of the architect, and by its novelty forcibly arreft the attention; we allude to its inclination, which exceeds fourteen feet from the perpendicular. Many afcribe this architectural phenomenon to defign, and this is now the generally received opinion. The quantity of marble contained in the four immenfe edifices above-mentioned, and the number of pillars employed in their decoration, are truly aftonifhing. It does not appear that they belonged to any edifices in this city or its vicinity. They may have been imported by the Pifan gallies in their triumphant returns from Majorca, Sardinia, Corfica, Carthage, Sicily, and Naples, and may perhaps be confidered rather as monuments of the victories of this once powerful republic, than as remains of its municipal magnificence under the Romans. Although the ftyle of this group of edifices has been called Gothic, it is, in fact, a compofite ftyle formed of Roman orders, corrupted and intermingled with Saracenic decorations. Pifa has feveral other churches, befides the cathedral, that are magnificent and much admired. Its baths are about four miles from the city, and fpring up at the foot of " Monte St. Giuliano;" they were frequented anciently, perhaps, more than at prefent. The remains of an ancient aqueduct may be feen at a little diftance, but they are eclipfed by a modern one of 1000 arches, erected originally in order to fupply Pifa, and now carried on to Leghorn. The univerfity of Pifa was one of the nurferies of reviving literature, and under the aufpices of republican liberty, rivalled the moft celebrated academies in Italy, when they all teemed with genius and fcience. Upon the fubjugation of Pifa to the Florentines, it funk into infignificance; but it was afterwards reftored by Lorenzo de Medici: it again declined, and was reftored by the

the grand duke Cofmo I. Since that period it has continued the feat of many eminent profeffors, though it has never regained the number of its ftudents, or all its ancient celebrity. It has more than forty public profeffors, who are refident, and men of high reputation in their refpective departments. It is well furnifhed with all the apparatus of an academy;—colleges, libraries, an obfervatory, with all the aftronomical inftruments in great perfection, and an extenfive, well-ordered botanical garden. Pifa is, indeed, the feat of Tufcan education, and frequented by the fubjects of the Florentine government.

Pifa is only four miles from the fea; its port was anciently at the mouth of the Arno, and a place of fome fame and refort. 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 Pifanus." According to Strabo, the Aufar flowed into the Arno at Pifa, though it now falls into the fea at the diftance of at leaft ten miles from it. Pifa 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 *Pifang*.

PISANIA, called alfo *Kuttijar Factory*, a town of Africa, in the kingdom of Yani, fituated on the banks of the river Gambia, about 200 miles from its mouth, where the Englifh have eftablifhed a factory. N. lat. 13° 35′. W. long. 13° 28′. This was the outfet of Mr. Park's journey for difcoveries in Africa, under the direction of the African Affociation, and the refidence of Dr. Laidley, who deferves mention on account of his kind and hofpitable treatment of the adventurous traveller, whom he received into his houfe, and attended for many weeks during a ferious illnefs; and whom he furnifhed with every neceffary for his journey, when he was difappointed of the goods requifite for his expences, taking bills upon the Affociation for the amount. From Pifania, Mr. Park proceeded eaftward to Medina, the capital of Wolli, and thence to the E.N.E. through the countries of Bondou, Kajaaga, and Kaffon, the two latter of which are feparated by the river Senegal. In his way, he took obfervations of latitude at Kolor (N. lat. 13° 49′), Koorkoorany (13° 53′), and Joag (14° 25′. W. long. 9° 37′), on this fide the river. From Joag he proceeded to Kooniakarry (14° 34′), and from Kooniakarry by Kanjee (14° 10′), both in the country of Kaffon, and Feffurah (14° 5′) in Kaarta, to Jarra (15° 5′, long. 7° 13′), in the country of Ludamar. Here he was plundered of his fextant, which accident of courfe put an end to his obfervations of latitude; and thus, unfortunately, left the remaining half (very nearly) of his geography in a ftate of uncertainty as to parallel. Mr. Park purfued his journey from Jarra by Waffiboo (14° 49′, and 95 geographical miles E. of Jarra), Diggani (lat. 14° 17′, and 266.1 geographical miles E. of Jarra), to Sego, 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 fought for river Niger (or Joliba), near which the city of Tombuctoo ftands, Mr. Park proceeded along it feveral days' journey towards this city, on a courfe, 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 eaftward, at a point fomewhat more than 16° E. of Cape Verd, and precifely in the fame parallel. Jinné, a large town, lies two fhort journies below Silla and Tombuctoo, twelve ftill lower down; and it would appear that all the journies were conceived to be fhort, as Mr. Park allows only 200 geographical miles for the aggregate of the fourteen journies of the caravan. (See TOMBUCTOO.) For other particulars we refer to Proceedings of the Affociation for promoting the Difcovery of the Interior Parts of Africa; containing an abftract of Mr. Park's Account of his Travels and Difcoveries, abridged from his own Minutes, by Bryan Edwards, efq.—Alfo, Geographical Illuftrations of Mr. Park's journey, and of North Africa at large, by Major Rennell, 1798.

PISAQUA, a town of Peru, in the diocefe of Arequipa, on the coaft; 40 miles S. of Arica.

PISATELLO, a river of Italy, which rifes in the department of the Rubicon or Rouagna, and being joined by two other ftreams, runs into the Adriatic, between Rimini and Cervia. See RUBICON.

PISCA PIGNATARA, a town of Naples, in the county of Molife; 15 miles N.W. of Molife.

PISCADORE ISLANDS, a clufter of iflands 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 coaft of Peru, near the broken gap between Attico and Ocona. S. lat. 16° 48′.

PISCADORES. See PONG-HU.

PISCADORES, fix rocks near the coaft of Peru; 5 leagues N.N.W. of Callao. S. lat. 12° 14′.

PISCARY, PISCARA, in our *Ancient Statutes*, the liberty of fifhing in another man's waters.

This differs from a free fifhery, which is an exclufive right: in this laft the man has a property in the fifh before they are caught; in a common of pifcary, not till afterwards.

PISCATAQUA, or PASCATAQUA, in *Geography*, the only large river whofe courfe is in New Hampfhire, rifing in a pond in the N.E. corner of the town of Wakefield, and purfuing a general S.S.E. courfe of about 40 miles to the fea. It divides New Hampfhire from York county, Maine, and is called Salmon Fall river from its head to the lower Falls at Berwick, where it affumes 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 weftern branch meets it; from this junction to the fea the river is fo rapid, that it never freezes. At the lower falls in the feveral branches of the river are landing places, whence lumber and other country produce are tranfplanted, and veffels and boats from below difcharge their lading. This river, by its form, and the fituation of its branches, is very favourable to the purpofes of navigation and commerce. A light-houfe ftands at the entrance of Pifcataqua harbour, in N. lat. 43° 41′, and long. 70° 41′.

PISCATAWAY, a townfhip of New Jerfey, in Middlefex county, on Rariton river, fix miles from its mouth. In 1810 it had 2475 inhabitants; three miles and a half N.E. of New Brunfwick.—Alfo, a fmall poft-town of Prince George's county, Maryland, on the creek of its name which runs W. into Patowmac river, oppofite to mount Vernon in Virginia, and 14 miles S. of Wafhington. The town is 16 miles S.W. of Upper Marlborough.

PISCES, in *Aftronomy*, the twelfth fign, or conftellation of the zodiac.

The ftars in Pifces, in Ptolemy's Catalogue, are 38; in Tycho's, 36; in Hevelius's, 39; in the Britannic Catalogue, 113. See CONSTELLATION.

PISCES, in *Natural Hiftory*, is the name of the fourth of the claffes into which Linnæus has diftributed the animal kingdom;

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 Halieuticon, 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 fixteenth 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, Boſſueti, Conrad Geſner, 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 finiſhing 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 *Branchioſtegous*, which correſponds to the *amphibia nantes* of Linnæus, which want the operculum, or branchioſtegous 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 branchioſtegous 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 Montpelier, 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 *Branchioſtegous* 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; Broussonet, 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 Cépéde, 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. Chondropterygious 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 cartilagenei, 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*, *jugular*, 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 *cædo*, to slay 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.

Ess. 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; Loeffl. It. 275. Ichthyomethia n. 1; Browne Jam. 296. Pseudo-acacia, 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 Phlomis.) 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. carthaginensis*, 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. (Æfchynomene longifolia; Cavan. Ic. v. 4. 8. t. 315.) This is a native of New Spain, and has alfo flowered at Madrid. The habit is very like the *punicea*, but the *leaflets* are acute, and *flowers* yellow. *Legume* not obferved by Cavanilles.

Piscidia, in *Gardening*, furnifhes plants of the exotic tree kind, of which the fpecies cultivated are the Jamaica dogwood tree (P. erythrina); and the Carthaginian pifcidia (P. carthaginienfis).

Method of Culture.—Thefe plants are capable of being increafed by feeds, when they can be obtained frefh from the countries where they grow naturally. They fhould be fown upon a good hot-bed in the fpring, and when the plants come up and are fit to tranfplant, be each planted in a fmall pot filled with light earth, and plunged into a hot-bed of tanners' bark, and afterwards treated in the fame way as the other tender exotics of the fame kind.

They afford variety in the ftove.

PISCINA, in *Antiquity*, a large bafon in an open public place or fquare, where the Roman youth learnt to fwim: and which was furrounded with a high wall, to prevent the cafting of filth into it.

The word is formed from the Latin *pifcis*, *fifh*; becaufe men here imitated fifhes in fwimming, and becaufe fifhes were actually kept in fome of thefe places.

Piscina was alfo ufed for the fquare bafon in the middle of a bath.

Piscina *probatica* was a pool or refervoir of water, near the court of Solomon's temple; fo called from the Greek προβατον, *fheep*; becaufe here they wafhed the cattle, which were deftined for facrifice.

By this pifcina it was, that our Saviour wrought the miraculous cure of the paralytic. Davilier obferves, there are ftill remaining five arches of the portico, and part of the bafon of this pifcina.

Piscina, or *lavatory*, among the Turks is a large bafon placed in the middle of the court of a mofque, or under the porticos that encompafs it.

Its form is ufually a long fquare. It is built of ftone or marble, furnifhed with a great number of cocks, wherein the Muffulmans wafh themfelves before they offer their prayers; as being perfuaded, that ablution effaces fin.

Piscina, the perforated ftone ufually found in a niche on the right hand fide of the altar in our ancient churches and chapels, into which the water ufed in wafhing the hands of the officiating priefts and other facred ablutions was caft.

Piscina, in *Geography*, a town of Naples, in Abruzzo Ultra, the fee of a bifhop; 18 miles S. of Aquila.

PISCIOTA, a town of Naples, in Principato Citra; 16 miles W. of Policaftro.

PISCIPULA, in *Botany*. See Piscidia.

PISCIS, in *Ichthyology*. See Fish.

Piscis *Auftralis*, in *Aftronomy*. See Australis.

Piscis *Foffilis*, in *Ichthyology*, a name given by Johnfton to a kind of the cobitis, found buried in the fand, and dug out by the people in many parts of Germany for food. It is called by many authors the *muftela foffilis*, and by fome the *pœcilia*. It is properly a fpecies of cobitis, and is called by Artedi the *blueifh cobitis*, with five longitudinal black lines on each fide of the body. See Cobitis.

Piscis *Sancti Petri*, a name given by Jovius and fome other authors to the *faber* or *John Doree*. It is properly a fpecies of *zeus*.

Piscis *Volans*, the *Flying Fifh*, in *Aftronomy*, is a fmall conftellation of the fouthern hemifphere, unknown to the ancients, and invifible to us in thefe northern regions. See Constellation.

PISCIVOROUS Animals are fuch as feed on fifh. See Bird.

PISCO, in *Geography*, a town of Peru, in the archbifhopric of Lima and jurifdiction of Iça, Pifco, and Nafca, formerly fituated on the coaft of the South fea, but now a quarter of a league from it. An inundation of water, occafioned by an earthquake, in October 1682, deftroyed the old town, the ruins of which are ftill vifible. The whole town contains about 300 families, moft of whom are Meftizoes, Mulattoes, and Blacks; the whites being the fmalleft number. The road of Pifco is fufficiently fpacious to accommodate a royal navy, and fheltered from the ufual winds, which are thofe 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 Jaffi. N. lat. 45° 45′. E. long. 27° 38′.

Pisco *Pagani*, a town of Naples, in the province of Bafilicata; feven miles N.W. of Muro.

PISCOBAMBA, a town of South America, in the jurifdiction of Guamalies.

PISCOPIA, or Tilo, a fmall ifland in the Mediterranean; 16 miles N.W. of Rhodes. This ifland lies nearly in the middle of the interval which feparates the ifle of Rhodes from that of Stancho; and is fomewhat larger than Limonia and Narki. It has a tolerably good harbour, and feveral anchorages, which are ufeful accommodations for fhips that frequent thefe feas. The ancients called it Telos, and they highly efteemed the perfumes which were there prepared. This branch of trade is loft; but it proves the goodnefs of the foil of Pifcopia, and the mildnefs of its climate; circumftances the moft favourable to the expanfion of the fweet odour of plants and flowers. N. lat. 36° 34′. E. long. 27° 9′.

Piscopia, or *Epifcopi*, a town of the ifland of Cyprus, near a river anciently called "Lycus." In its vicinity are fome magnificent ruins, fuppofed to be thofe of the ancient city of Curias. The environs furnifh cotton and fruit trees in abundance.

PISDRI, a town of the duchy of Warfaw; 22 miles S. of Gnefna.

PISE′, a term applied to a peculiar mode of forming buildings of different kinds, but more efpecially thofe defigned for farm purpofes, with fome fort of ftiff earthy materials of a loamy quality. It is an eafy, economical, and convenient method, which had its rife on the continent, and which has been had recourfe to, for fome time, in fome parts of this kingdom, as in Bedfordfhire, Lancafhire, &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 practifed with great fuccefs, and in a very cheap manner, in fome departments of France, and which is now had recourfe to with fimilar advantage in fome parts of this country. It has been defcribed, delineated, and recommended by Mr. H. Holland in the firft volume of Communications to the Board of Agriculture, and is to be managed fomewhat in the manner directed below.

Sorts of Implements neceffary for.—In this fort of work, in addition to the common tools, fuch as fpades, trowels, bafkets, watering pots, a plumb rule, hatchet, hammer, and nails, a mould and rammer are likewife required. The following are the different conftituent parts. In the plate on pifé buildings and implements, *fig.* 1. is an outfide view of the mould; *fig.* 2, infide ditto; *fig.* 3, the head of the mould, feen without; *fig.* 4, the other face, feen within; *fig.* 5, wedges; *fig.* 6, a round ftick termed

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 ſeen; *fig.* 11, a mould put together, all the parts ſeen, as well as a ſmall rope; *fig.* 12, the rammer, or piſoir, 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:

	ft.	in.
The two ends, remaining beyond the mortiſes, three inches and a half each -	0	7
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 occafionally applying a plumb-rule, to take care that the mould does not fwerve from its upright pofition. The labourers who dig and prepare the earth muft give it in fmall quantities to the workmen in the mould, who, after having fpread it with their feet, begin to prefs it with the rammer. They muft only receive at a time fo much as will cover the bottom of the mould to the thicknefs of three or four inches. The firft ftrokes of the rammer fhould be given clofe to the fides of the mould, but they muft be afterwards applied to every other part of the furface; the men fhould then crofs their ftrokes, fo that the earth may be preffed in every direction. Thofe who ftand next to one another in the mould fhould regulate their ftrokes fo as to beat at the fame time under the cord, becaufe that part cannot be got at without difficulty, and muft be ftruck obliquely; with this precaution the whole will be equally compreffed. The man at the angle of the wall fhould beat carefully againft the head of the mould, and for the fake of the appearance, or perhaps to increafe the ftrength of the building, it is ufual to fpread every fix inches high a layer of mortar near the head, in imitation of the joints of ftone-work. Care muft be taken, that no frefh earth is received into the mould till the firft layer is well beaten, which may be afcertained by ftriking it with the rammer; the ftroke fhould leave hardly any print on the place. They muft 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 firft been completed: the regular manner of joining the different lengths may be feen in the geometrical elevations in the plate at *fig.* 16, and more particularly at *fig.* 17, where it will be obferved, by the letters A and B, that no joints are left in this work, as the different lengths are united, and made to prefs one on the other. In the fecond length, and moft of the following, the head of the mould is ufelefs; it is only made ufe of at the angles. As foon as the workmen have gone round the whole building, taking the mould to pieces and putting it together again fucceffively, they fhould begin upon the partition marked C in the fame plate *fig.* 15, where the head of the mould muft be ufed, as the door jambs are fquared like the angles of the wall. The jamb next to the exterior wall, which is too narrow to be made of pifé, can eafily be made of wood, brick, or ftone. And the firft courfe being thus completed proceed to the fecond, and here it muft be obferved, that if in laying the firft courfe the work begin with one angle, as the angle A, *fig.* 15, and proceed towards E, it muft, for the fecond courfe, begin with A, and proceed towards B, and fo in each fucceffive courfe it muft proceed in a direction contrary to that of the preceding. It may eafily be conceived, that with this precaution the joints of the feveral lengths will be inclined in oppofite directions, which will contribute very much to the firmnefs of the work. There is no reafon to fear overcharging the firft courfe with the fecond, though but juft laid; for three courfes may be laid without danger in one day; mark the grooves for receiving the joints in the firft courfe, at the diftance of three feet from one another, but not immediately over the former grooves, but over the middle points between them, as feen at *fig.* 17. in the plate. Thefe grooves muft be cut with a pick-axe, and the fecond courfe completed in the fame manner as the former, except that it muft proceed in a contrary direction, as was before obferved, and that the head of the mould and wall-gage muft be diminifhed, in order that the fame inclination of the fides to one another that was given to the firft courfe, may be preferved in this fecond. It muft, however, be remarked, that this fecond courfe is not to be continued without interruption like the firft, as it is neceffary that the partition-wall fhould join or bond into the exterior wall; or rather, that all the walls in the building, whether outfide or partition-walls, which meet at an angle, fhould crofs each other at every courfe. In purfuance, therefore, of this rule, when the work has been advanced from A to C, or perhaps not quite fo 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 fame 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 unfinifhed in the exterior wall, marked C, at *fig.* 15. in the plate; and after having filled up that fpace, carry the mould on beyond the partition-wall, and complete the courfe. The reafon of the partition-wall on the fide oppofite to C, not being connected in the fame 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 courfe muft be carried over the door, and join into the wall, as above. It has been obferved, that this defcription of the two firft courfes is equally applicable to all the others, and will enable any perfon to build a houfe, with no other materials than earth, of whatever height and extent he pleafes to have it.

Befides this, it may be remarked that the gables cannot be croffed, as thefe are detached from one another; but as their height is fo inconfiderable, and they are befides connected together by the roof, this is not of any confequence. They may be made without any difficulty, by merely making their inclination in the mould, and working the earth accordingly. It has been obferved, that each courfe will be two feet and a half high, if the mould is two feet nine inches; for the mould muft include three inches of the courfe beneath. For this reafon the grooves are made fix inches deep, though the joifts are only three inches in thicknefs. If the directions which have been given for diminifhing the thicknefs of the walls are obferved, that thicknefs will be reduced to fifteen inches at the roof, in a houfe (like that of which a defign is annexed) confifting of fix courfes; for in each courfe there will be an inclination of half an inch. The gables might have been reduced to fourteen inches only in thicknefs, as an interval of fourteen inches only was left between the mortifes of the joifts: and by increafing or diminifhing that interval the thicknefs of the walls may be regulated at pleafure.

It is noticed that in this mode of building, according to the account of the Rev. Mr. Jancour, as practifed at Montbrifon, the capital of the Forêts in France, as tranfmitted to the Board of Agriculture, the earth is pounded as much as poffible, in order to crumble any ftones therein; clay is added thereto in a fmall 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 flightly wetted, the foundation of the houfe is dug for; this is laid with ftone, and when it is about one foot high above the furface of the ground, planks are arranged on each fide, which are filled with the earth intended for the wall. It is ftrongly beaten; and this method is continued fucceffively all round the building. The walls have more or lefs thicknefs, according to the fancy of the owner; he has feen them of fix and of eighteen inches thick. Some builders interfperfe from fpace to fpace a thin layer of lime. If feveral ftories are intended in fuch 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 fame manner. Of fuch buildings he never faw any confifting of more than two ftories at moft; generally they have but one befides the ground-floor. When the building is thus finifhed, it is left for fome months to dry: then fuch as wifh to make the building more folid and durable, give it a rough-caft coating on the outfide with lime and fand.

And in regard to the manner of forming the openings for the doors and windows, they fhould 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 reprefented *figs.* 3 and 4 in the plate,) as may be neceffary, wherever the wall is to terminate and the opening commence. They fhould be made floping a little, in order to leave room for the frames and fafhes. And the exterior decorations of the windows and doors are ufually made, by the rich, of ftone or brick, and by the poor of wood, which latter have a bad effect on the appearance of the houfe, as wood will never unite well with pifé-work; and notwithftanding the greateft precautions, the exterior covering will break and fall off the wood; whereas ftone or brick-work unite perfectly with the pifé, and retain their plafter, and of courfe the paint, of which it forms the ground. The chimney-pieces of brick or ftone are laid and united with the walls in the fame manner as in common buildings; and the flues are alfo very firmly connected with them, being made of brick-work. But a very particular advantage is, that the apartments may be very handfomely finifhed, without making any jambs to the infide doors, either of ftone, brick, or wood. The finifhing of the earthen walls will make jambs unneceffary, and it is not requifite to be at the expence of any other finifhing, as the doors may be hung on the grounds or wainfcot of the apartment, as may be found neceffary.

The particular Nature of, and Manner of preparing the Earth.—It is further obferved that beating, or compreffion, is ufed in many different forts of work; the ancients employed it in making their rough walls; the Italians employ it for the terraces which cover their houfes; the Moors for all their walls; the Spaniards, the French, and others, for fome of the floors of their apartments. The intent of the ancient architects, when they recommended the beating of cement, and other compofitions ufed in building, was to prevent them from fhrinking and cracking; and it is employed for the fame purpofe in the walls which are made of earth. The beater, by repeated ftrokes, forces out from the earth the fuperfluous water which is contained, and clofely unites all the particles together, by which means the natural attraction of thofe particles is made powerfully to operate, as it is by other natural caufes, in the formation of ftones. Hence arifes the increafing ftrength and aftonifhing durability which houfes of this kind are found to poffefs. It is added that upon beating a fmall portion of earth, and weighing it immediately afterwards, it was found to contain thirty-nine pounds and a half; fifteen days after it had loft four pounds and a quarter; in the fpace of another fifteen days it loft but one pound; and in fifteen days after that its weight diminifhed only half a pound. In the fpace of about forty-five days the moifture was completely evaporated, and its weight was diminifhed about one-eighth; confequently only one-eighth of the whole mafs was occupied by moifture, and this fmall proportion cannot at all affect the folidity and confiftency of the earth fo treated. This experiment is alfo fufficient to fhew 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 foften the materials employed, which entirely deftroys their confiftency; the water, which occupies a confiderable fpace 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 fupporting feveral ftories, or fuch ponderous weights as the beaten earth or pifé can fuftain.

And with regard to the quantity or height of walling of this fort that may be done in one day, it is ftated, that three courfes, of about three feet each, may be laid one over the other in the courfe of a day; fo that a wall of earth, of about eight or nine feet, or one ftory high, may be raifed in the fame time. Experience has proved, that as foon as the builders have raifed their walls to a proper height for flooring, the heavieft beams and rafters may, without danger, be placed on the walls thus newly made; and that the thickeft timber of a roof may be laid on the gables of this fort the very inftant they are completed.

Further, on the proper forts of earth for this ufe, it is ftated, that, 1ft. All earths in general are fit for fuch ufe, when they have not the lightnefs of poor lands, nor the ftiffnefs of clay. 2dly. All earths fit for vegetation. 3dly. Brick-earths; but thefe, if they are ufed alone, are apt to crack, owing to the quantity of moifture which they contain. This, however, does not hinder perfons who underftand the bufinefs from ufing them to a good purpofe. 4thly. Strong earths, with a mixture of fmall gravel, which for that reafon cannot ferve for making either bricks, tiles, or pottery. Thefe gravelly earths are very ufeful; the beft work of this fort is made of them. And it is faid, that from the following marks may be known what earths are fitteft to be employed by themfelves. When thefe have been defcribed, it will remain to point out fuch as muft be mixed with others, in order that they may acquire the neceffary quality. And the following appearances indicate that the earth in which they are found is fit for building: when a pick-axe, fpade, or plough, brings up large lumps of earth at a time; when arable lands lie in clods or lumps; when field-mice have made themfelves fubterraneous paffages in the earth; all thefe are favourable figns. 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 fides of thofe roads fupport themfelves upright, it is a fure mark that the work may be executed in that village. One may alfo difcover the fitnefs of the foil, by trying to break with one's fingers the little clods of earth in the roads, finding a difficulty in doing it, or by obferving the ruts of the road in which the cart-wheels make a fort of pifé by their preffure: whenever there are deep ruts on the road, one may be fure of finding abundance of proper earth. And proper earth is found at the bottom of the flopes, on low lands that are cultivated, becaufe 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 flope. In digging trenches and cellars for building, it generally happens that what comes out of them is fit for the purpofe of this fort of building. But as it may fometimes happen that earth of a proper quality is not to be found on the fpot 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 itfelf be proper, it is very probable that it may be rendered fo by the mixture of a fmall quantity of another earth fetched from a diftance. The principle on which a mixture muft be made is very fimple; ftrong earths muft be tempered with light; thofe in which clay predominates, with others that are compofed more of chalk and fand; and thofe of a rich, glutinous fubftance, with

with others of a poor and barren nature. The degrees in which thefe qualities of the earth prevail, muft determine the proportions of the mixture ; which it is impoffible here to point out for every particular cafe, but which may be learnt by a little practice. And it will not be amifs to mix with the earth fome fmall pebbles, gravel, rubbifh of mortar, or in fhort any fmall mineral fubftances ; but none of the animal or vegetable kind muft be admitted. Such hard fubftances bind the earth firmly between them, and being preffed and preffing in all directions, contribute very much to the folidity of the whole ; fo that well-worked earth, in which there is a mixture of gravel, becomes fo hard at the end of two years, that a chiffel muft be ufed to break it, as if it was freeftone, or other folid ftone.

The following experiments are detailed in order to afcertain the qualities of any earth.

Experiment 1.—Take a fmall 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 ftone, flat and level ; place your tub upon the ftone, fill around it the earth that has been dug out to make the hole, and ram it well, that the tub may be enclofed, to prevent its burfting. Then ram into the tub the earth you mean to try ; putting in, at each time, about the thicknefs of threee or four fingers' breadths ; when this is well rammed, add as much more, and ram it in the fame manner, and fo the third and fourth, &c. till the earth is raifed above the brim. This fuperfluous earth muft be fcraped off extremely fmooth, and rendered as even as the under part will be, which lies on the ftone. Loofen with a fpade the earth round the tub, and you will then be able to take it out, and with it the compreffed earth that it contains ; then turn the tub upfide down, and if it is wider at the top than at the bottom, as fuch veffels ufually are, the pifé will eafily come out ; but if it fhould happen to ftick, let it dry in the air about twenty-four hours, and you will then find that the earth is loofe enough to fall out of itfelf. You muft be careful to cover over this lump of pifé with a little board ; for though a fhower of rain, falling in an oblique direction, will not injure it, yet it may be a little damaged, if the rain falls perpendicular, and efpecially if it remains upon it. Leave the lump expofed to the air, only covered with a board or flat ftone, and if it continues without cracking or crumbling, and increafes daily in denfity and compactnefs, as its natural moifture decreafes, you may be fure that the earth is fit for building. But you muft remember that it is neceffary that the earth employed fhould be taken from a little below the furface of the ground, in order that it may be neither too dry nor too wet : it muft be obferved alfo, that if the earth is not well preffed around the outfide of the tube before it is filled, though the hoops were of iron, they would burft, fo great is the preffure of the beaten earth againft the mould, of whatever fize it may be.

Experiment 2.—This trial may be made in the houfe. Having brought from a field the earth you want to try, prefs it in a ftone mortar, with a peftle of wood, brafs, or iron (the latter is beft); or with a hammer ; fill the mortar above the edge, and then with a large knife, or fome other inftrument, take away the fuperabundance of the earth even with the brim. If you find then that the earth will not quit the mortar, you muft expofe it to the fun, or near a fire ; and when it is fufficiently dry, it may be taken out without difficulty by turning the mortar upfide down on a flat ftone, or the floor. It will have the fhape of the mortar, and if expofed as above directed, will fhew the quality of the earth.

Experiment 3.—Prefs with the end of a ftick, or cane, your earth in a little box, round which you had better firft tie a piece of packthread, left it fhould burft 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, unlefs you had rather wait, and let it dry in the air, in the fun, or before a fire. It will take the exact form of the box, be it round, fquare, or oval ; if your earth be red, or any other colour, that which is enclofed in the box will ftill remain the fame. It is not improper to remark, that the colour of the earth neither adds to nor diminifhes the goodnefs of the pifé, therefore every proprietor may be at eafe on that head. Befides, every perfon in walking on his ground, may make little balls of earth, and prefs 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 alfo be a judge of the mixture it will be neceffary to make.

Further, in preparing the earth, all the operations are very fimple and eafy : there is nothing to be done but to dig up the earth with a pick-axe, break the clods with a fhovel, fo as to divide it well, and then lay it in a heap ; which is very neceffary, becaufe as the labourers throw it on that heap, the lumps of earth and large ftones roll to the bottom, where another man may break them, or draw them away with a rake. He muft obferve, that there fhould be an interval of about an inch and a quarter between the teeth of the rake, that the ftones and pebbles of the fize of a walnut, or fomething more, may efcape, and that it may draw off only the largeft. If the earth that has been dug has not the proper quality, which is feldom the cafe, and that it is neceffary to fetch fome better from a diftance, then the mixture muft be made in this manner : one man muft throw one fhovel full of the beft fort, while the others throw five or fix of the inferior fort on the heap, and fo more or lefs, according to the proportion which has been previoufly afcertained. No more earth fhould 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 muft have at hand either planks, mats, or old cloths to lay over the heap of earth, fo that the rain may not wet it ; and then as foon as the rain is over, the men may refume their work, which, without this precaution, muft be delayed : for it muft be remembered, that the earth cannot be ufed when it is either too dry or too wet, and therefore if the rain fhould wet it after it has been prepared, the men will be obliged to wait till it has recovered its proper confiftency ; a delay which would be equally difadvantageous to them and their employer. When the earth has been foaked by rain, inftead of fuffering compreffion, it becomes mud in the mould ; even though it be a little too moift, it cannot be worked : it fwells under the blows of the rammer, and a ftroke in one place makes it rife in another. When this is the cafe, it is better to ftop the work, for the men find fo much difficulty, that it is not worth while to proceed. But there is not the fame neceffity of difcontinuing the work when the earth is too dry, for it is eafy to give it the neceffary degree of moifture ; in fuch a cafe it fhould be fprinkled with a watering-pot, and afterwards well mixed together ; it will then be fit for ufe. It has already been obferved, that no vegetable fubftances fhould be left in the earth ; therefore in digging, as well as in laying the earth in a heap, great care muft be taken to pick out every bit of root, great and fmall, all fprigs and herbs, all bits of hay and ftraw, chips or fhavings of wood, and in general every thing that can rot, or fuffer a change in the earth after it has been prepared in this manner for ufe in building.

The Kind of Timber neceffary.—It is ftated that, in order to to make good walls, it is not fufficient that the earths be well beaten, but they muft be well united together. In houfes of brick or ftone, to confolidate their parts, they make ufe of angles and binders of free-ftone, and of iron braces, and cramp irons, which are very expenfive; but here the binders coft very little; they confift only of thin pieces of wood, a few cramps and nails, and thefe are fufficient to give the greateft ftability to buildings of pifé. It is added, that the firft courfe A, *figs.* 15 and 16 in the plate, being laid on the front and inner walls of a houfe, then begin the fecond; and if, for the inferior courfe, the mould has been directed from A to E, it muft, for this fecond, be directed from A to F, as has been explained above. But before this fecond courfe is begun, lay at the bottom of the mould a board about five or fix feet long, refting on the angle A, and extending lengthwife towards B. This board muft be rough as the fawyers have left it, fomething lefs than an inch thick, and in breadth about eight, nine, or ten inches, fo that there may remain on each fide 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 courfe there is no danger of its rotting. This has often been proved by experience, as in taking down old houfes of pifé fuch boards have always been found perfectly found, and many that had not even loft the colour of new wood. It is eafy to conceive how much this board, from the preffure of the work raifed above it, will contribute to bind together the two lengths A and B, and to ftrengthen the angle A; but this is not all, it is ufeful (particularly when the earth is not of a very good quality) to put ends of planks into the pifé after it has been rammed about half the height of the mould. Thefe ends of planks fhould be only ten or eleven inches long, to leave as before a few inches of earth on each fide of the wall, if it is eighteen inches thick; they fhould be laid crofswife (as the plank before-mentioned is laid lengthwife) over the whole courfe, at the diftance of about two feet from one another, and will ferve to equalize the preffure of the upper parts of the works on the lower courfe of the pifé, or rammed earth. But thefe boards need only be placed at the angles of the exterior wall, and in thofe parts where the courfes of the partition-walls join to thofe of the exterior wall; the fame directions that have here been given for the fecond courfe, muft be obferved at each fucceeding courfe, up to the roof. By thefe means, it is feen, an innumerable quantity of holders or bindings will be formed, which fometimes draw to the right, fometimes to the left of the angles, and which powerfully unite the front walls with thofe of the partitions; the feveral parts deriving mutual fupport from one another, and the whole being rendered compact and folid. Hence thefe houfes, made of earth alone, are able to refift the violence of the higheft winds, ftorms, and tempefts. The height that is intended to be given to each ftory being known, boards of three or four feet in length fhould be placed before-hand in the pifé, in thofe places where the beams are to be fixed, and as foon as the mould no longer occupies that place, the beams may be laid on, though the pifé be frefh made; little flips of wood, or boards, may be introduced under them, in order to fix them level. The beams thus fixed for each ftory, the pifé may be continued as high as the place on which you intend to erect the roof of the building.

And befide the ufe of this fort of material in the building of houfes, it may be applied to the raifing of walls for different forts of inclofures, as parks, gardens, yards, &c. in which the mould muft be fixed in an angle, or againft a building, if the wall is to reach fo far, and the workmen muft proceed from thence to the other extremity of the wall; and when they have finifhed the firft courfe, they muft raife the mould to make the fecond, returning to the place where they began the firft. But when a very great inclofure is to be made, as for inftance a park wall, then, for the fake of fpeed, it is neceffary to fet feveral moulds and men at work. In fuch a cafe, a mould fhould be placed at each end, and the number of men be doubled; they will work at the fame time, and meet in the middle of the wall, where they will clofe the firft courfe; after which each fet of men raife their mould to make the fecond; and both fetting out from the middle continue working, in oppofite directions, towards the ends where they firft began.

In this way houfes may be built, which are ftrong, healthy, and very cheap; and which will laft a great length of time, as the author fays, he had pulled down fome of them, which, from the title deeds in the poffeffion of the proprietors, appeared to be 165 years old, though they had been ill kept in repair. The rich traders of Lyons have, he obferves, no other way of building their country-houfes. An outfide covering of painting in frefco, which is attended with very little expence, conceals from the eye of the fpectator the nature of the building, and is a handfome ornament to the houfe. That method of painting has more frefhnefs and brilliancy than any other, becaufe water does not impair the colours. No fize, oil, or expence is required, manual labour is almoft all it cofts, either to the rich or poor. Any perfon may make his houfe look as fplendid as he pleafes for a few pence laid out in red or yellow ochre, or in other mineral colours. And he adds that ftrangers, who have failed upon the Rhone, probably never fufpected that thofe beautiful houfes which they faw rifing on the hills around them, were built of nothing but earth; nay, many perfons have dwelt for a confiderable time in fuch houfes, without ever being aware of their fingular conftruction. Farmers in that country generally have them fimply white-wafhed, but others, who have a greater tafte for ornament, add pilafters, window-cafes, pannels, and decorations of various kinds.

Befides, it is fuggefted that there is every reafon for introducing this method into all parts of the kingdom; whether we confider the honour of the nation as concerned in the neatnefs of its villages, the great faving of wood which it will occafion, and the confequent fecurity from fire, or the health of the inhabitants, to which it will greatly contribute, as fuch houfes are never liable to the extremes of heat or cold. It is attended with many other circumftances that are advantageous to the ftate, as well as to individuals. It faves both time and labour in building, and the houfes may be inhabited almoft immediately after they are finifhed; for which latter purpofe the holes made for the joifts fhould not be clofed up directly, for the air, if fuffered to circulate through them, will dry the walls more fpeedily. And the durability of this fort of building is fully fhewn by the ftatement of the Rev. Mr. Jancour, who refided at Montbrifon in France, where, he fays, the church was the moft remarkable in this ftyle of building; it is about eighty feet long, forty feet broad, and fifty feet high; the walls built in *pifé* eighteen inches thick, and *crépé*, or rough-caft on the outfide with lime and fand. Soon after his arrival, the church, by fome accident, was deftroyed by fire, and remained unroofed for about a twelvemonth, expofed to rains and froft. As it was fufpected that the walls had fuftained much damage, either by fire or the inclemency of the feafon, and might fall down, it was determined to throw them down partially, and leave only the lower parts ftanding; but

but even this was not done, he adds, without much difficulty, fuch was the firmnefs and hardnefs thefe walls had acquired, the church having ftood above eighty years; and all the repairs required, were only to give it, on the outfide, every twelve or fifteen years, a new coating of rough-caft. And it is further remarked, that befides the advantages of ftrength and cheapnefs, this method of building poffeffes that of fpeed in the execution. It is found that a mafon ufed to work, can, with the help of his labourer, when the earth lies near, build, in one day, fix feet fquare of the pifé. If two men can build, in one day, fix feet fquare, it is evident that fix men, which is the neceffary number to work the mould, (*viz.* three in the mould, and three to dig and prepare the earth,) will build, in the courfe of fixteen days, or three weeks at moft, fuch a houfe as is feen in the plate, at *figs.* 15 and 16, containing 228 fquare feet of wall; a very fhort time therefore is fufficient for a man to build himfelf a folid and lafting habitation. Thefe facts, which have been proved by numberlefs inftances, afford a proportion by which every one may determine the time that his houfe or wall will take in building, having firft afcertained the number of feet it will contain. Thus, if he wifhes to have a wall 540 feet long, and fix feet high, it will be finifhed in one month, with one fingle mould, and fix men; but if he doubles both mould and men, it will be done in fifteen days. Thefe are fimple but neceffary inftructions, for they will prevent the inconvenience to which many are expofed from having the completion of their building protracted beyond the time that they originally expected. All perfons who wifh to build, may now contract with the builder that the work fhall be finifhed on fuch a day; or that he fhall indemnify them for all the loffes which they may incur from his failure to make good his engagement in that refpect.

And in regard to the outfide covering of plafter, which is proper for rammed earth or pifé walls, it is quite different from that which is made ufe of on any other walls: it is neceffary, too, to take a proper time for laying it on. When a houfe of this fort has been begun in February, and completed in April, the covering may be laid on in the autumn, that is to fay, five or fix months after it is finifhed; or if it is finifhed in the beginning of November (at which time the mafons generally give over working) it may be laid on in the fpring. In this interval the walls will be fufficiently dried; but it muft not be imagined that it is the drought or cold that extracts the moifture from an earthen wall; it is only the air, which is of itfelf fufficient either in fummer or winter, to dry a pifé or rammed-earth wall thoroughly. If the plafter be laid over them before the dampnefs is entirely gone, it muft be expected that the fweat of the walls will caft it off.

But in order to prepare the walls for plaftering, they fhould be indented with the point of a hammer, or hatchet, without being afraid of fpoiling the furface left by the mould; all thofe little dents muft be made as clofe as poffible to each other, and cut in, from top to bottom, fo that every hole may have a little reft in the inferior part, which will ferve to retain and fupport the plafter. And to do it the mafons muft make a fmall fcaffold in the holes which the joifts of the mould have left at *figs.* 2 and 3 in the plate. This fcaffold may be made in a few minutes, and when, with the affiftance of it, they have indented the upper parts of the houfe, they muft run a ftiff brufh over the indented furface, to remove all duft or loofe earth. The walls, when thus prepared, may receive the plaftering; but it fhould be obferved that there are two kinds of plafter that may be ufed in the pifé; rough-caft, and ftuccoing. Rough-caft confifts of a fmall quantity of mortar, diluted with water in a tub, to which a trowel of pure lime is added, fo as to make it about the thicknefs 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 mafons on the fcaffold.

Befides, for the purpofe of rough-cafting one workman and his labourer are fufficient; the workman only fprinkles with a brufh the wall he has indented, fwept, and prepared; after that he dips another brufh, made of bits of reed, box, &c. into the tub which contains the rough-caft, and throws with this brufh the rough-caft againft the wall; when he has covered, with as much equality as poffible, fo much of the wall as is within his reach, he lowers his fcaffold, and ftops up the holes of the joifts with ftones, or old plafter, &c. does as before, and continues lowering his fcaffold in the fame manner till he comes to the bottom of the houfe. This rough-caft, which is attended with fo little trouble and expence, is notwithftanding the beft cover that can be made for pifé or rammed-earth walls, and for all other conftructions; it contributes to preferve the buildings, and though not beautiful, has the recommendation of being attainable by people in moderate circumftances. It is the peculiar advantage of thefe buildings that all the materials they require are cheap, and all the workmanfhip fimple and eafy to be performed.

But in regard to the procefs of ftuccoing it is very different; two workmen and two labourers are requifite, the two workmen being on the fcaffold, and one of the labourers making up the mortar, while the other carries it with water, and ferves the workmen. One of the workmen holds in his right hand a trowel, and in the other a brufh, with which he fprinkles the wall, having beforehand indented and fwept it; after that, he lays on a few trowels full of ftucco, which he fpreads as much as poffible with the fame trowel, and then he lays on more, and thus continues his work. The fecond workman has alfo in his left-hand a brufh, and in his right-hand a fmall wood float; he fprinkles water over the mortar that his partner has fpread, and rubs over that part he has wetted with his wood float. Thus the firft workman lays on the plafter, and advances gradually, the fecond follows and polifhes; one labourer makes up the ftucco, the other carries it, and ferves the workmen. By this procefs the fmootheft, fineft, and cheapeft plaftering is made. And at the fame time that the plafter is laid on, it may alfo be whitened by the ufe of lime alone, which is alfo an object of economy, fince it faves white lead, &c. For this purpofe dilute lime in a tub of very clear water, and let a labourer take fome of it in a pot, and carry it to the workmen, who muft lay it on with a brufh; this, as well as all other colours, adheres to the plafter, and never falls, although it is ufed with water only, without fize or oil. This is to be attributed to the precaution of laying on the colour whilft the plafter is ftill wet; as it grows dry, it incorporates the mineral colours with its own fubftance, and makes them laft as long as itfelf. This is on the principles of frefco colouring or painting, which is very neat.

And it is added, that the lime is of very general utility; it is ufed in building, in plaftering, and in white-wafhing; and it will appear that for painting alfo it may be employed with advantage. Thofe who intend to build, therefore, ought always to have a ftore of it by them, and it fhould be flaked a long time before it is ufed, to prevent crevices and bliflers, which, without this precaution, will arife in the plafter, and give it fo difagreeable an appearance, that it will be neceffary to do the work over again. The reafon of it is this, there will always remain in the lime fome particles that have not been flaked in the pit; all the ftones are not

entirely

entirely reduced to lime in the kiln, and thofe ftones will refift the action of the water for a time, and will burft from the plafter after it has been laid, leaving the crevices above-mentioned. This inconvenience will not happen if the lime, after being flaked, is left to ftand fome time before it is ufed. Indeed it will not be amifs to let it lie by a whole year, or longer, when it can be done with convenience. Befides this, it is obferved on the painting in frefco of the outfide covering, that that kind of painting which is known by this name, is the moft beautiful and cheapeft of any, and it is that which the author recommends for the decoration of pifé or rammed-earth buildings. The moft celebrated painters were very partial to it, and Rome furnifhes many excellent models, which fhould engage us to reftore it from that neglect and difufe into which it has, without reafon, been fuffered to fall. And that, whoever wifhes to have his houfe painted in frefco, muft have a painter ready, and place him on the fcaffold with the workmen. The latter lay on the mortar, as before directed, and are attentive to fpread it very even, to receive the paint. When they have finifhed one part, they fufpend their work, to give the painter time to do his; for if they continued working on, the painter, who cannot go on fo faft as they, would find the mortar too dry, and the colours would not incorporate with it. It is abfolutely neceffary that the plafterer's work fhould be fubordinate to that of the painter; it is fometimes fo 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 plafterers are to cover during his abfence, forefeeing how much he fhall be able to paint in the courfe of the day. All thefe precautions are taken to prevent the too fpeedy drying of the mortar, and to feize the proper time to lay on the colours while it is frefh.

And in order to make the colour meant to be given to a country-houfe, dilute in a large tub a fufficient quantity of lime which has been flaked a long time; and alfo dilute in another tub or pot fome 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 ftir it about with a ftick, fo as to mix it well with the lime; take fome of the colour on a brufh, and try it on a board or wall; if it is too deep or too light, add frefh lime or colour from the tub, and by repeated trials bring it to the tint that is wifhed to be given to the houfe. The colour being made for the body of the houfe, the frames of the doors and the windows are next to be confidered, and a new colour chofen, to diftinguifh them from the reft of the front. If the body of the houfe 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 cafes it will be a very eafy matter to find the moft fuitable colours. It is added, that the plafterers are equal to painting the fronts of houfes in a common way; but when builders or proprietors wifh to have them decorated in a fuperior manner, they muft call in a painter, whofe bufinefs it is to do it. The writer afferts that thefe paintings in frefco are more lively and more brilliant than any other; becaufe the colours are not deadened by fize or oil, which do not enter into their compofition; their effect is furprifing, and may be had at a little expence. And in concluding, it is remarked that the plafter proper to ferve as a ground for frefco painting or colouring, is made of one part lime and three parts clean, fharp, wafhed fand; alfo that this fort of painting has lately been executed with great fuccefs at Woburn Abbey, and fome other places in this country. It is not very ufual, it is obferved, to flake the lime in this country fo long before it is wanted; but it is an excellent practice, efpecially if it be wood-burnt.

In fhort, this method of building feems, from its cheapnefs and durability, and the readinefs with which it is executed, to deferve the attention of the proprietors of lands in this kingdom, as the means of raifing comfortable houfes for their labourers and cottagers, which, from the increafed prices of the ufual forts of building materials, are now become ferioufly expenfive in providing.

Some different kinds of buildings of thefe earthy materials may be feen at Woburn Abbey, the feat of the duke of Bedford, and in fome other places.

There are other neat buildings of the cottage kind, formed and raifed in this way, which may be feen in *Plate* XXII. in the fecond volume of the Farmer's Dictionary, under the head *Pifé Cottages*, with different elevations, ground plans, &c.

Others likewife built with the common forts of materials, but which may be raifed equally well and conveniently in pifé work, are reprefented at *figs.* 1, 4, and 7, in *Plate* VII. on *Agriculture*, under the title of *Ornamental Cottages*, in which *figs.* 2, 5, and 8, fhew the ground plans, and *figs.* 3, 6, and 9, thofe of the upper rooms. Thefe kinds of cottages would have an extremely neat and ornamental appearance when erected in the latter of thefe methods, about the entrances of parks and other kinds of pleafure grounds, as well as near any large country refidences, and at the fame time be built at an eafy 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 Afia Minor, N. of Pamphylia, feparated by a chain of mount Taurus from Ifauria.

PISIFORME Os, in *Anatomy*, one of the bones of the carpus See Extremities.

PISIG, in *Geography*, a fmall ifland in the Eaft Indian fea. 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 Afia 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 thofe which lay between the two Syrtes.—Alfo, a town of Afia, in Pamphylia, placed by Ptolemy in that part of this country which was called Carbalia.

PISINGARA, a town of Afia, in the Leffer Armenia, placed by Ptolemy at a diftance from the Euphrates towards the mountains.

PISISTRATI Insulæ, three iflands on the coaft of Ionia, near Ephefus, called by Pliny Anthinæ, Myonnefos, and Diarrheufa.

PISISTRATUS, in *Biography*, an eminent Athenian citizen, was of noble defcent, which he derived from Codrus, the laft king of Athens, and inherited a large property from his father Hippocrates. He poffeffed the natural advantages of a commanding perfon, a ready elocution, and an uncommon capacity, which he improved with the utmoft diligence. Entering into public life, he promoted, by his eloquence, the endeavours of Solon to roufing the Athenians to the recovery of Salamis, and he accompanied that legiflator in the fuccefsful expedition for the purpofe. Naturally ambitious, he ingratiated himfelf with the lower claffes of citizens by the moft winning affability, and boundlefs

lefs liberality. He relieved their neceffities, fet open his gardens, and in all his difcourfes he was the advocate of political equality, and the democratic conftitution. Solon and others faw through the artifice of his conduct. Pififtratus one day haftily appeared in the market-place, bleeding from fome flight wounds which he had inflicted on himfelf, and loudly implored the protection of his fellow-citizens from pretended enemies, who were, he faid, purfuing his life, on account of his attachment to the democracy. From this time he obtained a guard to attend his perfon for his fecurity. This guard he foon employed to feize the citadel. He difarmed the multitude, and was now the undoubted mafter of Athens, while Solon, who had refifted his tyranny in vain, departed from his enflaved country. This event occurred B.C. 560. Though Pififtratus juftly incurred the charge of tyranny by the mode which he adopted to acquire his power, he by no means ufed that power in an offenfive way. On the contrary, it is thought, that very few lawful fovereigns ever conducted themfelves with greater moderation, or with more regard to the beft interefts of his countrymen. He did not in the leaft attempt to abrogate the wife laws of Solon, but invefted them with additional authority, and he always expreffed great veneration for the legiflator, whom he intreated, but in vain, to return to Athens. His fupremacy, however, was not as yet well fecured, and attempts were made by Megacles to overthrow his power. He fucceeded, and Pififtratus was obliged, in his turn, to become an exile, while his property was put up to public fale. Afterwards Megacles permitted him to return, on condition that he would marry his daughter, to which Pififtratus readily acceded, though he refufed to live with her, which fo far exafperated the father-in-law, that to avoid his vengeance he retired to Eretria. He there occupied himfelf in preparations for the recovery of his authority by force, which he effected in the eleventh year of his fecond exile. From this time he continued to govern with the fame 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 furrounding diftrict: and by exacting the tenth of every man's income and produce, he augmented the public revenues, which he expended on magnificent buildings. He alfo ftudied to foften 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 fcattered in detached parts throughout Greece, and digefted them into the order which they have fince preferved. Senfible of the odium attaching to a tyranny, he was careful to mafk his power under the demeanour of a citizen, and in this way he exercifed the fovereignty during the remainder of his life, regarded rather as the father than the oppreffor of his country, which fcarcely ever enjoyed a longer period of quiet and profperity. He died in the year 527 B.C., leaving his fons, Hippias and Hipparchus, the heirs of his power. Univer. Hift.

PISKOI, in *Geography*, a town of Ruffia, in the government of Archangel, on the river Mezen; 188 miles E. of Archangel.

PISMIRE, in *Zoology*. See ANT.

PISO, L. CALPURNIUS, in *Biography*, furnamed *Frugi*, a Roman of a diftinguifhed patrician family, called the Calpurnian, according to Cicero; though in another paffage he reprefents him as the fon of a tribune. The epithet Frugi is faid to have been given him on the following occafion. When conful in the year 183 B.C., he went into Sicily in order to fupprefs a mutiny among the flaves, and after the bufinefs was effected, beftowing commendations from the tribunal on thofe who had chiefly contributed to the fuccefs, he awarded to his own fon the prize of a golden crown of three pounds weight, faying, at the fame time, that he meant to leave him the gold as a legacy, fo that he fhould receive the honour from his generals, and the reward from his father. For this inftance of frugality of the public money, the appellation of Frugi was beftowed upon him. In proof of the exactnefs of the principles of juftice by which he was governed, we have the following anecdote. He had always oppofed the law for the gratuitous diftribution of corn, but when it had been carried by C. Gracchus he came to demand his portion. Gracchus perceiving him ftanding in the crowd, afked him how he could be fo inconfiftent as to receive corn by virtue of the law which he had oppofed. To this he replied, "It was againft my will that you fhould have the diftribution of my property, but if it muft be fo, I will claim my fhare of it." Pifo was afterwards cenfor with Metellus Balearicus. He pleaded caufes, and was a promoter or oppofer of feveral laws. He left behind him various orations, and was the author of "Hiftorical Annals," which, though written in the meagre fimplicity of the times, were reckoned of good authority.

PISO, in *Commerce*, a weight ufed on the coaft of Guinea. A feron is $1\frac{1}{2}$ pifo, and a pifo is fubdivided into $1\frac{1}{3}$ quintos, 2 agiragues, or 4 media-tablas.

PISOGNE, in *Geography*, a town of Italy, in the department of the Benaco; 20 miles N.N.W. of Brefcia.

PISOLITE, in *Mineralogy*, a flaty artificial calcareous ftone of a grey colour, arifing from calx of iron. See LIME-*Stone*.

PISONIA, in *Botany*, received that appellation from Father Plumier, in memory of William Pifo, a phyfician of Leyden, the companion of Marcgraf, but whether his mafter or fervant remains in difpute. (See MARCGRAVIA.) Pifo furvived 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. Juff. 91. Lamarck Illuftr. t. 861. Gærtn. t. 76.—Clafs and order, *Polygamia Dioecia*, Linn. rather *Heptandria Monogynia*. Nat. Ord. *Aggregatæ*, Linn. *Nyctagines*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-fhaped; its limb in five acute, equal, fpreading, folded fegments, permanent. *Cor.* none. *Stam.* Filaments more numerous than the fegments of the calyx, ufually from fix to ten, prominent, awl-fhaped; anthers roundifh, two-lobed. *Pift.* Germen fuperior, oblong; ftyle fimple, cylindrical, longer than the calyx; ftigma cloven. *Peric.* Capfule oval, of one cell, without valves, clothed with the permanent pentagonal tube of the calyx. *Seed* folitary, fmooth, oblong.

Eff. Ch. Calyx bell-fhaped, five-cleft, plaited. Corolla none. Capfule of one cell, without valves, clothed by the angular calyx. Seed folitary.

Obf. The ftamens on one plant, and the piftils on another, are more or lefs imperfect, fo that the genus is, in effect, dioecious, or at leaft polygamous; but it is one of thofe which, having no other difference of ftructure in their flowers, but, on the contrary, the rudiments at leaft of both organs prefent in every flower, are beft claffed by the number of their ftamens. In this latter refpect however *Pifonia* is uncertain, like its relations *Mirabilis*, *Valeriana*, and *Boerhavia*.

1. P. *aculeata*. Prickly Pifonia, or Fingrigo. Linn. Sp. Pl. 1511. Ait. n. 1. Plum. Ic. t. 227. f. 1. (Paliuro

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 Carthagena. 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 *bracteas* 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 *bracteas* 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 Piſonia. Linn. Sp. Pl. 1511. Willd. n. 5. (P. inermis; Swartz Obſ. 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 *bracteas*. *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. Poiret, in Lamarck, has confounded it, under the faulty name of *inermis*, with the *nigricans* of Swartz.

6. P. *grandis*. Superb Piſonia. 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 Piſonia. Poiret in Lamarck 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 Poiret'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*, Poiret n. 4, is an accidental error for *ſubcordata* of Swartz.

The beautiful BUGINVILLÆA of Commerſon, ſee that article, is very nearly allied to *Piſonia*. Its curiouſly twiſted limb of the *calyx*, in the ripening *fruit*, is not repreſented by Lamarck, 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 piſonia (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

The plants afford variety in ftove collections of exotic plants.

PISONOS, in *Ancient Geography*, a town of Afia, in Leffer Armenia, on the route from Sebafte to Cocufon, between Ad Prætorium and Melitene, according to the Itinerary of Antonine.

PISRAH, in *Geography*, a town of Hindooftan, in Bahar; 58 miles S.S.W. of Patna.

PISSA, a town of Pruffian Lithuania; four miles S. of Stalluponen.—Alfo, a river of Pruffia, which runs into the Pregel, near Infter.

PISSANIZENA, a town of Pruffia, in Natangen; 10 miles S. of Marggrahowa.

PISSASPHALTUM, or Pissasphaltus, πισσασφαλτος, compounded of πισσα, *pitch*, and ασφαλτος, *bitumen*, in *Natural Hiftory*, denotes a native, folid bitumen, found in the Ceraunian mountains of Apollonia: of an intermediate nature between pitch and afphaltum. Its characters are thefe: the piffafphalta are fluid mineral bodies, of a fomewhat thick confiftence, dufky, and opaque; of a ftrong fmell, and readily inflammable, but leaving a refiduum of greyifh afhes after burning.

There are three known fpecies of this genus. 1. A thinner blackifh kind, called *oleum terræ*, and *petrol*. 2. A thicker black one, called *piffelæum Indicum*, or *Barbadoes tar*. And, 3. A black and vifcous one, called fimply *piffafphaltum* in the fhops. See Bitumen.

Piffafphaltum is as tough and vifcous as bird-lime, and of the fame confiftence when old. It very much refembles the common black pitch, when foftened a little by heat; and has been generally thought to have fomething of the fmell of that fubftance; but this feems to have arifen from its being too frequently adulterated by mixing pitch with it, and the true genuine fubftance has no other fmell than the rank one of all the bitumens, which fomewhat refembles that of oil of amber. It is produced in feveral parts of the world, and there are large quantities of it in Germany, in Perfia, and in France. It yields a limpid oil by diftillation, which very much refembles the native petroleum, and is too often fold with us under this name, being annually imported in large quantities from thofe parts of Germany where it is manufactured, and having itfelf no particular name in the fhops of our druggifts.

Piffafphaltum was much recommended by the ancients for external ufe, as an emollient, maturant, and digeftive: with this intention it was ufed in cataplafms, for ripening all forts of tumours, and againft the fciatica and other pains of the limbs. They alfo had recourfe to it for ftrengthening the limbs, after the reduction of diflocations. It is little ufed at prefent, the petroleum being thought very proper to fupply its place.

Pissasphaltum is alfo a name given to a factitious fubftance, compounded of pitch and afphaltus, or the true bitumen Judaicum.

The coarfenefs of this, the black colour, and the fetidnefs of the fmell, diftinguifh it from the true afphaltum.

Pissasphaltum is alfo ufed, by fome writers, to denote the Jewifh pitch, or fimple afphaltum.

PISSELÆUM, πισσελαιον, *oleum Picinum*, or oil of pitch, an obfolete medicament compounded of oil and pitch.

Pisselæum *Indicum*, among *Modern Writers*, denotes a bituminous fubftance brought from the Weft Indies, popularly called *Barbadoes tar*.

It is a heavy, thick, and dufky-looking mineral fluid, of the colour and confiftence of common treacle, and of a very opaque hue; it is of a difagreeable fmell, faintly approaching to that of oil of amber, and is very inflammable. It is found trickling down the fides of the mountains at the back of feveral of our plantations in America, and is in great efteem there for coughs and diforders of the lungs. We meet with very little in England that is genuine, feveral different fophiftications of it being in common ufe, even upon the fpot. (See Bitumen.) It has a ftrong fmell not unlike the common tar, and is not very pleafant to fight or tafte. It is accounted a good balfamic, and where the ftomach can difpenfe with it, will do great fervice in many diforders of the breaft, which has alfo 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 cafes, as in burns, frefh wounds, &c. It was made of oil of rofes, bees-wax, and pitch, proportioned fo as to give the whole a foft confiftence. It was of the nature of our modern black bafilicon, and found a good ointment in many cafes.

PISSINUM. Pliny fays it was cuftomary for the ancients to hold fleeces of wool over the fteam of boiling tar, and fqueeze the moifture from them, which watery fubftance was called *piffinum*.

Ray will have this to be the fame with the piffelæum of the ancients; but Hardouin, in his notes on Pliny, thinks the piffelæum to have been produced from the cones of cedars. What ufe they made of thefe liquors anciently, is not known; but it may be prefumed they were ufed in medicine, though at prefent it does not appear they are ufed 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 wafhed in fea-water or brine, and afterwards in frefh water many times; and after a tedious preparation of this kind, two ounces of it were ordered to be put to eight gallons of muft, which is to be fuffered to work together, and the clear liquor to be bottled off.

This was accounted a warm wine, very affiftant to concoction, and of an abfterfive faculty, and a good pectoral: on thefe accounts it was given in diforders of the breaft, and in obftructions of the liver, fpleen, and uterus, if not attended with a fever; and was a common medicine in coughs and afthmas of all kinds.

PISSOCEROS, a name given by the old naturalifts to a fubftance found very frequently in the hives of bees, and confifting of a mixture of propolis and wax. The ancients were well acquainted with the ufe of this fubftance, which was ufed for ftopping up the cracks and chinks in the hives: they mention, indeed, three forts of matter ufed by the bees for this purpofe; the metys, the piffoceros, and the propolis; but later authors call them all by the general term propolis, the piffoceros and metys being only the fame fubftance, mixed with wax in different proportions. This propolis is a refinous fubftance, of a foft and vifcous confiftence, 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 diftrict of Mont-de-Marfan; 27 miles N.W. of Tartas. The place contains 1338, and the canton 4572 inhabitants, on a territory of 482½ kiliometres, in feven communes.

PISSOSIS, a word ufed by the old writers on medicine for the depraved appetite of young women about the firft eruption of the menfes, and of fome women with child.

PISS-POT Bay, in *Geography*, a bay in the ftraits of Magellan. S. lat. 53° 14′. W. long. 75° 12′.

PISTACHIA-Nut, in *Botany*, *Gardening*, &c., a well known fort of nut. See Pistacia.

Pistachia, or *Piftach-nut*, a fruit brought from feveral

 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 πιστακιον, whence, according to Menage, the city Psittacium 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 phthisical 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.

Pistachia-*Tree, Black Virginian*, a species of the *hamamelis*; which see.

PISTACIA, in *Botany*, πιστακια of Dioscorides, a word of doubtful origin. Athenæus attributes it to the Syrians. Forskall gives *fostuk* as the Arabic name of the *Lentiscus*, and Olaus Celsius of the *Pistacia*; hence De Theis supposes πιστακια a corruption of that word; but surely it is hazarding enough to presume them of one common origin. Rauwolf's *fistuc* indeed comes much nearer.—Linn. Gen. 518. Schreb. 683. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 5. 381. Lamarck Illustr. t. 811. (Terebinthus; Tourn. t. 345. Juss. 371.)—Class and order, *Dioecia Pentandria*. Nat. Ord. *Amentaceæ*, Linn. *Terebintaceæ*, 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, fistuc 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. Matthiolus 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* panicled, 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; Bocc. 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 panicled. 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

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. *Lentiſcus*. Maſtick Tree. Linn. Sp. Pl. 1455. Ait. n. 4. Woodv. Med. Bot. t. 152. (Lentiſcus; 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 maſtick, 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 lentiſchinum*, 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 maſtic tree (P. lentiſcus.)

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 *Pharmaceutic 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 Acanticone, 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 acuminated 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 indeterminately angular, ſometimes wedge-ſhaped and ſplintery. It occurs in coarſe granular diſtinct concretions. 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,

PISTE, in the *Manege*, the track or tread which a horfe makes upon the ground he goes over.

The word is French, and literally fignifies a *track*.

The pifte of a horfe may be either *fingle* or *double*.

If the rider make him go but an ordinary gallop, in a circle, or rather fquare, he will make but a fingle pifte: if he either make him gallop with his haunches in, or go terra a terra, he will make two piftes, one with the fore-part, another with the hind. And the fame if the rider make him paffage, or go fideways, either in a ftraight line, or upon a circle.

PISTEREEN, or PIASTRINE, in *Commerce*, the name given in the Weft Indies to the Spanifh pecetas. Piftereens are alfo called two-bit pieces; they pafs at Jamaica for 1*s*. 3*d*. currency, and are worth 10½*d*. fterling. Englifh fhillings and fixpences occafionally pafs here as piftereens and bits.

PISTIA, in *Botany*, fo named by Linnæus, from πιςης, *a channel* or *watering place*, becaufe it inhabits pools and rivers.—Linn. Gen. 467. Schreb. 455. Willd. Sp. Pl. v. 3. 690. Mart. Mill. Dict. v. 3. Juff. 69. Lamarck Illuftr. t. 733. (Kodda-pail; Plum. Gen. 30. t. 39.)—Clafs and order, *Gynandria Hexandria*, Linn. *Monadelphia Octandria*, Schreb. Willd. Nat. Ord. *Inundatæ*, Linn. *Hydrocharides*, Juff.

Gen. Ch. corrected by Schreber, *Cal.* none. *Cor.* of one petal, unequal, erect, permanent; tube fhort, clofely embracing the germen; limb roundifh, fomewhat heart-fhaped, dilated, pointed, undivided, contracted at each fide, in the middle, by a lateral plait directed inwards. *Stam.* Filament round, thick, obtufe, fpringing almoft perpendicularly from the centre of the limb of the corolla, and ftanding over the piftil, furrounded at the bafe by a membranous difk, and augmented at each fide below, with a dependent fringe, the breadth of the anthers; anthers fix to eight, globofe, ftanding in a row round the margin of the filament at its fummit. *Pift.* Germen fuperior, 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; ftyle thick, erect, fhorter than the filament; ftigma obtufe, fomewhat peltate. *Peric.* Capfule ovate, compreffed, of one cell. *Seeds* numerous, oblong, depreffed, and marked with an umbilicated point at the fummit, horizontally inferted into the back of the capfule, 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. Vefling. Ægypt. 44. t. 45.)—Native of Afia, Africa, and South America, in ftagnant waters. Rumphius fays it is found only in fuch as have a muddy bottom, though the plant floats entirely like a *Lemna*, fending down its long, ftraight, fimple, pubefcent *roots* deep into the water, but not fo far as the ground. The whole herb confifts of a number of broad wedge-fhaped obtufe *leaves*, fpreading in the form of a large rofe, without any ftem, of a coriaceous or rather fpongy texture, ribbed, glaucous, with a velvet-like furface; the innermoft 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 Bafilicata; 12 miles from Turfi.

PISTILLUM, in *Botany* and *Vegetable Phyfiology*, the piftil of a flower, is one of thofe effential parts of the fructification, neceffary to the production of feeds. It is either one or feveral, fituated in the centre of the flower, within the ftamens, if the latter be, as ufual, in the fame flower. When in a feparate one, the piftils are not always central. The idea of Linnæus, of their originating from the pith, and the ftamens from the wood, is refuted by anatomical obfervation, as well as by more correct phyfiological enquiries. Each piftil confifts properly of three parts; the *germen*, or rudiment of the young fruit or feed, which of courfe is effential; the *ftyle*, various in length and thicknefs, not always prefent, as it merely ferves to elevate the third part, the *ftigma*, which, though indifpenfably neceffary, is, in feveral cafes, feated immediately upon the germen. See FECUNDATION *of Plants*, GERMEN, and, hereafter, STIGMA and STYLUS, or STYLE.

Piftils are fometimes obliterated, though more generally transformed to petals, in double flowers, as well as the ftamens. In the double-bloffomed cherry the piftil is actually changed to a leaf. The ftyle in that cafe becomes dilated, ferrated, and affumes a deep green colour, turning to a perfect leaf, and the ftigma, without much vifible change, becomes the gland terminating the leaf, like what is found on the original and proper foliage. Some plants, which increafe plentifully by root, are fubject to have the piftils weakened and abortive, as in Mint, and *Lilium bulbiferum*; but they do not, in fuch cafes, undergo any transformation. Many whole genera have rudiments only of piftils in fome flowers, and of ftamens in others, as the *Rhodiola*; fuch plants being in effect either dioecious, or monoecious. Still more have, intermixed with perfect flowers, whofe male as well as female organs are complete, a greater or lefs number whofe ftamens only are perfect and effective, their piftils being imperfect, or entirely obliterated. Such is the nature of a great majority of tropical trees, which are therefore, in Linnæan language, polygamous, and ftrictly belong to the clafs *Polygamia*; but fo much difficulty attends a clofe adherence in practice to this principle, in confequence of accidental variations, that it is found beft to confider no plants as polygamous that have not a difference of ftructure in their feveral flowers. See POLYGAMIA.

PISTILS FIORD, in *Geography*, a bay on the N. coaft 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 yellowifh-white, and in fmall round drops, or lumps of a roundifh fhape, and firm confiftence.

PISTOCCHI, FRANCESE-ANTONIO, of Bologna, in *Biography*, one of the greateft ftage fingers of the feventeenth century, began to flourifh, both as a performer and compofer, about the year 1679. He was retained fome time at the court of the margrave of Brandenburg as maeftro di capella; but late in life, after eftablifhing a fchool of finging at Bologna, which was afterwards continued by his difciple Bernacchi, he retired to a monaftery, where he ended his days.

An oratorio of his compofition, which we were fo fortunate as to find in Italy, called "Maria Virgine Adolorata," has more merit of expreffion, and elegance of melody, than any vocal mufic of the fame century. There is no date to this compofition; but by the fimplicity of the ftyle it feems to have been produced about the end of the 17th century, at which time recitative, freed from formal clofes, and in poffeffion of all its true forms, was occafionally extremely pathetic and dramatic; and Piftocchi feems a more correct contrapuntift than the generality of opera fingers whom the demon of compofition feizes at a period of their lives, when it is too late to begin, and impoffible to purfue fuch ftudies effectually, without injuring the cheft, 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 folemn, all the degrees of the diminution of found are ufed: as *piano, più piano, pianiffimo*, equivalent to the *diminuendo, calando*, and *fmorzando*, of the prefent times.

Piftocchi publifhed fix 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 *Piftoria*, in *Geography*, a city of Etruria, which is an epifcopal fee, remarkably well built, and from the unufual widenefs of the ftreets and folidity of its edifices, appearing both airy and magnificent. Of thefe buildings, the principal are the cathedral, the church called "Del Umilla," and the feminary. The dome of the firft, the front, or rather the veftibule of the fecond, and the general difpofition of the third, are much admired. Thofe eftablifhments called feminaries in Italy and France, are not merely academies or fchools, but colleges, where the young clergy are inftructed in the peculiar duties of their profeffion, under the infpection of the bifhop, during three years previous to the time of their receiving holy orders. Hence each diocefe has its feminary, which is always in the epifcopal city, and generally contiguous to the bifhop's palace. In Piftoia there are two public libraries. The river Ambrone flows clofe to the town. The furrounding country is not only fertile and well cultivated, but unufually picturefque.

PISTOL, a little fire-arm, borne at the faddle-bow, at the girdle, or in the pocket.

The piftol is faid to have taken its name from Piftoia, a city in Italy; where, as Fauchet tells us, it was firft made. Borel derives the word from *fiftula, pipe;* the barrel of this piece bearing fome refemblance to a flute.

It is faid that from harquebuffes (fee HARQUEBUSS) came piftole, or piftolets, with wheel-locks, the barrels of which were only one foot long, being the harquebufs in miniature. The Germans are faid to have ufed them in France before the French; and the horfemen who received them in the time of Henry II. were called "Piftoliers." They are mentioned as early as the year 1544, under the reign of Francis I. Piftols with a fimple fpring, inftead of the wheel formerly ufed, fufils and mufketoons, are of modern invention; but the inventors are not known. In the year 1658, the ufe of wheel-locked piftols was not abolifhed. The wheel-lock was a little folid wheel of fteel, fixed againft the plate of the lock of the harquebufs or piftol; 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 faftened, which twifted round it on the wheel being turned, and bent the fpring by which it was held; to bend this fpring, a key was made ufe of, into which the exterior end of the axis was inferted. By turning this key from left to right, the wheel was made to revolve, and by this movement a little flider of copper, which covered the pan with the priming, retired from being over it; and by the fame movement the cock, armed with a flint like the cock of a fufil, was in a ftate to be difcharged, on pulling the trigger with the finger, as in ordinary piftols; 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-weft paffage, mentions this bay as the only remaining part of Hudfon's Bay where this weftern communication may exift. But this has been examined; and upon the authority of captain Chriftopher, who failed from fort Churchill in the year 1761, for the purpofe of examining Chefterfield's inlet, through which it was fuppofed there might be a paffage to the Weftern ocean, the reader may be affured that there is no inlet of any confequence in all that part of the coaft. Nay, he has, in an open boat, failed round the bottom of what is called Piftol bay, and inftead of a paffage to a weftern fea, found it does not run above three or four miles inland. See NORTH-WEST *Paffage*.

PISTOLE, DOUBLOON, or *Doblon*, in *Commerce*, a gold coin ftruck in Spain.

The piftole 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 tranfactions 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 efcudos, or quadruple piftole, which paffes for 320 reals vellon; the dobloon of 4 efcudos, or double piftole for 160; the dobloon de oro, or piftole for 80; the efcudo for 40; and the coronilla, or veinten de oro, for 20.

In 1786, the ftandard of the gold was reduced to 21 carats for the different dobloons and their divifions, and to $20\frac{3}{5}$ carats for the coronilla, or veinten de oro. The quadruple piftole, or dobloon of 8 efcudos, coined fince 1786, contains $366\frac{1}{6}$ troy grains of fine gold, and is therefore worth 3*l.* 4*s.* $9\frac{1}{2}$*d.* valued in Englifh gold coin; and the fubdivifions of the quadruple are in proportion: the allowance for remedy may be valued at 6*d.* in the quadruple. By the affay of the London mint, the weight of the quadruple is 17 dwt. 8 gr., and its finenefs $4\frac{1}{2}$ gr. worfe than Englifh ftandard: hence its value in Englifh gold coin is 3*l.* 4*s.* $0\frac{1}{2}$*d.* The value of gold in the Spanifh coins is to that of filver as 16 to 1.

The affay, weight, &c. of the different Spanifh gold coins, are as follow.

	Affay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grs.	L. s. d.
Quadruple piftole, or dobloon, coined before 1772	W. 0 $1\frac{1}{2}$	0 17 $8\frac{1}{2}$	375.4	3 6 $5\frac{1}{4}$
Double piftole, before 1772, fingle and half in proportion - - - -	W. 0 $1\frac{1}{2}$	0 8 $16\frac{1}{4}$	187.7	1 13 $2\frac{1}{2}$
Quarter piftole, or gold dollar, before 1772	W. 0 2	0 1 3	24.2	0 4 $3\frac{1}{4}$
Quadruple piftole, or dobloon of 1772, the double and fingle in proportion -	W. 0 $2\frac{1}{4}$	0 17 $8\frac{1}{2}$	372.	3 5 10
Half piftole, or efcudo de oro of 1772 -	W. 0 $2\frac{1}{2}$	0 2 4	46.4	0 8 $2\frac{1}{2}$
Quarter piftole, or golden dollar of 1772	W. 0 3	0 1 3	24.	0 4 3
Quadruple piftole of 1801 - -	W. 1 1	0 17 9	360.6	3 3 10
Double piftole of 1801 - - -	W. 1 1	0 8 $16\frac{1}{2}$	180.3	1 11 11
Piftole, or doubloon of 1801 - -	W. 1 1	0 4 $8\frac{1}{4}$	90.1	0 15 $11\frac{1}{2}$
Coronilla, or golden dollar of 1801 -	W. 1 $2\frac{1}{2}$	0 1 3	23.	0 4 1

The

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 SAPIENTIÆ 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 ſcudo, 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, JOSEPH 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 Auguſt. 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 rixdollars 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 $38\frac{6}{17}$ 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 $35\frac{1}{2}$ pieces weigh a Cologne mark of gold, $21\frac{1}{2}$ carats fine: they are then called "paſſier piſtoles." The aſſay of the George d'or of Hanover is W. 0 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, 16*s.* $4\frac{1}{2}$*d.* The aſſay of Heſſe-Caſſel piſtole is W. 0 car. $2\frac{1}{2}$ gr.; weight, 0 oz. 4 dwt. $7\frac{1}{4}$ gr.; contents in pure gold, 92; value in ſterling, 16*s.* $3\frac{1}{2}$*d.* Aſſay of Manheim piſtole W. 0 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, 16*s* $4\frac{1}{2}$*d.*. The George d'or of Hanover bears on the front the king's arms; legend, GEORG. II. D. G. M. B. F. ET H. REX. F. D.; reverſe, V THALER (5 rix-dollars of account), and under this the date; legend, BRUNS. 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 piſtoles, 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 Manheim 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 ſols; 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. 0 car. 2 gr.; weight, 0 oz. 4 dwt. $7\frac{3}{4}$ gr.; contents in pure gold, 92.5 gr.; value in ſterling, 16*s.* $4\frac{1}{2}$*d.* The aſſay of the new piſtole is W. 0 car. $0\frac{1}{2}$ gr.; weight, 0 oz. 3 dwt. $15\frac{3}{4}$ gr.; contents in pure gold, 80; value in ſterling, 14*s.* 2*d.*

The aſſay of the piſtole of the Helvetic republic of 1800 is W. 0 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, 18*s.* 9*d.* The aſſay of the piſtole of Lucerne is W. 0 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, 18*s.* 9*d.* The aſſay of the piſtole of Soleure is W. 0 car. $1\frac{3}{4}$ gr.; weight, 0 oz. 4 dwt. 22 gr.; contents in pure gold, 106.8 gr.; value in ſterling, 18*s.* $10\frac{3}{4}$*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. 0 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, 1*l.* 3*s.* 9*d.* The aſſay of the piſtole coined ſince 1785 (half, &c. in proportion) W. 0 car. $1\frac{3}{4}$ gr.; weight, 0 oz. 5 dwt. 20 gr.; contents in pure gold, 127.8 gr.: value in ſterling, 1*l.* 2*s.* $7\frac{1}{2}$*d.*; The aſſay of the doppia or piſtole of Genoa, (the pieces of of 2, 4, and 5 piſtoles in proportion) is W. 0 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, 16*s.* $6\frac{1}{4}$*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 PISTOIA.

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 Wittemberg.

PISTYRUS, or PISSIRUS, in *Ancient Geography*, a town in the western part of Thrace, near Mestras, 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 πισον, which means the same thing, and which others derive from πτισσω, *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, *pesiere*; the Italian *piso*; the Welsh *pus*; all synonimous. 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. comosum; 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. (Pisi pulchra species, folio angulofo; Bauh. Hist. v. 2. 297. Moris. 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 serrated; 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, serrated. 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 together

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 sive Ervilia; Ger. Em. 1249. Aracus 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 *footstalks* 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; Masters'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; Essex 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 sticks 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 lattter 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 sticks, 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 sowed 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 sticked.

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.

When

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 ſticked 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 ſouth 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 ſucceſſional 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 ſticked, 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; likewiſe 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 or tan: the latter, where it can be obtained eafily at a moderate expence, is confiderably the beft for this purpofe. It fhould 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 fhould be laid eight or ten inches thick all over the bed; then in a dry mild day, the plants may be taken up, raifing them with their roots as entire as poffible, with what earth will readily hang about the fibres; and after drawing fmall drills in the earth of the hot-bed, from the back to the front of the frame, a foot and a half afunder, and about an inch deep, the plants fhould be put in the drills, not more than an inch apart, covering in the earth clofe to their roots and ftems, and giving a very light watering, juft to fettle the earth; after which the lights fhould be put on, being careful to raife them occafionally at the upper end, to give vent to the fteam, &c. And at firft planting out, when in funny weather, if the plants fhould flag, a moderate fhade fhould be given in the middle of the day, till the plants have taken root, and eftablifhed themfelves.

After this, frefh air muft be admitted to the plants daily, in fine weather, to ftrengthen them, by tilting the upper end of the lights, according to the temperature of the bed and outward air; keeping them clofe in cold nights, and covering alfo with mats. Occafional moderate waterings fhould likewife be given in fine days; and, as the plants advance in growth, a little earth be drawn up to their ftems once or twice; repeating the moderate refrefhments of water frequently, as the warm feafon advances; which may be given more freely when the plants are in bloom. And according to the advanced growth of the plants, and increafed warmth of the weather, a larger fhare of frefh air in proportion fhould be given; and when they are in bloffom, if the fun at any time appears too violent for them through the glaffes, it is advifable to give a very flight fhade an hour or two in the heat of funny days: likewife, when in full bloffom, and fruiting, to admit plenty of free air; even fometimes, in fine days, fhoving the glaffes entirely off; alfo ftill continuing the waterings more abundantly during the time of fetting and growth of the pods, and indulging them with the benefit of warm fhowers of rain. In this way, the plants may be brought to bearing in March or April; and by a fucceffion of two crops, in hot-beds made at three or four weeks' interval, and managed as above, a fupply be continued till the natural ground crops come into bearing in May.

Where there is the convenience of fruit forcing-houfes, hot-walls, &c. a few of the earlieft kinds, either previoufly raifed in young plants an inch or two in growth, as in the hot-bed culture, or, in default of it, the feed fown; and which being in pots, are placed in thefe departments: or, where there are internal borders of earth, fome young plants may be placed therein. The internal moderate heat of the above departments, effected either by bark-beds, &c. or fire, or both occafionally, in a requifite degree for forcing the fruit-trees to early production, forwards them alfo, fo as to have fome for gathering in the moft early feafon, in a fmall proportion.

Method of Culture in the Field.—Where defigned to raife crops, in order to gather the produce green and young, for the fupply of markets, November, or rather December, is foon enough to begin the firft fowings, efpecially in open expofed grounds; a dry light foil being chofen for the more forward fowings. As to the forts, any of the hotfpurs may be ufed for the forward crops; and for a general crop, the Reading hotfpur is excellent; and after that fort, the Mafters's and Ormrod's, &c.; but of the large kinds, the marrowfats and Spanifh morattoes fhould be chofen for the main crops.

The ground for their reception muft be prepared by proper ploughing and harrowing; drills are then to be drawn with a hoe crofsways the lands, or with a drill-plough lengthways, two feet at leaft, or two and a half afunder for the early, and three for the larger forts. As no fticks are intended for thefe large field crops, having fown the feed, it fhould be covered in either with the hoe, rake, or harrow; but the hoe or rake will cover them more evenly, and almoft as expeditioufly. When they come up, they muft be kept clean from weeds, by broad-hoeing; but this is fometimes performed in fields by horfe-hoeing, for the fake of expedition; which, having hoes fixed in a fort of plough horizontally, is drawn by a horfe between the rows, a man holding the plough-fhafts to guide it. But as this can only cut down the weeds, a common drawing hand-hoe muft be ufed to earth up the plants: though this is often difregarded in the field-culture, it, however, proves very beneficial to the crops.

In thefe cafes, the rows fhould be laid down fo as to face the fun as much as poffible.

Method of faving Seed.—In order to fave feed, fome of each fort fhould be fuffered to ftand entirely for that purpofe, or fome fown of each purpofely in different parts; and the whole produce fuffered to remain and ripen for feed.

In the latter mode, they fhould be fown in February, in fome open ground, in rows two or three feet afunder, no fticks being required; and, when the plants come up, be kept clean from weeds by hoeing, the earth being laid up to their ftems once or twice. When they are in bloom, they fhould be examined row by row, to fee if there be any degenerate fort, which, when prefent, muft be pulled out; or if any improved variety be difcovered, to mark it; which is the only method to preferve both the purity of the known forts, and to procure new varieties. For example: if amongft the hotfpurs any large forts appear, they fhould be removed directly; alfo any hotfpurs, &c. from amongft the large kinds; and different forts of any of thefe from each other. And if any new fort difcovers itfelf, either by flowering earlier than all the reft, or poffeffing fome other fingularity, or noticeable merit for culture, it fhould be carefully marked; the feed being faved feparate, to fow feparately for furnifhing a proper increafe.

According as the feeds of the different forts ripen in July and Auguft, which is difcoverable by the pods changing brown, and the feed becoming a little hard, the haum fhould be cut or pulled up in dry weather, and expofed in heaps to the fun, turning them every day; and when the feed is become perfectly dry and hard, it may either be threfhed out directly, or ftacked up in a dry fituation, till another opportunity: but when threfhed, each fort muft be kept feparate, and, when properly cleaned, be put up in facks, with the name of each upon them.

PIT *and Gallows*, in our *Ancient Cuftoms*. See FURCA and FOSSA.

PITS, *Brine*, the name given by the people of Worcefterfhire and Chefhire, to the wells or pits affording the falt water, out of which they extract the falt.

Thefe waters, though they all contain falt, yet have other things alfo in them, and thefe not in fmall quantity. They all contain a very large proportion of ftony matter: this is common to the whole fet, but particular fubftances befide this

this are found in the particular pits. At Northwich, in Chefhire, there are four pits, the water of which ftinks very ftrongly of fulphur, and contains fo 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 falt, common at our tables under the name of bafket-falt, and having no fuch properties.

There is a vaft quantity of ftony matter precipitated from thefe pans of brine, in the boiling of them to falt: this is partly faved in fmall pans fet at the fide of the boiler, and partly precipitates to the bottom of the pan, where it forms a cruft like that at the bottom and fides of our tea-kettles, which the workmen find it neceffary to remove every week; but there is no vitriol or fulphur feparated. Phil. Tranf. N° 150.

In the country near where thefe brine-pits are, the inftruments ufed in boring often bring up fine and hard falt; fo that they give proofs of there being rocks of falt in many places.

All along the river Weever, on each fide, the earth affords brine wherever it is opened; but all thefe are not fit for boiling, many of the pits affording a brine too weak to be worked to any advantage. The very ftrongeft pits fometimes alfo become at once too weak: this is owing to the irruption of frefh fprings into them, and fometimes the river itfelf makes its way into them, and overflows them with fuch a quantity of frefh water, that they are utterly fpoiled. The brine-pits at Wefton, near Stafford, afford a brine that ftinks like rotten eggs: this turns inftantly to ink with galls, and purges and vomits violently, if taken even in a fmall quantity. This, in boiling, depofits a white flaky fand, or ftony matter, without fmell or tafte, and the falt is pure and fine.

The pit at Droitwich, in Worcefterfhire, affords no fand in the boiling, nor any the leaft fediment of the ftony matter at the bottom of the pan, and the falt is the pureft of all the others; and by the people of the country it is efteemed the moft wholefome, becaufe of its being without the fand.

This and the other pits hereabout, all have the fmell of rotten eggs, efpecially after a little reft, as on the Monday morning after the Sunday's reft. If meat be put to pickle in the brine of thefe pits, inftead of being preferved, it will ftink in twenty-four hours, fometimes in twelve, yet they yield the beft falt of any inland pits in the world.

The fulphur fpaws of Yorkfhire, which are very numerous in different parts of the county, all ftink violently of rotten eggs; but if well drawn and worked, they would prove as inoffenfive as the reft, and only fo many weaker or ftronger brine pits; and the fmell is no other than that of the Chefhire and Staffordfhire brine, when it has been left fome time at reft. It is remarkable, that though the ftony matter is depofited in fuch vaft plenty by the waters of all our falt fprings, it is not found in any abundance in thofe places where falt is made out of fea-fand, as in Lancafhire, and fome other places; fo that it is much more than the natural quantity of fpar contained in water that is thus depofited; and indeed it appears from trial, that the brine of our falt fprings, in general, contains more than twenty times the quantity of fpar that common water does.

This ftony matter feparates itfelf from the water before the falt does, and thus it appears in many other waters impregnated with mineral particles. The vitriolic waters all contain ochre and falt, and in all thefe the ochre feparates itfelf firft in the boiling, and then the vitriol; and the ftony matter precipitated from common falt fprings affords, on an analyfis, the falt called *nitrum calcareum*, in confiderable abundance. Phil. Tranf. N° 156. See SALT.

PITS, *Forcing*, in *Gardening*, fuch as are formed and conftructed on fomewhat fimilar principles to thofe in hot-houfes, ftoves, &c., and which are found of very great ufe and advantage in raifing crops of culinary exotics, as cucumbers, and many other forts;—in forcing common vegetables, as afparagus;—in raifing young exotics, as pines and other plants;—or in producing grapes. For thefe general purpofes, pits have been conftructed with one fingle fire, which are capable of producing four different temperatures of heat at the fame time. They are, confequently, 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 HOT-HOUSE and STOVE.

PIT-*Coal*. See COAL.

Vegetables have been confidered as the materials for the formation of pit-coal; but M. Chaptal obferves, that a few forefts, being buried in the earth, are not fufficient to form the mountains of coal which exift in its bowels. He thinks fome provifion, greater and more proportioned to the effect, is requifite, and this he finds only in the prodigious quantity of vegetables which grows in the feas, and which is ftill increafed by the immenfe mafs of thofe that are carried down by rivers. Thofe vegetables carried away by the currents, are agitated, heaped together, and broken by the waves; and afterwards become covered with ftrata of argillaceous or calcareous earth, and are decompofed. It is eafier to conceive how thefe maffes of vegetables may form ftrata of coal, than that the remains of fhells fhould form the greater part of the globe. In confirmation of this theory, Chaptal alleges, the prefence of vegetables in coal mines; the impreffions of fhells and of fifh that are found in the ftrata of coal, and not unfrequently fhells themfelves; and alfo the evidence afforded by the nature of the mountains which furnifh coal, from which it appears that their formation is fub-marine; for they all confift either of fchiftus, or grit, or limeftone. The fecondary fchiftus is a kind of coal, in which the earthy principle predominates over the bituminous. As the origin of the fchiftus, on which the texture of the vegetable, and the impreffion of fifh are well preferved, is fub-marine, the fame muft likewife be the origin of the coal diftributed in ftrata through its thicknefs. The grit-ftone confifts of fand heaped together, carried into the fea by rivers, and thrown up againft the fhores by the waves. The ftrata of bitumen which are found in thefe cannot but come from the fea. Calcareous earth rarely contains ftrata of coal, but is merely impregnated with it; the bitumen forming a cement with the calcareous earth.

Pit-coal is ufually found in ftrata in the earth, almoft always in mountains of fchiftus or grit. The fecondary fchiftus is the bafis of all pit-coal, and the quality of the coal moftly depends upon the properties of this bafis. When the fchiftus predominates, the coal is heavy, and leaves a very abundant earthy refidence after its combuftion. As the formation of the pyrites, as well as that of coal, arifes from the decompofition of vegetable and animal fubftances, all pit-coal is more or lefs pyritous; fo that we may confider pit-coal as a mixture of pyrites, fchiftus, and bitumen. The different qualities of coal, therefore, arife from the difference in the proportion of thefe principles. When the pyrites is very abundant, the coal exhibits yellow veins of the mineral, which are decompofed as foon as they come in contact with the air; and form an efflorefcence of fulphat of magnefia, of iron, of alumine, &c. When pyritous coal

is

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 schistus, 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 TAR.) Pit-coal likewise affords ammoniac 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 sulphats 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-*Visch*, 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 Brasilian 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 method of teaching the principles of phyfiology and pathology on mathematical principles, was, however, not very intelligible by the ftudents, and met with confiderable oppofition from the members of the faculty; infomuch that, after refiding about a year, during which fhort fpace he publifhed feveral differtations illuftrative of the advantages of applying mathematical principles to medicine, he quitted Leyden rather unceremonioufly, deferting a chair, in which he had found himfelf fomewhat neglected.

On his return to Scotland in 1693, he married the daughter of fir Archibald Stephenfon, an eminent phyfician in Edinburgh, and was induced again to fettle there, when he wrote a valedictory letter to the univerfity of Leyden. His lady did not furvive her marriage many years; but fhe 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 republifhed the Differtations which he had formerly printed, together with fome additional ones; they were dedicated to profeffor Bellini of Pifo, who had adopted the mathematical doctrines of phyfiology, and had paid a fimilar compliment to him in his Opufcula. This edition was publifhed in 4to. at Rotterdam, under the title of "Difputationes Medicæ," and contains eight effays. The laft edition, which appeared during his life, was publifhed at Edinburgh, a few months before his death, under the fame title; but they were reprinted in 1714 at Rotterdam, and in 1715 at Venice, under the title of "Opufcula Medica." After his death, his lectures to his pupils were publifhed, under the title of "Elementæ Medicinæ Phyfico-Mathematica," Lond. 1717; and in an Englifh tranflation in 1727. All his works have been collected and printed together at Venice, 1733, and Leyden, 1737, in 4to. Pitcairn ufed to amufe himfelf occafionally with writing Latin poetry, for which he had no mean talent; and a few of his compofitions in this way were printed, with the title of "Poemata Selecta," which are chiefly of the epigrammatic kind. Eloy Dict. Hift. de la Medecine. Hutchinfon, Biographia Medica.

Pitcairn's *Ifland*, in *Geography*, an ifland in the South Pacific ocean, fo called by captain Carteret in 1767, after a young gentleman, fon to major Pitcairn of the marines, who was loft in the Aurora, and who had difcovered it. Upon approaching it, it appeared like a great rock rifing out of the fea, not more than five miles in circumference, and feeming to be uninhabited. It was neverthelefs covered with trees, and a ftream of frefh water was obferved to run down one fide of it. A number of fea birds hovered round it, and the adjoining fea feemed to have fifh. It is feen at the diftance of more than fifteen leagues, and lies about a thoufand 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. Prefident of the College of Phyficians, and a truftee of the Britifh Mufeum; one of the moft amiable and benevolent of men, who employed the leifure of the extenfive medical practice, to which his long life was devoted, to the cultivation of a botanic garden at Iflington. There he entertained his friends, and communicated his fcientific riches, with the fame liberality with which he beftowed the moft valuable charity of his medical advice, on thofe who ftood in need of it. In conjunction with the no lefs diftinguifhed Fothergill, Dr. Pitcairn fent a perfon to collect on the Alps of Switzerland, many curious plants, previoufly unknown to Englifh cultivators, the great number of which acquifitions may be feen in the Hortus Kewenfis of the late Mr. Aiton and his fon. The name of *Hepetis*, appropriated by Swartz, from Solander's manufcripts, to this fame genus, has by common confent been given up, in favour of the claims of fo 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 Illuftr. t. 224. (Hepetis; Swartz Prodr. 56. Schreb. 798.)—Clafs and order, *Hexandria Monogynia*. Nat. Ord. *Coronariæ*, Linn. *Bromeliæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, in three deep, lanceolate, equal fegments, converging into a tube, permanent, its bafe adhering to the lower half of the capfule. *Cor.* Petals three, oblong, twice the length of the calyx, cohering in the form of a tube, withering. Nectary a fcale at the bafe of each petal. *Stam.* Filaments fix, thread-fhaped, fhorter than the corolla, inferted into the bafe of the calyx; anthers erect, linear-arrow-fhaped. *Pift.* Germen fuperior, ovate, with three furrows; ftyle thread-fhaped, the length of the ftamens; ftigmas three, twifted together. *Peric.* Capfule ovate, pointed, three-lobed, with three longitudinal furrows, three cells, and three valves; the partitions from the inflexed valves, foon feparating at the upper part. *Seeds* numerous, minute, oblong, winged.

Eff. Ch. Calyx in three deep fegments, inferior, permanent. Petals three, with a fcale at the bafe of each. Stigmas three, twifted together. Capfule of three lobes, burfting at their inner edge. Seeds winged.

1. P. *bromeliæfolia*. 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 fpinous teeth. Flower-ftalks fmooth, equal to the calyx, longer than the bracteas.—Native of Jamaica, on the fides of fhady rocky precipices, where it flowers in the middle of fummer. *Swartz.* It was brought to England before 1781, and is readily increafed in the ftove by offsets. *Root* perennial, of numerous long ftout fibres. *Stem* none. *Leaves* numerous, radical, fheathing, fpreading, very long, linear, taper-pointed, channelled, keeled, fmooth, moft glaucous, beneath an inch wide; their edges a little recurved, fringed with numerous fpinous teeth, efpecially the outermoft; the inner ones are often deftitute of teeth, particularly upwards. *Stalk* central, radical, erect, two or three feet high, round, bearing a few toothed *bracteas*, or fmall leaves, occafionally at the bottom, the upper part racemofe, fomewhat pyramidal, fometimes branched, many-flowered. Partial *ftalks* alternate, horizontal, fimple, fingle-flowered, fmooth, an inch long. *Bracteas* folitary at the bafe of each partial ftalk, lanceolate, taper-pointed, coloured, fhorter than the ftalk, permanent. *Flowers*, as well as their common and partial *ftalks*, and *bracteas*, of a beautiful rofe-colour approaching to fcarlet. *Calyx* an inch long, quite fmooth. *Petals* more than twice as long, withering and fading quite in a different manner from the calyx. *Capfule* the length of the calyx, with long-pointed valves.

2. P. *anguftifolia*, Narrow-leaved Pitcairnia. Ait. n. 2. Willd. n. 2. Redout. Liliac. t. 76. Curt. Mag. t. 1547. —Leaves fringed with fpinous teeth. Flower-ftalks downy, longer than the downy bracteas. Calyx downy at the bafe, twice the length of the flower-ftalks.—Native of the ifland of Santa Cruz, where it was difcovered by Mr. Ryan, and fent by him to Kew in 1777. It flowers in the ftove in winter. This has narrower and more fpinous *leaves* than the former; much fhorter downy partial *ftalks* and *bracteas*. *Flowers* variable in colour, at leaft in our gardens, according to the greater or lefs 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. Repos. t. 322. Curt. Mag. t. 856, excluding the synonym of Redouté.—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 *bromeliæfolia*, 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. *Bracteas* 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 *bracteas* 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. Repos. t. 249.)—Leaves entire; slightly spinous at the base. Flowers nearly sessile, crowded. Bracteas 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 *bracteas*, 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 zopissa 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 soot of burned pitch: and it is likewise prepared by collecting the soot 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 Pharmacopeias "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 viscidity and unctuosity, 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 asphaltes, 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 asphaltes of commerce is extracted from the mine of Annemora, and more particularly in the principality of Neufchatel. M. Pallás found springs of asphaltes 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 pretroleum. 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 $\frac{2}{9}$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 gliſtening, and its luſtre is reſinous. The fracture is imperfect and flat: the fragments indeterminately 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 uran 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 uran 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, uran-mica and uran-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 ſtoop 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 Porſeloue.

PITCHIN, a town of Perſia, in the province of Mekran; 100 miles W. of Kidge.

PITCHING. See Pavement.

Pitching, in *Seamanſhip*, 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 fetting down every fack of corn, or pack of merchandize, in a fair or market.

PITCHSTONE, in *Mineralogy*, a fpecies of the clay genus, of which the colours are black, green, brown, red, and fometimes, but rarely, grey. Of the black, there are the greenifh, greyifh, and brownifh-black. From greenifh-black it paffes through blackifh-green into mountain-green, afparagus-green, leek-green, olive-green, and oil-green. From olive-green it paffes into liver-brown, yellowifh and reddifh-brown, and again into light-blood and brick-red. The varieties of the grey are fmoke and dark afh-grey, and fometimes a kind of grey which paffes into brown. It has fometimes a blueifh colour. Its colours are not lively, but always fomewhat deep and muddy, or rather mixed with grey and brown. It is generally uniform, and it feldom happens that feveral colours occur together. It is found almoft always maffive, in great beds and rocks. Internally its luftre is fhining, fometimes fplendent, fometimes gliftening, and intermediate between refinous and vitreous, yet more inclining to the firft. The fracture paffes from the large conchoidal into the coarfe fplintery and coarfe grained uneven. The fragments are indeterminately angular, more or lefs fharp-edged. It occurs fometimes in coarfe diftinct concretions, and the furface of the concretions is fomewhat bent; alfo in prifmatic generally wedge-fhaped diftinct concretions, of which the furface is fmooth. It is commonly tranflucent in a fmall degree; the black variety is only tranflucent on the edges. It is brittle; eafily frangible, and not very heavy. The fpecific gravity of the Saxon pitchftone is about 2.3. Before the blowpipe it is fufible without addition. The black variety, heated to 21° of Wedgewood's pyrometer, fwelled a little, its colour was flightly altered, the furface glazed, and internally it was porous; at 31° it was foftened; at 65°, the intumefcence was more confiderable; and at 100° it was ftill veficular, but more compact. The blackifh-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 ftill porous. The pitchftone of Meiffen, by analyfis, gave of

Silica	73.00
Alumine	14.50
Lime	1.00
Oxyd of iron	1.00
Oxyd of manganefe	0.10
Natron	1.75
Water	8.50
	99.85
Lofs	15
	100.00

It occurs in beds in the newer porphyry formations, and in beds and veins that belong to the neweft flotz trap formation. It is found in great quantity in the electorate of Saxony, particularly in the neighbourhood of Meiffen, alfo in Hungary, as at Tokay and Schemnitz; in fome of the iflands of the Archipelago, where it was firft obferved by Mr. Hawkins; and at Glamofcard in the ifland of Skye. It was firft difcovered about fixty years ago in the neighbourhood of Meiffen in the electorate of Saxony, and was named pitchftone from the ftriking refemblance which feveral of its varieties bear to pitch.

PITCHT, Shoulder. See Shoulder *Pitcht*.

PITCHY *Iron-Ore*, in *Mineralogy*, a metallic foffil, of a very deep reddifh-brown, which fometimes paffes into black. It occurs maffive with a rough furface, owing to a covering of iron-ochre. Internally it is gliftening, and its luftre is femi-metallic, paffing into refinous. The fracture is compact, and fometimes foliated. It is opaque, not eafily frangible, and brittle. Its fpecific gravity is nearly 4. It melts very eafily into a black enamel before the blowpipe; and its conftituent parts are, phofphoric acid, oxyd of iron, and oxyd of manganefe. It is found at Limoges in France.

PITEA, or Pithea, in *Geography*, a fea-port town of Sweden, in Eaft Bothnia, fituated on a fmall ifland at the mouth of a river of the fame name: joined to the continent by a wooden bridge. The ftreets are parallel, and the church is at a confiderable diftance from the town. It has a commodious harbour and a good fchool. It was firft built in 1621 by Guftavus Adolphus, three miles from its prefent fcite higher in the country; but in 1666 this town was deftroyed by fire, and the prefent town was built in its prefent fituation. N. lat. 65° 23′. E. long. 21° 22′.

PI-TEOU, a fmall ifland near the coaft of China. N. lat. 25° 20′. E. long. 119° 14′.

PITESZTI, a town of Walachia; 50 miles N.W. of Buchareft. N. lat. 44° 57′. E. long. 24° 49′.

PITH, in *Vegetable Phyfiology*. See Medulla.

PITHECALOPEX, the *Semivulpa*, or *Ape-fox*, in *Zoology*, a name given by Aldrovandus and fome others to that ftrange American animal which we call the opoffum.

The name is compounded of that of the fox and the ape; of the natures of both which animals it is fuppofed by fome to participate.

PITHECON Portus, in *Ancient Geography*, a port of Africa, in Libya, near Carthage.

PITHECUSSÆ, iflands of the Tyrrhenian fea, near the coafts of Campania.

PITHIAS, or Pithites, with fome writers, a fort of comet, or rather meteor, in form of a tub. Of thefe it is faid there are divers kinds, *viz.* fome of an oval figure, others like a tun or barrel fet perpendicular, and fome like one inclined or cut fhort off; others having a hairy train or bufh, &c.

PITHING, the name of an operation performed for killing animals fuddenly and without pain. This is effected with a narrow doubled-edged poniard paffed in between the fkull and firft vertebra of the neck: in this way the medulla oblongata is divided, and the animal inftantaneoufly deprived of fenfibility. This operation was performed by Mr. Cline junior, affifted by Mr. Brodie and Mr. Clift, on a camel that had been the fubject of Mr. Home's experiments. (See Phil. Tranf. vol. xcvi. p. 359.) In the common mode of pithing cattle, the medulla fpinalis only is cut through, and the head remains alive, which renders it the moft cruel mode of killing animals that could be invented. See Dr. Dugard's Experiments, publifhed in the Board of Agriculture's Report for Shropfhire, by Jofeph Plumley, M. A. p. 246.

PITHIVIERS, in *Geography*, a town of France, and principal place of a diftrict, 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 kiliometres, in 22 communes. N. lat. 48° 11′. E. long. 2° 24′.

PITHOU, Peter, in *Biography*, a magiftrate diftinguifhed for his integrity and erudition, was born in 1539 at Troyes, in Champagne. He received a good education, after which he ftudied the law as a profeffion. When called to the bar his natural diffidence fo completely embarraffed him, that he found it neceffary to renounce that branch of his profeffion. Being of the reformed religion he had nearly been facrificed

facrificed at the horrid maffacre of St. Bartholomew's day, which probably had fuch an effect upon his mind, naturally timid, that in the following year he conformed to the Catholic church, and foon after obtained the office of attorney-general in the chamber of juftice in Guienne. When Gregory XIII. had iffued a brief againft the ordinance of Henry III., concerning the council of Trent, Pithou publifhed a memoir, in which he developed the fecret purpofes of the brief, and vigoroufly defended the caufe of his king and country. After Henry IVth's converfion, as it has been called, he ufed his beft endeavours to reduce the city of Paris to allegiance. He was one of the writers of the "Catholicon d'Efpagne," a fatire which proved very effectual in throwing ridicule upon the Spanifh party. He alfo publifhed a little work, which he pretended was a tranflation from the Italian, entitled "Raifons pour lefquelles les Evêques de France ont pu de droit donner l'Abfolution à Henry de Bourbon," which was feveral times printed, and which made many converts to the royal caufe. He died in the year 1596, at the age of 57. He is reprefented by De Thou as one of the firft men of the age, as well for probity, candour, and real piety, as for the extent of his learning, the foundnefs of his judgment, and his political wifdom. He had a moft intimate acquaintance with every thing relative to French hiftory and antiquities, and his profound knowledge of the civil law, in which he was fcarcely inferior to Cujas himfelf, under whom, in his youth, he had ftudied. The works of this gentleman are, "Traité des Libertès de l'Eglife Gallicane," in four vols. folio, and which is thought to be the bafis of all that has been written on the fame fubject: "A commentary on the Cuftoms of Troyes," and other tracts on civil and canonical jurifprudence. He publifhed, in 1609, a large collection of "Opufcules," alfo editions of feveral monuments of antiquity, chiefly relating to the hiftory of France. He had collected a curious and very valuable library, rich in MSS., which by his will he directed to be fold only to a fingle purchafer acquainted with its value; this precaution, however, did not prevent its difperfion. By his deep and extenfive erudition he acquired the title of the French Varro, and his name was not lefs celebrated abroad than in his own country. Gen. Biog.

Pithou, Francis, brother of the preceding, born in 1544, was likewife brought up to the law, and exercifed the office of attorney-general to the chamber of juftice, eftablifhed by Henry IV. to check the frauds of the financiers. He affifted at the conferences of Fontainebleau, and was one of the commiffioners for regulating the boundaries between France and the Low Countries. After this he retired, paffing his life in ftudy, emulating his brother in the variety and depth of his learned refearches. He died in 1621. He took a part in moft of his brother's publications, and efpecially contributed to the elucidation of the "Body of Canon Law," printed at Paris, in two vols. fol. He was author likewife of feveral works, of which the chief are, "La Conference des Lois Romaines avec celles de Moyfe;" an edition of the "Salic Law," with notes; "Traité de la Grandeur et Droits du Roi et du Royaume de France." He publifhed an edition of the "Antiqui Rhetores Latini," 1599. He difcovered "Phædrus' Fables," which he publifhed 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 feveral publications is prefixed to their works in Latin, printed in 1715. Moreri.

PITHYUSA, in *Botany*, a name ufed by many authors for a fmall fpecies of fpurge.

PITI, in *Geography*, a town of Thibet; 204 miles S. of Latac.

PITIES, in *Commerce*, the only money of the natives of the ifle of Java, which is a fmall coin containing four parts of lead and one of tin; 25 of thefe pafs for two duyts, each duyt being a fourth part of the copper coin, called the ftiver.

PITIGLIANO, in *Geography*, a town and fortrefs of Etruria; 23 miles E.N.E. of Orbitello.

PITIHEMPO, a mountain of Afia, which bounds Thibet to the north-weft.

PITINUM, in *Ancient Geography*, a town of Italy, in the territory called by Pliny "Pitinas Ager," on the other fide of the Apennines, and watered by the river Novanus. Ptolemy affigns this town to the Umbrians who inhabited the territory N. of the Tufcans.

PITISCUS, Samuel, in *Biography*, a learned philologift, was born at Zutphen in 1637. He ftudied under J. Fr. Gronovius at Deventer, and afterwards went through a courfe of theology at Groningen. When he had completed his education, he was made mafter of the fchool 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 alfo gave a new and improved edition of the "Roman Antiquities" of Rofin, and of Pomey's "Pantheon Myfticum."

PITIVILCO *la Baranca*, in *Geography*, a town of Peru, in the diocefe of Lima; 28 miles N.N.W. of Guaura.

PITKEATHLY or Pitcaithly, a village in the parifh of Dumbarny, and county of Perth, Scotland, is feated in a fequeftered corner of the rich vale of Stratherne, at the diftance of four or five miles from Perth. It has been long celebrated for its mineral fprings, and of late years has become a place of very fafhionable refort. In the efficacy of the waters for the cure of fcrofula, fcurvy, gravel, and complaints in the ftomach and bowels, Pitkethly wells are generally confidered equal, if not fuperior, to any in North Britain; and the village yields to none in beauty and agreeablenefs of fituation. There are here five diftinct fprings of different degrees of ftrength, but all partaking of the fame qualities. The chief mineralizers are muriate of foda (common falt) and muriate of lime, with a portion of chalk and Paris plafter held in folution. An account of thefe waters, and of their medicinal ufes, was publifhed in the 62d volume of the Philofophical Tranfactions. The period of their difcovery cannot be afcertained; as even tradition is filent upon the fubject.

The parifh of Dumbarny is about four miles in length and three in breadth. The foil is extremely fertile, and the furface finely diverfified with level and rifing grounds, wood, and water. The river Earn runs through the middle of the parifh; and on one fide it is bounded by the hill of Mordun or Moncrieff, the view from which is characterifed by Pennant as "the glory of Scotland." The bridge over the Earn here is of great antiquity, and is kept in repair by the magiftrates of Perth. Carlifle's Topographical Dictionary of Scotland, vol. i. 4to. Beauties of Scotland, vol. iv.

PITLAND, a town of Hindooftan, in Guzerat; 18 miles N.E. of Cambay.

PITLAR, a town of Ruffia, in the government of Tobolfk; 48 miles S. of Obdorfkoi.

PITLAWAD, a town of Hindooftan, in the circar of Banfwalch; 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 Montpelier 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 Montpelier 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 Bucharia; 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 Pimpern, 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 Eneid, 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 oppofition party. With this party Mr. Pitt uniformly voted, by which he incurred the difpleafure of fir Robert Walpole, who revenged himfelf by taking away his commiffion : which fact was celebrated by the following lines of his friend Lyttelton, ironically complimenting the minifter for fnatching the fervile ftandard from his hand, and raifing him to patriotic eminence.

" Long had thy virtues marked thee out for fame
Far, far fuperior to a Cornet's name;
This *gen'rous Walpole* faw, and griev'd to find
So mean a poft difgrace that noble mind:
The fervile ftandard from the free-born hand
He took, and bad thee lead the patriot band."

Mr. Pitt very foon attained the firft place, for eloquence, in the ranks of oppofition, and the minifter foon repented his rafhnefs in making him his enemy. This illuftrious young man was diftinguifhed for a fine figure, an expreffive countenance, and a melodious voice. A keen eye, a graceful manner, and pleafing addrefs, gave luftre and effect to a copious elocution, not, at firft, highly correct, but animated with the fire of genius, and frequently marked with paffages of fingular force and energy that impreffed themfelves upon the memory, and were almoft irrefiftible in their effect. "The records of the Britifh fenate," it is faid, "fcarcely prefent another name fo diftinguifhed by that eloquence which bears away with it the paffions and convictions of the hearer, and ftrikes an antagonift with awe. To thefe powers he added true elevation of mind, honour, integrity, and pure conftitutional principles." Without attempting to trace all the fteps of this ftatefman's progrefs from an oppofitionift to a member of adminiftration; we may briefly obferve, that he continually rofe in the efteem of the nation, as an able and vigilant oppofer of all meafures that appeared to him to be unconftitutional. Seven of his fpeeches preferved in Chandler's Debates, and which were delivered during the remainder of fir Robert Walpole's adminiftration, exhibit the ardour of his mind, and the comprehenfivenefs of his views as a young but truly enlightened ftatefman; but his moft important fpeech in this period of his life, was in fupport of a motion for inquiry into fir Robert Walpole's (then earl of Orford) conduct. The motion was at firft loft, but when introduced a fecond time, limiting the retrofpect to the laft ten years, it was carried; but by a minifterial manœuvre the inquiry was defeated. To popular applaufe was added a more fubftantial teftimony of approbation of his conduct, by Sarah, duchefs of Marlborough, who, in a codicil to her will, dated in 1744, bequeathed him the fum of ten thoufand pounds on the grounds of his public fervices. In 1745 Mr. Pitt was mentioned to the king, George II., by the duke of Newcaftle, as a proper perfon to fill the office of fecretary at war; but fo obnoxious was his name to his majefty, probably on account of his conftant oppofition to Hanoverian politics, that he was decidedly, and at once, rejected, and a general refignation of the Pelham party followed. In the following year they were reinftated, and Mr. Pitt was appointed to the office of vice-treafurer of Ireland. He foon after fucceeded to the lucrative place of pay-mafter of the forces, which gave him an opportunity of fhewing how difinterefted he was with regard to pecuniary concerns. His predeceffors had always held very large fums of the public money in their hands, of which they made advantage by means of the funds, but Mr. Pitt never once availed himfelf of his fituation for his own private emolument. He even refufed the ufual perquifite upon a fubfidy voted to the king of Sardinia, nor would he accept of any prefent in lieu of it. In 1754 Mr. Pitt married Hefter, daughter of Richard Grenville, a lady of great merit, of a highly cultivated mind, and of general and very extenfive knowledge, with whom he paffed the remainder of his life in uninterrupted harmony.

In 1755, when the king returned from Hanover, bringing fubfidiary treaties with Heffe-Caffel, and Ruffia for its defence, he did not fcruple to join Mr. Legge in oppofing their ratification by parliament. On this account they were both difmiffed, together with Meffrs. George and Richard Grenville. It fhould be noticed, as exhibiting a prominent feature in Mr. Pitt's character, that when turned out of his fituation, the balances belonging to his office were all lodged in the bank. Thofe who encouraged the many attempts to throw a fhade upon his moral character, were the difcoverers of the fact, to their own utter mortification and confufion. Mr. Pitt was now an eager oppofitionift, and fpoke with honeft indignation againft the favourite meafures of introducing foreign troops for the defence of the kingdom, and protecting Hanover by fubfidies; the natural force of the nation, he faid, was fufficient to repel any attack of the enemy. That ftate alone is worthy of being denominated a fovereign ftate, *qui fuis ftat viribus, non alieno pendet arbitrio:* which depends on its own ftrength, and not on foreign affiftance. The difafters with which the new war began, occafioned great diffatisfaction with the conduct of public affairs, and the nation eagerly expected a change of men and meafures; and in the autumn of 1756 a new adminiftration was formed, in which Mr. Pitt took the place of fecretary of ftate. The afpect of affairs was inftantly changed; and the vigour infufed into the public councils became immediately apparent by the formation of a national militia, to which the internal defence of the country was entrufted, while the foreign mercenaries were fent away:—by the levying of a body of Highlanders to ferve in North America:—by the difpatching of fquadrons of men of war to the Eaft and Weft Indies, and by a fuccefsful expedition to Goree on the African coaft. Mr. Pitt was ftill inimical to the war in Germany, at leaft under the conduct of the duke of Cumberland; on which account he and his friends were difmiffed from office. The public difcontent at this meafure was manifefted in the moft marked and decifive manner, and his majefty invited him very foon after to take the efficient poft in the miniftry on any terms that were agreeable to him. He refumed his poft of fecretary, and arranged a miniftry according to his own views of the neceffity of the cafe, and it was that adminiftration which raifed the Britifh nation from a ftate of depreffion and difgrace to the higheft pitch of glory and fuccefs. Of this miniftry he was the foul, and he infufed his own fpirit through every department of the ftate. The principle upon which he acted was, to difregard all party diftinctions; all family interefts; and to employ men of real talents wherever he found them. Inftead of inactive and incapable commanders, whom he found in the fervice, he filled the army and navy with men raifed to notice by their abilities and exertions. By a perpetual feries of enterprizes he kept all the national powers on the alert, and affaulted the enemy in every quarter of the globe. He gave all his own time to bufinefs and none to parade, not holding a fingle levee during his fecretaryfhip. He firft accurately informed himfelf of the practicability of his plans, and then was moft peremptory in his orders; and he provided, with the moft wonderful forefight, againft every emergency. The hiftory of Mr. Pitt's adminiftration is fo interwoven with the annals of the country, and the public events that occurred in it are fo well known, that it will be fufficient if we give a mere fummary of the moft important; and previoufly to this we may fhew the extent of his minifterial 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 negociation 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 Britifh greatnefs. "I rejoice," faid his lordfhip, "that the grave has not clofed upon me; that I am ftill alive to lift my voice againft the difmemberment of this ancient and moft noble monarchy. Preffed down, as I am, by the hand of infirmity, I am little able to affift my country in this moft perilous conjuncture; but, my lords, while I have fenfe and memory I will never confent to deprive the royal offspring of the houfe of Brunfwick of their faireft inheritance.—Shall this kingdom, that has furvived, whole and entire, the Danifh depredations, the Scottifh inroads, and the Norman conqueft; that has ftood the threatened invafion of the Spanifh armada, now fall proftrate before the houfe of Bourbon? Surely, my lords, this nation is no longer what it was! Shall a people that feventeen years ago was the terror of the world, now ftoop fo low as to tell its ancient and inveterate enemy, take all we have, only give us peace? It is impoffible." Lord Chatham's plan, at this moment, for conciliation with America was, no doubt, inefficient; the colonifts had paffed the Rubicon, and in 1778 nothing fhort of independence would have fatisfied them; but the dying earl thought otherwife, and he propofed to make a great impreffion upon France, to prevent her fending that affiftance to the Americans, which he knew the French court had promifed; he recommended alfo a treaty of union with the Americans; and that America fhould make peace and declare war in concert with Great Britain; that fhe fhould hoift the Britifh flag, and ufe the king's name in her courts of juftice; and he imagined that when America faw the impoffibility of deriving any affiftance from France, the congrefs would accept of thefe terms. He hoped thus at once to conquer and conciliate America by making a vigorous impreffion upon France. He faw that a war with France was unavoidable, and therefore with his ufual penetration and ardour he wifhed inftantly to ftrike the firft blow; detefting that procraftination which gave the enemy power, not only of choofing the period of his conveniency, but the firft fcenes of operation. The duke of Richmond having replied to his fpeech, lord Chatham attempted to rife to anfwer his grace, but after two or three unfuccefsful efforts to ftand, he fainted, and fell back in his feat. He was caught in the arms of fome of the lords who ftood clofe to him, and was conveyed to an adjoining room, and the houfe immediately adjourned. From this ftate of exhauftion he never recovered; he was indeed conveyed to his feat at Hayes in Kent, where he languifhed till the 11th of May 1778, when he died, in the 70th year of his age, to the fincere regret of every Britifh fubject, who had a juft fenfe of human dignity and virtue. His death, rendered peculiarly impreffive by the circumftances juft referred to, excited general fympathy. Intelligence of his deceafe being fent to London, colonel Barré, the moment he heard of the fact, haftened to the houfe of commons, who were then fitting, and communicated the melancholy information. Although the event had been, in fome meafure, expected for feveral days, yet the houfe were affected with the deepeft fenfibility. Even the adherents of the court joined in the general forrow, 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 fhould no more hear the precepts of his experience, nor feel the powers of his eloquence. A deep grief prevailed. The public lofs was acknowledged on all fides. Every one bore teftimony to the abilities and virtues of the deceafed, and on this occafion all appearance of party was extinguifhed. 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 lift was annexed to the earldom of Chatham. The fenfe of the extraordinary merits of this great man was not confined to his own country; it pervaded the whole of Europe, and was attefted by fome of the higheft characters in it. But of all the numerous portraits which have been drawn of him, and of which many are preferved in the "Anecdotes" already referred to, that of lord Chefterfield is the moft ftriking, and probably, upon the whole, the moft accurate. "His private life," fays the noble writer, "was ftained by no vice, nor fullied by any meannefs. All his fentiments were liberal and elevated. His ruling paffion was an unbounded ambition, which, when fupported by great abilities, and crowned with great fuccefs, 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 addrefs; but one might difcern through them too great a confcioufnefs of his own fuperior talents. He was a moft agreeable and lively companion in focial life, and had fuch a verfatility of wit, that he would adapt it to all forts of converfation. He had a moft happy turn to poetry, but feldom indulged, and feldom 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 fuch energy of diction, and fuch dignity of action and countenance, that he intimidated thofe who were the moft willing, and the beft able to encounter him. Their arms fell out of their hands, and they ftruck under the afcendant which his genius gained over theirs." Demofthenes was his great model in fpeaking, and it has been faid he tranflated fome of his orations feveral times over. But though he was delighted with the manner of this orator, who united a wonderful power of expreffion to the moft forcible method of reafoning, yet he was equally mafter of the pleafing, diffufe and paffionate ftyle 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 fhot a few years fince in a duel.

His lordfhip had five children, *viz.* three fons and two daughters: 1. John, the prefent earl of Chatham, born in 1756. 2. William, born in 1759, who will be the fubject of the following article. 3. James Charles, born in 1761, and who is now dead. 4. Lady Hefter, born in 1755, who married the prefent earl Stanhope, and died in the year 1780: this lady left three daughters, of whom the youngeft, lady Lucy Rachel, married Thomas Taylor, efq. and who, to the great grief of all that knew her, died March 1, 1814, having exhibited through, alas! much too fhort a life, in almoft the higheft degree, every virtue that could adorn the child, the wife, the mother, and the friend. 5. Lady Harriet, born in 1758, who married the eldeft fon of lord Eliot, and died in 1786.

Pitt, William, fecond fon of the preceding, and his fucceffor 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 difcovered that in his fon were talents that would repay all the attention that could be beftowed on them, and which were likely to raife him to diftinction in the country. For the claffical education of his fon he had a domeftic tutor, but he relied entirely upon his own inftructions, communicated in converfation, for opening his mind, and giving him a turn to large and accurate enquiry. For the purpofe of accuftoming him to that facility of fpeaking, which he felt had been of great importance to his own rife 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 fchool, Mr. Pitt

Pitt was found fully qualified for the univerfity : and accordingly, as foon as he had completed his fourteenth year, he was entered at Pembroke-hall, Cambridge, and placed under the private tuition of Dr. Prettyman, the prefent bifhop of Lincoln. At college he was diftinguifhed alike for the clofenefs of his application, and for the fuccefs of his efforts, in attaining thofe branches of knowledge to which his ftudies were particularly directed. Although no proofs are recorded of extraordinary brilliancy in his academical career, yet few young men of any rank have paffed through the probation of an univerfity with a more refpectable character for morals, abilities, induftry, and regularity. He was intended by his father for the bar and the fenate, and his education was regulated fo as to embrace both thefe objects. Soon after he quitted the univerfity, he went to the continent, and paffed a fhort time at Rheims, the capital of Champagne. The death of his illuftrious father, while he was in his 19th year, could not fail to caft a cloud over his profpects, but the foundation was laid of thofe qualities which would enable him to clear the path to eminence by his own exertions. He had already entered himfelf a ftudent of Lincoln's Inn, and as foon as he was of age, in the year 1780, he was called to the bar, went the weftern circuit once, and appeared in a few caufes as a junior counfel. His fuccefs during this fhort experiment was thought to be fuch as was amply fufficient to encourage him to purfue his legal career, and to render him almoft certain of obtaining all the wealth and honours which await the able and induftrious labourers in the vineyard of the law. He was, however, deftined to purfue a very different path, to fignalize himfelf as a ftatefman rather than as a barrifter, and to take, for a long feries of years, an active part in the regulation of the deftinies of his country and the civilized world. At the general election in 1780, he was perfuaded to offer himfelf as a candidate to reprefent the univerfity of Cambridge, but, upon enquiry, he found his intereft would not be equal to carry the election ; he therefore wifely declined the conteft. Before, however, he had completed his twenty-fecond year, he was, through the influence of fir James Lowther, returned member of parliament for the borough of Appleby. This was in the month of January 1781, a period in which an oppofition, compofed of fome of the greateft characters in the nation, was in warm contention againft the miniftry, which, under the guidance of lord North, was carrying on a difaftrous war with the American colonies. By this party the power of the crown was regarded as too great for the balance of the conftitution, and its reduction by means of certain reforms was the favourite topic of the times. For this purpofe Mr. Burke, at the commencement of the feffion, brought forward his well-known bill for an economical reform in the civil lift. It was on this occafion that Mr. Pitt, on the 26th of February, 1781, made his firft fpeech in the Britifh fenate. The attention of the houfe was naturally fixed on the fon of the illuftrious Chatham, whofe memory was ftill 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. Unembarraffed by the novelty of the fituation in which he had been fo lately placed, he delivered himfelf with an eafe, a grace, a richnefs of expreffion, a foundnefs of judgment, a clofenefs of argument, and a claffical accuracy of language, which not only anfwered, but exceeded, all the expectations which had been formed of him. During the fame and the fubfequent feffion, he occafionally rofe to give his fentiments on the mal-adminiftration 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 feemed particularly to intereft his patriotic feeling, which he unqueftionably poffeffed, at this time, was a reform of parliament. The neceffity of fome improvement of this kind had ftrongly impreffed a large proportion of the nation, and meetings of numerous bodies of men had been held in different parts, who had appointed delegates to confider of the beft plans for bringing it to effect. In one of thefe conventions, holden at the Thatched-Houfe tavern, Weftminfter, Mr. Pitt himfelf fat 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 feem to remember that he fat as a delegate, though he admitted he had been engaged in attempts to obtain a parliamentary reform, for which, and which only, the prifoner, at the inftance chiefly of Mr. Pitt, was then under trial for high treafon ; but Mr. Sheridan, who was engaged with Mr. Pitt on the fame bufinefs, exprefsly 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 themfelves individually, but for thofe who deputed them.

As a public fpeaker, we have already obferved Mr. Pitt had opened his courfe with great fplendour, and it was foon evident to all who acted with him, or who were witneffes to the exercife of his talents, that he was apparently deftined to act a high part on the political ftage. When, however, lord North's adminiftration broke up, and a new one was formed under the aufpices of the marquis of Rockingham, Mr. Pitt was not invited to take a fhare in it. He ftill purfued the great object of parliamentary reform, and in May 1782, moved for a committee, "to enquire into the ftate of the reprefentation in parliament, and to report to the houfe their obfervations thereon" The motion was loft by a majority of twenty. Mr. Pitt did not on this occafion endeavour to difcufs the queftion as to the beft fpecies of reform ; he only afked for an enquiry, in order that a report might be made to the houfe as to the beft means of carrying into execution a moderate and fubftantial reform in the reprefentation of the people. On this and two other occafions, *viz.* in May 1783, and April 1785, he fupported the neceffity of a parliamentary reform with great eloquence, and the moft powerful reafoning, after which he abandoned the caufe for ever. It has fince been ably advocated by alderman Sawbridge, Mr. Flood, Mr. Grey, fir Francis Burdett, and the Hon. Thomas Brand. (See a fketch of various propofals for a conftitutional reform in the reprefentation of the people from 1770 to 1812, fuppofed to be drawn up by Mr. Meadley, author of the lives of Dr. Paley and Algernon Sydney.) The death of the marquis of Rockingham foon put a period to the adminiftration of which that nobleman was the bond of union, and in July 1782, lord Shelburne having, with a part of the former members, placed himfelf at the head of a new arrrangement as firft lord of the treafury, affociated Mr. Pitt, who had juft completed his 23d year, as chancellor of the exchequer : he refufed, it was faid, to occupy an inferior poft. A general peace foon followed, which was made a ground of cenfure by a very powerful oppofition ; and in April 1783, the famous coalition miniftry took the places of thofe whom they had expelled. Mr. Pitt, during his continuance in office, had found little opportunity to diftinguifh himfelf, otherwife than as an able defender of the meafures of adminiftration, and a keen animadverter upon the principles and conduct of his antagonifts. He retired with a character unimpeached, and immediately, as we have feen, refumed his efforts for promoting the reform of the reprefentation.

A circumftance foon after occurred, which was the eventual caufe not only of Mr. Pitt's return to office, but of his poffeffion of a degree of authority with the king, and of popularity with the nation, which has rarely been the lot

of

of a minifter, and which he preferved, with fhort 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 provifion of which was to veft the whole management of the affairs of the Eaft India Company in feven commiffioners named in the act, and of courfe to be appointed by the exifting miniftry. It was moft violently oppofed by Mr. Pitt, on account of its being a violation of the chartered rights of the Company. It neverthelefs paffed the houfe of commons by a large majority, and was of courfe carried from thence to the upper houfe. In the mean time, an alarm was raifed refpecting the inordinate power which fuch a regulation would confer upon the miniftry, and which would render them almoft, or perhaps altogether, independent of the crown. It was afterwards afcertained, that, in a private audience granted to lord Temple by his majefty, this danger was reprefented in fuch a light, that directions were fent to all the noblemen dependent upon, or in confidence with, the court, to vote againft the bill; and it was accordingly rejected. The immediate refult of this was a change of miniftry; and in the new arrangement, in December 1783, Mr. Pitt united in his own perfon the offices of firft lord of the treafury and chancellor of the exchequer; and thus in his 24th year affumed the ftation of prime minifter. Though called to this high ftation by the voice of the fovereign, he had a moft formidable oppofition to encounter in the houfe of commons; and his firft India bill was rejected, on the motion for its commitment, by a majority of eight, there being for the motion 214, and againft it 222. A fpectacle was now prefented, which in this country was regarded as very extraordinary, *viz.* that of a minifter ftanding unmoved, though oppofed to the majority of the national reprefentatives; and it was obvious he had but one of two meafures to adopt, either to retire from office, or diffolve the parliament. He chofe the latter, which took place in the month of March 1784, and of courfe a general election fucceeded. On this occafion, independently of that fort of influence, which, though namelefs, is not lefs efficacious in obtaining a majority, it evidently appeared that the voice of the nation was decidedly in favour of the minifter; and he had the fingular good fortune of being fupported as well by the friends of the royal prerogative, as by thofe of parliamentary independence, and the new parliament opened with a large majority on the minifterial fide. Mr. Pitt, on this occafion, was returned member for the univerfity of Cambridge; and his firft meafure of great importance in parliament was the paffing of his India bill with fome alterations: the effence of which was the conftituting of a board of controul appointed by the king, out of the privy council, for fuperintending 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 poffefs a negative upon all appointments of the Company; and a new court of judicature was inftituted for the trial of offences committed in India. Another important plan, in which he occupied himfelf, was for the prevention of fmuggling; and for this purpofe, he, by what was denominated the Commutation Act, took off the principal duties from tea, and fupplied the deficiency by a large addition to the window-tax. Through the whole of his career, Mr. Pitt obtained the moft general applaufe as a minifter of finance; and the plans which he introduced for the gradual extinction of the national debt, are ftill operating with great benefit, and have enabled this country to carry on a twenty years' war of unexampled expence. Adopting the principle of fome able writers on political arithmetic, of the vaft accumulating powers of compound intereft, he introduced, in 1786, a bill, for fetting apart a million annually for the purchafe of ftock, which fum was to be augmented by the intereft of the ftock fo purchafed. Perfeverance in this plan, with occafional improvements, has already, amidft all the preffure of public burdens, extinguifhed between two and three hundred millions of debt, and produced a very confiderable revenue to be applied to the fame purpofe. 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 felected the leaft efficient; and for this he did not think it worth his while to make the fmalleft public acknowledgment. (See FUND and PRICE.) Mr. Pitt likewife made various alterations in the mode of collecting taxes, fo as to obviate and prevent frauds and defalcations, render them more productive, and come in aid of the great fyftem. A commercial treaty with France, in 1787, founded, as it was underftood to be, on reciprocal advantages, and fupported upon the liberal principle that neighbouring ftates, inftead of being foes and rivals, might become mutual affiftants in the progrefs to profperity, exhibited, in a faint degree, the minifter's attention to the trading intereft. It was foon difcovered, that the fuperior information of the Englifh negociators threw the benefits of the treaty fo much into their own fcale, that, upon experience of its effects, it occafioned general diffatisfaction among the merchants in France.

On the queftion of the impeachment of Mr. Haftings, Mr. Pitt, who feemed ever defirous of following public opinion, voted with the majority in favour of that meafure, though moft of his colleagues in office inclined to the other fide. A fimilar attention to the prevailing fentiments, perhaps, induced him to act as the champion of the eftablifhed church, in feveral applications from the diffenters for the repeal of the Teft and Corporation Acts (fee TEST); a meafure to which it was fuppofed that a fon of the illuftrious earl of Chatham would have naturally been inclined. Mr. Pitt entered eagerly into continental politics, and the aggrandifement of Ruffia, under the emprefs Catharine, was confidered by him as an object for the interference of the Englifh court. He formed leagues to counterbalance her power in the north; and in order to prevent her from retaining poffeffion of the fortrefs of Otchakof, he had nearly involved the two countries in a war. The unpopularity of this meafure was foon manifeft; his refolution was fhaken, and he abandoned the object altogether. He next difplayed a readinefs to recur to arms, in a difpute with Spain refpecting the fur-trade at Nootka found, which was violently oppofed in and out of parliament, and which was at length adjufted by a convention. His interference to preferve the power of the ftadtholder in Holland, and defeat the machinations of the French in that country, was a very popular meafure.

In the autumn of 1788, the people of England were thrown into a ftate of alarm, by a calamity which threatened to deprive them of their fovereign. In the beginning of October, his health appeared to be fenfibly impaired; and though he was fufficiently recovered to hold a levee on the 24th of that month, before its conclufion the diforder affumed a marked character, and moft ferious afpect. Early in the enfuing month, it became generally known that it had fettled in the brain, and had rendered his majefty incapable of exercifing the royal functions. Parliament having been prorogued to the 20th of November, it became neceffary that it fhould meet that day, as the fovereign, by whom only it could be further prorogued, was not in a fituation 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, Ruffia, Italy, and Spain; and almoft every where, in the year 1793, private as well as public credit was impaired, if not, for the feafon, totally deftroyed. In one refpect England differed, at this crifis of general diftrefs, from moft of the other European nations: her public credit was found, and, by affording a prompt and liberal affiftance to her manufacturers and merchants, the difficulties were in a fhort time overcome. It was in the midft of thefe calamities, brought on by the prevalence and extenfion of the war fyftem throughout Europe, that an able writer, and moft excellent man, now, alas! no more, thus apoftrophifed the minifter: "If I were bold enough to appreciate your political life, Mr. Pitt, I fhould be inclined to allow the outfet of it extraordinary merit. The fentiment of approbation that attended you was indeed almoft univerfal: you were the hope of the good, the pride of the wife, the idol of your country. If your official career had terminated with the difcuffions on the regency, it may be queftioned whether modern Europe could have produced a politician or an orator more ftrenuous, more exalted, more authoritative; one whofe ambition was apparently more free from felfifhnefs; who afforded to his opponents lefs room for cenfure, or gave to his friends more frequent occafions of generous triumph, and honeft applaufe. The errors that you have fallen into are natural for men long poffeffed of power uncontrolled; and in imputing them to you, I accufe you only of the weakneffes of human nature. It is natural, I believe, for fuccefsful ambition to feek new objects on which it may exert itfelf. Hence, after you had fubdued oppofition in England, you iffued forth, like another Hercules, in queft of new adventures, and traverfed the continent of Europe to feek monfters, whom you might fubdue. You could not, however, but be fenfible that the reputation of a minifter of trade and finance, which you had juftly obtained, was incompatible with that of a great war minifter, in the prefent ftate of the nation. You took, therefore, the middle line: you made preparations for fighting on every occafion, but you took care not to ftrike. England might perhaps bear the expence of arming, but could not actually go to war; and this fecret, which your three fucceffive armaments difcovered to all Europe, led Mirabeau on his death-bed to give you the name of *miniftre preparatif*.

"In men long in poffeffion of power, a fecret fympathy, unknown perhaps to themfelves, is gradually ftrengthening in favour of others in the fame fituation; and a fecret prejudice, amounting perhaps at laft to enmity, againft oppofition to power in every perfon. Hence the danger you faw to England, in the triumph of the patriots of Holland over the prince of Orange; and the fafety we acquired from the fubjugation of the Dutch by the Pruffian arms. Hence alfo the perfect compofure with which you expected the conqueft of France, by the defpots of Germany; and the fudden alarm with which you were feized, on the repulfion of that invafion, and the over-running of Flanders by the republican arms. By the freedom of Brabant, the conftitution of England might be endangered; but it became more fecure in your eye, it fhould feem, by the extenfion of defpotifm over every corner of Europe, and the fuccefs of foreign bayonets in rooting out liberty, as well as licentioufnefs in France." Such was the character of Mr. Pitt, drawn in 1793, by the mafterly hand of the late Dr. Currie, under the feigned name of Jafper Wilfon. Its likenefs, after more than twenty years, will not be difputed; 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 fhall content ourfelves with noticing a few of its confequences. Great Britain, on the whole, was triumphant on her own element; but the conteft on the continent went entirely in favour of France, who, at length, united in a confederacy againft England fome 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 fame time was preffed by an accumulation of difficulties, which native ftrength alone could have enabled her to furmount. In 1797, the bank of England was unable to anfwer the demands made upon it, and an act of parliament was paffed to allow the governors of that eftablifhment to fufpend their payments in cafh, and to fubftitute for gold and filver, notes of every defcription, even to thofe for two pounds and one pound. Another fhock to the credit of the country was a daring mutiny of the fleet; and thefe difafters had fcarcely been averted, before a moft formidable rebellion in Ireland broke out, and which was not extinguifhed without the employment of a large military force, and the adoption of fuch fanguinary meafures as were difgraceful to thofe who reforted to them. The public burthens went on accumulating in a vaft ratio, and Mr. Pitt was obliged to have recourfe to a triple affeffment, and finally to an income tax, for raifing the neceffary fupplies. In 1799, he, with the aid of pecuniary offers, produced a new confederacy, in which the numerous armies of Ruffia and Auftria were employed to overthrow the preponderancy of France, but its final iffue was completely unfortunate. In the following year Mr. Pitt had brought to effect the great and arduous meafure of an union between Great Britain and Ireland, a meafure, the true policy of which has long fince been generally acknowledged. The war with France was now become fo hopelefs with regard to any object with which it might have commenced, and the nation was fo completely wearied with protracted hoftilities, that Mr. Pitt, aware that he could make no peace correfpondent to his high language, refolved to quit the important ftation he had fo long occupied. He refigned his poft in February 1801, and was fucceeded by Mr. Addington, now lord Sidmouth. The peace of Amiens foon followed, which Mr. Pitt defended in his place in parliament. He afterward, in fome important points, joined the oppofition, and the new minifter was in a fhort time forced into a fecond French war. His talents were foon found unequal to the conteft in which he had embarked, and Mr. Pitt, in 1804, refumed his poft as firft lord of the treafury, at the head of an arrangement formed of part of the minifters then in place, with the addition of fome of his own friends. He now came into office as a war minifter, and exerted all the vigour of his character to render the conteft fuccefsful. He engaged the two great military powers of Ruffia and Auftria in a new confederacy againft France. The errors committed by them in their plan of co-operations were fatal to the caufe, and the battle of Aufterlitz put an end to the hopes of a check to the then enormous aggrandizement of an empire which feemed deftined to fway the European continent. Mr. Pitt was in a ftate of health ill calculated to meet this terrible ftroke. He had, from an early period of life, given indications of inheriting his father's gouty conftitution, with his talents, and it had been thought neceffary to make the liberal ufe of wine a part of his ordinary regimen. The habit and the neceffity, of courfe, gained ground upon him, and he did not efcape the charge of convivial intemperance. This abufe of ftrong ftimulants, added to the cares and exertions of office during the ftormy period of his adminiftration, brought on a premature exhauftion of the vital powers. In December 1805, he was recommended to go to Bath, but the change afforded him no permanent relief. On the

the 11th of January he returned to his feat at Putney, in fo debilitated a ftate, as to require four days for the performance of the journey. The phyficians, even yet, faw no danger, and they faid there was no difeafe, but great weaknefs, in confequence of an attack of the gout. On the following Sunday he appeared better, and entered upon fome points of public bufinefs with his colleagues in office: the fubject was fuppofed to relate to the diffolution of the new confederacy, by the peace of Prefburgh, which greatly agitated him. On the 17th, at a confultation of his phyficians, it was agreed, that though it was not advifable he fhould attend to bufinefs for the next two months, yet there was hope he would be able to take a part in the houfe of commons in the courfe of the winter. On the 20th, however, he grew much worfe, and it was admitted his fituation was precarious; in other words, thofe who till then had encouraged hope in the patient, now faw that he was in the moft imminent danger, and that, probably, he had not many hours to live. The bifhop of Lincoln, who never left him during his illnefs, informed him of the opinion now entertained by fir Walter Farquhar, and requefted to adminifter to him the confolations of religion. Mr. Pitt afked fir Walter, who ftood near his bed, "How long do you think I have to live?" The phyfician anfwered that he could not fay, at the fame time he expreffed a faint hope of his recovery. A half fmile on the patient's countenance fhewed that he placed this language to its true account. In anfwer to the bifhop's requeft 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 rife as he fpoke, "I throw myfelf entirely on the mercy of God." The bifhop then read the prayers, and Mr. Pitt appeared to join in them with a calm and humble piety. He defired that the arrangement of his papers and the fettlement of his affairs might be left to his brother and the bifhop of Lincoln. Adverting to his nieces, the daughters of earl Stanhope by his elder fifter, for whom he had manifefted the fincereft affection, he faid, "I could wifh a thoufand or fifteen hundred a-year to be given them; if the public fhould think my long fervices deferving of it." He expreffed alfo much anxiety refpecting major Stanhope, that youthful hero, who fell a facrifice to his valour at Corunna, in company with his friend and patron general fir John Moore, and his brother, who was alfo at Corunna at the fame time, and who has been engaged in all the great battles in the peninfula, and more than once feverely wounded in his country's fervice. 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 thofe debts which he had incurred in his country's fervice. Public monuments have been fince erected to his memory in Weftminfter-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 poffeffion of the efteem and attachment of a large portion of his countrymen, and his political confequence was proved by the entire diffolution, at his death, of the miniftry of which he was the head, and the neceffary admiffion of a party, againft whom ftrong prejudices were known to prevail. He will long live in memory as a diftinguifhed orator, an able financier, and a man of uncommon talents: whether he is alfo to be ranked among great and enlightened ftatefmen, impartial hiftory will hereafter decide. Dr. Stock, in his interefting life of Dr. Beddoes, fpeaking of the "Effays on the public Services of Mr. Pitt," fays, "But we are as yet too near the time of action to examine, with equal impartiality, the merits of writings fo hoftile to Mr. Pitt. A great portion, however, of the events anticipated in thefe effays, is already become hiftory. The career of this celebrated ftatefman is clofed. If his meafures were good, he can no longer direct; if bad, he can no longer reftrain their influence. A long period muft elapfe, perhaps it muft be left to diftant pofterity, to trace their full influence on the deftinies of Great Britain. The cenfure which the author (Dr. Beddoes), has thrown upon his plans may be unjuft, but his anticipation of their failure was prophetical. Principles were in action, the full operation of which had not been familiar to human experience. Common political calculations, and common-place ftatefmen, were every where baffled and confounded. But however deplorably his fchemes of foreign policy may have failed, whether from deficiency in political fagacity, or from incapacity or treachery of allies; his advocates will triumphantly maintain that, in point of primary importance, he fucceeded: he faved the Englifh conftitution. If this be true, no praife can exceed his deferts, and no honours that a grateful nation can pay to his memory can be exceffive. To have preferved a conftitution, which has raifed man to the true level of his nature, which has *ripened fouls*, which fecures to every individual under its protection a degree of practical liberty of writing, of fpeaking, and of action, greater than exifts in any country on the furface of the globe, muft emblazon his name to all pofterity. Should all the other pillars that fupport the temple of his fame give way, fo long as this remained unfhaken, it would, fingly, uphold the fabric. His opponents will, however, remind us of unhallowed attempts to deprive us of thefe proud diftinctions; and they will contend, that great as are the honours that fhould be paid to his memory, if the meafures of his adminiftration fhould appear to have been really the means of preferving this glorious monument of the wifdom of our anceftors; fo great muft be the indignation that fhould purfue it, if they fhould have proved to have impaired its magnificence, to have undermined its foundations, and to have expofed us to the hazard of a conteft, in which not common interefts only are involved, but on the iffue of which is ftaked every thing that is dear to the heart of a Briton, every thing that can render life itfelf valuable and defirable."

It is not eafy to underftand what is meant by the word Conftitution: if by it is intended fimply the government by King, Lords, and Commons, Mr. Pitt found fuch a government, and left it as fafe as he found it; but it would be difficult to prove that it ever was in danger: in the very worft 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 thoufand perfons, who would, whatever were their motives, have wifhed for any change in this refpect; and hence no great merit can be given to Mr. Pitt as the faviour of our mixed form of government. If, however, by the Conftitution are intended thofe guards and that fecurity of the people, which are effential to their exiftence as a free nation, it would not be eafy to fhew in what refpect Mr. Pitt was the faviour of the Conftitution. The fecurities to which we have referred, and which, in the eftimation of Blackftone and all our great conftitutional lawyers, have been regarded as the fundamentals of our excellent conftitution, are *Magna Charta*, the *Habeas Corpus Act*, the *Liberty of the Prefs*, and *Trial by Jury*. If thefe exift in a country, the people have a pure and a perfect conftitution; they need no more to render them, in every juft fenfe of the

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 Cuſtomhouſe 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 meanneſs 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,

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° 20′.—Alſo, a ſmall iſland in the Chineſe ſea. N. lat. 10° 57′. E. long. 114° 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° 10′. W. long. 52° 15′.

PITTACIUM, Πιττακιον, 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 *pictantia*, 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 *pictantiæ* 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 33½ 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 Mauten.

PITTI, a ſmall iſland in the ſtraits of Malacca, N. lat. 2°. E. long. 101° 29′.

PITTONIA, in *Botany*, ſo named by Plumier, in honour of his great countryman and contemporary, Joſeph Pitton de Tournefort. (See Tournefortia.) Linnæus, 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 πιττοω, *to beſmear with pitch*, and σπερμα, *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.—Gærtn. 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. *Dumoſæ*, Linn. *Rhamni*, 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 refinous fluid produced by the infide of the valves.

Eff. Ch. Calyx five-cleft, deciduous. Petals five, converging into a tube. Capfule of feveral cells and as many valves. Seeds enveloped in a liquid refin.

1. P. *coriaceum*. Thick-leaved Pitch-feed. Ait. n. 1. Willd. n. 1. Vahl Symb. v. 2. 43. Andr. Repof. t. 151.—Leaves obovate, obtufe, coriaceous, very fmooth. Capfules of two valves.—Native of Madeira. A greenhoufe fhrub, flowering in May, faid to have been firft raifed by Meffrs. Lee and Kennedy, about the year 1783. The *ftem* is fix or eight feet high, bufhy, with round, finely downy, *branches*, leafy at their fummits. *Leaves* crowded, alternate, two or three inches long, remarkably coriaceous, of a fine green, fmooth and even, not fhining, with one rib, and numerous fcarcely vifible tranfverfe veins. *Footftalks* fhort, broad, channelled, downy when young. *Stipulas* large, broad, folitary, withinfide of the footftalks. *Flowers* feveral, in terminal bracteated umbels, with downy ftalks, white, powerfully fragrant, like Jafmine, but of fhort duration. *Calyx* divided to the very bafe, and finally falling off in feparate portions. *Petals* obovate, obtufe, recurved, fcarcely revolute. *Germen* elliptic-oblong. *Capfule* faid to have only two valves, a point we have had no means of determining.

2. P. *Tobira*. Gloffy-leaved Pitch-feed. Ait. n. 2. Sims in Curt. Mag. t. 1396. (Euonymus Tobira; Thunb. Jap. 99. Willd. Sp. Pl. v. 1. 1130. Tobira; Kæmpf. Am. Exot. 796. t. 797.)—Leaves obovate, obtufe, coriaceous, very fmooth and fhining. Capfules of three valves.—Native of Japan. Brought by an India fhip from China to Kew, in 1804, where it flowers abundantly in fummer, being a hardy greenhoufe fhrub. This is fo like the foregoing, that it is not eafy to difcern a fpecific difference between them. The *leaves* of the *Tobira* however are of a more fhining and darker green above; pale beneath. *Capfule*, on a fpecimen from Kew, triangular, and of courfe having three valves. *Flower-ftalks* and *germen* very hairy, as in the *coriaceum*, though none of the figures of either give the leaft indication of fuch a circumftance. Kæmpfer's plate fhews the *inflorefcence* to be fomewhat racemofe.

3. P. *revolutum*. Downy-leaved Pitch-feed. Ait. n. 3.—"Leaves elliptical, bluntifh; downy beneath; revolute at the margin."—Native of New South Wales. Sent by fir Jofeph Banks to Kew, in 1795. It flowers from March to Auguft, and is a greenhoufe fhrub, like the two above defcribed. We have two fpecimens from Port Jackfon, anfwering to the character we have copied, except that the *leaves* are acute, and indeed pointed, in both. The *flowers* in one grow five or fix together, in a ftalked hairy *umbel*; in the other they ftand in pairs, on very fhort *ftalks*, which at length become thick and woody, fupporting a large woody *capfule*, of three reflexed valves, whofe partitions are but flightly prominent. Thefe fpecimens appear to conftitute different fpecies, and probably will be better explained in the fequel of Mr. Brown's Prodromus.

4. P. *ferrugineum*. Rufty Pitch-feed. Ait. n. 4. (Cortex filarius; Rumph. Amboin. v. 7. 13. t. 7.—Leaves elliptical, taper-pointed, fmooth. Footftalks clothed with rufty down. Calyx equally divided to the bafe.—We received fpecimens of this, in March 1789, from Mr. Hoy at Sion-houfe. It is faid in Hort. Kew. to be a native of Guinea, and to have been introduced before 1787, by the earl of Tankerville, flowering in the ftove from February to May. We are poffeffed of fine fpecimens of this very plant, gathered by the late Mr. Chriftopher Smith in Oma, one of the Molucca ifles, near Amboyna, but without any mention of its name or properties. Cortex filarius of Rumphius appears to be the fame thing. The author never faw the *flowers*, but his reprefentation and defcription of the bivalve *fruit* exactly anfwers to the genus before us. He fpeaks of the bark as affording a fort of thread. Of this indeed we can obferve no figns, in our dried fpecimens, but every other part of his defcription agrees exactly. The *ftem* is fhrubby, rather flender, determinately branched; young *branches* round, clothed with rufty down, leafy towards the ends. *Leaves* fcattered or crowded, elliptic-lanceolate, pointed at each end, two or three inches long, entire, flightly wavy, with one rib and feveral tranfverfe veins ending in minute reticulations; fmooth on both fides, except an occafional pubefcence on the ribs; paler and more opaque beneath. *Footftalks* three-quarters of an inch long, flender, channelled, clothed with fine, fhining, rufty down. *Flowers* very numerous, fmall, white, in long-ftalked, aggregate, rufty, downy *umbels*. *Calyx* almoft fmooth, in five deep, awl-pointed, recurved fegments, not fo fpeedily deciduous as in fome other fpecies. *Petals* folded fpirally over each other in the bud; recurved when expanded. *Anthers* obtufe. *Germen* very hairy. *Style* fhort. *Stigma* capitate. We have feen 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, fmooth; waved at the margin. Footftalks nearly fmooth. Calyx five-toothed, fplit on one fide to the bafe.—Native of New South Wales. Communicated to Kew garden, in 1789, by fir J. Banks. A greenhoufe fhrub, flowering from April to June. Its habit is very much like the laft, but every part is larger. The *leaves* are more wavy; their adult *footftalks* fmooth, though downy when young. *Flowers* white, fragrant, full twice as large as thofe of *P. ferrugineum*, but much fewer, in folitary, nearly fimple, feffile *umbels*, whofe ftalks are nearly fmooth. *Calyx* effentially different, being divided only one-third of its length into five acute fegments, though fplit down to the bafe at one fide, fometimes in two places; one tooth, in the latter cafe, being entirely feparate to the bottom. The whole *calyx* foon falls off. Its infide and edges are a little downy. Ventenat's account of the *inflorefcence* differs from our's, but we find fome parts of our fpecimens have, as he fays, three-flowered ftalks. He errs in giving the Canary iflands as the native country of this fpecies, confounding its hiftory with that of the *coriaceum*. What Gærtner has defcribed, under the names of *tenuifolium* and *umbellatum*, are probably diftinct from all the above, or he would have been cited in Hort. Kew. As he gives no fpecific characters, we can form no juft idea of thefe fpecies. Poffibly his *tenuifolium* may be our *undulatum*. Here again we muft recur to Mr. Brown's future communications, in the long-expected continuation of his work.

PITTQUOTTING, in *Geography*, an Indian fettlement in the ftate of Ohio, at the mouth of Huron river, which difcharges itfelf into lake Erie.

PITTSBOROUGH, or PITTSBURG, a town of America, the capital of Chatham county, North Carolina, fituated on an eminence, and containing a court-houfe, a gaol, and about 40 or 50 houfes. The adjacent country is fertile and well cultivated; and is much reforted to from the maritime parts of the ftate in the fickly months. The Hickory mountain is not far diftant, 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 Miege town, about 15 miles; but from thence to the Miſſiſippi 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 Queſne, 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° 31′ 44″. W. long 80° 8′.—Alſo, a townſhip of America, in Frontinac 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.

PITTSTON, a town of America, in the county of Kennebec, and diſtrict of Maine, containing 1018 inhabitants.

PITTSTOWN, 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 Darraway, 50 miles below Tatta, and runs into the ſea, N. lat. 24° 42′. E. long. 66° 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 PHLEGM.

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 CRANIUM.

PITUM HOTUN, in *Geography*, a town of Chineſe Tartary; 438 miles E. of Peking. N. lat. 40° 18′. E. long. 125° 21′.

PITUMBA, in *Botany*, a word that occurs in Schreber's index, and, by his reference, ſeems ſynonimous with his *Wolfia*, 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 *Wolfia* 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 Golconda 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 "Meſoles." On the map of M. d'Anville, it is placed on a river, which runs towards the S.W. into the Meſolus.

PITYONESUS, an iſland on the coaſt of the Peloponneſus, ſix miles from the continent, over-againſt Epidaurus.

PITYRIASIS, πιτυρίασις, in *Medicine*, from πιτυρον, *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 acceptation of the word pityriaſis. Galen, Aëtius, and Oribaſius, ſpeak of it as affecting the head only: Alexander of Tralles, however, and Paul of Ægina, 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 scaliness is augmented. This complaint is attended with a dry and unperspiring 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 sallow 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 "*maculæ hepaticæ*," 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 potass, 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. Synops. of Cutan. Diseases, p. 44.

PITYRODIA, in *Botany*, πιτυρώδης, branny. Brown Prodr. Nov. Holl. v. 1. 513.—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Verbenaceæ*, Juss. in Ann. du Mus. v. 7. 63. Brown.

Eff. 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. Drupa dry at the summit, of four cells, perforated at the base. Seeds solitary in each cell.

1. P. *salvifolia*.—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 Successianus, 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 Hermonic gulf, S.E. of the peninsula of the Argolide, 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, contradistinguished from the *Balearic*, and so called, according to Ptolemy, Strabo, and Pomponius Mela, from the Greek word πίτυς, *a pine*, whence πιτυοῦσσα, 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, ftone, and corn, from which laft article it is faid to derive its prefent name; the three Conejeras to the weft of the former, which, though of confiderable extent, are deftitute of habitations, and furnifh food for the flocks of the neighbouring ifles; three fmall iflands, called the gates of Ivica; the ifle of Groffa; the ifles of Santa Eulalia y de Arabi, lying towards the E.; the ifles of Margueritas, &c. The inhabitants of thefe iflands, 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 forts of hufbandry, the occupiers cultivate olives, vines, and corn; and raife from thefe productions a greater quantity than they confume; but they are forbidden to export corn, oil, and fruits, and therefore, notwithftanding the richnefs and productivenefs of their foil, they almoft all live in a fort of indigence; falt and wool are the only commodities which are exported in foreign bottoms. Their habits are much the fame with thofe of the inhabitants of the Balearic iflands, one of the chief of which is indolence; their language is alfo much the fame. They keep a number of holidays, which they devote to the purpofes of religion, or fuperftition; and they have affemblies and fome amufements. They are reckoned courageous, and difplay proofs of valour in their contefts with the pirates on the coaft of Barbary. The people are in general ignorant, and have hitherto little availed themfelves of any opportunities or means of improvement.

PITZEN, a town of Pruffia, in the province of Bartenland; 9 miles S.S.W. of Raftenburg.

PITZIUNTA, or DANDAR, a town of Circaffia. 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 fhoe of iron, or other metal, ufually conical, or terminating in a point; whereby a body intended to turn round bears on another fixed at reft, and performs its circumvolution.

The pivot ufually bears or turns round in a fole or piece of iron or brafs, hollowed to receive it.

Large gates, &c. ufually turn on pivots. The ancients tell us, they had theatres in Rome, that held eighty thoufand people, which have yet turned on a fingle pivot.

PIVOT (*Fr.*), in *Military Language*, is that officer, ferjeant, corporal, or foldier, upon whom the different wheelings are made in military *evolutions*; which fee. Of thefe pivots, two forts are diftinguifhed according to the pofition of the troops that are governed by them; *viz. ftanding* and *moveable* pivots. When a battalion, *e. g.* ftands in open column of companies, the "right in front," the laft man upon the left of the front rank of each company, is called the *inner*, or *ftanding* pivot; and the firft man upon the right ditto is called the *outer*, or *wheeling flank*. The accurate pofition 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 pofted upon the flanks, they become abfolutely neceffary to the prefervation of that perpendicular and parallel order of a march, without which direction, the beft concerted manœuvres muft be ultimately rendered ufelefs. At the inftant when an officer has wheeled his divifion, he muft refume his perpendicular pofition, look fteadfaftly on his leading pivot, maintain his relative diftance, and keep his perfon perfectly fquare. He ought likewife to be particularly correct in ftepping off when the wheel is completed. The *moveable* pivot is one which, during the wheel of its divifion, advances in a circular direction, inftead of turning on the fpot where it originally ftood. Thus, when divifions, &c. are fucceffively wheeled, without being firft halted, the pivot upon which they wheel is faid to be *moveable.* In the drill, fingle ranks are frequently wheeled on a moveable pivot. In which cafe, both flanks are moveable, and defcribe concentric circles round a point, which is a few paces diftant from that which otherwife would be the ftanding 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 feveral companies, platoons, &c. and *vice verfa*, when the left is in front.

PIVOT-*Flank Officer*, the officer who is on the firft flank. In all wheelings during the march in column, the officer on that flank upon which the wheel is made, muft confider himfelf 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 jurifdiction of the fame name, in the bifhopric of Truxillo. This was the firft Spanifh fettlement in that country, and was founded in the year 1531, by don Francifco Pizarro, who built the firft church in it. It ftood firft in the valley of Targafale, and was called "St. Miguel di Piura;" but it was removed, on account of the infalubrity of the air, to its prefent fituation, on a fandy plain. The houfes are conftructed either of bricks baked in the fun, or of a kind of cane called quincas, and they have generally only one ftory. The corregidor, and an officer for collecting the royal revenue, refide here and at Payta fix months alternately. The town contains about 1500 inhabitants, none of whom are perfons of diftinction. Although the climate is hot and dry, it is not upon the whole unhealthy. As the country is level, water is eafily conveyed to different parts by canals. But in fummer, when water is fcarce, they are under a neceffity of procuring it by digging wells in the bed of the river. This town has an hofpital, under the care of the Bethlehemites, which is remarkable for the cures afforded to a great number of perfons labouring under the venereal difeafe; 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 flourifhed in the fecond century, was probably the fucceffor of Hyginus, and in that cafe commenced his pontificate about the year 143. According to Eufebius, he died in the year 157. Other hiftorians, as Cave, Pearfon, and Dodwell, imagine that he prefided over the fee 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 faid to have fuffered death, for the fake of his religion, under the reign of Antoninus Pius, but there feems no good authority for this fact, and the title of martyr is not given to him by Irenæus. Two "Letters" to "Juftus of Vienne," which were formerly attributed to Pius, may be found in the fecond volume of the "Orthodoxographia," and likewife in the "Bibl. Patrum," but they have long fince been given up as fpurious, and allowed to be the production of a much later age. Moreri. Bower.

PIUS II., pope, whofe original name was Æneas-Sylvius-Piccolomini, was defcended from one of the moft illuftrious families of Sienna, in Tufcany, 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 Corſignano. 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 Copronica, 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, Straſburg, 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 Ratiſbon, 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 negociate 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,

replied, that the edict confifted of the very decrees of the council of Bafil, which Pius himfelf had approved, had penned, and probably had fuggefted, when fecretary to that affembly, and which it had received with one confent, and obferved for the fpace of twenty-five years by the whole French nation. Upon the death of Charles, the pontiff renewed his application to his fucceffor Lewis XI., who confented to abolifh the edict by a folemn declaration, for which he and his fucceffors were rewarded by the title of "Moft Chriftian," a title which defcended uninterruptedly to Lewis XVI., and was only abolifhed with the deftruction of the monarchy. Though the king thus degraded himfelf by becoming a tool to the pope's ambition, his council better confulted the dignity of their fovereign, and their own reputation, by refifting, to a man, the pope's demand; and the full execution of Lewis's declaration was prevented by the noble ftand made by the univerfity of Paris, and the parliament, in favour of the "Pragmatic Sanction."

During the years 1462-3, Pius again, but unfuccefsfully employed all his talents and eloquence in endeavouring to unite the Chriftian princes againft the Turks, who had at that time made themfelves mafters of almoft all Greece. Finding his efforts of no avail, he equipped a fleet at Ancona, avowing his determination, notwithftanding his age and bodily infirmities, to face the inconveniences and dangers of war, imagining, that with fuch an example, the Chriftian princes would be afhamed of remaining quiet and inactive at home. While, however, he was thus bufily employed, he fell fick, and was advifed by his phyficians to pay a vifit to Sienna, for the benefit of his native air. Before he left Rome, he publifhed a folemn retractation of all that he had written in favour of the council of Bafil, and declared, without fhame or hefitation, that, as Æneas Sylvius he was a damnable heretic, but as Pius II. he was an orthodox pontiff. After a very fhort ftay at Sienna he returned to Rome, but being informed of the inroads of the Turks, and that they had actually laid fiege to Ragufa in Dalmatia, he fet out without delay for Ancona, though at that time he was in fo infirm a ftate of health, as to be obliged to travel in a litter. The journey, however, proved too much for him, and he died in the fummer of 1464, at the age of fifty-nine, having filled the pontifical throne fix years within a few days. According to Platina, he was endowed with every virtue that became his exalted ftate; but the conduct of the pope certainly militated againft the excellent qualities which he had difplayed, previoufly to his advancement to that high dignity. No man ever laboured harder, and perhaps few more fuccefsfully than Æneas Sylvius, to reftrain the power of the pope within the boundaries admitted by the canons, and no pope ever ftrove more than Pius II. to extend that power beyond all the bounds of reafon and law. To effect his purpofes, he fpared neither kings, dukes, nor people, when he affumed that they invaded the rights of the church, or entrenched upon the emoluments of the clergy. When young he indulged his paffion for the fex without reftraint, and in his more mature years, he feems to have thought tranfgreffions againft the rules of chaftity to be very venial fins, if they could even be denominated fins. As a fcholar, he was an elegant writer in Latin, and left behind him various works, moft of which he compofed before his elevation to the popedom. Of thefe an abridged lift is given in the General Biography, but a complete catalogue of them may be found in Cave and Dupin. The following feem to be the moft generally important: "Comment. de Geftis Concilii Bafilienfis;" "De Ortu, Regione, ac Geftis Bohemorum ad Ann. 1458;" "Cofmographiæ, feu Hiftoriarum de Mundo univerfo;" "Epiftolarum Liber," containing four hundred and thirty-two letters, many of which are interefting and curious. The whole works of this pope were publifhed in a collective form at Bafil in 1551, and again at Helmftadt in 1700. A hiftory of his life was publifhed at Rome in 1584, which was generally believed to have been drawn up by himfelf. Moreri. Mofheim.

Pius III., pope, whofe original name was Francis Todefchini, was a native of Sienna, and born in the year 1429. He was nephew on the maternal fide 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 raifed him to the dignity of cardinal, and nominated him to the bifhopric of Sienna. He was employed in feveral legations by popes Paul II., Innocent VIII., and Alexander VI., to whom he gave the moft entire fatisfaction, by the prudence and integrity with which he difcharged the feveral commiffions and high trufts repofed in him. Upon the death of Alexander VI. in 1503, the city of Rome was thrown into the utmoft confufion by the ftruggles for power between Valentine Borgia, the fon of Alexander, and the Orfini, and others whom he had deprived of their eftates. Scarcely a day paffed in which there were not battles fought in the ftreets by the partifans of thefe rivals. The cardinals, therefore, found it quite neceffary to raife a confiderable body of troops for their own defence, while they fhould be fhut up in conclave. They alfo applied to the ambaffadors then refiding in Rome, by whofe means the heads of the oppofite factions were prevailed upon to withdraw from the city, till the election of the new pope fhould be declared. The choice foon fell upon Piccolomini, who, out of grateful refpect to the memory of his uncle, affumed the name of Pius III. As foon as the intelligence of his election had reached the hoftile factions, they returned to Rome, and renewed the war within the walls, throwing the city into the utmoft confufion. Valentine was foon obliged to fubmit to the enemy, and he was then left to the mercy of the pope, who permitted him to retire unmolefted wherever he pleafed. Pius, by this event, had the happinefs to fee peace reftored 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 poifon. He was regarded as a perfon of unblemifhed moral conduct, and in every refpect worthy of the high dignity to which he had been raifed. Bower. Moreri.

Pius IV., pope, whofe original name was John Angelo di Medici, was born at Milan in the year 1499. He wifhed to be thought a branch of the famous houfe of Medici, to which he had no real pretenfions, being, in fact, of low origin, and whofe real name was Medicino inftead of Medici. He enjoyed the advantages of a liberal education; and having applied himfelf chiefly to the ftudy of the civil law, he was in early life admitted to the degree of doctor. After this he practifed with high reputation as a civilian, and by his abilities, united with the intereft of a brother, he obtained the office of prothonotary under Clement VII. In this fituation he recommended himfelf to the favour and patronage of cardinal Farnefe, who, after his elevation to the papal dignity under the title of Paul III., employed him in various legations. By the fame pope he was appointed commiffary to the army of the church; nominated archbifhop of Ragufa; and created cardinal prieft of Santa Prifca 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, whofe power was fo equally balanced, that neither of them

them could obtain the requifite fuperiority over his rivals; till at length, wearied out with their fruitlefs ftruggles, they gave their united votes in favour of the cardinal of Santa Prifca; who, at his confecration, 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 fince the death of his predeceffor, and he then took meafures for bringing to juftice the perfons whofe oppreffive enormities had provoked them to their irregular conduct. The Caraffas were accordingly arrefted, tried, and convicted of crimes, for which they were condemned to forfeit their lives and their eftates. The cardinal was, in purfuance of the fentence, ftrangled; and his two brothers, the duke of Pagliano and marquis of Montebello, were beheaded, with feveral of their accomplices. One of the early meafures of this pope's adminiftration was to terminate the differences between the papal and imperial courts, occafioned by the late pope's refufal to approve Ferdinand's fucceffion to the imperial crown, refigned to him by his brother Charles V., without applying in the firft inftance for the confent of his holinefs. He next adopted certain meafures, with a view, if poffible, of putting a ftop to the progrefs of the reformation. The power and influence of the Proteftants were now every day becoming more and more confiderable. England and Scotland had difclaimed allegiance to the fee of Rome, and had new-modelled their religion. In the Netherlands, the reformers had greatly multiplied; and in France, there was reafon to apprehend that they foon might become too powerful for the Catholics. The new opinions had penetrated even to Italy. From Naples they were extirpated by Philip II., who iffued 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 defired the pope's permiffion to hold a conference of the principal ecclefiaftics in his dominions, on the fubject of religion. France determined to have recourfe to the fame expedient. The pope promifed that he would fummon a general council without delay, which he did, to meet at Trent. The bull was drawn up in fuch equivocal expreffions, as might be interpreted to fignify either a new council, or a continuation of the former one at the fame place. The emperor, the French king, Philip, and the other Catholic princes, received the bull, and gave orders to the ecclefiaftics in their dominions to repair to Trent, at the time appointed. An invitation to attend was alfo fent to the feveral Proteftant powers; but they all refolved to give no encouragement to a council, which was called by one whofe authority they could not acknowledge, and in which only thofe were to have decifive votes, who had fworn allegiance to the pope and the fee of Rome. The council opened in January, 1562. Attempts were foon made to abridge the authority of the pope, which created in his holinefs perpetual anxiety, and he was on the point of fuddenly diffolving the affembly; but he found it more expedient to flatter and cajole, than to have recourfe to violent meafures. In 1563 it was brought to an end, but not until decrees were paffed, defigned as an acknowledgment of the fubordination of the council to the holy fee. When information of the diffolution of the council was brought to Pius, he received it with great joy, and ordained a folemn thankfgiving on the occafion; and in a very fhort time, he publifhed a bull of confirmation, requiring all the prelates and princes to receive and enforce the decrees of the council of Trent, prohibiting perfons from writing any explication or commentary of them, and commanding the Catholics every where to have recourfe in all doubtful cafes to the apoftolic fee. By the republic of Venice, the feveral Italian princes, moft of the Catholics in Germany, and the king of Spain, the authority of the council was acknowledged, and the decrees received; in fome countries, without any limitation whatever; but in Spain, and all through the Spanifh dominions, with the claufe, "Saving the rights of the crown, and the privileges of the fubjects." Pius had the mortification to find that they met with a different treatment in France. The court refufed to receive and publifh 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 prefling inftance of the emperor Maximilian II., granted the ufe of the cup to the laity of Auftria and Bohemia; but he could not be perfuaded to confent to the marriage of the priefts, though earneftly 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 fix years. That event is faid to have been accelerated by his apprehenfions for the lofs of Malta, which was then befieged 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 feverity and oppreffion of his government. This hatred, united with religious enthufiafm, had given rife to a confpiracy againft him not long before his death; but it was difcovered, and the parties concerned in it were executed with much torture. Pius is praifed for the vaft fums which he laid out on public works, for the convenience and ornament of Rome. According to Onuphrius, he was poffeffed, or at leaft feemed to be poffeffed, while cardinal, of every virtue that could render him worthy of the high ftation to which he had been raifed; but no fooner had he attained the fummit of his ambition, than he abandoned himfelf, without reftraint, to all the oppofite vices; ftopping at no means of accumulating wealth, that he might enrich and aggrandife his nephews and other relations.

Pius V., pope, whofe original name was Michael Ghiflieri, was defcended from an obfcure family, and born at Bofchi, a fmall town near Alexandria, in the north of Italy, in the year 1504. When he was fourteen years of age, he embraced the monaftic life in a Dominican convent, where he was foon diftinguifhed by the ftrictnefs of his conformity to the rules of the order, and acquired a high character for piety and virtue. He was ordained prieft at Genoa, and became a very celebrated preacher, being mafter of a moft powerful and perfuafive eloquence. Afterwards he was elected prior of the convent of Vigevani, and nominated inquifitor by cardinal Caraffa, commiffary-general of the holy office, who had conceived a ftrong attachment to him. In a fhort time after, that cardinal was elevated to the papal throne, under the name of Paul IV. He made Ghiflieri bifhop of Sutri; and when, in the year 1557, our prelate was preparing to refign his dignity, and to return to the monaftery, he was prevented by the interpofition of his holinefs, who promoted him to the purple, by the title of cardinal *de fancta Sabina*, though he was moft commonly known by the name of cardinal Alexandrini, from his native country. He was, at the fame time, appointed to the poft of commiffary-general to the inquifition. This office he executed with fo much feverity in the Milanefe and Lombardy, that he was obliged to quit thofe countries; and his zeal was afterwards checked by the government, when he attempted to difcharge the functions of inquifitor at Venice. Pius IV. tranflated him from Sutri to the fee of Mundovi; and upon the death of that pontiff in 1566, by the unanimous fuffrages of the conclave, he was elected his fucceffor, when he affumed the name of Pius V. The people expreffed no joy at his coronation: they dreaded a fevere government under a man, in whofe rigid and auftere manners his fucceffive promotions from the condition of a fimple monk had made no change. Senfible of the coldnefs of the reception he met with, he obferved to thofe about him, "I hope that, fome time hence, the Romans will be as forry 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 difplayed great zeal and diligence in promoting a reformation in the manners and morals of all ranks of the people. He repreffed the exceffive pride and oftentation of the cardinals, as well as the luxury in drefs and mode of living of the other orders of the clergy. He gave directions for banifhing all the proftitutes from Rome, and he prohibited the bull-fights in the circus, as well as all other diverfions which had a tendency to promote irregularity and diffipation among the lower claffes. He gave directions for ftrictly enjoining on the clergy refidence, and commanded that no perfons fhould be admitted to ecclefiaftical benefices, who would not refide; and when he was told, that a ftrict adherence to fuch a decree would caufe the court of Rome to be deferted, he replied, that it was better that the court fhould be deferted, than that the fervice of the altar fhould be neglected. He ordered his own relations to retire from Rome, providing them all with fmall penfions for their fubfiftence, excepting two nephews, who were attached to ftudy; one of whom, Michael Bonello, who poffeffed fhining talents and an excellent difpofition, he was perfuaded by his friends to raife to the dignity of cardinal. While Pius V. was engaged in introducing a partial reformation among the ecclefiaftics and community of Rome, he difplayed a furious zeal againft the Proteftants, by perfecuting them with the fame favage feverity, which rendered him odious in his former character of inquifitor. Peter Carnefecchi, a perfon of diftinction at Florence, was, by his exprefs order, condemned to the flames, after having been convicted of correfponding with fome of the reformed religion in Germany, and with fome of his countrymen in Italy, who were fufpected of herefy. Aonius Palearius (fee his article), one of the ornaments of his age as an elegant and liberal fcholar, underwent the fame fate, for faying that in fome things the Lutherans were excufable, particularly for calling the inquifition "the dagger drawn againft literature in general." Not fatisfied 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 Proteftant fubjects; fending a confiderable body of troops to join the royal army, and permitting fome of the eftates of the church in France to be alienated, in order to fupply funds for carrying on hoftilities. Pius V. was not outdone by any of his predeceffors in zeal for maintaining the high claims of the papal fee. In 1568 he publifhed his famous bull, entitled "In Cœna Domini," which it was ufual to publifh at Rome on Maundy Thurfday every year, till it was fuppreffed by pope Clement XIV. By this bull, anathemas were pronounced againft fuch perfons as fhould appeal to general councils from the decrees of the popes, and againft thofe princes who fhould impofe reftraints on ecclefiaftical jurifdictions, or exact contributions from the clergy. This bull, evidently calculated to deprive princes of their fovereignty, and to render them and their fubjects entirely dependent on the will of the Roman pontiffs, was never received in any kingdom out of Italy. Some French bifhops did, a few years afterwards, attempt to introduce it into their diocefes; but their offence againft the liberties of the Gallican church was moft feverely punifhed. In 1569 Pius conferred the title of grand duke of Tufcany upon Cofmo de Medici, duke of Florence, who went to Rome, where he received the crown at the hand of his holinefs; and during the fame year, the pope iffued a bull of excommunication againft Elizabeth, queen of England, abfolving her fubjects from their allegiance. This paper was fixed up in the night on the bifhop of London's palace, and in other parts of the metropolis; but it was very harmlefs, for none but a few bigotted Catholics noticed it with the fmalleft regard: they indeed endeavoured to excite fome commotions, but their efforts were fruitlefs, and for the feeble attempt they paid the forfeit of their lives.

In the year 1571, the zeal of this pontiff was directed againft Selim the Turkifh fultan, who, in violation of a folemn treaty, had invaded the ifland of Cyprus. The Venetians, to whom the ifland belonged, folicited his holinefs to employ his influence in procuring affiftance for them from the Chriftian princes. With their requeft Pius readily complied. He was, however, fuccefsful in his application only with Philip II., who, without hefitation, entered into a league with his holinefs and the republic, by which he bound himfelf to pay one-half of the expence of a powerful armament which it was judged neceffary 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 fo much celerity and difpatch, that about the middle of September a fleet was ready to fail from Meffina, confifting of more than 250 fhips of war, and other veffels, carrying nearly 50,000 men. The command of this mighty armament was given to don John of Auftria, whom the pope, indulging the moft fanguine hopes with regard to the iffue of the war, exhorted to embrace the firft opportunity of engaging with the enemy, affuring him that he would obtain a complete victory. He fent him, at the fame time, a confecrated ftandard, and a number of ecclefiaftics to officiate in facred things on board the fhips; and, moreover, he ordered a faft and jubilee to be proclaimed, with an abfolution from their fins to all who fhould acquit themfelves with honour againft the infidels. A victory was foon afterwards obtained by this fleet over the Turks near the gulf of Lepanto, the intelligence of which fpread univerfal joy throughout all Chriftian Europe. When the important news was brought to the pope, he cried out, in the words of facred writ, "There was a man fent from God, whofe name was John," in reference to the prince under whofe command the victory was obtained. (See JOHN *of Auftria*.) Pius furvived this event only a few months, and was carried off by an attack of the ftone in 1572, when he was about the age of fixty-eight, after a pontificate of little more than fix years. Notwithftanding his defects, compared with many of his predeceffors, his name appears with honourable diftinction among the lift of popes. He was a lover and patron of learned men, and fcarcely preferred any perfons to confiderable dignities who were not ftrongly 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 publifhed at Antwerp in 1640, under the title of "Apoftolicarum Pii Quinti Pontificis maximi Epiftolarum, lib. v." Moreri. Bower.

PIUS VI. pope, originally known by the name of John Anthony Brafchi, was defcended from a noble, but reduced family, and born at Cefena, a fmall town belonging to the ecclefiaftical ftate, in the year 1717. Being deftined for the church, and poffeffing a promifing capacity, he received the beft education that could be procured. His

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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 direction, 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 Suſſex, 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 master 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 then 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 opp ressive public spoliations. In the mean time he was invol ved in new disputes with the court of Naples, which, encouraged by the example of the emperor, had abolished some of the perogatives 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 Vennaissin and Avignon were confiscated by the National Assembly. Against this seizure of his property, briefs and bulls were issued by the pope; and the partizans 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

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take the civic oath, they depofed the pope from his fovereignty, feized his revenues, and Avignon, with the whole of the papal territory in France, was converted into republican departments. When the National Affembly had formed their civil conftitution for the clergy, the pope was folicited by the anti-conftitutionalifts, with the abbè Maury at their head, to fuppress it by an apoftolical bull. Accordingly he difpatched, with this view, his celebrated monitory of the 13th of April, 1791. But this inftrument, fo formidable in former times, now ferved no other purpofe than to excite ridicule, increafe the feverity of the proceedings againft the non-conforming clergy, and to excite popular odium againft his holinefs. In Paris it was regarded as the tocfin for a civil war, and the mob, without hefitation, to exprefs their refentment againft the power which iffued it, burnt the effigy of the pope, in all his pontifical infignia, in the garden of the Palais Royal.

The hoftility of the court of Rome to what was tranfacting in France was not confined to briefs and bulls, but was difplayed in profecutions againft fuch perfons as were fufpected of any attachment to the revolution which had taken place. Several officers, natives of France, but in the pope's employ, were degraded, and fent to the gallies, for having difcovered fentiments favourable to the new order of things. A kind of profcription, likewife, was begun againft every thing or perfon which bore the name of French or Frenchman, till it was fufpended in confequence of the interference of the executive council of the French republic, which threatened hoftilities, if redrefs were not inftantly obtained. After the appearance of the *famous* manifefto iffued by the duke of Brunfwick of the coalition of crowned heads, againft the French republic, menacing with extermination all who fhould dare to refift the forces employed in maintaining the caufe of royalty, military preparations were begun to be made in the papal dominions, which could not but be confidered by the French government as intended to ftrengthen the power of their enemies. This fufpicion was confirmed by the circumftances connected with, and immediately following the murder of Baffeville, the French ambaffador, by the mob of Rome. That minifter had been fent, in 1793, to diffuade the pope from joining the league againft the republic, and had been inftructed to erafe the royal arms from the French academy, and all public buildings belonging to the nation, and to fubftitute the republican infignia in their place. Pius, however, refufed to acknowledge him as the reprefentative of France, till a reparation had been made to the holy fee for its wrongs. Baffeville being prevented from difplaying on the public buildings the emblems of his own government, determined to maintain its honour in his own perfonal appearance, and without hefitation openly paraded the ftreets with the national cockade in his hat. He had not worn it many days before he was affaffinated in the ftreets. This deed was condemned in very gentle terms by the pope, who probably was not grieved at what had happened; inftead, therefore, of making conceffions, and endeavouring to difcover and punifh the perpetrators of the act, he openly declared againft the French republic. His manifefto, which ordered a general armament, avowed the intention of affifting to exterminate the fworn enemies of all thrones and altars. The manifefto offered alfo amnefty and abfolution to criminals who fhould take up arms for the church and ftate, and exempted no perfons from the rifing in mafs but children, old men, and priefts, "who were to raife 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 fhort time he was glad to change his tone, and to declare himfelf neutral; he had not, however, wifdom and prudence fufficient to be fteady in his neutrality. In 1796, when Bonaparte was every where victorious, Pius committed an act of aggreffion by fuffering the Neapolitan cavalry who were haftening to their fuccour to pafs through the territories of the church, and even directed their march. No fooner had the conqueror difperfed the Auftrian armies in Italy, than he proceeded againft thofe Italian ftates which had either joined or favoured them. Having with his main army entered the territory of the pope, and without refiftance taken poffeffion of Bologna, Ferrara, and Urbino, the pontiff was under the neceffity of throwing himfelf on the clemency of the conqueror, who would not even grant him an armiftice but on very fevere conditions. By the terms of it, the pope was compelled to fet at liberty thofe perfons who were at that time confined for their political conduct or opinions, to renounce the friendfhip of the coalefced powers, and to fhut up his ports againft them; to furrender to the French the cities of which they already had poffeffion, as well as the citadel of Ancona, to pay nearly a million fterling, and to deliver one hundred pictures, bufts, vafes, ftatues, &c. and five hundred manufcripts, to be felected by commiffioners who fhould be fent to Rome for that purpofe. When the terms of peace came to be difcuffed, the pope refufed to accede to thofe conditions to which he had agreed when the armiftice was concluded.

The court of Rome had now the temerity to refolve trying the fortune of its arms againft thofe of France, having been promifed the affiftance of a confiderable body of troops by the court of Vienna. Every effort was now made by the pope, but he was ill-feconded by his fubjects, many of whom were more anxious to welcome the French to Rome than prevent their arrival. The crifis foon arrived which brought affairs to an iffue, and expofed the fatal policy which had directed the determination of the papal cabinet. A feries of ill fuccefs obliged his holinefs to confirm all the conditions of the armiftice without referve; to admit the annexation of Avignon and Vennaifin to the French republic; and he likewife confented to pay thirty millions of livres, as well as to furnifh the French army with 16,000 horfes, by way of ranfom for the remnant of his dominions which he was permitted to retain. By this peace the political exiftence of the holy fee was prolonged for a fhort time, but it was left in a ftate of extreme embarraffment: and the pope, who had already demanded of his fubjects the half of their plate, was now obliged to call upon them for the remainder, requefting that it might be brought into the pontifical treafury within three days. This requifition produced much difcontent and murmuring among the people, and ftrong fymptoms of a revolutionary fpirit were difcoverable in all parts of the ecclefiaftical ftate. The popular odium was particularly manifefted againft the duke of Brafchi, on whom was lavifhed every expreffion of indignation and contempt. To check and reftrain thefe tokens of public hatred and difaffection, the government of the court of Rome became fevere and tyrannical. To overawe the people a ftrong garrifon was placed in the caftle of Angelo, and foldiers were diftributed in different quarters of the city. Thefe feverities directed the public refentment againft the pope, who could never appear abroad without receiving the ftrongeft marks of difapprobation. Political confpiracies were every day forming, and in this diftracted fituation of affairs Jofeph Bonaparte, the brother of the general, arrived at Rome in the quality of ambaffador from the French republic. This was highly acceptable to thofe who were planning a change in the government, and towards the end of December 1797, an infurrection broke out, attended with very

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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 Baſſeville, 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 negociate 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 earthquake 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 handſomeſt 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 to many bitter ſarcaſms, and which the ſeriouſly devout were at a loſs to reconcile with the acknowledged ſanctity and gravity of his character." See alſo 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 ſay, living, at that time, in London; pitied and reſpected 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 ſmall proportion or ſample of the coins ſtruck at the mint is reſerved, in order to be aſſayed and compared with a check-piece or ſtandard kept in the exchequer for the occaſion. This operation, which is called the "trial of the pix," is performed with great exactneſs in the preſence of the privy council, the officers of the mint, and a jury of the goldſmiths' company; and there is no inſtance upon record of the coins thus tried being found to vary from the full ſtandard.

PIXITES, in *Ancient Geography*, a river of Aſia, in the Colchide, towards the north of the town called Trapezus.

PIZARRO, Francisco, in *Biography*, the diſcoverer and conqueror of Peru, was the natural ſon of a Spaniſh gentleman by a woman of the loweſt rank. His father, not thinking himſelf bound to raiſe him to a condition ſuperior to his maternal birth, not only left him deſtitute of all education, but employed him in the ſervile office of keeping ſwine. Indignant at this treatment, he ran away and enliſted as a common ſoldier. After ſerving ſome time in Italy, he joined the adventurers who were embarking at Seville for America. He was preſent in all the wars of Cuba and Hiſpaniola, and upon every occaſion he ſtood pre-eminent for undaunted courage, perſeverance, and enterprize, and was in a ſhort time conſidered 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 ſome property, he, with Diego de Almagro, and Hernando Luque, entered into an aſſociation for the conqueſt of the ſuppoſed rich countries on the coaſt of the South ſea. Pizarro made the firſt attempt. He failed in November from Panama in a ſingle veſſel with 112 men, ſo feeble were the means by which the ſubverſion of a great empire was to be effected. (See Peru.) Pizarro made ſeveral voyages, and with his aſſociates acquired the moſt important conqueſts, till at length the conquerors quarrelled among themſelves, and in April, 1538, the two hoſtile parties of Spaniards, each bearing the royal ſtandard, met and engaged with all the fury of inveterate foes, while an immenſe multitude of Indians, who had borne the cruelties of both, aſſembled on the ſurrounding mountains, enjoying, to them, the edifying ſpectacle of their ſavage foes deſtroying each other by mutual ſlaughter. The battle was fatal to the cauſe of Almagro, who was himſelf taken priſoner after the total and bloody defeat of his troops. In a very ſhort time the mercileſs Pizarro brought his old aſſociate to trial, condemned and executed him. Afterwards Pizarro was the unrivalled maſter of theſe extenſive regions, and without any regard to the Spaniſh court, he divided them like a conqueror among his followers, ſetting apart the moſt valuable lots for himſelf, his brothers, and favourites. His partiality excited much diſcontent among perſons, all of whom were actuated by the thirſt of gain. The partizans of Almagro ſighed in ſecret for revenge; but as no open hoſtility was manifeſted, the plan of diſcovery was carried on with vigour, and Gonzalo Pizarro was diſpatched by his brother upon the arduous enterprize of croſſing the Andes, and exploring the countries to the eaſt of that chain. It was on his return to Quito that he learnt the deſtruction of his brother. The followers of Almagro had repaired in great numbers to Lima, where the ſon of their late chief received them with much kindneſs, and engaged their warmeſt attachment by his popular qualities. In their private meetings a conſpiracy was formed againſt the life of Pizarro. He was apprized of the fact, but, in the confidence of uncontrolled power, he diſregarded them. The plot was, however, matured; and on the 26th of June 1541, at mid-day, a time, in thoſe hot climates, devoted to repoſe, Herroada, one of the principal of the Almagrian officers, at the head of eighteen determined aſſociates, ſallied out armed from Almagro's houſe, and proceeded to the palace. They paſſed unobſerved through the outer courts, and were arrived at the foot of the ſtaircaſe before an alarm was given. Pizarro was in a large hall with ſome friends. One of theſe who came to the top of the ſtairs to enquire into the cauſe of the tumult, was laid dead, while others eſcaped through the windows. The conſpirators ruſhed into the hall; Pizarro, with his half brother Alcantara, was killed, and the others mortally wounded: the former defended himſelf till he was abſolutely exhauſted with fatigue, when, unable any longer to parry off the weapons, he received a thruſt full in the throat, fell, and expired. His memory lives and ever will live as a ſignal contributor to his country's aggrandizement, but blackened with the ſtain of atrocious cruelty and perfidy. Univer. Hiſt. Robertſon'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 ſeparate volume of plates, in 1782, a treatiſe "On the Science of Sounds and of Harmony:" "La Scienza de' Suoni, e dell' Armonia." The author clearly explains the phenomena of ſound, as far as concerns practical muſic, from d'Alembert, another modern writer on harmonics, and gives an account of late diſcoveries in the ſcience, and of the ſyſtems of Rameau and Tartini, from Rouſſeau, explaining the laws of harmony in their preſent uſe.

PIZZICATO, in *Italian Muſic*, from *pizzicare*, to pinch, is a term that announces to the performers on bowed inſtruments the uſe of the fingers inſtead of the bow. When the bow is to be reſumed, it is expreſſed 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 coaſt; 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; ſix 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 Finiſterre, and chief place of a canton, in the diſtrict of Breſt; ſeven miles N.E. of Breſt. The place contains 3255, and the canton 11,833 inhabitants, on a territory of 230 kiliometres, in 12 communes.

PLACAGNODIAUGIA, in *Natural Hiſtory*, the name of a genus of ſpars.

The word is derived from the Greek πλαξ, *a cruſt*, αγνος, *pure*, and διαυγης, *pellucid*.

The bodies of this genus are cryſtalline terrene ſpars, or ſparry bodies with much of the brightneſs and tranſparence of 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 botryoide 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 πλαξ, *a cruſt*, αγνος, *pure*, and σκιερος, *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 corniche 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 Leipſic, 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 ſuppoſitiorum" 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 Excerpendi," 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. appointed 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 ſuperintendant of the houſhold; and upon the rupture of that prince with the court, about the year 1566, M. La Place retired to the caſtle of Vé 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 Carteſians, 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 inveſted

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 immoveable 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 apparens* of the object cannot be determined; only that it will appear vastly remote.

Nor can the *locus apparens* 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 $23° 30'$: to the sine of any present declination given or observed, *v. gr.* $23° 15'$ :: so is radius 10 : to the sine of his longitude $80° 52'$, which, if the inclination were north, would give $20° 51'$ of Gemini, if south, $20° 52'$ 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 foldiers are pofted ready to fuftain thofe at work in the trenches, againft the foldiers of the garrifon. It is cuftomary to make three places of arms, when the ground will permit; the firft and moft diftant from the place is about three hundred toifes from the glacis of the covert way; the fecond is within one hundred and forty toifes; and the third at the foot of the glacis. See PARALLELS.

PLACE *of Arms particular*, in a garrifon, is a place near every baftion, where the foldiers, fent from the grand place to the quarters affigned them, relieve thofe 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 thofe who advance in the approaches to retire.

Thofe places of arms that are in the covered way, are places made at the entering and faliant angles, confiderably larger than the ftreet of the covered way, and formed by turning the head of the glacis into two faces, projecting towards the country: thofe at the faliant angles are formed by the rounding of the counterfcarp; thofe at the entering angles are conftructed by taking the gorges at the head of the glacis of a certain length, drawing the faces at a certain angle, and parallel to thofe 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 alfo denotes a large fpace 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 fpot 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 feat or fource of an argument; or that from which it is taken.

PLACE is ufed in the doctrine of artificial memory: and thefe places may be either fuch in a proper fenfe, as a door, a window, a corner, &c. or familiar and known perfons; or any thing at pleafure, provided that they be placed in a certain order, animals, plants, words, letters, characters, hiftorical perfonages, &c. though fome of thefe are more and fome lefs fit for the purpofe; but fuch kinds of places greatly help the memory, and raife 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 *Aftrology.* See HYLEGIAL.

PLACE, *Whifpering.* See WHISPERING.

PLACE, *Additions of.* See ADDITION.

PLACE, *Unity of.* See UNITY.

PLACE *Bricks*, were kiln-burnt red bricks of a full fize, now entirely difufed in the metropolis; but in lieu of them, the foft infufficiently burnt bricks from the outfide of the clamps are called, by way of diftinction from ftock or hard burnt bricks, place bricks. Thefe are of a foul red colour, and will eafily break or crufh 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 furfaces when burnt very coarfe and hard. See BRICK.

PLACENTA, in *Anatomy*, a vafcular fpongy body, containing the ramifications of veffels from the uterus, and of others from the fœtus, and forming the medium by which the mother and child are connected. See GENERATION.

PLACENTA, in *Natural Hiftory*, the name of one of the claffes of the echini marini. The characters of thefe are, that they are of a depreffed or flatted form, and are wrought in various fhapes, as the paftry people make their cakes; they all have a cinquefoil flower at their top, and their mouth is in the middle of the bafe; the aperture for their anus is ufually near the edge.

Of this clafs there are three genera: 1. The melitta. 2. The laganum. And 3. The rotula: which fee under their feveral heads.

PLACENTA, among the *Ancients*, a kind of cheefe-cake, the moft fimple kind of which was made of flour mixed with oil and cheefe, to which honey was added: but the more luxurious fort of people added likewife a great variety of herbs and fruits, as alfo fugar, eggs, butter, &c.

PLACENTIA, or PIACENZA, in *Geography*, a city of Italy, and capital of a duchy annexed to Parma, on the S. fide of the Po. This city was built and colonized by the Romans about 218 years B.C., and not long after, ferved as an afylum to the Roman army, when defeated by Hannibal at the Trebia. It was afterwards affaulted by that Carthaginian general, without fuccefs. This city became very flourifhing and municipal, but it fuffered much in the troubles that attended the elevation of Otho to the empire; and when attacked by a party of the Vitellians, it effectually refifted, and in the bloody conteft had only to lament the lofs of its amphitheatre, remarkable for its capacioufnefs and architecture, which was fet on fire and reduced to afhes. Placentia, after having frequently changed mafters, was annexed to Parma, and thus remained till the expulfion 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-houfe, with fome other public buildings in the great fquare, Gothic. Several churches, particularly that of St. Agoftino, are of fine Roman architecture, and fome of them adorned with paintings of great celebrity. The great fquare is ornamented with two brafs equeftrian ftatues, one of Alexander Farnefe, and the other of his brother Ranuccio, which are much admired, particularly the former, for attitude, animation, and drapery. The ftreets of Placentia are handfome, broad, and ftraight: one in particular, called the Stradone, is reckoned the longeft and moft beautiful in Italy, being 3000 feet in length. Placentia is a bifhop's fee, and contains, befides the cathedral, 1 collegiate, 12 parochial, and 38 other churches, 8 abbies, 16 convents, and an univerfity. The number of inhabitants is about 20,000, including 2000 ecclefiaftics. The neighbourhood of Placentia is, perhaps, more interefting than the town itfelf, 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 foil is fertile, and furnifhes mines of iron, copper, and vitriol; 52 miles S.E. of Milan. N. lat. 45° 3′. E. long. 0° 43′.

PLACENTIA *Bay*, a fpacious bay on the S. coaft of Newfoundland, which forms a good harbour for fhips, and is frequented by fhips employed in the cod-fifhery, and by thofe 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., $15\frac{1}{2}$ leagues apart; lying between N. lat. 46° 43′ 30″ and 47° 54′, and between W. long. 54° 1′ and 55° 21′ 30″. The poft-town, which gives name to the bay, is on the eaftern fhore; 67 leagues to the E. of the ifland 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 fo capacious, that 150 fail of fhips may lie in fecurity, and fifh as quietly as in any river. The entrance into it is by a narrow channel, which will admit but one fhip at a time. Sixty fail of fhips can conveniently dry their fifh on the Great Strand, which lies between two fteep 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 ſort 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° 38′. W. long. 89° 40′.

PLACENTIA *Iſland*, an iſland near the coaſt of Maine. N. lat. 44° 10′. W. long. 68° 10′.

PLACER *de Abraxas*, a rocky iſlet, near the S. coaſt of Cuba. N. lat. 21° 18′. W. long. 80° 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 Panormus 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 ſought 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 the age of 62, in the year 450. She was interred at Ravenna, where her tomb, and even her corpfe feated in a cyprefs chair, were preferved for many ages. This emprefs received many compliments from the orthodox clergy, and St. Peter Chryfologus affured her, that her zeal for the Trinity had been recompenfed by an auguft trinity of children. Univer. Hift. Gibbon, vols. v. and vi.

PLACITA, PLEAS, a term frequent in our laws and cuftoms. Originally, placita fignified certain public affemblies of all degrees of men, in which the king prefided, and where the great affairs of the kingdom were confulted upon.

Thefe affemblies were called *placita generalia;* becaufe *generalitas univerforum majorum tam clericorum quam laicorum ibidem conveniebat.* And hence the decrees, ordinances, fentences, &c. of this affembly, were alfo called *placita.*

Sim. Dunelmenfis tells us, they were held in the open fields; for, fays he, *nullam oportet regem in literis affignare curiam, quia ubi rex judicat in aperto ibi eft curia fua.*

Some will have thefe *placita generalia,* and *curiæ regis,* of ancient times, to be much the fame with what we now call a *parliament.*

The lords courts came hence alfo to be called *placita generalia,* though oftener *curiæ generales;* becaufe all their tenants and vaffals were obliged to appear in them.

We alfo 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 lapfed.

Lord Coke derives the word *placitum à placendo, quia beneplacitare fuper omnia placet:* indeed, this feems a very fanciful etymon; and others have more reafon in deriving the word from the German *platz,* or the Latin *plateis, fields,* or *ftreets,* where thefe affemblies were originally held.

PLACITARE, in the old *Law Books,* fignifies to plead caufes. See PLEADING.

"Mos placitandi, ante Conquæftum, fuit coram aldermanno, et proceribus, et eorum hundredariis, fc. barônibus, majoribus, melioribus, fenioribus, et urbanis." Mifc. in Bibl. Cott. fub. 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 fentence of the court; or an opinion, ordinance, or decree.

Cuftos PLACITORUM *coronæ.* See CUSTOS.

PLACKET, or PLAQUETTE, in *Commerce,* a fmall filver coin of the Netherlands, of $3\frac{1}{2}$ ftivers current. The old plaquettes have been reduced to $2\frac{1}{2}$ ftivers. The affay of the placket is W. (worfe than the Englifh ftandard) 5 oz. 8 dwt.; its weight, 1 dwt. 18 gr.; its contents in pure filver grains, 20: and its value in fterling, 0*s.* $2\frac{3}{4}$*d.*

PLACODIUM, in *Botany,* from πλακωδης, *broad and cruftaceous,* a divifion of the natural order of *Lichenes,* as firft diftributed by Hoffmann, and conftituting the fourth fection of his feventh genus, *Lobaria.* It compofes the fecond tribe in the *Prodromus* of Acharius, but has no part in the fubfequent arrangement, publifhed in his *Methodus.* See LICHENES.

PLACUS, from πλακους, *a cake,* becaufe the inhabitants of Cochinchina ufe the fragrant juice of the genus in queftion, as an ingredient in cakes.—Lour. Cochinch. 496.—Clafs and order, *Syngenefia Polygamia-fuperflua.* Nat. Ord. *Compofitæ nucamentaceæ,* Linn. *Corymbiferæ,* Juff.

Gen. Ch. Common calyx imbricated, inverfely turbinate, fcales linear, flender, erect. *Cor.* compound, equal to the calyx, erect; *florets* of the difk few, all perfect, tubular, five-cleft; thofe of the circumference very numerous, naked. *Stam.* (in the perfect florets) Filaments five, very fhort; anthers forming a cylindrical tube. *Pift.* (in all the florets) Germen oblong; ftyle thread-fhaped, fhort; ftigmas 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, moft flender in the female ones; down capillary. *Recept.* naked, convex.

Eff. Ch. Receptacle naked. Down capillary. Calyx imbricated, inverfely turbinate, with linear fcales. Florets of the radius without a corolla.

1. P. *tomentofus.* Lour. n. 1.—Leaves ovate, obtufe, downy on both fides. —Found wild, as well as cultivated, in Cochinchina. *Stem* herbaceous, two feet high, erect, branched. *Leaves* alternate, feffile, ferrated, odoriferous. *Flowers* violet, in terminal, erect, oblong panicles.

2. P. *lævis.* Lour. n. 2.—Leaves ovate, pointed, fmooth. Native of the fame country.—*Stem* not quite fo tall, fmooth. *Flowers* pale yellow, in fhort terminal panicles. *Calyx* tumid at the bafe. We know nothing of thefe plants but from the account of Loureiro. See ELICHRYSUM, GNAPHALIUM, and ERIGERON.

PLADAROTIS, from πλαδαρος, *fluid,* in *Surgery,* a fungous tubercle upon the infide of the eye-lid.

PLADIA, or BLADIA, in *Geography,* a town of Pruffia, in the province of Natangen; 22 miles S.W. of Konigfberg.

PLADLING, a town of Bavaria, fituated on the Ifer; 8 miles N.W. of Ofterhofen.

PLAFOND, or PLATFOND, in *Architecture,* the ceiling of a room, whether it be flat or arched; lined with laths and plafter, and fometimes alfo enriched with paintings, &c. See CEILING.

PLAFOND is alfo more particularly ufed for the bottom of the projecture of the larmier of the corniche; called alfo the foffit.

PLAGALIS, Lat. πλαγιος, *obliquus, à latere.* Plagal and authentic, in the ecclefiaftical modes, or canto fermo, imply the different divifions of the octave: the divifion is called *authentic,* when the 5th is in the acute; and *plagal,* when the 4th is in the grave. (See PLAIN CHANT, and MODES, *Ecclefiaftical.*) The terms *authentic* and *plagal* are with reafon cenfured by Meibomius and Bontempi as barbarous. Bontempi propofes, inftead of the word *authentic,* to fubftitute *principal;* and for *plagal, relative* or *collateral.* Thefe diftinctions in the Romifh church are fimilar to the difcriminations made by the Greek mufical writers where they clafs their modes under the denominations of *principal* and *fubordinate,* with the diftinction of *hyper* and *hypo.* It is not furprifing that the primitive Chriftians fhould give Greek names to the fpecies of octaves in imitation of the Greek modes; nor, if we reflect on the fimplicity that was aimed at, and the humble ftate of thofe who firft employed mufic in their religious worfhip, fhall we wonder at the incorrect and artlefs manner in which it was done. How the Roman church acquired Greek terms in canto fermo it is eafy likewife to imagine, if we recollect that it was a prefent from Greek fathers: and Gregory, in reforming the mafs, not only retained thefe Greek terms, but adopted others, both from the Greek and Hebrew languages and ceremonies, in order to conciliate parties, and acquire converts: as *Kyrie Eleïfon* from the Greek, and *Hallelujah* from the Hebrew.

PLAGIANTHUS, in *Botany,* fo called by Forfter, from πλαγιος, *oblique,* and ανθος, *a flower,* becaufe of the oblique difpofition 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, *Monadelphia Dodecandria*. Nat. Ord. *Columniferæ*, 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 *Connarus*, 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.

PLAGIOPLATEUS, in *Natural Hiſtory*, a term uſed by Artedi and others, to ſignify depreſſed, in oppoſition to the term cathetoplateus, 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, mammæ, &c. and they bring up their young with milk.

The term is derived from the Greek πλαγιος, *tranſverſe*, and ουρα, *a tail.*

Under this claſs of fiſh are comprehended the following genera: the phyſeter, 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 "reddiſh or livid, with an eruption of *ſmall puſtules and ſores.*" (φλυκταίναις μικραῖς καὶ ἕλκεσιν ἐξηνθηκος. 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, this

this brief character of the difeafe is as correct as any that can be given; for, in fact, the difeafe varies greatly in its appearances in different inftances; infomuch that even fever is by no means invariably prefent; and in the more fatal cafes of plague, death terminates its courfe, before a fufficient time has elapfed to admit of the formation of buboes and carbuncles.

It is not eafy to give a general hiftory of the fymptoms of the plague; becaufe, in its different degrees of violence, its courfe and character exhibit very material variations. Hence it has been the practice of almoft all the phyficians, who have publifhed their obfervations on the difeafe, to divide the congeries of fymptoms into feveral claffes: the phyficians of Marfeilles defcribed five fpecies of the malady, and Dr. Ruffell divided it into fix; while Lange, Orræus, and others, fpeak only of three types which it affumed, or three degrees of violence, the mild, fevere, and malignant.

The general derangement of the fyftem, which ufhers in an attack of the plague, is much like that which commences the courfe of ordinary fever. A fenfe of cold, with fome fhivering, which is foon followed by heat, and acceleration of the pulfe, with giddinefs, head-ache, depreffion of ftrength and fpirits, white tongue, vomiting, or diarrhœa, and great oppreffion about the præcordia, are among the firft fymptoms of the difeafe. Thefe are fucceeded by a burning pain about the pit of the ftomach, by a peculiar muddinefs of the eyes, by coma, delirium, and other affections of the fenforium, which terminate by death in fome cafes on the fecond or third day, before the pathognomonic fymptoms, buboes, and carbuncles, have appeared; but which, in others, continue to increafe, while thefe morbid changes enfue, together with purple fpots and ecchymofes, which belong to the plague, in common with other malignant fevers. Without attempting a defcription of the different claffes of the plague as fubdivided by the writers above-mentioned, we fhall follow the laborious Dr. Ruffell through fome of his remarks on the particular fymptoms, as he obferved the difeafe at Aleppo.

The fever is prefent at one ftage or other of the plague with very few exceptions, though it differs materially in its degree, duration, and fymptoms, in different individuals. It is ufually preceded by a wearinefs and a confufion of head, which becomes a fevere pain as the fever advances. The cold ftage is fhort, and lefs marked than in an intermittent; but the changes in the fucceeding hot fit are fudden, anomalous, and alarming. Naufea and vomiting frequently occur from the beginning; but thefe fymptoms are abfent in a large proportion, even in cafes which terminate fatally. Indeed in many the attack is fcarcely to be diftinguifhed from that of ordinary fevers before the fecond night, unlefs where buboes and carbuncles arife within the firft twenty-four hours. Although thefe remove all doubts about the nature of the fever, they do not, however, afford any certain prognofis of the event of the difeafe. In fome cafes clear remiffions occur on the fecond or third day; but in general the changes from better to worfe are frequent in the courfe of the firft twenty-four hours, and more fudden and various than in common fevers. The difeafe in moft cafes advances with extreme rapidity, infomuch that the patient on the fecond or third day is often in point of debility, diforder of the fenfes, and of the vital functions, reduced apparently to the condition of one in the laft ftage of a malignant fever; yet to this defperate ftate will fucceed a remiffion, in which his fenfes and intellectual faculties are reftored, and weaknefs only feems to remain. Neverthelefs, thefe remiffions, when occurring early in the difeafe, or when not preceded by a fweat, are often fhort and fallacious: but when they follow a perfpiration on the third day or later, and are of fome hours continuance, they afford hopes of a favourable iffue.

Delirium in the plague feldom becomes fo violent and phrenitic, as in fome other fevers. It fometimes comes on the firft night, but in general not before the fecond; and is higheft in the febrile exacerbations. Sometimes delirium alternates with coma, which laft is in general a more dangerous fymptom, but moft particularly fo when it comes on early, and does not abate in the remiffions.

The change in the *eyes*, which has been defcribed as a *muddinefs*, is extremely remarkable. It fometimes takes place on the firft day, but more commonly on the fecond or third, and remains till fome favourable turn of the difeafe occurs. "It refembled fomewhat the dull fixed eye obfervable in the laft ftages of malignant fevers, but the dullnefs was different, muddinefs and luftre being ftrangely blended together:" and Dr. Ruffell adds, that it contributed much to that confufion of countenance, which enabled him, after a little experience, to pronounce with tolerable certainty on the exiftence or nonexiftence of the plague. The *tongue* very often retains its natural appearance; and where it change its colour, it becomes only white, and remains moift, feldom becoming parched, and never putting on fo thick a fur, or affuming fo dark a colour, as in the advanced ftages of fome other fevers. The *pulfe* is generally low, quick, and equal; and in the latter ftages it becomes exceedingly quick and fmall, efpecially during the exacerbations, fo as to be fcarcely perceptible; yet in fome cafes, when the difeafe is confiderably protracted, and other fymptoms denote much diforder, the pulfe varies little from its natural ftate. In fact, the variations of the pulfe are often quite incongruous with the other fymptoms. The refpiration is little difordered, except in the advanced ftage: there is no fœtor of the breath, nor cough; but there is an extreme anxiety and oppreffion about the præcordia, which produce great inquietude, and where they come on early, always dangerous fymptoms. They are often accompanied by a pain and diftreffing fenfe of heat in the epigaftrium, probably connected with the ftomach, and rather increafed than relieved by the vomiting.

The functions of the brain and nerves are particularly affected by the attack of the plague; fo that a fudden and extreme proftration of ftrength belongs to the difeafe under all circumftances, and is, in fact, the moft marked characteriftic of its fevere and fatal forms; the vital principle appearing to be fuddenly as it were extinguifhed, or fo enfeebled at once as to be incapable of refifting the violence of the diforder.

Vomiting did not occur in a very large proportion of the fick at Aleppo: but where it appeared at the beginning, and continued with fhort intervals, it generally denoted a fatal termination. The matter ejected from the ftomach was various at the beginning, it was only the ordinary contents of the vifcus; but after repeated reachings, bile commonly followed. Dr. Ruffell did not obferve any fetid difcharges from the ftomach; but a blackifh liquor fometimes came off in the laft ftage of the difeafe. A diarrhœa began fometimes on the firft day, but more commonly in the advance of the complaint, and was generally confidered as a dangerous fymptom; but the ftools were lefs offenfive than thofe in tertian fevers in the fame climate. Sometimes dark coloured blood was difcharged by ftool unmixed with fæces, and without griping pains. As a loofenefs of the bowels was generally detrimental; fo, on the other hand, a ftate of 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 diſperſe 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 diſperſe 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 *petechiæ* 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 *bullæ*, 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 worſer; 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; inſomuch 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 dearth and famine, according to the general teſtimony of hiſtorians, during which the people are not only ill-fed, but ill ſupplied with

with fuel, clothing, and other healthful accommodations, and alfo difpirited in the extreme.

Dr. Bancroft has collected fome facts and teftimonies which concur in pointing out the circumftances which induce a predifpofition in the body to receive the contagion of the plague, or to refift its influence. He quotes Dr. Pugnet's opinion, that the fufceptibility of a perfon for the contagion is greatly increafed by a moderately warm and moift atmofphere; that children, females, and perfons of delicate feeble conftitutions, are moft apt to become infected; and that thofe who are naturally robuft and vigorous feldom take the difeafe, unlefs weakened by exceffive fatigue, watching, exceffive venereal indulgence, or intoxication. Dr. Defgenettes remarks, that the plague feemed more particularly to attack thofe who are expofed to fudden tranfitions from a hot to a cold atmofphere, and *vice verfâ*, fuch as bakers, cooks, and blackfmiths; and that men addicted to exceffes with women and fpirituous liquors, very feldom recovered from the difeafe.

Dr. Bancroft has alfo adduced fome obfervations, made by himfelf, in proof of the influence of atmofpheric heat and cold, in both their extremes, in rendering the contagion dormant, or in fufpending that fufceptibility or affinity of the human body, without which it cannot produce difeafe in ordinary circumftances. Peftilential contagion, he obferves, probably exifts at all times in Lower Egypt, Syria, and many of the great cities of the Levant, and it is frequent on board Turkifh and Greek veffels. When he was in Egypt, he remarked, that the obvious effect of heat in leffening the fufceptibilities of individuals, or their aptitudes for taking the difeafe, was moft evident in thofe who had lately arrived from cold climates, and who were comparatively moft affected by the fummer's heat; and afcribed his own efcape, at that time, to that circumftance. "There were, however, perfons in Egypt," he adds, "who had been long accuftomed to greater degrees of heat, and who were therefore not rendered infufceptible of the difeafe, and fome few of thefe caught it after it had become extinct in the Britifh army, and when a perfon landed from England would not receive it, though he flept in an infected bed; and it was from this caufe, that in the autumn of the fame year, the difeafe began at Rofetta nearly two months before the ufual time, *i. e.* on the 13th of September, when I firft difcovered it in two natives of the Eaft Indies, attached to the Indian army; and it was propagated with fome rapidity for fix or eight weeks, among perfons who were either born in, or had juft come from, a climate *much hotter* than Egypt, whilft the Britifh troops directly from England did not receive, and probably could not have been made to take the difeafe." On Yellow Fever, p. 591.

It is fortunate for mankind, as the fame able author has remarked, that the communication of the contagion of the plague depends upon the co-operation of fo many favourable circumftances, and particularly upon that of a fuitable temperature, and of certain aptitudes and fufceptibilities in the human fubject; for without fuch requifites, or fuch obftacles to its propagation, the earth might have long fince become defolate.

It would feem fuperfluous to enter into a long detail of facts to prove that the plague is a *contagious* difeafe, notwithftanding the refufal of fome perfons to admit the fact. The majority of the hiftories of the plague teem with evidences from which it is undeniably inferred. It is more efpecially to be inferred, however, from the circumftance of the multitude of medical attendants on the fick under this malady who have perifhed by its attacks, and particularly of thofe who have been under the neceffity of the moft clofe contact with the infected. Dr. Samoilowitz, who for many years officiated as an army furgeon in places where he had numerous opportunities of feeing perfons under the plague, and efpecially during that of Mofcow in 1771, has filled nearly one hundred pages of his treatife "fur la pefte," with proofs of its contagious influence; and among thefe he mentions, that having fucceffively volunteered his fervices as chief furgeon, in three of the principal hofpitals of Mofcow, *all* the affiftant furgeons who were employed under him, fifteen in number, took the difeafe, 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 perifhed by the plague within one year, according to Dr. Sotira, who was one of the furvivors. He adds, that in the two following years, it was thought expedient to employ Turkifh barbers to drefs buboes, carbuncles, and blifters, as well as to bleed, and apply frictions of oil, under the infpection of French phyficians and furgeons, and that, in confequence of this arrangement, only twelve medical officers died in twice the former time. He alfo ftates, that more than half of the Turks, who were thus employed to affift the French furgeons, took the plague, which, in feveral inftances, proved mortal; though among a confiderable number of other Turks, employed at Rofetta by the French *to bury the dead*, only one caught the difeafe. This is one of the many facts which indicate that there is comparatively little danger in handling the bodies of infected perfons *after death*, than while alive. See Bancroft, loc. cit. and Gaetan Sotira, Mem. fur la Pefte, obfervée en Egypt, p. 5.

The plague, which ravaged Marfeilles in 1720, appears to have afforded ample evidence of its contagious nature. The report tranfmitted to the regent by M. Chicoyneau on the 18th of Auguft, reprefents the phyficians and furgeons as unanimous in their declaration, "that when one perfon in a family was attacked and died, the reft foon underwent the fame fate, infomuch that there were inftances of families entirely deftroyed in that manner; and if any one of an infected family fled to another houfe, the contagion accompanied him, and proved fatal to the family where he had taken refuge." (Relation Hiftorique, p. 115.) It appears, too, from the hiftorical record juft quoted, that the firft hofpital 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'Efcale, the ftreet in which the diftemper firft broke out. Two of the nurfes who affifted at her reception, and the matron who changed her linen, were taken ill the next day, and died after a few hours' illnefs. In confequence of the dreadful rapidity with which the contagion fpread in that eftablifhment, it deftroyed phyficians, furgeons, apothecaries, confeffors, and all the other officers and fervants, with the whole of the poor in the hofpital, including above three hundred foundlings. The priefts and monks who attended the infected fuffered in the fame manner as the medical affiftants. And, laftly, of two hundred and thirty galley-flaves, employed in going into the infected houfes, and burying the dead, two hundred and twenty perifhed in the fpace of ten or twelve days. The whole tenour of the hiftory of that plague, indeed, concurs to eftablifh the fact of its contagious nature. We fhall, therefore, conclude this brief detail with the obfervations of Dr. Ruffell, fuggefted by his experience in the Eaft.

"If of one hundred perfons, expofed to the infection of of the plague by a near approach to the fick, ninety fhould fall ill, fhall human inability to affign fatisfactory reafons for the prefervation of the other ten, be converted into a pofitive argument againft the difeafe having been caught by contagion? If perfons retired from all commerce with the infected and their attendants, breathing the fame air with the reft of the inhabitants, and nourifhed by the fame aliment, remain untouched during the ravage of the plague, as long as they continue fecluded, but upon unguarded communication are taken ill like others,—can any rational doubt arife about the caufe of their former fecurity? Or if through ftealth, or neglect of requifite precautions, fubftances tainted by the fick fhould be conveyed into thefe fecluded retreats; and perfons living temperately as before, ignorant of what had happened, and confequently in the midft of imaginary fecurity, happen to be feized with the diftemper,—can it with any fhow of reafon be afcribed, not to contagion, but to terror, or to colluvies in the ftomach and bowels, produced by intemperance and bad aliment? The inftances here alluded to are not the creation of fancy, but ftrictly confonant to repeated experience in Turkey; to fay nothing at prefent of what has been obferved at Marfeilles, and in various cities in Europe." Ruffell on the Plague, p. 208.

We cannot, therefore, but confider the *contagious* nature of the plague as fatisfactorily proved, though not demonftrable. The principal difficulty in the way of an unqualified admiffion of the propofition, is the complete and often fpeedy eradication of the difeafe in a place, where no particular means of purification have been employed, by which the contagion might be removed or deftroyed. But this difficulty is not infurmountable, as we have already attempted to fhew, and as might be farther illuftrated by a reference to the progrefs of thofe contagious difeafes, which admit of no difpute, fuch as the fmall-pox and meafles. For even thefe are only widely epidemic and feverely fatal at particular feafons, when circumftances, that are not always cognizable, give a peculiar virulence to the contagion, or a predifpofition to the human conftitution 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 fmall-pox, may infect a perfon a fecond time. Dr. Bancroft fays, "two cafes of *re-infection*, or fecond attacks of plague, fell under my obfervation in Egypt; one occurred in Mr. Webfter, then an affiftant furgeon, and the other in a foldier of the 27th regiment, each of whom had a bubo: they were, however, but flightly indifpofed, the weather having become hot. Dr. Buchan had a fecond attack, but with only a fmall carbuncle, as he informed me. Dr. Price alfo had a fecond attack, without either bubo or carbuncle, but, according to his account, with a violent affection of the head and nervous fyftem." In general," he adds, "I think fecond attacks are milder than the firft, though Dr. Price informed me of his having feen a lad, who, under fuch an attack, died on the fecond day. Pugnet fays, that re-infections, when they occurred, were ofteneft in perfons who had been mildly treated by the firft attack; and that feveral of thefe had the difeafe very violently the fecond time, immediately after ufing the bed or blanket of perfons who had died of it." (Loc. cit. p. 599.) The fact of the occurrence of the plague in the fame individual more than once, is, indeed, fully eftablifhed upon the beft authorities, although fome have difputed it. Merteus fays of the plague at Mofcow, "Experientia comprobatum fit, hanc (peftem) illos non folum in variis vitæ periodis, fed et eadem epidemia, bis, aut fæpius occupare poffe." (Obf. Med. p. 123.) Dr. Ruffell alfo bears teftimony to the fame fact in the epidemics which he witneffed at Aleppo. Neverthelefs, a fecond infection is admitted to be rather a rare occurrence, at leaft during the fame epidemic. In above one hundred and twenty peftilential cafes recorded by Diemerbroeck, there are only two in which the patients had been infected twice during the fame feafon; but he had met with feveral inftances of perfons attacked at Nimeguen, who had fuffered the plague fome years before. (See Diemerbroeck De Pefte, lib. iv. Hift. 37, and 45.) Whether the obfervation of Thucydides is thus fanctioned, as applicable to the true plague, may be queftioned. He fays that, in the plague of Athens, "thofe who recovered had much compaffion on thofe who were dying, and thofe who lay fick, as having known the mifery themfelves, and *were now in a fecure condition, for it never feized the fame perfon twice fo as to be fatal.*" (Thucyd. de Bello Pelopon. lib. ii.) As the fymptoms defcribed by Thucydides were more analogous to thofe of the fmall-pox than of the true plague, as above ftated; fo this confidence of the convalefcents in their fecurity (which is not ufual in cafes of the true plague when epidemic) rather confirms the opinion the plague of Athens was fmall-pox.

With refpect to the *treatment of the plague*, very little that is fatisfactory can be collected from the writings of thofe who have witneffed its ravages. Dr. Bancroft expreffes 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 affiftance, except by reftraining all violent and dangerous fymptoms, all exceffive and debilitating evacuations, and fupporting, when neceffary, the powers of life, by a moderate ufe of wine, ether, opium, volatile alkali, and Peruvian bark. "The inftances of perfons who have ftrangely recovered from the plague, after having wandered alone about the country, particularly in Egypt, expofed to *cold* and *wet*, feem to indicate, that even the moft moderate fweating is at beft ufelefs; but on the other hand, the unfuccefsful trials made by Dr. Price, of the cold bath, afford no encouragement to repeat fuch applications to the furface. In fome few cafes, where the difeafe occurs in the vigorous and robuft, and is accompanied with highly inflammatory fymptoms, bleeding might perhaps prove beneficial, if employed within a few hours from the attack; though in general very bad effects appear to have refulted from this evacuation. Mild emetics are faid, in fome cafes, to have proved beneficial, given at the very beginning of the difeafe."

This paragraph feems to contain the fum of the information, which is to be found in the records of modern medicine on the fubject. *Blood-letting*, in general, is to be deprecated in a difeafe, in which the inflammatory fymptoms are feldom confiderable, and the depreffion of ftrength ufually great and fudden. And in like manner, all violent evacuations, either by *emetics* or *purgatives*, appear to be detrimental, efpecially as violent vomiting and diarrhœa are apt to occur fpontaneoufly, and are deemed very unfavourable fymptoms. Dr. Ruffell remarks, that "the neglect of purging at the beginning was not followed by the confequences which might rationally have been expected," and, he adds, "I never faw any acute diftemper, where coftivenefs was attended with fo little inconveniency. Neverthelefs, 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 conftantly prevent loofenefs, or other fymptoms produced by matter pent up, and rendered more putrefcent by the fever, yet I think it fometimes had that effect; and the paffage of the bowels often appeared

peared to relieve the head, both in the augment and decline of the difeafe."

It appears to have been a very early and general opinion, as Dr. Bancroft remarks, among the phyficians of this and other neighbouring countries, that thofe who were attacked with the plague, and other contagious difeafes, had imbibed a *morbid poifon*, and that it was neceffary, above all things, to affift nature in expelling that poifon from the body, and this principally by *fweating*, which Morton called the king's highway. In "certain rules, directions, or advertifements, for this time of peftilential contagion, firft publifhed for the behoofe of the city of London, in the vifitation of 1603," and republifhed upon the recurrence of the plague in 1625, *copious fweatings* were directed to be excited by ftrong fudorifics, with warm beds and bed-clothes, "fo foon as any of them (the poorer fort of people) apprehend themfelves to be taken with the plague," and thefe were to be repeated every eight hours, and they were to "continue this courfe for four or five days;" and while they were fweating, it was ordered that they were not to be fuffered "to reft or fleep." The fame modes of treatment were adopted in the "advice fet downe by the College of Phyficians, by his majefties fpeciall command," which was printed in 1630. Not only ftrong fudorifics were enjoined, but it was directed "that there be good fires kept in and about the *vifited* houfes, 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 houfes." In 1665, the College of Phyficians were required by government to infpect the rules of former times, and make fuch alterations as they deemed proper; and among the directions which they then publifhed, after mentioning bleeding, purging, and vomiting, they fay "thefe three great remedies rarely have place in the plague, but are generally dangerous, and moft of all purging, by any ftrong medicines," but exprefs an opinion, that "the poifon is beft expelled by fweating, provoked by *poffet-ale*, and *London treacle*" mixed; and order the patient to "be put to bed to fweat, well covered in a blanket, without his fhirt, for twenty-four hours, every fifth hour renewing his cordial, but in half the quantity, between whiles refrefhing him with poffet drink, oatmeal caudle, or thin broths, made jelly, wine, or hartfhorn jelly;" and, if neceffary, warm bricks, wetted with vinegar, and wrapped in flannel, were to be put to his feet, and care was to be taken, that he "fleep not till the fweat be over." *Bliflers* were at the fame time to be applied "behind the ears, about the wrifts, near the arm-pits, on the infides 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 fpeed."

Such was the univerfal practice employed in the plagues of the feventeenth century; and it is enough to have ftated it to prove the mifchievous confequences which it muft have produced, to the fatisfaction of every pathologift of the prefent day. The miliary fevers, of which the writers of thofe times fpeak fo much, were the actual product of this violent excitement (fee MILIARIA); and the fmall-pox was rendered doubly fatal by the fame treatment. That coolnefs of the bed and apartment, with the moft liberal admiffion of air, and the moft complete reft that can be obtained, fhould be enforced under every form of fever, is now demonftrated beyond the poffibility of difpute. And it is not lefs clearly afcertained, with refpect to the management of the buboes, or glandular fwellings, that, although it may be proper to promote their fuppuration by emollient cataplafms, &c., where a natural difpofition to that iffue is evident; yet that there can be no danger or impropriety in favouring their difperfion or refolution, by the ufual means, when a fpontaneous tendency to fuch a termination is obferved. Dr. Bancroft juftly fays, "I know that the fudden retroceffion of buboes, previous to fuppuration, and whilft other fymptoms indicating danger fubfift unabated, is often followed by death. But this mortality is not in fuch cafes produced by any change in the bubo itfelf, or by the retention of any matter which ought to be difcharged, but by fuch an extreme diminution of the living power, or other injurious effects of the difeafe, as is incompatible with the continuation of a fuppurating procefs, and alfo with the patient's recovery; and, therefore, this retroceffion is to be confidered not as the caufe of death, but as an indication and confequence of that condition of the patient, from which death neceffarily refulted; and on the other hand, when thefe glandular fwellings rife, and fuppurate favourably, they indicate fuch a ftate of the living power and of the fyftem, as is likely to overcome the difeafe, without the fuppofed benefit of an evacuation of morbid poifon by that fuppuration. The fame reafoning appears applicable to carbuncles, though in their gangrenous ftate, and when not furrounded by concentric inflamed rings, they require hot ftimulant applications, and afterwards fuch as will promote a fuppuration, and a feparation of the carbonaceous cruft." On Yellow Fever, &c. p. 617.

It may be added, that *mercurial* preparations were employed, and pufhed as far as they could be carried, during the plague at Marfeilles (according to M. Deidier) without any good effect. Orræus, Pugnet, and Sotira, likewife give their teftimony to the fame refult of their own experience, even when carried to falivation. But where the difeafe is violent, it is obvious that fufficient time cannot be given to affect the falivary glands, even if the advantage of doing fo were clear; and when they have been affected, it is probable that this was rather the effect, than the caufe, of the mild and protracted ftate of the difeafe.

Frictions with oil were ftrongly recommended by Mr. Baldwin for the cure of the plague; but the evidence in favour of their efficacy is very defective. Thefe frictions, Dr. Bancroft informs us, were tried extenfively by the French phyficians in Egypt, and with very little, if any benefit, though in a few cafes they feemed to give temporary eafe. Puguet indeed fays, that they were not only ufelefs, but caufed anxiety and difturbance to the fick; that of fifteen patients to whom thefe frictions were applied, under the French phyfician Carrie, one recovered with difficulty, and all the reft died; and that where they feemed to do good, the difeafe was always mild. With fo much reafon to doubt of their efficacy, there is a ftrong objection to their ufe, arifing from the very great danger of communicating the difeafe to the unfortunate perfon by whofe *hands* they may be applied, and thus deftroying many lives, without much probability of faving one. Bancroft, p. 623.

Prevention of the Plague.—The meafures 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 thofe places where it prevails; and to the prevention of its propagation among the population, if it have already been introduced.

It feems to be generally admitted, that the plague does not originate in this country; and, therefore, from its infular fituation, the infection can only be introduced through the medium of fhips. Egypt, the Levant, and other parts of the Mediterranean, are feldom entirely free from the malady in the cool and temperate feafons; and probably, therefore, never free from the lurking contagion which the

 congenial

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 ſulphureous 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 ſound 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 cleansed 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 no where 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 respecting 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 prefervatives, with which the older medical books are copioufly ftored, they are in general compofed of a complex farrago of herbs and gums, of very queftionable properties of any kind. Thefe have been copied, with very little alteration, from the formulæ of dark and ignorant times, and confift of a few medicated ales, diftilled waters, and electuaries. It will be fufficient to mention one of thefe compofitions, calculated for the rich, which was preferved among the revifed directions of the College of Phyficians in 1665, and was difgraced by the following ingredients; oriental bezoar, pearl, hyacinth ftone, unicorn's horn, and lignum aloes, the proportion of the laft article being about three grains to four hundred and fifty of the other ingredients. In truth, unlefs individuals have a ftrong prepoffeffion in favour of thefe ufelefs expedients, and lofe all confidence without them, they may be fully difpenfed with. The principal fyftem of prevention that can be of any avail, muft confift in maintaining that ftate of health in which we are leaft liable to fuffer from the exciting caufes of difeafe. We muft neither weaken the body by evacuations, nor ftimulate and excite plethora by high living. A temperate and regular courfe of life, and a temperate ufe of cuftomary liquors, promife every advantage that can be expected from cordial and ftomachic medicines; inanition, long fafting, immoderate watching, late hours, heated rooms, cafual debauches, exceffive fatigues, fudden changes in diet, fhould be cautioufly avoided; inafmuch as whatever deftroys the balance of moderate health, induces a predifpofition to difeafe, under which contagion, like other occafional caufes of diforder, more readily operates upon the fyftem. Grief, terror, defpondence, and other debilitating affections of the mind, have been univerfally held to be of moft dangerous tendency in peftilential times; while, on the contrary, a regular flow of fpirits, cheerfulnefs, a temper not given to anticipate evils, and a lively hope of efcaping infection, are confidered as the beft fafeguards againft contagion. Thefe, however, it is not in the power of medicine altogether to beftow; but this confideration affords the only apology for the ufe of the inert amulets before mentioned. The ufe of *tobacco* was confidered by Diemerbroeck and others as conducive to repel the infection of the plague. But the experience of Dr. Ruffell led him to doubt the correctnefs of this opinion; as thofe who ufed tobacco copioufly did not appear to be lefs liable to the difeafe than others. At Aleppo, indeed, the cuftom of fmoking is univerfal both among men and women of all ranks, and therefore the very fact of the frequent prevalence of the plague feems to afford a refutation of this opinion. The beft prefervative is certainly to avoid a near approach to the fick, and efpecially to avoid the contact of the fick and of their clothes. The remarkable fact, mentioned by Dr. Samoilowitz, that all the affiftant furgeons in the hofpitals at Mofcow, took the plague, while the phyficians, who only walked among the fick, but carefully avoided contact, generally efcaped, affords a ftrong proof of the greater facility with which actual contact communicates the infection.

Moral Confequences of the Plague.—Having ftated every thing which appears to be material in the phyfical hiftory of the plague, we cannot altogether omit the confideration of fome of the moral evils, which have commonly been obferved in the train of every fevere peftilence. So urgent are the phyfical diftreffes which peftilence inflicts, and univerfal the interruption to the ordinary intercourfe of focial life which it occafions; fo neceffary is it for individual fafety to fhun all communication with others, and fo difficult, therefore, to obtain affiftance when in need of it; that a fyftem of felfifh principles becomes every where prevalent, and the ordinary moral rules of conduct are every where laid afide; and vices, follies, and crimes, of every defcription, contribute to augment the fum of mifery, which peftilence brings with it. The extreme uncertainty of the tenure of life, when every day may probably terminate it, feems to loofen the moral ties of the people, partly becaufe multitudes of thofe who are the arbiters of individual character are deftroyed, partly becaufe, in the general confufion, the chance of efcaping detection is much diminifhed, and partly becaufe the probability of living to undergo punifhment is exceedingly fmall. The extreme and fudden changes of fortune, too, which the death of whole families brings unexpectedly to many, unhinges the moral feelings, and leaves the indulgence of the paffions to be purfued with little controul.

A ftriking picture of the diffolution of morals, during the prevalence of the peftilence at Athens, has been drawn by Thucydides. After ftating that, in confequence of the dreadful mortality, the people, not knowing what to do, or whither to go, began to neglect all their duties facred and profane, he firft obferves, that the rites of burial were not performed at all, from the deftruction of fervants and domeftics, or performed in the moft irregular manner. Some, he fays, would take poffeffion of the funeral piles erected by others, and anticipating their arrival, would lay the bodies of their friends upon them, and fet them on fire; while others would depofit their corpfe upon the burning pile containing one already partly confumed, and retire. "But this malady," he proceeds, "was the fource of much greater depravities to the city in other refpects. For people now dared to do many things openly, which they were heretofore compelled by fhame to conceal; and they calculated upon their fudden change of fortune, feeing that many of the wealthy perifhed, while thofe who formerly were deftitute, became rich with their property. They, therefore, deemed it right to fet about the immediate enjoyment of it, and gave up all mind to pleafures, confidering that they in turn might be deprived of the treafures, and of life itfelf in a few days. Nor was any individual difpofed to undertake any labours for an honourable reward, becaufe he thought it uncertain whether he fhould not die before he could obtain it. Whatever each perfon deemed agreeable or lucrative to himfelf, this he confidered as expedient and honourable; and he did not allow himfelf to be reftrained in the purfuit of it, either by the fear of God or of human laws. This indifference to all moral and religious duties, arofe partly from the circumftance, that the fulfilment or neglect of them appeared to be equally unavailing; for all equally perifhed; and partly from the general expectation that no one would furvive a fufficient length of time to undergo trial and punifhment. And many perfons, confidering themfelves already doomed by fate to worfe punifhment than the laws could inflict, determined to enjoy fome of the pleafures of life before the time of fuffering arrived." Thucydides, lib. ii. § 53.

Very fimilar accounts of the diffolute ftate of the public character, attendant on times of peftilence, are related by other writers, who have witneffed thefe calamities. In the interefting defcription of the plague at Florence in the year 1348, given by Boccaccio in the introduction to his Decamerone, many allufions are made to this lawlefs condition of the city. After defcribing the different views which fome perfons adopted as to the mode of felf prefervation; he fays, "others maintained free living to be a better prefervative, and would baulk no paffion or appetite they wifhed to gratify, drinking and revelling inceffantly from tavern to tavern,

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 careleſs 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 wiſe 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 imminent 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, authoriſed 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 baſtilles from each other, and the opportunity of going to them

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 *Music*. 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 hypothenuse, 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

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 D A, D B, (*fig.* 2.) the sides of the angle required: or A B 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 *c e* 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 *c d* indefinitely. Thus have you the quantity of the angle laid down.

Measure the lines D A, D B, 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 *c b* and *c a* be proportional to D B and D A. Transfer the distance *a b* to the same scale, and find its length; the length, thus found, will be the length, or distance of A B required.

2. *To find the distance of two places, one of which is inaccessible, by the plain table.*—Suppose the distance required A B (*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 *a c* and *c b*. Measure the distance from your station to A; and set it off from the scale upon *c a*. 2. Remove the table to A, where place it so as that the point *a* representing A, and the index laid along the line *a c*, 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 *a b*. 4. On the scale measure the interval *a b*; which will be the distance of A B required.

3. *To find the distance of two inaccessible places by the plain table.*—Suppose the distance of A B (*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 *c d*, *c b*, *c a*. 2. Measure the distance of the stations C, D; and set this off from a scale on *c d*. 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 *c d*, 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 *d a* and *d b*; lastly, find the distance of *a b* on the scale, and this will be the distance of A B 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.* O *a*, O *b*, O *c*, &c.; measure the distance of each angle from the station, *viz.* O A, O B, O C, O D, &c. and from a scale set these off from O on their correspondiug 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 B C, 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 C D, 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 af 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 D E running off the paper; draw as much of the line D E as the paper will well hold; *viz.* D O. And by means of the divisions on the edge of the frame, draw the line P Q through O, parallel to the edge of the table H M; and through the point of intersection O, draw O N parallel to M Z. This done, take off the frame, remove the sheet, and put a fresh one (*fig.* 7.) in its stead; drawing on it a line R S near the other edge parallel thereto. Then lay the first sheet on the table, so that the line P Q lie exactly on the line R S, to the best advantage, as at O. Lastly, draw as much of the line O D, 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 inconvenience, 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 verſâ.*

To take an angle by the plain table, conſidered as a theodolite.—Suppoſe the quantity of the angle E K G (*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 E K G 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°, is the quantity of the angle ſought. If the remainder chance to be more than 180°, 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 circulum.* 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 townſhip of Hampſhire county, Maſſachuſetts, incorporated in 1785, and containing 977 inhabitants; 122 miles W. of Boſton.—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, PLAINTE, 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.

PLAINTE, 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 *blaſphemiæ.*

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 $217\frac{1}{2}$ kiliometres, in 20 communes.

PLAISANCE, 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 *plateſſa* and *paſſer lævis*, by ſome *quadratulus*, and the *pleuronectes plateſſa* 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, Eſſex. 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 maſſives with a black waſh. The projectures 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 Ainſa.

PLAN *Ober*, 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 forepart 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 exſertile 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 confervæ 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.

QUADRAN-

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.

Crenata. 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 ſcattered 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 ſea-wrack.

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 furcellatus.

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 $117\frac{1}{2}$ kiliometres, 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 Pruffia, in Natangen; 10 miles S.W. of Brandenburg.

PLANCOET, a town of France, in the department of the Northern Coafts, and chief place of a canton, in the diftrict of Dinan; 8 miles N. W. of Dinan. The place contains 635, and the canton 13,522 inhabitants, on a territory of $202\frac{1}{2}$ kiliometres, in 12 communes.

PLANCY, a town of France, in the department of the Aube; 8 miles W. of Arcis-fur-Aube.

PLANE, Planum, in *Geometry*, denotes a plain figure, or a furface lying evenly between its bounding lines.

Wolfius defines plane, a furface, from every point of whofe perimeter a right line may be drawn to every other point in the fame.

As the right line is the fhorteft extent from one point to another, fo is a plane the fhorteft extenfion between one line and another.

Planes, *Oblique*. See Oblique.

Planes, *Parallel*. See Parallel.

Planes are frequently ufed in *Aftronomy*, &c. for imaginary furfaces, fuppofed to cut, and pafs through, folid bodies, and on this foundation it is, that the whole doctrine of conic fections, and of the fphere, turns.

When a plane cuts a cone parallel to one of its fides, it makes a *parabola;* when it cuts the cone parallel to its bafe, it makes a *circle*. See each refpectively.

The fphere is wholly explained by planes, imagined to cut the celeftial 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 whofe orbit is the plane of the ecliptic, their inclination is eftimated 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 bufinefs of *levelling;* which fee.

Plane, *Inclined*, is a plane which makes an oblique angle with a horizontal plane.

A machine has been contrived for meafuring the acceleration of a ball down an inclined plane, and comparing it with that found in bodies falling at liberty. See its defcription in Mem. de l'Acad. Roy. de Scienc. 1699, p. 343.

The doctrine of the motion of bodies on inclined planes makes a very confiderable article in mechanics; the general principle of it has been already illuftrated under Mechanical *Powers*, and the fubftance of it is as follows:

Laws of Defcent of Bodies on inclined Planes.—I. If a body be placed on an inclined plane, its relative gravity will be to its abfolute gravity as the height of the plane, *e. gr.* A B (*Plate* XXXV. *Mechan. fig.* 1.) to its length A C. For, the conftruction being as in the figure, it is evident that the abfolute 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.* becaufe 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 fufpend 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 fine or radius, A B will be the fine of the angle of inclination A C B. The abfolute gravity of the body, therefore, is to its refpective gravity applied to the inclined plane; and, therefore, alfo the weight D to the weight L acting according to the direction D A, which fuftains it, as the whole fine is to the fine of the angle of inclination.

3. Hence the refpective gravities of the fame body on different inclined planes, are to each other as the fines of the angles of inclination.

4. The greater, therefore, the refpective gravity is, the greater is the angle of inclination.

5. As, therefore, in a vertical plane, where the inclination is greateft, *viz.* perpendicular; the refpective gravity degenerates into abfolute; fo in a horizontal plane, where there is no inclination, the refpective gravity vanifhes: and hence it appears, that the inclination of the plane may be fo fmall, that the greateft weight may be fuftained on it by the fmalleft power.

II. To find the fine of the angle of inclination of a plane, on which a given power will be able to fuftain a given weight. Say, as the weight is to the given power, fo is the whole fine to the fine of the angle of inclination of the plane. Thus, fuppofe a weight of 1000 be to be fuftained by a power of 50, the angle of inclination will be found 2° 52′.

III. If the weight L defcend according to the perpendicular direction A B, and raife up the weight D in a direction parallel to the inclined plane, the height of the afcent of D will be to that of the defcent of L, as the fine of the angle of inclination C to the whole fine.

Hence, 1. The height of the defcent C D of the weight L, is to the height of afcent D H of the weight D, reciprocally as the weight D to the equivalent weight L.

2. Since then $CD \times L = DH \times D$, 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 maffes, and the altitudes through which they afcend or defcend in a plane either inclined or perpendicular.

3. The powers that raife weights through altitudes reciprocally proportional to them, are equal. This Des Cartes affumes as a principle whereby to demonftrate the power of machines.

Hence we fee why a loaded waggon is drawn with more difficulty up an inclined than on an horizontal plane: as being preffed 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 fame height C D, are to each other as the lengths of the planes A C and C B.

S. Stevinus gives a very pretty demonftration of this theorem, which, for its eafinefs and ingenuity, we fhall here add. Put a chain, whofe 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 arife a perpetual motion of the chain about G I H: but this being abfurd, it follows that the parts of the chain I H and G I, and confequently all other bodies which are as the lengths of the planes I H and I G, will balance each other.

V. A heavy body defcends on an inclined plane, with a motion uniformly accelerated.

Hence, 1. The fpaces of defcent are in a duplicate ratio of the times, and likewife of the velocities; and therefore in equal times they increafe according to the unequal numbers, 1, 3, 5, 7, 9, &c.

2. The fpace paffed over by a heavy body defcending on an inclined plane is fubduple of that which it would pafs over in the fame time, with the velocity it has acquired at the end of its fall.

3. Heavy bodies, therefore, defcend by the fame laws on inclined planes as in perpendicular planes. Hence it was, that Galileo, to find the laws of perpendicular defcent, made his experiments on inclined planes, becaufe the motions are flower in the latter than the former; as in the following theorem.

VI. The velocity of a heavy body defcending on an inclined plane, at the end of any given time, is to the velocity which it would acquire in falling perpendicularly in the fame time, as the height of the inclined plane is to its length.

VII. The fpace paffed over by a heavy body on an inclined plane A D (*fig.* 4.), is to the fpace A B it would pafs over in the fame time in a perpendicular plane, as its velocity on the inclined plane is to its velocity in the perpendicular defcent, at the end of any given time.

Hence, 1. The fpace paffed over on the inclined plane is to the fpace it would defcend in the fame time in the perpendicular plane, as the altitude of the plane A B to its length A C; and, therefore, as the fine of the angle of inclination C, to the whole fine.

2. If, then, from the right angle B, a perpendicular be let fall to A C; A C : A B :: A B : A D. So that in the fame time wherein the body would fall perpendicularly from A to B; in an inclined plane it will defcend from A to D.

3. The fpace, therefore, of perpendicular defcent being given in the altitude of the plane A B; by letting fall a perpendicular from B to A C, we have the fpace A D to be paffed over in the fame time on the inclined plane.

4. In like manner, the fpace A D, paffed over on the inclined plane, being given, we have the fpace A B through which it would defcend perpendicularly in the fame time, by raifing a perpendicular at D meeting the altitude of the plane in B.

5. Hence in the circle C D E F, *fig.* 5, the body will defcend through all the planes A D, A E, A F, A C, in the fame time; *viz.* in that time wherein it would fall through the diameter A B, fuppofing that perpendicular to the horizontal plane L M: becaufe all the angles D, E, F, C, in the femicircle, are right angles.

VIII. The fpace A D, (*fig.* 4.) paffed over an inclined plane A C being given, to determine the fpace which would be paffed over in any other inclined plane in the fame time.

From the point D erect a perpendicular D B, meeting the altitude A B in B; then will A B be the fpace through which the body would fall perpendicularly in that time. Wherefore, if from B a perpendicular B E be let fall to the plane A F; A E will be the fpace in the inclined plane which the body will pafs over, in the fame time wherein it falls perpendicularly from A to B; and confequently A D will be the fpace in the other inclined plane A C, which it paffes through in the fame time.

Hence, fince A B is to A D as the whole fine to the fine of the angle of inclination C; and A B is to A E as the whole fine to the fine of the angle of inclination F; the fpaces A D and A E, which the body will pafs over in the fame time on different inclined planes, are as the fines of the angles of inclination C and F, and reciprocally as the refpective gravities on the fame planes. And, confequently, they are alfo reciprocally as the lengths of planes equally high, A C and A F. Whence the problem may be refolved various ways by calculation.

IX. The velocities acquired in the fame time on different inclined planes, are as the fpaces paffed over in the fame time.

For A D, A B, and A E, are the fpaces paffed over in the fame time; and fince A B : A C :: the velocity acquired in paffing over A D to the velocity acquired in paffing over A B; A C : A F :: the velocity acquired in paffing over A E to the velocity acquired in paffing over A B; A B : A C :: A D : A B; and A B : A F :: A E : A B; the velocity acquired in paffing over A D is to the velocity acquired in A B :: A D : A B, and the velocity acquired through A E to the velocity through A B :: A E : A B; therefore the velocities acquired in the fame time in paffing over A D and A E will be as the fpaces of A D and A E paffed through in the fame time.

Hence, alfo, they are as the fines of the angles of inclination C and F; reciprocally as the refpective gravities on the fame planes; and reciprocally as the lengths of equally high planes A C and A F.

X. A body defcending on an inclined plane A C, when it arrives at the horizontal line C B, has acquired the fame velocity which it would have acquired in a perpendicular defcent A B, to the fame horizontal line C B.

For A D is the fpace paffed over in the fame time with A B; and, therefore, the celerity acquired in paffing through A B is to that acquired through A D as A C to A B: but the celerity through A C is to that acquired through A D :: $\sqrt{A C} : \sqrt{A D}$; and fince A C : A B :: A B : A D, A C : A D :: $A C^2 : A B^2$, and $\sqrt{A C} : \sqrt{A D}$ :: A C : A B: confequently the celerity acquired through A C is to that acquired through A D as A C is to A B: therefore the celerity acquired through A C is equal to that acquired through A B.

Hence 1. A heavy body defcending through different inclined planes A C, A G, A F, hath acquired the fame velocity when it arrives at the fame horizontal line B F.

Hence alfo, 2. A body, continuing its defcent through feveral contiguous inclined planes, acquires the fame velocity which it would acquire in defcending perpendicularly to the fame horizontal plane.

XI. The time of defcent along an inclined plane A C, is to the time of perpendicular defcent through A B, as the length of the plane A C, to its altitude A B: but the times of defcent through different inclined planes equally high, A C and A G, are as the lengths of the planes.

For the time through A C is equal to the time in which A C would be defcribed uniformly with half the celerity acquired in C; and the time through A B is equal to that in which A B would be defcribed uniformly with half the celerity acquired in B; but thefe celerities are equal; confequently the times are as A C and A B. In the fame manner it might be fhewn, that the times of defcent through A C and A G, are as A C and A G.

XII. If the diameter of a circle A B (*fig.* 5.) be perpendicular to the horizontal line L M; a body will defcend from any point of the periphery D, E, or C, to B, along an inclined plane D B, E B, and C B, in the fame time in which it will defcend through the diameter A B.

For, letting fall the perpendicular C G, the time in which G B is defcribed is to the time in which B C is defcribed as B G : B C; but the time in which B C is defcribed is to the time in which A B is defcribed in the fubduplicate ratio of B G to A B; *i. e.* becaufe B G : B C :: B C : A B, in the ratio of B G to B C: confequently, the time of defcent through G B has the fame ratio to the time of defcent through B C and the diameter A B; therefore the time in which B C is defcribed is equal to the time in which A B is defcribed, &c. Hence,

XIII. The defcents of bodies through a femicycloid D E F (*fig.* 6.), and through any arc thereof D G, are always 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 superseded 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 equable. 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 subduple 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 paffing through the fpectator's eye, parallel to the horizon, cutting the perfpective plane, when it is perpendicular to the geometrical one, at right angles.

Plane, *Objective*, is any plane fituate in the horizontal plane, whofe reprefentation in perfpective is required.

Plane, *Perfpective*, is a plain pellucid furface, ordinarily perpendicular to the horizon, and placed between the fpectator's eye and the object he views; through which the optic rays, emitted from the feveral points of the object, are fuppofed to pafs to the eye, and in their paffage to leave marks that reprefent them on the faid plane.

Some call it the *table*, or *picture*, becaufe the draught or perfpective, of the object, is fuppofed to be thereon; others the *fection*, from its cutting the vifual rays; and others the *glafs*, from its fuppofed tranfparency. See Perspective.

Plane, *Vertical*, a plane paffing through the fpectator's eye, perpendicular to the geometrical plane, and ufually at right angles to the perfpective plane. See Perspective.

Plane, a tool ufed by artificers who work in wood, to produce ftraight, flat, and even furfaces upon that material. Almoft all trades which fabricate articles of wood, employ planes at times; but as joiners make a greater ufe of thefe tools than any others, they are ufually confidered as joiners' and carpenters' tools. Planes have been, of late years, ufed by fome artifts to produce flat furfaces in metals. A plane operates to cut off a thin chip or fhaving from the wood on which it is applied, by the fharp edge of a fteel cutter or broad chiffel, called, very improperly, the plane *iron:* this is fixed in a hole made through a wooden block, called the plane *ftock*, and the edge of the iron projects a very fmall quantity through the lower fide of the ftock, called the *face* of the plane; the furface of which face is made a perfectly true plane. The iron is fixed in an inclined pofition in the hole through the ftock, by means of a *wedge* driven in before it, to jamb it faft in the hole, which being wider than the thicknefs 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 fide or face, but grows wider as it rifes up through the ftock; the wedge is alfo cut forked, to allow more room for the fhavings which the plane iron cuts to pafs up before it through the mouth. When a plane of this kind is applied with its face upon the furface of a piece of wood, and preffed down upon it whilft it is moved forwards, the edge of the iron penetrates the wood to the depth which it projects through the face, and removes a fhaving of that thicknefs and the whole breadth of the edge of the iron, the fhaving turning up before the iron paffes through the mouth, and efcaping. The inclination of the iron makes it cut eafily; and if the iron is *fet fine*, that is, if the edge projects but very little beyond the face, it will remove very thin fhavings, and produce a flat and fmooth furface: on the other hand, if it is *fet rank*, that is, with a confiderable projection, it will cut away very faft, producing a flat though rough furface, and quickly reducing the wood to its intended thicknefs: if the wood has an irregular furface, it foon reduces it to a plane, becaufe the face, being flat, will not fuffer the edge of the iron to defcend into the hollow places, but removing all the eminences it paffes over till they are reduced to one level.

This is a general defcription of feveral kinds of planes, which are all known by different names, from their different dimenfions and purpofes. Joiners ufe the *jack plane*, the *long plane*, *trying plane*, *fhooting plane* or *jointer*, and the *fmoothing plane;* all which they denominate *bench planes*, becaufe the wood they are ufed upon is generally laid on the work-bench. They have alfo the *ftraight block* for ftraightening fhort edges, *rebating planes* for forming rebates; others, for the fame ufe, are called the *moving fillifter*, *fafh fillifter*, and *fide-rebating plane*. The *plough* is a narrow plane, provided with apparatus to guide it, in moving ftraight, to plow a groove or trench at any required diftance from the edge of a board or other piece of wood, and to any depth or width. The *dado grooving plane* is alfo for forming grooves.

There are feveral other tools, which, having an iron fitted into a ftock, are called planes, becaufe they cut in the fame manner, though, in ftrictnefs, they are not planes, for they do not make plane furfaces; thefe 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 *fnipe's-bills; fide fnipe's-bills*, *beads*, *hollows* and *rounds*, *ovolos* and *ogees*. The varieties and different fizes of thefe form a vaft number, with which every complete joiner is furnifhed. It is impoffible to defcribe the terms applied to thefe tools without figures, as they are arbitrary, though generally known among workmen. The faces of all thefe planes are ftraight in the direction of their length, but a fection acrofs the face is the impreffion or reverfe of the moulding they are intended to make, and the edge of the iron is curved to correfpond with this curve when in its place, but will in reality be a very different figure, becaufe it is inclined to the face of the plane at an angle of about forty-five degrees. Another diftinction between thefe and the bench planes is, that their mouths do not open fo as to difcharge the fhaving through the ftock at the top thereof, but the wedge completely fills the hole, and the fhaving paffes out fideways through a hole for that purpofe; in fome, thefe apertures are on the right, and in others on the left fide; in the firft cafe the fhaving is faid by the workmen to be thrown on the bench, that is, upon the right fide of the plane; but when the orifice of difcharge is on the left, and confequently the fhaving thrown upon the left, then the plane is faid to throw the fhaving off the bench. The *compafs plane* is ufed 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 furface of a cylinder. The *forkftaff plane* is ftraight in the direction of its length, but its face is made concave in its breadth, to the arc of a fmall cylinder; the edge of the iron is of courfe curved in the fame manner, and it planes cylindrical furfaces. Coopers alfo employ long and heavy planes to form the edges of the ftaves of barrels; thefe are mounted in an inclined pofition on legs like a ftool, with their faces upwards, and the ftave is drawn backwards and forwards upon them.

Planes are fo neceffary for all kinds of work, that any who intend to work in wood, fhould underftand the ftructure and the manner of ufing them. The *jack plane* is ufed for taking off the rough and prominent parts from the furface of the wood, and reducing it nearly to the intended thicknefs, in coarfe fhavings or flices. The ftock of this plane is about feventeen inches in length, three inches high, and three and a half inches broad; all the fides are ftraight and at right angles to each other: the mouth is cut through the folid of the ftock to receive the iron, and hold it at fuch 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 fide confifting of iron the other of fteel; the lower end of the iron is ground to an acute angle off the iron fide, forming a floping part called the bafil of the iron, fo as to bring the fteel fide to a fharp edge: the wedge which fixes the iron in its place, is let

let into two grooves of the fame form, on the fides of the opening or mouth: two fides of the wedge are parallel, and it is forked or cut away in the middle, leaving the fides like two prongs, to fill the lower part of thefe grooves; this allows the fhaving to pafs up without obftruction before the wedge: for the mouth or opening through the ftock muft be uninterrupted from the face to the top, and muft be no wider on the face of the plane, than is fufficient for the thickeft fhaving to pafs with eafe; and as the fhaving is difcharged at the upper fide of the plane, the opening through it muft expand or increafe from the face to the top, fo as to prevent the fhavings from fticking therein. A handle, called the *tote*, is fixed to the upper fide of the ftock, immediately behind the iron; it is formed to the fhape of the hand, and direction of the motion, fo as to produce the moft power in pufhing the plane forward.

A workman in ufing the jack plane, lays the piece of wood on the *bench* parallel to its fides, with the farther end lodged againft the *bench-hook;* then laying the fore-part of the plane upon the hind end of the wood, with the right hand he takes the handle, and preffing with his left upon the fore end, thrufts the plane forward in the direction of the fibre of the wood and length of the plane, until he has extended the ftroke the whole length of his arm, the fhaving being difcharged 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 fteps forwards the diftance of the length he has planed, and operates upon another length in the fame manner, proceeding this way by fteps, until the whole length is gone over and rough planed. To do this is very eafy; but a workman will not make good progrefs nor do clean work, unlefs he has firft adjufted his tool properly for the work. The methods of doing this are nearly the fame for all planes. The firft care is to obtain a fharp cutting edge to the iron; if it requires grinding on the grindftone, the carpenter places his two thumbs under the iron, and the fingers of both hands above, laying the bafil fide to the grindftone, and holding it to the angle he intends it fhall make with the fteel fide of it, keeping it fteady while the ftone revolves; and preffing the iron to the ftone with his fingers; in order to prevent the ftone from wearing the edge of the iron into irregularities, he moves it alternately from edge to edge of the ftone, with fo much preffure on the different parts as will reduce it to the required bevel, and make the edge ftraight.

The bafil being brought to a proper angle, and the edge to a regular and flight curvature, the roughnefs occafioned by the gritty particles of the ftone are taken away by rubbing its edge on a fmooth flat hone or Turkey ftone, fprinkled with olive oil on its furface. As the bafil is generally ground, to give a more acute angle than the edge of the iron would ftand, for the quicker difpatch of wetting it, the face of the iron is inclined nearer to the perpendicular, while it is rubbed backwards and forwards with the fame inclination throughout. Every time the iron becomes dull or blunt by ufe, the fharpening is produced by grinding on the rubber-ftone, or flat grindftone, or on a Turkey ftone; but in repeating this, after the edge gets thick, it requires fo much time to bring it up to an edge, that recourfe muft be had to the grindftone. The iron being thus fharpened, muft be fixed in the plane by its wedge: the projection of the cutting-edge muft be juft fo much beyond the face of the plane, as that the workman may be able to work it freely in the act of planing, and muft be regulated by the ftuff to be wrought; whether it is hard or foft, crofs-grained or curling; fo that a man may be able to perform the moft work, or reduce the fubftance moft in a given time. If the ftuff is good and clean-grained, it is evident that a confiderable projection may be allowed, as a thicker fhaving may be taken: the extreme ends of the edge of the iron muft never enter the wood, as this not only retards the progrefs of working, but choaks and prevents the regular difcharge of the fhavings at the orifice of the plane. The projection of the cutting-edge is called *iron*, and the plane is faid to have more or lefs 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 ftock, and the blows will loofen the wedge, and raife the iron in a certain degree, and the head of the wedge muft be knocked down to fix it again.

When he has occafion to take out the iron to fharpen it, he ftrikes the fore end of the top of the ftock fmartly with the hammer, which loofens the wedge and the iron.

All the other bench planes are adjufted in the fame manner, and indeed do not differ, except in dimenfions, as we fhall explain, from the jack plane. Of late years, a great improvement has been introduced in the irons of planes, to caufe them to cut fmooth; thefe are called double ironed: they were at firft only ufed in the fineft fhooting planes, but the advantages have been found fo great, particularly in planing bad wood, that they have become general for all forts of planes. The double iron confifts of a fecond iron, with a reverfed bafil fcrewed againft the front fide of the iron, fo that its edge lies againft the iron at a very fmall diftance from, and parallel to, the cutting edge; and applying clofely to the fteel fide of the iron, it forms an inclined plane, which turns the fhaving over immediately after it is feparated or cut up by the edge, and thus it prevents the iron from fplitting the fhaving deeper down than it will afterwards cut, and therefore leaving a rough or torn furface. This fecond iron is called the cover of the iron; and the bafil of its edge, inftead of being ground flat, as that of the iron, is rounding: the fcrew, which binds the cover upon the iron, paffes through a flit in the cover, and thus admits of its edge being adjufted at any required diftance from the cutting edges of the iron, and this diftance depends altogether on the nature of the wood the plane is to be worked upon. If the ftuff is clean-grained, the edge of the cover may be fet at a confiderable diftance, becaufe the difficulty of pufhing 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 occafioned by the edge of the cover turning the fhaving over immediately it is cut up.

The *trying plane* is ufually 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 ufe, it fucceeds the operation of the jack plane, to ftraighten the wood, and remove the ridges left by the former; it is fet with lefs iron, and cuts a finer fhaving: the mouth is alfo much narrower. When it is ufed upon a long piece of work, the workman takes every fhaving the whole length, by ftepping forwards, inftead of ftopping at arm's length, as with the jack plane. The fhaving of this plane, though finer, is fo much broader than the jack, that it requires as much force to pufh it forwards.

The *long plane* is fet very fine for finifhing work which is to be very ftraight; it is twenty-fix inches long, three and a half broad, and three inches in height.

The *fhooting plane*, or *jointer*, is the longeft, and moft correct plane ufed; it is employed after all the others, chiefly in fhooting the ftraight edges of boards which are to be jointed together; it is generally made two feet and a half long,

long, three inches and a quarter broad, and three and a half high; it is ufed like the others, but with great care to move it fteadily from one end of the work to the other, without preffing it down, as that might fpring the plane, or the work, and caufe the iron to cut when the work was fomething hollow, whereas the object is to make a perfectly ftraight edge. The face of this plane muft be kept quite true, and therefore it is a great object to make it of a fine piece of clean-grained, hard beech, well feafoned, that it may not warp, or vary, by the weather.

The *fmoothing plane* is very fhort, without any handle, and its fides are curved, fo that it very much refembles a coffin; it is feven inches and a half long, three broad at the mouth, and two inches and three quarters in height; it is ufed for finifhing work when put together, and to give the greateft degree of fmoothnefs to the wood, for which purpofe it is fet with as fine an edge as poffible.

Rebating planes are ufed for cutting out rebates; thefe are a kind of femi-grooves upon the edge of a board, or other piece of wood, formed by cutting down or reducing a fmall part of the breadth of the board to half, more or lefs, of the general thicknefs: by this means, if a rebate is cut on the upper fide of one board, and the lower fide of another, the two may be made to overlap each other, without making them any thicker at the joint. Rebates are alfo ufed for ornamenting mouldings, and many other purpofes in joiners' work. The planes for cutting them are of different kinds, fome having the cutting edge at the fide of the iron and of the ftock, others at the bottom edge of the iron and the face of the ftock, and others cutting in both thefe directions; the former, being ufed to fmooth the fide of the rebate, are therefore called fide-rebating planes; whilft the others are ufed for fmoothing the bottom. There is alfo a third fort, called *fillifters*, ufed for finking, or cutting away the edge of the piece of wood to form the rebate, leaving it for the others to fmooth the furfaces 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 cafes they have the mouth and the edge of the iron coming out at one edge of the face, and the fide of the iron alfo expofed at one of the upright fides of the ftock, whether it is formed with a cutting edge there or not: this expofed fide is either on the right or left, and they are named accordingly. In all cafes they throw the fhaving out on the fide, inftead of at the top of the ftock. The cutting edges and mouths are generally fituated obliquely acrofs the face, inftead of being at right angles to the length of the plane, as in others.

The *moving fillifter* is a rebating plane, which has a ruler of wood, called the *fence*, fixed upon its face by fcrews 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 diftance from the edge, to leave more or lefs of the cutting edge expofed, and this quantity will be the breadth of the rebate it will cut; becaufe when it is ufed, the edge of the fence is applied againft the edge of the piece to be rebated, and thus gauges the breadth its iron fhall cut away. The cutting edge of this plane is not fituated at right angles to the length of the ftock, but has an obliquity of about forty-five degrees, the expofed fide 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, fliding againft the edge, prevents this, the drift always keeps the fence in contact with the edge, without the attention of the workmen; it alfo caufes the iron to cut the bottom of the rebate fmoother, particularly in a tranfverfe direction to the fibres, or where the ftuff is crofs-grained, than could otherwife be done, when the fteel face of the iron is perpendicular to the vertical fides of the plane. The principal ufe is, however, to contribute, with the form of the cavity, to throw the fhaving into a cylindrical form, and thereby making it iffue from one fide of the plane. The iron is what is called fhouldered, that is, the lower part or fhoulder where the edge is, has double the width of the upper part, which is received into the mortife, and jambed faft by the wedge. It is the edge of this wide part only which is expofed at the fide of the ftock. Befides this principal iron, there is another fmall iron, called the tooth, which precedes the other, to fcratch or cut a deep crack at the width of the rebate, thus making the fhavings which the iron cuts up from the bottom feparate fideways from the reft of the wood. This tooth is inferted in a vertical mortife through the ftock, between the fore end of the ftock and the iron. The lower end of this little iron is ground with a bafil on the infide, fo as to bring the bottom of the narrow fide of the iron to a very convex edge; it is faftened by a wedge paffing down before it in the mortife in the ftock. The ufe of this tooth is principally for cutting the wood tranfverfely when wrought acrofs the fibres, and by this means it not only cuts the vertical fide of the rebate quite fmooth, but prevents the iron from ragging or tearing the ftuff. The iron between the fence and the edge of the face of the plane, muft project the whole breadth of the uncovered part of the face, otherwife the wood of the plane will bear it up, and prevent the plane finking as it cuts away the rebate, and the edge of the tooth or little iron fhould ftand out a little farther on the fide of the plane than the iron. The depth of the rebate which this plane will cut, is regulated by a ftop fixed on the outfide of the plane, at the intended height above the level of the face: then, when the plane has penetrated or funk the intended depth of the rebate, the ftop comes to bear upon the folid of the wood beyond the rebate, and bears it off from cutting any longer. The ftop is a piece of brafs, which moves in a vertical groove made in the fide of the ftock, between the iron and the fore end of the plane; in this it is moved up and down by a fcrew, which is inferted in a vertical perforation from the top of the plane to the groove, and paffing through a part projecting from the ftop into the groove: the upper part of the fcrew is formed to a thumb-nut, to turn it round by, and it is fo confined by proper collars, that it can neither move up nor down; but being turned, the inclination of the threads will rife or fall according to the direction in which the thumb-fcrew is turned, and caufe the ftop to move up and down in the groove on the fide of the plane, thus regulating it at pleafure to the depth to which the rebate is required to be funk.

In grinding and fixing the iron of this plane, it is neceffary that the cutting edge of the iron fhould ftand equally prominent in all parts out of the face, otherwife the plane cannot make fhavings of an equal thicknefs; and, confequently, inftead of keeping the vertical pofition, will, as it proceeds, become deeper on the fide on which the fhavings are thickeft, and then the part cut away will not be regular, for the bottom of the rebate will not be parallel to the upper furface of the wood, and the fide which ought to have been vertical, will be a kind of a ragged curved furface, formed by as many gradations or fteps in the depth as the number of fhavings.

The *fafh fillifter* differs in feveral 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 *striping*, 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. Holtzapfell and Deyerlien of Cockspur-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*, *Bastard* 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 sycamore, 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 Linnæan 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 carpinifolius*, 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, πλανητης, *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.

PLANETS,

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 $\frac{1}{217}$ 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 excentrical, 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 ellipsis, 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 apsides of the orbit will be moved sometimes *in consequentia*, and sometimes *in antecedentia* (whereas the nodes and apsides 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, *cæteris 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 $8^s\ 17^\circ\ 37'$, and his retrogradations continue $151^d\ 12^h$. When the Earth is in its aphelion, and the Georgium Sidus in its perihelion, it becomes stationary at an elongation of $8^s\ 16^\circ\ 27'$, and the retrogradations continue $149^d\ 18^h$. The following table contains the most correct elements of the orbit of the Georgium Sidus, and other particulars relating to this planet.

Tropical revolution - -	$30589^d\ 8^h\ 27'$
Mean distance from the Sun, that of the Earth being 100000 - -	1908352
Density, that of water being 1 -	$0\frac{99}{100}$
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 -	$11^s\ 16^\circ\ 30'\ 31''$
Secular motion of aphelion -	0 1 29 2
Excentricity of its orbit, the mean distance being 100000 -	90804
Longitude for 1784 - -	$3^s\ 14^\circ\ 43'\ 18''$
Greatest equation of the centre -	0 5 27 16

Longitude

Longitude of aſcending node in 1788	$2^s\ 12^\circ\ 47'\ 0''$
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 excentricity 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 -	$4^y\ 7^m\ 10^d$
Do. from Maſkelyne's Table, -	$1681^d\ 12^h\ 9'$
Annual motion - - -	$2^s\ 18^\circ\ 14'\ 0''$
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, according to Maſkelyne -	0.08141
Do. according to La Lande -	0.079
Inclination of orbit - -	$10^\circ\ 37'\ 0''$
Greateſt equation of centre, Maſkelyne	9 20 8
——————————, La Lande	9 3 0
Mean diſtance from the Sun, that of the Sun from the Earth being 1, La Lande	- 2.77
Do. from Maſkelyne's Table -	2.735
Mean diſtance in Engliſh miles -	260.000.000
Diameter in Engliſh miles, Herſchel -	163
——————————, Schroeter	1624
Apparent mean diameter, as ſeen from the Earth - -	- $1''$

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 nebuloſity 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 excentricity 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 Burckhardt.

Revolution - -	$5^y\ 182^d$
According to others (ſee *Planetary* NUMBERS) in - - - - - -	$1590^d\ 1\ 35'$
Mean longitude, 31ſt December, 1804, noon, - -	$1^s\ 12^\circ\ 17'\ 23''$
Place of aſcending node - -	5 21 6 0
Place of perihelion in 1805 -	1 29 49 33
Excentricity, the mean diſtance being 100.000 - - -	25096
Inclination of orbit - - -	$21^\circ\ 0'\ 0''$
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 $7^h\ 30'$ in longitude $11^s\ 15^\circ\ 54'\ 26''$.

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 nebuloſity, and has no viſible diſc. (Phil. Tranſ. 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. Tranſ. 1807, part ii. p. 245.

M. Burckhardt 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 - - -	$3.^y182$
According to others (ſee *Planetary* NUMBERS) in - - - - -	$1335^d\ 0^h\ 23'$
Place of aphelion - -	$6^s\ 3^\circ\ 0'\ 0''$
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 Burckhardt, in the Connoiſſance de Temps for 1809, from the moſt recent obſervations on the continent.

Place

Place of afcending node	$3^s\ 13^\circ\ 1'\ 0''$
Place of perihelion	8 9 42 53
Inclination of orbit	7 8 46
Mean diftance	2.373000
Excentricity	0.093221

We fhall fubjoin to the account above given of the four new planets, called by Dr. Herfchel *afteroids* (which fee), fome obfervations concerning their origin. From a variety of confiderations it has been concluded, agreeably to the opinion fuggefted by Dr. Olbers, that thefe four planets are the fragments of a large celeftial body, which once exifted between Mars and Jupiter. On the fuppofition that they are independent planets, their diminutive fize, the great excentricity and inclination of their orbits, and their numerous interfections, when projected on the plane of the ecliptic, are phenomena abfolutely inexplicable on every principle of fcience, and completely fubverfive of that harmony and order, which, before the difcovery of thefe bodies, pervaded the planetary fyftem. But if we admit the hypothefis, that thefe planets are the remains of a larger body, which circulated round the fun, nearly in the orbit of the greateft fragment, the fyftem refumes its order, and we difcover a regular progreffion in the diftances of the planets, and a general harmony in the form and pofition of their orbits. Thus does the ingenious Dr. Brewfter introduce his general reafoning on this fubject. He then proceeds to obferve, that the elements of the new planets furnifh us with feveral direct arguments, drawn from the excentricity and inclination of their orbits, and from the pofition of their perihelia and nodes, and all concurring to fhew, that the four new planets have diverged from one point of fpace, and have, therefore, been originally combined in a larger body. When the original planet burft in pieces, by fome internal force capable of overcoming the mutual attraction of the fragments, the larger fragment muft obvioufly receive the leaft impetus from the explofive force, and circulate in an orbit deviating lefs than any other of the fragments from the original path of the large planet; while the leffer fragments, being thrown off with greater velocity, would revolve in orbits more excentric, and more inclined to the ecliptic. Applying this remark to the cafe before us, the excentricity of Ceres and Vefta is nearly one-twelfth of their mean diftance, that of Ceres being rather the greateft; and the excentricity of Pallas and Juno is one-fourth of their mean diftance, that of Pallas being a little greater than that of Juno. From the theory it might be expected, that Pallas and Juno would be confiderably fmaller than Ceres and Vefta, and that Ceres fhould be the larger fragment, and have an orbit more analogous in excentricity and inclination than any of the fmaller fragments to the other planets of the fyftem. As far as the diameters of the new planets have been meafured, the theory is very ftrikingly confirmed by obfervation. According to Dr. Herfchel, the diameter of Ceres is 163 miles, while that of Pallas is only 80. The obfervations of Schroeter make Juno confiderably lefs than Ceres; and though the diameter of Vefta has not been accurately afcertained, yet the intenfity of its light, and the circumftance of its being diftinctly vifible to the naked eye, are ftrong proofs that it exceeds in magnitude both Pallas and Juno. The ftriking refemblance between the two leffer fragments, Pallas and Juno, in their magnitudes, and in the extreme excentricity of their orbits, would lead us to anticipate fimilar refemblances in the pofition of their nodes, in the place of their perihelia, and in the inclination of their orbits; while the elements of Ceres and Vefta fhould exhibit fimilar coincidences. Now, the inclination of Ceres is 10°, and that of Vefta 7°; while the inclination of Juno is 21°, and that of Pallas 34°; the two greater fragments having nearly the fame inclination, and keeping near the ecliptic, while the leffer fragments diverge from the original path, and rife to a great height above the ecliptic, and far above the orbits of all the other planets in the fyftem. If it fhall be found, from obfervation, that Vefta is one of the fmaller fragments, we may then account for its pofition with regard to Ceres, and for the fmall inclination and excentricity of its orbit, by fuppofing the planets Ceres, Pallas, and Juno, to have diverged in the fame plane, and nearly at right angles to the ecliptic, while Vefta diverged from the direction of the original planet, in a plane parallel with the ecliptic. This opinion is ftrongly confirmed by the fact, that the orbit of Vefta is nearer to the fun than either of the orbits of the other three fragments. The fame coincidence is apparent in the pofition of the nodes. The orbits of Pallas and Juno cut the ecliptic in the fame point, and the nodes of Ceres and Vefta are not far diftant. If all the fragments of the original planet had, after the explofion, been attracted to the larger fragment, it is obvious that they would all move in the fame orbit, and confequently have the fame perihelion. If the fragments received a flight degree of divergency from the explofive force, and moved in feparate orbits, the points of their perihelion would not coincide, and their feparation would increafe with the divergency of the fragments. But, fince all the fragments partook of the motion of the primitive planet, the angle of divergency could never be very great; and, therefore, we fhould expect that all the perihelia of the new planets would be in the fame quarter of the heavens. This theoretical deduction is moft wonderfully confirmed by obfervation. Thefe fingular refemblances, as our author clofes his reafoning on this fubject, in the motions of the greater fragments, and in thofe of the leffer fragments, and the ftriking coincidences between theory and obfervation in the excentricity of their orbits, in their inclination to the ecliptic, in the pofition of their nodes, and in the places of their perihelia, are phenomena which could not poffibly refult from chance, and which concur to prove, with an evidence amounting almoft to demonftration, that the four new planets have diverged from one common node, and have therefore compofed a fingle planet. Our author proceeds to account for the origin of meteoric ftones, which he confiders as phenomena that might accompany this great convulfion. Fergufon's Aftronomy, by Dr. Brewfter, vol. ii. See BALLS *of Fire*, FALLING *Stones*, and GEORGIUM SIDUS.

Saturn is reprefented by the character ♄. This planet, on account of its great diftance, appears to the eye with a feeble light. It performs its revolution round the fun in about thirty years. See SATURN.

Jupiter, marked ♃, is a bright refulgent ftar, finifhing its courfe round the fun in about twelve years. See JUPITER.

Vefta has no character affigned it. See VESTA.

Juno is reprefented 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, finifhing its courfe in about two years. See MARS.

The Earth, marked ⊕, performs its revolution in one year. See EARTH.

Venus, ♀, is the brighteft of all the planets, conftantly attending the fun, and never diftant from him above 48 degrees. It finifhes its courfe in about feven months.

When it goes before the fun, it is called *Phofphorus* and *Lucifer;* and when it follows him, *Hefperus*.

Mercury, ☿, a little bright planet, the fun's conftant companion, from whofe fide it never departs above 28 degrees, and by that means is ufually hid in his fplendour.

 It

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 immaturæ a me fruſtra leguntur, o.y;" which, duly arranged, is "Cynthiæ figuras 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 $24\frac{1}{3}$ days; that the north pole anſwered to the 20th degree of Aquarius, and was elevated from 15° to 20° 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 $24\frac{1}{3}$ 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° 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. Tranſ. 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. Tranſ. 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. Tranſ. 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. Tranſ. for 1781.) From farther obſervations upon Mars, which he publiſhed in Phil. Tranſ. for 1784, he makes its axis to be inclined to the ecliptic 59° 42′, and 61° 18′ to its orbit; and the north pole to be directed to 17° 47′ of Piſces upon the ecliptic, and 19° 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.

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 $9\frac{1}{3}$ 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 atmoſpherical 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 atmoſphere 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-feet 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. Tranſ. 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. Tranſ. 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 on 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 immerged 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 maculæ, 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.

Wolfius 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 dilatable 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 $\frac{2}{10}$ths, (which Wolfius tells us was his own height,) the ordinary ſtature of Jupiter's inhabitants will be found about 14 feet $\frac{2}{3}$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, $\frac{1}{1067}$, $\frac{1}{3021}$, $\frac{1}{169282}$; 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

For the places and motion of the aphelia of the planets, and the method of determining them, see APHELION.

For the diameters of the fun and planets, as feen from the earth, and the diameters of the planets, as feen from the fun, fee DIAMETER.

For the relative mean diftances of the planets from the fun, fee DISTANCE.

The greateft equations of the planets are as follow: Mercury, 23° 40′ 0″; Venus, 0° 47′ 20″; the Earth, 1° 55′ 36″.5; Mars, 10° 40′ 40″; Jupiter, 5° 30′.38″.3; Saturn, 6° 26′ 42″; the Georgian, 5° 27′ 16″. See EQUATION.

The following table exhibits the relation of the denfities, diameters, quantities of matter, and gravity on the furfaces of the fun and planets, refpectively.

Planets.	Denfities.	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 intenfities of light and heat which the planets receive from the fun, vary inverfely as the fquares of their diftances from the fun: and the apparent diameter of a body is inverfely as its diftance; and therefore affuming the mean diameter of the fun = 32′, we fhall have his apparent diameter at the feveral planets as follows.

The following table exhibits the relative intenfities of light and heat at the different planets, and the apparent diameter of the Sun feen from them.

Planets.	Intenfities 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 ellipfes; one of whofe foci is in the fun. This Kepler firft found from Tycho's obfervations; before him, all aftronomers took the planetary orbits for excentric circles. The manner in which he proceeded was as follows.

Let S (*Plate* XIX. *Aftronomy*, *fig.* 3.) be the fun, M Mars, D, E, two places of the earth when Mars is in the fame point M of its orbit. When the earth was at D, he obferved the difference between the longitudes of the fun and Mars, or the angle M D S; in like manner, he obferved the angle M E S. Now the places D, E, of the earth in its orbit being known, the diftances 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 laftly, in the triangle M D S, we know M D, D S, and the angle M D S, to find M S, the diftance of Mars from the fun. He alfo found the angle M S D, the difference of the heliocentric longitudes of Mars and the earth. By this method, Kepler, from obfervations made on Mars when in aphelion and perihelion (for he had determined the pofition of the line of the apfides, by a method independent of the form of the orbit), determined the former diftance from the fun to be 166780, and the latter 138500, the mean diftance of the earth from the fun being 100000; hence, the mean diftance of Mars was 152640, and the excentricity of its orbit 14140. He then determined, in like manner, three other diftances, and found them to be 147750, 163100, 166255. He next calculated the fame three diftances, upon fuppofition that the orbit was a circle, and found them to be 148539, 163883, 166605; the errors therefore of the circular hypothefis were 789, 783, 350. But he had too good an opinion of Tycho's obfervations, (upon which he founded all thefe calculations,) to fuppofe that thefe differences might arife from their inaccuracy; and as the diftance between the aphelion and perihelion was too great, upon fuppofition that the orbit was a circle, he knew that the form of the orbit muft be an oval: "Itaque planè hoc eft: Orbita planetæ non eft circulus, fed ingrediens ad latera utraque paulatim, iterumque ad circuli amplitudinem in perigæo exiens, cujufmodi figuram itineris ovalem appellitant," p. 213. And as, of all ovals, the ellipfe appeared to be the moft fimple, he firft fuppofed the orbit to be an ellipfe, and placed the fun in one of the foci; and upon calculating the above obferved diftances, he found they agreed together. He did the fame for other points of the orbit, and found that they all agreed: and thus he pronounced the orbit of Mars to be an ellipfe, having the fun in one of its foci. Having determined this for the orbit of Mars, he conjectured the fame to be true for all the other planets, and upon trial he found it to be fo. Hence, he concluded, "that the fix primary planets revolve about the fun in ellipfes, having the fun in one of the foci."

The relative mean diftances of the planets from the fun are as follow: Mercury, 38710; Venus, 72333; Earth, 100000; Mars, 152369; Jupiter, 520279; Saturn, 954072; Georgian, 1918352.

Having thus difcovered the relative mean diftances of the planets from the fun, and knowing their periodic times, he next endeavoured to find if there was any relation between them, having had a ftrong paffion for finding analogies in nature. On March 8, 1618, he began to compare the powers of thefe quantities, and at that time he took the fquares of the periodic times, and compared them with the cubes of the mean diftances, but, from fome error in the calculation, they did not agree. But on May 15, having made the laft calculations

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 apsides, 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 *excentricity of the planet*. For the excentricities 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, *e. 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°. 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

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, β, γ, δ, &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 excentricity; 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 this 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 eclipſe 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 excentricity, 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 ecliptic 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

the places of the aphelia, and the excentricities 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 $365^d.242 : 50.3$ (precef.) :: 30589.352 (trop. per.) : $4212''.5$ the precession in Georgian's whole tropical period: then

$$\frac{4212''.5 \text{ whole precef.}}{42''.4 \text{ daily motion}} = 99^d\ 8^h\ 28' \text{ to be added to the}$$

tropical period for the sidereal: consequently

	30589^d	8^h	$27'$	tropical period
+	99	8	28	arising from precession
	30688	16	55	= the sidereal period: and

$$\frac{30688.705}{365} = 84^y\ 28^d\ 14^h\ 55', \text{ the period in years of}$$

365 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 ECLIPTIC, 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.* *a b c d* 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. A B 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. C D 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 A B, 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 assume affumed, the pairs of wheels that act together refpectively will be fo many fractions of that period. Thus, the loweft wheel of 83 teeth, on the annual arbor, will drive its fellow 20, with its tube, round in $\frac{20}{83}$ of a year; and the little arm, that is fixed by friction on its fuperior end, will perform a revolution round the fun in the fame time. In like manner, the period of Venus will be performed in $\frac{32}{52}$ 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 being 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 fimple manner.

If we affume an exact folar year as the period of the firft moving or driving wheels, then the fractions will produce the periods fubjoined, *viz.*

				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 thefe periods be compared with the true periods given under *Planetary* NUMBERS, it will be feen that the mean motions produced by this fimple mechanifm are far from being accurate, and that the errors, by continual accumulation, will become fenfible in a comparatively fhort fpace of time; but where general reprefentation only is aimed at, and the refpective *times* of the phenomena exhibited by the planetarium are difregarded, this is the cheapeft and fimpleft conftruction of a planetary machine that has yet been devifed; and where its imperfections can be difpenfed with, its fimplicity is no fmall recommendation. Still, however, the *true* places of the planets, depending on the *equations* as well as *mean motions* of thefe bodies, are not the places indicated by this planetarium, fuppofing its mean motions ever fo accurate; nor are the motions of the five recently difcovered planets attempted to be exhibited, which they might be by additional wheelwork, without altering the conftruction of the machine. For the ufe of thofe who are fatisfied with the reprefentation of mean motions only, we beg leave to fuggeft the numbers fuitable for wheels, that will produce the revolutions of thefe five diminutive bodies alfo. Let $\frac{95}{26}$ be taken for Vefta, $\frac{74}{17}$ for Juno, and $\frac{72}{20}$ for both Ceres and Pallas, with one tube only for thefe two pairs; and thefe wheels, acting in the fame way that has been defcribed, will give the mean revolutions with as much accuracy as the prefent ftate of our knowledge of the motions of thefe little bodies will allow. The planet Herfchel would require $\frac{335}{4}$ for its long period, which numbers are impracticable in a fmall machine; but for this planet a train might be fubftituted, fuch as will be defcribed as forming a part of the following machine.

When a planetarium of this common conftruction is fitted up, its appendages are ufually a lunarium and tellurium, feparately adapted to the fame ftand; but in thofe, the annual and lunar trains are never free from confiderable errors.

Planetarium conftructed at the Houfe of the Royal Inftitution.—When the late Dr. Garnett refigned the lectufefhip of the Royal Inftitution, and took his aftronomical and other apparatus with him into Great Marlborough-ftreet, his fucceffor, Dr. Thomas Young, was authorifed by the managers of the inftitution to procure as good a planetarium for his lectures as he could get for about fifty pounds; this being confidered as large a fum as the ftate of the finances would allow to be expended on one inftrument, confiftently with the other demands of the apparatus room. The doctor, in confequenee of the permiffion thus given him, examined the fhops of the different mathematical inftrument-makers for a machine already made, which might be confidered as adequate to the illuftration of the folar fyftem, in a large and magnificent lecture room. His inquiries, however, were unfuccefsful; but having heard that aftronomical mechanifm was a fubject which had occupied the attention of the Rev. W. Pearfon, he introduced himfelf to that gentleman in the autumn of 1801, for the purpofe of conferring with him on the fubject. The refult of this conference was, that, being a proprietor of the Royal Inftitution from its firft eftablifhment, and having confequently an intereft in promoting its fuccefs, Mr. Pearfon agreed to calculate, contrive, and draw a plan for a new inftrument, which was accordingly done, and put into the hands of Kenneth M'Culloch, an old but ingenious workman employed at that time in the workfhops of the inftitution.

The materials being prepared, the machine was begun in the fummer of 1802, and finifhed in that of 1803, after having been ufed, in an unfinifhed ftate, in the fpring courfe of lectures of the latter year. The arrangement and dimenfions of the various parts of the machine are as follow, *viz.* In *fig.* 2, A B C D reprefent a ftrong frame of mahogany, well feafoned, and firmly put together, 5 feet 2 inches high, and $2\frac{1}{2}$ feet acrofs; the two upright pieces of which are each in fubftance 4 inches by $1\frac{1}{2}$, and braced, as feen in the figure; and the crofs foot-pieces are each 32 inches long, for the fake of fteadinefs. Above the crofs bar, A B, is another bar E F, 6 inches from the former, which turns upon very ftrong metallic pivots of five-eighths of an inch

diameter,

diameter, upon brafs bearing-pieces, at E and F, which are divided acrofs the centres of their holes, and allow the bar to be taken off and put on at pleafure, by means of a joint, that permits the upper part of each bearing-piece to be turned back. To the fhoulders of the pivots are attached the femicircular brafs plates, G, G, one-fourth of an inch thick, in which holes are drilled in the horizontal and perpendicular lines, and alfo at 45°, and at other intermediate angles; into fome of which holes two fteel bolts, H, H, placed on the bar A B, are inferted, to fuftain the mechanifm, placed on the moveable bar E F, in any given pofition. This method of mounting the fuperftructure gives a degree of fteadinefs, which could not be obtained from a central joint, and is equally capable of different degrees of elevation. It was found neceffary, however, to have a contrivance for either difcharging or locking both the bolts at the fame time; which contrivance was the invention of K. M'Culloch, and anfwers its purpofe completely. The mechanifm is fimply this: a thick circular plate of brafs has an arbor rivetted into it, which paffes down through the centre of the fixed bar A B, and has a thumb-piece, I, inferted below, and clofe to the bar, on a fquare filed upon its lower extremity, and pinned faft. 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 acrofs the plate, and divided into two equal parts, a femicircle is drawn from each of the two points, which lie equidiftant at oppofite fides of the centre, with fuch 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 fmall femicircles is drawn entirely upon one femicircle of the plate, and the other upon the other; after which the two defignated fmall femicircles are perforated in various places, nearly in the fhape of an S, and the intermediate folid parts filed away, and rendered perfectly fmooth with a burnifher. Each bolt is bent in the form of a half-crank, the remote ends of which are cylindrical, and pafs through two cocks fixed on the bar A B; whilft 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 fteel pin, fixed into each fliding brafs bar of the crank-piece, exactly fits, and paffes through each femicircular perforation of the circular plate, and completes the contrivance. The manner of applying this mechanifm to its purpofe is this: as the thumb-piece below the bar, A B, is faft to the arbor of the circular plate above the bar, turning it half round carries the plate along with it half a turn; in confequence of which, the metallic pins, rivetted into the fliding bars of the cranked bolts, are made to approach to, or recede from, the centre of the metallic plate, by reafon of their connection with the fmall femicircular perforations, accordingly as the thumb-piece is turned one way or the other half round; and thus both the bolts are pufhed in or out at pleafure by the mere turning of the thumb-piece, and will be kept faft to their places in any fituation without an additional fecurity.

Having defcribed the ftand of this planetarium, and pointed out the application of its different parts to conftitute a whole, we come next to particularize the mechanifm which the fuperftructure is compofed of, and to fhew the mutual relations of the various portions to each other, in regular fucceffion. The wheelwork, which conftitute the ratios of the velocities of the different bodies, claim our firft notice.

L M N O, in *fig.* 3, is a frame of ftrong brafs, kept together by four brafs pillars, faftened at both ends by thick fcrews, fo that either the upper or the lower plate will take off feparately. 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 refpective revolutions of all the primary planets that had been difcovered at the time of its invention, including Ceres and Pallas. To fhorten the defcription, we will poftpone the dimenfions of the wheels, and infert 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 affumed period of an exact folar year. Q Q is an arbor fcrewed faft to the lower plate, and, inftead of revolving itfelf, fuffers all the wheels which are borne by it to revolve loofely round it. P P is another arbor of the fame kind, but longer, and extending 5 inches upwards above the frame, to fupport the fun and his mechanifm. To give the reader a competent idea of the operation and order of the different trains, we will firft lay before him the following Table, and then explain it, as it has a reference to the drawing where the fame 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 Herfchel	7	105 12	67

1ft. The wheel of 90 is placed firft, or loweft, faft 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 laft wheel of the train 67, fixed on the longeft and innermoft 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 fimilar 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 faftened; the latter of which impels the fecond tubed wheel of 63 round in the tropical period of Venus.

3dly. Four wheels of each 60 teeth are employed in a fimilar manner, to produce the earth's revolution in an exact folar year; and the laft of the four is faftened to the third revolving tube, to carry the annual bar, or radius vector of the earth.

4thly. A

4thly. A wheel of 53 fucceeds on the arbor R, to drive round Q Q the wheel of 56, to which is faftened the wheel 50, to actuate the fourth tubed wheel of 89 in the tropical period of Mars.

5thly. A fmall 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 fame period; the difference of their refpective velocities being not yet fufficiently afcertained to require a difference in the wheelwork.

6thly. The fmall wheel 22 comes next on the arbor R, and drives 111 round Q, and alfo with it 40, as a fellow for the fixth tubed wheel of 94, with which is connected the radius vector of Jupiter.

7thly. The long pinion of 7, which is cut in the folid 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 feventh tubed wheel of 98 in Saturn's period.

Laftly: The faid pinion of 7 alfo 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 Herfchel.

This is the *order* in which the wheels ftand when they act; and their number might have been diminifhed one half, if accuracy in the calculations had not been confidered as a primary object. But to obtain a great degree of accuracy, the numbers that conftitute the ratios of a year neceffarily run high, and render it unavoidably requifite to break the high fimple fractions into compound ones of fewer figures, but of the fame value; or, which is the fame thing, it became expedient to fubftitute, in the moft convenient manner, a train of wheels for each planet, inftead of a fimple pair, where great accuracy muft have been out of the queftion. By this adoption, it will be feen in the fubjoined table of the powers of the wheelwork, that a greater degree of accuracy is attained than had perhaps ever been before accomplifhed; and that not merely in one, but in all the revolutions of the different primary planets.

But before we give the tables of dimenfions and powers of the wheelwork, it will be proper to obferve that *fig.* 4, which is an end-view of the frame, reprefents three brafs bridges, with tubes faftened to them, to be interpofed between the revolving tubes, in order to bear the weight of the machinery, and to take off the friction, which would otherwife have been too confiderable to be difpenfed with. The firft bridge, 1,1, fpans 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 fun's axis. This bridge is fcrewed to the upper fide of the lower plate of the frame. The fecond bridge, 2,2, with its tube, is placed over the tubed wheel of the earth, and is faftened by fcrews upon the lower plate, like the firft bridge; and the third bridge, with its tube, lies between the tubed wheel of Saturn and that of Jupiter, and is fupported 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 Lalande's Tables.
		D. H. M. S.	D. H. M. S.
Mercury - -	$\frac{22}{90} \times \frac{67}{68}$	87 23 14 35.796	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 Herfchel	$\frac{105}{7} \times \frac{67}{12}$	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

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 pivotted 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 apſides, 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.
	Teeth.	Teeth.	
Mercury -	37.9	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 Herſchel	34.6	32.4	67

The

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 $\frac{5}{16}$ bore, and the outermoſt, or ſhorteſt, $\frac{5}{8}$ths of an inch long, and $1\frac{1}{4}$ 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 hypothenuſe 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 excentricity, 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 excentricities proportional to the lengths of the radii vectores, are expreſſed in the annexed table.

TABLE

TABLE of Diſtances and Excentricities of the Planets in the Planetarium.

Planets.	Mean Diſtance from Sun in Inches.	Ratio to the Truth.	Short Arms.
Mrcury -	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			Inches.	diſtance is ſubtended by	Inches.
	Mercury -	= 7° 0′ 0″ at	1.94		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 Mercury's tropical revolution $= 25^d\ 10^h\ 0^m\ 0^s.223$; 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, $\frac{1}{5}$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, $\frac{1}{5}$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 aphelion 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 verſâ*, 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° 16′, and it points always to 17° 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 L M N O, by the interpoſition of the moveable croſs bar of mahogany E F, 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 29th 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

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 surest, 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 T U (*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 these 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 La 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 interposition 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 the

the parallelifm of the crank is preferved during its whole revolution, the diftance of the planet will vary conftantly, as well as its velocity, in the manner that has been explained under the article EQUATION *Mechanifm*, above referred to. When the horizontal part of the crank is equal to double the excentricity of the orbit, the equation will be properly reprefented, but the diftances will be better exhibited when the faid piece is equal to the fimple excentricity; there are, therefore, two holes drilled and tapped in this piece, to fuit either condition, but the nearnefs of the planet to the fun will not allow the introduction of the correction, which moft of the other planets have got, as will be prefently explained.

Hitherto the ufual mode of eftimating the value of a common train of wheels has been adhered to, becaufe the two trains that we have examined are fo placed, as to act in the ufual way in ftationary pofitions; but henceforth we fhall have to confider trains, in each of which a certain portion is placed on and carried round the fun by the very arm that is put into motion. In this conftruction, for a reafon that will appear prefently, the fyftem of concentric tubes, contrived by Roemer, and ufed in the common planetarium, is impracticable, unlefs as many fixed tubes could be introduced between them alternately, as there are revolving ones; the motion of each inferior planet is therefore tranfmitted to the next fuperior, beginning with Mercury and ending with Georgian, fo that each calculation is neceffarily that of a ratio between the periods of every pair of contiguous planets taken in fucceffion. In calculating thofe ratios the author had two choices, namely, of the *periodic*, and of the *fynodic* revolutions; one of which, as we have fhewn under the head NUMBERS *for Synodic Revolutions*, is eafily convertible into the other: if the periodic revolutions had been preferred, the wheelwork muft neceffarily have been placed on cocks, bridges, or in other *permanent* fituations; but when fynodic periods are chofen, fome of the wheels will require to be placed, or at leaft will admit of being placed on *moveable* fupports; the latter revolutions were thence chofen, in order to do away the neceffity of cocks and bridges, and the numbers calculated to produce fynodic revolutions, by the *mode* in which they are ufed, produce the periodic revolutions, after an allowance is made for the preceffion of the equinoxes. Thus, if the tropical period of Venus be to that of Mercury as $224^d.69847 : 87^d.96579$, we fhall find, by one of the methods of determining *planetary* NUMBERS, that thefe periods are to each other as $1553 : 608$ very nearly; but the numbers for the fynodic period are here required; therefore let 608 be taken from 1553, and let the remainder, 945, be fubftituted 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 alfo $\frac{608}{1553}$ of Venus's tropical period equal to that of Mercury, abfolutely confidered, it will be found that $\frac{608}{945}$ of the tropical period of Venus will be the *fynodic* or relative period of the two planets, Mercury and Venus, from conjunction to conjunction, namely, 144.54 &c. days, which time very nearly correfponds to the period given in our table of mean fynodic revolutions, inferted under the title NUMBERS. Now the factors compofing the ratio $\frac{608}{945}$ are $\frac{38 \times 16}{15 \times 63}$, or in the form of a train inverted, (becaufe the motion is given by Mercury,) $\frac{15}{38} \times \frac{63}{16}$, or otherwife $\frac{63}{16} \times \frac{15}{38}$; 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 planetarium before us. The wheel 76 revolves along with Mercury's ring, to which it is made faft, and drives a pinion of 30, revolving on a pin, or ftud, at the pofterior end of Venus's arm, by which it is carried; then a pinion of 16 made faft to the faid 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 faft to the central ftem, by clofe fitting, and therefore does not move, but by its refiftance caufes the arm of Venus to move inftead, 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 itfelf. In this way the calculations made for fynodic revolutions in all the other trains, produce the requifite tropical periods of all the remaining primary planets, agreeably to the table of wheelwork which we have fubjoined, for the fake of abbreviating our defcription.

Again, the wheel 126, under the arm of Venus and made faft to it, drives a pinion of 26 and its attached pinion of 32, both which revolve on a ftud on the earth's arm; and the intermediate pinion 13, being refifted by the fixed wheel of 97, revolves round it and carries the earth's arm round the fun in a folar year, as it regards the ecliptic; but as it regards Venus, in the proper fynodic period of 583.9 &c. days. On the earth's arm are carried the wheels and pinions for preferving her parallelifm and alfo for producing the moon's period, both which are effected with great accuracy: juft above the faid arm the wheel of 107 is fixed to the central ftem, and by its refiftance gives motion to the wheel 62, which again impels another wheel of 107 in a contrary direction, thereby producing true parallelifm; in the mean time wheel 86, made faft to wheel 62, revolves with it on a ftud, and, through the medium of a fmall wheel of 32, for changing the direction of motion, impels the pinion 12, with which the moon is connected. The lunation thus occafioned is $\frac{62}{107} \times \frac{12}{86}$ of 365.242, &c. $= 29^d\ 12^h\ 44^m\ 0^s.4$. At a fmall diftance below the earth's arm, and faft to it, revolves the wheel 142, impelling the pinion 28 and with it the pinion 30, refting together on a ftud in the arm of Mars; while the intermediate pinion of 13, refifted 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 faft the wheel 166, which impels the wheel 53, and with it the 34 attached to it, round a ftud on the arm of Pallas, while the intermediate pinion 15, oppofed by the fixed wheel of 154, pulls the arms of both Pallas and Ceres round with the fame 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 thefe periods were calculated (1806), thofe of Juno and Vefta had not been afcertained, nor had Vefta been difcovered; but room was left during the progrefs of the work for their introduction, and arms were fince inferted on the fame tube that carries the other two arms, which may be adjufted by hand occafionally when their places are required for any particular purpofe; but when the period of thofe little bodies are finally fettled they

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		7	0	0	0
Sun's axis	$\frac{61}{18} \times \frac{30}{28}$ of ſeven days	25	10	0	0
Mercury	$\frac{61}{18} \times \frac{35}{53} \times \frac{73}{13}$ of ditto.	87	23	14	36
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 La 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 requires 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 *ejected unity* from the value, as a compenſation for the *addition* made to each revolution by the *mode* in which the wheels are placed

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 pullies 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 $\frac{3}{2}$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 pullies, 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 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
Herschel	$\frac{1}{2}$ = 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 satellites 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″

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 ever 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

TABLE IX.—Angular Diftances of Saturn for every Half Degree of Equation.

Ang. Dift. Aphelion	Equation. 0° $0'$	Ang. Dift. Perihelion	Equation. 0° $0'$
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 Diftances of Georgian for every Half Degree of Equation.

Ang. Dift. Aphelion	Equation. 0° $0'$	Ang. Dift. Perihelion	Equation. 0° $0'$
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 Dift. Node	Hel. Lat. 0° $0'$
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. Dift. Node	Hel. Lat. 0° $0'$
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. Dift. Node	Hel. Lat. 0° $0'$
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 Vefta.

Ang. Dift. Node	Hel. Lat. 0° $0'$
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. Dift. Node	Hel. Lat. 0° $0'$
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. Dift.		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. Dift.		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. Dift.		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, fomething that relates to the planets. In this fenfe we fay, planetary worlds, planetary inhabitants, &c. Huygens and Fontenelle bring feveral probable arguments for the reality of planetary worlds, and animals, plants, men, &c. The former in his Κοσμοθεωρος, five de Terris Cœleftibus; the latter in his Dialogues, fur le Pluralité des Mondes.

PLANETARY *Hours*, in *Chronology*. See HOUR.

PLANETARY *Days*. Among the ancients, the week was fhared among the feven planets, each planet having its day. This we learn from Dion Caffius; and Plutarch, Sympof. lib. iv. q. 7. Herodotus adds, that they were Egyptians who firft difcovered what god, that is, what planet, prefides over each day; becaufe among this people the planets were directors. And hence it is, that, in moft European languages, the days of the week are ftill denominated from the planets; Sunday, Monday, &c.

PLANETARY *Years*, the periods of time in which the feveral planets make their revolutions round the fun, or earth.

As from the proper revolution of the fun, the folar year takes its original; fo from the proper revolutions of the reft of the planets about the earth, fo many forts of years do arife, *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 almoft equal to the folar year; they are more ufually eftimated from the fun, the true centre of their motions. See periodic times under PLANETS, *fupra*; and YEAR.

PLANETARY *Machines, an Hiftorical Account of.*—"The apparent motions of the heavenly bodies," fays profeffor Vince, "are the moft obvious phenomena in nature; and as a knowledge of the return of the feafons muft always have been neceffary for the hufbandman, the courfe of the fun probably engaged the attention of mankind in the early ages of the world." Accordingly the Jewifh hiftorian, Jofephus, 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. Berosus, 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 existimarent 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."

The

The other reaſon of this order of the planetary names of the ſeven days, as given by Johannes Oxiphilinus, 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 deinceps ad viceſimam quartam, quæ Martis cum eſſet, contingebat, ut proximæ diei prima eſſet Solis, tertiæ Lunæ, quartæ Martis, quintæ Mercurii, ſextæ Jovis, et ſeptimæ Veneris. Ex eo diebus hebdomadis planetarum inditum eſt præſidium, 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 Chaldæan 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 known 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 Alexandriæ, 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

culated an eclipse, probably from the assistance of the *Chaldean Saros*, which was a period of 223 lunations, or 6585⅓ days for the revolution of the nodes, from which a lunation was determined to be $29^d\ 12^h\ 44^m\ 7''$, 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 repented 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 Cnidos, 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:
Huccine mortalis progressa potentia curæ!
Jam meus 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 Cinthia mense redit:
Jamque, suum volvens audax industria mundum,
Gaudet, & humanâ sidera mente regit.
Quid falso insontem tonitru Salmonea 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 sphæram illigavit, effecit idem, quod ille, qui in Timæo mundum ædificavit Platonis deus, ut tarditate, et celeritate dissimillimos motus una regeret conversio. Quod si in hoc mundo fieri sine deo non potest, ne in sphæra quidem eosdem 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, " Archimedem arbitrantur plus valuisse in imitandis sphæræ 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 Ctesi-

 bius

bius 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 Poſidonius 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, ſphæram aliquis tulerit hanc, quam nuper familiaris noſter effecit Poſidonius cujus ſingulæ converſiones idem efficiunt in ſole, & in luna, & in quinque ſtellis errantibus quod efficitur in cœlo ſingulis diebus & noctibus; quis in illâ barbarie dubitet, quin ea ſphæra ſit perfecta ratione?" In Engliſh thus; "If any one ſhould convey into Scythia or into Britain this ſphere which our friend Poſidonius 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 clepſydræ, (Hiſtoire de la Méſure du Tems, tome i. p. 20, 21.) that "Ceſar 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 etoient 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 duodecimas ſingula poſſideant mundi, verſentur que ab oriente ad occidentem continentèr, tunc per ea ſigna contrario curſu Luna, ſtella Mercurii, Veneris, ipſe Sol, item que Martis, et Jovis, et Saturni; ut per gradunm aſcenſionem percurrentes, alius aliâ circuitionis 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 volvuntur, ſtellarum curſus ſempiterni; cui ſubjecti ſunt ſeptem, qui verſantur retrò, contrario motu, atque cœlum, 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 ſuà 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*, *ſuperiòr*, *inferior*, *ſublunary*, *ſolſtice*, *ſun's path*, *aſcenſion*, *deſcenſion*, *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

tions of all the planets, except of Mercury and Venus, which planets were made to revolve as fecondaries to the fun, or fecond planet in order from the centre; the moon being the firft: fuch a fyftem would exhibit the phenomena relating to the fun, Mercury, Venus, and moon very well, but would not give a reprefentation of the retrogradations of our fuperior planets.

Ptolemy, who died about 138 years after the commencement of the Chriftian reckoning, faw the difficulty of explaining the retrogradations of the fuperior planets by the Alexandrian fyftem, and therefore devifed the circles and epicycles that diftinguifh his fyftem, in order to account for the apparent irregularities of the planetary motions; and though he probably could not conftruct a machine to reprefent the faid motions exactly, yet in his Almageft is defcribed a fphere, with the conftellations depicted thereon, to which he could refer the apparent paths of the heavenly bodies, and by which he could explain his fyftem.

From the time of Ptolemy to the fixteenth century, in which Copernicus revived the fyftem of Philolaus, or as is generally faid of Pythagoras, the machines which were conftructed we muft fuppofe reprefented the Ptolemaic fyftem, which, like the Egyptian, placed the earth in the centre, but fuppofed the moon and planets all feparately revolving round it every day, whilft they flowly performed periodic cycles and epicycles, to account for the ftationary and retrograde appearances, that could not otherwife be explained. The moft 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 firft volume of Beckmann's "Hiftory of Inventions and Difcoveries." According to the accounts of St. Sebaftian and St. Polycarp, this coftly piece of mechanifm confifted of a pavilion of glafs, in the conftruction of which were confumed two hundred pounds weight of gold, as materials for the workmanfhip; and all the heavenly bodies were reprefented by mechanifm, together with the change of the phafes of the moon: there appears to have been alfo an ecliptic circle divided into figns. But whatever the particular conftruction of this machine may have been, it was loft to pofterity by the violent hands which the faints laid upon it, either on account of the valuable materials of which it was conftructed, or by reafon of fome fuppofed *impiety* attached to fuch a reprefentation of the heavens. St. Sebaftian reprefents Chromatius as fpeaking thus; "Habeo cubiculum holovitreum, in quo omnis difciplina ftellarum ac mathefis mechanicâ eft arte conftructa in cujus fabricâ pater meus Tarquinius amplius quam ducenta pondo auri dignofcitur expendiffe," *i. e.* "I have a chamber of glafs, in which all the knowledge relating to the ftars is laid down by mechanical contrivance, in the conftruction of which my father Tarquin is known to have confumed more than two hundred pounds weight of gold:" to which St. Sebaftian anfwers, "Si hoc tu integrum habere volueris teipfum frangis," *i. e.* "if you wifh to preferve this entire, you ruin yourfelf;" to which Chromatius replies, "Quid enim? mathefis aut ephemeris aliquo facrificiorum ufu coluntur, cum tantum eis menfium et annorum curfus certo numero per horarum fpatia diftinguuntur? Et lunaris globi plenitudo, vel diminutio, digitorum motu, rationis magifterio, et calculi computatione prævidetur?" (Act. Sanc. Seb. cap. 16.) *i. e.* "But why? this knowledge of the daily motions, is it not ufeful for the obfervance of the facred rites, feeing that the lapfe of months and of years is diftinguifhed by the paffage of a certain number of hours? And are not the increafe and decreafe of the lunar globe forefeen by the motion of indexes, guided according to certain calculations?" St. Polycarp, fpeaking of the fame mechanifm, ufes thefe words; "Illic figna Leonis, et Capricorni, et Sagittarii, et Scorpionis, et Tauri funt; illic in Ariete Luna, in Cancro hora, in Jove ftella, in Mercurio tropica, in Venere Mars, et in omnibus iftis monftruofis dæmonibus ars deo inimica cognofcitur:" that is, "There are the figns of Leo and of Capricorn, of Sagittarius and of Scorpio, and of Taurus; there are the moon in Aries, the hour-hand in Cancer, a ftar in Jupiter, the tropic in Mercury, in (or with) Venus Mars; and in all thofe monftrous dæmons is difcovered an art hoftile to the Deity."

The next inftrument in the order of time which occurs in our refearch, is that which was contrived by Y-tang, the celebrated Chinefe aftronomer, in the year 721, and which merited the admiration of his contemporaries. Berthoud (tome i. p. 38, and tome ii. p. 178, 179, Hiftoire de la Méfure,) fpeaks of this inftrument in the words of father Gaubil, thus: "L'eau faifoit mouvoir pleufieurs roues; et par leur moyen, ou reprefentoit le mouvement propre, et le mouvement commun du foleil, de la lune, et des cinque planetes; les conjonctions, les oppofitions, les éclipfes du foleil et de la lune; les occultations des etoiles et des autres planetes."—Which account in Englifh may be thus; "Many wheels were put in motion by water, and by their means were reprefented both the proper and common motions of the fun, moon, and five planets; the conjunctions and oppofitions, the eclipfes of the fun and moon, and occultations of the ftars, as well as of the planets."—By the proper and common motions, we conceive, we muft underftand the apparent or fuppofed diurnal motion of the planets round the earth, as well as their progreffive motions in the ecliptic, and alfo the lunation and motion of the moon's nodes. For it is faid, moreover, that this inftrument exhibited, by two pointers, the *hours* of the day and night, and alfo the *ke*, or hundredth part of the Chinefe day; and it may be worthy of remark here, that at every return of the index to the *ke* a little wooden ftatue ftept forth, and gave a blow on a wooden board, and then retired; which probably was the origin of *ftriking* clocks; but what was the regulator of this early horological, as well as aftronomical machine, does not appear.

We muft now pafs on to the eleventh century, in which William, the learned abbot of Hirfham, is faid "to have invented a natural horologe in imitation of the celeftial hemifphere;" (naturale horologium ad exemplum cœleftis hæmifpherii excogitâffe;) but this fhort notice conveys no exact idea of the conftruction of this piece of mechanifm.

The next machine that we find defcribed is an *horologium*, which, Trithemius fays, was prefented to the emperor Frederic II., of Germany, by one of the fultans of Egypt, in the year 1232: his defcription is as follows. "Saladinus Egyptiorum Frederico Imperatori dono mifit per fuos oratores tentorium pretiofum, mirabili arte compofitum, cujus pretii æftimatio quinque ducatorum millium procul valorum exceffit. Nam ad fimilitudinem fphærarum cœleftium intrinficus videbatur conftructum, in quo imagines folis, lunæ, ac reliquorum planetarum artificiofiffimè compofitæ movebantur ponderibus et rotis incitatæ; ita videlicet, quod, curfum fuum artis ac debitis fpatiis peragentes, horas tam noctis quam diei infallibili demonftratione defignabant; imagines quoque xii fignorum zodiaci certis diftinctionibus fuis motæ cum firmamento curfum in fe planetarum continebant."—"The fultan of Egypt prefented to the emperor Frederic, by his orators, a valuable tent (or pavilion), conftructed with admirable art, the value of which has been eftimated at more than five thoufand ducats. For its appearance within reprefented the celeftial fpheres, in which were the reprefentatives ſentatives 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 ſtated 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 wheel-work, 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 oſtendére. Ergo talem horologii fabricam magno labore, majore ſumptu, arte vero maximâ compegit, qualem non habet tota, meâ opinione, Europa ſecundam; ſive quis curſum ſolis ac lunæ, ſeu fixa ſidera notet, ſive 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 opinon, 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 ſphæræ, ut ſic ſiderum omnium motus, veluti in cœlo, 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 decet 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 Konigſhovens Elfaſs and Straſb.-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 (Doppelmayer 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 Geneviéve," 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° $\frac{V}{68}$, 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 excentricities 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

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. D. H. M. S.	Motion in 24*h*.
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 ſurpriſed, 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 ſurpriſing, 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 pullies. 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 pullies, 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

"3. The motion of the fun completes the year in exactly 365 days, which makes an error of 25 days in a century.

4. The difcs of the planets are made much too large in proportion to the fun."

The laft of thefe obfervations muft neceffarily conftitute an objection in every inftrument, where the ball for the fun is not made inconveniently bulky.

We are difpofed to think, that the irregularities of motion were not reprefented 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, fome of which were moft likely excentric. The fuppofed apogeal 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 thefe numbers the annual motions of the aphelion points, as at prefent afcertained, the above quoted places will be found to differ only in the *minutes*, except in the inftances of Mercury and Venus, in the former of which there is an error of about $2°\frac{1}{3}$, and in the latter, if we reckon forwards, of more than feven figns.

The fyftem which is reprefented by this mechanifm is the fame as was reprefented by the preceding one of Oronce Finée, which proves that the Copernican fyftem had not generally prevailed in the middle of the feventeenth century.

It may not be improper to mention here, that Cardan, who wrote in the middle of the fixteenth century, mentions the names of William of Zealand, and Junellus Turrianus, who invented machines of this defcription about the fame time.

Automaton of C. Huygens.—We come now to the firft machine, in all probability, which reprefented the true folar or Copernican fyftem, namely, the automaton planetarium of Chriftian Huygens; the defcription of this inftrument was not, indeed, publifhed till the year 1703, among the author's other pofthumous works; but Benjamin Martin fays, that this was the *original* from which all the more recent inftruments were afterwards made, and informs us, moreover, that during the refidence of this very ingenious mechanician and able mathematician at Paris, from 1665 to 1681, "he invented and perfected feveral ufeful inftruments and machines" (Biograph. Phil. p. 340.): we muft, therefore, fix the date of the automaton to be in this interval. The learned inventor fays, that he had feen and read of many elaborate inftruments contrived for exhibiting the celeftial motions, but as they were all very imperfect, he employed his mathematical attainments and mechanical fkill, for both which he was juftly renowned, in conftructing a more perfect machine than any which had been before made, inafmuch as it was to reprefent the excentricities and unequable motions of a fyftem, which was likely to maintain its ground amidft the fcrutiny of after ages.

In the "Defcriptio Automati Planetarii" we meet with an account of the numbers, and a drawing of the wheelwork of this machine, which we briefly fhall defcribe, and attach the proper value to each movement, and then make fuch obfervations on them as may occur.

In this machine there is a large watch or clock movement, regulated by a balance and balance fpring, 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 fecond wheel of 73 once round in a year; $\frac{45}{4} \times \frac{73}{9}$ of 4 days being equal to 365 exactly. The laft mover of 73 has a long arbor lying horizontally, or nearly fo, acrofs the machine, on which arbor all the firft moving or driving wheels are placed of the different planetary movements; the ratios, therefore, conftituted by the wheelwork are fo many fractions of 365 days, according to the fubjoined plan, in which the value of each feparate movement is given in days, hours, minutes, and feconds, refpectively: *viz.*

		D.	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

Befides the above wheels and pinions, there is a fingle fcrew driving a wheel of 300 teeth once round in 300 years of 365 days each, to fhew for what year the inftrument is at any time rectified: alfo 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 thefe periods with the exact periods which the beft tables give, the reader will obferve many very confiderable errors, and be difpofed to conclude unfavourably of the calculations here employed; but what will be his furprife when he is told that Huygens wrote exprefsly upon an excellent method of approximating to the

the truth, in calculations of this kind, which no doubt he employed before he began making his inftrument! He will naturally conclude that the fcientific contriver of this mechanifm has not made the moft of his calculations and ingenuity; and that this was really the cafe may be unqueftionably proved; for the fact is, he has calculated periods in fractions of a *folar* year, and afterwards has introduced a firft mover to revolve in a *civil* year of 365 days, as we have feen; whereas, he ought to have made the annual arbor revolve in 365.242 days, as his calculations fuppofed, and then the periods would have been thefe: *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

Thefe periods, being very near the true tropical periods, muft evidently have been calculated from a folar year, and therefore ought to have been produced by wheels placed on a common arbor revolving exactly in that time; hence, the fubftitution of a proper annual movement in this machine will reftore to all the other wheels their proper intended motions, and make the periods what the wheelwork was calculated to effect. See NUMBERS, *Planetary*.

The laft moving wheels, which are here put as numerators of the different refpective fractions, were fo many flat rings with the teeth cut in their pofterior or concealed furfaces, and projecting more or lefs from their planes to meet their drivers; thefe were fupported 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, whilft they were kept in their proper pofition by the rollers. On thefe moveable rings the planetary balls were fupported, and the aphelion and perihelion points, latitudes, and fhape of the orbits, were marked on the intermediate fixed rings, which, together with the revolving rings, refting on fhoulders turned at the outward and inward edges of the fixed ones, formed the cover of the machine, and concealed the wheelwork from fight. The frame was too feet in diameter, and fix inches deep, placed in an erect pofition; and the periods to be reprefented were collected from the tables of Ricciolus, according to which the folar year was $365^d\ 5^h\ 49^m\ 15^s$, and a lunation $29^d\ 12^h\ 44^m\ 3^s$, as we now generally reckon it. The aphelia, afcending nodes, inclinations of the orbits, mean diftances, excentricities, and proportional diameters, with refpect to the fun, were taken from that ancient aftronomer for January 1, 1682, as expreffed in the annexed table:

	Aphelia.				Afcending Node.				Inclination.			Mean Dift.	Excentr.	Diam. comp. with the Sun.
	°	′	″		°	′	″		°	′	″			
☿	15	11	19	♐	14	29	47	♉	6	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 fhould feem from thefe dates that the inftrument was finifhed 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 fatellites, fo that it was properly what is now called a planetarium, and differed from a common planetarium in what it profeffed to exhibit only, inafmuch as the variable diftances and velocities of the planets were attempted to be exhibited: thefe two requifites are defcribed as being produced in fome of the planetary motions by unequal teeth cut in the laft moving wheels, and in others by means of rings, cut into equal teeth, and placed excentrically as they regarded the fun: but it has been fhewn, when we treated of the different methods that have been devifed for producing unequable motion, under our article EQUATION *Mechanifm*, that neither of thefe two methods, adopted by Huygens in his automaton, as he has defcribed them, will produce more than *one half* of the grand equation, and it does not appear that he, in any inftance, ufed them *jointly;* whence we may fairly conclude, that the accelerations and retardations of velocity, being reprefented in only *half* their due quantity, were much lefs perfect than the author himfelf imagined.

Should our readers wifh to attain a more clear conception of the internal ftructure and external appearance of the automaton of Huygens, he may confult the defcription of Antide Janvier, given in his quarto pamphlet entitled "Des Revolutions des Corps Céleftes par le Mechanifme des rouages," (Paris 1812,) who, like ourfelves, has given the fubftance of the original, together with two plates that illuftrate the conftruction, but which did not fall into our hands till our defcription was finifhed. From a view of thefe plates it is evident, that both Mr. Walker's eidouranion, and Mr. Lloyd's celeftial mechanifm, are copied from the automaton on an enlarged fcale, with but little deviation as to the mode of imparting and modifying the refpective motions, though we have reafon to believe that the periods produced in the latter machines are not fo accurate as in the prototype.

Laftly, the objection which father Alexander made very properly to the preceding machine of Schirleus de Rheita, in regard to its lofing 25 days in a century, is equally applicable

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.

Roemer'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. Flamstead, 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 Roemeri," Hauniæ, 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.

 Martinot's

Martinot's Armillary Sphere.—In the "Traité des Horloges" of father Alexander (p. 323.), is contained a defcription of an inftrument made by Martinot, a Frenchman, and prefented to the king of France, on February 28th, 1701, an exact tranflation of which will conftitute the moft faithful account we can give. "The defign of this piece of workmanfhip," fays the author, "is the conftruction of an armillary fphere, which, by the motion of its circles, may imitate thofe of the heavens, particularly of the primum mobile of the fun and moon, and imitate, by a fenfible refemblance, the apparent fituation of heaven at every moment.

"The primum mobile makes its revolution in 24 hours from eaft to weft 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°; and the zodiac, upon which are marked the figns, is pierced (in the middle we fuppofe), that its breadth may not conceal the fun and moon.

"The heaven is compofed of three large circles, namely, the ecliptic and two meridians. The body of the fun is attached to a point of the common fection of the meridian with the ecliptic. The ecliptic, turning upon its centre according to the order of the figns, carries the fun, and makes him perform a revolution through the ecliptic in 365 days; and at the fame time the heaven is carried by the primum mobile from eaft to weft in 24 hours. The heaven of the moon is alfo compofed of three circles, like that of the fun; but the poles are five degrees removed from thofe of the ecliptic. The moon, turning upon the poles of her heaven, moves through the zodiac, according to the order of the figns, in the fpace of one lunar month, and in 24 hours from eaft to weft upon the poles of the primum mobile. The body of the moon is of filver, of a fpherical fhape, one-half of which is darkened, and, prefenting the illuminated half always to the fun, fhews the phafes. The moon's circles carry her from weft to eaft in twenty-nine days and a half, to make a lunar revolution from one conjunction to another.

"In the middle of the fphere there is a little globe which reprefents the earth: this globe is immoveable, and Paris is conftantly 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 confifts 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 fee at any inftant what hour it is at each city which is marked. On the immoveable plate is feen the hour of the fun's rifing and fetting. The horizon carries two concentric circles, on which are marked the figns, and their correfponding days of the month. There are alfo the names of the winds and their divifions. Upon the ftand of the fphere are put the allegorical figures which reprefent the four elements. The diameter is two feet."

Such is the account given by Alexander of Martinot's armillary fphere, to which he has annexed the following obfervation. "The motion of this fphere," fays he, "is not very exact, becaufe the fun's period is only 365 days, and wants almoft fix hours in a year. The motion of the moon, too, is performed in $29\frac{1}{2}$ days; fo that it wants 44 minutes in a lunation; and in lefs than three years this quantity amounts to more than a day."

Whether the motion of the fun in this fphere was confidered as *real* or only *apparent*, does not appear certain from the account which is here given. In accommodation to natural appearances, we ftill, it is true, continue to fpeak of the fun's place in the ecliptic; and the idea of the fun's performing an annual journey through the heavens is countenanced by the language of our poets; but in all cafes it will be allowed, that an inftrument ought to exhibit the fyftem which it profeffes to illuftrate, in a manner which cannot miflead the uninftructed. The inventor of the armillary fphere before us, we are difpofed to believe, like Martin and Parke in our own time, affected to difcredit the Copernican fyftem.

Pigeon's Sphere.—Nearly about the fame time with Martinot, M. Jean (or John) Pigeon conftructed a fphere, in which the planets were introduced and kept in motion by clockwork: the account which M. Saverieu has given of this inftrument in his "Dictionnaire des Mathematiques," makes it rank much higher in our eftimation than the laft we examined, and it is much to be regretted, that the numbers of the wheelwork have not been tranfmitted to us. The author expreffes himfelf to this purpofe: "Many ages have paft over, before we have found ourfelves in a fituation to execute the plan of the fphere of Archimedes. It is not till our own days that a fphere in motion has been feen, for which we are indebted to the fkill of our ingenious artift, M. Jean Pigeon. His fphere is eighteen inches in diameter, and elevated to the height of five feet four inches by a fupport, from the fummit of which is fufpended a pendulum: in the middle of the fphere ftands the reprefentative of the fun, which is a large gilt ball, and all the planets are attached to their orbits in refpective order. Thus, Mercury is the neareft 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 fphere, according to the order of the figns around the fun as their common centre. The earth turns upon its axis in 24 hours, and alfo makes the tour of the zodiac, according to the order of the figns, in $365^d\ 5^h\ 49^m$. Around the earth is a little circle which reprefents the ecliptic, fo that one may judge in what fign any planet is, and whether its declination be north or fouth. This circle alfo ferves to afcertain the retrogradations, direct motions, and ftations of the planet. There are alfo two other fmall circles round the earth, one of which reprefents the horizon, and the other the meridian, which is adjuftable to any place on the earth. To the orb of this planet is attached an index, pointing towards the fun, the ufe 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 fee if the moon be at any time in the ecliptic, &c."—From this defcription of Pigeon's fphere, it feems to have been the moft comprehenfive reprefentation of the Copernican fyftem of any which we have hitherto met with, inafmuch 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 muft conclude, were mean motions, and as nothing is faid about the wheelwork, we know not how far thefe motions were accurate. The plan, however, feems to have been happily conceived, and well calculated to produce a pleafing object to the eye of a fpectator.

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 fuch combination the name of *Orrery*, in honour of the earl of Orrery, who at that time patronized the fciences; but as we have defcribed this complex mechanifm with confiderable minutenefs under our article ORRERY, it would be fuperfluous to fay more in in this place, than that the date alluded to was about the year 1715.

A Sphere moving by Clockwork, calculated by M. Paſſemant, 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. Paſſemant, 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 Choicy 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. Caffiery, father and ſon, after which it was again preſented to the king at Choicy, 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 $29^d\ 12^h\ 44'\ 3''$, 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, fuſée, 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 temperature 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 pinionswhich 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.

$$\left.\begin{matrix}\text{Pinions} & 72.25.20.41.20\\ \text{Wheels} & 75.54.44.31.73\end{matrix}\right\} = 27^d\ 7^h\ 43'\ 4''\ 58'''.$$

Revolution of Mercury from a motion of 27 days 7 hours, &c.

$$\left.\begin{matrix}\text{Pinions} & 31.\ 85\\ \text{Wheels} & 84.101\end{matrix}\right\} = 87^d\ 23^h\ 14'\ 15''\ 56'''.$$

Annual revolution of the Earth from a motion of 87 days 23 hours, &c.

$$\left.\begin{matrix}\text{Pinions} & 8.35.83\\ \text{Wheels} & 43.44.51\end{matrix}\right\} = 365^d\ 5^h\ 48'\ 58''\ 3'''.$$

Revolution of Venus from a motion of 365 days 5 hours 48 minutes, &c.

$$\left.\begin{matrix}\text{Pinions} & 53.76\\ \text{Wheels} & 42.59\end{matrix}\right\} = 224^d\ 16^h\ 40'\ 30''.$$

Revolution of Mars from a motion of 365 days 5 hours 48 minutes, &c.

$$\left.\begin{matrix}\text{Pinions} & 53.75\\ \text{Wheels} & 84.89\end{matrix}\right\} = 1^y\ 321^d\ 16^h\ 32'\ 11''.$$

Revolution of Jupiter from a motion of 365 days 5 hours 48 minutes, &c.

$$\left.\begin{matrix}\text{Pinions} & 9.45\\ \text{Wheels} & 49.98\end{matrix}\right\} = 11^y\ 312^d\ 22^h\ 28'\ 0''.$$

Revolution of Saturn from a motion of 365 days 5 hours 48 minutes, &c.

$$\left.\begin{matrix}\text{Pinions} & 7.\ 40\\ \text{Wheels} & 80.103\end{matrix}\right\} = 29^y\ 156^d\ 12^h\ 46'\ 40''.$$

Revolution of the Moon, with reſpect to the node, from a motion of 29 days 12 hours 44 minutes 3 ſeconds.

$$\left.\begin{matrix}\text{Pinions} & 50.67\\ \text{Wheels} & 49.63\end{matrix}\right\} = 27^d\ 5^h\ 5'\ 36''.$$

N. B. Each dot between the figures in the above examples is a ſign of multiplication.

"It

"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 Paſſemant; 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.

Paſſemant's Planetary Clock.—Beſides the preceding machine of M. Paſſemant, 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 Paſſemant 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 whofe aftronomical mechanifm has in part been explained under our article Orrery, and is to be found in their works in almoft every one's hands, we meet with no original machinery of any importance till we arrive at the year 1791, in which a defcription was publifhed in a pamphlet, in London, of a planetarium or aftronomical 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 confifted of three feveral portions, which were actuated by a pendulum clock, and which compofed three different fyftems; *viz.* 1ft, the folar fyftem of feven primary planets; 2dly, the particular planets only which have fecondaries, in which thofe fecondaries have their motions given by wheelwork as well as their primaries; and 3dly, a celeftial fphere of copper, with 1500 ftars 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 thefe motions are faid to have been produced by trains of wheelwork that were calculated with the greateft accuracy, but as the numbers have not been difclofed that compofe the teeth of thofe wheels, we cannot form an eftimate of their accuracy; neither can we gratify our readers with an account how the inequalities of motion were produced, according to which feveral of the planets are ftated to have moved. The whole fabric was of the beft workmanfhip, and its different portions were fo fymmetrically arranged, that it was deemed a handfome prefent to be taken by lord Macartney in his capacity of ambaffador to China, where probably its ufes will not be duly appreciated.

Planifphere and Sphere by Antide Janvier of Paris.—A. Janvier, whofe new *orrery* we have defcribed in its place, received his mechanical and mathematical inftructions from l'Abbé Tournier, who maintained a fyftem of aftronomy in fome refpects fimilar to that of Ptolemy; and during the early part of his life the pupil employed himfelf in reprefenting, by means of wheelwork, the planetary fyftem of his mafter, as feen from the earth as the centre of all the apparent motions. The terreftrial globe, placed in the middle of the fyftem, was made to have the diurnal motion, while the fun was made a planet, with his fecondaries, Mercury and Venus, beyond the orbit of the moon, which was confidered as the firft planet. The other planets had their periodic revolutions in their refpective times; but, to reprefent the retrogradations and ftations, a fecond arm was made to revolve at the point of mean diftance, in the fame direction as the radius vector of each planet, once in each *fynodic* revolution, as they regarded the fun, each fhort arm being made equal to the radius vector of the fun. This arrangement produced the geocentric appearances fo well, that the author of the fyftem pertinacioufly withftood all the arguments of Caffini in favour of the Copernican fyftem; and a perufal of it has probably laid the foundation of what has very recently been denominated the *Martinian* fyftem by a pretender, who is endeavouring, in our own time, to inftitute a *Society*, under *royal patronage*, for the defence of his fyftem, as compared to that of Copernicus and fir Ifaac Newton! Janvier, however, was foon convinced that the fyftem of his preceptor was erroneous, and in the year 1789 he began the conftruction of a fphere that was to include the motions of the planets agreeably to the Newtonian fyftem, and that was finifhed in the year 1801, after a period of eleven years fpent in the calculations and conftruction. The fphere 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 feconds' pendulum clock of the beft conftruction. To thefe four faces are attached feveral dials and correfponding hands to indicate the various phenomena of the planets that are exhibited within the fphere, where the heavenly bodies are in motion. It would not be poffible to give fuch a verbal defcription of this machine as would enable the reader to comprehend the peculiarities of its conftruction, without feveral plates for the reprefentation of the refpective parts; but we will not conclude our prefent 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 fix or eight wheels and pinions, from which confequently great accuracy may be expected; but thofe that actuate the planets within the fphere are not fo numerous, and confequently not fo accurate; fo that the indication of the phenomena is more exact than the occurrence of thofe phenomena. The wheels and pinions that are principally employed, and the periods correfponding to the refpective trains, may be put down thus:

The Tropical Revolutions.

					D.	H.	M.	S.
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	$49\frac{3}{10}$
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

The

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 ♃		$\frac{4}{3} \times \frac{76}{31} \times \frac{98}{181}$	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^h - -	$\frac{69}{6} \times \frac{127}{8} \times \frac{177}{10}$	=	3231 8 33 0
From $27^d\ 7^h\ 43^m$	$\frac{57}{10} \times \frac{74}{13} \times \frac{113}{31}$	=	3231 8 44 0
From 365 5 48 49^s	$\frac{93}{98}$, *viz.* $\frac{93}{98-93}$	=	$19\frac{3}{5}$ years

The Moon's Nòde.

From half synodic revolution of the Moon	$\frac{106}{25} \times \frac{259}{59}$	=	6798 5 0 0
From $365^d\ 5^h\ 48^m\ 49^s$ - -	$\frac{115}{102}$, *viz.* $\frac{115}{115-102}$	=	$8\frac{11}{13}$ 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, $\frac{86400'' \times 833}{305085} = \frac{2160 \times 833}{7627} = 3'\ 55''\ 54'''\ 33''''\ 40'''''$; and the time required for its accumulation into 24^h will be very nearly $365^d\ 5^h\ 48^m\ 49^s$. 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 eidouranion, and Mr. Lloyd's dioastrodoxon, 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 sideways 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 cheeks are fixed, which project beneath the face of the plane just as much as the thickness the board is to be reduced to: these cheeks, 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 cheeks are beneath the surface of the plane, the cheeks 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 cheeks 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 cheeks 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 cheeks 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 cheeks 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 cheeks 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 ufed very advantageoufly for planing all kinds of timber flat, at an exceedingly fmall expence. In 1802 he took out a patent for the invention, which he defcribes in his fpecification to confift in the following particulars. "The cutting tools employed to reduce the wood, inftead of being worked by hand are to be fixed on frames, fome of which are moved in a rotatory direction round an upright fhaft, and others have a fhaft lying in a horizontal pofition like a common lathe. In other inftances, the tools are fixed on frames, which flide in ftationed grooves to be driven alfo by machinery. The principal points on which the merits of the invention reft are, 1. The materials to be wrought are made to flide in contact with the tool, inftead of the tool being carried by the hand over the work in the ufual way. 2. The tool is made to travel acrofs the work in a fquare or oblique direction, except in cafes where it may be neceffary to fix the tool in an immoveable ftation, and caufe the work to fall in contact with it by a motion. 3. Inftead of common tools, bent knives, fpoke fhaves, or deep cutting gouges, are ufed for cutting off the rougheft parts, and planes of various fhapes and conftructions, as the work may require, are applied to follow the former in fucceffion, under the fame operation, and which latter I call finifhers. 4. Thefe are fixed on frames which move in cafes, like thofe on which the faws are fixed in a fawing-mill, and in other inftances thefe frames are fixed on a rotatory upright fhaft turning on a ftep, and carrying the frame round in a direction fimilar to the upper millftone for grinding corn, and fometimes the frames turn on a horizontal fhaft, refembling the mandrel of a common turning lathe. The different planes, tools, &c. are fixed in the frames, fo as to fall fucceffively in contact with the wood or other materials to be cut, fo that the cutter or tool calculated to take the rough and prominent part operates firft, and thofe that follow muft be fo regulated as to reduce the material down to the line intended for the furface. Thefe cutter frames muft alfo have the property of being regulated by a fcrew, or otherwife, fo as to approach nearer the work, or recede at pleafure, in order that a deeper or fhallower cut may be taken at difcretion, or that the machine may repeat its action, without raifing or depreffing the material on which they act. 5. When an upright fhaft is ufed, the pivot is to turn in oil, and it may be raifed or depreffed at pleafure, by means of a greater or lefs quantity of the faid fluid being confined between the end of the fhaft and the bottom of the ftep. 6. The materials to be cut muft be firmly fixed on a frame, fimilar to thofe in fawing-mills, on which the timber is carried to the faws. Thefe frames muft be moved in a fteady progreffive manner as the cutter frame turns round, either by the fame power which moves the latter, or otherwife, as may be found to anfwer beft in practice. 7. The motion of the cutter frames muft be under the controul of a regulator, fo that the velocity of the tool, in paffing over the work, may be made quicker or flower as fuch work may refpectively require, to caufe the cutter to act properly to the beft advantage." For this purpofe Mr. Bramah propofes to ufe what he calls a univerfal regulator of velocity, and which he defcribes as follows: "I take any number of cog-wheels, of different diameter, with teeth that will exactly fit each other through the whole; fuppofe ten, or any other number, but for an example fay ten, the fmalleft of which fhall not exceed one inch in diameter, and the largeft fuppofe ten inches in diameter, and all the reft to mount by regular gradation in their diameters from one to ten. I fix thefe ten wheels, faft and immoveable, on an axis perfectly true, fo as to form a cone of wheels; I then take ten other wheels, exactly the fame in all refpects as the former, and fix them on another axis, alfo perfectly true, and the wheels in perfect gradation alfo; but thefe latter wheels I do not fix faft on their axes, like the former, but leave them all loofe, fo as to turn upon the faid axes, contrary to the former, which are all fixed. All thefe latter wheels I have the power of locking, by a pin or otherwife, fo that I can at difcretion lock or unite any fingle wheel at pleafure to the axis. I then place the two axes parallel to each other, with the wheels which form the two cones as above defcribed, in reverfe pofition, fo that the large wheel at one end of the cone may lock its teeth into the fmalleft one in the cone oppofite, and likewife *vice verfâ*. Then fuppofe 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 correfpondent to their diameters and thofe of the former, but their axes will not move. Then lock the largeft wheel on the loofe axis, and by turning about the faftened axis, as before, it muft take ten revolutions, while the oppofite wheel performs but one; then by unlocking the largeft wheel, and locking the fmalleft one at the contrary end of the cone in its ftead, and turning as before, the faftened axis will then turn the oppofite ten times, while itfelf only revolves once. Thus the axes or fhafts of thefe 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 primum mobile, as ten to a hundred; for when the fmall wheel on the loofe axis is locked, and the faft one makes ten revolutions, the former will make one hundred; and by adding to the number of thofe wheels and extending the cones, which may be done *ad infinitum*, velocities may be likewife infinitely varied by this fimple contrivance: A may turn B with a fpeed equal to thoufands or millions of times its own motion; and by changing a pin and locking a different wheel, as above defcribed, B will turn A in the fame proportion, and their power will be transferred to each, in proportion as their velocities reciprocally. Here is an univerfal regulator at once for both power and velocity. In fome inftances I produce a like effect, by the fame neceffary number of wheels made to correfpond in conical order, but inftead of being all conftantly mounted on the axes or fhafts, as above defcribed, they will reciprocally be changed from one axis to the other, in fingle pairs, to match according to the fpeed or power wanted, juft as in the former inftance. This method will have, in all refpects, the fame effect, but not fo convenient as when the wheels are all fixed."

The utility of Mr. Bramah's machine, not lefs than its ingenuity, has induced us to procure drawings of one of them, which he has in conftant ufe in his factory at Pimlico. It is upon exactly the fame conftruction as one he made for the royal arfenal at Woolwich, by which all the timber for gun-carriages, and other fimilar 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 fteam-engine, the power being communicated to it by a pair of bevelled wheels B, one fixed on the vertical fhaft, and the other at the extremity of a horizontal fpindle C, *fig*. 1; fee alfo *fig*. 8. *Plate* II. which has a live and dead pulley upon it at *c*, for the reception of an endlefs ftrap, by which the machine is driven. The fhaft *a* A is for the purpofe of carrying an iron wheel 33, fhewn feparate in *fig*. 3; it has the cutters fixed at the different points 7, 7, 7, 7, of its circumference; thefe 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 cuttters 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, *e*, 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*, *h*, 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 step, 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 *h*, 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 ⅛th instead of ¼th, 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 withinside, 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:

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 jambed 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 *ſticking*, 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

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, fet up on end upon the fides of the box, and connected therewith by being divided into two cheeks, which at the lower fides are formed to an arc of a circle, and united to the box by chains, in the fame manner as the beams of fteam-engines are connected with their pifton-rods. The upper part of the beam is made to pafs always through one point by fliding between friction-wheels, or otherwife in a tube hung on two pivots perpendicularly over the centre of the work, and at fuch heights as may be moft convenient for the length of the ftroke 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 pofitions to preferve the plane horizontal. To guide the box of planes in a rectilinear motion, and alfo to bear them off when they have been reduced to the depth required, fences are ufed, which are irons fliding perpendicularly in tubes or fockets in the box or frame, and clipping a tongue, or ruler fixed in the direction of the required ftroke, in the frame fupporting the bench.

PLANISPHERE, a projection of the fphere, and the feveral circles thereof, on a plane; as upon paper, or the like.

In this fenfe, maps of the heavens and the earth, in which are exhibited the meridians, and other circles of the fphere, are called planifpheres. See PROJECTION.

PLANISPHERE is fometimes alfo confidered as an aftronomical inftrument, ufed in obferving the motions of the heavenly bodies; confifting of a projection of the celeftial fphere upon a plane, reprefenting the ftars, conftellations, &c. in their proper fituations, diftances, &c. Such is the aftrolabe, which is a common name for all fuch projections.

In all planifpheres, the eye is fuppofed to be a point viewing all the circles of the fphere, and referring them to a plane on which the fphere is as it were flattened. This plane is called the *plane of the projection.*

A perfpective plane is only a plane of projection placed between the eye and the object, fo as to contain all the points which the feveral rays drawn from the object to the eye imprefs thereon. But in planifpheres or aftrolabes, the plane of the projection is placed beyond the object, which is the fphere. The plane of the projection is always one of the circles of the fphere.

Among the infinite number of planifpheres which the different planes of projection, and the different pofitions of the eye, would furnifh, there are two or three that have been preferred to the reft. Such are that of Ptolemy, where the plane of projection is parallel to the equator; that of Gemma Frifius, where the plane of projection is the colure, or folftitial meridian, and the eye the pole of the meridian; that of John de Royas, a Spaniard, whofe plane of projection is a meridian, and the eye placed in the axis of that meridian, at an infinite diftance. This laft is called the analemma.

The common defect of all thefe projections is, that they diftort and alter the figure of the conftellations, fo that it is not eafy to compare them with the heavens; and that the degrees in fome places are fo fmall, that they afford no room for operation.

All thefe faults M. de la Hire has provided againft in a new projection, or planifphere; where it is propofed the eye fhall be fo placed, as that the divifions of the circles projected fhall be fenfibly equal in every part of the inftrument. 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 lefs dimenfions it is called *board.*

PLANK, *Garboard.* See GARBOARD.

PLANK-*Hook*, is a pole with an iron-hook at its end, with which the navigators fhift their runs or wheeling-planks, as occafion requires.

PLANK-*Piling*, the fame with *Camp-fheeting;* which fee.

PLANK-*Sheers*, or *Plan-Sheers*, the pieces of plank wrought horizontally over the heads of the timbers of the forecaftle, quarter-deck, and round-houfe, for the purpofe of covering the top of the fide; hence fometimes called *covering-boards.*

PLANKENBERG, in *Geography*, a town of Auftria; four miles S.S.W. of Talla.

PLANKENSTEIN, a town of the duchy of Stiria; four miles S. of Windifch Weiftritz.

PLANKENWARD, a town of the duchy of Stiria; eight miles W. of Gratz.

PLANKING, in *Ship Building*, covering the timbers of a fhip with plank; fometimes quaintly called *fkinning.*

PLANO-*Concave Glafs*, or *Lens.* See LENS.

PLANO-*Convex Glafs*, 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 fpecies of *Euphorbia;* which fee.

PLANT, *Egg*, a fpecies of *Solanum;* which fee.

PLANT, *Ice.* See MESEMBRYANTHEMUM.

PLANT, *Parafitical.* See PARASITE.

PLANT, *Senfitive*, is the Englifh name of a diftinct genus of plants, called by botanifts *Mimofa;* which fee.

PLANT, *Baftard fenfitive.* See ÆSCHYNOMENE.

PLANT, *To*, in *Military Language*, is to place or fix, as, *e.g.* to plant a ftandard. It likewife fignifies to arrange different pieces of ordnance for the purpofe of doing execution againft the enemy or his works; as, *e.g.* to plant a battery.

PLANTA, in *Anatomy*, the loweft part, or fole of the foot of a man, comprehended between the tarfus and the toes.

PLANTAGENET, in *Hiftory*, an addition, or furname, borne by many of our ancient kings.

The term plantagenet has given infinite perplexity to the critics and antiquaries, who could never fettle its origin and etymology.

It is allowed that it firft belonged to the houfe of Anjou, and was brought to the throne of England by Henry II. where his male pofterity preferved it till the time of Henry VII., a fpace of above four hundred years.

It is difputed, who it was that firft bore the name. Moft of our Englifh authors conclude, that our Henry II. inherited it from his father Geoffrey V., earl of Anjou, fon of Fulk V., king of Jerufalem, who died in 1144. This Geoffrey they will have the firft of the name; and our Henry II. the iffue of Geoffrey, by Maud, only daughter of Henry I. the fecond.

Yet Mahege will not allow Geoffrey to have borne the name; and adds, that, in effect, the old annalift of Anjou, J. Bourdigne, never calls him fo. The firft, Manege adds, to whom he gives the appellation, is Geoffrey, third fon of this Geoffrey V.

Yet muft the name be much more ancient than either of thefe princes, if what Skinner fays of its origin and etymology

logy be true. That author tells us, that the houfe 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; difciplining himfelf every night with a rod made of the plant genêt, genifta, broom; whence he became nicknamed *Planta-genêt*.

Now it is certain that our Geoffrey made the tour of Jerufalem; but then he did not kill his brother, nor did he go thither out of penance, but to affift king Amauris his brother. Who then fhould this prince of the houfe of Anjou be? Was it Fulk IV? It is true he difpoffeffed his elder brother Geoffrey, and put him in prifon; but he did not kill him; nay, Bourdigne obferves, he was even releafed from the fame prifon by his fon Geoffrey V., already mentioned.

Farther; this Fulk did make a journey to Jerufalem; and that, too, partly out of a penitental view: we are affured, by Bourdigne, he did it out of apprehenfion of the judgments of God, and eternal damnation, for the great effufion of Chriftian blood in the many mortal battles he had been in. The annalift alfo adds, that he made a fecond voyage; but it was to return God thanks for his mercies, &c.; to which we may add, that Fulk was never called Plantagenet; fo 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 houfe of Anjou after Geoffrey V., whereas, in fact, the name was only given to a few, and that, as it fhould feem, to diftinguifh them from the reft. Thus Bourdigne never applies it to any but the third fon of Geoffrey V. and diftinguifhes him, by this appellation, from the other princes of the fame family. Though it is certain that it was likewife given to the elder brother, Henry of England, as before obferved.

PLANTAGINELLA, in *Botany*, is Vaillant's name for the *Limofella*; fee that article.

PLANTAGINES, the fecond order of Juffieu's feventh clafs, for the characters of which clafs fee NYCTAGINES. The *Plantagines*, or *Plantagineæ*, as Juffieu now terms them, in which he is followed by Mr. Brown, Prodr. Nov. Holl. v. 1. 423, are thus defined.

Calyx moftly in four deep fegments. *Tube* petal-like, contracted at the fummit, and generally four-cleft, refembling a *corolla*, but withering and not deciduous, inferior. (This "*tube*" is the Linnæan *corolla*.) *Stamens* four; their filaments long, prominent, inferted into the bottom of the "tube." *Germen* folitary; *ftyle* one; *ftigma* fimple. *Capfule* divided circularly, of one or two cells, with one or more feeds in each cell. *Perifperm* (or *albumen*) none. *Plants* herbaceous. *Sexes* fometimes in diftinct individuals.

Juffieu's genera of this order are *Pfyllium*, *Plantago*, and *Littorella*. The two firft are combined by Linnæus, as well as by Decandolle and Brown. The latter author defcribes an albumen of the fhape of the feed, and of a denfely flefhy texture. He remarks that the analogy between the fuppofed *corolla* of the *Plantagineæ* and the membranous tube, which connects the *ftamens*, in the neighbouring order of *Amaranthaceæ*, or *Amaranthi*, is weakened by the prefence of the fame part in the female flower of *Littorella*, a monoecious genus. We would obferve however, though by no means inclined to invalidate the opinion of the part in queftion being a real *corolla*, that barren filaments are often found in female flowers, and therefore any other organ relating to the *ftamens*, may likewife be prefent in fuch, while the *ftamens* themfelves are abfent. See LITTORELLA and PLANTAGO.

PLANTAGO, the herb Plantain, feems moft probably to have been fo named in ancient times, either from its refemblance to the fole of the foot, *planta*, in flatnefs, breadth, and lines or furrows; or from the depreffed trodden appearance of fome of the moft common fpecies, particularly *P. media*. Such is nearly the explanation of Ambrofinus, Ray, and the lexicographers. Linnæus, in Phil. Bot. 167, has "*Plantago, planta tangenda*." "A bold etymology," fays De Theis, who, neverthelefs, leaves as he finds this derivation, without fearching 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. Purfh v. 1. 98. Ait. Hort. Kew. v. 1. 250. Juff. 90. Tourn. t. 48. Lamarck Illuftr. t. 85. Gærtn. t. 51. (Coronopus; Tourn. t. 49. Pfyllium; Tourn. t. 49. Juff. 90.)—Clafs and order, *Tetrandria Monogynia*. Nat. Ord. *Plantagines*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep erect fegments, fhort, permanent. *Cor.* of one petal, membranous, permanent, withering; tube fwelling in the middle; limb depreffed, in four deep, ovate, acute fegments. *Stam.* Filaments four, capillary, erect, extremely long, inferted into the tube, alternate with the fegments of the limb; *Brown*; anthers rather oblong, moftly beaked or crefted, incumbent. *Pift.* Germen fuperior, ovate; ftyle threadfhaped, half the length of the ftamens, ftigma fimple, acute. *Peric.* Capfule ovate, fomewhat membranous, of two or four cells, burfting by a tranfverfe circular fiffure, the partition at length becoming unconnected. *Seeds* feveral, oblong, convex on one fide, concave on the other.

Obf. In fome fpecies the calyx is equal, in others unequal. Mr. Brown remarks that *P. Coronopus* has four cells to the capfule, with one feed in each cell. Gærtner, without mentioning the number of cells, fays there are four feeds in each cell, in that fpecies. Tournefort made *Coronopus* a diftinct genus, merely on account of the deep fegments of the foliage. It is rather to be wifhed that *Pfyllium* of authors could have been retained, as there are feveral fpecies of that fuppofed genus, and their branched leafy habit is very different from what is ufual in *Plantago*. Juffieu thought to diftinguifh *Pfyllium* by having folitary feeds, but the fame is the cafe with many indubitable fpecies of *Plantago*, as *P. Bellardi*, *cretica*, *media*, and others. For the difficulties attending the true nature of the corolla, fee PLANTAGINES.

Eff. Ch. Calyx four-cleft. Corolla four-cleft, inferior, membranous; its limb reflexed. Stamens very long. Capfule with two cells, burfting all round.

The fourteenth edition of Linn. Syft. Veg. enumerates twenty-four fpecies 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. Purfh's American Flora. The genus is divided into two very unequal fections, of each of which we fhall give fome examples, particularly mentioning the five Britifh fpecies. The new ones all belong to the firft fection.

Sect. 1. *Stem none. Flower-ftalks naked.* Thirty-fix fpecies in all.

P. *major*. Greater Plantain. Linn. Sp. Pl. 163. Willd. n. 1. Curt. Lond. fafc. 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, fmoothifh, fomewhat toothed, with longifh footftalks. Stalk round. Flowers imbricated. Seeds numerous.

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. quinquenervia; 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, greener *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 Linnæus 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, sive 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, sive 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,

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 sive 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. Gerarde 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 *bracteas* 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. Bracteas 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. *Bracteas*, 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 *footstalk*, 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*. *Bracteas* 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. *hispida*. Hispid 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. Ecphr. v. 1. 258. t. 259. P. angustifolia serrata hispanica; Barrel. Ic. t. 749.)—Leaves lanceolate, five-ribbed, with awl-shaped tooth-like serratures. Stalk round. Spike elongated, slender, cylindrical, imbricated. Bracteas 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 *bracteas*.

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. *Bracteas* 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. Bracteas 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. *Bracteas* 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 incana,

 cana,

cana, Barrel. Ic. t. 750; a ſpecimen of which, from the ſouth of France, we have referred to *albicans*.

P. *Pſyllium*. 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. Bracteas uniform, lanceolate, obtuſe.—Native of cultivated fields, vineyards, &c. in the ſouth of Europe, very common in Greece, being doubtleſs the real ψυλλιον 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*. *Bracteas* ovato-lanceolate, concave, blunt, rough at the keel, all uniform, and nearly of equal ſize. *Calyx* about as long as the bracteas, 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. *Pſyllium*, Bulliard t. 363, in its large leafy *bracteas* and entire *leaves*, agrees beſt with *indica* of Linnæus.

P. *Cynops*. Shrubby Plantain. Linn. Sp. Pl. 167. Willd. n. 32. Ait. n. 29. (Pſyllium majus ſupinum; Bauh. Hiſt. v. 3. 513. Pſ. ſempervirens; Ger. Em. 587. Pſ. alterum; Matth. Valgr. v. 2. 414.)—Stem branched, ſhrubby. Leaves entire, thread-ſhaped, ſtraight. Bracteas 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 *bracteas*, with linear rough points.

The cuts of old authors, given for the true *Pſyllium*, as Ger. Em. 587. f. 1. Matth. Valgr. v. 2. 413, and the modern plate of Bulliard, t. 363, having large *bracteas* 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 *Pſyllium*. The *afra*, Linn. Sp. Pl. 168, appears to us much more clearly a luxuriant, biennial, and ſomewhat ſhrubby, variety of *Pſyllium*, 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. Bracteas leafy, elongated, rough.—Native of Egypt. This is a very diſtinct annual ſpecies, whoſe long recurved *bracteas* 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 *Lanceolata*, 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 furnifhes a very fcanty crop. And it has been made ufe of in fome parts of Yorkfhire as a fummer grafs. As an article of pafturage for cattle and fheep, it is there in high efteem; it is not, however, well eaten by horfes; and as an article of hay it is held to be detrimental to the crop; retaining its fap an unufual length of time; and when fully dry falls into a fmall compafs, or is broken into fragments, and left behind in the field. One advantage of this plant is, that its feeds may be eafily procured genuine. A fmall proportion of it may be eligible: it has now ftood the teft of twenty years eftablifhed practice, and feems to be ftill in good eftimation even among farmers that are the moft attentive in grafs hufbandry. It has been ftated by Mr. Marfhall that he made a trial of it in Norfolk, as a fubftitute for clover, but gained no credit from the experiment: on which it has been obferved that the fact is, horfes do not affect it, and they are the principal confumers of the clover crop in that county. It is a plant that varies much in fize as well as in the breadth of the leaves, &c. The narrow leaves have only three ribs. The fpike is fometimes furrounded by large leaves, inftead of the ufual fmall bracteas: it fometimes becomes an abortive panicle: and it is found with two or three heads. Its qualities feem to be nearly the fame with thofe of the following; and it is more ufed than that by the common people in fome places.

It is probable that the fort which has been termed grafs-leaved plantain (*tenuifolia*) by Dr. Anderfon, is only a variety of this. See Rib Grass.

Plantago, *Major*, the great plantain. This affords more feeds than the former, and is perennial. The root when old is the thicknefs of the thumb, præmorfe or ftumped, laying ftrong hold of the earth by its fibres, which ftrike deeply, and are whitifh. The leaves petioled, feven-ribbed, or fometimes nine-ribbed, fmooth, but fomewhat hairy when young, about a hand in length, often remotely toothed about the edge. The petioles long, convex on the under fide, concave above, each forming a kind of fheath at its bafe. The fcapes upright, pubefcent, longer than the leaves. The fpikes cylindrical, very long, linear, compofed of many clofely imbricate flowers, under each of which is a lanceolate concave bractea. This is likewife a plant, according to Mr. Zappa, that may be ufeful as a cattle food. It grows not only along the roads, near dunghills, in damp and fat places, but in irrigated meadows alfo of every diftrict 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 fix inches long, and the ftalk almoft a foot high; notwithftanding it is not tender, every fort of cattle like it, and cows are as fond of it as of the above fort. It has alfo been noticed by Mr. Curtis that cattle in general appear very ready to eat the leaves. Sheep, goats, and fwine, alfo eat it well. But it is not in fo much efteem among the farmers as the narrow-leaved fort. See Rib Grass.

Plantago, in the *Materia Medica*. The leaves of the plantago major, common great plantain, or weybread, have a weak herbaceous fmell, and an auftere bitterifh fubfaline tafte, and their qualities are faid to be refrigerant, attenuating, fubftyptic, and diuretic. Plantago was formerly reckoned among the moft efficacious of vulnerary herbs; and by the peafants the leaves are now commonly applied to frefh wounds, and cutaneous fores. Inwardly they have been ufed in phthifical complaints, fpitting of blood, and in various fluxes, both alvine and hæmorrhagic. The feeds, however, feem to be better adapted to relieve pulmonary difeafes than the leaves, as they are extremely mucilaginous. The roots have alfo been recommended for the cure of certain intermittents, and from the experience of Bergius, not undefervedly. An ounce or two of the expreffed juice, or the like quantity of a ftrong infufion of plantain, may be given for a dofe; in agues the dofe fhould 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-fnake; but for this there is probably little foundation, although it is one of the principal ingredients in the remedy of the Negro Cæfar, for the difcovery of which he received a confiderable reward from the affembly of South Carolina. Woodv. Med. Bot.

PLANTAIN, or Plantane, in *Botany*, &c. See Plantago.

Plantain, *Water*. See Alisma.

Plantain, *Leffer Water*. See Limosella.

Plantain *Shot*. See Canna.

Plantain, *Star-headed Water*, *Damafonium*, is a fpecies of the *Alifma*; which fee.

Plantain-*Tree*. See Musa.

Plantain *Ifland*, in *Geography*, a fmall ifland in the Atlantic, near the coaft of Africa N. lat. 7° 54′. W. long. 12° 18′.

PLANTANOCEPHALUS, in *Botany*. See Cephalanthus.

PLANTARIS, in *Anatomy*, a fmall mufcle fituated in the calf of the leg. See Gastrocnemius.

PLANTATION, in the *Iflands and Continent of America*, a fpot of ground which fome planter, or perfon arrived in a new colony, cultivates and tills for his own ufe.

Plantations, or colonies in diftant countries, are either fuch where the lands are claimed by right of occupancy only, by finding them defart and uncultivated, and peopling them from the mother country; or where, when already cultivated, they have been either gained by conqueft, or ceded to us by treaties. See Colony.

But there is a difference between thefe two fpecies of colonies, with refpect to the laws by which they are bound. For it hath been held (Salk. 411. 666.) that if the uninhabited country be difcovered and planted by Englifh fubjects, all the Englifh laws then in being, which are the birthright of every fubject, are immediately there in force. But this muft be underftood with very many and very great reftrictions. Such coloniſts carry with them only fo much of the Englifh law as is applicable to their own fituation, and the condition of an infant colony; fuch, for inftance, as the general rules of inheritance, and of protection from perfonal injuries. But in conquered or ceded countries, that have already laws of their own, the king may indeed alter and change thofe laws; but, till he actually does change them, the ancient laws of the country remain, unlefs fuch as are againft the law of God, as in the cafe of an infidel country. 7 Rep. 17. Calvin's cafe. 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 fhrubs, which are cultivated either in nurfery grounds or other places, in order to be raifed and protected to proper and fuitable ftates of growth for being afterwards planted out in particular fituations; or which are planted out for ornamental or other purpofes, generally in the way of beautifying portions of ground or particular fpots furrounding or lying about country refidences, &c. The former are commonly denominated nurfery plantations.

As moft plantations of the latter fort, befides the ornament

ment which they give, afford confiderable improvement to the places where they are formed, they fhould, of courfe, be more fully attended to and regarded, in all cafes and fituations wherever there is any fort of want or deficiency of either variety or beauty. This is ftill further defireable, as they have alfo an excellent effect in all fuch fituations, by giving an idea of grandeur to them, and at the fame time an air of cultivation and fertility.

In the forming of thefe, as well as other kinds of plantations, it is conftantly neceffary to felect and provide the plants with a view to the nature of the foils, and the peculiarity of the expofures in which they are to be placed.

The plants, for the moft part, after being firft raifed from the feeds, or by fome other proper means, and having a little growth, are tranfplanted or removed into nurfery grounds or plantations, where they remain for two, three, or more years, according to their different natures, and the ufes for which they are intended; when they are, in general, ready, and in the beft order for being planted out in different forts of plantations, as larger plants are commonly found not to fucceed fo well. Larger plants may, however, be occafionally found neceffary, efpecially in particular cafes of ornamental planting, and for producing blinds, covers, and fhades, in fome peculiar fituations; but for all common purpofes, in almoft all cafes of this fort of work, young plants, which have been raifed in, and procured from, the nurfery plantations, and which are from about two or three to five or fix feet in their growth, are moftly in the beft and moft proper ftates to be employed, and efpecially in all fituations where timber is in any way an object. The plants fhould alfo be chofen as nearly of equal growth as poffible for the fame plantation.

For all ordinary purpofes of planting, a fmall portion of ground will be quite fufficient for raifing the young plants; but in all nurfery grounds of any extent, there are moftly pretty large tracts fet apart for the purpofe of receiving plantations of thefe kinds, where a great many different forts of trees and fhrubs of various growths are kept, being fet out in rows at different diftances, according to their ages and other circumftances. See NURSERY.

The young plants in all thefe nurfery plantations fhould be kept clean and free from every fort of obftruction, by digging or hoeing frequently between the different rows, until they become of fufficient growth for being fet out in other fituations.

In regard to the preparation of the ground before the making of the plantations, in all thofe of the nurfery kind it is conftantly dug or trenched over with the fpade; and this is likewife fometimes the cafe in forming thofe of the ornamental or other defcriptions; though frequently the plants are put in without, fimply by digging feparate holes at fuitable diftances for the reception of each; or by forming flits or crevices for them by the point of the fpade. The more fully, however, the land can be prepared previoufly to the plants being introduced, the better they will commonly fucceed. Plantations are alfo occafionally raifed by fowing the feeds of the different forts of plants, either in fmall drills, or over the whole furface of the ground, after being made ready in the above manner, or without undergoing any fuch preparation, but in the latter cafe the plants feldom thrive fo well.

In preparing the land for nurfery plantations, a little manure is not unfrequently had recourfe to in digging it over; but for thofe other kinds this is very rarely neceffary.

In making all thefe forts of plantations, the moft proper times for performing the bufinefs is in mild dry periods, either in the autumnal, or very early fpring feafons.

In the forming of every fort of plantation where any kind of ornament is intended, as great a variety as poffible of different forts of hardy trees and fhrubs fhould conftantly be had recourfe to, fuch as thofe of the middling and more tall growths of both the kinds, which in the former or thofe of the tree forts are ufually the oak, elm, afh, beech, chefnut, hornbeam, birch, alder, maple, fycamore, plane, poplar, lime, walnut, wild cherry, mountain-afh, larch, willow, hazel, &c.; and in the latter, or fhrubby fort, the pine, firs, cedar of Lebanon, holly, bay, laurel, yew, ever-green oak, box-tree, and fome others. See DECIDUOUS, EVER-GREEN, and FOREST *Trees*.

In regard to the general difpofition of the plants, the deciduous and ever-green kinds may be planted in feparate compartments, or in mixture, and fometimes the tree kinds by themfelves, fome in running varying plantations, towards the boundaries of lawns, parks, paddocks, &c., others in avenues, groves, thickets, and clumps, varioufly difpofed in different parts; and fometimes the trees and fhrubs together, forming fhrubberies, wilderneffes, fhady walks, and wood-works; placing thofe of taller growth backward, and the lower in front; bordering the whole with the moft beautiful flowering fhrubs and fhowy ever-greens, efpecially next the principal walks and lawns, varying the form of all the feveral compartments, fometimes by moderate fweeps and curves outward and inward, of different dimenfions, other parts in long eafy bends, varied projections and breaks, fo as to diverfify the fcene in imitation of natural plantations. The proper diftances, in planting, may be from five or ten to fifteen or twenty feet: for example, the tall trees defigned for continued plantations may be from ten to fifteen or twenty feet, varying the diftance in different parts, according to light and fhade, &c.; and thofe in groves, where open, may be fifteen or twenty feet diftance, and where clofe ten or twelve; for thickets, five or fix feet, or clofer in particular places where a very dark fhade 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 diftance occafionally, according to growth, as alfo the forts and numbers of trees in each, from two or three, to five, ten, or more. The form of the clumps may fometimes be triangular, at other times quadrangular, pentangular, &c., and fome in curves, others in ftraight lines, to caufe the greater variety. And in fhrubbery clumps, and wildernefs compartments, where the trees and fhrubs are employed promifcuoufly, they may be planted from five to ten feet diftance; the taller growths being placed backward eight or ten feet afunder, placing the lower plants gradually forward according to their gradations, to the loweft in front, as above, at four or five feet diftance: and if the trees and fhrubs of the plantations in general are difpofed fomewhat in the quincunx way, they appear to the greater advantage, and produce a better effect in fome inftances.

Before the making of any of thefe forts of plantations, the grounds fhould, in all cafes, be well inclofed in fome manner or other, and the plants be afterwards kept properly cleaned, pruned, and thinned out, fo as to take their full growths.

Mr. Loudon, in his Treatife on Country Refidences, after noticing the great variety which exifts in trees, fhrubs, and all forts of wood, both in refpect to beauty and utility, remarks, that all ornamental plantations may be divided into two kinds; namely, thofe whofe *grandeur* is the effect to be produced, and thofe whofe *variety* or *beauty* is the principal object. And it is afferted, 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 ufe of; but

but that as variety depends upon the parts alone, many different kinds are neceffary. This, it is contended, has given rife to a moft erroneous opinion and very pernicious practice among landfcape gardeners and planters. Imagining that variety is produced by mixture, their rule is to mix as many kinds together as they poffibly can, and never to let two trees of the fame fpecies be feen at once. This is faid to be their recipe for variety in plantations; which they follow, as far as poffible, in every arrangement of vegetables, from the parterre to the foreft. But inftead of affording variety, it is maintained that it, on the contrary, produces the moft diftracting incongruity. The eye, in examining the parts, finds no connection—no harmony—no relief—no repofe of effect—no difference of compofition, or change of character; or, if the furface of fuch a plantation be looked upon from a diftance, it is on account of the indifcriminate mixture of forms, more dull and monotonous than if only one fpecies of tree had been ufed. Its outline againft the fky 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 fuppofed, that this mixture is evidently produced by their ignorance of that which conftitutes variety; for it does not, as they imagine, confift in the diverfity of feparate parts, but "in the diverfity of their effects when combined together; in a difference of compofition and character:" very different from the other is the effect of fuch a variety; it relieves the eye and interefts the mind, without fatiguing either.

Therefore, in forming a plantation with a view to variety, inftead of felecting fuch trees and fhrubs as are of oppofite character, thofe differing in the flighteft degree are in general much better adapted to the purpofe. The upright fpiry *form* of the larch, mixes very ill with the round head of the oak. But by choofing trees of intermediate forms, and placing them in the interval between thefe extremes, a natural connection and gradation will be produced. By this means, with the ftore of trees and fhrubs which we poffefs, an endlefs fource of variety in woody fcenery may be had from the forms of trees and their modes of growth, independently of any other material of landfcape.

But there is another fource of variety which arifes from grouping, or the manner in which trees are difpofed, more than from the number of diftinct fpecies. And this is chiefly applicable to extenfive plantations where the general character is grandeur, as woods, groves, and forefts. It is produced by mixing together tall and low growths; planting irregularly, fometimes very clofe, at other times very wide; by pruning fo as to expofe trunks, ftems, or branches, in fome places, and to conceal them in others, &c. Much of the effect alfo depends on the diverfity 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 fuppofed, exifts in the greateft perfection in natural forefts; and the true way to ftudy its principles is, to obferve in them the effects of time, accident, the browfing of cattle, the felling of timber, and other circumftances. By this means we fhall, it is imagined, be enabled to transfer the fame effects, fometimes by different and fometimes by fimilar methods, to artificial plantations. Natural forefts cannot be too ftrongly recommended to the examination of the ornamental planter. Almoft every other operation of planting is mechanical; it is in this mode of grouping, and following the principles of nature, that the man of tafte will be diftinguifhed from the mere gardener. The effect of putting in practice the principles to be derived from fuch a ftudy may be feen, it is faid, in Mr. Price's woods at Foxley, which no man of tafte ever, it is fuppofed, faw without being filled with wonder and delight.

A ftill further fource of variety, which is independent of the modes of growth or the manner of difpofition, is in the *colour*. Therefore, in order to affift in the arrangement of a numerous collection of trees and fhrubs, a knowledge of the harmony of tints is effentially neceffary to the planter, and of very confiderable importance to his fuccefs in the bufinefs.

It may be thought, that the different tints of green in trees are diftinctions too minute to be attended to for this purpofe; but reflection and experience fhew that they are of material confequence in this fort of fcenery. Imagine, fays the writer, two woods of equal and confiderable extent,—the one compofed of the yellow green of the weeping willow, the other of the dark green of the oak: how different muft be the impreffion received from each, though the general form and compofition of both, at a diftance, would appear in fome meafure the fame! It is evident, that the effect of the different greens muft be much more confpicuous in fcenes intended to be more minutely examined by the eye: how different even the green of the goofebery-bufh and currant-tree when oppofed to each other!

It it remarked, that the tints of trees may be confidered in refpect to their harmony with one another—with external fcenery—their gradation—and their particular effects. The harmony of tints is fuppofed, in general, to be derived from the refpective agreement, difagreement, and deftruction of particular kinds when mixed together; and that thefe harmonies, difcords, and privations, will remain true, although the colours fhould not be bright. The flighteft tinge will have the effect. When weak colours that agree are placed near each other, they fupport and give fpirit to one another. A hawthorn hedge, among the green of pafture fields, has, it is afferted, the fame dull green appearance; but when oppofed to the brown of a ploughed field, it appears with peculiar fpirit and force. And again, the ploughed field, were it not contrafted with the hedge or fome object of a fimilar colour, would appear dark and colourlefs; but oppofed to the hedge, it appears of a rich brown. A Huntingdon willow, obferved alone, it is maintained, appears green like any other tree; but, contrafted with an oak or a chefnut, it approaches to white; and the oak again, by the contraft, appears much darker than before. If plantations were arranged agreeably to thefe principles, the colours would, it is believed, at all times appear ftriking and forcible; but from the oppofite conduct, that of mixing all colours together, they are *annihilated, and their feparate effects deftroyed*. In confequence of this, it is frequently faid that *trees have no colour but green, except in autumn*, and that attention to thefe principles in their arrangement is frivolous. But nothing can fhew greater ignorance of nature. Green is indeed the predominant colour of trees; but it is only in one or two of the fummer months that it nearly abforbs every other colour. All trees have their peculiar autumn and fpring tints, which in midfummer are only weakened, not deftroyed; and, whether it be not of greater importance to attend to the harmony of thefe tints, than to neglect it altogether, becaufe the effect would be in fome degree loft during a month or fix weeks in fummer, every man of tafte or fenfe is left to judge. It is evident, that the *harmony of wood with landfcape* muft 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 manfion fhould correfpond with the general appearance of the wood in the furrounding country:

 if

if otherwife, the fpace fo planted will appear a formal fpot in the general view. The fame principle requires alfo, that in a fcene where water is a prominent part, and has a tendency to make the landfcape too cold; trees of warm tints (by no means evergreens) fhould be principally planted adjoining to it. On the contrary, where buildings make the landfcape too warm, cool tints, fuch as ever-greens, fhould be planted, to counteract that tendency. Some objects in landfcape require to be relieved and fet off with fpirit, others require to be kept under, or prevented from becoming principal. Thefe, and a great number of other important particulars, are effected by the colouring of trees and fhrubs.

It is remarked, that if we operate with the permanent dark and light greens, as with light and fhade in landfcape painting, we may produce many of the effects of *aerial perfpective*. The imaginary height of a hill may be increafed, by placing dark coloured trees at the bafe, and lighter kinds towards the fummit; fo may the apparent breadth of a lake, by planting trees of a dark green on the fide neareft the eye, and others of a lighter tinge on the oppofite fide; in the fame manner, bays or receffes 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 fuppofed, by the ignorant or unexperienced.

But though the harmony of tints only produces a pleafing fcene, their difagreement, on the other hand, may produce a ftriking effect. An outline, which cannot be varied in form, may be broken by the oppofition of its tints, or by maffes of dark and light green. Two or three trees together, that form a ftriking contraft with all around, may attract the eye, and fix it fo, as either to induce it to admire fome object, as a building; or prevent it from viewing fomething difagreeable, or lefs noble, in the fcene. Trees of a reddifh tint, or ever-greens, have the power of attracting the eye in an aftonifhing degree; and in many places, where the former have been planted at random among other trees, they diftract the whole fcenery in the autumnal months.

In regard to the arrangement of the materials of plantations, the great bufinefs is that of uniting beauty with utility in the moft natural manner, which is beft accomplifhed by the confideration of forefts or woody waftes, which are the fpecies of fcenery that approach as near or nearer to nature than any other in this country; by this means may be difcovered the indications of every valuable or ufeful practice in beneficial or picturefque planting. But in refpect to arrangement where utility alone is the main object, it may be obferved, that as every tree has a certain foil and fituation, or thofe in which it will profper better than in any other, that is, produce timber in the greateft quantity and beft quality, and as this tree will in general pay better than more valuable kinds which would not thrive, or would grow too quick in fuch places; it follows, that in the formation of ufeful plantations, one great object fhould be, to accommodate the trees to thefe circumftances, as already feen. And, as the properties of foils and fituations are various, thefe naturally lead to a correfponding variation of the forts of trees alfo; and this *variation*, it is fuppofed, *at once produces ornament and utility*. Thus, in natural forefts fuch 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, graffes, and moffes, chiefly to prevail. While a little farther on, a few beeches mingle with the oaks; ftill more onward the beech becomes the principal tree; the undergrowths changing in the fame way, the thorn, with other plants, graffes, and moffes being found. Ultimately the land becomes moift, when the birch gradually fhews itfelf, and this moifture increafing as the birch retires, it is fucceeded by the alder; each with their appropriate undergrowths, or ever-varying glades of pafture, as fhewn by Gilpin in his "Foreft Scenery," and "Walks in a Foreft," &c. In this manner the arrangement proceeds throughout the whole foreft; and if the foil were minutely examined, it would be found to vary correfpondently with the trees. Where the oak abounds, it will generally be deep and good; dry where the beech fucceeds beft; and moift in different degrees where the birch and alder prevail.

Planters, it is fuppofed, have feldom a fufficient idea of the effects and advantages that might be produced, by having recourfe to this mode of arranging vegetables in artificial fcenery, whether the firft expence of planting, the future beauty, or the ultimate utility of it be regarded. Only thofe who combine a knowledge of botany with painting, it is imagined, can conceive the variety and perpetual intereft that may be thus created in a place even of the fmalleft extent, and with the leaft natural advantages. In the prefent mode, all improved places have a famenefs in their general appearance; as they are compofed of the fame kind of mixture. The fhrubbery, or a part of it, in one place, is precifely the fame with another at a diftance from it, and affords a pattern of all others; but were nature followed in this refpect, the variety would be endlefs. Nothing, it is believed, could then be more interefting, than to walk or ride through a place thus laid out; to view the trees, fhrubs, plants, and even the graffes and ferns; the infinite diverfity of fhapes, colouring, and compofition of the trees and fhrubs; and the ever-varying openings and intricate receffes between them; again, varied with groups and turfs of flowering plants and ferns, fpreading among the grafs, in every direction; and all this independently of every other object, fuch as buildings, rocks, water, animals, diftant profpect, and even variety in the grounds. So that by this mode of planting, a fituation naturally the moft dull and infipid, may be made infinitely varied and interefting. And it is afferted, that this mode of arrangement is not more beautiful in fhrubberies, flower-gardens, and green-houfes, than it is profitable in extenfive plantations.

In the difpofition of the wood in plantations about country refidences, the forms of the furfaces the moft defireable to be planted in the grounds, are chiefly to be determined by the character which they are to affume. Where they are of an even or level furface, there can be nothing to interfere with this rule; but when the furface is varied with fwells, hollows, and abruptneffes, the great art is, to combine the natural character of the place with the character to be created; and when thefe are underftood by the defigner, the beft effect will be produced. However, independently of artificial characters, nature always points out rifing grounds for plantations. Wood placed on knolls or fwells, it is contended, heightens their effects, and gives fpirit, force, and intricacy to a fcene, otherwife tame and monotonous. On the contrary, wood placed in the hollows only, or in the hollows and eminences indifcriminately, deftroys all the expreffion or natural features of the furface, and often produces deformities. Nothing is more noble than a fteep hill clothed with wood; but, imagine this hill perfectly bare, while the furrounding country is wooded, and it becomes a deformity in the general view. To plant the hollows, and leave bare the eminences, is, in almoft every fituation, counteracting nature. Even in pleafure grounds or parks, a 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 Carſe 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 ſcite 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 declivity, 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 maſs 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 uninicloſed; 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

made of double their prefent value, have a much better effect, and afford better fhelter. Moft plantations, efpecially 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 reft in a decided manner, cut over, and allowed to fpring up again, while a certain number, from fifteen to thirty feet diftance, are preferved 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. Thofe removed are either cut over, or grubbed out by the roots, as is found moft convenient, without any regard to propriety. In confequence of this management, a few bufhes of undergrowth are found in fome places, and the reft of the ground, if not fhaded too much by the crowded trees, is covered with pafture; and neither the pafture, nor the undergrowth, from being intermixed, can be turned to the advantage of the proprietor. There are other plantations where undergrowth exifts among timber trees in a more general way, but of kinds which are of little or no ufe, except for fuel; and this is by no means a profitable article, efpecially in a cold diftrict. But, on the other hand, there are woods in fome places where both timber and undergrowth are cultivated; and it is from obferving the great profits derived by the proprietors of thefe, that the advantages of raifing oak undergrowth in woods is fo ftrongly recommended. The very high price which is given for oak-bark is generally known; and the fum given for an acre of oaks, from twelve to twenty-five years old, valuable for the bark alone, is very confiderable. Inftances of thefe kinds are adduced from the woods of Dunkeld in Scotland, where there are lands of very little value for any other purpofe, that contain oak woods, chiefly of the natural kind, the undergrowth of which is fold 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 fheltered fituations, it is contended, that double the advantage would be derived, in confequence of the more quick growth, as in fuch cafes the undergrowth would become equal in fize in the courfe of twelve or thirteen years, and therefore afford two cuttings inftead of one in the fame length of time; befides more uniform crops be produced, from the greater regularity in planting, which would be adopted. But left oak undergrowth fhould be thought to be made more profitable than it really is, it is further remarked, that, in the moft cold, hilly fituations of Scotland and Wales, it will afford upwards of 2*l.*, and in more favourable fituations above 3*l.*, the ftatute acre annually; and if properly attended to in its early growth, ftill more. The eafy and cheap method of raifing it by means of the acorn, is alfo a great recommendation of it, as well as that of its growing better and more expeditioufly in this way. Where an undergrowth alone of oak is wanted, other forts of timber trees may be planted with the acorns. Thefe ftatements ftrongly difplay the fuperiority and advantages of woods over other kinds of plantations; but the recommendation of the formation of them, exclufive of groves or coppices, is not by any means intended, as, on the contrary, there are thin kinds of land, with bad under ftrata, where the fir formed into groves, is more profitable than any other kind of plantations: and there are fteeps and rocky banks, where no tree can be fo advantageoufly cultivated as the common afh; and rich moift places, where no plantation will turn out fo profitable as ofiers. But, generally fpeaking, it may be fafely afferted, that woods are the kind of plantation that ought to be moft commonly formed; and that though the kind of *timber* grown in thefe woods muft vary according to the confumption of different places, yet that oak will be found the beft and moft profitable *undergrowth* of any. See WOOD.

In refpect to the third fort, or copfe-wood, it is alone feldom defirable in point of character, though, in many places, it is the moft profitable kind of plantation. Its formation is very fimple: when of a proper fize it is cut down; after which, the ftools fpring up again; and this operation is had recourfe to in a periodical manner. Thefe kinds of woods are, however, in general, under a very wretched fort 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 fhould be well and ornamentally formed.

And in the fifth, or avenue, whether the rows of the trees be leading to a refidence or in other parts of grounds, they fhould be well fuited to the nature of their fituations and other circumftances. See AVENUE.

In all cafes where plantations are to be made, it is of great confequence to fix upon the moft proper kinds. In afcertaining this, the kinds of woods and fpecies of trees met with in the furrounding country, the market, the prefent or probable expence of carriage by land or water, and a variety of other circumftances, are to be confidered; and that kind fixed upon which will in the end turn out the moft profitable. And the plantations being once made, the particular kinds fhould be held ftrictly in view in their management afterwards. A collection of oaks defigned for a grove, if not gradually thinned out as they grow up, will never, it is fuppofed, fucceed; but if the fame collection were intended for a wood, thinning them out, in place of cutting over, would leffen 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 erroneoufly planted to rear a grove, ever be made to affume that character. The idea of forming and preferving a diftinct character in plantations, it is thought, is never fufficiently attended to by planters in general,—a certain fpace is to be planted; and it is filled up with trees at random. It is fuppofed to be from this neglect alone, independent of all others, as thofe of previoufly preparing the foil 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, fuggefted, that, if the particular kind of plantation to be formed, were previoufly determined upon, the bufinefs might proceed with a degree of certainty unknown and unpractifed at the prefent period, as well as other great advantages be derived from it.

In relation to the outlines or boundaries of plantations, they fhould, it is imagined, be determined by the character which they are to affume. The tree being a picturefque object, all wood is confequently fo; and as the addition of wood to ground is always an addition of picturefquenefs, although frequently blended with grandeur or beauty, hence the propriety of irregular or picturefque outlines in all kinds of plantations. Where the character to be produced is that of grandeur, the bounding line, it is afferted, fhould confift of bold angular prominences, fucceeded by deep incifions, forming large bays and promontories; and to give thefe ftill greater effect, and vary their outline againft the fky, they fhould be adapted to the variations of the ground, the bays being in the hollows, and the promontories

montories 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 plantations, 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 graſs. 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;

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 ſorts 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, cheſnut, 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 3*s.* 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, cheſnut, 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, 3*l.* 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

to

to be then worth 6*d.* each on an average, as ſtandards, and clear of all expences, if ſold. 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 ſands; 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*s.* - - - - -	0	15	0
	4	10	0

In five years more.

Reparation of the fences - - -	0	5	0
Intereſt of 4*l.* 10*s.* for five years - -	1	2	6
Allow for compound intereſt - -	0	15	0
Rent - - - - -	0	15	0
	2	17	6
Firſt five - - - - - -	4	10	0
Expence at the end of ten years - -	7	7	6
Received for thinnings - - -	5	0	0
Exceſs - - - - - - -	2	7	6

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.* - - - -				25	0	0
Value of 2000 remaining, at ſame rate -				50	0	0
				75	0	0
Deduct as above - -	£3	0	0			
Exceſs at end of five years -	2	7	6			
				5	7	6
Clear profit in 20 years - - -				69	12	6
Which is *per* acre *per annum* - - -				3	9	1

And that ſuppoſing the 2000 trees left ten years longer, the account will ſtand thus:

	£	s.	d.
Received for 1000 at 6*d.* - - - -	25	0	0
Deduct, as above - - - - -	5	7	6
Profit in 20 years, excluſive of trees remaining	19	12	6
Which *per* acre *per annum*, may be called -	1	0	0

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 - - - - - -	97	0	0
Firſt ten years expence - - - -	7	7	6
Second ten ditto - - - - -	3	0	0
Third ditto - - - - - -	3	0	0
Total expence - - - - - -	13	7	6
Received ſecond thinning - - -	5	0	0
Third ditto - - - - -	25	0	0
The 2000 remaining - - - -	100	0	0
Total - - - - - - -	130	0	0
Expences - - - - - -	13	7	6
Clear profit in 30 years - - - -	116	12	6
Or *per* acre *per annum* - - - -	3	17	1

At the end of forty years.

Expences, as before - - - - -				3	0	0
Received for 2000 trees at 2*s.* - -				200	0	0
Ditto firſt and ſecond thinnings - -				30	0	0
Total - - - - - - -				230	0	0
Deduct expences, as before	£13	7	6			
Ditto - - - - -	3	0	0			
				16	7	6
Clear profit in 40 years - - -				213	12	6
Or *per* acre *per annum* - - - -				5	6	1

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,

for

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*l.* for 30 years, at 4 *per cent.*	2520
Total expence	7800
Produce.—Thinning in 10 years, at 5*l.* an acre	3500
Ditto, in 20 years, 1000 *per* acre, at 6*d.*, 25*l.*	17500
Cut down at 30 years, 2000 *per* acre, at 1*s.*, or 100*l.* *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 to 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 so, 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 grass 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; the grass 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

any one calculate the profit of hiring land on a 21 (or more) years leaſe, and immediately planting. In what other application of the lands can ſuch great profit be made, as gaining 6*l.* an acre without any riſk, and almoſt without any expence? It is true ſuch a conduct cannot, like the culture of corn and graſs, be general, for reaſons obvious to every one; but as far as the whole demand of any neighbourhood extends, it is profitable to execute it.

And ſuppoſe, ſays he, 5 acres of larch planted every year; at the end of 16 or 17 years, 5 acres will every year be cut down, of the value of 500*l.*: from that day a regular product of 500*l.* a-year is gained from the application of 100 acres of land. Let to a tenant, theſe 100 acres produce 40*l.* a-year; but planted, they produce 500*l.* a-year. What an amazing difference! Or ſuppoſe a ſingle acre planted every year, after the expiration of 18 or 20, to cut annually 100*l.* a-year from only 20 acres, which let, would yield but 8*l.* a-year. How beneficial a conduct!

Mr. Fellowes has alſo planted plane-trees, and finds them to thrive amazingly in low moiſt ſituations. They will, in ſuch, grow much faſter than the poplar. One he has of 30 years growth that will cut into planks 20 inches broad; but ſo vaſt a ſize he attributes in ſome meaſure to its ſtanding on the edge of a ditch through which the drainings of a farmer's pigſties run. Poplars, in ſome parts of the kingdom, are planted in low ſituations, to the excluſion of every thing elſe: it is of conſequence, therefore, to know that the plane will do better. But Mr. Fellowes, in general, recommends the larch as preferable to every other tree he has tried; and which will pay a planter much greater profit than any of the reſt. Theſe ſtatements ſhew the great profits formerly derived from planting, and they have not been leſs ſince.

Mr. Davis, ſteward to the marquis of Bath, after obſerving that oaks and beeches planted on the *beſt* ſpots of ground, and nurſed by Scotch firs, will not be ſo valuable at ſixty years old, as the Scotch firs are on the very *worſt* land at thirty, further ſtates, that four firs will grow where one oak or beech will grow; for firs are the better, and deciduous trees the worſe, for being crowded. And that a great deal of poor heathy ſhallow land, which will produce Scotch firs in the greateſt perfection (and a great deal of the land planted by lord Bath is of that deſcription), will not grow oak or beech at all, nor in fact any thing but Scotch fir. Even larch has failed univerſally on all thoſe ſpots where the upper ſtratum is peat. Having lately had occaſion to cut ſome rides through ſome extenſive plantations of Scotch firs which were planted juſt thirty years ago, I meaſured the land, and the trees which were cut off it, very exactly, and the following reſult ſhews that the profit of planting Scotch firs has been full ſeven *per cent.* compound intereſt; whereas no plantation of deciduous trees, within my knowledge, has paid five *per cent*, ſimple intereſt. Indeed we uſually reckon, in valuing eſtates for ſale, that the common growth, even of elm timber, on its moſt favourite ſoils, is ſeldom equal to more than three or three and a half *per cent.* ſimple intereſt.

336 Scotch firs, of 30 years old, cut upon a ſtatute acre, average meaſure three feet *per* tree, valued at only 10*d.* *per* foot, *viz.* 2*s.* 6*d.* *per* tree, amount to, *per* acre, - - - - - -		£. *s.* *d.* 42 0 0
At the time of planting, this land, then newly incloſed from a common, was not worth above 2*s.* *per* acre *per ann.*, which, at twenty-five years purchaſe for the fee ſimple, amounts to -	2 10 0	
And the coſt of the trees and planting was not above - - -	3 0 0	
Total expence *per* acre, even ſuppoſing the land to be annihilated -	5 10 0	

5*l.* 10*s.* principal will increaſe, in thirty years, as follows:

	£. *s.* *d.*
At 5 *per cent.* ſimple intereſt, to only - -	13 15 0
At 5 *per cent.* compound intereſt, to - -	23 15 5
At 7 *per cent.* compound intereſt, to - -	41 17 4

So that the Scotch firs, which have increaſed 5*l.* 10*s.* principal to 42*l.* in thirty years, have paid upwards of 7 *per cent.* compound intereſt. Tranſactions of the Society of Arts. &c. vol. xvi.

The ſtatements which are given below, as drawn up by Mr. Maſon, ſhew the great advantage of making plantations with aſh, on the grounds of his grace the duke of Newcaſtle, together with a valuation of the lands previous to their being planted with the trees.

Names of the Places and Fields.

	A.	R.	P.	Value *per* Acre. *s.*	*d.*	Yearly Value. *L.*	*s.*	*d.*
At Houghton.								
Bog Cloſe, late George Padley - -	10	0	22	8	0	4	1	1
Bog Cloſe, late Dewick - - - - -	20	0	34	2	0	2	0	5
Great Kennel, in Dewick's bogs - -	3	2	0	7	0	1	4	6
Little Kennel, in the ſame - - -	2	0	0	5	0	0	10	0
Dobſon's Hopyard - - - - - -	1	0	0	10	0	0	10	0
Goſling Carr - - - - -	8	1	37	5	0	2	2	0
Crow Park - - - - - - -	5	2	0	9	0	2	9	6
Decoy plantation, including the banks about Fat Coſe ponds - - - - -	7	2	0	15	0	5	12	6
Croſs Cloſe plantation - - - -	3	2	0	12	0	2	2	6
Bog ground - -	61	3	13			20	12	6
At Bevercotes.								
Farny's plantation - - - - - -	51	1	0	8	0	20	10	0
Clay ground								

At

	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.						1	4	0
School-houſe plantation - - - - -	3	0	0	8	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 Bothamſell 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
Bothamſell 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 2700l. for which his grace will have the additional rent of 300l. 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 300l. 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 1000l. Now 1000l. improved at compound intereſt, at the rate of 4l. *per cent.*, would, in 60 years, amount to the ſum of 10,519l.: 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 4l. 3s. 4d. 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 4l. 3s. 4d. a-year, though improved after the ſame rate of compound intereſt, would not amount to 40l. in eight years; ſay, however, that it would amount to 81l., 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 10,600l. If the amount of 81l. for 52 years be taken into conſideration, the expence of the plantation in 60 years will be 11,222l. 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

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, eſq. 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 ruſh 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 ſawn 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

they

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.

	Ft. In.		Ft. In.
At the height of	1 8	from the ground, the circumference is	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-axles, 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 ſtinted. 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 ſound 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 ſkreening, 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 Alcala. 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 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 graſs turfs turned upſide down, eſpecially when planting upon graſs ground, or any out-plantations, where turfs of graſs can be obtained; or in orchards, where the ground is in graſs; 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-ſets, &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-ſets, &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, ſuckers, &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.

In

In the fifth, or Holing-in Planting, which is fometimes ufed in the nurfery, in light loofe ground: alfo, fometimes with potatoes, &c., in pliable foils; the ground being previoufly dug or trenched, and a line placed: it is thus performed; a perfon with a fpade takes out a fmall fpit of earth, to form a little aperture, in which another perfon directly depofits a plant, &c., the digger at the fame time taking another fpit at a little diftance, turns the earth thereof into the firft hole over the roots: placing directly another plant in the fecond opening, the digger covers it with the earth of a third fpit, and fo on to the end of the row.

In the fixth, or Drill Planting, which is by drawing drills with a hoe from two to four or five inches deep, for the reception of feeds and roots, and is a convenient method for many forts of large feeds, fuch as walnuts, chefnuts, and the like; fometimes alfo for broad beans, and always for kidney beans, and peas; likewife for many forts of bulbous roots, when depofited in beds by themfelves; the drills for thefe fhould 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 feeds and roots with the earth, always to the depth of the drills.

In the feventh, or Bedding-in Planting, which is frequently practifed for the choicer kinds of flowering bulbs, fuch as hyacinths, &c., alfo for the larger feeds of trees, as acorns, large nuts, and other large kinds of feeds, ftones, and kernels: it is performed by drawing the earth from off the tops of the beds fome inches in depth, then planting the feeds or roots, and covering them over with the earth, drawn off for that purpofe; for which the ground fhould be previoufly dug or trenched over, raked, and formed into beds three or four feet wide, with alleys between; then with a rake or fpade 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 feeds, one or two, according to what they are, and their fize; afterwards, for bulbous roots, drawing lines along the furface of the bed, nine inches diftance, placing the roots bottom downward, along the lines, fix or eight inches apart, thrufting the bottom into the earth: but when for feeds, they may be fcattered promifcuoufly; and having thus planted one bed, then with the fpade let the earth, that was drawn off into the alley, be fpread evenly upon the bed again over the roots or feed, &c., being careful that they are covered all equally the above depth, raking the furface fmooth and fine.

This method is in occafional practice, in planting feveral kinds of the larger prime forts of bulbous-rooted flowers in beds; and nurferymen alfo practife it in planting many of their larger feeds, nuts, &c.

And another method of this kind is occafionally practifed in fome 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 afunder in the rows: this done, the alleys are dug one fpade depth, cafting the foil upon the beds over the fets, fo as to cover them four or five inches deep; in this way, where the ground is very wet, the alleys drain the moifture from the beds, fo as fometimes to afford great crops. Sometimes, in low moift grounds, that are in grafs or fward, the beds are marked out as above, and without digging the ground; placing the potatoe fets immediately upon the fward, then digging the alleys, firft turning up the fward, and placing it topfy-turvy upon the bed, fo as to be fward to fward over the fets; then finifhing by applying more earth from the alleys, to cover in the fets, the proper depth of four or five inches. This, in fome counties, is called the lazy-bed method, becaufe the ground is not dug over.

In the eighth, or Furrow Planting, which is by drawing furrows with a plough, and depofiting fets or plants in them, covering in alfo with the plough: it is fometimes practifed for planting potatoe-fets in fields, and has been adopted in planting young trees for large tracts of foreft-tree plantations, where the cheapeft and moft expeditious method is required; but this method can be practifed only in a light pliable ground, and is performed thus: a furrow being drawn, one or two perfons are employed in placing the fets or plants in the furrow, whilft the plough following immediately with another furrow, turns the earth upon the roots of the plants. This is not a mode to be much advifed.

In the ninth, or Dibble Planting, which is the moft commodious method for moft forts of fibrous-rooted feedling plants, particularly all the herbaceous tribe; alfo for flips, offsets, and cuttings both of the herbaceous and fhrubby kinds; likewife for fome kinds of feeds and roots, fuch as broad beans, potatoe fets, Jerufalem artichokes, and horfe-radifh fets, with numerous forts of bulbous roots, &c.; it is expeditioufly performed with a dibble or fetting-ftick, by making a narrow hole in the earth for each plant, inferting one in each hole always as the work proceeds.

Having a dibble or fetting-ftick, it is ufed by thrufting it into the earth in a perpendicular defcent, in depth as the particular plants, &c. may require; directly inferting the plant, feed, or fet, as each hole is made, clofing it immediately by a ftroke of the dibble. In fetting any kind of plants, flips, cuttings, &c., having long fhanks or ftems, it is proper to make holes a proportionable depth, to admit them a confiderable way in the ground: for example, cabbage-plants, favoys, &c. fhould be planted down to their leaves; flips and cuttings fhould be inferted two parts of three, at leaft, in the ground; being particularly careful in dibbling-in all forts of plants, to clofe the holes well in every part about the roots; by ftriking the dibble flantways into the ground, fo as to ftrike the mould firft firmly up to the root and fibres, at the fame time bringing it clofe to the ftem. See Dibble.

In the tenth mode, or Trowel Planting, it is performed with a garden trowel, made hollow like a fcoop, and is ufeful in tranfplanting many forts of young fibrous-rooted plants with balls of earth about their roots, fo 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, fo as by having its roots firmly attached to the furrounding earth, it ftill, during the operation, continues its growing ftate, without receiving any, or but very little check from its removal: this is often practifed more particularly for the more delicate and choicer kinds of exotics, trees, fhrubs, and herbaceous plants; and occafionally for many of the fibrous-rooted, flowery plants, annuals, perennials, and biennials, even in their advanced growth and flowering ftate, when particularly wanted to fupply any deficient compartments; though it is not fo eligible for bulbous-rooted kinds: likewife, when intended to remove any fort of tree or plant out of the proper planting feafon, as very late in fpring, or in fummer, it is proper to tranfplant it with a good ball of earth, to preferve it more certainly in a ftate of growth. Some trees and fhrubs are more difficult to remove with a ball than moft kinds of the herbaceous fibrous-rooted plants, though

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 maſs 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 ſo 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.

Garden

Garden pots for this ufe are of feveral regular fizes, from two to fixty in a caft, diftinguifhed at the pot-houfes accordingly; as twos, fixes, twelves, fixteens, twenty-fours, thirty-twos, forty-eights, fixties, or fixty-fours, &c., each pot having one or more apertures at bottom to difcharge the fuperfluous moifture. They are fold by the potters at fo much *per* caft; large and fmall, all of a price; thofe of only two in a caft the fame as thofe of fixty; and from two fhillings to half a crown or three fhillings *per* caft is the general price. See POT, *Garden*.

Sometimes, inftead of bafkets, fmall young trees and other plants with balls, intended to be fent to any diftance, are put feparately in pots, and when they are to be placed in the full ground, each fhould 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 fome ftanding, have the whole earth by means of the numerous fibres formed into one compact lump, fo that it will readily come out entire and firm; or to fuch as do not fo eafily quit the pot, a long blade of a knife, or fome other thin inftrument, may be thruft down between the outfide of the ball and pot all round, and it will then readily come out, either in drawing by the ftem of the plant, or by ftriking the edge of the pot with fomething; or, if fmall plants, you may turn the pot mouth downward, and ftrike the edge gently againft any firm fubftance. In replanting thofe potted plants, if the fides of the ball of earth are much matted with the fibres of the root, it is proper to pare off the groffeft part, together with a little of the old earth, efpecially if to be planted in pots again; then put it in a pot a fize larger than before, filling up all round with frefh mould, finifhing with a moderate watering.

With refpect to the proper ftate and preparation of trees for planting, it may be obferved that young trees, both of the fruit and foreft kinds, are the moft fuitable, and fucceed beft, as from three or four to fix or eight feet in height, and from three or four to five or fix years old. See FOREST, DWARF, and STANDARD TREES.

In foreft-trees, the ftraighteft, moft vigorous, and thriving plants of the refpective kinds fhould always be chofen.

In preparing for planting, in taking up the trees out of the nurfery, the greateft care is neceffary in raifing them with as great a fpread of root as poffible, which is often ill attended to, efpecially when large orders of plants are to be drawn in a hurry. The ground about the trees fhould always be opened with the fpade widely round the roots, and deep enough to get to their bottoms without hacking and cutting them with the fpade, but fo as to raife each plant with all its roots as entire as poffible. After having taken up the trees out of the nurfery, &c., it is alfo of great moment to have them replanted as foon as poffible in the places allotted for them; for although by properly covering the roots with litter, or, if fent to any confiderable diftance, by tying them in bundles, and packing them up with plenty of ftraw about the roots, and afterwards clofely matted round, they may be preferved in tolerable good condition a fortnight or longer, yet, where it is poffible to plant them the fame day, or in a day or two after, before the fmall fibres are fhrunk or dried, it will be of much advantage in the firft growth of the trees; but when this cannot be done, they fhould be immediately laid in the ground in a trench.

In preparing for planting, the roots muft have occafional 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 fuch parts as have been broken or damaged in taking up, and any cafual decayed parts or other blemifhes, being careful to leave all the found roots every where entire; leaving alfo all the fmall fibres that are frefh and vigorous, only trimming off fuch as are become dry and mouldy; fuffering all the main roots to remain, moftly at full length, except juft to tip off their ends a little on the under fide, floping outward; and reduce any very long ftragglers, and fhorten long perpendicular tap-roots, more particularly of fruit-trees, to prevent their running down into a bad foil, 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 ftraggling fhoots and branches from the ftems, leaving the heads for the generality entire, only juft retrenching very irregular branches, and fhortening any very long ftragglers; always fuffering the main or leading top fhoot to remain at length, particularly in foreft-treees, and all others that are to grow to a lofty ftature. Fruit-trees, however, fometimes require a more accurate regulation of the head preparatory to planting, particularly dwarfs for efpaliers and walls. If the fruit-tree is taken from the nurfery at one year old from the budding and grafting, and with its firft fhoot from budding and grafting entire, this firft fhoot muft neceffarily be fhortened or headed down to force out lateral wood below, to furnifh the bottom properly; but this heading down is not neceffary at the time of planting, but fhould remain till fpring, until the tree has taken frefh root and begins to fhoot; 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 fix eyes of the infertion of the bud or graft, and the fhoot fo headed will throw out, from its remaining lower eyes, feveral lateral branches the enfuing fummer.

If it is two, three, or more years old from the budding and grafting, and the firft fhoots were headed down in the nurfery at the proper time, it is proper to plant it with its whole head entire, only retrenching any irregular branch, or any very luxuriant fhoot; or thin out the worft of fuch as are evidently too clofe or crowded, leaving however all the regular branches at full length, except juft to reduce any very long rambler.

For new planting trees it is very improper to retrench the branches too feverely, and cut all that remains fhort, as is very often practifed, on a fuppofition of ftrengthening their roots, which however has often the contrary effect; for the branches and leaves imbibe the refrefhing influence of the air, &c., which, being conveyed to the roots, proves nutrimental, and contributes exceedingly towards vegetation, and confequently promotes the rooting afrefh more expeditioufly and effectually. Befides, by a fevere retrenching, and a general fhortening, of fruit-trees in particular, in moft forts the very parts where fruit would have been foon firft produced are cut off, and it will probably coft the tree two or three years growth to furnifh new branches equal to thofe cut away, as well as retard its bearing in proportion. And it often happens by fuch 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 nourifhment, either make very little progrefs in fhooting for two or three years after, or fometimes, when they do fhoot, throw out a profufion of unneceffary wood from the remaining eyes or buds.

Therefore if young fruit-trees at planting, whether dwarfs or ftandards, are furnifhed with five or fix 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 fhould at all times be but fparingly fhortened; and fince feveral good branches being already obtained in the proper parts to give the head its firft regular form, they in their turn readily furnifh more; and if there is a vacancy in any part, it will be better to endeavour to fill it by ftopping fome of the young fhoots produced the fummer after planting, by either pinching or pruning them in May or June the fame year to three or four eyes, or cutting them down to that length in the winter or fpring following. Some fruit-trees, however, fuch as peaches, nectarines, &c., againft walls, require moft of their young fhoots to be fhortened annually.

Foreft-trees, &c., in their preparation previous to planting, after being drawn out of the nurfery, fhould only have the blemifhed roots trimmed, and all branches from the lower part of the ftem pruned off, cutting the lower ones clofe, the others to two, three, or four inches, particularly the deciduous kinds, leaving the head always tolerably branchy, and moftly entire; not to trim away all the branches to one leading fhoot only, as is often practifed, but leave a proportionable fhare of the upper more erect branches, to form fome tolerable head, and only juft retrenching the lower ftragglers, very long rambling luxuriants, and very irregular growths, to preferve a little regularity; being particularly careful to leave always the top or leading fhoot perfectly entire, unlefs it is decayed, or is very crooked, bending much downwards, &c., in which cafes, if any ftraight fhoot is conveniently fituated, the crooked part may be retrenched down to the ftraight fhoot, which leave entire to run up in height, as without a leader a tree can never afpire to any confiderable ftature; for the leader, by its annual erect fhoot, gradually increafes the length of the ftem, and, as it advances, fends out a fupply of laterals to furnifh the head, branching and fpreading.

In planting large tall trees, where it is defigned to form fhade, fhelter, or blind as foon as poffible, very little reduction of the branches of the head fhould be fuffered, only to reduce any very irregular growers.

In removing pretty large trees of any fort with confiderable heads, efpecially when very fpreading or crowded, it may be proper to reduce the whole regularly in fome proportion to the root, that the winds may not have too much power to incommode it after planting; in which cafes it may be neceffary to retrench or reduce fome of the moft extenfive lower branches, and thin out fome where much crowded, reducing others down to fome convenient lateral branch they may fupport, fo as each reduced branch may, notwithftanding its reduction, terminate in a leader, having its top entire, not to exhibit naked ends of branches, ftanding up like ftumps.

In refpect to the preparation for planting of all the fhrub kind, only juft trim the ftraggling under branches and fhoots from the lower part of the ftem, retrenching any luxuriants of the heads that feem to fhoot away very irregularly and vigoroufly at the expence of the neighbouring branches, and reducing long ramblers, &c., juft to preferve a little regularity.

All new planted tall trees fhould be ftaked as foon as planted, in order to fupport them fteady every where till they are well rooted and have fomewhat eftablifhed their roots, that winds may not overfet, or otherwife incommode them; particularly all trees of fix, eight, or ten feet high, and upwards; one tall ftout ftake being placed to each tree, or more, if the trees are of large fize, fharpening the lower ends, and driving them firmly into the ground near the ftem; or if larger trees, place it flantways, at a little diftance, fo as its top reach the upper part of the ftem, on the oppofite fide to that moft expofed to the winds, in which it will have the greateft effect; but large trees with full heads, fhould generally have very tall ftrong ftakes, three to each tree, placed triangular-ways, in an oblique or flanting direction, afterwards binding the ftems of the trees firmly to the ftakes, previoufly wrapping fome foft fubftance, fuch as hay-bands, &c., round them, at the part where it is to be faftened to the ftakes, in order to fave the bark from being rubbed off againft the ftakes by the motion of the winds, which is more particularly neceffary to tall plants that are much expofed. Large trees of confiderable ftature, with full heads, are often fupported with ropes fufpended from the top of the ftem three different ways, ftraining them tight, and the end of each rope ftaked fecurely down to the ground; fo that whatfoever way the wind blows the ropes ftay the tree ftill in its upright pofition.

Such new planted trees as are expofed to cattle fhould each be well fortified all round the ftem with thorn bufhes, briars, furze, &c.

The general feafon of planting, for all forts of trees, is autumn and fpring, as from the beginning of the decay of the leaf, in October, until December, for the former; though evergreens may be begun to be tranfplanted towards the middle or latter end of September, and continued till December. And for the fpring planting, February and March are the principal time, but may be continued occafionally until April; and feveral forts of tender young evergreens fucceed beft when planted the beginning of that month, or later. Much, however, in this bufinefs, muft depend on the foil and ftate of the weather.

In preparing to plant herbaceous fibrous-rooted plants, care is to be had to remove them with good roots; young feedlings, &c., efpecially require particular care in drawing them with proper roots. When they are to be taken all clean up, they may be readily loofened and raifed out of the earth with fome inftrument with all their fibres entire; but when they are only to be thinned, they do not admit of this, as it would difturb the remaining plants, fo muft be drawn out by hand carefully, with as much root as poffible.

Many forts of fibrous-rooted plants, however, are fo hardy, and apt to grow, that if taken up almoft any how, with a little root, they will ftrike; it is neverthelefs advifeable to ufe care in drawing all forts for planting with tolerable roots, as they will, in proportion, make more progrefs in their future growth. And as to any trimming preparatory to planting, very little is wanted, only in fome forts, juft fhortening very long naked fpindly roots, and trimming any ftraggling 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 thefe forts of trees, which is a practice that has lately been more attended to than formerly; probably from the advantages of it being more fully underftood, and more correctly afcertained. The particular forts of land that may be converted to this purpofe with the greateft chance of profit, have been already pointed out.

In the accomplifhing the bufinefs, the principal difficulty confifts in properly adapting the trees to the nature of the foil, as, unlefs that be the cafe, the fuccefs is far from fo great as it would otherwife be. The land fhould alfo be in a proper ftate of preparation for the reception and growth of the trees, and the work be executed at a proper feafon in a proper manner, and at fuitable diftances, according to the nature and quality of the foil, and that of the trees; the whole being well fenced from the attacks of cattle.

Soil.—The particular kinds of foil beft adapted to the cultivation of the different forts of timber trees, and in which fome or other of them will be found to grow in the moft perfect manner, are gravelly or light fandy foils, with free porous fubfoils; gravelly or fandy loams on porous fubfoils; 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 mosses 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 *6d.* 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 coppice. 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 seed-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.

Surface Soil.	Subfoil.	Common Growth.	Planted Growth.	Ufes of.
Heavy and gravelly loams.	Heavy loam with chalk.	Birch, hornbeam, oak, afh, hazel, beech, &c.	Oak, afh, chefnut, willow, lime, walnut.	Timber, hop-poles, cord-wood, hurdles, bavins for bakers, and lime.
Sandy loams.	Heavy loams.	Birch, hornbeam, oak, afh, hazel, beech, &c.	Elm, beech, Weymouth pine, common fpruce .	Timber, hop-poles, cord-wood, hurdles, bavins for bakers, and lime.
Flinty ftrong loam.	Heavy loam.	Ditto.	Willow and chefnut.	Timber, fencing-poles, and as above.
Gravelly and fandy loams.	Gravelly loam.	Afh, beech, oak, hazel, &c.	Chefnut, afh.	Hop-poles, fencing-poles, and all as above.
Gravelly, fandy and flinty loams.	Heavy gravelly flinty loam.	Afh, beech, hornbeam, and oak.	Afh, 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.	Afh, oak, hazel, &c.	Afh, larch, &c.	Cord-wood, hop-poles, bavins, ftakes, ethers, &c.
Ditto.	With a few flints, but nearly as above.	Oak, hazel, beech and afh.	Chefnut, afh, and willow.	Hop-poles, fencing-poles, ftakes, cord-wood, &c.
Lightifh black loam.	Dry fandy gravel.	Birch, elm, afh.	Afh, elm, &c.	Various ufes in hufbandry.
Flinty gravelly loams.	Strong loam, with flints.	Oak, afh, beech, &c.	Afh, &c.	Poles, bavins, cord-wood, &c.
Chalky, flinty gravelly loam.	Chalk, with fome gravelly loam.	Ditto.	Ditto.	Ditto.
Gravelly loam.	Heavy, flinty, and poor loam.	Oak, afh, hazel, and beech.	Afh, 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, afh, &c.	Afh and chefnut.	Poles, cord-wood, &c.
Gravelly loam.	Ditto.	Afh, oak, and beech.	Oak, larch.	Ditto.
Ditto.	Gravelly loam and heavy loam.	Ditto.	Scotch pine.	Ditto.
Sandy gravel.	Gravelly and fandy loam.	Afh, oak, beech, and Scotch pine.	Larch, chefnut, &c.	Poles, ftakes, ethers, &c.
Stone fhatter and gravelly loam.	Strong loam with ragftone.	Oak, hazel, birch, &c.	Birch, oak, &c.	Oaken tillers, fmall timber poles, &c.
	Gravelly loam with fome ftone.	Oak, birch, afpen, hazel, and afh.	Afh, chefnut, and willow.	Fencing-poles, hop-poles, cord-wood, &c.
Gravelly loam.	Gravelly loam, with fome ftones.	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 ftone fhatter.	Gravelly loam with ragftone.	Oak, beech, birch, hazel, afh.	Ditto.	Ditto.
Gravelly loam and ftone fhatter.	Deep loam, heavy clay and gravel.	Ditto.	Ditto.	Ditto.
Ditto.	Gravelly loam.	Ditto.	Ditto.	Ditto.
Gravelly and fandy loam.	With ftrong clay and loam.	Oak and ditto.	Afh, larch, &c.	Poles, fire-wood, &c. as above.
Gravelly loam flinty.	Gravel with clay and fome flint.	Scrubby oak, hazel, &c.	Oak, afh.	Timber and ditto.
Wet fpungy land.	Moift and boggy earth	Alder, willow.	Alder, ofier, willow, &c.	Hurdles, hop-poles, &c.
Drier ditto.	Ditto more dry.	Poplar.	White poplar, willow.	Hop-poles, &c.
Light fandy loam.	Dry gravelly earth.	Mountain afh, afh.	Scotch pine, filver fir.	Hop-poles.
Light gravelly loam.	With dry gravel.	Afh.	Sycamore.	Timber, turnery, &c.

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 on 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 plat, 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-cheſnut, 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 ozier, 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 adviſeable. 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 havock 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 ſeminary 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 deep 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 adviſeable 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 ſuſtenance 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

 plants

plants have room to grow till their thinnings become ufeful. But even where this is not an object, there is a greater; namely, that the plants may not grow too fquat in their infancy, and that the pruning hook be not much wanted in the formation of ftately timber. It is fuppofed that he who plants too thin, with the idea of faving 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 fafer fide to err on. By which mode alfo, there is a more equal crop on the ground, beeting or filling up vacancies being much lefs neceffary. And in oppofition to the common practice, it is fuppofed that thick planting is moft neceffary where the plants are largeft, as the greateft number die in thefe cafes. The Nottinghamfhire Report ftates, that in the duke of Portland's plantations, where trees of various fizes are planted in an irregular manner, the number upon an acre is ufually about two thoufand; but in other cafes the number is frequently much larger.

With refpect to the manner of fetting the trees in the plantations, it is probably the beft method, except where vegetable crops are to be cultivated between, to plant without any regular order, though the line or row manner is frequently practifed, as being the leaft troublefome and expenfive of any that can be adopted. With refpect to the moft advantageous manner of blending or intermixing the trees, it is obferved that fome have advifed the planting in groups, to prevent the fuppofed injury of trees of different forts growing together; others, however, prefer the mixed method, not only as affording a better means of afcertaining what forts of timber trees fucceed beft, but as enabling the planter to protect them more effectually. It has, however, been fuggefted by Mr. Nicol, that it matters little whether we plant in diftinct groups or in indifcriminate mixture; provided, in the latter cafe, we ultimately retain the moft profitable and flourifhing kinds only: for, with the provifo that moft of the kinds evidently adapted to the foil and fituation be planted according to the mode of thick planting, a fufficiency of them will remain, after all others are thinned away, for a full and final crop. For inftance: if it fhould be fuppofed that the foil is beft adapted to the oak; that it is defirable to raife the moft valuable kinds rather than the decorative; and that, exclufive of the larch for nurfes, and a few firs to enliven the borders, fix kinds are to compofe the mixture; plant two oaks for one elm, two elms for one beech, two beeches for one afh, two afhes for one birch, and two birches for one fycamore. And thus will the plantation at once be formed, in uniform gradation, of kinds moft likely to fucceed each other, in the cafe of either difagreeing with the foil or climate; and which alfo fucceed each other in refpect of value as timber: doing juftice, at leaft, to the patriotic intention of the planter, fhould the firft and more valuable kinds fail.

It is conceived that in all fituations, and on all foils, except thofe termed humid, and which are adapted to the aquatic kinds only, the larch is, without doubt, the moft proper nurfe, and therefore fhould take preference of all others for this purpofe. But on fub-humid, or loamy foils, the Lombardy poplar and Huntingdon willow are good fubftitutes; and, when variety is the object, ought to be mixed with the larch, for the purpofe of nurfing the other more valuable kinds. And that on elevated, poor fcites, the mountain-afh, for the firft ten or fifteen years, is outdone by the larch only in the office of nurfing, and is juftly admitted for the fake of variety. In all fituations, this plant grows quickly in youth. In maritime fituations, the fycamore is likewife evidently ufeful for this purpofe. Few trees, except the above, grow fafter in youth; and none are more patient of the fea-breeze. Confequently, when the fcite is much expofed thereto, this tree fhould be freely planted in mixture with the larch for nurfing the oak, beech, elm, &c. if the intention be the culture of fhip-timber. It is likewife fuggefted, that the common pine may fometimes be ufeful in this view, and afford greater variety. The proportion in which trees of this fort fhould be employed, muft neceffarily depend on the peculiarity of the fituation, and other circumftances. Some recommend in thin foils, and bleak fituations, tree for tree; and in lefs expofed fituations, and better foils, one nurfe for two principal trees; and in moft fheltered fituations, with good foil, one nurfe for three, four or five principal trees may be a fufficient allowance. On the moft expofed and bleak fituations, where the foil is evidently fterile, the fafeft way is to plant too many rather than too few, as, unlefs well fheltered, the timber trees never fucceed well in expofed fituations.

The time of planting thefe forts of trees with the moft advantage, and the greateft chance of fuccefs, differs according to the nature of the foils and the plants, as well as in the ftate of the weather. It has been ftated, that in the more porous dry foils, with the hardier forts of trees, the autumn, as from the middle of October to the latter end of November, may be the moft fuitable; as they will be better eftablifhed againft the fummer heats, which are often deftructive to new planted trees. But in the more heavy foils, efpecially thofe of the clayey and loamy kinds, and with lefs hardy forts of trees, the early fpring feafon, as from the middle or latter end of February to the beginning of April, may be the moft proper. The condition of the land fhould be particularly attended to in this fort of work, as it is equally improper to plant when either in too dry or too moift a fituation. At a time when the foil is neither wet nor dry, the operation of planting is moft eafily, and alfo moft fuccefsfully performed. The mould adheres not to the fpade, nor does it run in; it divides well, and with little trouble intermingles with the fibres; nor, in the operation of treading and fetting the plant upright, is it wrought into a mortar, to the evident prejudice of the plant, whatever weather may enfue. Confequently, on a retentive foil, it cannot be proper to plant in time of rain, nor in many cafes for a day or two afterwards; nor after a fall of fnow, until for feveral days it has entirely difappeared. Whereas on a dry abforbent foil, it may be very proper to plant in time of gentle rains or immediately after heavy ones.

Another circumftance which ought to be regarded in this bufinefs, is the difference in the forwardnefs of the vegetation of different forts of trees, as it fhould regulate in fome degree the time of planting, where thofe of the fame forts are only made ufe of. In this view, it is advifed that the larch, elm, fycamore, lime, horfe-chefnut, mountain-afh, birch, alder, poplar, willow, and fome others, fhould be put in by the beginning of March; and that the oak, birch, afh, chefnut, hornbeam, &c. be finifhed planting by the beginning of April at the lateft. The beft feafon for planting of many trees of the evergreen kind, fuch as the Weymouth pine, fpruce, Scotch, filver, and other firs, is fuppofed by fome to be in the latter end of July, or in the beginning of the following month, when the weather is inclined to be moift or cloudy.

Planting out.—It is advifed, that as foon as the trees have been taken up with care, fo as to injure the fibres of the roots as little as poffible, and a few of the bruifed extremities cut off, they fhould, when intended to be planted in mixture, be put together in proper proportions, and conveyed in this way

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 ſteeps, 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 choaking 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 *Architecture*, denotes the laying the firſt courſes

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, developement, 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 *Confervæ*, 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*, FECUNDATION *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 *shrinks;* 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 alerations 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 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. *fruticoſa*, 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. *nidifica*, 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.

Circæa. 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. *Chamædrys*, 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. *triphyllos*, 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.

Lemna. Duck-weed.

1. L. *triſulca*, ivy-leaved. 13. 926. Pools and ditches. Ann. 6.

2. L.

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-graſs.

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-ſallad. 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. *fœtidiſſima*, 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 turfy 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. 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*, leaſt. 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*, briſtle-ſtalked. 24. 1693. Sandy wet places. Ann. 7, 8.
11. S. *triqueter*, 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-graſs.

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-graſs.

1. N. *ſtricta*, common. 5. 290. Sandy moiſt heaths. Per. 7.

Ord. 2. *Digynia.*

PHALARIS. Canary-graſs.

*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-graſs.

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-graſs.

1. P. *pratenſe*, common. 15. 1076. Paſtures. Per. 6—10.

2. P.

2. P. *alpinum*, alpine. 8. 519. Highlands. Per. 7.
3. P. *paniculatum*, panicled. 15. 1077. Fields, rare. Ann. 7.
4. P. *Boehmeri*, canary. 7. 459. Sand or chalk. Per. 7.
5. P. *Michelii*, Michelian. 32. 2265. Highland rocks. Per. 7.
6 P. *arenarium*, fea. 4. 222. Sandy fields. Ann. 6.

ALOPECURUS. Fox-tail-grafs.

1. A. *pratenfis*, meadow. 11. 759. Paftures and meadows. Per. 5.
2. A. *alpinus*, alpine. 16. 1126. Highlands. Per. 7.

" Stem erect, fmooth. 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, Aberdeenfhire. *Stem* a foot high. *Spike* white and downy, fcarcely an inch long.

3. A. *agreftis*, flender. 12. 848. Cornfields, and way fides. Ann. 7.
4. A. *bulbofus*, bulbous. 18. 1249. Salt marfhes. Per. 7.
5. A. *geniculatus*, floating. 18. 1250. Ponds and ditches. Per. 7.
6. A. *fulvus*, orange-fpiked. 21. 1467. Ponds. Per. 7.

" Stem afcending, bent at the joints. Spike compound, cylindrical. Glumes obtufe, hairy. Awn the length of the calyx. Anthers roundifh."—Larger than the laft. *Anthers* orange-coloured, opening at each fide by an oval orifice.

KNAPPIA. Knappia.

1. K. *agroftidea*, early. 16. 1127. Sandy places, rare. Ann. 3, 4.

POLYPOGON. Beard-grafs.

1. P. *monfpelienfis*, long-awned. 24. 1704. Salt marfhes. Ann. 7, 8.
2. P. *littoralis*, fhort-awned. 18. 1251. Muddy falt marfhes. Per. 8.

MILIUM. Millet-grafs.

1. M. *effufum*, fpreading. 16. 1106. Moift woods. Per. 6, 7.
2. M. *lendigerum*, clofe, or panick. 16. 1107. Low fields. Ann. 8.

AGROSTIS. Bent-grafs.

1. A. *Spica venti*, filky. 14. 951. Moift fandy fields. Ann. 6, 7.
2. A. *canina*, brown. 26. 1856. Moift paftures. Per. 7.
3. A. *fetacea*, briftly. 17. 1188. Dry heaths. Per. 7, 8.
4. A. *vulgaris*, fine. 24. 1671. Paftures and heaths. Per. 7.
5. A. *ftolonifera*, creeping. 22. 1532. Moift fields. Per. 7, 8.
6. A. *alba*, marfh. 17. 1189. Bogs and woods. Per. 7.

AIRA. Hair-grafs.

1. A. *criftata*, crefted. 9. 648. Dry paftures. Per. 7, 8.
2. A. *aquatica*, water. 22. 1557. Ponds, &c. Per. 5. 6.
3. A. *cæfpitofa*, turfy. 21. 1453. Moift ground. Per. 6, 7.
4. A. *lævigata*, fmooth-fheathed. 30. 2102. Highlands, and fea-coaft. Per. 5, 6.

" Leaves flat; with very fmooth fheaths. Panicle clofe. Petals awned, hairy at the bafe. Partial ftalk fmooth and very fhort."—Native of Lapland as well as Scotland. Generally viviparous. Not half fo tall as the laft.

5. A. *flexuofa*, wavy. 22. 1519. Sandy heaths. Per. 7.
6. A. *canefcens*, grey. 17. 1190. Sandy fhores. Per. 7.
7. A. *præcox*, early. 18. 1296. Dry gravelly places. Ann. 5, 6.
8. A. *caryophyllea*, filver. 12. 812. Barren heaths. Ann. 7.

HOLCUS. Soft-grafs.

1. H. *lanatus*, meadow. 17. 1169. Meadows and paftures. Per. 6, 7.
2. H. *mollis*, creeping. 17. 1170. Fields and woods. Per. 7, 8.
3. H. *avenaceus*, oat-like. 12. 813. Wafte 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 fandy ground. Per. 8.

SESLERIA. Moor-grafs.

1. S. *cærulea*, blue. 23. 1613. Limeftone 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. *diftans*, reflexed. 14. 986. Wafte ground. Per. 7.
4. P. *maritima*, creeping fea. 16. 1140. Salt marfhes. 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. *compreffa*, flat-ftalked. 6. 365. Walls, &c. Per. 7, 8.
8. P. *alpina*, alpine. 14. 1003. Highlands. Per. 7.
9. P. *flexuofa*, zig-zag. 16. 1123. Highlands. Per. 7.
10. P. *bulbofa*, bulbous. 15. 1071. Sea-coaft Per. 5, 6.
11. P. *cæfia*, fea-green. 24. 1719. Highlands. Per. 6, 7.
12. P. *trivialis*, roughifh. 15. 1072. Meadows and paftures. Per. 6—9.
13. P. *pratenfis*, fmooth-ftalked. 15. 1073. Mead. and paft. Per. 5, 6.
14. P. *humilis*, fhort blueifh. 14. 1004. Mountain paftures. Per. 6.
15. P. *annua*, annual. 16. 1141. Cultivated ground. Ann. 3—11.
16. P. *glauca*, flender 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*, fmall. 19. 1316. Fields, rare. Ann. 7.
2. B. *media*, common. 5. 340. Paftures. Per. 5. 6.

DACTYLIS. Cock's-foot-grafs.

1. D. *ftricta*, fmooth. 6. 380. Muddy fea fhore. Per. 8.
2. D. *glomerata*, rough. 5. 335. Meadows and paftures. Per. 6—8.

CYNOSURUS. Dog's-tail-grafs.

1. C. *criftatus*, crefted. 5. 316. Paftures. Per. 7.
2. C. *echinatus*, rough. 19. 1333. Sandy ground. Ann. 7.

FESTUCA.

FESTUCA. Fefcue-grafs.

1. F. *ovina*, fheep's. 9. 585. Open paftures. Per. 6.
2. F. *vivipara*, viviparous. 19. 1355. Mountains. Per. 7.
3. F. *cæfia*, fea-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 compreffed, channelled, glaucous."—About Bury, Suffolk, forming broad, depreffed, very glaucous tufts. *Stems* a fpan high.

4. F. *duriufcula*, hard. 7. 470. Meadows and paftures. Per. 6.
5. F. *rubra*, creeping. 29. 2056. Mountains and fea fhore. 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-hufked. 20. 1430. Sea fand. Ann. 6.
9. F. *triflora*, three-flowered. 27. 1918. Paftures. Per. 7.

"Panicle fpreading. 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, beardlefs; the upper ones deciduous. Leaves linear, ftriated."—Lower and much more flender than the laft. The lowermoft *floret* only ripens feed.

13. F. *loliacea*, fpiked. 26. 1821. Moift paftures. Per. 6, 7.
14. F. *pratenfis*, meadow. 23. 1592. Meadows and paft. Per. 6, 7.
15. F. *elatior*, tall. 23. 1593. Moift meadows. Per. 6, 7.

BROMUS. Brome-grafs.

1. B. *fecalinus*, fmooth rye. 17. 1171. Corn-fields. Ann. 7.
2. B. *multiflorus*, downy rye. 27. 1884. Corn-fields. Ann. 7.
3. B. *mollis*, foft. 15. 1078. Paftures, &c. Bienn. 6.
4. B. *racemofus*, fmooth. 15. 1079. Paft. and meadows. Ann. 6.

†5. B. *fquarrofus*, corn. 27. 1885. Corn-fields. Ann. 7.
6. B. *arvenfis*, taper field. 28. 1984. Fields. Ann. 7.
7. B. *pratenfis*, tumid field. 13. 920 (arvenfis). Fields. Ann. 6.

"Panicle fpreading, compound. Spikelets ovate, turgid, eight or ten-flowered. Florets elliptical, broad, imbricated, fmoothifh, with three equidiftant ribs at each fide."—Two feet high. *Panicle* fmaller and more erect than in the laft, but the *fpikelets* are larger, more tumid, and greener. The true *arvenfis* has only two clofe ribs on each fide the keel of the *glume*.

8. B. *erectus*, upright perennial. 7. 471. Chalky paft. Per. 7.
9. B. *afper*, hairy wood. 17. 1172. Moift woods. Ann. Biennial. 7.
10. B. *fterilis*, barren. 15. 1030. Wafte ground, and fields. Ann. 6, 7.
11. B. *diandrus*, upright annual. 14. 1006. Walls and fand. Ann. 6.
12. B. *fylvaticus*, flender wood. 11. 729. Thickets and hedges. Per. 7.
13. B. *pinnatus*, fpiked heath. 11. 730. Chalky heaths. Per. 7.

STIPA. Feather-grafs.

†1. S. *pennata*, plumy. 19. 1356. Rocks. Per. 7.

AVENA. Oat-grafs.

1. A. *fatua*, wild haver. 31. 2221. Fields. Ann. 8.
2. A. *ftrigofa*, briftle-pointed oat. 18. 1266. Corn-fields. Ann. 7.

This is now admitted as a native fpecies, in confequence of its having been found in Scotland, Wales, Yorkfhire, and Cornwall, notwithftanding the contrary opinion expreffed in Fl. Brit. 140. See AVENA, n. 22.

3. A. *pubefcens*, downy. 23. 1640. Chalky paftures. Per. 6.
4. A. *pratenfis*, narrow leaved. 17. 1204. Limeftone foil. Per. 7.
5. A. *planiculmis*, flat-ftrawed. 30. 2141. Highland mountains. Per. 7.

"Panicle erect. Calyx containing about five florets. Receptacles bearded upwards. Leaves naked, finely ferrated, with rough fheaths. Stem compreffed."—Like *A. pubefcens* in general afpect, but larger in every part, and the *leaves* are naked, not downy; their edges finely ferrated, as in *pratenfis*. *Flowers* much larger than in either of thofe.

6. A. *flavefcens*, yellow. 14. 952. Paftures and wafte ground. Per. 6, 7.

LAGURUS. Hare's-tail-grafs.

1. L. *ovatus*, ovate. 19. 1334. Sands in Guernfey. Ann. 6.

ARUNDO. Reed.

1. A. *Phragmites*, common. 6. 401. Fens and ditches. Per. 7.
2. A. *epigejos*, wood. 6. 402. Moift woods. Per. 7.
3. A. *Calamagroftis*, fmall. 30. 2159. Moift woods and fens. Per. 7.
4. A. *ftricta*, fmalleft clofe. 30. 2160. Marfhes, Scotland. Per. 6.

"Calyx fingle-flowered, full as long as the corolla. Panicle erect, clofe. Flowers fcattered, erect, with a dorfal awn. Down fhorter than the corolla."—Half the fize of the laft. *Calyx* acute, but without elongated points. *Stipula* very fhort. The *panicle* is of a purplifh bronze hue, not unlike *Melica cærulea*.

5. A. *arenaria*, fea. 8. 520. Sandy fea-coaft. Per. 7.

LOLIUM. Darnel.

1. L. *perenne*, perennial. 5. 315. Meadows and paftures. Per. 6.
2. L. *temulentum*, bearded. 16. 1124. Fields. Ann. 7.
3. L. *arvenfe*, white. 16. 1125. Fields, rare. Ann. 7.

ROTBOLLIA. Hard-grafs.

1. R. *incurvata*, fea. 11. 760. Salt marfhes. Ann. 8.

ELYMUS. Lyme-grafs.

1. E. *arenarius*, upright fea. 24. 1672. Sandy fea-coaft. Per. 7.

2. E.

2. E. *geniculatus*, pendulous fea. 23. 1586. Muddy fea-coaft. Per. 7.
3. E. *europæus*, wood. 19. 1317. Chalky woods. Per. 6.

HORDEUM. Barley.

1. H. *murinum*, wall, or moufe. 28. 1971. Way fides. Ann. 6—8.
2. H. *pratenfe*, meadow. 6. 409. Moift paftures. 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. Wafte ground. Per. 6—9.
3. T. *caninum*, bearded. 20. 1372. Chalky woods. Per. 7.
4. T. *criftatum*, crefted. 32. 2267. Sea cliffs, Scotland. Per. 7?

Bromus criftatus 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. *fylveftris*, wild. 15. 1032. Moift hedges. Bienn. 7.
3. D. *pilofus*, fmall. 13. 877. Moift chalks. Per. 8.

SCABIOSA. Scabious.

1. S. *fuccifa*, devil's bit. 13. 878. Paftures. Per. 8—10.
2. S. *arvenfis*, field. 10. 659. Corn-fields. Per. 7.
3. S. *columbaria*, fmall. 19. 1311. Gravel or chalk. Per. 6, 7.

SHERARDIA. Field-madder.

1. S. *arvenfis*, 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.

GALIUM. Bed-ftraw.

1. G. *cruciatum*, crofs-wort. 2. 143. Thickets and hedges. Per. 5.
2. G. *paluftre*, white water. 26. 1857. Moift meadows. Per. 7.
3. G. *Witheringii*, rough heath. 31. 2206. Moift hills. Per. 7.
4. G. *faxatile*, fmooth 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 paftures. Per. 6, 7.
7. G. *verrucofum*, warty-fruited. 31. 2173. Corn-fields. Ann. 6—8.

This is the *Valantia Aparine* of Linnæus, whofe feeds, befet with large tubercles, are compared by Tournefort and Vaillant to coriander comfits.

8. G. *tricorne*, three-flowered. 23. 1641. Corn-fields. Ann. 7.
9. G. *fpurium*, fmooth-feeded corn. 26. 1871. Corn-fields, rare. Ann. 6, 7.
10. G. *pufillum*, leaft mountain. 2. 74. Limeftone 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. *boreale*, crofs-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*, leaft. 4. 235. Sandy marfhes. Ann. 7.

PLANTAGO. Plantain.

1. P. *major*, greater. 22. 1558. Paftures 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 paftures. Per. 6, 7.
4. P. *maritima*, fea. 3. 175. Sea-coaft and lofty mountains. Per. 8.
5. P. *Coronopus*, buck's-horn. 13. 892. Sandy paftures. 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 paftures Per. 6.

EPIMEDIUM. Barren-wort.

1. E. *alpinum*, alpine. 7. 438. Mountain thickets, 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 paftures. Per. 6, 7.
2. A. *alpina*, alpine. 4. 244. Micaceous rocks. Per. 7.

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. *pusillum*, small. 3. 215. Clay-pits. Per. 7.
12. P. *pectinatum*, 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 mountains. Ann. 5—8.
3. S. *apetala*, small-flowered. 13. 881. Sandy wastes. Ann. 5, 6.
4. S. *erecta*, upright. 9. 609. Gravelly pastures. Ann. 5.

Tillæa. Tillæa.

1. T. *muscosa*, mossy. 2. 116. Sandy heaths. Ann. 5, 6.

Radiola. Flax-seed.

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 bracteas; 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 β is our following species, *versicolor*; the γ 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 bracteas. 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 bracteas. Calyx divided above half way down, its hairs copious, spreading and elongated."—Most like the last; with still larger blue *flowers*.

Lithospermum. Gromwell.

1. L. *officinale*, common. 2. 134. Chalky hills. Per. 5.
2. L. *arvense*, corn. 2. 123. Fields. Ann. 5, 6.
3. L. *purpuro-cæruleum*, 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. Bugloss.

1. L. *arvensis*, small. 14. 938. Fields and hedges. Ann. 6, 7.

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. Primrofe.

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*, cowflip. 1. 5. Meadows and paftures. Per. 4, 5.
4. P. *farinofa*, bird's-eye. 1. 6. Mountain bogs. Per. 6, 7.

CYCLAMEN. Cyclamen.

*1. C. *europæum*, fpring. 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. *paluftris*, common. 6. 364. Pools and ditches. Per. 6, 7.

LYSIMACHIA. Loofeftrife.

1. L. *vulgaris*, yellow. 11. 761. Watery thickets. Per. 7.
2. L. *thyrfiflora*, 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. *arvenfis*, fcarlet. 8. 529. Fields and gardens. Ann. 6, 7.
2. A. *cærulea*, blue. 26. 1823. Fields, rare. Ann. 6, 7.
3. A. *tenella*, bog. 8. 530. Bogs and fprings. Per. 7, 8.

AZALEA. Azalea.

1. A. *procumbens*, trailing. 13. 865. Alpine heaths. Small fhrub. 7.

CONVOLVULUS. Bind-weed.

1. C. *arvenfis*, fmall. 5. 312. Gravelly paftures. Per. 6, 7.
2. C. *fepium*, great. 5. 313. Moift hedges. Per. 7, 8.
3. C. *Soldanella*, fea. 5. 314. Sandy fea-coaft. Per. 7.

POLEMONIUM. Jacob's-ladder.

1. P. *cæruleum*, 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*, fpreading. 1. 42. Paftures, rare. Bienn. 7, 8.
3. C. *Rapunculus*, rampion. 4. 283. Banks. Bienn. 7, 8.
4. C. *latifolia*, giant. 5. 302. Woods and fhady 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*, cluftered. 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*, fcabious. 13. 882. Sandy paftures. Ann. 6, 7.

LOBELIA. Lobelia.

1. L. *Dortmanna*, water. 2. 140. Lakes, rare. Per. 7.
2. L. *urens*, acrid. 14. 953. Moift heaths, rare. Per. 8, 9.

IMPATIENS. Balfam.

1. I. *Noli-me-tangere*, yellow. 14. 937. Shady fprings, rare. Ann. 8.

VIOLA. Violet.

1. V. *hirta*, hairy. 13. 894. Limeftone woods. Per. 4
2. V. *odorata*, fweet. 9. 619. Groves and banks Per. 3, 4.
3. V. *paluftris*, marfh. 7. 444. Moffy 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 panfy. 18. 1287. Fields. Ann. 5—9.
7. V. *lutea*, yellow mountain. 11. 721. Mountain bogs. Per. 5—9.

VERBASCUM. Mullein.

1. V. *Thapfus*, great. 8. 549. Hedges and way fides. 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 waftes. Ann. 7.

HYOSCYAMUS. Hen-bane.

1. H. *niger*, common. 9. 591. Wafte ground. Ann. 7.

ATROPA. Deadly-nightfhade.

1. A. *Belladonna*, common, or dwale. 9. 592. Chalky hills. Per. 6.

SOLANUM. Nightfhade.

1. S. *Dulcamara*, woody. 8. 565. Hedges. Shrub. 6, 7.
2. S. *nigrum*, common, or garden. 8. 566. Cultivated ground. Ann. 6—9.

CHIRONIA. Centaury.

1. C. *Centaurium*, common. 6. 417. Gravelly paftures. Ann. 7, 8.
2. C. *littoralis*, dwarf tufted. 33. 2305. Sea-coaft. Ann. 6.

" Stems herbaceous, fimple, ftraight. Leaves linear-obovate. Calyx-teeth awl-fhaped. Flowers denfely corymbofe, nearly feffile."—About two inches high. *Flowers* large and handfome. Diftinct from the varieties of the foregoing mentioned under CHIRONIA, n. 11.

3. C. *pulchella*, dwarf branched. 7. 458. Sandy fea-coaft. Ann. 8, 9.

SAMOLUS. Brook-weed.

1. S. *Valerandi*, pimpernel. 10. 703. Marfhes. 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. *Xylofteum*, 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*, taftelefs mountain. 10. 704. Woods and thickets. Shrub. 4, 5.
3. R. *fpicatum*, acid mountain. 18. 1290. Mountain woods. Shrub. 5.
4. R. *petræum*, rock. 10. 705. Mountains. Shrub. 5.
5. R. *nigrum*, black. 18. 1291. Wet thickets. Shrub. 5.
*6. R. *Groffularia*, rough goofeberry. 18. 1292. Hedges. Shrub. 4.
*7. R. *Uva crifpa*, fmooth goofeberry. 29. 2057. Hedges. Shrub. 4.

HEDERA. Ivy.

1. H. *Helix*, common. 18. 1267. Woods and walls. Shrub. 10.

ILLECEBRUM. Knot-weed.

1. I. *verticillatum*, whorled. 13. 895. Sea marfhes, Dev. and Corn. Per. 7.

GLAUX. Salt-weed.

1. G. *maritima*, fea, or black. 1. 13. Muddy falt-marfhes. Per. 6, 7.

THESIUM. Baftard Toad-flax.

1. T. *linophyllum*, common. 4. 247. Chalky hills. Per. 7.

VINCA. Periwinkle.

1. V. *minor*, leffer. 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*, fmooth. 3. 206. Sand or gravel. Per. 7, 8.
2. H. *hirfuta*, hairy. 20. 1379. Sand, rare. Per. 7, 8.

CHENOPODIUM. Goofefoot.

1. C. *Bonus Henricus*, perennial. 15. 1033. Wafte ground. Per. 5, 6.
2. C. *urbicum*, upright. 10. 717. Dunghills and banks. Ann. 8, 9.
3. C. *rubrum*, red. 24. 1721. Wafte ground. Ann. 8.
4. C. *botryodes*, many-cluftered. 32. 2247. Sea marfhes. Ann. 8.

" Leaves triangular, fomewhat toothed; the upper ones bluntifh. Clufters upright, compound, rounded, leafy." *Leaves* much fmaller, and more flefhy, than in the laft, 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. Moift wafte 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*, ftinking. 15. 1034. Near the fea. Ann. 8.
11. C. *polyfpermum*, round-leaved. 21. 1480. Dunghills, &c. Ann. 7, 8.
12. C. *acutifolium*, fharp entire-leaved. 21. 1481. Wafte ground. Ann. 7, 8.

" Leaves ovate, acute, entire. Stem erect. Clufters fomewhat cymofe, elongated, leaflefs."—Differs from the laft, with which it has generally been confounded, in its erect, more angular *ftem*, and fharp-pointed *leaves*. The *clufters* alfo are fpiked rather than cymofe.

BETA. Beet.

1. B. *maritima*, fea. 4. 285. Muddy fea-fhores. Per. 8.

SALSOLA. Salt-wort.

1. S. *Kali*, prickly. 9. 634. Sandy beach. Ann. 7.
2. S. *fruticofa*, fhrubby. 9. 635. Norfolk and fouthern coafts. Shrub. 7, 8.

ULMUS. Elm.

1. U. *campeftris*, common, or Norfolk. 27. 1886. Woods and hedges. Tree. 4.
2. U. *fuberofa*, cork-barked, or Suffex. 31. 2161. Woods and hedges. Tree. 3.
3. U. *glabra*, fmooth, 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 thiftles and nettles. Ann. 8, 9.
2. C. *Epithymum*, leffer. 1. 55. On heath and thyme. Per? 8.

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. *acaulis*, 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-ear.

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 *involucrum* 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.

SIUM. 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.

SISON.

SISON. Hone-wort.

1. S. *Amomum*, hedge. 14. 954. Moift chalk or marl. Ann. 8.
2. S. *fegetum*, corn. 4. 228. Chalky fields, rare. Ann. 8.

OENANTHE. Water-Dropwort.

1. O. *fiftulofa*, common. 6. 363. Ditches and bogs. Per. 7, 8.
2. O. *pimpinelloides*, parfley. 5. 347. Salt marfhes. Per. 7.
3. O. *peucedanifolia*, fulphur-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.

PHELLANDRIUM. 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-Parfley.

1. A. *Cynapium*, common. 17. 1192. Cultivated ground. Ann. 7, 8.

SCANDIX. Chervil.

1. S. *odorata*, great or fweet. 10. 697. Mountain paftures. Per. 5.
2. S. *Pecten-Veneris*, needle. 20. 1397. Corn-fields. Ann. 6, 7.
*3. S. *Cerefolium*, garden. 18. 1268. Banks and hedges. Ann. 6.
4. S. *Anthrifcus*, rough. 12. 818. Hedges and rubbifh. Ann. 5.

CHÆROPHYLLUM. Cow-Parfley.

1. C. *fylveftre*, fmooth-ftalked. 11. 752. Hedges and thickets. Per. 4, 5.
2. C. *temulentum*, rough-ftalked. 22. 1521. Hedges and groves. Bienn. 6, 7.
3. C. *aureum*, tawny-feeded. 30. 2103. Borders of fields, Scotland. Per. 6.

IMPERATORIA. Mafter-wort.

1. I. *Oftruthium*, great. 20. 1380. Moift mountain paftures. Per. 6.

PASTINACA. Parfnep.

1. P. *fativa*, wild. 8. 556. Chalky banks. Bienn. 7.

SMYRNIUM. Alexanders.

1. S. *Olufatrum*, common. 4. 230. Ruins, and fea cliffs. Bienn. 5.

ANETHUM. Fennel.

1. A. *Fœniculum*, common. 17. 1208. Chalk cliffs. Bienn. 7, 8.

CARUM. Caraway.

*1. C. *Carui*, common. 21. 1503. Meadows and paftures. Bienn. 6.

PIMPINELLA. Burnet-Saxifrage.

1. P. *faxifraga*, common. 6. 407. Dry chalky paftures. Per. 7, 8.
2. P. *magna*, great. 6. 408. Limeftone groves. Per. 7, 8.
3. P. *dioica*, dwarf. 17. 1209. Limeftone rocks, rare. Per. 5, 6.

APIUM. Celery.

1. A. *graveolens*, wild. 17. 1210. Ditches and marfhes. Bienn. 8.

AEGOPODIUM. Gout-weed.

1. A. *Podagraria*, common. 14. 940. Shady cultivated ground. Per. 5, 6.

Ord. 3. *Trigynia*.

VIBURNUM. Guelder-rofe.

1. V. *Lantana*, mealy. 5. 331. Chalky hedges. Shrub. 5.
2. V. *Opulus*, common. 5. 332. Watery groves and hedges. Shrub. 6.

SAMBUCUS. Elder.

1. S. *Ebulus*, dwarf. 7. 475. Wafte 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. Tamarifk.

1. T. *gallica*, common, or French. 19. 1318. South coaft. Shrub. 7.

CORRIGIOLA. Strap-wort.

1. C. *littoralis*, fand. 10. 668. South-weft coaft. Ann. 7, 8.

Ord. 4. *Tetragynia*.

PARNASSIA. Grafs of Parnaffus.

1. P. *paluftris*, common. 2. 82. Boggy moors. Per. 9, 10.

Ord. 5. *Pentagynia*.

STATICE. Sea Lavender.

1. S. *Armeria*, thrift. 4. 226. Mountains, and fea fhore. Per. 7, 8.
2. S. *Limonium*, common. 2. 102. Muddy fea fhore. Per. 7, 8.
3. S. *reticulata*, matted. 5. 328. Norfolk coaft. Per. 7, 8.

LINUM. Flax.

1. L. *ufitatiffimum*, common. 19. 1357. Fields. Ann. 7.
2. L. *perenne*, perennial blue. 1. 40. Chalky hills. Per. 6, 7.
3. L. *anguftifolium*, narrow-leaved pale. 6. 381. Sand or limeftone. Per. 7.
4. L. *catharticum*, purging. 6. 382. Dry paftures. Ann. 6—8.

SIBBALDIA. Sibbaldia.

1. S. *procumbens*, procumbent. 13. 897. Scottifh mountains. Per. 7.

Ord. 6.

Ord. 6. *Hexagynia.*

DROSERA. 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*, leaft. 7. 435. Gravelly corn-fields. Ann. 5.

Clafs 6. HEXANDRIA.

Ord. 1. *Monogynia.*

GALANTHUS. Snowdrop.

1. G. *nivalis*, common. 1. 19. Meadows and orchards. Per. 2.

LEUCOJUM. Snowflake.

1. L. *æftivum*, fummer. 9. 621. Moift meadows. Per. 5.

NARCISSUS. Narciffus.

1. N. *poeticus*, poetic. 4. 275. Sandy downs. Per. 5.
2. N. *biflorus*, pale. 4. 276. Sandy downs. Per. 4, 5.
3. N. *Pfeudo-narciffus*, daffodil. 1. 17. Woods and paftures. Per. 3.

ALLIUM. Garlick.

1. A. *Ampeloprafum*, great round. 24. 1657. Severn ifles. Per. 7.
2. A. *arenarium*, fand. 19. 1358. Mountain woods. Per. 7.
3. A. *carinatum*, mountain. 24. 1658. Rocks and mountains. Per. 7.
4. A. *oleraceum*, ftreaked field. 7. 488. Fields. Per. 7.
5. A. *vineale*, crow. 28. 1974. Chalky hills and fields. Per. 7.
6. A. *urfinum*, broad-leaved. 2. 122. Groves and thickets. Per. 5, 6.
7. A. *Schoenoprafum*, chive. 34. 2441. Meadows and paftures, rare. Per. 6.

FRITILLARIA. Fritillary.

1. F. *Meleagris*, common. 9. 622. Moift paftures. Per. 4.

TULIPA. Tulip.

1. T. *fylveftris*, 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*, fpiked. 7. 499. Paftures and hills, rare. Per. 6, 7.
3. O. *umbellatum*, common. 2. 130. Meadows and paftures. Per. 4, 5.
4. O. *nutans*, drooping. 28. 1997. Dry meadows, rare. Per. 5.

HYACINTHUS. Hyacinth.

1. H. *racemofus*, ftarch. 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 weft. Per. 3, 4.
3. S. *autumnalis*, autumnal. 2. 78. Dry paftures, rare. Per. 9.
4. S. *nutans*, hare-bell. 6. 377. Groves and paftures. Per. 5.

ANTHERICUM. Spider-wort.

1. A. *ferotinum*, mountain. 12. 793. Welfh mountains. Per. 6.

NARTHECIUM. Afphodel.

1. N. *offifragum*, Lancafhire. 8. 535. Turfy bogs. Per. 7, 8.

ASPARAGUS. Sperage.

1. A. *officinalis*, common. 5. 339. Stony fea-coaft. 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 feal. 2. 128. Woods, Scotland. Per. 6.
3. C. *Polygonatum*, angular Solomon's feal. 4. 280. Woods, rare. Per. 5, 6.
4. C. *multiflora*, common Solomon's feal. 4. 279. Woods. Per. 5, 6.

ACORUS. Sweet Flag.

1. A. *Calamus*, common. 5. 356. Watery places. Per. 6.

JUNCUS. Rufh.

1. J. *acutus*, great fharp. 23. 1614. Sandy fea-coaft. Per. 7.
2. J. *maritimus*, leffer fharp. 24. 1725. Muddy fea-coaft. Per. 8.
3. J. *glaucus*, hard. 10. 665. Moift paftures. Per. 7.
4. J. *conglomeratus*, common. 12. 835. Moift paftures. Per. 7.
5. J. *effufus*, foft. 12. 836. Moift paftures. Per. 7.
6. J. *filiformis*, leaft. 17. 1175. Alpine rills. Per. 8.
7. J. *trifidus*, three-leaved. 21. 1482. Alpine bogs. Per. 7.
8. J. *fquarrofus*, mofs. 13. 933. Sandy heaths. Per. 6, 7.
9. J. *acutiflorus*, fharp-flowered jointed. 4. 238, (articulatus). Bogs. Per. 6.

"Leaves with knotty joints, flightly compreffed. Stem without joints. Panicle repeatedly forked, denfe. Calyx-leaves all fharp-pointed."—*Stem* leafy. *Panicle* fpreading, with upright branches. *Flowers* fmall.

10. J. *lampocarpus*, fhining-fruited jointed. 30. 2143. Boggy ground. Per. 6, 7.

"Leaves with knotty joints, compreffed. Stem without joints. Panicle compound, erect, elongated. Inner calyx-leaves bluntifh, bordered. Capfule coloured, varnifhed."—*Stem* leafy. *Panicle* tall, many-flowered. *Capfule* large, of a dark chocolate hue, and highly polifhed.

11. J. *obtufiflorus*, blunt-flowered jointed. 30. 2144. Marfhes. Per. 7, 8.

"Leaves and ftem with knotty joints, cylindrical. Panicle repeatedly compound; its branches divaricated and reflexed. Calyx-leaves obtufe, as long as the capfule."—

 Stem

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. *lævis*, ſmooth. 3. 205. Muddy ſalt-marſhes. Per. 7.
2. F. *pulverulenta*, powdery. 31. 2222. Suſſex 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 ſorrel. 13. 910. Alpine rivulets. Per. 6.
10. R. *Acetoſa*, common ſorrel. 2. 127. Meadows and paſtures. Per. 6.
11. R. *Acetoſella*, ſheep's ſorrel. 24. 1674. Gravelly fields. Per. 6, 7.

TOFIELDIA. Tofieldia.

1. T. *paluſtris*, Scottiſh aſphodel. 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. β. 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. *europæa*, 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. *alſinifolium*, 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

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. *Dabeoci*, Irish. 1. 35. (Erica Dabeoci.) 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. Dunghills. 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. *Bistorta*, 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.

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*, serrated. 8. 517. Alpine woods. Per. 7.
6. P. *uniflora*, single-flowered. 3. 146. Alpine woods, rare. Per. 7.

Ord. 2. *Digynia.*

CHRYSOSPLENIUM. 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.

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. Weſt 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. *cæſpitoſa*, 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. *platypetala*, 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.

SCLERANTHUS. 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. *cæſius*, mountain. 1. 62. Dry limeſtone rocks, rare. Per. 6, 7.

Ord. 3. *Trigynia.*

CUCUBALUS. Berry-Chickweed.

1. C. *baccifer*, black-fruited. 22. 1577. Angleſea, *Dillenius.* Per. 6, 7.

11

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. *graminea*, 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. *ceraſtoides*, alpine. 13. 911. Highland mountains. Per. 6.

ARENARIA. Sandwort.

1. A. *peploides*, ſea. 3. 189. Sandy beach. Per. 6, 7.
2. A. *trinervis*, 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.

CHERLERIA. Cherleria.

1. C. *ſedoides*, dwarf. 17. 1212. Highland mountains. Per. 7.

Ord.

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. *daſyphyllum*, 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*, inſipid. 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. *Acetoſella*, common. 11. 762. Woods. Per. 4, 5.
2. O. *corniculata*, yellow procumbent. 24. 1726. Shady rocks. Per. 5—10.

AGROSTEMMA. Cockle.

1. A. *Githago*, 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. *ſaginoides*, ſmooth awl-ſhaped. 30. 2105. Highland mountains. Per. 6.
5. S. *ſubulata*, ciliated awl-ſhaped. 16. 1082. Sandy heaths. Per. 7, 8.

Claſs 11. DODECANDRIA.

Ord. 1. *Monogynia.*

ASARUM. Aſarabacca.

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. *Luteola*, dyer's-weed. 5. 320. Fields and rubbiſh. Ann. 7.
2. R. *lutea*, wild, or baſe 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*, cypreſs. 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. Houſeleek.

1. S. *tectorum*, common. 19. 1320. Roofs and walls. Per. 7.

Clafs 12. Icosandria.

Ord. 1. *Monogynia.*

Prunus. Cherry or Plum.

1. P. *Padus*, bird cherry. 20. 1383. Woods and hedges. Tree. 5.
2. P. *Cerafus*, common cherry. 10. 706. Woods and hedges. Tree. 5.
*3. P. *domeftica*, common plum. 25. 1783. Hedges. Tree. 4.
4. P. *infititia*, bullace. 12. 841. Hedges and groves. Tree. 4.
5. P. *fpinofa*, floe. 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 fervice. 5. 298. Woods and hedges. Tree. 4, 5.
4. P. *domeftica*, true fervice. 5. 350. Mountain woods, rare. Tree. 5.
5. P. *aucuparia*, mountain afh. 5. 337. Mountain woods. Tree. 5.
6. P. *pinnatifida*, baftard mountain afh. 33. 2331. Rocks, rare. Tree. 5.
7. P. *Aria*, white beam-tree. 26. 1858. Limeftone rocks. Tree. 5.

Spiræa. Spiræa.

1. S. *falicifolia*, willow-leaved. 21. 1468. Wet mountain thickets. Shrub. 7.
2. S. *Filipendula*, dropwort. 4. 284. Dry open paftures. Per. 7.
3. S. *Ulmaria*, meadow-fweet. 14. 960. Moift meadows. Per. 6. 7.

Ord. 2. *Polygynia.*

Rosa. Rofe.

1. R. *fpinofiffima*, burnet. 3. 187. Sandy heaths. Low fhrub. 7.
2. R. *rubella*, red-fruited dwarf. 36. 2521. Northumberland. Low fhrub. 7.
3. R. *involuta*, prickly unexpanded. 29. 2068. Weftern ifles. Low fhrub. 6.
4. R. *hibernica*, Irifh. 31. 2196. Ireland. Shrub. 6—11.
5. R. *arvenfis*, white field. 3. 188. Hedges and thickets. Shrub. 6, 7.
6. R. *villofa*, apple. 9. 583. Mountain thickets. Shrub. 6.
7. R. *mollis*, foft-leaved round-fruited. 35. 2459. Thickets. Low fhrub. 6.
8. R. *cinnamomea*, cinnamon. 34. 2388. Thickets, Yorkfhire. Shrub. 5.
9. R. *tomentofa*, dowys-leaved briar. 14. 990. Woods and hedges. Shrub. 6, 7.
10. R. *rubiginofa*, fweet briar. 14. 991. Gravelly heaths. Shrub. 6, 7.
11. R. *micrantha*, fmall-flowered fweet briar. 35. 2490. Hedges. Shrub. 6, 7.
12. R. *fcabriufcula*, roughifh-leaved briar. 27. 1896. Hedges. Shrub. 6.
13. R. *cæfia*, glaucous-leaved. 33. 2367. Highland valleys. Shrub. 7.
14. R. *canina*, common dog-briar. 14. 992. Hedges. Shrub. 6.
15. R. *collina*, rough-ftalked dog-briar. 27. 1895. Thickets, Suffex. 7.
16. R. *dumetorum*, downy-ftalked dog-briar. 36. 2579. Thickets, Suffex. 7.

Rubus. Bramble.

1. R. *idæus*, rafpberry. 34. 2442. Woods and thickets. Shrub. 5, 6.
2. R. *fuberectus*, red-fruited. 36. 2572. Northern woods. Shrub. 6.
3. R. *cæfius*, dew-berry. 12. 826. Groves and hedges. Shrub. 6, 7.
4. R. *corylifolius*, hazel-leaved. 12. 827. Hedges. Shrub. 7.
5. R. *fruticofus*, common. 10. 715. Hedges. Shrub. 7, 8.
6. R. *faxatilis*, ftone. 32. 2233. Mountain woods. Per. 6.
7. R. *arcticus*, dwarf crimfon. 23. 1585. Stony hills, rare. Per. 5, 6.
8. R. *Chamæmorus*, cloud-berry. 10. 716. Mountain moors. Per. 6.

Fragaria. Strawberry.

1. F. *vefca*, common. 22. 1524. Groves and banks. Per. 5, 6.
2. F. *elatior*, hautboy. 31. 2197. Woods in the fouth, rare. Per. 6, 9.
3. F. *fterilis*, barren. 25. 1785. Barren paftures. Per. 3, 4.

Potentilla. Cinquefoil.

1. P. *fruticofa*, fhrubby. 2. 88. Mountain thickets, Yorkfhire. Shrub. 6.
2. P. *anferina*, filver-weed. 12. 861. Boggy meadows. Per. 6, 7.
3. P. *rupeftris*, ftrawberry-flowered. 29. 2058. Rocks, Wales. Per. 6, 7.
4. P. *argentea*, hoary. 2. 89. Gravelly paftures. Per. 6.
5. P. *aurea*, golden. 8. 561. Highland mountains. Per. 7.
6. P. *verna*, fpring. 1. 37. High open paftures. 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 paftures. Per. 6—8.
10. P. *tridentata*, trifid-leaved. 34. 2389. Highlands. Per. 5, 6.

Tormentilla. Tormentil.

1. T. *officinalis*, common. 12. 863. Heaths and paftures. Per. 6, 7.
2. T. *reptans*, trailing. 12. 864. Hedges, rare. Per. 6, 7.

Geum.

GEUM. Avens.

1. G. *urbanum*, common. 20. 1400. Woods and hedges. Per. 5—8.
2. G. *rivale*, water. 2. 106. Moift fhady meadows. Per. 6, 7.

DRYAS. Mountain-avens.

1. D. *octopetala*, white. 7. 451. Alpine moors. Per. 7, 8.

COMARUM. Marfh-cinquefoil.

1. C. *paluftre*, common. 3. 172. Spongy bogs. Per. 6, 7.

Clafs 13. POLYANDRIA.

Ord. 1. *Monogynia.*

ACTÆA. Bane-berries.

1. A. *fpicata*, herb chriftopher. 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 fea-coaft. Per. 7, 8.
†2. G. *phoeniceum*, fcarlet. 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-fmooth-headed. 9. 644. Sandy fields. Ann. 6—8.
4. P. *Rhoeas*, common red. 9. 645. Corn-fields. Ann. 6, 7.
5. P. *fomniferum*, 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*, leaft, 32. 2292. Alpine lakes. Per. 7.

TILIA. Lime-tree.

1. T. *europæa*, common. 9. 610. Woods and hedges. Tree. 7.
2. T. *parvifolia*, fmall-leaved. 24. 1705. Woods. Tree. 8.

CISTUS. Ciftus.

1. C. *marifolius*, hoary dwarf. 6. 396. Rocks, rare. Dwarf fhrub. 5, 6.
2. C. *guttatus*, fpotted-flowered. 8. 544. Sandy paftures, rare. Ann. 6, 7.
3. C. *ledifolius*, ledum-leaved. 34. 2414. Sandy paftures, rare. Ann. 6, 7.
4. C. *furrejanus*, dotted-leaved. 31. 2207. Chalk hills, rare. Shrub. 7, 8.
5. C. *Helianthemum*, common dwarf. 19. 1321. Gravelly banks. Shrub. 7, 8.
6. C. *tomentofus*, 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. Larkfpur.

1. D. *Confolida*, field. 26. 1839. Sandy fields. Ann. 6, 7.

AQUILEGIA. Columbine.

1. A. *vulgaris*, common. 5. 297. Meadows and paftures Per. 7.

STRATIOTES. Water-aloe.

1. S. *aloides*, common. 6. 379. Ditches and pools. Per. 7.

Ord. 3. *Polygynia.*

ANEMONE. Anemone.

1. A. *Pulfatilla*, pafque-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*, leffer. 1. 11. Calcareous paftures. Per. 6, 7.
3. T. *majus*, greater. 9. 611. Mountain thickets. Per. 6, 7.
4. T. *flavum*, common. 6. 367. Moift meadows. Per. 7.

ADONIS. Pheafant's-eye.

1. A. *autumnalis*, corn. 5. 308. Corn-fields. Ann. 5—10.

RANUNCULUS. Crowfoot.

1. R. *Flammula*, leffer fpear-wort. 6. 387. Watery places. Per. 6—9.
2. R. *Lingua*, great fpear-wort. 2. 100. Ditches. Per. 7.
3. R. *gramineus*, graffy. 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. *fceleratus*, 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 paftures. Per. 5.
9. R. *hirfutus*, pale hairy. 21. 1504. Wafte and cultivated ground. Ann. 6—10.

R. *parvulus* of Linnæus, and Fl. Brit. 593, found below Briftol hot-wells by Mr. Dyer, and by feveral botanifts at Montpellier, proves a ftarved variety of our *hirfutus*, a

5 fpecies

ſpecies unnoticed by Linnæus. Mr. Curtis, in deſcribing the latter, had not adverted to the tuberculated ſeeds, 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. *fœtidus*, 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. *Chamædrys*, 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*, horſe. 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. *hirſuta*, hairy. 7. 447, 448, (ſativa). 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. *agretis*, 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. *Tetrahit*, common. 3. 207. Corn-fields. Ann. 7, 8.
4. G. *verſicolor*, large-flowered. 10. 667. Sandy fields. Ann. 7, 8.

Galeobdolon. 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.

Clinopodium. Baſil.

1. C. *vulgare*, wild. 20. 1401. Gravelly or chalky banks. Per. 8.

Origanum

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*, bafil. 6. 411. Sandy fields. Ann. 7. 8.
3. T. *Calamintha*, common calamint. 24. 1676. Gravelly banks. Per. 7, 8.
4. T. *Nepeta*, leffer calamint. 20. 1414. Chalky banks. Per. 8.

MELITTIS. Baftard-balm.

1. M. *Meliffophyllum*, reddifh. 9. 577. Woods, weft of England. Per. 5, 6.
2. M. *grandiflora*, purple and white. 9. 636. Woods, weft of England. Per. 5.

SCUTELLARIA. Scull-cap.

1. S. *galericulata*, common. 8. 523. Watery places. Per. 7, 8.
2. S. *minor*, leffer. 8. 524. Wet gravelly heaths. Per. 8.

PRUNELLA. Self-heal.

1. P. *vulgaris*, common. 14. 961. Meadows and paftures. Per. 7, 8.

Ord. 2. *Angiofpermia.*

BARTSIA. Bartfia.

1. B. *alpina*, alpine purple. 6. 361. Alpine rills. Per. 7.
2. B. *vifcofa*, yellow vifcid. 15. 1045. Marfhes, rare. Ann. 7, 8.
3. B. *Odontites*, red. 20. 1415. Meadows and paftures. Ann. 7, 8.

RHINANTHUS. Yellow-rattle.

1. R. *Crifta-galli*, common. 10. 657. Meadows. Ann. 6.

EUPHRASIA. Eye-bright.

1. E. *officinalis*, common. 20. 1416. Heaths and paftures. Ann. 7—9.

MELAMPYRUM. Cow-wheat.

1. M. *criftatum*, crefted. 1. 41. Fields and groves, rare. Ann. 7.
2. M. *arvenfe*, purple. 1. 53. Wheat fields, Norfolk. Ann. 7.
3. M. *pratenfe*, common. 2. 113. Groves and thickets. Ann. 7, 8.
4. M. *fylvaticum*, 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. *paluftris*, marfh. 6. 399. Marfhy meadows. Per. 6, 7.
2. P. *fylvatica*, pafture. 6. 400. Mountain heaths. Per. 6, 7.

ANTIRRHINUM. Snapdragon.

*1. A. *Cymbalaria*, ivy-leaved. 7. 502. Old walls. Per. 5—11.

2. A. *fpurium*, round-leaved fluellin. 10. 691. Fields. Ann. 7—9.

3. A. *Elatine*, fharp-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*, leaft. 28. 2014. Sandy fields. Ann. 6—8.

*7. A. *majus*, great. 2. 129. Old walls. Per. 7, 8.

8. A. *Orontium*, leffer. 17. 1155. Sandy or chalky fields. Ann. 7, 8.

SCROPHULARIA. Figwort.

1. S. *nodofa*, 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. Paftures 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*, Cornifh moneywort. 10. 649. Moift 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*, leffer. 6. 422. On clover roots. Ann? 7, 8.
4. O. *rubra*, red fragrant. 25. 1786. Bafaltic rocks, Ireland. Per. 8.
5. O. *cærulea*, purple. 6. 423. Paftures near the fea. Per. 7.
6. O. *ramofa*, branched. 3. 184. On hemp. Ann. 8, 9.

Clafs 15. TETRADYNAMIA.

Ord. 1. *Siliculofa.*

VELLA. Crefs-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 paftures. Ann. 3, 4.
2. D. *aizoides*, yellow alpine. 18. 1271. Rocks, South Wales. Per. 3.
3. D. *hirta*, fimple-haired. 19. 1338. Alpine rocks. Per. 5, 6.

4. D.

4. D. *incana*, twifted-podded. 6. 388. Limeftone rocks. Bienn. 5, 6.
5. D. *muralis*, fpeedwell-leaved. 13. 912. Shady hills. Ann. 5.

ALYSSUM. Alyffum.

*1. A. *fativum*, gold of pleafure. 18. 1254. Fields. Ann. 6.
2. A. *maritimum*, fweet. 25. 1729. Sea-coaft, rare. Per. 8, 9.

LEPIDIUM. Pepper-wort.

1. L. *latifolium*, broad-leaved. 3. 182. Sea-coaft. Per. 7.
2. L. *ruderale*, narrow-leaved. 23. 1595. Sea-coaft. Bienn. 6.
3. L. *campeftre*, mithridate. 20. 1385. (Thlafpi). Fields, Ann. 7.
4. L. *hirtum*, hairy. 26. 1803. (Thlafpi). Fields, rare. Per. 6.

HUTCHINSIA. Hutchinfia.

Brown in Ait. Hort. Kew. v. 4. 82.

Eff. Ch. Pouch entire; valves tumid. Seeds two in each cell. Filaments fimple.

1. H. *petræa*, rock. 2. 111. (Lepidium petræum). Limeftone. Bienn. 3, 4.

Leaves pinnatifid, entire. Petals fhorter than the calyx. Stigma feffile.

Named, by Mr. R. Brown, in honour of Mifs Hutchins, of Bantry, in Ireland; a lady whofe difcoveries in the moft difficult parts of practical botany, well entitle her to commemoration. The genus is diftinguifhed from *Draba* and *Subularia*, in having but two, inftead of many, feeds 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 feeds. Other fpecies of *Hutchinfia* are *Iberis rotundifolia* and *Lepidium alpinum* of Linnæus.

TEESDALIA. Teefdalia.

Brown in Ait. Hort. Kew. v. 4. 83.

Eff. Ch. Pouch emarginate, inverfely heart-fhaped. Seeds two in each cell. Filaments each bearing a fcale, at the infide, near the bafe.

1. T. *nudicaulis*, naked-ftalked. 5. 327. (Iberis nudicaulis). Gravelly paftures. Ann. 5.

Petals equal.

This genus is dedicated, by Mr. Brown, to the memory of the late Mr. Robert Teefdale, F.L.S. Another fpecies is the exotic *Lepidium nudicaule* of Linnæus, differing in having equal petals, and but four ftamens. See TEESDALIA hereafter in its proper place.

THLAPSI. Mithridate Muftard.

1. T. *arvenfe*, penny crefs. 24. 1659. Fields, rare. Ann. 6, 7.
2. T. *perfoliatum*, perfoliate. 33. 2354. Limeftone quarries. Ann. 4, 5.
3. T. *alpeftre*, alpine. 2. 81. Limeftone hills. Per. 6. 7.
4. T. *Burfa-paftoris*, fhepherd's purfe. 21. 1485. Common. Ann. 3—9.

COCHLEARIA. Scurvy-grafs.

1. C. *officinalis*, common. 8. 551. Mountains, and fea-coaft. Ann. 5.
2. C. *groenlandica*, Greenland. 34. 2403. Highlands. Ann. 8
3. C. *anglica*, Englifh. 8. 552. Muddy fea fhores. Ann. 5.
4. C. *danica*, Danifh. 10. 696. Muddy fhores, rare. Ann. 5, 6.
5. C. *Armoracia*, horfe-radifh. 33. 2323. Watery places. Per. 5.

CORONOPUS. Wart-crefs.

1. C. *Ruellii*, common. 24. 1660. Wafte ground. Ann. 6—8.
2. C. *didyma*, leffer. 4. 248. Weft 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 fhore. Ann. 6—9.

CRAMBE. Kale.

1. C. *maritima*, fea. 13. 924. Sandy fea-coaft. Per. 5, 6.

Ord. 2. *Siliquofa.*

DENTARIA. Coral-wort.

1. D. *bulbifera*, bulbiferous. 5. 309. Shady places, rare. Per. 4, 5.

CARDAMINE. Ladies'-fmock.

1. C. *bellidifolia*, daify-leaved. 33. 2355. Mountains, rare. Per. 8.
2. C. *impatiens*, impatient. 2. 80. Stony mountains. Ann. 5, 6.
3. C. *hirfuta*, hairy. 7. 492. Wafte and cultivated ground. Ann. 3—6.
4. C. *pratenfis*, meadow. 11. 776. Meadows and paftures. Per. 4, 5.
5. C. *amara*, bitter. 14. 1000. Watery places, rare. Per. 4, 5.

SISYMBRIUM. Rocket.

1. S. *Nafturtium*, water-crefs. 12. 855. Running waters. Per. 6, 7.
2. S. *fylveftre*, creeping water. 33. 2324. Inundated gravel. Per. 6—9.
3. S. *terreftre*, 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 rubbifh. Per. 7—10.
6. S. *murale*, fpreading wall. 16. 1090. Sandy waftes. Ann. 8—10.
7. S. *monenfe*, dwarf fea. 14. 962. Sandy coafts, rare. Per. 6, 7.
8. S. *Sophia*, flix-weed. 14. 963. Wafte ground. Ann. 7.
9. S. *Irio*, London. 23. 1631. Rubbifh and walls. Ann. 7, 8.

ERYSIMUM. Hedge-muftard.

1. E. *officinale*, common. 11. 735. Wafte places, and roads. Ann. 6, 7.

2. E.

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 fhrubby. 27. 1935. Sea cliffs, rare. Shrubby. 5.
3. C. *finuatus*, fea. 7. 462. Welch coaft. Bienn. 8.

HESPERIS. Dame's-violet.

†1. H. *inodora*, fcentlefs. 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. *ftricta*, Briftol rock. 9. 614. Rocks, Briftol. Per. 5.
3. A. *hifpida*, alpine rock. 7. 469. (Cardamine haftulata). Rocks. Per. 6, 7.
4. A. *Turrita*, tower. 3. 178. Walls, rare. Bienn. 5.

TURRITIS. Tower-muftard.

1. T. *glabra*, fmooth. 11. 777. Gravelly banks. Ann. 5, 6.
2. T. *hirfuta*, 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 navew. 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.
2. E. *mofchatum*, mufky. 13. 902. Mountain paftures. Ann. 6, 7.
3. E. *maritimum*, fea. 9. 646. Sandy coaft. Per. 5—9.

Ord. 2. *Decandria*.

GERANIUM. Crane's-bill.

1. G. *phæum*, dufky. 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. *pratenfe*, crowfoot-leaved. 6. 404. Hilly paftures. 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. Paftures 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 paftures. 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. Marfh-mallow.

1. A. *officinalis*, common. 3. 147. Sea marfhes. 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. *mofchata*, 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.

Ord. 2. *Octandria.*

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. *europæus*, 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*, sea. 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. Thickets, rare. Per. 6.
7. V. *lævigata*, smooth-podded sea. 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*, subterraneous. 15. 1048. Gravelly pastures. Ann. 5.
5. T. *ochroleucum*, 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*, teasel-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.

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, ſouth 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*, tutſan. 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*, briſtly. 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. *cæruleus*, 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. *viroſa*, ſtrong-ſcented. 28. 1957. Chalky banks. Bienn. 8, 9.
2. L. *Scariola*, prickly. 4. 268. Rubbiſh, rare. Bienn. 8.
3. L. *ſaligna*, leaſt. 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. Hedypnois; *Hudſ.* 340. *Sm. Fl. Brit.* 823.

Eſſ. Ch. Receptacle naked, dotted. Calyx imbricated. Seed-down feathery, ſeſſile, unequal.

1. A. *hiſpida*, rough. 8. 554. (Hedypnois 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. haſtile*, 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 HEDYPNOIS.

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.

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. *Lawſoni*, glaucous hairy. 29. 2083. North of England. Per. 7.

11. H. *paludoſum*, ſuccory-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. *fœtida*, ſtinking. 4. 406. Chalky paſtures, rare. Bienn. 6, 7.

2. C. *pulchra*, ſmall-flowered. 33. 2325. Rocks, Scotland. Ann. 6—9.

3. C. *tectorum*, ſmooth. 16. 1111. Paſtures and rubbiſh. 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 rubbiſh. Ann. 6, 7.

2. L. *puſilla*, little. 2. 95. (Hyoſeris minima). Gravelly fields. Ann. 6.

Stem none. 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. heteroph.) 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. Carline-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.

Chrysocoma. 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. Tanſy.

1. T. *vulgare*, common. 18. 1229. Hills and way ſides. Per. 7, 8.

Artemisia.

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. Rubbiſh. Per. 8.
5. A. *vulgaris*, common. 14. 978. Waſte ground, hedges, &c. Per. 8.
†6. A. *cæruleſcens*, blueiſh. 34. 2426. Sea ſhore, Lincolnſhire. *Hudſon*. Per. 8.

GNAPHALIUM. Cudweed.

1. G. *luteo-album*, Jerſey. 14. 1002. Sandy ground, Jerſey. 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. *ſylvaticum*, Highland. 13. 913. Alpine paſtures. Per. 8.
5. G. *rectum*, upright wood. 2. 124. Sandy thickets. Per. 8.
6. G. *ſupinum*, dwarf. 17. 1193. Micaceous mountains. Per. 7.
7. G. *uliginoſum*, marſh. 17. 1194. Sandy puddles. Ann. 8.
8. G. *gallicum*, narrow-leaved. 33. 2369. Gravelly fields, rare. Ann. 7, 8.
9. G. *minimum*, leaſt. 17. 1157. Barren gravelly fields. Ann. 7.
10. G. *germanicum*, common. 14. 946. Gravelly fields. Ann. 7, 8.

CONYZA. Spikenard.

1. C. *ſquarroſa*, plowman's. 17. 1195. Calcareous paſtures. Bienn. 7, 8.

ERIGERON. Flea-bane.

*1. E. *canadenſe*, 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 moſtly ſingle-flowered. Calyx hairy. Florets of the radius erect, ſomewhat tubular.

TUSSILAGO. Colt's-foot.

1. T. *Farfara*, common. 6. 429. Moiſt chalk. Per. 3, 4.
2. T. *hybrida*, tall butter-bur. 6. 430. Moiſt meadows, rare. Per. 4.
3. T. *Petaſites*, common butter-bur. 6. 431. Moiſt meadows. Per. 4.

SENECIO. Ragwort.

1. S. *vulgaris*, common groundſel. 11. 747. Fields and rubbiſh. Ann. 3—10.
2. S. *viſcoſus*, ſtinking. 1. 32. Chalky banks, rare. Ann. 7—10.
3. S. *lividus*, green-ſcaled. 35. 2515. Barren heaths. Ann. 9, 10.
4. S. *ſylvaticus*, mountain. 11. 748. Gravelly thickets. Ann. 7, 8.
5. S. *ſqualidus*, inelegant. 9. 600. Walls, Oxford. Ann. 6—10.
6. S. *tenuifolius*, hoary. 8. 574. Chalky hedges. Per. 7, 8.
7. S. *Jacobæa*, common. 16. 1130. Paſtures and meadows. Per. 7, 8.
8. S. *aquaticus*, marſh. 16. 1131. Marſhes. Per. 7, 8.
9. S. *paludoſus*, fen. 10. 650. Fens, rare. Per. 6, 7.
10. S. *ſaracenicus*, broad-leaved. 31. 2211. Moiſt hills. Per. 7, 8.

ASTER. Star-wort.

1. A. *Tripolium*, ſea. 2. 87. Muddy ſea 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. Moiſt paſtures, rare. Per. 7, 8.
2. I. *dyſenterica*, common fleabane. 16. 1115. Watery places. Per. 8.
3. I. *pulicaria*, ſmall fleabane. 17. 1196. Sandy puddles. Ann. 9.
4. I. *crithmoides*, ſamphire-leaved. 1. 68. Muddy ſaltmarſhes. Per. 8.

CINERARIA. Flea-wort.

1. C. *paluſtris*, marſh. 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. Daiſy.

1. B. *perennis*, common. 6. 424. Paſtures. Per. 3—12.

CHRYSANTHEMUM. Ox-eye.

1. C. *Leucanthemum*, great white. 9. 601. Paſtures and fields. Per. 6, 7.
2. C. *ſegetum*, yellow corn. 8. 540. Cultivated fields. Ann. 6—8.

PYRETHRUM. Feverfew.

1. P. *Parthenium*, common. 18. 1231. Rubbiſh. Per. 6, 7.
2. P. *inodorum*, corn. 10. 676. Gravelly fields. Ann. 8, 9.
3. P. *maritimum*, ſea. 14. 979. Sea-coaſt, rare. Per. 7.

MATRICARIA. May-weed.

1. M. *Chamomilla*, wild chamomile. 18. 1232. Fields and dunghills. Ann. 5—7.

ANTHEMIS. Chamomile.

1. A. *maritima*, ſea. 33. 2370. Stony beach, rare. Ann. 7.
2. A. *nobilis*, common. 14. 980. Gravelly paſtures. Per. 8, 9.

3. A. *arvenfis*, corn. 9. 602. Gravelly fields. Ann. or Bienn. 6, 7.
4. A. *Cotula*, ftinking. 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*, goofe-tongue. 11. 757. Moift bufhy places. Per. 7, 8.
2. A. *ferrata*, ferrated. 36. 2531. Derbyfhire. Per. 8.

Leaves linear-lanceolate, feffile, downy, deeply ferrated; laciniated at the bafe. Corymbs nearly fimple. Fragrant; the *flowers* fmaller than thofe of *Ptarmica*, and yellowifh.

3. A. *Millefolium*, common. 11. 758. Paftures, common. Per. 6—8.
4. A. *tomentofa*, woolly yellow. 36. 2532. Paftures, Scotland and Ireland. Per. 8.

Ord. 3. *Polygamia-fruftranea.*

CENTAUREA. Knapweed.

1. C. *Jacea*, brown radiated. 24. 1678. Paftures, Suffex and Ireland. Per. 8, 9.
2. C. *nigra*, black leffer. 4. 278. Paftures, every where. Per. 6—8.
3. C. *Cyanus*, blue-bottle. 4. 277. Corn-fields, common. Ann. 7, 8.
4. C. *Scabiofa*, greater. 1. 56. Borders of fields. Per. 7, 8.
5. C. *Ifnardi*, Jerfey. 32. 2256. Paftures, Jerfey. Per. 7, 8.
6. C. *Calcitrapa*, red ftar-thiftle. 2. 125. Gravelly fandy ground. Ann. 7, 8.
7. C. *folftitialis*, yellow ftar-thiftle. 4. 243. Fields, rare. Ann. 7, 8.

Clafs 20. GYNANDRIA.

Ord. 1. *Monandria.*

The natural family of the *Orchideæ*, of which this order entirely confifts, has lately received fome frefh corrections from the able pen of Mr. R. Brown, given by Mr. Aiton in his new edition of the Hortus Kewenfis, v. 5, clafs *Gynandria*. By thefe we have profited in the following arrangement, where we have adopted feveral of Mr. Brown's new genera; only deriving their diftinctions from characters fomewhat different from his. It is a ftrong proof of the validity of fuch genera, that they will ftand this teft. We exclude the marks taken from the abfence, prefence, or number, of the minute pouches whence the maffes of pollen originate; not fo much on account of the difficulty of having recourfe to thofe parts in practice, but becaufe the diftinctions founded thereon do not appear to lead to the knowledge of natural genera. On the contrary, they rather fhew 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, becaufe they feem to us naturally to belong to *Orchis*. Nevertheless, we readily fubmit our opinion to the correction of thofe who, on mature enquiry, may think otherwife. What is to become of Willdenow's HABENARIA, fee that article, muft be decided by the future ftudy of exotic *Orchideæ*, fcarcely known fufficiently at prefent, to any European botanift, to enable him to form an opinion. See ORCHIDEÆ, ORCHIS, OPHRYS, NEOTTIA, EPIPACTIS and MALAXIS.

The *Orchideæ* are difpofed in three very natural fections, which give the leading diftinctions of the genera. 1ft. Anther united to, or rather a continuation of, the column; terminal, in a manner, though fometimes furmounted by a point. 2d. Anther parallel to the ftigma, and oppofite to that part. 3d. Anther a terminal vertical moveable lid, either permanent or deciduous. Mr. Brown fubdivides this third fection, according to the anther being permanent or not, which feems to us unneceffary.

Section 1.

ORCHIS. Orchis.

Eff. Ch. Nectary with a pofterior fpur.

1. O. *bifolia*, butterfly. 1. 22. Woods, efpecially on chalk. Per. 6.

Bulbs undivided. Lip of the nectary lanceolate, entire; fpur very long. Lateral calyx-leaves fpreading, deflexed. This is referred to *Habenaria* by Mr. Brown, becaufe the maffes of pollen originate from two diftant glands, which are naked, or deftitute of a pouch at the bafe. The *flowers* are fnow-white, with fome touches of green, and fmell powerfully, in an evening only, like a very fweet honey-fuckle.

2. O. *pyramidalis*, pyramidal. 2. 110. Chalky paftures. Per. 7.

Bulbs undivided. Lip of the nectary in three equal entire fegments, with two prominences above; fpur elongated, thread-fhaped. This and the fix following, having the gland, or glands, of their maffes of pollen enclofed in a fingle pouch, belong to the true genus of *Orchis*. *Br.*

The *flowers* of *O. pyramidalis* are crimfon, fragrant, compofing a fhort, denfe, pyramidal fpike.

3. O. *Morio*, meadow. 29. 2059. Moift paftures. Per. 5, 6.

Bulbs undivided. Lip of the nectary four-cleft, crenate; fpur obtufe, afcending. Calyx many-ribbed.

Leaves without fpots. *Flowers* purple or crimfon. The three *calyx-leaves* cohere together, in the form of a hood, and are ribbed with green.

4. O. *mafcula*, early purple. 9. 631. Meadows and groves. Per. 4, 5.

Bulbs undivided. Lip of the nectary four-cleft, crenate; fpur obtufe. Lateral calyx-leaves reflexed upward.

The *leaves* are fpotted with black. *Flowers* purple, fcentlefs. *Calyx-leaves* with only three ribs, of their own colour. The *ftalk*, *bracteas*, and *germens* are purple.

5. O. *uftulata*, dwarf. 1. 18. Chalky hills. Per. 6.

Bulbs undivided. Lip of the nectary four-cleft, rough, with prominent points; fpur obtufe, one-third the length of the germen.

Three inches high. *Calyx* almoft black. *Lip* purple, with entire lobes. *Flowers* fmall.

6. O. *militaris*, narrow-lipped military. 27. 1873. Chalk hills. Per. 5.

Bulbs undivided. Lip of the nectary five-cleft, rough; fegments linear. Calyx and petals taper-pointed, confluent.

A foot high. *Leaves* light green, unfpotted. *Flowers* rofe-coloured, their *calyx* paler, or whitifh. This whole plant, like the following, while drying, exhales a powerful fcent of melilot, woodruff, or new hay.

7. O. *fufca*, broad-lipped military. 1. 16. (O. militaris). Chalk hills. Per. 5.

Bulbs

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 *Habenariæ* 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 ἑρμα or ἑρμιν, *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

Lip of the nectary villous, three-lobed, emarginate, pointless, 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 Linnæus, 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. *Loeselii*, lily-leaved. 1. 47. (Ophrys Loeselii.) Sandy bogs. Per. 7.

CORALLORRHIZA. Coral-root.

Eff. Ch. Anther deciduous. Nectary elongated underneath. Petals spreading. Column unconnected.

1. C. *innata*, spur-less. 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; insomuch 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 *Orchideæ;* though the two lowermost are, for the most part, nearly united into one.

Ord. 3. *Hexandria.*

ARISTOLOCHIA. Birthwort.

1. A. *Clematitis*, common. 6. 398. Thickets and rubbish. Per. 7, 8.

Class

Clafs 21. Monoecia.

Ord. 1. *Monandria.*

Zannichellia. Horned Pondweed.

1. Z. *paluftris*, 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. *anguftifolia*, leffer. 21. 1456. Pools, rare. Per. 6, 7.
3. T. *minor*, dwarf. 21. 1457. Marfhes, rare. Per. 7.

Sparganium. Bur-reed.

1. S. *ramofum*, branched. 11. 744. Rivers and ditches. Per. 7, 8.
2. S. *fimplex*, 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 feparate-headed. 8. 543. Bogs. Per. 5, 6.
2. C. *Davalliana*, prickly feparate-headed. 30. 2123. Marfhes. Per. 5, 6.
3. C. *pulicaris*, flea. 15. 1051. Marfhes. Per. 6.
4. C. *pauciflora*, few-flowered. 29. 2041. Alpine bogs. Per. 6.
5. C. *ftellulata*, little prickly. 12. 806. Marfhes. Per. 5, 6.
6. C. *curta*, white. 20. 1386. Watery places, rare. Per. 6.
7. C. *elongata*, elongated. 27. 1920. Marfhes, Yorkfhire. Per. 6.
8. C. *ovalis*, oval-fpiked. 5. 306. Marfhes. Per. 6.
9. C. *remota*, remote. 12. 832. Moift groves. Per. 5, 6.
10. C. *axillaris*, axillary cluftered. 14. 993. Bogs, rare. Per. 5, 6.
11. C. *incurva*, curved. 13. 927. Sandy mouths of rivers, rare. Per. 7, 8.
12. C. *arenaria*, fea. 13. 928. Sandy coaft, abundantly. Per. 6.
13. C. *intermedia*, foft brown. 29. 2042. Marfhes. Per. 5, 6.
14. C. *divifa*, bracteated marfh. 16. 1096. Salt marfhes. Per. 5, 6.
15. C. *muricata*, greater prickly. 16. 1097. Moift meadows. Per. 5, 6.
16. C. *divulfa*, grey. 9. 629. Moift fhady places. Per. 5.
17. C. *vulpina*, great fpiked. 5. 307. Marfhes. Per. 5.
18. C. *teretiufcula*, leffer panicled. 15. 1065. Marfhes. Per. 5.
19. C. *paniculata*, great panicled. 15. 1064. Bogs. Per. 6.
20. C. *digitata*, fingered. 9. 615. Woods, on limeftone. Per. 5.
21. C. *clandeftina*, dwarf filvery. 30. 2124. Sunny rocks. Per. 5.
22. C. *pendula*, great pendulous. 33. 2315. Moift hedges. Per. 5, 6.
23. C. *ftrigofa*, loofe pendulous. 14. 994. Groves. Per. 4, 5.
24. C. *fylvatica*, pendulous wood. 14. 995. Woods, frequent. Per. 5, 6.
25. C. *depauperata*, ftarved wood. 16. 1098. Woods, rare. Per. 5, 6.
26. C. *Mielichoferi*, loofe-fpiked rock. 32. 2293. Alpine rocks. Per. 8.

Sheaths not half the length of the flower-ftalk. Female fpikes three, diftant, erect, lax and flender. Fruit ovate, triangular, bluntly cloven, twice the length of the obtufe fcale.

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; fee Carex, n. 97.

27. C. *capillaris*, capillary. 29. 2069. Highland mountains. Per. 7, 8.
28. C. *rariflora*, loofe alpine. 35. 2516. Lofty Highland mountains. Per. 7.

Sheaths extremely fhort. Female fpikes nearly linear, pendulous; their fcales loofely imbricated. Fruit obovate, with three blunt angles and depreffed fides. Root creeping.

Wahlenberg makes this a variety of *limofa*, n. 30, with which it agrees in the creeping *root*, fhort *fheaths*, and drooping female *fpikes;* but differs in its obovate, triangular, (not broad and compreffed), *fruit;* much fmaller fize; and lax blacker *fcales.*

29. C. *Pfeudo-cyperus*, baftard-cyperus. 4. 242. Marfhes. Per. 6.
30. C. *limofa*, green and gold. 29. 2043. Spongy boggy pools. Per. 6.
31. C. *uftulata*, fcorched alpine. 34. 2404. Alpine rivulets. Per. 7. See Carex, n. 127.
32. C. *atrata*, black. 29. 2044. Alpine meadows. Per. 6, 7.
33. C. *pulla*, ruffet. 29. 2045. Alpine paftures. Per. 7.
34. C. *pallefcens*, pale. 31. 2185. Meadows and groves. Per. 5, 6.
35. C. *flava*, yellow. 18. 1294. Marfhes. Per. 5, 6.
36. C. *fulva*, tawny. 18. 1295. Marfhes. Per. 6, 7.
37. C. *Oederi*, Oederian. 25. 1773. Moift meadows. Per. 7.
38. C. *extenfa*, long-bracteated. 12. 833. Sea-coaft. Per. 6.
39. C. *diftans*, loofe. 18. 1234. Marfhes. Per. 6.
40. C. *binervis*, green-ribbed. 18. 1235. Dry heaths. Per. 6.
41. C. *præcox*, vernal. 16. 1099. Open paftures, common. Per. 4.
42. C. *pilulifera*, round-headed. 13. 885. Paftures and heaths. Per. 4, 5.
43. C. *tomentofa*, 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. Moift meadows. Per. 5, 6.
46. C. *recurva*, glaucous heath. 21. 1506. Paftures 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 fmooth fruit, and feveral male fpikes.

47. C. *cæfpitofa*, tufted bog. 21. 1507. Marfhes. Per. 5.
48. C. *ftricta*, glaucous ftraight-leaved. 13. 914. Marfhes. Per. 4.

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. *lævigata*, 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*, ſedgy. 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 cheſnut. 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*, haſel. 11. 723. Woods and hedges. Small tree. 3, 4.

Ord. 6. *Monadelphia.*

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. *Croweana*, 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.

10. S. *decipiens*, varnifhed. 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 marfhes. 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*, fhining dark-green. 26. 1806. Woods. Shrub. 4, 5.
†16. S. *petiolaris*, dark long-leaved. 16. 1147. Marfhes. Shrub. 4.
17. S. *phylicifolia*, tea-leaved. 28. 1958. Highlands of Scotland. Shrub. 5.

S. radicans, Fl. Brit. 1053, proves to be the fame fpecies.

18. S. *Arbufcula*, little tree. 19. 1366. Mountains of Scotland. Shrub. 4.
19. S. *vitellina*, yellow. 20. 1389. Marfhy 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. *myrfinites*, green whortle-leaved. 19. 1360. Highlands. Shrub. 5, 6.
23. S. *prunifolia*, plum-leaved. 19. 1361. Highlands. Shrub. 4, 5.
24. S. *venulofa*, 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. *Dickfoniana*, broad-leaved mountain. 20. 1390. Highlands. Shrub. 4.

S. myrtilloides, Fl. Brit. 1056, but not of Linnæus.

28. S. *herbacea*, leaft. 27. 1907. Micaceous mountains. Small fhrub. 6.
29. S. *reticulata*, wrinkled. 27. 1908. Highlands. Small fhrub. 6.
30. S. *arenaria*, downy mountain. 26. 1809. Highlands. Shrub. 5.
31. S. *glauca*, glaucous mountain. 26. 1810. Highlands. Shrub. 5.
32. S. *Stuartiana*, fhaggy mountain. 36. 2586. Highlands. Shrub. 7.
33. S. *argentea*, filky fand. 19. 1364. Sandy fea-coaft. Shrub. 5.
34. S. *proftrata*, proftrate dwarf. 28. 1959. Moift hills. Small fhrub. 5, 6.
35. S. *fufca*, brownifh dwarf. 28. 1960. Mountainous heaths. Small fhrub. 5.
36. S. *parvifolia*, fmall-leaved dwarf. 28. 1961. Moift meadows. Shrub. 5.
37. S. *adfcendens*, afcending dwarf. 28. 1962. Moift heaths. Shrub. 5.
38. S. *repens*, creeping dwarf. 3. 183. Sandy moift heaths. Small fhrub. 5.
39. S. *rofmarinifolia*, rofemary-leaved. 19. 1365. Moift fand. 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. *rupeftris*, filky rock. 33. 2342. Highland rocks. Small fhrub. 4.
45. S. *Anderfoniana*, green mountain fallow. 33. 2343. Scotland. Shrub. 5.
46. S. *Forfteriana*, 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. *fphacelata*, 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. Moift woods. Tree. 4.
52. S. *ftipularis*, auricled ofier. 17. 1214. Ofier holts. Tree. 3.
53. S. *molliffima*, velvet ofier. 21. 1509. Ofier holts. Small tree. 4.
54. S. *viminalis*, common ofier. 27. 1898. Ofier holts, &c. Tree. 4, 5.
55. S. *alba*, common white. 34. 2430. Woods and meadows. Tree. 4, 5.
56. S. *cærulea*, blue. 34. 2431. Moift meadows. Large tree. 5.

Ord. 2. *Triandria*.

EMPETRUM. Crake-berry.

1. E. *nigrum*, black. 8. 526. Mountain moors. Small fhrub. 5.

RUSCUS. Butcher's-broom.

1. R. *aculeatus*, common. 8. 560. Woods and thickets. Per. 3, 4.

Ord. 3. *Tetrandria*.

VISCUM. Miffeltoe.

1. V. *album*, white. 21. 1470. On trees. Small fhrub. 5.

HIPPOPHÄE. Sallow-thorn.

1. H. *rhamnoides*, fea. 6. 425. Sandy cliffs. Small tree. 5.

MYRICA. Gale.

1. M. *Gale*, fweet. 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.

Ord. 6. *Octandria.*

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. *Morsus ranæ*, common. 12. 808. Ditches. Per. 7.

Ord. 8. *Monadelphia.*

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. *Monoecia.*

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. Horse-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.

Frond 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 *involucrum* 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. *brevisetum*, short-bristled. 20. 1417. (Hymenophyllum alatum.) Wet rocks in Yorkshire and Ireland, rare. Per. 5, 6.

HYMENOPHYLLUM. Filmy-fern.

1. H. *Tunbridgense*, Tunbridge. 3. 162. Moist rocks. Per. 5, 6.

PILULARIA. Pillwort.

1. P. *globulifera*, pepper-grass. 8. 521. Moist heaths. Per. 6, 7.

Isoetes. Quillwort.

1. I. *lacuftris*, mountain. 16. 1084. Alpine lakes. Per. 5, 6.

Ord. 2. *Mufci.*

Sphagnum. Bog-mofs.

Four fpecies. Clear watery bogs. Per. 6.

Buxbaumia. Buxbaumia.

1. B. *aphylla*, naked-ftalked. 23. 1596. Barren heaths, rare. Ann. 12—2.
2. B. *foliofa*, leafy. 5. 329. Shady rocks. Ann. 7.

Phascum. Earth-mofs.

Seventeen fpecies. Banks, heaths and woods. Ann. 3—5.

Gymnostomum. Beardlefs mofs.

Twenty fpecies. Banks, rocks, and mountains. Ann. or per. 3—8.

Splachnum. Gland-mofs.

Thirteen fpecies. Mountains or bogs, on dung. Ann. 5, 6.

Andræa. Andræa.

Fl. Brit. 1178. *Hooker Tr. of Linn. Soc. v.* 10. 381. See Andreæ, John.

Eff. Ch. Capfule oblong, of four valves, whofe points adhere to the lid. Fringe none.

1. A. *rupeftris*, dufky rock. 18. 1277. Moift alpine rocks. Per. 6.

Leaves lanceolate, keeled, fickle-fhaped, leaning one way, without a rib.

2. A. *Rothii*, black mountain. 31. 2162. Dry rocks. Per. 6.

Leaves lanceolate, keeled, fickle-fhaped, with a mid-rib, leaning one way. Sheath-fcales without a rib.

3. A. *alpina*, chocolate alpine. 18. 1278. Alpine rocks. Per. 6.

Leaves ovate-oblong, concave, riblefs, imbricated every way.

4. A. *nivalis*, tall flender. 33. 2334. Lofty alpine rocks. Per. 6.

Leaves loofely imbricated, lanceolate, curved towards one fide, fingle-ribbed, as well as the fheath-fcales.

This laft is three inches, or more, in height, being much taller, and more branched, than any of the reft. The character of the genus was totally miftaken by Hedwig and others, the valves of the capfule being fuppofed the fringe, till Mr. W. J. Hooker corrected the character, as above. See Fringe *of Moffes*.

Tetraphis. Four-toothed-mofs.

1. T. *pellucida*, tranfparent. 15. 1020. Wet fhady places. Ann. 3, 4.

Capfule cylindrical. Leaves ovate, acute, fingle-ribbed.

2. T. *ovata*, dufky. 22. 1422. (Grimmia Browniana.) Sand rocks. Ann. 3.

Capfule ovate. Radical leaves ftrap-fhaped, obtufe, riblefs.

Great diverfity of opinion has exifted refpecting the genus of this mofs, referred to *Orthotrichum* in Fl. Brit. 1269, and incorrectly drawn, as to the fringe, in Engl. Bot. A German botanift, named Funk, has fhewn that part to confift of four teeth only. This fpecies muft be allowed to accord very ill in habit with the firft.

Encalypta. Extinguifher-mofs.

Five fpecies. Banks and rocks. Per. 3—8.

Grimmia. Grimmia.

Thirty-one fpecies. Banks, rocks, and trees. Moftly per. 4—7.

From thefe is to be deducted *G. Forfteri*, 31. 2225, as being the fame with *Mnium conoideum*. See Grimmia and Mnium.

Dicranum. Fork-mofs.

Forty-eight fpecies. Woods, hills and bogs. Moftly per. 4—8.

From this genus, as it ftands in Fl. Brit., four fpecies are to be deducted; *calliftomum*, n. 15, as being the fame with *rigidulum*, Engl. Bot. 20. 1439; *pulvinatum*, n. 21, removed to *Grimmia*, 24. 1728; *fciuroides*, n. 22, removed to *Pterogonium*, 27. 1903; and *viridiffimum*, n. 34, removed to *Gymnoftomum*, 22. 1583. Their place is fupplied by four others; *Bruntoni*, 35. 2509; *Starkii*, 31. 2227; *latifolium*, 35. 2492; and *virens*, 31. 1462.

Trichostomum. Fringe-mofs.

Eighteen fpecies. Rocks, heaths or water. Per. 4—8.

T. cirratum, Fl. Brit. n. 6, is to be expunged, as not differing from *Dicranum polyphyllum*, 17. 1217.

Tortula. Screw-mofs.

Nineteen fpecies. Banks, heaths and walls. Per. 3—12.

Orthotrichum. Briftle-mofs.

Eleven fpecies. Trees, wet rocks, &c. Per. 1—4.

O. Brownianum, Fl. Brit. 1269, is *Tetraphis ovata*.

Pterogonium. Wing-mofs.

Six fpecies. Trees and rocks. Per. 4, 5.

We poftpone remarks on this genus till it comes in its proper place. See Pterogonium.

Neckera. Neckera.

Six fpecies. Trees and rocks. Per. 2—4.

Among them is the following very curious mofs, difcovered fince our article Neckera was publifhed.

N. *fplachnoides*. Pear-fruited Neckera. 36. 2564.

Stem branched, fpreading. Leaves lanceolate, pointed, flat, fpreading every way; thofe of the fheath fix, in two rows. Fruit-ftalk granulated above. Capfule erect, contracted at the bafe. Veil fringed.

Found by Dr. Taylor on the Secawn mountain near Dublin.

Hypnum. Feather-mofs.

Eighty-one fpecies. Trees, rocks and bogs. Per. 2—10.

From the 77 fpecies in Fl. Brit. are to be removed *lucens*, n. 25, which is *Hookeria lucens*; and *filamentofum*, n. 42, which has been fhewn by Dr. Swartz to be the fame as *dubium*, n. 74. Six are added in their ftead; *pratenfum*, Turn. Mufc. Hib. 161; *filefianum*, Engl. Bot. 28. 2016; *Thuringicum*, Turn. Mufc. Hib. 181; *fquarrofulum*, 24. 1709; *fallax*, 30. 2127; and *Crifta-caftrenfis*, 30. 2108.

Hookeria. Hookeria.

1. H. *lucens*, fhining. 27. 1902. Shady bogs. Per. 4—7.

FONTINALIS. Water-mofs.

Three fpecies. Running waters. Per. 7, 8.

FUNARIA. Cord-mofs.

1. F. *hygrometrica*, twifting. 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 fhort, 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 fpreading, 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 moffes has been dedicated to the memory of Mr. John Bartram, the venerable correfpondent of Linnæus, Collinfon, Fothergill and other naturalifts, who during his travels in North America, contributed greatly to enrich the gardens and mufeums of Europe. See the end of the article BRYUM. We here fubjoin a more ample lift of Britifh 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. *crifpa*, frizzled. 22. 1526. Northumberland. Per. 4, 5.

Fruit-ftalks erect, furmounting the ftems. Leaves linear-awlfhaped, broad at the bafe, curled when dry. Capfule rather oblique. Lid obtufely conical.

4. B. *ithyphylla*, 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 flender. 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 cluftered, 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 cluftered, flender, upright.

8. B. *arcuata*, curve-ftalked. 18. 1237. Mountain bogs, rare. Per. 7.

Fruit-ftalks recurved. Leaves lanceolate, furrowed, finely ferrated. Branches fcattered, fpreading.

MNIUM. Spring-mofs.

1. M. *androgynum*, narrow-leaved. 18. 1238. Shady wet places. Per. 3, 4.

2. M. *cinclidium*, club-fruited. 18. 1239. Trees. Per.

3. M. *paluftre*, greater forked. 6. 391. (Bryum paluftre.) Bogs. Per. 5—7.

BRYUM. Thread-mofs.

Thirty-four fpecies. Heaths, bogs, mountains. Moftly 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 *inclinans*, 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. Suec. 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 fpreading in three rows, ovato-lanceolate, fharp-pointed, finely ferrated. Capfule flender-pear-fhaped, oblique and incurved. Lid conical. The *fruitftalks* exceed all other Britifh moffes in length, extending to three or four inches.

B. *obtufifolium*, 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 moffes 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. *Hepaticæ.*

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. *pufilla*, 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. *terreftris*, 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.

2. A. *major*, broad-leaved. 22. 1538. With the former. Ann. 6.

A. lævis of Linnæus, who erroneoufly fuppofed it had no warts, or male flowers.

3. A. *multifidus*, fine-cut. Dill. t. 68. f. 4. Highland rocks. *Dickfon.*

Ord. 4. *Algæ.*

This order begins with the natural family of LICHENES; (fee that article.) Of thefe, 391 are figured in *Engl. Bot.*; but feveral ftill remain for further examination. An ample view of numerous fpecies, both native and exotic, may be found under the article LICHEN; and their terminology, phyfiology, and generic diftribution, under LICHENES.

The following, except the firft genus, which is of an amphibious nature, are aquatic, or fubmerfed, *Algæ.*

TREMELLA. Jelly-bladder.

About twenty fpecies, found on rotten wood, in water, or on the ground, after much wet.

ULVA. Laver.

About thirty-five fpecies. In frefh or falt water. Ann. or per. Various feafons.

FUCUS. Fucus.

About ninety fpecies. In falt water. Ann. or per. Various feafons.

RIVULARIA. Rivularia.

Eleven fpecies are figured in Engl. Bot. Frefh or falt water.

CONFERVA. Conferva.

About 180 fpecies. Frefh or falt water, at various feafons. Above 130 are figured in Engl. Bot.

VAUCHERIA. Vaucheria.

Three or four, not very well defined, fpecies, found in frefh water. See Engl. Bot. v. 25.

BYSSUS. Byffus.

Hudfon has nineteen fpecies of this genus, but the number is much leffened in confequence of fubfequent enquiries; infomuch that it is hard to fay what really conftitutes a *Byffus* at all. The fibrous kinds are generally reducible to *Conferva*, the powdery ones to *Lepraria*. Some of the latter indeed, having occafionally produced fhields, prove themfelves either *Lecideæ* or *Parmeliæ*. See LICHENES.

Ord. 5. *Fungi.*

Withering, who excels in this obfcure department of Britifh botany, defcribes about 556 fpecies of *Fungi*, difpofed in feventeen genera. Of thefe *Agaricus*, confifting of 282 fpecies, is the principal. The diftribution of the reft has been fo much altered by following writers, and efpecially by Perfoon, that it would be ufelefs to enter into any details concerning Withering's generic arrangement. The number of known Britifh fpecies is alfo greatly augmented fince his time; fo that perhaps they might be eftimated between 750 and 800. A great part of them are figured in Sowerby and Bolton. This order is purpofely excluded from the *Englifh Botany*, becaufe 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 vanifhes amongft undiftinguifhable, almoft imperceptible, tribes, whofe confines blend with each other. The imperfection which we proudly attribute to fuch as we cannot underftand, rather belongs to our own limited powers, or to our fuperficial enquiries. The accuracy and minutenefs of inveftigation, amongft naturalifts of the prefent day, fo far tranfcends what was ufual thirty years ago, that the cryptogamic clafs, like the infect tribes, has difplayed a new world, as it were, to the curious enquirer, and has fmoothed the way for fucceeding obfervers; who in their turn need apprehend no deficiency of occupation or entertainment.

PLANTS, in *Agriculture*, vegetable productions, of which there are numerous kinds, fuch as herbs of various forts, comprehending all the different graffes, leguminous vegetables, and efculents of other defcriptions; trees, including thofe of the large or timber kind, and thofe of a more low or fhrubby growth, whether under the name of fhrubs, or under-fhrubs. But properly, in an agricultural point of view, they chiefly comprehend fuch graffes or plants of that nature as are employed as the food of animals, and fuch trees or other plants as are capable of being applied to the purpofes of timber, or made ufe of in the bufinefs of hufbandry. And it may be farther obferved with refpect to plants, that moft of them are hermaphrodite, containing the male and female parts in the fame flower; others have flowers on the fame ftems, fome of which are male, and others female. Some likewife produce flowers over the whole without being followed by any fruit, while others of the fame fort bear fruit with flowers, in confequence of which they are diftinguifhed into male and female plants. There are many of this fort, as the hop, hemp, and the poplar tree. The female flowers are only followed by fruit, the hermaphrodites, in refpect to this, being confidered among the female. Plants are capable of being fecundated from very confiderable diftances, which is a circumftance that the farmer fhould carefully keep in mind in faving the feeds of particular forts of plants, as all the cabbage tribe, and many others.

They require nourifhment and air as well as animals to fupport, and keep them in a proper ftate of healthy growth, the former of which is principally drawn from the earth or the furrounding atmofphere. The gafeous materials are chiefly drawn from the atmofphere by the upper furfaces of their leaves, while the oxygen gas or *pure air* is given out during the fun-fhine by their under furfaces. It is evident, therefore, that the means of fupport 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 furrounds them. See FOOD *of Plants*, and MANURE.

Moft of the plants which are the principal objects of agriculture, are either raifed and increafed from the feeds, or the cuttings or other parts of roots, in the fields where they are to grow, as in all the grain and grafs kinds, as well as in the potatoe; but there are a few in which the young plants, or offsets, are made ufe of, being fet out in fomewhat the garden method, and in which great care fhould conftantly be taken that they are good in their kinds, and perfect in their nature and different parts. Thefe are chiefly of the cabbage, madder, and other fimilar kinds.

Wheat plants are likewife fometimes tranfplanted, 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 fometimes raifed and provided from the feeds in the places where they are to grow;

grow; and at others reared and procured from the nurfery grounds in the proper ftate for ufe in the forming of woods, plantations, and other forts of wooded lands.

In the practice of planting, experience for a long time has fufficiently fhewn, that where there is any degree of natural fhelter or protection in the fituation, and particularly where the ground has been properly prepared for the purpofe, that fuch plants as have been tranfplanted in the nurfery, and which are from a foot and a half to two or three feet in height, are the moft fuitable to be made ufe of in this intention. And it is directed by Mr. Loudon and others, that in performing the bufinefs, they fhould be placed from four to fix feet diftant from each other, being put into the foil in an irregular manner. But that in expofed fituations and fpots, where fhelter and protection are only to be gained by putting them in in a thick or clofe method, or by that of planting nurfes, tranfplanted plants which are under a foot and a half in height fhould alone be had recourfe to, being planted out from two feet and a half to four feet apart in fuch plantations. The fpace or diftance between the plants in both thefe inftances, muft of neceffity vary very greatly, according to the nature of the kind, and other circumftances. Alfo the borders and margins of large plantations, as well as narrow ftripes and patches, ought to be thicker, or more clofely planted with thofe forts of plants, than the infides of great extents, though in the fame expofures; but, on the contrary, where the ground is of a deep loamy quality, they may be put at wider diftances, than where it is more thin and gravelly in its nature. Likewife in making very extenfive plantations, it frequently becomes a matter of importance in fetting 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 inftances, the neceffary cultivation, by fuch means, can be readily given with advantage by the plough and the horfe-hoe; and not unfrequently different kinds of vegetables and roots may be introduced between the rows with great propriety and benefit, as thofe of the turnip, cabbage, onion, potatoe, carrot, and various other forts.

It is contended that in all common plantations, the plants of thefe defcriptions fhould be put into the ground with fome degree of irregularity; but that wherever ornament is the leaft had in view, it fhould always be done in a manner, *irregularly irregular;* they fhould be grouped, or, in the more plain language of thofe engaged in the bufinefs, planted out juft as if they had grown up by accident from the feed: or in fuch a manner as is feen in natural forefts, where, in fome parts, perhaps two or three trees appear to fpring from one root, and in others quite thin and more detached. As by this means an endlefs variety of compofition is produced, and at the fame time an equal quantity of timber afforded, as the fame would have yielded, if planted out in the moft regular manner in refpect to the diftances. 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 fprung fufficiently thick. Some of the plants of which, it is afferted, may ftand at two feet, others not above two inches feparate from each other; but that wherever two are clofe together, by being unencumbered all round, they grow more vigoroufly than the others; and as the bulk fwells, pufh each other afunder; fo that in a fhort time the whole furface of the field is covered. The fame thing, it is contended, takes place in natural woods. Suppofe two fpaces, containing twenty fquare yards each, and in each fpace two trees; but in one the trees to be planted three feet afunder, and the other three yards: when ten years growth has taken place, the bulk and height produced upon each of the fpaces would be exactly alike in every refpect.

In regard to the methods of introducing or inferting the plants, in making plantations with them, they are in fome meafure different. The modes either by pitting them in or flit-planting are probably the beft, as being the moft generally practifed; they may, however, be put in by the dibble, though it is a practice which can feldom be had recourfe to with propriety or much fuccefs. With the pine and fir tribe of plants, the mode of planting is moftly confidered as more cheap and expeditious, than that of fowing the feeds; but in raifing large and extenfive woods and forefts, or other forts of plantations, where moft kinds of deciduous trees are required, and efpecially the oak and the afh, which fhould be the moft generally grown, they ought to be produced from the feeds by fowing them in the fituations where the plants are finally to remain and become trees. The feed of the oak put into the earth at the fame time with a plant of the fame kind five or fix years old, will, it is fuppofed, over-top it in the courfe of feven years, and frequently fooner; befides, they are believed by fome to laft 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 defirable to raife oak plants, for becoming trees, it will be found the beft method to fow the feeds, as this can be done at lefs than a fifth of the expence of planting out the young plants, and befides, the trees will turn to advantage, either as timber or undergrowth much more expeditioufly. And farther, as the oak is a particularly valuable fort of tree for its bark equally as well as for the timber, it ought to be univerfally raifed; and were the above mode more generally attended to, there would be found a faving, even in the firft place, of from three to four pounds the acre, which, to thofe who plant largely, would be of great confequence.

Plants, in *Gardening*, young living vegetables of any kind, which are raifed or produced from a feed or in any other manner. Plants are of many different forts and defcriptions, as well as employed for a variety of different ufes, and in a great diverfity of intentions. They may, however, in the view of their garden culture, be principally confidered as of the herbaceous, fhrubby, and tree kinds, and as being annual, biennial, and perennial in their nature, and the time of their continuance.

Every plant may be faid to confift of a root, that ftrikes down into the ground, or into fome other body in fome way or other, and which fends off numerous ramifications, which ferve the purpofe of fixing it in the earth or other fituation, and at the fame time to fupply it with food or nourifhment for its growth, increafe, and continuance. There is likewife a ftalk, ftem, or trunk, which rifes upwards into the atmofphere, and which is compofed of a bark in the outer parts, a fubftance which is called *alburnum*, more internally a woody material, and a medullary matter, that is termed *pith*, in the infide of the whole. From this ftem or trunk are formed and fent off the different branches and twigs, which contain the leaves and flowers, and which are very different in different forts of plants. Befides which, all plants are furnifhed and provided with different forts of veffels for conveying their fap, juices, and other kinds of fluids, and endued with feveral different powers, motions, and properties, which ferve their different habits of growth, and the ufes and intentions which they are to fulfil. See Vegetable, and Vegetation.

The mode of growth and increafe in plants, after they have been evolved and fprung up from feeds, 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 explication 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 involucra, 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 raifed, it is almoft conftantly done from the young plants, after they have had fome little growth from the feeds, and are in a perfect condition in every refpect. This method is purfued in all the different kinds of cabbages, cauliflowers, brocolies, and lettuces, as well as with endive, celery, and many others. But there are fome which are raifed from feeds without being tranfplanted in the above manner, and a few from offsets or flips, and by dividing the roots or other parts.

In the fhrubby and tree kinds, the plants are moftly increafed from feeds, cuttings, layers, and flips.

All plants poffefs, by means of their living principles, the proper and neceffary degrees of heat, by which they vegetate, increafe, and are enabled to refift the over-abundant cold or heat, which may at any time furround them; but they differ very materially in this refpect, fome having a much greater power of doing it than others. There are fome which have alfo a remarkable capability of refifting cold in their roots; and others, which are equally remarkable in refifting 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 fpinach, it quickly becomes thawed; and if a veffel full of water be expofed in a bed of cucumbers, the water fpeedily becomes warm, but the cucumbers remain cold to the touch; and if one be eaten the ftomach is found to be cooled, as if it had taken ice. And the fame thing has been found in refpect to fruits, while growing upon the trees. The ftate of heat in plants would therefore feem to proceed from the matter of heat, which is taken from the furrounding air; and hence it is, that the fhades of all forts of trees are fo cooling in their nature.

Plants, *Foffile*. Many fpecies of tender and herbaceous plants are found at this day, in great abundance, buried at confiderable depths in the earth, and converted, as it were, into the nature of the matter they lie among; foffile wood is often found very little altered, and often impregnated with fubftances of almoft all the different foffile kinds, and lodged in all the feveral ftrata, fometimes firmly imbedded in hard matter, fometimes loofe: but this is by no means the cafe with the tenderer and more delicate fubjects of the vegetable world. Thefe are ufually immerfed either in a blackifh flaty fubftance, found lying over the ftrata of coal, or elfe in loofe nodules of ferruginous matter of a pebble-like form, and they are always altered into the nature of the fubftance they lie among: what we meet with of thefe are principally of the fern kind: and what is very fingular, though a very certain truth, is, that thefe are principally the ferns of American growth, not thofe of our own climate. The moft frequent foffile plants are the polypody, fpleenwort, ofmund, trichomanes, and the feveral larger and fmaller ferns; but befide thefe there are alfo found pieces of the equifetums, or horfe-tails, and joints of the ftellated plants, as the clivers, madder, and the like; and thefe have been too often miftaken for flowers; fometimes there are alfo found complete graffes, or parts of them, as alfo reeds and other watery plants; fometimes the ears of corn, and not unfrequently the twigs or bark, and impreffions of the bark, and fruit of the pine or fir kind, which have been, from their fcaly appearance, miftaken for the fkins of fifhes; and fometimes, but that very rarely, we meet with moffes and fea-plants.

Many of the ferns not unfrequently found, are of very fingular kinds, and fome fpecies yet unknown to us; and the leaves of fome appear fet at regular diftances, with round protuberances and cavities. The ftones which contain thefe plants fplit readily, and are often found to contain, on one fide, the impreffion of the plant; and on the other the prominent plant itfelf: and, befide all that have been mentioned, there have been frequently fuppofed to have been found with us ears of common wheat, and of the maize or Indian corn; the firft being in reality no other than the common endmoft branches of the firs, and the other the thicker boughs of various fpecies of that and of the pine kind, with their leaves fallen off; fuch branches in fuch a ftate cannot but afford many irregular tubercles and papillæ, and, in fome fpecies, fuch as are more regularly difpofed.

Thefe are the kinds more obvious in England; and thefe are either immerfed in the flaty ftone which conftitute whole ftrata, or in flattened nodules, ufually of about three inches broad, which readily fplit into two pieces on being ftruck.

They are moft common in Kent, on coal-pits, near Newcaftle, and the foreft of Dean, in Gloucefterfhire; but are more or lefs found about almoft all our coal-pits, and many of our iron-mines.

Though thefe feem the only fpecies of plants found with us, yet in Germany there are many others, and thofe found in different fubftances. A whitifh ftone, a little harder than chalk, frequently contains them; they are found alfo often in a grey flaty ftone, of a firmer texture, not unfrequently in a blackifh one, and at times in many others; nor are the bodies themfelves lefs various here than the matter in which they are contained; the leaves of trees are found in great abundance, among which thofe of the willow, poplar, whitethorn, and pear-trees, are the moft common; fmall branches of box, leaves of the olive-tree, and ftalks of garden thyme, are alfo found there; and fometimes ears of the various fpecies of corn, and the larger as well as the fmaller moffes in great abundance.

Thefe feem the tender vegetables, or herbaceous plants, certainly found thus immerfed in hard ftone, and buried at great depths in the earth: others of many kinds there are alfo named by authors; but as in bodies fo imperfect, errors are eafily fallen into, thefe feem all that can be afcertained beyond mere conjecture. Hill's Hift. of Foffils. See Petrifaction.

Plants, *Marine*. See Sea-*Plants*.

PLANUM, Os, in *Anatomy*, the fmooth orbital plate of the ethmoid bone. See Cranium.

PLAPPERT, in *Commerce*, a money of account in Switzerland; 15 plapperts, or fkillings, being = 12 grofchen, or gros, = 10 Swifs batzes = 9 good batzes = 1 livre, and containing 36 creutzers = 90 rappen = 180 pfenings.

PLAQUET, in *Ancient Armour*, a plate which was occafionally added to the breaft-plate, in order to ftrengthen it.

PLAS, in *Biography*, two brothers, born in Spain, celebrated performers on the hautbois, who, like the two Bezozzis of Turin, always lived, practifed, and performed together, as one and the fame being. They left Madrid in 1752, and arrived at Paris the fame year, where their performance excited equal wonder and extacy. Their tone, expreffion, tafte, and execution, were as exactly fimilar as double ftops on the fame inftrument.

In 1761 they went into Germany, and were engaged in the chapel of the duke of Wirtemberg, and in his houfhold as chamber muficians.

PLASCHKEN, in *Geography*, a town of Pruffian Lithuania; 9 miles N.W. of Tilfit.

PLASEMBURG, a town of Tranfylvania, near Hermanftadt.

PLASENCIA, or Placencia, a town of Spain, in the province of Guipufcoa; 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 ſnagged 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*. Juſſieu, 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 neverthe leſs 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

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 terras 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 GYPSUM, 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, assuage 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 pharmacopeia, 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 Meloes 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 concrete 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 kidnies 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 scrophulous 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. pharmac. 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 *Adhesivum.*) 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, *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 thinniſh 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 baſon 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. Tranſ. N° 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 ſundry 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. Inriched 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 cielings 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° 93. See STUCCO.

PLASTIC, Πλαςικος, from πλαςις, of πλαττω, or πλασσω, *fingo*, *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 can

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 Diſſ.

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*, πλασται.

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 fretwork ceilings; but the Italians apply it alſo to the mantlings of chimnies with great figures.

PLASTRON, in *Ancient Military Armour*, a breaſtplate 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 *ſexes*; 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 verſâ*. 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 ſtates 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. Guarania,	22. La Paz,
8. Paraguay,	23. Cochabamba,
9. Chaco,	24. Sicaſica,
10. Salta,	25. Laricaja and Omaſuyos,
11. Jujuy,	26. Chucuito,
12. Chichas and Tarija,	27. Puno or Paucarcola,
13. Lipes,	28. Lampa,
14. Atacama,	29. Aſangaro,
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 Aſangaro 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, ſugar, 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 expence 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 fortreſs, 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 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, Potosi, 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 accompts 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 merchandise. But the chief branch of the revenue is the duty called *fifths*, though in fact the *tenth* only of all metals. There is also a capitation tax from eight to ten dollars, paid by each person. However, the royal expences 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 Potosi, 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 intendancy 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 $2\frac{1}{2}$ 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 $5\frac{1}{2}$ 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 beeves, 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 chace, 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 beeves 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 POTOSI.) Befides gold and filver, copper is found at Articoya near Oruro, and in the diftrict of Lipes. A rich mine of tin is wrought in the diftrict of Paria; and mines of lead abound in the province of Chichas.

The following is the ftate 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
Lipes } prov. of Potofi	2	1	1		1
Porco } prov. of Potofi	1	2	1		
Caraagas - -		2	1		
Pacajes, or Benenguela		1			
Chucuyto - -		2			
Paucarcolla, town Puno		1			
Lampa - -		2			
Montevideo - -	1				
Chichas and Tarija -	4	5			1
Cochabamba - -	1				
Sicafica - -	2				
Laricaja - -	4				
Omafuyos - -	4				
Afangaro - -	3				
Carabaya - -	2	1			
Potofi - -		1			
Chayanta - -	2	3	1	1	1
Mizque - -		1			
Paria - - -		1		1	1
Total	30	27	7	2	7

The fame author has given the following ftatement of the whole coinage in Spanifh America, from January 1, to December 31, 1790, taken from the official regifter.

	In Gold.	In Silver.	Total.
	Piaftres.	Piaftres.	Piaftres.
At Mexico	628,044	17,435,644	18,063,688
At Lima	821,168	4,341,071	5,162,239
At Potofi	299,846	3,983,176	4,283,022
At Santiago Chili	721,754	146,132	887,866
Total	2,470,812	25,906,023	28,376,855

Pinkerton's Geography, vol. iii. ed. 1807.

PLATA, *La*, a province of the above defcribed viceroyalty. Its capital of the fame name was formerly a city of Peru and the fee of an archbifhop. It was built by captain Pedro Anzures in the year 1539, by order of Gonzalo Pizarro, on the fcite of Chuquifaca, and called Plata, in allufion to the filver mines of the mountain of Porco in its neighbourhood, from which the Incas obtained great quantities of filver. Its ancient name long prevailed, and, as Ulloa fays, is now commonly ufed. This city ftands on a fmall plain environed by eminences, which defend it from the winds. In fummer 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, tempefts of thunder and lightning are very common, and rain is of long continuance. The houfes are covered with tile, having one ftory befides the ground floor; they are roomy and convenient, and have delightful gardens planted with the fruits of Europe. Water is fcarce. The inhabitants confift of Indians and Spaniards, and are faid to amount to 14,000. The cathedral is large, of good architecture, and finely adorned with paintings and gildings. The parifh is ferved by two priefts, one for the Spaniards, and one for the Indians. Another parifh, fituated at one end of the city, is appropriated to the Indians living within its precinct, and amounting to about 3000. The convents of the Francifcans, Dominicans, Auguftines, the fathers of Mercy, and the college of Jefuits, are fpacious buildings, with fplendid churches. Here are alfo two nunneries, and an univerfity dedicated to St. Francis Xavier, the rector of which is always a Jefuit: and alfo two other colleges, in which lectures of all kinds are read. The magiftracy confifts of regidores, who are perfons of the firft diftinction, with a corregidor at their head; from thefe are annually chofen two ordinary alcaldes for fuperintending the police. Plata was erected into a bifhopric in 1551, and in the year 1608 was raifed to a metropolis. The jurifdiction of this city includes the imperial town of Potofi, which fee. 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 ftreams are the Paraguay and the Parana, which fee refpectively. This river was firft difcovered by Juan Dias de Salis, in the year 1515, who failed up the ftream as far as an ifland, which lies in S. lat. 34° 40′. The mouth, nearly 60 leagues broad, is fuppofed to have been called La Plata from the great quantity of filver found by thofe who firft vifited the countries adjacent to its banks; though it was originally called the river Salis, from its firft difcoverer, who, obferving fome Indian tents as he failed up the river, imprudently went on fhore with ten men, who were all murdered by the favages. The river Plata, receiving confiderable ftreams, fometimes fwells to fuch a degree, that the banks on each fide are overflowed, like thofe of Egypt by the inundation of the Nile, and thus rendered remarkably fertile. The current of the river, where it falls into the fea, is fo rapid, that the water is frefh fome leagues diftant from its mouth. Its water is alfo clear, fweet, and wholefome. It abounds with great plenty and variety of fifh; and its banks are frequented by a number of very beautiful birds. The diftance from the conflux of the Paraguay and Parana to the mouth of the river is near 600 miles, and this interval is interfperfed with delightful iflands, and navigable by the largeft fhips. See PARANA.

PLATA, *La*, a fmall ifland in the Pacific ocean, near the coaft of Peru. S. lat. 1° 10′.

PLATA, *La*, or *Sebaftian del Oro*, a town of South America, in the province of Popayan; 60 miles E. of Popayan. N. lat. 2° 50′. E. long. 75°.

PLATA *Keys*, a large fand-bank among the Bahama iflands, about 40 miles N. of Hifpaniola.

PLATÆ, a word ufed by fome anatomical writers to exprefs the fcapulæ.

PLATÆA, in *Ancient Geography*, an ifland of the Mediterranean, on the coaft of Lybia, whither, according to Herodotus, the Cyrenians fent a colony. It was fituated on the coaft of the Giligammes, in the midway between that coaft and the ifle of Aphrodifias. Scylax places it on the coaft of Marmarica.

PLATÆÆ, a town of Greece, in Bœotia. Homer writes this name in the fingular Πλάταια, Platæa; but the hiftorians write it Πλαταιαί. It was fituated on the river

 Afopus;

Afopus; and feems 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 firft military exploit of the Platæans, of which we have any knowledge, occurred at Marathon, where they effectually aided the Athenians; they afterwards diftinguifhed themfelves on many occafions; 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 thofe Platæans who had fallen in combating againft the Perfians. The other Greeks had alfo a common fepulchre, whilft the Athenians and Lacedæmonians had another apart for themfelves. Jupiter *Liberator* had an altar near the common burying place of the Greeks; both the robes and the ftatue of the god were of white marble. The Platæans inftituted games, which they celebrated every fifth year, on which occafion they ran armed before the altar of Jupiter. The temple of Juno was very fplendid and highly ornamented; her ftatue was of an extraordinary fize, and executed by Praxiteles of Pentelician marble. Minerva had alfo a temple at Platæa, which had been erected of the fpoils gained from the Perfians in the battle of Marathon. Her ftatue was the work of Phidias, and was not lefs in fize, than that of bronze in the citadel at Athens. In this city was alfo the tomb of Leitus, who was the only Bœotian chief who returned from the fiege 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 noftrils are fmall, and at the bafe of the bill; tongue fhort, pointed; the feet are four-toed and femi-palmate. There are three

Species.

* Leucorodia; White Spoon-bill. Body white; chin black; hind-head fub-crefted. The bill is black, brown, or fpotted; tongue heart-fhaped; irids grey; lores, orbits, and naked dilatable chin black; quill-feathers fometimes tipt with black; the legs are black. There are two varieties of this fpecies, of which the *firft* has the wings varied with black and white, the legs yellowifh; in the *fecond* the body is all white; legs flefh-colour. The white or common fpoon-bill weighs about three pounds and a half, and meafures two feet eight inches in length. It inhabits from the Feroe iflands to the Cape of Good Hope; it is rarely feen in England, but its appearance is fufficiently frequent to juftify us in placing before it the afterifk. It lives on grafs, carices, the roots of reeds, ferpents, frogs, mufcles, and other fhell fifh; but efpecially on fifhes, which it often feizes from other birds. It makes its nefts in high trees, near to the fea, and lays three or four white eggs, fpeckled with pale red fpots. The flefh of the young fpoon-bill is reckoned very good, little inferior to that of the goofe.

Ajaja; Rofeate Spoon-bill. Body rofe coloured; tail-coverts fcarlet. There is a variety blood-red; neck white; collar black; tail-feathers fcarlet. It inhabits South America, and is twenty-feven inches long.

Pygmæa; Dwarf Spoon-bill. Body above brown, beneath white. It is only the fize of a full-grown fparrow, and is found in Guiana and Surinam.

PLATAMON, a word ufed to exprefs a low and fmooth rock, juft appearing above water.

PLATAMONE, in *Geography*, a town of European Turkey, in Macedonia, at the mouth of the river Jenicoro; 44 miles S.S.E. of Edeffa.

PLATANAL, a fmall ifland in the Spanifh main, near the coaft of Darien. N. lat. 9° 6′. W. long. 80° 40′.

PLATANARIA, in *Botany*, a name by which fome authors have called the *fpargarium*, or burr-reed, from its round echinated fruit, which in fhape and fize much refemble thofe of the platanus.

PLATANI, in *Geography*, a river of Sicily, which rifes near Caftro Nuovo, and runs into the fea, 10 miles S. of Sacca.

PLATANUS, in *Ancient Geography*, a town of Afia, in Syria; fituated on the weftern bank of the river Orontes, E. of mount Cafius, towards N. lat. 35° 50′.—Alfo, a town of Phœnicia, placed by M. d'Anville between Berytus and Sidon, in the vicinity of Libanus.

Platanus, in *Botany*, the claffical name of the Plane-tree, adopted by the Romans from the Greeks, whofe πλατανος was derived from πλατυς, *broad*, in allufion to the wide fpreading 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. Purfh North Amer. v. 2. 635. Juff. 410. Lamarck Illuftr. t. 783. Gærtn. t. 90.—Clafs and order, *Monoecia Polyandria*. Nat. Ord. *Amentaceæ*, Linn. Juff.

Gen. Ch. Male flowers compound, difpofed in a globular catkin. *Cal.* A few flight minute fegments. *Cor.* fcarcely difcernible. *Stam.* Filaments oblong, fwelling upwards, coloured; anthers fquare, furrounding the lower part of the filament.

Female flowers numerous, forming a globe, on the fame tree. *Cal.* of feveral minute fcales. *Cor.* Petals feveral, concave, oblong, club-fhaped. *Pift.* Germens feveral, awl-fhaped, ending in awl-fhaped ftyles; ftigma fimple, recurved. *Peric.* none; feveral fruits are collected together into a globe. *Seed* roundifh, tapering at the bafe, crowned with the awl-fhaped permanent ftyle, the bottom of the feed being furrounded with copious capillary down.

Obf. Linnæus fubmits his defcription of the flowers to the more attentive fcrutiny of "fome lynx-eyed obferver," 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 globofe. Calyx and corolla obfolete. Anthers furrounding the filament.

Female, Catkin globofe. Calyx of many leaves. Corolla none. Stigma recurved. Seed club-fhaped, pointed by the ftyle, briftly at the bafe.

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-fhaped at the bafe: fegments lanceolate, finuated: ribs pedate. Stipulas nearly entire.—Native of the Levant.—A fpecimen in the Linnæan herbarium was gathered by Haffelquift, from a remarkably large tree, in the ifland of Cos, now Stanchio, the circumference of whofe trunk was thirteen and a half Swedifh ells, about eight yards and a half. This beautiful fpecies is among the earlieft 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 firft who planted it in any abundance. The Greeks and Romans efteemed this tree very highly for its fhade, as well as beauty. About the Roman villas it was always planted, and fometimes honoured, rather than benefited perhaps, with libations of wine. Some ancient trees of this kind are reported to have attained a more ample fize than the above.

above. The fineft Oriental Plane, we believe, in England, ftands at one corner of Chelfea garden, raifing its round head far above all neighbouring objects. Miller fpeaks of this as the Maple-leaved variety, now made a fpecies, fee n. 3; and he afferts, that young plants, which fprung from its feeds, proved of the common fort. We have no opportunity at prefent of inveftigating this point. An elegant fpecimen of the Oriental Plane, whofe fpreading branches are feathered down to the ground, ftands near the temple in the arboretum at Kew. In Germany, this fpecies is not hardy enough to attain the fize of a tree. The *branches* of *P. orientalis* are round, fmooth, flightly zigzag. *Leaves* deciduous, alternate, on longifh, round, downy *ftalks*, rather deeply palmate, about a fpan wide, with five lanceolate, more or lefs deeply or copioufly finuated, lobes, whofe points are callous or glandular, and fomewhat incurved: both fides are fmooth, with pedate ribs, and innumerable fine veins: in an early ftate only, the leaves are clothed with mealy deciduous down. *Stipulas* tubular, furrounding the branch, with a fpreading border, more entire in this fpecies than the reft. *Buds*, as in the whole genus, enclofed in the hollow bafe of each *footftalk*, ovate, obtufe, compreffed, quite concealed till the leaves fall. By their fwelling, the buds promote the feparation of the footftalks. *Flowers* in three or four globular heads on each long drooping ftalk, appearing in April and May. *Stigmas* crimfon. 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-fhaped and elongated at the bafe; triple-ribbed, nearly fmooth.—Gathered by Haffelquift in the Levant. Miller is faid to have cultivated it in 1739. In fome points this anfwers to his "Spanifh, or Middle Plane Tree;" but we find great difficulty in applying with certainty the Englifh names of this genus, which are in ufe amongft nurfery-men. The *leaves* in our wild fpecimen are remarkably wedge-fhaped, and elongated at their bafe; in confequence of which there are only three principal ribs, of which the lateral ones are feldom precifely oppofite: the lobes are three, ftrongly finuated, but not feparated fo far as the middle of the leaf. *Footftalks* long. Miller defcribes them fhort, and covered with fhort down, in his Spanifh Plane, which character anfwers to another fpecimen in the Linnæan herbarium from Burgundy, refembling the true *orientalis*, except in its fhort *footftalks*, and ftrongly toothed *ftipulas*. This fpecimen may be a nondefcript fpecies. The leaf in Duham. Arb. v. 2. t. 34. given for the following, reprefents 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-fhaped, five-lobed, fmooth, diftantly toothed; abrupt and three-ribbed at the bafe.—Native of the Levant, where it was noticed by Tournefort. The Hort. Kew. mentions this fpecies as cultivated here before 1724. Willdenow fays it is hardy, forming a lofty tree, in Germany, and that it is known from all the reft by the *leaves* being abrupt, not wedge-fhaped at the bafe, and having their two lateral ribs fpring from the top of the *footftalk*, unaccompanied by any leafy expanfion beyond them. He adds, that they are extremely like thofe of the Sugar Maple, *Acer faccharinum*. We have no fpecimen that anfwers to this defcription, 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. Catefb. Carolin. v. 1. 56. t. 56. Duham. Arb. v. 2. 172. t. 35.—Leaves with five angles, flightly lobed, toothed; wedge-fhaped at the bafe; downy beneath.—Native of the banks of rivers in North America, from Canada to Florida, as well as in Louifiana. Mr. Purfh fays this is perhaps the largeft North American tree, fome individuals, on the fertile banks of the Ohio and Miffifippi, meafuring from ten to fixteen 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 ufually hardy with us, as well as in Germany, flowering like the other fpecies in April and May; but the winter of 1810, or fpring of 1811, was fatal or injurious to moft of the Occidental Planes in England, owing perhaps to tranfient cold, not generally obferved, at fome critical period of the growth of thefe trees in particular. The broad, flightly lobed foliage diftinguifhes this fpecies readily from all the reft. The three or five principal ribs have a confiderable leafy, though fcarcely wedge-fhaped, expanfion below the point of their union. The *ftipulas* are wavy, with blunt fhallow teeth. *Footftalks* rather fhort, downy.

Platanus, in *Gardening*, contains plants of the exotic deciduous tree kind, of which the fpecies cultivated are; the oriental plane tree (P. orientalis); and the American plane tree (P. occidentalis).

Of the firft fort there are two varieties, as the *maple-leaved*, which has not its leaves fo deeply cut as thofe of the eaftern plane: they are divided into five fegments, pretty deep, but are not lobed, like thofe of the occidental plane. The petioles are much longer than in either of the fpecies, and the upper furface of the leaves is rougher, fo that they might be taken for different forts, if it was not known that they rofe from the fame feeds.

The *Spanifh* plane, which has larger leaves than either of the forts, and are more divided than thofe of the occidental, but not fo much as thofe of the oriental. Some of the leaves are cut into five, and others into three lobes only; thefe are fharply indented on the edges, and are of a light green; the footftalks are fhort, and covered with a fhort down. This is by fome called the middle plane tree, from the leaves being of a fhape between the two fpecies.

Method of Culture.—Thefe plants may be increafed by feed, layers, and cuttings; but principally in the two laft methods.

The beft feafon for fowing the feed is autumn, if they can be procured, otherwife in the fpring, upon a fomewhat lightifh mellow foil: the ground having been dug and raked, it fhould be formed into four-feet wide beds, and the feeds then fcattered evenly on the furface, and raked in, or with the back of a rake the earth be previoufly trimmed off the furface near half an inch deep into the alleys; then fowing the feed, and directly with the rake turned the proper way, drawing the earth evenly over the feeds, and trimming the furface fmooth, when many of the plants will rife in fpring, but probably not generally till the fpring following. When they are one or two years old, they fhould be planted out in nurfery-rows, two feet afunder, and about half that diftance in the lines; to remain till of a proper fize for being finally fet out.

In the layer method, fome ftout plants muft be planted for ftools, which in a year after muft be headed down near the bottom, that they may throw out many fhoots near the ground convenient for laying; which, in the autumn after they are produced, fhould be laid down by flit-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*, *tænia*, and *corſa*.

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 Rega; 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 Courcy, 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 when abroad. If he appear dull and heavy, and there to ſuppoſe it is owing to too hard riding; or, as s expreſs it, to ſome greaſe 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 overſweating 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 *priſe*-plates, are two plates of iron on the cheeks of a gun-carriage, from the cap-ſquare to the centre, through which the priſe-bolts go, and on which the hand-ſpike reſts, when it poiſes up to the breech of the piece. *Breaſt*-plates are the two plates on the face of the carriage, one on each cheek. *Train*-plates are the two plates on the cheeks 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-*Glass*. 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 chock 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 intersections 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

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 blueiſh 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 $\frac{1}{31}$ 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 rivetted, 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, ſoldered to the copper, although no ſolder 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 ſcowered 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

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 copperſmiths, 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, *e*, 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 *c*. 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 underſide 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 ſoldering. 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 *a b c d* 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 ſolder is intended to be run muſt be made perfectly clean by ſcraping. The ſolder employed is that called ſilver ſolder. 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 ſolder 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 ſolder for plated metal. The braſs ſhould be the leaſt poſſible, being no more than what is neceſſary to give the requiſite fuſibility to the ſolder, 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 ſhreds. 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 ſoldered 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 firſt fuſes,

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 ſoldered 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 ſolder contains too much braſs.

Veſſels intended to have other forms are generally ſoldered 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 ſoldered 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 ſlitting iron.

The beading 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 ſolder melted in with a ſoldering 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 ſolder 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 ſolder is employed, or when it is applied to great heat. The ſoft ſolder 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 ſolder, 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 ſolder. This unites the ornament, without leaving any appearance of ſolder 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 ſolder, 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 ſolder. 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 ſolder, 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

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 ſoldered together, ſome parts with hard and others with ſoft ſolder. 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 ſoldered together, the joinings muſt be accurately fitted, in order to prevent the copper from appearing. In theſe caſes hard ſolder 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 ſtake, 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 welding 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 uninterrupted 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 Sclavonia, on the Save; 10 miles from Poſzega.

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 plaiſe. See Pleuronectes *Plateſſa*.

PLAT-FOND, in *Architecture*, the ſame as ſoffit.

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 madriers, 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 neceſſaries. When a plat-form is to be laid on marſhy ground, firſt lay a floor or two of 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 πλατιαζω, *I dilate*, formed from πλατυς, *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 πλατυς, *wide*, and κορη, *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, Bartolommeo, 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 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, Descotils, 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. Trans. 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. Trans. 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. Trans. 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. Tranſ. 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. Tranſ. 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. Tranſ. 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 Achard 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 Mouſſin Pouſchkin was, we believe, the firſt perſon who propoſed to prepare platina from the ammoniaco-muriate (Nicholſon'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. Cock, 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 $2\frac{1}{2}$ inches long, by $1\frac{1}{2}$ 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 parallelopiped. 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. The

 metal

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 laminæ 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. Tranſ. 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 $\frac{1}{10000}$dth, or even $\frac{1}{18000}$dth part of an inch in diameter; and the tenacity of the latter was ſtill ſuch as to ſupport 1 $\frac{1}{3}$d 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 $\frac{1}{100}$dth of an inch, was fixed longitudinally in the centre of a ſhort cylindrical mould of $\frac{1}{3}$d 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 $\frac{1}{30}$th, the platina wire was reduced to $\frac{1}{1000}$dth 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 laminæ 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. Tranſact. 1803.) The alloy of platina and gold, in particular, poſſeſſes properties, eſpecially

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in regard to its hardnefs and malleability, which may fome day be found ufeful. The alloy of platina and filver is moderately fufible and very malleable; but when heated to rednefs, its furface becomes uneven, and incapable to be wrought. Lead combines readily with platina at a full red heat, forming a malleable and eafily fufible alloy. Mercury acts but flowly upon platina in its malleable ftate; but the triple falt, or ammoniaco-muriate, readily combines with mercury by trituration, forming folid and brilliant amalgams.

Platina does not appear to be capable of combining with fulphur; but it unites readily with phofphorus, forming a phofphuret of much greater hardnefs and fufibility than the metal itfelf. When expofed to a ftrong fire, the phofphorus is melted and volatilized; a circumftance which has fuggefted the idea of purifying platina by the intervention of phofphorus. Pelletier, Ann. de Chim. xiii. 105.

Platina has not hitherto been extenfively ufed in the arts on account of its high price; but its utility is becoming every day more generally acknowledged. From its great infufibility and unalterability in particular, crucibles, and other utenfils made of this metal, are of incalculable value in analytical refearches. Many facts are daily brought to light by means of platina inftruments, which, without it, might perhaps ever have efcaped notice. The remarkable flownefs with which platina conducts caloric, increafes its utility in many chemical manipulations. Thus fmall tongs or fpoons, or thin flips of laminated platina (which often anfwer the purpofe better than fpoons) may be held with the hand by one end, whilft the other extremity is expofed to an intenfe heat, without the heat reaching the fingers. The touch-holes of guns are now generally made of this metal, inftead of gold, which was formerly ufed for this purpofe. From the circumftance of platina not being tarnifhed by air or moifture, nor fcarcely by any chemical agent, mirrors for reflecting telefcopes have been made of this metal; and inftruments of various kinds might, no doubt, be covered over or plated with it with great advantage.

Guyton Morveau has recommended platina as a fubftance likely to afford a new and ufeful means of afcertaining high temperatures, by its dilatations and contractions, which he believes to bear an exact proportion to the changes of temperature. Platina being nearly infufible and unalterable by heat and air, would feem, on thefe accounts, likely to be a valuable pyrometrical fubftance. Morveau's contrivance confifted in connecting a bar of platina with a very fimple machinery, by which the elongations or contractions of the portion of the apparatus which was expofed to the heat, were rendered confpicuous, and could be accurately meafured. Ann. de Chim. tom. xlvi.

Platina veffels have, in a few inftances, been ufed upon a large fcale in manufactories, efpecially in the concentration of vitriolic acid, which is ufually carried on in large glafs retorts, containing as much as 50 or 60 pounds of acid. The burfting of thefe veffels, an accident both dangerous and expenfive, and by no means uncommon, may be totally avoided by fubftituting veffels of platina. A veffel of this metal, containing 300 pounds of vitriolic acid, has, for many years, been ufed for this purpofe in the manufactory of Mr. Sandman in the Borough. Still larger veffels have fince been ufed for the fame purpofe by other manufacturers. The diftillation is alfo more eafy, becaufe the veffel is fet upon a naked fire, inftead of being placed in a fand bath.

The metallic glazing, with which fome kinds of earthen ware and porcelain utenfils have, for a few years paft, been coated, is obtained from oxyd of platina. (Klaproth's Dictionary, iii. 380.) This glazing has a brilliant filvery, or rather fteel-grey luftre. The ammoniaco-muriate of platina is faid to be commonly employed in Britifh potteries for this purpofe.

PLATISMA, in *Botany*, from πλατυς, *broad*, the name of the nineteenth fection of Lichens, in the Prodromus of Acharius. See LICHENES.

PLATNER, JOHN ZACHARIAH, in *Biography*, an able phyfician, was born at Chemnitz, in Mifnia, in Auguft 1694. His father, who was one of the principal merchants of the place, intended to make him his fucceffor in the fame line; but refolved to enlarge his mind by a liberal education, and to give him a knowledge of ancient languages and philofophy, before he led him into commercial purfuits. But young Platner poffeffed a delicate conftitution; and, partly on this account, and partly in confideration of the rapid progrefs which he made in his ftudies, his parents relinquifhed their original defign, and confented that he fhould direct his attention to medicine, for which he had manifefted a ftrong inclination. He repaired, therefore, to Leipfic in 1712, where he purfued his ftudies for the fpace of three years, when the reputation of the univerfity of Halle induced him to vifit its fchools. During the following winter, he ftudied 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 purfuit of profeffional knowledge became his paffion, and he fpent four years in vifiting the moft celebrated feats of learning in Europe. At Paris he particularly attended to anatomy and furgical operations, efpecially to thofe relative to difeafes of the eye, in which he is faid by Haller to have acquired fuch dexterity, as to have fucceeded in the cure of fome, which the celebrated St. Ives had failed to relieve.

He now determined to fettle at Leipfic, and accordingly fixed himfelf in that city in 1720; and his great profeffional acquirements were fpeedily rewarded by public acknowledgements of their value. In 1721 he was appointed profeffor extraordinary of anatomy and furgery. In 1724 he obtained the chair of phyfiology, which had become vacant by the death of Rivinus; in 1737 he was promoted to the profefforfhip of pathology; and in 1747 to that of therapeutics. He was alfo nominated perpetual dean of the faculty, and confulting phyfician to the court of Saxony. He did not live long, however, to enjoy thefe flattering diftinctions; for he was carried off fuddenly, on the 19th of December 1747, in the fifty-fourth year of his age, by a paroxyfm of afthma. He had vifited his patients on the morning of that day, and given his lecture after dinner; and upon returning home, about fix in the evening, was feized with the fatal fit.

He left only three different works, the firft of which, entitled "Inftitutiones Chirurgiæ Rationalis, tum medicæ, tum manualis," Leipfic 1745, was publifhed by himfelf. It paffed through feveral editions. The fecond, entitled "Opufculorum Chirurgicorum et Anatomicorum Tomi duo: Differtationes et Prolufiones," ibid. 1749, was edited by his fon, Frederic Platner, a profeffor of law. And the third, entitled "Ars medendi fingulis morbis accommodata," ibid. 1765, which had been bequeathed by the author to his pupil J. B. Boehmer, upon condition that it fhould not be publifhed, was printed by a bookfeller, Fritfch, into whofe hands a copy of it fell eighteen years after the author's death. Eloy Dict. Hift. de la Med.

PLATO, a Greek comic poet, who flourifhed about the clofe of the fifth century B.C., was contemporary with Ariftophanes and Euripides. He is faid 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 methodiſtical 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 citharœdic 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 tranſitions, 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 expence 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 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 Ariſto, was an Athenian, related by his father to Codrus, and by his mother to Solon; born in the iſland of Ægina, 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 ſubſtance 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, Ουδεὶς ἀγεωμέτρητος εἰσίτω: "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 Athenians. 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 Adiamantus. 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 Lyſias 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 characteriſed 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 *majeutic*, as reſembling the teaching of the rudiments of the art, and the *piraſtic*, as repreſented by a ſkirmiſh, or trial of proficiency. The "agoniſtic" dialogues, ſuppoſed to reſemble the *combat*, were either *endeictic*, as exhibiting a ſpecimen of ſkill, or *anatreptic*, 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*.

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The writings of Plato were originally collected by Hermodorus, one of his pupils: they confift of 35 dialogues, and 13 epiftles. They were firft publifhed, after the invention of printing, by Aldus Manutius, at Venice, in 1513. The editions of Ficinus and Serranus are the moft valuable; but the notes and interpretations fhould be read with caution; for Ficinus, having formed his conceptions of the doctrine of Plato after the model of the Alexandrian fchool, frequently, in his "Arguments," mifreprefents the defign of the author, and in his verfion obfcures the fenfe of the original; and Serranus, for want of an accurate acquaintance with the doctrine of his author, and under the influence of a ftrong predilection for the fcholaftic fyftem of theology, fometimes gives an incorrect and injudicious explanation of the text.

Availing ourfelves of the excellent work, which has furnifhed the materials of this article, we fhall now proceed to detail the philofophical fyftem of Plato, in order to which fome general obfervations fhould be premifed. Plato, difdaining the fober method of reafoning introduced by Socrates, left his firft mafter in fearch of other preceptors. Inclined to fpeculative refinement, and mifled by the celebrity of the Italian fchool, which abounded in fubtleties, he attached himfelf to the Pythagorean philofophy; and purfuing his ftudies under the Egyptian priefts, he deviated ftill farther from the plain path of common fenfe, which had been purfued in the Socratic fchool. Among other errors which he adopted from foreign philofophy, it was not the leaft that he borrowed the art of concealing his real opinions: and hence his writings became not only incidentally, but perhaps defignedly, obfcure. After the example of Pythagoras, he threw a veil of obfcurity over his public inftructions, which was removed only for the benefit of thofe who were admitted to his more private and confidential lectures. This concealed method of philofophifing he adopted partly from a regard to his perfonal fafety, and partly, if not principally, from motives of vanity. For this purpofe the colloquial form of inftruction, introduced by Socrates in his contefts with the Sophifts, and adopted in the Dialectic fchools, was found by Plato to be peculiarly convenient. Accordingly Cicero, though an enthufiaftic admirer of Plato, obferves, that "Plato affirms nothing, but after producing many arguments, and examining a queftion on every fide, leaves it undetermined." His language likewife, occafionally fplendid, and at other times ambiguous and equivocal, renders his meaning often doubtful and unintelligible: to which we may add, that the obfcurity of his writings is greatly increafed by the intermixture of mathematical ideas or language with thofe of metaphyfics. After all, the principal caufe of the want of perfpicuity that characterizes the writings of Plato is the extreme fubtlety of his fpeculations upon abftract and fublime topics. Raifing 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 reprefents thefe fictions of fancy as the firft principles of wifdom. In fuch a wondrous maze of words does Plato involve his notions, that none of his difciples, not even the fagacious Stagirite, could unfold them; and yet we receive them as facred myfteries, and if we do not perfectly comprehend them, imagine that our intellects are too feeble to penetrate the conceptions of this divine philofopher, and that our eyes are blinded, as Burnet in his "Archæologia" expreffes it, by that refplendent blaze of truth, upon which his eagle fight could gaze without injury. Plato, indeed, ambitious of the honour of forming a new fect, and endued by nature with more brilliancy of fancy than ftrength of judgment, collected the tenets of other philofophers, which were, in many particulars, contradictory, and could by no exertion of ingenuity be brought to coalefce; and that, out of this heterogeneous mafs, he formed a confufed fyftem, deftitute of form or confiftency. This, it is faid, will be acknowledged by every one, who, in perufing the philofophical writings of Plato, is capable of divefting himfelf of that blind refpect for antiquity, by which the learned fo frequently fuffer themfelves to be mifled. In confirmation of this judgment, we need only refer to the dialogue entitled "Timæus;" a chaotic mafs of opinions, which no commentators have yet been able to reconcile, or to explain. The followers of Plato, inftead of arifing to difperfe the clouds that envelope his fyftem, feem to have combined in increafing its obfcurity. By fucceffive changes in the academy, after the death of its founder, new opinions were introduced, and thefe increafed the difficulty of exploring the true fenfe of Plato; and when, in a fubfequent period, the Platonic philofophy was profeffed in Alexandria, it was further adulterated by an injudicious and abfurd attempt to mould into one fyftem the doctrines of Plato, the traditionary tenets of Egypt and the eaftern nations, and the facred records of the Jews and Chriftians; a coalition which will appear, in the fequel of this article, to have proved exceedingly injurious both to philofophy and religion.

All the preceding circumftances confidered, it will appear to be no eafy tafk to delineate an accurate fketch of the Platonic philofophy. This philofophy, as he fuggefts, and his interpreters allow, may be divided into three branches: the firft treating of the art of reafoning, or dialectics; the fecond, of theoretical queftions concerning nature, or phyfics; and the third, of practical fubjects refpecting life and manners, or ethics.

Wifdom, in the ftrict Platonic fenfe of the term, is the knowledge of thofe things which truly exift, and are comprehended by the intellect, particularly thofe which refpect God, and the human foul as diftinct from the body. Philofophy is the defire of divine fcience, or the liberation of the mind from the body, and its direction towards thofe real effences, which are perceptible only by the underftanding: accordingly, a philofopher muft poffefs a mind naturally turned towards contemplation, an ardent love of truth, a penetrating judgment, and a retentive memory; and he muft alfo be inured to the exercife of temperance and fortitude, that nothing corporeal may divert him from the purfuit of wifdom. Philofophy, as employed in the contemplation of truth, is termed theoretical; and as converfant 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 refemblance to the divinity; the latter leads to an active life, and applies the principles of wifdom to the benefit of fociety. Befides the contemplation of truth and virtue, the philofopher will inquire into the right conduct of the underftanding, and the powers of fpeech in the purfuits of knowledge, or will ftudy the art of reafoning or difputation. The office of philofophy then is threefold, *dialectic*, *theoretical*, and *practical*.

For the fum of Plato's doctrine on *dialectics*, as collected from his dialogues, fee DIALECTICA. The *theoretical* philofophy is divided by Plato into three branches, *viz. theological*, *phyfical*, and *mathematical*.

On *theology*, the fundamental doctrine of Plato, as well as that of other ancient philofophers, is, that from nothing nothing can proceed. This univerfal axiom, applied not only to the infinite efficient, but to the material caufe, 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 ἓν, and τ' ἀγαθὸν, *the good*, he ſuppoſes an immoveable 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 *empyrean*, 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, uncircumſcribed 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 Το Αγαθὸν, *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, ὄντως 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 pyramidical, thoſe of air in the form of an octahedron, and thoſe of water in that of an icoſahedron; 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 tinctured 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 contented

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. Neverthelefs, 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 Thraſybulus, 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. Alcinous, 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 philoſophy. 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 unqueſ-

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 Sacca 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 Sacca, 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 tinctured 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 partizans 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 emaning 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 soul 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 Cabbalistic 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, Chalcidius, 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 commendations

mendations 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 ECLECTICS.

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 Beſſario, 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 Joannes Picus of Mirandola, born in 1460; who, for his ſucceſs in reviving the Platonic philoſophy, was honoured with the title of the phœnix 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 Medicean 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 synonimous 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° 36′. W. long. 74° 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° 23′. E. long. 12° 45′.

PLATTENBURG, a citadel of Brandenburg, in the Mark of Pregnitz; 4 miles E. of Wilsnach.

PLATTS, a small island in the Indian sea. S. lat. 5° 55′. E. long. 55° 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° 41′. W. long. 73° 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 artizans 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 πλατυνω, *to dilate* or *enlarge*, in allusion to its large spreading calyx; a genus described by Jussieu, in the Annales du Musée, 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 πλατυς, *broad*, and λοβος, *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. *Pist.* 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.

Eff. 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. Malmais. t. 31.—Leaves ovate, somewhat heart-shaped. Germen all over hairy. Stalk of the legume shorter than the calyx. Bracteas 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 *bracteas* under the

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. Bracteas 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 antimony, 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.

ANATINUS. 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, serratures, 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 lessens 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 six 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 serrated 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 i tmust 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.

PLATYRYNCHOS, in *Ichthyology*, a name given by some to the nasus, 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 *Nasus*.

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 πλατυς, *broad*, and ζωμα, *a belt*, 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 *involucrum*.

The

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 Fiſtritz.

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 Jenibaſar.

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 Sarſina, 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 repreſented 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, ſeller 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, Walſh 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, Cook, 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 foure 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 ſeller, 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 Théis.* 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 tort*, 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 apprize the court and the adverſe party of the nature and circumſtances of the defence, and to keep the law and

and the fact diftinct. And it is an invariable rule, that every defence which cannot be thus fpecially pleaded, may be given in evidence, upon the general iffue at the trial. Of late, on account of the chicane and delay that have attended fpecial pleading, the courts have, in fome inftances, and the legiflature in many more, permitted the general iffue to be pleaded, thus leaving every thing open, the fact, the law, and the equity of the cafe, and have allowed fpecial matter to be given in evidence at the trial.

Special pleas, *in bar* of the plaintiff's demand, are very various, according to the circumftances of the defendant's cafe. As, in real actions a general releafe, or a fine, both of which may deftroy and bar the plaintiff's title. Or, in perfonal actions, an accord, arbitration, conditions performed, nonage of the defendant, or fome other fact which precludes the plaintiff from his action. A *juftification* is likewife a fpecial plea in bar; as in actions of affault and battery, *fon affault demefne*, that it was the plaintiff's own original affault; in trefpafs, that the defendant did the thing complained of in right of fome office which warranted him fo to do; or, in an action of flander, that the plaintiff is really as bad a man as the defendant faid he was. A man may alfo plead the ftatutes of limitation in bar. (See *Statutes of* LIMITATION.) An eftoppel is likewife a fpecial plea in bar. See ESTOPPEL, BAR, and ABATEMENT.

The conditions and qualities of a plea are, 1. That it be fingle, and containing only one matter; for duplicity begets confufion. But by ftatute 4 & 5 Ann. c. 16. a man, with leave of the court, may plead two or more diftinct matters or fingle pleas; as in an action of affault and battery, thefe three, not guilty, *fon affault demefne*, and the ftatute of limitation. 2. That it be ftrict and pofitive, and not argumentative. 3. That it have convenient certainty of time, place, and perfons. 4. That it anfwer the plaintiff's allegations in every material point. 5. That it be fo pleaded as to be capable of trial. Special pleas are ufually in the affirmative, fometimes in the negative, but they always advance fome new fact not mentioned in the declaration; and then they muft be averred to be true in the common form; "and this he is ready to verify." This is not neceffary in pleas of the general iffue; thofe 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 fpecially fuch a plea as amounts only to the general iffue, or a total denial of the charge; but in fuch cafe he fhall be driven to plead the general iffue in terms, whereby the whole queftion is referred to a jury. But if the defendant, in an affife or action of trefpafs, be defirous to refer the validity of his title to the court rather than to the jury, he may ftate his title fpecially, and at the fame time *give colour* to the plaintiff, or fuppofe 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 iffue, or total contradiction of the declaration, but only evades it, the plaintiff may plead again, and *reply* to the defendant's plea; either traverfing it, that is, totally denying it; as if on an action of debt upon bond, the defendant pleads *folvit ad diem*, that he paid the money when due, here the plaintiff in his *replication* may totally traverfe 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 fet forth an actual award, and affign a breach; or the replication may *confefs and avoid* the plea, by fome new matter or diftinction, confiftent with the plaintiff's former declaration; as, in an action for trefpaffing upon land of which the plaintiff is feifed, if the defendant fhews a title to the land by defcent, and that therefore he had a right to enter, and gives colour to the plaintiff, the plaintiff may either traverfe and totally deny the fact of the defcent; or he may confefs and avoid it by replying, that true it is fuch defcent happened, but that fince the defcent the defendant himfelf demifed the lands to the plaintiff for term of life. To the replication the defendant may *rejoin*, or put in an anfwer called a *rejoinder*. The plaintiff may anfwer the rejoinder by a *fur-rejoinder*; upon which the defendant may *rebut*; and the plaintiff anfwer him by a *fur-rebutter*; which pleas, replications, rejoinders, fur-rejoinders, rebutters, and fur-rebutters, anfwer to the *exceptio*, *replicatio*, *duplicatio*, *triplicatio*, and *quadruplicatio* of the Roman laws. Inft. 4. 14. Bract. l. 5. tr. 5. c. 1.

The whole of this procefs is denominated the *pleading*; in the feveral ftages of which it muft be carefully obferved, not to depart or vary from the title or defence, on which the party has once infifted. For this (which is called a *departure* in pleading) might occafion endlefs altercation, therefore the replication muft fupport the declaration, and the rejoinder muft fupport the plea, without departing out of it. As in the cafe of pleading no award made, in confequence of a bond of arbitration, to which the plaintiff replies, fetting forth an actual award; now the defendant cannot rejoin that he hath performed this award, for fuch rejoinder would be an entire departure from his original plea, which alleged that no fuch award was made; therefore he has now no other choice, but to traverfe the fact of the replication, or elfe 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 evafive plea by the defendant, reduce that general wrong to a more particular certainty, by affigning the injury afrefh with all its fpecific circumftances in fuch manner as clearly to afcertain and identify it, confiftently with his general complaint; which is called a *new* or *novel affignment*. Although duplicity in pleading muft be avoided for various reafons, yet it is often expedient to plead in fuch a manner, as to avoid any implied admiffion of a fact, which cannot with propriety or fafety be pofitively affirmed or denied. And this may be done by what is called a *proteftation*; by which the party interpofes an oblique allegation or denial of fome fact, protefting (by the gerund, *proteftando*) that fuch a matter does or does not exift; and at the fame time avoiding a direct affirmation or denial. The ufe of this proteftation is to fave the party from being concluded with refpect to fome fact or circumftance, which cannot be directly affirmed or denied without falling into duplicity of pleading; and which yet, if he did not thus enter his proteft, he might be deemed to have tacitly waived or admitted.

In any ftages of the pleadings, when either fide advances or affirms any new matter, he ufually avers it to be true, "and this he is ready to verify;" on the other hand, when either fide traverfes or denies the facts pleaded by his antagonift, he ufually tenders an iffue, as it is called; the language of which varies with the party by whom the iffue is tendered; for if the traverfe or denial comes from the defendant, the iffue is tendered thus, "and of this he puts himfelf upon the country," thereby fubmitting himfelf to the judgment of his peers; but if the traverfe lies upon the plaintiff, he tenders the iffue, or prays the judgment of the peers againft the defendant in another form; thus, "and this he prays may be inquired of by the country." But if either fide (*e. g.* the defendant) pleads a fpecial negative plea, not traverfing 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. Blackst. 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 *respondeat ouster*, 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 impannelled 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 *instanter*, 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 Cestriæ." 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 exprefsly 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 fteps which may be taken by a defendant before he puts in his plea. When thefe proceedings are over, the defendant muft then put in his excufe or plea. For an account of the different pleas, and the further procefs by pleading; fee PLEA, *fupra*.

PLEASANT, in *Geography*, a town of Clermont county, in Ohio, containing 1245 inhabitants.—Alfo, in Fairfield county, containing 988 inhabitants.

PLEASANT, *Mount*. See MOUNT *Pleafant*; adding in that article after Pennfylvania, containing, in 1810, 1105 inhabitants.—Alfo, *Mount Pleafant* in Wafhington county, containing 1165; and *Mount Pleafant* in Weftmoreland, containing 1780 inhabitants, both in the fame ftate.—Alfo, in Jefferfon county, Ohio, containing 846 inhabitants.

PLEASANT *Point*, a N.E. headland in Merry-meeting bay, Lincoln county and ftate of Maine.—Alfo, a fertile and agreeably fituated point of land, on the weftern bank of the Paffamaquoddy river, about 15 miles from the mouth of the river, and four above Moofe ifland. On this point refide the remains of the Paffamaquoddy tribe of Indians, confifting of about 400 in number, and thought to be on the decline. They have a Roman Catholic prieft, and lately, a refpectable meeting-houfe has been erected at the expence of the ftate. Unacquainted with agriculture, their fummer employment is that of fifhing, and fhooting porpoifes, the oil of which they extract, and fell to the Americans for the ufe of lamps; and in winter they occupy themfelves in hunting. They have fome idea of moral obligation, but are not diftinguifhed for their honefty or fidelity. The women are graceful and delicate in their manners, and modeft in their drefs. The men are fullen and unfociable.—Alfo, the eaftern boundary of Hawk's, or Sandwich river, in the harbour of Chebucto.

PLEASANT *River*, a fmall village, with a poft-office, on the fea-coaft of Wafhington county, in Maine, at the head of Narraguagus bay; 16 miles N.E. of Goldfborough.

PLEASURE, the effect of a fenfation, or perception, agreeable to the mind, or of the gratification of fome appetite.

Pleafures may be diftinguifhed into two kinds. The firft, thofe which anticipate, or go before the reafon: fuch are all agreeable fenfations. Thefe are popularly called *pleafures of fenfe*, or *of the body*.

The fecond are thofe which do not precede, or anticipate, either the fenfes or reafon. Thefe we call *pleafures of the mind*. Such is the joy arifing from a clear perception of fome future good, or the confufed fenfation of a prefent one.

For an inftance of each. A man frequently finds pleafure in eating a fruit he was before unacquainted with; this is *anticipating pleafure*, 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 pleafure that follows from the knowledge of his prefent or future good.

Pleafure and *pain* feem to be no other than engines in nature's hand, by which we are directed to confult our own prefervation, and avoid our ruin. To things that may contribute to the one, as food, &c. fhe has annexed pleafure; and to thofe that may conduce to the other, as hunger, difeafes, &c. pain.

Among the multiplicity of things to be done, and to be avoided, for the prefervation of animal life, &c. how fhould we have diftinguifhed between the one and the other, but for the fenfation of pleafure or pain? Thefe are not only fpurs to urge us on, but alfo guides, to direct us whither we are to go. Wherever nature has fixed a pleafure, we may take it for granted, fhe there enjoins a duty; and fomething is to be there done, either for the individual, or for the fpecies.

Hence it is, that our pleafures vary at different ftages of life; the pleafures, *e. gr.* of a child, a youth, a grown man, an old man, &c. all tending to thofe particular things required by nature in that particular ftate of life, either for the prefervation, fimply, or, jointly, for that and propagation, &c.

Hence, from the different conftitutions of the body, at different ages, it were very eafy to account for all the particular taftes and pleafures thereof: not by deducing the pleafures mechanically from the difpofition of the organs in that ftate, but by confidering what is neceffary for the perfection and well-being of the individual in that ftate, and what is to contribute to that of the fpecies. In a child, *e. gr.* mere prefervation in the prefent ftate is not enough, it muft likewife grow: to bring this to pafs, nature has made the returns of hunger, &c. more frequent, as well as more acute, and the pleafures of feeding more exquifite. And that the excefs of aliment, in proportion to the bulk of the body, may be difpenfed with, fhe has made one of the great pleafures of the ftate to confift in a feries of fportive exercifes; by means of which the parts of the body come to be opened and expanded, and arrive at maturity. This done, the pleafures that conduced to it difappear; and others, fuited to the new ftate, fucceed.

In the Hartleyan fyftem, the capacity of pleafure and pain is one of the faculties of the human mind, by which a man becomes capable of action, enjoyment, or fuffering. Our affections, or paffions, are feelings arifing from the perception of pleafure or pain, or, in other words, of natural good or evil, according to the circumftances in which they are placed. "By the affections," fays Dr. Hartley, "we are excited to purfue happinefs and all its means, and to flee from mifery and all its apparent caufes." The primary affections in his fyftem are ten; five grateful, and five ungrateful: the former are love, defire, hope, joy, and pleafing recollection: the latter are hatred, averfion, fear, forrow, and difpleafing recollection. (See AFFECTION and PASSION.) The exiftence of this capacity of pleafure and pain we derive from confcioufnefs; and what pleafure and pain are, we learn from experience; thefe being feelings which cannot be expreffed by definition. Natural good produces pleafure, and that which produces pain is natural evil. Our pleafures and pains are either fenfible or intellectual, that is, they are the effect of either fenfations or ideas. The pleafurable and painful fenfations he thus explains by his theory of vibrations. Moderate vibrations are the caufes of pleafure, whilft violent vibrations occafion pain; hence the fame fenfation, which in a moderate degree is pleafurable, may, by increafing beyond certain limits, become exquifitely painful, as in the cafe of heat. Dr. Hartley conjectures, that the precife limit between pleafure and pain is the folution of continuity in the nerve that vibrates. Hence, Hartley and his difciples alfo account for the pleafure which accompanies the recovery from painful diforders, and from the recollection of paft pains, dangers, and troubles. The vigorous vibrations, which occafion pain, fubfide by length of time within the limits of pleafure. Hence, it has been fuggefted, we may account, at leaft in part, for the exiftence of evil in the univerfe, and are able to affign a reafon, why a ftate of probation, to beings conftituted like ourfelves, fhould be in a confiderable degree a ftate of fuffer- ing.

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-feet wide beds arranging parallel, with two-feet 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, thrift, 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 hahas, 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 interſections, 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

In thefe rural works, however, we fhould not entirely abolifh all appearance of art and uniformity; for thefe, when properly applied, give an additional beauty and peculiar grace to all natural productions, and fet nature in the faireft and moft advantageous point of view. One principal point in laying out a pleafure ground, is for the defigner to take particular care that the whole extent of his ground be not taken in at one view, as where the contrary is the cafe, there is a tamenefs and want of proper effect produced.

It is impoffible to give any directions for planting a pleafure ground; as the plan may be varied exceedingly, according to the natural figure, pofition, and fituation of the land, and tafte of the defigner.

In refpect to the fituation, it muft be immediately contiguous to the main houfe, whether high or low fituated: however, a fomewhat elevated fituation, or the fide or fummit of fome moderate rifing ground, is always the moft eligible on which to erect the chief habitation, arranging the pleafure ground accordingly; fuch an expofure being the moft defirable, both for the beauty of the profpect and healthfulnefs of the air; a low level fituation neither affording a due profpect of the ground, nor the adjacent country, befides being liable to unwholefome dampnefs, and fometimes inundation in winter: there are, however, many level fituations, forming plains or flats, that poffefs great advantages both of foil and profpect, and the beauties of water without too much moifture; there are alfo fometimes large tracts of ground, confifting both of low and high fituations, as level plains, hollows, eminences, declivities, and other inequalities, which may be fo improved as to make a moft defirable pleafure ground, as the fcene may be varied in the moft beautful manner imaginable; but as the choice of fituation and fcope of ground is not always attainable, every one muft regulate his plan in the moft commodious manner poffible, agreeable to the nature of the particular fituation, extent of ground, and plan which has been adopted.

The extent of pleafure grounds may be varied, according to that of the eftate or premifes, and other circumftances, as from a quarter or half an acre to thirty or forty or more.

The ground for this purpofe fhould previoufly be well fenced in, by a wall, paling, hedge, or parts of each fort, and in fome parts a foffe or haha, where it may be neceffary to extend the profpect, either at the termination of a lawn, walk, or avenue; and the clofe fences fhould generally be concealed withinfide, particularly the wall and paling fences, by a range of clofe plantation, unlefs where the wall may be wanted for the culture of wall fruit. But fometimes, when the pleafure ground adjoins to a fine park, paddock, or other agreeable profpect, the boundary fence on that fide is often either a low edge, or a haha; but many prefer the latter, efpecially at the termination of any fpacious opening, both to extend the profpect more effectually, and give the ground an air of greater extent, than it really has, at a diftance; the haha being funk, nothing like a fence appears, fo that the adjacent park, fields, &c. appear to be connected with the grounds.

The arrangement of the feveral divifions, both internal and external, muft be wholly regulated by the nature and extent of the ground.

And in whatfoever mode fuch grounds are laid out, the whole of the different quarters, walks, and other parts, fhould be kept in an exact and neat order.

According to Mr. Loudon, the pleafure ground may confift of fcenes of different expreffions of avowed art, as thofe of gardening; and of nature, as thofe of picturefque improvement, fuch as tranquil or fequeftered glades, romantic glens, flowery meads, furzy heaths, tangled dingles, wooded dells, rocky fteeps, and numberlefs others, which are to be met with in a varied or picturefque country, and are either to be heightened in effect, or preferved from cultivation by the improver. Wherever the pleafure ground is not under fome of the particular fcenes of ornamental gardening, it fhould be fed at leaft by fheep, and often by horfes, cattle, &c., which fhould be allowed to come clofe to the terrace wall that feparates the lawn from the manfion; for what can be more dull and unnatural, than the modern method of furrounding a houfe by a naked lawn totally deftitute of animation?

A hollow winding dell or dingle, containing a brook or rill overhung with wood, and its banks diverfified by broken ground prefenting various coloured earths, and among the low growths old trunks of trees, roots, and ftones, or dells of a grander character, containing bold, perpendicular, projecting, or irregular, maffive rocks, overhung with huge trees, bufhes, ferns, and creepers, grouped and combined in an infinite diverfity of ways,—the ftream, interrupted by the rocks, tumbling over in roaring cataracts, foaming cafcades, or interrupted only by gentle falls,—and perhaps in fome places, where the dell widens into a valley, fpreading itfelf into a cryftal lake, varied by little iflands and woody projections, all heightened by the ufual appendages of animation, the finging of birds, the fragrance of flowers, from what is confidered to be among the moft enchanting kinds of reclufe pleafure ground fcenery. When a place is fortunate enough to have fuch a romantic chain of picturefque beauty as this, it fhould feldom be touched by the hand of art. It may happen, that fome improvement may be made, by fhewing, in a partial manner, rocks, roots, or ftones, that are perhaps totally concealed; by augmenting a natural cafcade, or by fupplying ivy, or fome other creepers, or evergreens, &c.; but in general little more can be attempted with propriety. The principal operation, that in any cafe can be undertaken in fuch a fcene, is, where it may be requifite to lead through a walk, or road, either to obferve its beauties, or as an approach to fome other part of the refidence. The difficulty of executing either of thefe will be great to thofe, who think of nothing but undulating fweeps, fhaven lawns, and ferpentine gravel walks; but by thofe accuftomed to admire this kind of fcenery, the operation will eafily be accomplifhed. See RESIDENCE.

PLEASURE *of the King*, in *Law*, is ufed in connection with the infliction of punifhment for any crime, not to fignify any extrajudicial will of the fovereign, but fuch as is declared by his reprefentatives, the judges in his courts of juftice: "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 diftrict of Tulles; 18 miles E. of Tulles. The place contains 655, and the canton 6355 inhabitants, on a territory of 232½ kiliometers, in 8 communes.

PLEAUX, a town of France, in the department of the Cantal, and chief place of a canton, in the diftrict of Mauriac; 8 miles S.W. of Mauriac. The place contains 2584, and the canton 10,667 inhabitants, on a territory of 182½ kiliometres, in 12 communes.

PLEBANUS was anciently the title of a rural dean.

The denomination arofe hence, that thefe deaneries were then affixed to the *plebania*, or chief mother-church within fuch a diftrict; which, at firft, was ufually ten parifhes.

PLEBANUS feems alfo to have been ufed for a parifh-prieft of fuch a large mother-church, as was exempt from the jurifdiction of the ordinary; fo that he had the authority of

 a rural

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*, πληκτρον, 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. (Germanea; Juſſ. 116. Lamarck Illuſtr. t. 514.)—Claſs and order, *Didynamia Gymnoſpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, 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 article. 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 *Ocymum*, 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 *Ocymum* 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. (Germanea urticifolia; Lamarck 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. Maſſon 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 ſerrated like thoſe of a common nettle, veiny, roughiſh. *Flowers* copious, in pale violet cluſters.

2. P. *galeatus*. Helmet Plectranthus. Vahl. Symb. v. 1. 43. Willd. n. 2.—Nectary gibbous. Partial flower-ſtalks branched. Leaves ovate, ſomewhat heart-ſhaped, pointed, ſerrated.—Native of Java. *Stem* villous, furrowed. *Leaves* ſtalked, broadly ovate, villous, eſpecially the veins beneath. *Cluſter* terminal; the flower-ſtalks oppoſite, branched, without *bracteas*. *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 *bracteas*. *Corolla* ſmall, cloſed, downy.

4. P. *Forſkolaei*. Bearded Plectranthus. Vahl. Symb. v. 1. 44. Willd. n. 4. Ait. n. 2. (P. barbatus; Andr. Repoſ. 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 *bracteas*.

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. Cluſter 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. Diſſ. 9. t. 2. Am. Acad. v. 10. 52. t. 3. Ait. Hort. Kew. v. 3. 383. Katu-Kurka; Rheede Hort. Malab. v. 10. 179. t. 90. Nepeta indica, rotundiore folio; Moriſ. Sect. 11. t. 6. f. 7.)—Nectary gibbous. Spikes ovate, denſe. Leaves ovate, ſomewhat heart-ſhaped, fleſhy, wavy or ſerrated.—Found by Koenig, on dry walls and rocks, at Sadraſs 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 ſerrated, 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 πληκτρον, *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 *Rhamni*, Juſſ. Linnæus refers it to his *Contortæ*, 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, pemanent. *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 *bracteas* 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, πληκτρον, 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 Vadium.

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, ſuretiſhip, or an undertaking, or anſwering for another.

The appellant ſhall require the conſtable and mareſchal to deliver his pleggs, and to diſcharge them of their pledgery; and the conſtable and mareſchal 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 πλεῖον, *more*. Mich. Boreal. Amer. v. 1. 247. Purſh Am. Sept. v. 1. 275.—Claſs and order, *Enneandria Trigynia*. Nat. Ord. *Tripetaloideæ*, 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

Purfh v. 1. 278.—The only fpecies; a native of open wet woods in Lower Carolina. *Michaux.* The *root* is perennial, refembling that of an *Iris*. *Leaves* few, radical, fheathing at the bafe, erect, very narrow, fmooth, flattened, taper-pointed, about half as tall as the common *flower-ftalk*, which is radical, about a foot and half high, fimple, erect, round, fmooth, nearly naked. *Clufter* terminal, erect, fimple, of fix or eight yellowifh-brown ftalked *flowers*, the fize of *Ornithogalum umbellatum*, each accompanied by a tubular pointed *fheath* as long as the flower of its ftalk. This plant agrees in number of *ftamens*, though not of *piftils*, with our *Butomus umbellatus*, a genus of the fame natural order, but the ftructure of the *feeds*, and their infertion, are both different, as well as the *inflorefcence*.

PLEGII *de Retorno*, &c. in *Law*. See REPLEVY and RETORNO *Habendo*.

PLEGIIS ACQUIETANDIS, a writ that lies for a furety, againft him for whom he is furety, in cafe he pay not the money at the day. Fitz. Nat. Brev.

PLEGORRHIZA, in *Botany*, from πληγη, *a wound*, and ῥιζα, *a root*, becaufe the root of this plant is ufed by the inhabitants of Chili as a vulnerary. Molin. Chil., the German edition, 140. Willd. Sp. Pl. v. 2. 487. Juff. 438. —Clafs and order, *Enneandria Monogynia*.

Eff. Ch. Calyx none. Corolla of one petal. Capfule of one cell. Seed folitary.

1. P. *adftringens*. Willd. n. 1. (P. Guajcuru; Molina as above.)—Native of the northern provinces of Chili. *Stem* woody. Radical *leaves* collected into a tuft, ftalked, oval, fimple, undivided; thofe on the branches feffile, ovate. *Flowers* numerous, ftalked, terminal. *Corolla* undivided. *Stamens* nine, very fhort. *Anthers* oblong. *Germen* orbicular. *Style* cylindrical, the length of the ftamens. *Stigma* fimple. *Capfule* oblong, rather compreffed. *Seed* of the fame fhape. Juffieu reckons a *calyx*, what Willdenow, as above, terms *corolla*, and advifes that the genus fhould be compared with his orders of *Lauri* and *Polygoneæ*.

PLEGRA, in *Ancient Geography*, a town of Afia, in the interior of Galatia, in the country of the Paphlagonians: placed by Ptolemy between Zagira and Sacora.

PLEIADES, Πλειαδες, in *Aftronomy*, an affemblage of feven ftars in the neck of the conftellation Taurus.

They are thus called from the Greek πλειν, *navigare, to fail;* as being terrible to mariners, on account of the rains and ftorms that frequently rife with them.

The Latins call them *vergiliæ*, from *ver, fpring;* becaufe of their rifing about the vernal equinox.

The largeft is of the third magnitude, and is called *Lucida Pleiadum*. See TAURUS.

There are now only fix ftars vifible in Pleiades, and this appears to have been the cafe fo long ago as the time of Ovid:

"Quæ feptem dici, fex tamen effe folent."

PLEIADES, in *Mythology*, were the feven daughters of Atlas, called Maya, Electra, Taygefa, Afteropa, Alcione, Celeno, and Merope. Thefe Atlantides, it is faid, were tranflated to the heavens, and formed the Pleiades; the meaning of which fable is, that Atlas firft obferved thefe ftars, and called them by the names of his daughters.

PLEIADES, *Poetical*, is a name which the Greeks gave to feven celebrated poets, flourifhing 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 confifted of Daurat, Ronfard, du Bellay, Belleau, Baif, Tyard, and Jodelle.

On the fame model, fome of their authors afterwards projected a new Pleiades of the Latin poets of the laft century; but they were not agreed about the names of thofe that fhould compofe it; much lefs on him who fhould 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 paffes; it joins Theakiki river, which comes from the eaftward. Thence the united ftream takes the name of Illinois. The land between thefe branches is rich, and intermixed with fwamps and ponds.

PLEINFELD, or BLEINFELD, a town of Bavaria, infulated in Anfpach; 22 miles S.E. of Anfpach. 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 diftrict of St. Malo. The town contains 2726, and the canton 12,878 inhabitants, on a territory of 167½ kiliometres, in 11 communes.

PLEINTING, a town of Bavaria, on the Danube; 5 miles S.S.E. of Ofterhof.

PLEISKE, a river of Brandenburg, which runs into the Oder; 9 miles above Francfort.

PLEISNITZ, a town of Hungary, 25 miles W. of Cafchau.

PLEISSA, a river of Saxony, which runs into the Elfter, near Leipfic.

PLEISSEN, or PLEISSA, a lordfhip of Germany, in the principality of Heffe Rhinfels, infulated in the duchy of Brunfwick. It takes its name from an old caftle fituated 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 diftrict of Montfort; fix pofts E.N.E. of Vannes. The place contains 2917, and the canton 13,316 inhabitants, on a territory of 325 kiliometres, in 8 communes.—Alfo, a town of France, in the department of the Northern Coafts, and chief place of a canton, in the diftrict of Dinan; 6 miles E. of Loudeac. The place contains 854, and the canton 3903 inhabitants, on a territory of 122½ kiliometres, in 9 communes.

PLEMMYRIUM, in *Ancient Geography*, a promontory on the eaftern coaft of Sicily, over-againft Syracufe, of which it was the port, according to Thucydides. It is alfo mentioned by Virgil.

PLEMMYROS, a word ufed by the old Greek writers to exprefs a redundance of humours. Its proper fignification is the flowing in of the tide.

PLEMPIUS, VOPISCUS FORTUNATUS, in *Biography*, an eminent phyfician, was born at Amfterdam, of a diftinguifhed family, in December 1601. He received his claffical education at Gand, and ftudied philofophy at Louvain, whence he repaired to Leyden, and commenced his medical ftudies. He fubfequently travelled into Italy, and paffed the principal portion of his time at Padua and Bologna, having the advantage of purfuing his anatomical inveftigations 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 fettled in the practice of his profeffion in his native city, where he acquired a high reputation; and was induced to accept the invitation of Ifabella, princefs of the Low Countries, to the vacant profefforfhip of

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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, ſive de Oculi Fabricâ, Actione, et Uſu," Amſt. 1632; Lovæn. 1648. A tranſlation of the Anatomy of Cabrolius 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, ſive, 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 kiliometres, 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 phyſic, 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, Πληρωτικα, formed from πληροω, *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 parifh, fituated in the hundred of Dunmow, and county of Effex, England, though now containing, according to the parliamentary returns of 1811, only 46 houfes, and 221 inhabitants, was a place of diftinguifhed confequence in ancient times. Gough and Morant are both of opinion that it was the fcite of a Roman ftation, from the number of urns and Roman bricks which have been dug up here, and from the boldnefs and regularity of the entrenchment furrounding the village. The vallum of this work is ftill very perfect on three fides, and appears to have had four original entrances through it into the inclofed area. Thefe circumftances, however, though plaufible reafons for affigning to Plefhy a Roman origin, are not conclufive evidence. In the Saxon era no mention is made of this place; indeed its authentic hiftory does not commence till the reign of king Stephen, when we are informed that it was vefted in the crown by the king's marriage with Maud, granddaughter of Euftace, earl of Boulogne, by whom it is probable the caftle here was firft erected. Stephen granted it to William de Magnaville, high conftable of England, who procured licence to fortify the caftle from Henry II. Hence we conjecture that he was the perfon who conftructed the foffe, as well as the immenfe keep, which remains to this day a proud monument of the ancient grandeur and ftrength of this once majeftic fortrefs. The keep is oval fhaped, and meafures about 890 feet in circumference, and forty-five paces in breadth at the top.

Humphrey de Bohun, earl of Hereford, having fucceeded to the eftate and honours of the Magnavilles, obtained leave of Edward I. to enlarge his park at Plefhy, by inclofing 150 additional acres. In this family the caftle and manor continued till the year 1372, when Thomas of Woodftock, afterwards duke of Gloucefter, became poffeffed of them, and of the dignity of high conftable, by his marriage with Eleanor, eldeft daughter, and co-heirefs of Humphrey, the laft male heir of the Bohuns. This nobleman, whofe bufy life and tragical fate form confpicuous features in the hiftory of England, was decoyed from the caftle by his nephew, king Richard II., and treacheroufly put to death. Plefhy, 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 Lancafter. From that period the caftle feems to have been totally neglected, but the date of its demolition is not mentioned. Leland fays that this place was anciently called Tumbleftoun, and that Plefly is a corruption for Caftel de Placeto. A college for a mafter and eight fecular priefts, two clerks, and two chorifters, was founded here by Thomas of Woodftock in 1393. The original endowments were fubfequently augmented by various benefactors: and at the time of the diffolutions its revenues were valued at 139*l.* 3*s.* 10*d.* *per annum* clear. This houfe was granted by Henry VIII. to fir John Gates, who razed all the old buildings, the college-church excepted, which he however alfo partly deftroyed. It continued in a ruinous ftate till the beginning of the laft century, when bifhop Compton, having been promoted to the fee of London, repaired fuch portions of it as were ftanding, and added a neat body of brick. The principal monuments here are thofe of fir William Jolliffe, knt., and his nephew, Samuel Tuffnell, efq., whofe family here poffeffed the manor for upwards of half a century. Some memorial of the former confequence of Plefhy appears in the election of a mayor annually from among the freeholders of the village, at the court-leet for the manor. This cuftom is fingular, and feems to indicate that Plefhy was at one time a corporate town. Beauties of England and Wales, vol. v., by John Britton and E. W. Brayley, from Morant's "Hiftory, &c. of Effex," folio; and Gough's "Hiftory and Antiquities of Plefhy," 4to.

PLESMONE, a word ufed by the ancients to fignify plenitude or fatiety.

PLESSEVITZA, in *Geography*, a mountain of Croatia; 12 miles N.W. of Bihacs.

PLESSOW, a town of the duchy of Warfaw; 8 miles W. of Kalifch.

PLESTIN, a town of France, in the department of the North Coafts, and chief place of a canton, in the diftrict of Lannion; 7 miles S.W. of Lannion. The place contains 4862, and the canton 9460 inhabitants, on a territory of 105 kiliometres, in 7 communes.

PLESUR, a river of the Grifons, which runs into the Rhine at Coire.

PLESZ, or PLESSE, a town and fortrefs of Silefia, and capital of a lordfhip, in the principality of Ratibor, on the borders of Poland, furrounded with walls, flanked with towers, and containing two churches; 17 miles N.N.E. of Tefchen. 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, πληθωρα, in *Medicine*, from πληθω, *impleo*, fullnefs of habit, or an abundance of blood.

Every increafe of the fluids is fometimes called plethora; but the medical authors who fpeak definitely, limit the term to a fuperabundance of good blood. (See Van Swieten, Comment. ad Aph. 106.) This, then, is fcarcely to be confidered as itfelf a difeafe, but a degree of high health, bordering upon difeafe; a condition which predifpofes to difeafe, and renders the perfon liable to be difordered by any exciting caufe, by which the equilibrium of the circulation may be accidentally difturbed.

The mechanical phyficians afcribed many of the morbid actions of the fyftem to plethora; and they remarked, that an abundance of blood was inconvenient to the animal economy in a relative manner only, in different cafes, *viz.* relative to the quantity, to the fpace occupied, to the bulk, and to the patient's ftrength. The firft, plethora *ad molem*, or *ad vafa*, fignified the abfolute over-abundance of blood, as feen by the florid diftention of the minute veffels, and detected by a full, oppreffed, and labouring pulfe. This occurs generally in vigorous conftitutions, where the digeftive powers are ftrong and active, and the wafte from exercife difproportioned to the fupply. The fecond, or plethora *ad fpatium*, is produced when, the quantity of the circulating fluids remaining the fame, the capacity of the veffels is diminifhed; as may be exemplified in the ftate 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 fame, the bulk is augmented, as by external heat, inflammatory difeafes, ftimulating food and drink, violent paffions, &c. The blood, however, is not capable of much expanfion; and both this and the preceding condition are occafioned rather by a change in the diftribution of the blood, than by any actual variation in its condition. By cold, it is driven from the extreme veffels to thofe of the interior; by heat, it is admitted into the relaxed veffels of the external parts. The laft, or plethora *ad vires*, fignifies only a comparative weaknefs of the circulating powers; fo that although the quantity of blood be not fuperabundant, yet it is greater than the veffels are enabled to diftribute freely.

After all thefe refinements of pathology, it will be obvious that there is, in fact, but one kind of actual plethora, which is a real fuperabundance of blood, and is therefore the caufe of a predifpofition to difeafe, efpecially to fevers, to 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 contexture 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 Else 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° 6'. E. long. 23° 48'. Variation of the compass 27° 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 *Knysna*, which see. Plettenberg's bay is a division of the district of Zwellendam, which begins at the Kayman's river, and continues to the inaccessible forests of Sitsikamma. 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 3*d. 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 Jembasar.

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 Chatellerault. The place contains 1205, and the canton 7143 inhabitants, on a territory of 280 kiliometres, 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 Barea. N. lat. 31° 40'. E. long. 25° 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 πλευρον, *the side*, and κυστος, *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 ὀδυνη, *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 variegations. 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; Plaiſe. Body ſmooth; behind the left eye there is a row of ſix tubercles reaching to the lateral line. The plaiſe 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 plaiſe 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.

* Lævis; 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 plaiſe; 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 plaiſe.

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 alfo without pectoral fins. It is a native of China.

Punctatus. Body broad and very rough. It inhabits the deep fandy places of the Northern fea. It is reckoned a great delicacy in Denmark.

* Rhombus; Pearl. Body fmooth. It is found in European feas, and is the broadeft of its fize, except the turbot; the body is covered with fmall fcales, deep brown, with dirty yellow fpots, beneath white; the flefh is very good, but inferior to the turbot defcribed below.

Dentatus. Body oblong, fmooth; teeth extending out of the mouth. It inhabits Carolina.

* Maximus; the Turbot. Body rough. This fine fifh, fo highly prized by epicures, inhabits the European and Mediterranean feas: grows fometimes to thirty pounds weight; it is very voracious, and feeds on infects, worms, and teftaceous animals; the body is fquarer than any other fpecies; it is covered with obtufe, unequal, fpinous tubercles; above it is brown, varied with yellow; beneath it is white, fpotted with brown; the flefh is firm and excellent. For the method of catching turbot, fee the article Turbot.

* Passer; Whiff. Lateral line much curved, prickly. It is a native of European feas, and is about a foot long; the flefh is good.

Papillosus. Lateral line curved; body papillous. It inhabits America, and is fuppofed to be a variety of the laft.

Mancus. Head tuberculate; pectoral fins unequal. It inhabits the fandy bottoms of the Brafil and Pacific feas.

Argus. Body variegated; tail rounded; jaws equal. It is found in the neighbourhood of the Caribbee iflands; the body is covered with fmall foft fcales, and variegated with yellow fpots, which are dotted with brown, and edged with blue; the body is fprinkled with brown points.

Lunatus. Body with fcattered, blue, half ocellate fpots. It is a native of the North American feas; the tail is lunate.

Japonicus. Tongue rough. It is a native of the Japan feas. It is about fix inches long; the colour is brownifh above, and whitifh beneath; rays of the dorfal and anal fin fo extremely numerous as to be counted with difficulty.

PLEURO-PERIPNEUMONY, or Pleuro-pneumony, in *Medicine*, a term employed to denote the moft common form of pulmonary inflammation, in which both the pleura and the lungs are involved in the difeafe at the fame time. See Peripneumony.

PLEURORTHNOPŒA, a term ufed by medical writers to exprefs that kind of pleurify in which the patient cannot breathe, unlefs in an erect pofture.

PLEUROTHALLIS, in *Botany*, from πλευρα, *the fide*, and θαλλος, *a bough* or *frond*, apparently in allufion to the lateral infertion of the inflorefcence, the whole plant often confifting of but a fimple leaf with its ftalk; and at the fide, where both unite, the flowers are produced.—Brown MSS. Ait. Hort. Kew. v. 5. 211.—Clafs and order, *Gynandria Monogynia*. Nat. Ord. *Orchideæ*.

Eff. Ch. Lip of the nectary connected, by a joint, with the bafe of the column. Two lower calyx-leaves combined underneath. Maffes of pollen two, without a furrow. *Br.*

1. P. *rufcifolia*. Butcher's-broom leaved Pleurothallis. (Dendrobium rufcifolium; Swartz Orchid. 94. Willd. Sp. Pl. v. 4. 135. Epidendrum rufcifolium; Jacq. Amer. 226. t. 133. f. 3. Linn. Sp. Pl. 1353. Helleborine rufci majoris folio; Plum. Ic. 171. t. 176. f. 2.)—Stem elongated. Leaf folitary, ovato-lanceolate. Flowers aggregate, at the bafe of the leaf.—Native of woods in the Weft Indies. It flowers in the ftove in May and June. The perennial *roots* confift of numerous long fimple fibres, growing parafitically on the branches or ftems of trees. *Plants* feveral, about a fpan high, forming a tuft, like fmall lilies of the valley, but the *flowers* are not much elevated. Their form we have not had an opportunity of feeing.—We prefume the two other fpecies in Plumier's tab. 176, belong to the fame genus; but the above is alone mentioned in Hort. Kew.

PLEURS, Plurs, or *Piuro*, in *Geography*, a town of Switzerland, which was formerly large and flourifhing, and fubject, as well as Chiavenna, to the Grifons. It is faid to have contained three churches, many large houfes, and a ftone bridge over the Maria, and that its population amounted to at leaft 1500 inhabitants, who carried on no inconfiderable commerce. But it was totally overwhelmed by the fall of mount Conto, which terrible cataftrophe happened on the 25th of Auguft, 1618. The valley in which it was fituated is very narrow, and the whole town was buried in one undiftinguifhed ruin. A contemporary account relates, that the cloud of duft and rubbifh was fo great as to cover the heavens like fmoke, and even to extend as far as Chiavenna; the inhabitants of which place, alarmed at the phenomenon, were ftill more terrified at the fudden difappearance of the river Maria, the courfe of which was ftopped by the fallen fragments of rock, and apprehenfive 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 houfe, belonging to the richeft family in the place, are the only remains of its former exiftence.

PLEURTUIT, a town of France, in the department of the Ille and Villaine, and chief place of a canton, in the diftrict of St. Malo. The place contains 6596, and the canton 10,973 inhabitants, on a territory of 75 kiliometres, 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 feveral nerves or blood-veffels are united together. The plexus choroides is fituated in the lateral ventricle of the brain. (See Brain.) The plexus pampiniformis is made up of the ramifications and unions of the fpermatic veffels. (See Generation.) In the nervous fyftem plexufes are frequent, particularly in the great fympathetic. See Nervous *Syftem*.

PLEYBEN, in *Geography*, a town of France, in the department of Finifterre, and chief place of a canton, in the diftrict of Chateaulin; five miles N.E. of it. The place contains 3972, and the canton 14,404 inhabitants, on a territory of 375 kiliometres, in 9 communes.

PLEYBERG, a town of the duchy of Carinthia, formerly called "Auffenftein;" 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*, becaufe the difeafe is endemic in Poland, and the neighbouring countries, is an affection of the hair, which becomes matted together, and thickened, fo as to form maffes which cannot be unravelled, in confequence of the depofition of a morbid matter in and about the hair.

The difeafe is called *Koltum*, or *Koltek*, in Poland; and by the Germans *Weichfel-zopff*, on account of its prevalence in the region watered by the Weichfel, or Viftula. Sauvages and the nofologifts have denominated it *Trichoma*. As the difeafe is never feen in this country, except by the accidental vifit of a perfon affected with it from the country where

where it prevails, we can only defcribe it after the writers who have witneffed it. The moft clear and concife account of it is given by M. de la Fontaine, furgeon at Warfaw, in his furgical and medical treatifes on various fubjects refpecting Poland, publifhed in German, from which we fhall extract the following hiftory.

The fymptoms which precede the morbid affection of the hair are very various, and often put on the appearance of other difeafes. Thus pfeudo-rheumatic pains are fometimes the antecedents of the malady: and it is faid that apoplexy, mania, and various nervous difeafes are apt to occur, as well as inflammations, particularly of the eyes, indurations of the glands, gangrene, and caries, more particularly of the nafal bones and cranium. Sometimes, however, the *plica* comes on without any previous fymptom, even in the courfe of one night; and violent paffions of the mind, efpecially rage and terror, are faid to have caufed it inftantaneoufly. The moft common fymptoms of its approach are, a fenfe of weight and torpidity in all the limbs, pains in the back, giddinefs, difficulty of breathing, ringing in the ears, with an increafed fecretion 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 fcalp, pain in the præcordia, and depreffion of fpirits. In many patients there is a remarkable change in the appetite, a craving for fpirituous liquors, and for new and ftrange kinds of food, while they loathe the things which they ufed to relifh moft. But the moft certain figns that a plica will foon be formed, are clammy fweats about the head, with a diminution of pains, and a fenfation of tightnefs, as if the upper parts of the head were drawn together.

The hairs now begin to grow greafy, and emit a remarkably difagreeable fmell. The patient has frequent alternations of fhivering and heat, and feels an unpleafant prickling cold under his nails. Under thefe circumftances, a fort of crifis takes place, upon the depofition of the morbid matter upon the hair and nails, and the fymptoms of ill health immediately difappear, except in fome rare cafes, where a new depofition is to take place, and the crifis is therefore imperfect. The matter is depofited in the hairs, and fometimes in greater quantity than they can contain; they then burft, and a prodigious quantity is poured out between them, glueing them together. It is not true, that the hairs extend fo much that blood flows out of them, as has been affirmed, or that they bleed on being cut. Occafionally the matter is not only depofited in the hairy fcalp, but upon the hair of the pubis, of the arm-pits, or upon the nails. If the fymptoms continue, a fecond plica will certainly be formed, but not until the firft has feparated from the head, and new hair has grown: it is never certain, however, that a fecond will not be formed; for the difeafe often takes on a kind of periodic form. A conftant fenfe of cold about the head, and particularly at the temples, is a fure fign of its returning.

Sometimes the whole matter is depofited in one half of the hair, the other half remaining found: in which cafes, the previous fymptoms attack only one fide of the body. The peculiar form of the matting depends upon the previous fafhion of the hair: moft of the men cut it fhort, while the women, on the contrary, have uncommonly long and beautiful hair. The morbid matter is firft depofited in the rete Malpighii, from whence it penetrates into the hair, fometimes flowly, fometimes rapidly. The moifture oozing out from the hairs bind them fo together, that it is impoffible to feparate them again: if the whole hair be affected, it forms a kind of cap; if it flow out more partially, feveral tails or rope-like plicæ are produced. Some days after the mafs of difeafe has been formed, it begins to emit an odour like that of rancid fat; and when it is touched, it excites a pricking unpleafant fenfation in the fingers. M. Fontaine diffected a patient, in whom the plica had come on juft before death, and he found the bulbs of the hair larger than natural, from which he preffed 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 fuffers even more than from the difeafe.

All writers have divided the *plica* into feveral fpecies, according to the various forms which it affumes. Sauvages has defcribed three fpecies. 1. *Trichoma cirrofum*, or what the French call *plique en cordons*, is the moft common form, when it appears in long tails or cords, as before mentioned. It was called abfurdly enough by Schultz, plica *mas*, or the male plica. 2. *Trichoma villofum*, the plica *femina* of Schultz, when the difeafe is more generally diffufed. And 3. The *Trichoma Polonicum*, when it fuddenly extends to a great fize, and forms a cap over the head. M. Alibert, in the treatife "Sur les Maladies de la Peau," which he is now conducting, has alfo divided *la plique* into three fpecies, and points out feveral varieties under each. His firft is Plique *multiforme*, or Plica *caput-medufæ*, which applies to the tail-like or ferpentine agglutinations, which may not be inaptly compared to the fabulous head of Medufa. His fecond fpecies is Plique *à queue*, ou *folitaire*, or Plica *longi-cauda*, in which the plicæ are not divided, as in the former fpecies, but reunite and form one tail-like mafs, not unlike the tail of a quadruped, often acquiring a great length. And his third is Plique *en maffe*, or Plica *cefpitofa*, in which a conglomerated mafs is formed over the head, without any tail-like divifions. Thefe arbitrary claffifications afford at leaft fome diftinct notion of the varieties of appearance which the difeafe affumes.

The proximate caufe of the plica, according to M. de la Fontaine, is a peculiar morbid matter, which is clammy and acrid, has its feat in the lymph, and is depofited critically upon the hair or nails. When it is depofited 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 caufes are altogether uncertain; for neither the air, water, nor food, feems to have any influence in producing it; nor are cleanlinefs and regular combing the hair any defence againft it. Experience fhews, however, that it is a contagious difeafe, and very often congenital; at the fame time, thofe to whom it is communicated by contact are faid to have it flightly, and to be eafily cured. It fpares no fex, age, or condition, nor even newly arrived ftrangers, and fome infants bring it into the world with them: the lower claffes of the people, however, fuffer moft from it; and thofe who have foft brown hair are moft frequently affected, though no colour efcapes. The plica is never white; but when it drops off in old people, it is fometimes fucceeded by white hairs. Poles, who travel, are fometimes affected with it in other countries, and even their children. There is no accurate hiftory of its origin: the Greeks, Romans, and Arabians have not mentioned the difeafe; but fome modern writers affirm that it was imported from Tartary in the year 1387. It now prevails in Tartary, White and Red Ruffia, Lithuania, and from the fource of the Viftula to the Carpathian mountains; but is more frequent in fome diftricts than in others.

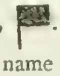
The method of cure recommended for plica varies with the circumftances of the cafe. When fever is prefent, moderate evacuations

evacuations muſt be reſorted 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 ſound 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 ſound 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, ſit 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 ſour. 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 moroſitatis*, 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. Juſſ. 342. Lamarck Illuſtr. t. 428.—Claſs and order, *Icoſandria Monogynia*. Nat. Ord. *Heſperideæ*, Linn. *Roſaceis affine*, Juſſ.

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.

Eſſ. 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 poffibly, confounded thefe 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 fynonyms are correctly ftated; fee alfo our article EUGENIA. We fubjoin all we can find upon record of the original and only fpecies of *Plinia,* of which we have never been fo fortunate as to fee a fpecimen.

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 oppofite, nearly feffile, ovate, pointed, entire, about three inches long and one broad, apparently fmooth, with one rib, and many tranfverfe incurved veins. *Flowers* fcattered over the larger branches, nearly feffile, folitary, fcarcely fo big as a hawthorn bloffom, the tapering *ftyle* projecting beyond the numerous *ftamens,* which are themfelves longer than the *petals. Fruit* globular, faffron-coloured and fragrant, according to Plumier, the fize of a large goofeberry, deeply furrowed and wrinkled. *Nut* more flightly furrowed, or rather quite globular and only ftriated, large, with a thin fhell, and full kernel.

Burmann, the editor of Plumier, mifconceived the *leaves* to be abruptly pinnate, taking the whole branch for a leaf. Linnæus adopted this error, and having once made a falfe ftep, he floundered deeper and deeper in trying to correct himfelf, altering the fpecific name time after time, and contrafting the plant with one of a different genus; into which laft miftake he was indeed led by his correfpondent Allamand. We do not prefume to throw any new light on this obfcure point of botanical hiftory, but what we have collected may ferve to affift thofe who may be fo fortunate as to meet, in fome part of the Weft Indies or of South America, with the plant Plumier defcribed. Dr. Swartz, who inveftigated the former with great induftry, feems never to have feen the *Plinia;* nor has he, in his *Obfervationes Botanicæ,* 203, done more than indicate the generic confufion, to which we have fufficiently adverted.

PLINIA, in *Gardening,* comprifes a plant of the exotic fhrubby kind for the ftove, of which the fpecies cultivated is the red-fruited plinia, or myrtle (P. pedunculata.)

Method of Culture.—It is increafed by the feeds, which fhould be procured from abroad, and which fhould be fown in pots, filled with rich mould, plunging them in a bark hotbed, when they appear in the fame feafon. They may alfo be increafed by planting cuttings of the young fhoots, in the later fpring and fummer months, in pots filled with good earth, covering them with hand or bell-glaffes, and watering them occafionally. They may be fo rooted as to be fit for removing into feparate pots the fame year.

It is a plant highly ornamental in ftove collections, from its flowering in the winter feafon.

PLINIANA, in *Geography,* a town or rather village of Italy, in the department of the Lario; fix miles N. of Como. This place is remarkable for a fingular fountain, which is ftill to be feen in the fame ftate as defcribed by Pliny, lib. iv. ep. 30. This fpring burfts from a rock, and falls in natural cafcades into the lake of Como. It ebbs and flows three times a day; gradually rifing until it forms a confiderable ftream, and then as gradually fubfiding till it becomes almoft dry.

PLINLIMMON, a mountain of Wales, in the N. part of the county of Cardigan, on the borders of Montgomeryfhire.

PLINTH, from πλινθος, *brick,* in *Architecture,* a flat fquare member, in form of a brick: fometimes, alfo, called the flipper.

The plinth is ufed as the foot, or foundation of columns: being that flat fquare table, under the mouldings of the bafe and pedeftal, at the bottom of the whole order; feeming to have been originally intended to keep the bottom of the primitive wooden pillars from rotting.

The plinth is alfo called the *orle* or *orlo.*

Vitruvius alfo calls the Tufcan abacus, plinth, from its refembling a fquare brick.

PLINTH *of a Statue,* &c. is a bafe or ftand, either flat, round, or fquare, ferving to fupport a ftatue, &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, ferving in a front wall to mark the floors; or to fuftain the eaves of a wall, and the larmier of a chimney.

PLINTHITIS, a kind of alum found in fome of the iflands of the Archipelago, and called alfo *placitis,* from its ufually being found in thin cakes.

PLINTHIUM, a name given by the ancients to a machine invented for the making extenfion of diflocated or fractured limbs. Oribafius defcribes feveral kinds.

PLINY, the elder, CAIUS PLINIUS SECUNDUS, in *Biography,* a diftinguifhed Roman writer, was born, it is thought, at Verona, in the reign of Tiberius, A.D. 23. He was defcended from an illuftrious family, and ferved in the army during the wars in Germany. He rofe to various public employments under the emperors Nero, Vefpafian, and Titus. It is faid that there is fcarcely a man of bufinefs who was fo devoted to ftudy, or comprehended fuch an extent of literary refearch. The following is the mode of his fpending his time at Rome, when he was high in the poffeffion of the imperial favour. Before day-break he waited upon Vefpafian, who was alfo an early rifer, and then proceeded to execute the emperor's orders. On returning home he employed the reft of the day in ftudy. After taking a light repaft, he reclined in the fun according to the Roman cuftom, while a book was read to him, from which he took notes. He never perufed any work without making extracts, as he was accuftomed to fay "that no book was fo bad as not to afford fomething valuable." He then bathed, flumbered a little, and rifing frefh, as if to a new day, ftudied till fupper time. Even during that repaft a reader was at his fide, as there was upon all his journies; 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 inftance: one of his friends having obliged the reader to repeat fomething that he had pronounced improperly, "Did you underftand him?" faid Pliny, "I did," he replied. "Why then did you ftop him? We have loft more than ten lines by the interruption." He always went from place to place in a fedan, that he might read on his road, and reproved his nephew for walking as fo much time loft. The plan thus adopted by the philofopher, it might be fuppofed, would have precluded all original obfervation and reflection; but he was diligent in natural purfuits, and it was his ardent curiofity and thirft of knowledge that occafioned his death. He had the command of the fleet ftationed at Mifenum, when, in the month of Auguft, A.D. 79, a great eruption of Vefuvius broke out. On its firft appearance he fteered directly to the fpot, as well for the humane purpofe of giving affiftance to the fugitives, as for viewing the progrefs of the eruption. The volcano raged with the utmoft fury, and fpread 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. Hardouin 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 prefect 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 unſuſpicious 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 Calphurnia: 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 panegyriſt 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 Veenhuſius; 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 Lawn*, 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.

PLIWISCHEN, a town of Pruſſia, in the province of Samland; 28 miles E. of Konigſberg.

PLOCAMA, in *Botany*, ſo named by Dr. Solander, from πλοκαμος, *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.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, of one leaf, minute, five-toothed, permanent. *Cor.* of one petal, bell-fhaped, in five deep oblong fegments. *Stam.* Filaments five, fhort, inferted into the tube; anthers linear, erect, fomewhat incumbent. *Pift.* Germen inferior, globofe; ftyle thread-fhaped, fwelling upwards, longer than the ftamens; ftigma obtufe, undivided. *Peric.* Berry nearly globofe, of three cells. *Seeds* folitary, linear-oblong.

Eff. Ch. Calyx fuperior, with five teeth. Corolla bell-fhaped, five-cleft. Berry of three cells. Seeds folitary.

1. P. *pendula*. Drooping Plocama. Ait. n. 1. Willd. n. 1.—Native of the Canary iflands, from which country it was fent to Kew by Mr. Maffon in 1779; and of the Cape of Good Hope, from whence we have a fpecimen communicated by Mr. Lambert. It is, or was, kept in the greenhoufe at Kew; but no time of flowering being mentioned, the plant is perhaps now loft, without having ever been figured, or fully defcribed. The *ftem* is fhrubby, erect, two or three feet high, roundifh, fmooth, with generally alternate *branches*, of which the uppermoft are extremely numerous, drooping or pendulous, flender, obfcurely quadrangular, roughifh, leafy. *Leaves* oppofite, on fhort ftalks, linear, acute, entire, very narrow, fmooth, fomewhat flefhy. *Stipulas* fmall, acute, between the footftalks, permanent, and at length forming a narrow ring, round each joint of the ftem or branch. *Flowers* terminal, axillary, or from the upper forks of the branches, fmall, on fhort, fimple, roughifh *ftalks*, either folitary, or two or three together. *Berry* not half the fize of a currant. The whole plant, except the old *ftem*, turns black in drying.

PLOCE, in *Rhetoric*, a figure by which a word is repeated, by way of emphafis; in fuch manner, as not only to exprefs the fubject, but fome particular character or property of it.

Cruelty! yes, cruelty beyond all example. His wife's a wife indeed! So Cicero fays, Young Cato wants experience, but yet he is Cato.

PLOCKEN-ALBEN, in *Geography*, a mountain of Carinthia; fix miles S.E. of Mauten.

PLOCZKO, or PLOZK, a town of the duchy of Warfaw, late of Poland, and capital of a palatinate of the fame name in Mafovia, fituated on an eminence near the Viftula: the fee of a bifhop, fuffragan to the archbifhop of Gnefna. It is alfo the refidence of a palatine, a caftellan, and a ftarofta: and contains feveral churches richly ornamented, one of which is the cathedral. The provoft or dean is fovereign of the nobility who refide here, and is accordingly ftyled prince of that territory. In the caftle is a gymnafium or feminary. 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 Warfaw. 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 PLON, a town of the duchy of Holftein, which has feveral times been deftroyed 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 diftrict, in the department of the Morbihan. The place contains 4512, and the canton 11,800 inhabitants, on a territory of 207½ kiliometres, in fix 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 Coafts, and chief place of a canton, in the diftrict of St. Brieuc; 10 miles S. of St. Brieuc. The place contains 5073, and the canton 12,800 inhabitants, on a territory of 170 kiliometres, in fix communes.

PLOGASTEL, a town of France, in the department of Finifterre, and chief place of a canton, in the diftrict of Quimper; feven miles W. of Quimper. The place contains 1047, and the canton 10,809 inhabitants, on a territory of 230 kiliometres, in 13 communes.

PLOK-PENIN, in *Commerce*, a term ufed in the public fales at Amfterdam for a little fum given by the laft bidder. The plok-penin is a kind of earneft, by which it is fignified, 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 pleafure of the buyer; and, fometimes, it is regulated by the ordinances of the burgomafters.

PLOMBIERES, in *Geography*, a town of France, in the department of the Vofges, and chief place of a canton, in the diftrict of Remiremont; fix miles S.W. of Remiremont. The place contains 1109, and the canton 9947 inhabitants, on a territory of 215 kiliometres, in fix communes.

PLOMNITZ, a town of Silefia, in the county of Glatz; two miles N.W. of Habelfchwerdt.

PLOMO, in *Metallurgy*, a name given by the Spaniards, who have the care of the filver mines, to the ore of that metal, when it is found adhering to the furface of ftones, and incrufting their cracks and cavities in the form of fmall and loofe grains of gunpowder. Though thefe grains be but few in number, and the reft of the ftone have no filver 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 fomewhere in the neighbourhood. And if in digging forwards they ftill meet with thefe grains, or the plomo in greater quantity, it is a certain fign that they are getting more and more near the good vein.

PLONCOUR, in *Geography*, a town of France, in the department of the Finifterre; eight miles S.W. of Quimper.

PLONE, a river of Pomerania, which runs into the Dammifch fee, at Damme.

PLONEVEZ *de Faou*, a town of France, in the department of the Finifterre; eight miles W. of Carhaix.

PLONGEON, in *Ornithology*. See COLYMBUS.

PLONKETS, in our *Old Writers*, a kind of coarfe woollen cloth. 1 Ric. III. cap. 8.

PLONSK, in *Geography*, a town of the duchy of Warfaw; 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; fix miles N.W. of Bayreuth.

PLOT, ROBERT, in *Biography*, a natural philofopher and antiquary, was born, in 1641, at Borden, near Sittingbourn, 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 diftinguifhed for his zeal in philofophical and natural fcience, and was made a fellow of the newly conftituted Royal Society, of which learned body he was elected one of the fecretaries in 1682. In the following year he was appointed the firft keeper of Afhmole's mufeum at Oxford, and at the fame time profeffor of chemiftry in the univerfity. Antiquities were the leading objects of his purfuit, and in 1687 he was made regifter to the earl marfhal'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 hiftories, which were the firft of the kind publifhed in England, and were exemplifications of a great plan which he had formed for a natural hiftory of the whole kingdom. The "Natural Hiftory of Oxfordfhire" was publifhed firft in 1677, and again in 1705, with additions and corrections by Mr. Burman. That of "Staffordfhire" was publifhed in 1679, and reprinted in 1686. It was decorated with views of the feats of the nobility and gentry. It is at prefent extremely fcarce. Both thefe county hiftories include not only all that properly belongs to the natural hiftory, but whatever relates to arts, manners, and antiquities, and all other memorabilia. As fecretary to the Royal Society, he conducted the publication of their Tranfactions from N° 143 to 166 inclufive, and he communicated to it fome papers of his own. Since his death two letters of Dr. Plot's have been publifhed relative to antiquities in Kent and Thetford. He left a number of manufcripts, among which were large collections for a natural hiftory 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 reprefented therein.

Plot is more particularly ufed for the knot or intrigue which makes the difficulty and embarrafs 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, furveyed with an inftrument, and laid down in the proper figure and dimenfions. 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 philofopher, was born at Lycopolis, a city of Egypt, in or about the year 204. In very early life he began to fhew a great fingularity both in tafte and manners. He began to ftudy philofophy at about the age of twenty, and for fome time he attended the lectures of different famous profeffors, who then abounded in Alexandria, but he was diffatisfied with all their fyftems, and attached himfelf to Ammonius, who attempted to reconcile the different opinions then fubfifting among the philofophers, and founded a diftinct eclectic fchool, in which he taught his difciples certain fublime doctrines, and myftical practices, which he communicated to them under a folemn injunction of fecrecy. With the inftructions of fuch a preceptor, Plotinus, whofe mind had a ftrong tincture of enthufiafm, was highly delighted, and he told his friend, that he had now met with a tutor in all refpects fuited to his wifhes. Under this mafter he profecuted his philofophical ftudies during eleven years, and became a deep proficient in the abftrufe fubtleties, and myftical flights of his fyftem. Upon the death of Ammonius, he determined to travel into Perfia and India, to learn wifdom of the Magi and Gymnofophifts. In this refolution he was encouraged by the example of Apollonius Tyanæus, whofe pretenfions to the magic arts were faid to be derived from thefe fources. For fome time Plotinus confidered himfelf to be under an obligation not to difclofe the doctrines which he had learned in the fchool of Ammonius, in confequence of the injunction of fecrecy to which he had fubmitted, but two of his fellow-pupils having publicly taught the myfteries of their mafter, he thought himfelf abfolved from his engagement, and became a lecturer in philofophy upon eclectic principles. During ten years he confined himfelf to oral difcourfe, but at length he found it neceffary, as well for the convenience of his pupils, as for himfelf, to commit the fubftance of what he delivered to writing. The novelty of his plan of inftruction drew after him a crowd of auditors, among whom were perfons of high rank of both fexes. To the inftructions of thofe who were willing to become his auditors he devoted himfelf with the greateft ardour and affiduity. He frequently prepared himfelf for his fublime contemplations by watching and fafting; hence his enthufiaftic paffions were fometimes raifed to fuch a pitch, that he believed he was under the immediate protection of a genius, or familiar fpirit, of the moft eminent order, who was not merely a dæmon, but a god. The fuperiority which he fancied belonged to his tutelar genius, inflated him with a degree of pride, that bordered upon impiety, or perhaps infanity. He, however, enjoyed fo high a reputation for wifdom and integrity, that many private quarrels were referred to his arbitration, and feveral perfons of both fexes, when upon their death beds, fent for him to take upon him the care of their eftates, and the guardianfhip of their children. Such offices he never refufed, and he difcharged them in a manner that gave the higheft fatisfaction to the parties concerned. His excellent character fecured to him the efteem of many perfons of high rank, and particularly of the emperor Gallienus, and his emprefs Salonina. The romantic turn of his mind was fufficiently fhewn, by the ufe which he made of his intereft 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 faid to Euftochius, "the divine principle within me is now haftening to unite with that divine being which animates the univerfe;" expreffing by thefe words a leading principle of his philofophy, that the human foul is an emanation from the divine nature, and will return to the fource whence it proceeded. By his difciple and biographer, Porphyry, he is reprefented as having poffeffed the power of working miracles: this was probably faid with a view of depreciating the Chriftian religion, of which Porphyry was a great enemy. The treatifes of Plotinus, which are fifty-four in number, were diftributed by his biographer under fix claffes, called Euneads. Proclus wrote commentaries upon them. At the requeft of Cofmo de Medici, Marfilius Ficinus made a Latin verfion of them, which was firft publifhed at Florence, under the title of "Plotini Opera ex interpet. Marfilii Ficini, cum commentariis, necnon Vita Plotini à Porphyrio confcripta 1492." The Greek text was afterwards publifhed at Bafil, from a manufcript ftated by Lambecci to be in the Imperial library, accompanied with the verfion of Ficinus in 1580. Dr. Enfield, in his abridgment, &c. of Brucker's Phil., fpeaking of Plotinus, fays "that he made it the main fcope and end of his life to dazzle his own mind, and the minds of others, with the meteors of enthufiafm, rather than illuminate them with the clear and fteady rays of truth. How much is to be regretted that fuch a man fhould have become, in a great degree, the preceptor of the world, and fhould, by means of his difciples, have every where diffeminated a fpecies of falfe philofophy, which was compounded of fuperftition, enthufiafm, and impofture. The muddy waters fent forth from this polluted fpring, were fpread through the moft celebrated feats of learning, and were even permitted to mingle with the pure ftream of Chriftian doctrine. Not only at Rome, where Plotinus taught, but firft in Alexandria, and afterwards in many of the principalities of Afia Minor, and even at Athens, the ancient feat of wifdom, the fyftem of Am-

monius

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°, and upwards for thoſe leſs than 180°.

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°.

Now ſince 191° is more than a ſemicircle or 180°, 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°; 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°, 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° 30′: draw the indefinite line C *d*, and theron 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°, 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° 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° 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°, 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° 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 $172\frac{1}{2}$ kiliometres, 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 kiliometres, 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 kiliometres, 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 $92\frac{1}{2}$ kiliometres, in eight communes.

PLOUDALMAZEAU, a town of France, in the department of the Finisterre, 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 $177\frac{1}{2}$ kiliometres, in 12 communes.

PLOUDERY, a town of France, in the department of the Finisterre, 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 LAPWING.

PLOVER, *Black-crowned*. See CHARADRIUS *Atricapillus*.

PLOVER, *Black-headed*. See CHARADRIUS *Melanocephalus*.

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 *Rubricollis*.

PLOVER, *Ringed*, or *Sea-lark*. 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 *ægocephalus* 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 Finisterre, 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 kiliometres, 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 is, 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 expence.

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 choak 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 creſt of mould, for the purpoſe of covering the ſeed, be added, its preference is ſtill more conſpicuous. But ſome of theſe inconveniencies 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

ploughing of old lays for wheat, peafe, and other fimilar crops; as, by fuch means, the growth of weeds through the broken ground is prevented. And the refiftance of the earth againft the breaft is likewife leffened, in proportion to the acute angularity of that part againft the beam of the plough. The mould-board fhould alfo have that fort of curved, twifted, or hollowed-out form, which is beft calculated to leffen refiftance, and at the fame time give the furrow-flice the proper turn. And the beam and muzzle of thefe implements fhould likewife have fuch a conftruction, as that the team or moving power may be attached in the beft and moft fuitable *line of draught*, as this is a circumftance of great importance, when feveral animals are made ufe of together, that the draught of the whole may coincide in the moft perfect manner, and with the utmoft exactnefs.

Likewife, in the conftruction of every fort of plough, much regard fhould be paid to the weight, fo that they may have fufficient ftrength for the purpofe, without being unneceffarily heavy. Much may be done in this intention, by leffening the quantity of wood in thofe parts where there is no particular ftrefs, while it is retained fo as to have full power in the others. This has been much lefs attended to in the making of ploughs than its importance would feem to demand.

It is noticed in the Agricultural Survey of the County of Effex, that the *throat* at the fore end or neb of the plate or breaft in the Norfolk, and moft other ploughs, with the exception of the Rotherham, rifes from the upper furface of the fhare too perpendicularly, and too much at right angles to the line of friction, or preffure of the earth the plate has conftantly to act againft: working thus abruptly in the ground, the flice or furrow is violently torn, or burft from off the ground hand, broken and imperfectly turned over, inftead of being gradually cut, raifed whole, and whelmed over; as will always be the cafe, when the plough enters the ground obliquely, and at a proper angle; and that the plate or mould board is properly turned for raifing up, and turning the flice completely over.

It is a clear pofition, proved by experiment, that a femiellipfis is the true form of throat which is neceffary in ploughs, which is the part or fpace from the fhare point to the junction or approach of the breaft to the beam: and that there is found a remarkable variation in the form of the *breafts*, or mould-boards of the ploughs throughout the northern parts of the fame diftrict, and which is chiefly in the degree of concavity or convexity. Some wheel-wrights and farmers prefer a form rather concave, a flatnefs in the fore part, which joins the fhare, and which gradually fills up as the fweep 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 breaft, in fome ploughs, is a circumftance which gives fteadinefs to the implements; but, at the fame time, it is probably the means of increafing the draught to the horfes in a great degree.

The fhortnefs of the breaft, if the curve or fweep be in perfection, or wears equally every where, may leffen friction, and certainly does, if the earth be loofe; but it probably may not have the fame effect in the firft earth, upon a ftiff layer. It is, however, a pretty general opinion, that it leffens it in all cafes.

A great variety of breafts, of different forms and conftructions, are reprefented in the plates upon ploughs, in the Agricultural Survey already referred to, which are well worth confulting by the inquirer on this fubject; and in the ploughs which are given here, there is alfo a very great diverfity in the fhape of the fame part, as will be feen by attending to the figures of the different plates.

Some cultivators in this diftrict ufe a breaft which is very convex, and contend that fuch a degree of roundnefs and fullnefs in the bofom is neceffary on heavy lands; alfo, that the foil fticks adhefively 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 breafts of ploughs, which appear in the plates of the above Survey, all of which are more or lefs diftinct and different from each other, it is obferved that they will all, on certain foils, and moments or times of tillage, make very good work; but it does not hence follow, that the form is a matter of indifference: fuch a conclufion would be very erroneous. There is a confiderable difference between a breaft paffing freely through the foil without loading, and driving the earth before it, or preffing it after the furrow is turned, and another that has either of thofe faults, not vifible perhaps in the work when finifhed, but to the great fatigue of the horfes. In the conftruction of the plough, as has been already feen, there is not a point of more importance.

One of the moft extraordinary circumftances in thefe breafts is, that of their all, with the exception of one, having more or lefs convexity, and in many, as has been feen, to a very extraordinary degree, efpecially in thofe about Birchholt and South-End. But in that furnifhed by his excellency Mr. Jefferfon, the late prefident of the United States of America, and which was fent to the Board of Agriculture, and firft tried by C. C. Weftern, efq., at Felix Hall in this diftrict, the formation was made on the idea, that as the bottom cut of the furrow is, or ought to be, perfectly *flat*, the breaft, which comes in direct contact with it, fhould be flat alfo; fo that there fhould be no difpofition in the mould to fink into any depreffion or concavity of the breaft; nor any projection from a right line in the breaft, to prefs or force into the furrow-flice, as it is turning. The idea is new and excellent: but what, on fuch principles, can be faid to the convexity in fome inftances, the fhape in the breafts of which muft conftantly have a tendency to *groove* that furrow-flice, from preffing in the centre. It fhould feem as if this muft, on every principle, be erroneous. The retaining of it, in the cafe of Mr. Ducket's plough, is fuppofed, more apparently than really, an exception, in confequence of the foil he had to work on, as it was invented for a very loofe fand only; and on fuch a foil the ftraight breaft is much more admiffible than on any other. This plough was feen at work on his farm many years ago, and it made excellent work: the convex *addition* to the flat furface, on the lower part, was probably made to divide the weight of the moving fand, and to keep enough of it in a due degree of elevation.

The objection to fo much concavity or flatnefs in the fore part of the breaft, as appears in that fupplied by the American prefident, is that of the loofe earth of the furrow *loading* there, which in fome cafes it is very apt to do.

Another point in which the ploughs here, as well as in other places, feem to be deficient, is in the height of the breaft from the ground: they are, for the moft part, too low behind; they fhould be, therefore, fomewhat raifed in this refpect. In turning over a furrow of loofe mould with rolling clods, the hind corner of the breaft fhould be high enough to fweep them over, but without preffure.

In the next place, that part which is called the ploughheel may be examined, which comprifes the pofition of the breaft behind, and forms, together with the end of the *reft*, that wedge which fills up the furrow. There are two principal

cipal 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 *ſwing* 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 landſide to the point of the ſhare	7	4	whole length.
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	bottom working ſurface.
Ditto of ſhare behind the wing	0	$3\frac{1}{2}$	
Length of ſurface on which the plough touches the ground	2	$10\frac{1}{2}$	
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 $1\frac{3}{4}$ cwt.

And it has alſo a copſe rack, or hock 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 tenor 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, by 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 protion 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 ſtilts. 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 ſo 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 aften 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 coulter, 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 coulter, by which means it is found to do the work much better, than when attached to the common coulter, 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 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 flinty 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 coulter 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 taprooted 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, 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 :

		Ft.	In.
	From 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 — *c*	2′	5
Diameter of wheel - -		1	9
	d — *f*	0	11
	g — *h*	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 coulters 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 maſter 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 ſwing-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 coulters, 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 of 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 *c c* 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 expence 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 unstirred, 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 Ross, 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 sun, caked, and works with great difficulty; notwithstanding which, not one farmer but says it will be of great

use

ufe in many inftances. It is lucky for him that his ploughman likes it double, and is inclined to ufe it on all occafions. Mr. Dougall alfo obferves, that Mr. Shirely from Warwickfhire gives a good account of the double-plough ; and fees no difference between the draught of four horfes in the double, and his own fingle-furrow plough ; a circumftance which has been noticed by others in fome cafes.

With regard to the advantage of thefe ploughs, his lordfhip offers the teftimony of another perfon, perfonally a ftranger to him ; his partiality, therefore, is to the plough itfelf ; not to the inventor. He is not difpofed to draw abfolute conclufions from ploughing-matches, becaufe much may depend on accident ; befides that, exertions might be made for three hours, without much apparent diftrefs, which neverthelefs could not be maintained for three weeks, and fo the public become mifled. Yet, as this match was much talked of, and many queftions on the fubject put to him, he wrote to Mr. Tweed to know the particulars : his tale is plain and unvarnifhed.

Mr. Tweed's land is ftrong and ftiff in quality, and not a turnip has been fown there for more than twenty years paft : it is what we term bean and wheat land. The practice of that country has been to allot 100 acres of land in tilth to four horfes ; therefore let it be remembered, that the faving of expence obtained by the ufe of the two-furrow plough does not arife from a comparifon on lands, expenfively cultivated with four or five horfes, incurring a charge of twelve, fixteen, or twenty fhillings *per* acre ; but in the county of Effex, and in the vicinity of Chelmsford, where it has long been a fyftem to work thefe ftrong foils with two horfes and no driver : and where this art is allowed to be as well underftood, and practifed with as much fkill and economy as in any part of Europe, Flanders not excepted. Mr. Tweed's account of the bufinefs in a letter to his lordfhip, is this : " In anfwer to the letter I have juft had the honour to receive, I take the liberty of ftating the experiments I have made with your two-furrow plough upon ftrong land, as well as the refult of the only match I have yet been engaged in. I put my firft plough to work with three horfes and one man, againft two of my own, and four horfes, held by two remarkable good ploughmen, who are very much averfe to any new implements : after exerting themfelves to the utmoft every day for a month, upon clover lays, bean and pea etches, for wheat, they allowed, very much againft their inclinations, that it performed the work beft, which is entirely owing to the fuperior form of the breaft, and the great advantage derived from the moveable plates. This trial having perfectly convinced me that there is an abfolute faving of five fhillings a day every day they are ufed, I ordered a fecond, and foon after a third, and have ever fince had all my work done with them, nine horfes, and three men, which before employed fix ploughs, twelve horfes, and fix men, caufing a reduction of one-fourth the horfes, and one-third of the men, and is, in my opinion, one of the greateft improvements that ever was made in agriculture, for which I conceive the public and myfelf highly indebted to your lordfhip. Being at Mr. Lovibond's rent dinner (the gentleman I live under), I made a propofal to the company, who were all farmers, to plough, for a wager, two acres of any land with the two-furrow plough and three horfes, as well, and in the fame time, as one acre could be ploughed by a fingle one and two horfes. This was accepted by Mr. Gibling of Hatfield, and a field of his fixed upon that had been fown with rye directly after harveft, (ftubble) upon a wheat etch, and being fed by bullocks and fheep in wet weather, poached a great deal ; and when the ploughing took place, was extremely dry and bound. A great number of fpectators attended ; at ftarting, the odds were three and four to one againft the two-furrow plough, as it was fuppofed not able to break up and turn hard work ; after a fair conteft, five farmers were appointed umpires, who were unanimous in their decifion, that the two-furrow plough, having executed the work foundeft and beft, and in the leaft time, was entitled to the wager.

Sandon, 1802. I remain, &c.

" In a fecond trial, the fweepftakes 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 horfes ; but Mr. Tweed's was worked with only three, and ploughed two roods, not only in the beft agricultural manner, but within confiderably fhorter time than the other common plough did their one rood." The noble writer adds, that in addition to this teftimony he has only to fay, that it has not been his ill-fortune to verify the old adage, which fays, " a prophet is no prophet at home ;" for thefe ploughs are fpreading, 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 defcription appeared, and the prize given by fubfcription was contended for by thefe ploughs only.

It has been argued, that a two-furrow plough, with the double mortifed beam, has an advantage over that of the curved fingle beam, inafmuch as, by a fcrew, the beams can be brought nearer, or fet more apart, for the purpofe of cutting a wider or narrower furrow. In common ploughing, no great benefit was contended to refult from this power, but in fowing under furrow, great things were to be expected. Now let us look round, and fee where the tillage hufbandry is reputed to be good, and fingle-furrow ploughs in ufe, confequently, the fize of the furrow is optional ; let us fee whether the wide or the narrow furrow is preferred. We can in a moment inftance the ufage of the country round Weftham, in Effex, and Peterfham in Moulfey, in Surrey. In both inftances the land is level and good, and the broadcaft hufbandry very high in reputation, as their crops, on an average of years, are ready to teftify. Here the feed is ploughed in at a ten or fometimes at an eleven inch furrow. We are not, however, to eftablifh a general fyftem on two or three inftances—twenty or thirty might, perhaps, be adduced ; but they are worth, at leaft, one affertion. It has been his determination to avoid, as much as poffible, any comparifon of other implements with his own ; but he may fay, that he learns from one, who is as good a judge of hufbandry as any among us, and has compared the double-beam two-furrow with that of the curved fingle beam in mortifing and iron-work, and confequent tendency to derangement, there is an abfolute difference of one horfe in four in favour of the patent plough.

And if land is inclined to be wet and ftiff, the lefs trod it is, the better. Here Mr. Tweed's mode is to work three horfes, one on the land, and two in the furrow, one before the other, inftead of three abreaft ; and it appeared by the regulation of the *cops*, that is, an iron fcrew, 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 almoft needlefs to fay, that the true point of draught fhould be exactly in the centre notch of the cops ; any deviation to the right or left can only be for the purpofe of counteracting a falfe friction or preffure, which muft have added to the weight. The fize of a furrow, provided it be of juft proportions, is optional ; that which he has preferred is nine inches and a quarter, and for every purpofe of hufbandry he knows of none better. It will give as much

 mould,

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, ſcufflers, &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 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 coulters: of this kind is the *Argyleshire* 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 copse 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 carucata 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 Gallows.

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

moſt 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 terræ*, 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 ſeed 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 thown 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

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 ſteril 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 ſod 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 expence 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; the

the views of the farmer and the crops to be grown upon them, circumſtances which have been already noticed in ſpeaking of *ploughs*. The ſeed 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 means

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 marle 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 20*s.* or 25*s.* 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. Dursgate approves of deep ploughing; remarking, that he breaks up his *ollonds* deeper than most people. Mr. Willis observing the marle 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 flinty soil. It is remarked, that Mr. Hill's father lived for many years at Gateson, and was succeeded in the farm by Mr. Parker. Mr. Hill's last crop yielded 400 lasts 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 fold that year but twenty lasts; the seeds 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 2*s.* 6*d.* an acre, in every part of the district, except Marshland: it is now 4*s.*; in some places 3*s.* 6*d.* 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,

cuts, or for new laying out broad ridges, called there *ſtatches*; 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 11*s.* and 12*s.* an acre; twenty years ago, 7*s.* were paid; all is done with four horſes and a driver: 20*s. 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 12*s. 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 4*s.* -	1	8	0
Eight truſſes of hay, at 5*l.* - - - -	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 11*s.* and 1*d. per* acre, beſides the wear of the horſes; at nine acres, it amounts to 9*s.* 2½*d.* 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 flinty 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 near 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 thoroughs to catch ſeeds; whereas, with the great plough, the ſeed rolls into thoſe thoroughs. But Mr. Parker of Munden uſes the foot-plough of Middleſex, as preferable to the great Hertfordſhire wheel-plough, and can break up flinty ſtrong land with it as well as the other performs it. Caſes very rarely happen, in which the county 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 moſt 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 moſt 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 *hacking*. 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 harrowing:

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 whippletrees. 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, eying the land carefully, and not diſcovering a ſingle falſe furrow; no variations in the breadths of the ſtitches, or of the furrows; no depreſſions, nor any variations in the curvatures of the ſtitches. 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 8*s.* 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, 7*s.* At Snorum, from 8*s.* to 9*s.* each ploughing; the ſoil very ſtiff. Mr. Ruſh, at Latchingdon, gives 9*s.*; at Rochford, 10*s.* 6*d.*; at Raleigh it was formerly 5*s.*, is now 8*s.*; at Thorndon, 10*s.*; at Margaretting, the common hiring price is 10*s.* 6*d.*; and at Toppesfield, Mr. Eley reckons it worth 8*s.* with three horſes; 6*s.* 6*d.* 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 2*s.* an acre for ploughing, 6*d.* for harrowing, and 2*d.* 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 Jeſtworth, 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, $1\frac{1}{2}$ *cwt.* of hay per week, at 4*s.* 6*d.* each - - - - -	1	4	0
One buſhel of oats *per* horſe, at 3*s.* 6*d.* -	0	14	0
Chaff, 2*s.* *per* week - - -	0	8	0
Decline of value - - - -	0	4	0
	2	10	0
Per 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 14*s.*

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

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 moſt 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 ſtouter wheat: and it is ſaid, that it ſhould be remarked that through all the parts of Tendring 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 huſbandry. 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 *flea-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 kiliometres, 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 kiliometres, 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 kiliometres, in 8 communes.

PLOUZE'VEDE, 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 kiliometres, 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 Ladrones; 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 Buffaloe'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 tranflated into various languages. His next publication was "Hiftoire du Ciel," in two vols. 12mo., of which the firft volume is chiefly mythological: the fecond relates to the formation of the world, and concludes with a confirmation of the Mofaic account of the creation. In 1750, he publifhed a treatife, entitled "The Truth of the Gofpel demonftrated." As a philologift, he is diftinguifhed by his "Mecanique des Langues, et l'Art de les Enfeigner," which is faid to be a very ufeful and judicious treatife. He died in 1761, at the age of 73, leaving behind him the character of a truly virtuous and refpectable man. Two of his pofthumous pieces were publifhed after his death, entitled "Concorde de la Geographie des differens Ages:" and "Harmonie des Pfeaumes, et de l'Evangile."

PLUCKART BAY, in *Geography*, a S.E. branch of Loch Ewe, on the W. coaft of Scotland. N. lat. 57° 45'. W. long. 5° 34'.

PLUCKENIN, a town of America, in Somerfet county, New Jerfey; 28 miles N. of Princeton. It carries on fome trade.

PLUDENTZ, a town of Germany, and capital of a county of the fame name, fituated on the Ill. In 1533 it was almoft deftroyed by an earthquake, and in 1638 was wholly burnt down; 62 miles W. of Infpruck. N. lat. 47° 3'. E. long. 9° 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° 3' 2", Fort lac la Plue in 48° 35' 49", ifland Portage, 50° 7' 31", at the Barrier, 50° 7' 51". W. long. 95° 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 ftop the bottom of a ciftern, cafk, pipe, or the like.

PLUG, in *Ship Building*. *Haufe-plugs* are pieces of timber trimmed to the fize of the haufe-holes, fo as to keep out the water. *Shot-plugs* are formed like the fruftum of a cone of various fizes, in proportion to the holes made by the different fizes of fhot which may penetrate the fhip's fides in time of action. The latter are fometimes made of tallow and junk, or oakum, made hard together, and are thruft or driven into thofe fhot-holes, to prevent leaking: accordingly they are always ready for this purpofe.

PLUKENET, LEONARD, in *Biography*, "a learned, critical, and laborious botanift," as Dr. Pulteney juftly denominates him, was the contemporary and rival of PETIVER, fee that article; and laboured, with ftill more ardent, as well as exclufive, affiduity, 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 furvived the fixty-third year of his age, but there is no precife record of his deceafe. A handfome portrait of him, at the age of forty-eight, is prefixed to his *Phytographia*, with the title of Doctor of Phyfic, and his arms; ermine, a bend dexter engrailed, gules. It is not known where he took his degree. His name feems to betray a French extraction, *plus que net*, and has been latinized *plus quam nitidus*. He refided in Old Palace-yard, Weftminfter, where he appears to have had a fmall garden; but as Dr. Pulteney fought in vain for his name, in feveral lifts of the College of Phyficians, printed in the firft years of the 18th century, as well as in thofe of the Royal Society, of the fame date, it fhould feem that he was not then eminent, either as a medical practitioner, or a natural philofopher. His motto, an anagram of his name, *ut pené n[illegible] ardet*, well expreffes the zeal with which he devoted himfelf to his favourite ftudy; while another motto in the fame page, over a burning candle, *aliis inferviendo confumor*, and a fubfequent one, to the fourth part of his work, *nil nifi præmia defunt*, evince that his worldly recompence was not adequate to his wifhes or expectations. Dr. Pulteney has difcovered that Plukenet had a fon Richard, who was a ftudent at Cambridge in 1696; and the *Almageftum* contains fome verfes written by another fon, Robert, at Eton fchool; which is all we know of his family or connections. He publifhed his early works at his own expence, but was affifted afterwards by trifling fubfcriptions. Towards the clofe of his life he is faid to have experienced royal patronage, to have obtained the fuperintendency of the garden at Hampton-court, and the title of Royal Profeffor of Botany; all from the favour of queen Mary. Three of the fections of his *Phytographia* are feverally dedicated to bifhop Compton, the firft earl of Portland, and king William III. That he enjoyed the friendfhip of Uvedale, who was his fellow-ftudent; and the high commendation of Ray; are fufficient proofs of his perfonal and fcientific merits. The beginning of the *Almageftum* teftifies his elevated piety, which at the end degenerates into the orthodox ftyle of the day. That he was fkilled in the learned languages, and that his correfpondence was very extenfive, appears from almoft every page of his works; and there are many particular parts which fhew his refearches to have been deep, and conducted with confiderable ability. It is to be lamented that fome of his latter pages betray a feverity of ftricture, on the literary labours of Sloane and Petiver more efpecially, of which we have already fpoken in the life of the latter, and of which more may be faid hereafter when we come to fpeak of Sloane. Plukenet was, apparently, a man of more folid learning than either of thofe diftinguifhed writers, and having been lefs profperous than either, he was perhaps lefs difpofed to palliate their errors. As far as we have examined, his criticifms, however fevere, are not unjuft.

Thefe are all the circumftances we can find, illuftrative of the life or character of Plukenet. We fhall now offer a few remarks upon his works.

Having collected a vaft Herbarium, for the time in which he lived, not only by means of his various correfpondents, but alfo from the treafures that were then daily pouring into the gardens about London, his object was to publifh a catalogue of the whole, accompanied by figures of the new or rare fpecies. The firft part of this defign was executed in his *Almageftum Botanicum*, which, like all his other publications, is in quarto, making a handfome 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 himfelf in this department. Each plant is diftinguifhed by a fpecific definition, either adopted in like manner from his predeceffors, or new-modelled by himfelf; and all the fynonyms he could collect are fubjoined. No ideas of fyftematical arrangement feem to have entered into his contemplation, at leaft in the plan of this work. There are paffages in his writings which fhew he had occafionally thought on that fubject, nor could it altogether efcape a man of fo much reading; but it was by no means one of his primary objects. Thefe were rather fpecific diftinctions of plants, their fynonyms, and their hiftory. This work is faid

faid to contain about 6000 fpecies, of which its author fuppofed 500 to be new. Of thofe 6000, many are now confidered as varieties, being merely differences founded upon colour, or on double or fingle flowers; but if Plukenet erred in thefe 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 confidered as an accompaniment of the *Almagestum*. It confifts of 350 plates, engraved by various hands, each plate containing figures of five, fix, or more, plants, chiefly, if not altogether, done from dried fpecimens, with various degrees of merit. If thefe figures feldom rife to any great excellence of botanical precifion, they are at leaft original, and not only free from the faults of copies, fo copioufly difplayed in the plates of Morifon and fuch authors, but alfo tolerably exempt from grofs miftakes of their own. Of their beauty little can be faid, but the work improves as it advances. Being fo generally cited by fucceeding authors, efpecially Linnæus, it is indifpenfible to every botanic library. This book came out in four parts, of which the firft and fecond were publifhed in 1691, the third in 1692. The plates of thefe have the names, and many fynonyms, of each plant engraved at the bottom. The fourth part, which commences with tab. 251, and was publifhed in 1696, wants this ufeful appendage, and moft of its figures are deftitute of any reference. They are however cited in the *Almagestum*, and fome of them likewife refer to that work; but in fo obfcure and difficult a manner, that few perfons take the trouble of fearching them out, or of citing them correctly in their own publications. Thofe who inveftigate the matter, will find feveral plants, fuppofed to be of recent introduction and hitherto no where delineated, which were known to Plukenet; though his references are often fo faulty, as to damp our ardour of enquiry, by the needlefs difficulties they throw in our way.

In 1700 appeared the *Mantissa*, or appendix to the *Almagestum*, confifting of 192 pages, with a copious index to both works. This publication comprehends above 1000 new plants, with numerous obfervations and corrections relating to the former. Some of Plukenet's criticifms difplay great learning; as what concerns the Gopher, or Juniper tree, of the bible, firft book of Kings, chap. xix. ver. 4; though he errs in referring the Barbadoes Juniper to this oriental plant; fee his Mant. 109. Commentators have not been fufficiently attentive to botanical geography, on many occafions.

In 1705, Plukenet publifhed his laft work, the *Amaltheum*, which is a fupplement to the other two, and compofed on the fame plan, confifting of 216 pages, with an index, and 103 plates, fome of which illuftrate the plants of the Mantiffa.

All thefe works were republifhed, with new title-pages, in 1720, and again, with a re-impreffion of the letter-prefs, in 1769, making four volumes all together. Gifeke publifhed a very incomplete Linnæan index to them at Hamburgh in 1779. The herbarium of Plukenet, containing about 8000 plants, having been bought by fir Hans Sloane, is now in the Britifh Mufeum. The original manufcript of his works was given by the late Mr. Hudfon to the writer of the prefent article. Pulteney's Sketches of Botany. Plukenet's Works. S.

PLUKENETIA, in *Botany*, was fo named by Plumier, after Leonard Plukenet, M.D.; fee the preceding article. Linnæus, in his *Critica Botanica*, p. 80, draws an analogy between the great fingularity of ftructure in the flowers, and the peculiarity of Plukenet's character as a botanift; which idea does not feem to us fo happy as many of our great mafter's comparifons. Plukenet's works have no remarkable excentricity about them, but are, on the contrary, plain matter of fact, interfperfed with laborious, but fober, criticifm.—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. Juff. 392. Lamarck Illuftr. t. 788.—Clafs and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juff.

Gen. Ch. Male, *Cal.* Perianth of one leaf, in four deep, ovate, acute, equal, fpreading fegments. *Cor.* none. *Stam.* Filaments numerous, about 20, united in an imbricated manner, awl-fhaped, very fhort; anthers fmall, fmooth, of two tumid furrowed lobes.

Female, on the fame plant, *Cal.* Perianth inferior, of one leaf, in four deep, ovato-lanceolate, acute, equal, fpreading, permanent fegments. *Cor.* none. *Pist.* Germen fuperior, four-lobed, depreffed, fmooth; ftyle very long, cylindrical, declining, four-cleft at the fummit; ftigmas four, capitate, globofe. *Peric.* Capfule four-lobed, coated, depreffed, fmooth, with dilated angles, of four cells, and eight elaftic valves. *Seeds* folitary, large, compreffed, with veiny wrinkles.

Eff. Ch. Male, Calyx in four deep fegments. Corolla none. Stamens numerous.

Female, Calyx in four deep fegments. Corolla none. Germen fuperior. Style fimple. Stigmas four, capitate. Capfule four-lobed; cells elaftic, with folitary feeds.

1. P. *volubilis*. Twining Plukenetia. Linn. Sp. Pl. 1423. Willd. n. 1. Ait. n. 1. (P. fcandens, hederæ foliis ferratis, fructu tetragono; Plum. Gen. 47. t. 13. f. 2. Ic. 220. t. 226.)—Angles of the capfule compreffed, keeled.—Native of the Weft Indies. Miller appears to have cultivated it at Chelfea, in 1739, but it had long been loft, till the late Hon. Mrs. Barrington received a living plant from Jamaica, which bloffomed in her ftove at Mungewell, near Wallingford, in 1795. The *stem* is twining, branched, round, leafy, fmooth; the young branches alternate, axillary, downy in their upper part. *Leaves* alternate, ftalked, fimple, heart-fhaped, pointed, about three inches long and half as wide, minutely ferrated, deep green, rather roughifh to the touch, naked, except a flight downinefs on the ribs at the back, reticulated on both fides with copious veins, and furnifhed with a pair of glands at the bafe. *Footstalks* about one-third the length of the leaves, channelled above, downy near the extremity. *Stipulas* in pairs at the bafe of the footftalk, very minute, triangular, acute, fmooth. *Flower-stalks* axillary, folitary, racemofe, downy, fquare at the bafe, round above, generally bearing one *female flower* at the bafe; confpicuous for its quadrangular *germen*, thick *style*, above an inch long, and large globofe *stigmas*; and above it a long compound downy *cluster*, of numerous fmall *male flowers*. Some branches terminate in a *cluster* of, partly axillary, *female flowers* only. All the *flowers* are green, and more fingular than beautiful. The *bracteas*, fcattered through the clufters, are fmall, ovate, acute, fmooth, membranous. *Fruit* the fize of a fmall walnut, green, depreffed, with four fpreading, dilated, compreffed, rounded angles, the valves feparating elaftically at the bafe. *Seeds* pale brown, large, greatly compreffed, lenticular, fomewhat 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 capfule terminated by two tubercles.—Native of Surinam, from whence our fpecimens were fent 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 ſerrated. 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. Upſ. 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 *Utta Pela*, or *Utta 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 ſerrated. 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 Linnæus 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 GUAIAVA.

PLUM, *Jamaica*, or *Hog*. See SPONDIAS.

PLUM, *Indian date*, *piſhamin*, *perſimon*, or *pitchumon*. See DIOSPYROS.

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. *Corculum* 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. europæa*, 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 Linnæus. *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 Linnæus.

Eſſ. Ch. Corolla funnel-ſhaped. Stamens inſerted into the receptacle. Stigmas five. Capſule membranous, of one cell. Seed ſolitary.

1. P. *europæa*. Common Lead-wort. Linn. Sp. Pl. 215. Sm. Fl. Græc. Sibth. t. 191, unpubl. (P. Plinii; Ger. Em. 1254. Tripolium Dioſcoridis; Column. Ecphr. 160.

160. t. 161.)—Leaves clafping the ftem, lanceolate-oblong, rough. Stem ftraight, erect.—Native of the fouth of Europe. Perennial and hardy in our gardens, but not in general cultivation. The *ftem* is herbaceous, three feet high, upright, leafy, furrowed, with many ftraight upright flowering branches, each terminating in a fimple denfe *fpike*, of fmall pale-purple *flowers* with a briftly *calyx*. The *leaves* are alternate, numerous, recurved, oblong-lanceolate, obtufe, bluntly toothed, dull green, rough but not hairy; their bafe tapering, then dilated round the ftem or branch.

2. P. *lapathifolia*. Dock-leaved Lead-wort. Willd. n. 2. (P. orientalis, lapathi folio, flore minore albido; Tourn. Cor. 7.)—"Leaves clafping the ftem, lanceolate, fmooth. Stem divaricated."—Native of Iberia. *Stem* taller, with longer more fpreading branches; *leaves* much larger, fmooth; *flowers* about half the fize of the foregoing. *Willd.*

3. P. *capenfis*. Cape Lead-wort. Thunb. Prodr. 33. Willd. n. 3.—"Leaves ftalked, 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 fpicata, ocymaftri foliis, fructibus lappaceis oblongis, radice urente; Comm. Hort. v. 2. 169. t. 85.)—Leaves ftalked, oblong-ovate, fmooth, entire. Stem erect, round.—Native of the Eaft Indies, and New Holland. It flowers in the ftove from April to September. The *ftem* is rather fhrubby. *Flowers* white; with a long tube.

5. P. *rofea*. Rofe-coloured Lead-wort. Linn. Sp. Pl. 215. Willd. n. 5. Ait. n. 3. Curt. Mag. t. 230. (Radix veficatoria; Rumph. Amboin. v. 6. 453. t. 168.)—Leaves ftalked, ovate, fmooth, fomewhat toothed. Joints of the ftem tumid.—Native of the Eaft Indies; faid to have been introduced by Dr. Fothergill in 1777. It blooms in the ftove almoft all the year long; and is the moft favourite fpecies of its genus, on account of the delicate pale fcarlet of its *flowers*, which form compound clufters at the ends of the branches. The *ftem* is fhrubby, four or five feet high, flender, and requiring fupport. *Leaves* recurved.

6. P. *fcandens*. Climbing Lead-wort. Linn. Sp. Pl. 215. Willd. n. 6. Ait. n. 4. (Dentellaria lychnioides fylvatica fcandens, flore albo; Sloane Jam. v. 1. 211. t. 133. f. 1.)—Leaves ftalked, ovate, fmooth. Stem zigzag, climbing. Native of the Weft Indies. It was brought into the ftoves of this country very early, but is not much regarded at prefent, the *flowers* being white and not ftriking in their appearance. Sloane compares them to the common field Campion. The climbing, much more lofty *ftem*, diftinguifhes it from the two laft. Their *leaves* are variable, and afford no well-marked diftinction.

7. P. *auriculata*. Auricled Lead-wort. Lamarck Dict. v. 2. 270. Willd. n. 7.—Leaves ftalked, ovate-oblong, with fcaly dots beneath. Footftalks auricled at their bafe, and clafping the ftem.—Native of the Eaft Indies. *Stem* fhrubby, flender. *Leaves* obtufe, fmooth above; contracted at their bafe. *Flowers* in fhort terminal fpikes, refembling thofe of *P. rofea* in form, but in the dried fpecimen they had no appearance of a red colour. *Lamarck.*

8. P. *triftis*. Dark-flowered Lead-wort. Ait. n. 5.—"Leaves obovate, abrupt, fmooth.—Native of the Cape of Good Hope, from whence it was fent to Kew by Mr. Maffon, in 1792. This is a greenhoufe fhrub, flowering in May and June. We have feen no fpecimens of thefe two laft fpecies.

PLUMBAGO, in *Gardening*, contains plants of the herbaceous, flowering, perennial kinds, of which the fpecies cultivated are; the European leadwort (P. europæa); the Ceylon leadwort (P. zeylanica); the rofe-coloured leadwort (P. rofea); and the climbing leadwort (P. fcandens).

Method of Culture.—The firft fort is increafed by parting the roots in the autumn, when the ftems decay, and planting them in a dry foil. They fhould afterwards be kept clean from weeds, and have proper fupport.

The three other forts fhould be raifed from feeds, which fhould be fown in pots in the fpring, and plunged in hot-beds. They likewife may fometimes be raifed by planting flips and cuttings in pots, and plunging them in the fame forts of hot-beds.

Thefe are all ornamental flowering plants; the firft in the pleafure-grounds, and the others in pots among hot-houfe collections.

PLUMBAGO, in *Metallurgy*, a metalline recrement, feparated in the purification of gold or filver with lead, and fticking to the fides of the furnace.

This is otherwife called *molybdæna;* and has the fame virtue with litharge. See MOLYBDÆNA.

PLUMBAGO feems to have been ufed, among the *Ancients*, for *Black* LEAD (which fee), and employed in making pencils for defigning, &c.

The black lead ufed for this purpofe, called "plumbago," and alfo "carbure of iron," by Werner "graphit," the "fer carbure" of Haüy, is a fpecies of coal, or mineral carbon (fee COAL), of a dark iron black colour, paffing into fteel-grey, and occurs in mafs, in kidney-fhaped lumps, and diffeminated. It has a gliftening metallic luftre; its fracture is fmall, fomewhat curved foliated, approaching to fcaly, or granular uneven: in the great it is flaty. It occurs generally in granular or fcaly diftinct concretions; takes a polifh by cutting or rubbing; gives a dark lead-grey ftreak, and is unctuous to the feel, foft, and not very brittle. Spec. grav. 1.98 to 2.26. It does not flame when heated, nor can by itfelf to fupport combuftion. After long expofure 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 cauftic dry alkaline, be heated in a retort with the pneumato-chemical apparatus, the alkaline becomes effervefcent, hydrogenous gas is obtained, and the plumbago difappears. This experiment proves, that the fmall quantity of water contained in the falt is decompofed, and that its oxygen, by combining with the carbon of plumbago, forms the carbonic acid. The fulphuric acid does not act upon plumbago, according to Scheele. Pelletier has obferved, that 100 grains of plumbago, and four ounces of oil of vitriol, being digefted in the cold for feveral months, the acid acquired a green colour, and the property of congealing by a very flight degree of cold. The fulphuric acid diftilled from plumbago paffes to the ftate of the fulphureous acid; at the fame time that carbonic acid is obtained, and an oxyd of iron is left in the retort. The nitric acid has no action upon plumbago, unlefs it be impure. The muriatic acid diffolves the iron and clay which contaminate native plumbago. Meffrs. Berthollet and Scheele availed themfelves of this method to purify it. The liquor being decanted after digeftion upon the plumbago, the refidue is then wafhed and fubmitted to diftillation to feparate the fulphur. The muriatic acid alone has no action upon plumbago, but the oxygenated muriatic acid diffolves it; the refult being a true combuftion effected by the oxygen of the acid, and the carbon of the plumbago. If ten parts of the nitrate of pot-afh be fufed in a crucible, and one part of plumbago be thrown upon it by a little at a time, the falt will deflagrate, and the plumbago will be deftroyed. The matter which remains in the crucible confifts of very effervefcent alkali,

alkali, and a fmall portion of martial ochre. If plumbago be diftilled with muriate of ammonia, the muriate fublimes, coloured by the iron. All thefe facts prove that plumbago is a peculiar combuftible fubftance, a true charcoal combined with a martial bafis. The purer kind of plumbago, according to Scheele and Berthollet, confifts 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	filex
100	

The brilliant charcoal of certain vegetable fubftances, more efpecially when formed by diftillation in clofe veffels, poffeffes all the characters of plumbago: and the charcoal of animal fubftances, poffeffes characters ftill more peculiarly refembling it. When animal fubftances are diftilled by a ftrong fire, a very fine powder fublimes, which attaches itfelf to the inner part of the neck of the retort. This fubftance may be made into excellent black-lead pencils. Carbon may be formed in the earth by the decompofition of wood, together with pyrites; but the origin of plumbago, fays M. Chaptal, is principally owing to the ligneous, and truly indecompofable, part of the wood, which refifts the deftructive action of water in its decompofition of vegetable fubftances. This mineral is found in primitive and tranfition rocks in England, Scotland, France, Spain, Germany, America, &c. Befides its ufe for pencils, the beft for this purpofe is that from Borrowdale, in Cumberland; it is fometimes ufed to lubricate machinery inftead of oil, and to protect iron from ruft. The hearths and plates of chimnies and other utenfils, which appear very bright, owe their colour to plumbago. For this purpofe Homberg long ago, *viz.* in 1699, directed 8lbs. of hog's-lard to be melted with a fmall quantity of water, with the addition of 4oz. of camphor. When this laft is fufed, the mixture is taken from the fire; and while it is yet hot, a fmall quantity of plumbago is added to give it a leaden colour. When this is to be applied, the utenfils muft be heated to fuch a degree, that the hand can fcarcely bear to touch them. In this ftate the compofition muft be rubbed on them, and afterwards wiped when the piece is dry. Thofe who prepare fmall fhot, ufe black lead to polifh or glaze it, by rolling or agitating them together with a quantity of plumbago. It is likewife ufed to make razor ftrops. When kneaded with clay, it makes excellent crucibles. One part of plumbago, three of argillaceous earth, and a fmall quantity of cow's dung very finely chopped, form an excellent lute for retorts; this lute is very refractory; and the glafs will melt with the coverings changing its form. Aikin's Dict. Chaptal's Chem. vol. ii.

Pomet fays, that plumbago was the fea-lead, *plumbum marinum*, of the ancients; who, he notes, took black-lead for a production of the fea, not a mineral, as it really is; but this is fcarcely credible.

Plumbago, in the *Hiftory of the Gems*, a word ufed by the Roman authors to exprefs a blemifh common to their worfe kinds, and greatly debafing their value. It was a fort of blueifh or blackifh deadnefs in the ftone, which mixed itfelf with the other colour, be that what it would, and rendered it dull and dead. The emerald was of all the gems the moft fubject to this fault; and in this cafe, its fine green colour was always rendered cloudy and blueifh; and in fome lights the ftone appeared of a dufky greyifh-blue, with no green at all in it. The Bactrian emeralds, which were in great efteem with the ancients, were often fubject to this imperfection; and thofe of Cyprus, taken out of the copper mines, though fubject to many other imperfections, were ufually quite free from this.

Plumbago, in *Mineralogy*, a name given by many authors to a fort of foffil, having very much the appearance of a lead-ore, but not fuch in reality.

It is called alfo galena, blende, and mock-lead. It is ufually of a plated texture, and dark blackifh-blue colour, like the lead-ores; but on trial it yields no metal. See Galena and Blende.

PLUMBARIA, in *Ancient Geography*, an ifland fituated on the coaft of Spain, near the promontory Dianium, according to Strabo.

PLUMBATÆ, among the *Ancients*, a kind of fcourge, the thongs of which were armed with lead.

Plumbatæ likewife fignified leaden balls, ufed by foldiers to annoy the enemy with; whence the foldiers were called *martiobarbuli*.

PLUMBERY, formed of *plumbum*, *lead*, the art of cafting, preparing, and working lead; and of ufing it in buildings, &c. See Lead.

The lead ufed in plumbery is furnifhed from the leadworks in large ingots, or blocks, called pigs of lead, ordinarily weighing about a hundred pounds a-piece.

As this metal melts very eafily, it is eafy to caft figures of it, of any kind, by running it into moulds of brafs, clay, plaifter, &c. But the chief article in plumbery is the fheets, and pipes of lead. They are thefe which make the bafis of the plumber's work in building; the procefs of thefe, therefore, we fhall give a defcription of.

Method of cafting large Sheets of Lead.—The lead deftined for this ufe is melted in a large cauldron or furnace, ufually built with free-ftone and earth, fortified on the outfide with a maffive of fhards and plaifter. At the bottom of it is a place funk lower than the reft, in which is difpofed an iron pot, or pan, to receive what may remain of the metal after the fheet is run. The furnace is fo raifed above the area of the floor, as that the iron pot juft refts on it.

To ufe 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 caft. This confifts of large pieces of wood, well jointed, and bound with bars of iron at the ends. Around it runs a frame, confifting of a ledge or border of wood, two or three inches thick, and one or two high from the table, called the *fharps*. 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 fand, prepared by moiftening it with a watering pot, then working it with a ftick; and at laft, to render it fmooth and even, beating it flat with a mallet, and planing it with a flip of brafs, or wood.

Over the table is a ftrike 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 fo placed, as that between it and the fand is a fpace proportionable to the intended thicknefs of the fheet. The ufe of this ftrike 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 fhovel, bearing, before, on the edge of the table itfelf, and behind, on a treffel fomewhat lower than the table. Its ufe is in conveying the metal into the mould; and the defign of its oblique difpofition is, that it may by that means be able to retain the metal, and keep it from running off at the fore-fide, 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 difpofed, 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 cut the coals, and clear the lead with another iron fpoon, pierced after the manner of a fcummer.

This done, they hoift up the lower part of the peel by its handle; upon which the liquid matter running off, and fpreading itfelf on the mould, the plumber conducts and drives it to the extremity of the table, by means of the ftrike, which the workman paffes along the ledges, and thus renders the fheet of an equal thicknefs.

The fheets thus caft, there remains nothing but to edge them, *i. e.* to planifh the edges on both fides, in order to render them fmooth and ftraight.

Method of cafting thin Sheets of Lead.—The table or mould here ufed is of a length or breadth at difcretion, only ledged on one fide. Inftead of fand, they cover it with a piece of woollen ftuff, 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, fo that it does not ftand horizontal, but moderately inclined.

Great regard is, in this procefs, had to the lead while melting, that it have the juft degree of heat, fo 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 fhrunk and fcorched a little, it is not hot enough.

Being then in its juft degree, they have a ftrike, but different from that defcribed in the former article; as ferving both for peel and ftrike; both to contain and to conduct the liquid lead. It is, in effect, a wooden cafe without any bottom, only clofed on three fides. It is pretty high behind, but the two fides, like two acute angles, ftill diminifh to the tip, from the place where they are joined to the third or middle piece, where they are of the fame height with it; *viz.* feven or eight inches high. The width of the middle makes that of the ftrike, which again makes that of the fheet to be caft.

The ftrike is placed at top of the table, which is before covered in that part, with a pafteboard, that ferves as a bottom to the cafe, and prevents the linen from being burnt while the liquid is pouring in. The ftrike is fo difpofed on the table, as that the higheft part looks to the lower end of the table, and the two floping fides to the higher end.

The ftrike is now filled with lead, according to the quantity to be ufed; which done, two men, one at each fide the table, let the ftrike defcend down the table, or elfe draw it down with a velocity greater or lefs, as the fheet is to be more or lefs thick; the thicknefs of the fheet ftill depending on the promptitude with which the ftrike flides down the inclining mould.

The fine fmooth fheets of lead, thus made, are fometimes ufed between the joints of large ftones in great buildings, &c.

For the method of cafting pipes, without foldering, fee PIPE.

The folder which the plumbers ufe, is a mixture of two pounds of lead with one of tin. See SOLDER.

Plumber's work is commonly eftimated by the pound or hundred weight; but the weight may be difcovered by the meafure of it, in the manner below ftated. Sheet lead ufed in roofing, guttering, &c. is commonly between feven and twelve pounds weight to the fquare foot; but the following table fhews by infpection the particular weight of a fquare foot for each of feveral thickneffes.

Thicknefs.	Pounds to a Square Foot.	Thicknefs.	Pounds to a Square Foot.
.10	5.899	.15	8.848
.11	6.489	.16	9.438
$\frac{1}{9}$	6.554	$\frac{1}{6}$	9.831
.12	7.078	.17	10.028
$\frac{1}{8}$	7.373	.18	10.618
.13	7.668	.19	11.207
.14	8.258	$.2 = \frac{1}{5}$	11.797
$\frac{1}{7}$	8.427	.21	12.387

In this table the thicknefs is fet down in tenths and hundredths, &c. of an inch; and the annexed correfponding numbers are the weights in avoirdupois pounds, and thoufandth parts of a pound. So the weight of a fquare foot of $\frac{1}{10}$ or $\frac{10}{100}$ of an inch thick, is 5 pounds and 899 thoufandth parts of a pound; and the weight of a fquare foot to $\frac{1}{9}$ of an inch thicknefs is 6 pounds and $\frac{554}{1000}$ 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 fquare foot?

Decimals.	Duodecimals.
39.5	39 6
$3\frac{1}{4}$	3 3
118.5	118 6
9.875	9 10 6
128.375	128 4 6
$8\frac{1}{2}$	$8\frac{1}{2}$
1027.000	1024
64.1875	64
	$2\frac{5}{6}$
	$0\frac{17}{48}$
1091.1875	Anfwer $1091\frac{9}{48}$ lbs.

2. What coft the covering and guttering of a roof with lead, at 18*s.* 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 fquare foot? Anf. 115*l.* 9*s.* $1\frac{1}{2}$*d.* Hutton's Menfuration.

PLUMBING, among *Miners*, a term ufed to exprefs the ufing a mine dial, in order to know the exact place of the work where to fink down an air fhaft, 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 fkilful perfon with an affiftant, and with pen, ink, and paper, and a long line and a fun-dial, after his guefs of the place above ground, defcends into the adit or work, and there faftens one end of the line to fome fixed thing in it; then the incited needle is let to reft, and the exact point where it refts is marked with a pen: he then goes on farther in the line ftill faftened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwife; and then letting down the dial again, he there likewife notes down that point at which the needle ftands in this fecond pofition. In this manner he proceeds from turning to turning, marking down the points, and

and marking the line till he comes to the intended place; this done, he afcends, and begins to work on the furface of the earth what he did in the adit, bringing the firft knot in the line to fuch a place where the mark of the place of the needle will again anfwer its pointing, and continues this till he comes to the defired place above ground, which is certain to be perpendicularly over the part of the mine into which the air-fhaft is to be funk.

PLUMBUM. See LEAD.

PLUMBUM *Corneum*, called alfo *Saturnus corneus*, in *Chemiftry*, is a metallic falt, formed by the precipitation of lead from its folution in nitrous acid with the marine acid, and all the neutral falts which contain it. It is thus called from its refemblance to the luna cornea. This falt may be made by other methods, and particularly by difengaging the volatile alkali from fal ammoniac by lead. In this way Mr. Margraaf makes the plumbum corneum, which he employs in the preparation of phofphorus. See LEAD.

PLUMBUM *Uftum*. See *Burnt* LEAD.

PLUME, a fet or bunch of oftrich feathers, pulled out of the tail and wings, and made up to ferve 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 fhews her conftitution.

When a hawk feizes her prey, and difmantles it of its feathers, fhe is faid 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 diftrict of Agen; 7 miles S.S.W. of Agen. The place contains 1588, and the canton 6633 inhabitants, on a territory of $127\frac{1}{2}$ kiliometres, in 10 communes.

PLUME *Alum*. See ALUM.

PLUMENAU, or PLUMLAW, in *Geography*, a town of Moravia, in the circle of Olmutz; 4 miles W. of Profnitz.

PLUMENTAAL, a town of Auftria; 4 miles W. of Ziftersdorf.

PLUMERIA, in *Botany*, was fo named by Tournefort, in honour of its difcoverer, the celebrated Father Plumier. (See PLUMIER, CHARLES.)—Tourn. Inft. 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. Juff. 145. Lamarck Illuftr. t. 173.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, fmall, in five deep obtufe fegments. *Cor.* of one petal, funnel-fhaped; tube long, gradually dilated upwards, naked at the mouth; limb fpreading, in five deep, ovate-oblong, oblique fegments. *Stam.* Filaments five, awl-fhaped, from the middle of the tube; anthers converging. *Pift.* Germen fuperior, oblong, cloven; ftyles fcarcely any; ftigma 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* feparate, cylindrical.

Eff. Ch. Corolla contorted, funnel-fhaped: 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 rofeo odoratiffimo; Tourn. Inft. 659. Trew. Ehret. 11. t. 41. Jafminum indicum; Merian. Inf. Surinam. t. 8.)—Leaves ovate-oblong. Flower-ftalks downy, even.—Native of Jamaica and Surinam, where it is cultivated on account of the beauty and fragrance of its bloffoms, which come out before the leaves. Merian fays it is readily propagated, and grows rapidly. In our ftoves it bloffoms in July and Auguft. The *ftem* is thick and flefhy, forming a tall fhrub, or fmall tree, in the courfe of a few months, and abounding with milky juice. *Leaves* deciduous, fcattered, ftalked, a fpan long, and one and a half or two inches wide, oblong, fomewhat ovate or elliptical, pointed, entire, fmooth, with one thick rib, and many tranfverfe veins, connected by a fubmarginal line. We find no traces of the two glands on the *footftalks*, mentioned by Linnæus, after Browne. The *flowers* are numerous, in a terminal cymofe *panicle*, whofe ftalks, in all the fpecimens we have feen, are denfely downy. The *corolla* expands near two inches, and is rofe-coloured, with a yellow mouth.

2. P. *acuminata*. Sharp Eaft Indian Plumeria. Ait. n. 2. (Flos convolutus; Rumph. Amboin. v. 4. 85. t. 38.)—Leaves lanceolate, flat, taper-pointed. Flower-ftalks fmooth, even.—Native, as well as cultivated, in various parts of the Eaft Indies, being much admired for its beautiful and fragrant white *flowers*. Thefe, according to Rumphius, are fometimes candied with fugar. It was introduced at Kew, about 1790, by fir Jofeph Banks, and flowers there from June to September. The habit of the plant is like the laft, but the *corolla* is white with a yellow mouth; the *flower-ftalks* fmooth; and the *leaves* much more pointed. The tapering *leaves*, and lefs tumid or rugged *flower-ftalks*, diftinguifh this from the following, which the *flowers* moft nearly refemble.

3. P. *alba*. White Weft Indian Plumeria. Linn. Sp. Pl. 306. Willd. n. 2. Ait. n. 3. Jacq. Amer. 36. t. 174. f. 12. (P. flore niveo, foliis longis anguftis et acuminatis; Tourn. Inft. 659. Plum. Ic. 227. t. 231.)—Leaves lanceolate, revolute. Flower-ftalks fmooth, knotty above.—Native of the Weft Indies, on rocks by the fea fide. *Jacq.* It flowers in our ftoves in July and Auguft, but is more rare than the firft fpecies. Nothing can exceed the fragrance of the large and elegant white *flowers*, whofe infide, at the mouth of the tube, is yellow, as in the two preceding.

4. P. *obtufa*. Blunt-leaved Plumeria. Linn. Sp. Pl. 307. Willd. n. 3. Ait. n. 4. Aubl. Guian. v. 1. 259. (P. flore niveo, foliis brevioribus obtufis; Tourn. Inft. 659. Plum. Ic. 228. t. 231. Catefb. Carolin. v. 2. t. 93.) —Leaves obovate, obtufe, with a fhort point.—Native of South America and the Weft Indies. It flowers in the ftove in July, according to Mr. Aiton. Our fpecimen is from Aublet. The fhape of the *leaves*, as above defined, is very different from any of the foregoing, with much more diftant, lefs parallel, veins; in which refpect Plumier's plate is altogether unlike our plant. Our *flower-ftalks* too are much more elongated, zig-zag, and copioufly jointed. Aublet fays it is as large as a pear-tree of the largeft fize. Burmann has very improperly confounded the fynonyms of *P. rubra* with this, and Willdenow, like Linnæus, erroneoufly cites under it Rumphius's *Flos convolutus*; fee n. 2.

5. P. *pudica*. Virgin Plumeria. Jacq. Amer. 37. Willd. n. 4.—Leaves oblong, flat. Limb of the corolla clofed.—Jacquin fays he faw this plant cultivated in the gardens of Curaçao, where it was highly efteemed for its *flowers*, known there by the name of Douzellas, or virgins, becaufe they are never expanded. Their colour is entirely yellow, and their fcent, in the opinion of the author we quote, greatly excels every other *Plumeria*, and feemed fuperior to all the flowers with which he was acquainted. The *fhrub* is five feet high, milky, with umbrageous, oblong, flat veiny *leaves*. *Flowers* lafting, in abundant fucceffion, for two months,

months, their *corolla* always rolled up, like the *Achania Malvavifcus*.

6. P. *cuneata*. Wedge-leaved Plumeria. Linn. fil. MSS. (P. alba; Aubl. Guian. v. 1. 259, excluding the fynonyms.)—Leaves obovate, fomewhat wedge-fhaped, rounded, pointlefs; veins diftant.—Cultivated at Cayenne, according to Aublet, who took it for the Linnæan *P. alba*. We have numerous *leaves* from his own herbarium, given by fir J. Banks to the younger Linnæus, who juftly remarked that this muft conftitute a diftinct fpecies, though he had feen merely thefe feparate *leaves*. Another fpecimen, apparently from the fame herbarium, and likewife without *flowers*, is marked *P. laurifolia;* but it looks to us like a lefs blunt variety of Aublet's *obtufa*.

The French name of this genus, *Frangipanier*, is rather remarkable. It is faid to allude to its fragrance, *Frangipani* being a fort of perfume, fo called in France from its inventor, an Italian, of the Frangipani family, fo confpicuous in the Roman difturbances of the twelfth century.

Plumeria, in *Gardening*, contains plants of the fucculent, flowering, exotic kind for the ftove, of which the fpecies cultivated are the red plumeria, or jafmine (P. rubra); the white plumeria (P. alba); the blunt-leaved plumeria (P. obtufa); and the clofe-flowered plumeria (P. pudica.)

Method of Culture—Thefe plants are capable of being increafed by feeds and cuttings of the young branches. The feeds fhould be procured from the native fituation of the plants, and be fown in pots, filled with a light fandy compoft, plunging them in a hot-bed, covered by glaffes, or the bark-bed in the ftove, when they readily vegetate; and when the plants have attained a few inches in growth, they fhould be removed into feparate pots, of a fmall fize, which muft be plunged in beds of the fame kind as above.

The cuttings fhould be made from the young branches, and after being laid in the ftove or fome other dry fituation, to difpel their fucculence, and heal over the wounds, be planted out during the fummer months, in pots, filled with light dry mould, plunging them in the bark bed of the ftove, giving occafional fhade and very flight waterings, till they have ftricken frefh root, and when they have become well rooted, they may be removed into feparate pots, being managed as other ftove exotics.

They afford much ornament and variety among collections of ftove plants; efpecially the red fort; and when fet out with other potted plants in the fummer, have a delightful fragrance.

PLUMIER, Charles, in *Biography*, a French botanift and ecclefiaftic, of the moft refpectable character, was born in 1646. He belonged to the religious order of Minims, and is defcribed as of a fimplicity of character becoming his monaftic profeffion, if not invariably affociated with it. To this he added the moft enthufiaftic love of botany, and a degree of accuracy and penetration rarely excelled in that fcience. He was fent, at the expence of the French king, on three different voyages to the Weft Indies; and was about to undertake a fourth, when he died of a pleurify at Cadiz in 1704, aged 58.

His firft publication is entitled *Defcription des Plantes de l'Amerique, avec leurs figures*, a fplendid folio of above 100 pages, with 108 plates, which iffued from the Louvre prefs, at the king's expence, in 1693. The text is French; the plates are outlines, drawn by Plumier himfelf, with a mafterly hand. In the preface he relates, that he firft imbibed a tafte for botany at his convent of Trinitâ dei monti at Rome, from the lectures of Father Sergeant, a French monk, and of de Onuphriis, a Roman phyfician. By this tafte he was infenfibly diverted from the mathematics, which have always been much ftudied in that convent, even to our own times. Being ordered to his native country, he obtained the permiffion of his fuperiors to botanize on the fhores of Provence, and the mountains of the Alps. Here he meditated a general *Pinax*, or Syftem of Botany, with figures, of which he had actually drawn a confiderable number, when he found at Marfeilles an opportunity of failing to America. Begon, intendant of the French navy, furthered his views, and procured for him the patronage and fupport of government; by which action alone, if by nothing elfe, the intendant may be faid 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 fpecies, previoufly unknown to botanifts. The reft of the engravings confift of many fpecies of *Piper*, *Arum*, and *Paffiflora*, with other climbing plants. Their parts of fructification are not critically detailed; but that defect was fupplied in the author's *Nova Plantarum Americanarum Genera*, a thin quarto, publifhed in 1703, after his third voyage. In this book 106 new genera are eftablifhed, and illuftrated with plates. The manner and principles of Tournefort are adopted throughout. In his nomenclature, Plumier is profufe in honouring botanifts, as well as in adopting the moft uncouth words of barbarous origin; fcarcely conftructing one original name, of Greek or Latin derivation, except perhaps *Saururus*, a genus now funk in the more ancient *Piper*. Haller juftly complains, that Plumier falls into the imperfections of Tournefort, with refpect to his fuperficial mode of confidering the parts of the flower, and his inattention to number in their defcription. He hints alfo that fome of the delineations have a doubtful or fufpicious afpect. That fome of thefe figures are erroneous in parts, cannot be denied; as the ftamens of *Fuchfia*, the ftigmas of *Plukenetia*, and the whole flower of *Matthiola;* befides abundance of flight negligences or inaccuracies; but we muft not try the performances of one of the fathers of fcientific botany, by the teft of our prefent advanced knowledge.

The Ferns of Plumier's firft publication were reprinted with a great number of additional figures of the fame tribe, very finely executed, in another fplendid folio, containing 172 plates, with Latin as well as French defcriptions. In the preface he inveftigates all that had been faid relative to the flowers of thefe plants; and though he attributes to Tournefort a fentiment of Pliny's, he proves himfelf fufficiently converfant with botanical writers. To give the more confequence to his favourite purfuit, he very commendably enlarges on the benefits which medicine may derive from the ftudy of the vegetable world: but as Rouffeau's Swifs herbalift died of a pleurify, whilft employed in gathering a fovereign Alpine remedy for that diforder; fo it is not improbable that Plumier was extolling the *Polytrichum*, fee his preface p. 2, as "un antipleuritique des plus affurez," when he himfelf fell a victim to the very fame diftemper; leaving his half-printed book to be his monument. So much eafier is it for an ardent botanift to catch a pleurify, we write from the conviction of experience, than to cure one!

The above works contained but a fmall part of the productions of Plumier's pencil. Vaft treafures of his drawings, in outline, have remained in the French libraries, for the moft part unpublifhed. The late earl of Bute obtained copies of a great number of thefe, which after his lordfhip's death paffed into the hands of fir Jofeph Banks. Boerhaave had previoufly procured copies of above 500, done by the accurate Aubriet, under Vaillant's infpection, which were afterwards, in great part at leaft, publifhed by John Burmann 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 Cochinilla*, publiſhed at Leipſic 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. Liſter, 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 Liſter's Journey to Paris. Plumier's Works. Haller Bibl. Bot.

PLUMMER's Ethiops. This medicine is compoſed of the ſulphur auratum antimonii and calomel, commonly in equal parts, *e. 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 gleets 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 ſarſaparilla.

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 Feelers.

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 *Manege*. See Estrapade.

PLUNGER, in *Mechanics*, a ſolid braſs cylinder uſed as a forcer 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 Chineſe 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 *Livings*, 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 30*l.*, 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*, or *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 shag 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, anemonies, &c., called also *thrum* or *thrummy heads;* by others, *hairy heads*, *buttons*, *bass*, *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

for he fays, he had not leifure at that time to learn the Latin language, on account of the number of commiffions with which he was charged, and the numbers who reforted to him in order to be inftructed in philofophy. He either revifited Rome, or made it his continued abode for a confiderable time, fince we find him in reputation there during the reign of Trajan, who is fuppofed to have been one of his auditors. That fame emperor is faid to have raifed Plutarch to the confular dignity: this, however, was probably only a titular honour. He finally retired to his native place, in which he fixed his refidence, giving this as a reafon, that being born in a little city, he would not make it lefs by deferting it. Here he was chofen to the office of archon, or chief magiftrate, and was afterwards admitted into the college of priefts of the Delphic Apollo. He is thought to have died about the year 120. He was married, and had feveral children. Two fons furvived him, *viz.* Plutarch and Lamprias; the latter probably imitated his father in his ftudies, as he drew up a catalogue of his works, and is fuppofed 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 illuftrious men, one of the moft interefting remains of ancient literature, and to which, in our biographical articles, we have had frequent recourfe. A vein of pure morality runs through them, with a fpirit of piety, occafionally deviating into fuperftition. From the lift of his writings it appears that feveral of his biographies are loft. Plutarch's moral treatifes are numerous and valuable; the author does not excel in depth and fagacity, but his fentiments are commonly marked with good fenfe and candour. In kindnefs of heart and humanity few philofophers have furpaffed him. It appears from his fon's catalogue, that more of his works of the moral and critical clafs have been loft than preferved. Of the complete works of Plutarch, the beft editions are thofe of Maufac and of Reifke. There are numerous editions of the Lives, and other detached works, tranflated 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, feem to have taken notice of his knowledge and love of mufic, or of his writings on the fubject, M. Burette, in the 8th vol. 4to., and 11th abridg. of the Memoirs of the Acad. des Infcriptions et Belles Lettres, in 1726, took up the fubject of ancient Greek mufic, and, with a true critical fpirit, laid open all its arcana, after a long ftudy of modern mufic, and the Greek writers who have treated of it *ex profeffo*, or incidentally; letting us know nearly all that is to be known with certainty of this myfterious fubject.

After denying to the ancients, in the moft formal terms, the knowledge of counterpoint, he proceeds to the examination of Plutarch's "Dialogue on Mufic," firft removing all doubt of its having been written by him, which had been difputed, and then proceeds to a clofe, and, in general, faithful tranflation, which he gives oppofite to the original text; and proves from that work itfelf, that the ancients were perfectly ignorant of compofition, or mufic in parts. And what gives greater force to this proof is, that Plutarch was thoroughly verfed in the fubject which he treats. He writes of the nature of found, fo far as was then known; of its generation and proportions; of the genera, intervals, modes, rhythm, melopœia; explains the mufical technica of the Greeks, (not the notation,) but neither quotes nor mentions any practical mufician, except Ariftoxenus. Of poet muficians, from Homer to the time of Alexander the Great, he makes honourable mention, but of none after.

He fpeaks frequently of mufic having been corrupted by the theatre, particularly in his "Dialogue," where he fays, "If we look back into remote antiquity, we fhall find that the Greeks were unacquainted with theatrical mufic. The only ufe they made of this art was in praifing the gods, and educating youth. The idea of a theatre had not then entered their thoughts, and all their mufic was dedicated to facrifices, and to other religious ceremonies, in which they fung hymns in honour of the gods, and canticles in praife of great and good men."

It fhould be remembered here, that Plutarch was a prieft of Apollo; and, moreover, that what he, Plato, and Ariftoxenus fay, concerning the injuries which mufic had received from the theatre, favours very much of cant and prejudice. Athenæus, on the contrary, tells us, that notwithftanding the complaints of Ariftoxenus againft theatrical corruption, others were of opinion, that mufic derived its principal improvements in Greece from the theatre; and it feems natural, that the hope of applaufe, and the fear of cenfure, fhould operate more powerfully on the induftry and faculties of a compofer or performer, than the idea of private praife or blame. And, if we may judge of ancient times by the prefent, the theatre feems the place to develope all the powers of mufic, and to expand the talents of its profeffors: for it is at the mufical theatre, the modern temple of Apollo and the mufes, that perfection of various kinds is more frequently found than any where elfe. But old things do get violently praifed, particularly mufic, after it ceafes to give pleafure, or even to be heard; and old people exclufively praife what pleafed them in their youth, without making allowance for their own want of judgment and experience at that time, which, perhaps, joined to the difpofition of youth to be eafily pleafed, occafioned their former delight.

It is natural to fuppofe as Greek mufic, like other arts, and other things, muft have had its infancy, maturity, and decrepitude; that in fecond childhood, as its effects were more feeble, its purfuits would be more trivial than before its decline. Few great actions were achieved by the Greeks after their total fubjection. However, they cultivated mufic under the Roman emperors, under their own, and are ftill delighted with it under the Turkifh government; but their mufic is now fo far from being the ftandard of excellence to the reft of the world, that none but themfelves are pleafed with it.

Plutarch treats the fubject of mufic in a manner lefs dogmatical than hiftorical. The two principal branches of the art, upon which he lays the moft ftrefs, 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 muficians mentioned in the courfe of the Dialogue; which faves his readers much trouble in feeking them, difperfed as they are through all literature; and greatly enlivens the tranflation of many parts of the treatife, that are now either unintelligible or ufelefs.

Upon the whole, however, there is more to be learned from this Dialogue, concerning the hiftory, and indeed practice, of ancient mufic, thus illuftrated and explained, than in Meibomius, Ptolemy, and all the philofophers and mathematicians, who only treat of the monochord, ratios, and harmonics, without giving us a fingle paffage of ancient mufic, or telling us what it was in practice.

PLUTEI, in the Roman *Art of War*, were engines contrived for the defence of foldiers, confifting of the fame 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, ᾅδης, 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 overſpread 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 Jaſion 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 daſtardly 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 $252\frac{1}{2}$ kiliometres, 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 *Seamanſhip*, 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 plyer. See BEATING, in *Navigation*.

Plying is alſo uſed by ferrymen to denote their waiting for a fare.

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 ſoldiers. 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 ſailed 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 aud 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 ſcite, 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, counterſcarp, 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 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 ſcite 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. Lancaſter; 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' almshouſes, 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 Iſelham. The principal gateway or entrance is in a very dilapidated ſtate, but the ruins of the priory itſelf are almoſt extinct, and their ſcite occupied by a ſmith's ſhop. The hoſpital of the Grey friars is ſtill remaining, and is now a private houſe. An abbey of Ciſtertian 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 parliamentary grants in 1791—1799. It is ſurrounded 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 break-water, 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 break-water, 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 Edgecumbe. 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 of of Stonehoufe only intervening. It is placed on the eaftern bank of Hamoaze. The manor, excepting a part of the dock-yard, is the property of the St. Aubyn family, who inherit it from fir William Morice, fecretary of ftate to Charles II., and mentioned by Clarendon as inftrumental to the reftoration. In this family reft the prefentation to the living of Stoke-Damerell. The ftreets are regular, interfecting each other at right angles, and generally well built. The pavement is of the marble with which the neighbourhood abounds, and after a fhower its veins have a beautiful appearance. Though of fuch confiderable magnitude, it is wholly of modern date, and owes its origin and rapid increafe to the eftablifhment of the dock-yard and naval arfenals. 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 houfes. The greater part of the town has been erected fince 1760. The number of inhabitants in Dock is about 25,000, and the houfes 2400. They are erected by the inhabitants on leafes for ninety-nine years, fubject to a fmall 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 21ft of his prefent majefty, George III. On the north-eaft and fouth fides the town is bounded by a fod wall, about twelve feet high, which was built in 1787. The weftern fide is fkirted 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 folid flate and limeftone rock. In this line of fortification are three barrier gates; the North barrier, the Stoke barrier, and the Stonehoufe barrier. Round the whole extent are planted pieces of ordnance, at regular diftances. The other fortifications are a battery on mount Wife; another at the Obelifk hill; and a redoubt or block-houfe on mount Pleafant, without the lines, which command the whole. It is in contemplation to fortify the town regularly, and the bufinefs is actually begun; but the dock-yard may be commanded from many of the adjacent eminences, all of which muft be fortified alfo, at an expence that would erect feveral diftinct yards! The town, being circumfcribed by this boundary of defence, does not admit of any increafe of building within it. A new town without the lines, named Morice-town, is alfo the property of the St. Aubyn's family. Dock has two chapels, and feveral meeting-houfes for fects of different denominations, which are very numerous. The parifh church is fituated about a mile from the town. There are few charitable inftitutions, perhaps in confequence of the recent growth of the town. The poor-houfe is extenfive, and will contain nearly 300 perfons: picking oakum for the dock-yard affords conftant employment to its inmates. The town, not being incorporated, is under the jurifdiction of the county magiftrates, who hold their feffions quarterly here. The inhabitants are fupplied with water from the fprings on Dartmoor, by an aqueduct fimilar to that of Plymouth. Markets are held three days in the week in the new market place, lately erected by fir John St. Aubyn. The government houfe is a handfome building, erected when lord Lennox commanded here; it is appropriated folely to the difpatch of military bufinefs, court-martials, &c. and has in front a grand parade. Here are eight different barrack eftablifhments, which afford conveniencies for 3000 men. The naval department confifts of an admiral and rear admiral, deputy judge advocate, and commiffioner for the payment of feamen's wages. Near the grand parade ftands the telegraph, by which a communication is kept up with the Admiralty in London, through thirty-fix different ftations. Inftances have occurred of a fhort meffage being tranfmitted to London, and an anfwer returned, in fifteen minutes. (See Post and Telegraph.) The dock-yard, even in its prefent unfinifhed ftate, is acknowledged to be one of the fineft in the world. When it was firft ufed as a naval arfenal is uncertain; but as the bafon and its dock are the moft ancient, and were not made till the reign of William III., it feems evident that this was a place of little confequence before that period. The wall, which feparates the yard from the town, is of flate and limeftone, and in fome places thirty feet high. The area within the wall is feventy-one acres and thirty-fix poles; including the projecting parts of the jetties. The entrance to the dock-yard from the land fide is from Fore-ftreet, by a large gate for carriages, &c., and a fmall one for foot paffengers. No perfon is fuffered to enter, unlefs well known, or in uniform, without an order from the commiffioner. Immediately within the gates is the mafter porter's houfe; and clofe by is the chapel, the tower and one aifle of which are as old as 1700, the other aifle 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, fkirted with elms, leads to the officers' dwelling-houfes, which are of brick, and thirteen in number. From hence to the lower part of the yard, which has been levelled from the folid rock, is a defcent by a flight of fteps, leading to two handfome buildings, the northernmoft of which is the joiner's fhop, the other is ufed as an office. Directly in front of thefe is the bafin and dock, made in the reign of William III. The bafin is a large excavation, in which all the boats belonging to the yard, as well as the launches employed in moving fhips, are kept; the water flows into it through an opening about feventy feet wide. Within the bafin is a dock, fufficiently capacious for a feventy-four gun fhip; its length is 197 feet 3 inches; its width, 65 feet 10 inches; and its depth, 23 feet 1 inch. The bafin is bounded on each fide by jetty-heads, which are platforms projecting over the fea, fupported by wooden pillars driven full of nails, to prevent the worms from perforating them. Ships of all fizes lie alongfide thefe jetties without grounding, and here all veffels are brought to be fitted out. On the fouth jetty is a landing place, called the mafter attendant's ftairs, where all ftores returned from fhips are landed, and thofe to be fent to them fhipped off. Adjoining this jetty is the rigging houfe, a handfome building, 480 feet long, and three ftories high, forming one fide of a quadrangle. This fabric is of lime-ftone, with the coins and cornices of Portland ftone. Within it the rigging for the fhips of war is kept in fuch a ftate of forwardnefs, as to be fit for ufe at a very fhort notice. Over the rigging is the fail loft, where all the fails are cut out and made. The remaining three fides of the quadrangle are ftore-houfes, in which the various articles neceffary to equip the fleets are kept. Advancing fouthward is a flip for hauling up and graving the bottoms of fmall veffels, fuch as floops of war, cutters, &c. Beyond this is the Camber, a long canal, about feventy feet wide, terminating at the upper end in a bafin, where boats lie; on the north fide of which is the boat-houfe, where boats are built and repaired. Here, before the year 1768, were the bounds of the yard; all thence to the fouthward is ftill called the "new ground." The black-fmith's fhop is fituated fouth of the canal; it is a fpacious building, about 210 feet fquare, and contains forty-eight forges. The largeft 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.

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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 thicknefs, 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 *layed* (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 16lb., 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. Morice-town, 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 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 Fæderal 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 pearch, 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 canons 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 scite was granted by queen Elizabeth to Arthur Champernon, 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 farm-house, 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, Πλυντηρια, 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.

Wolfius, 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 diftinction of the pneumatic fect, confifted in referring to a particular fpirit, or *pneuma*, which they confidered to arife from the heart and arteries. See Medicine, *Hiftory of*.

PNEUMATOCELE, from πνευμα, *wind*, and κηλη, *a tumour*, in *Surgery*, a fwelling containing air: alfo a wind rupture; a complaint which is fpoken of by many furgical writers; but has no real exiftence. Hernial tumours do, indeed, fometimes include air, which is combined within the protruded bowel, or elfe produced in the cellular membrane from putrefaction in the floughing ftate of the difeafe. Yet it is not the accidental prefence of fuch air that conftitutes the rupture or hernia; but the protrufion of fome of the vifcera from the cavity of the abdomen.

PNEUMATODES, a word ufed by Hippocrates to exprefs a perfon who fetches his breath fhort and quick: and fometimes for one who has his belly or ilia much diftended by flatulencies. *Pneumutias* is alfo ufed in the fame double fenfe.

PNEUMATOMACHI, Πνευματομαχοι, in *Ecclefiaftical Hiftory*, ancient heretics, fo called, becaufe they oppofed the divinity of the Holy Spirit, placing him in the number of creatures.

PNEUMATOMPHALOS, from πνευμα, *wind*, and ομφαλος, *the navel*, in *Surgery*, a rupture of the navel, containing air, or fuppofed 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 *emphyfema*. In this fenfe Sauvages employs the term, and defcribes four fpecies of pneumatofis; the firft he calls *fpontanea*, as it arifes without any evident caufe; the fecond, *traumatica*, which originates from wounds of the lungs, whence the air is permitted to efcape into the cellular membrane of the whole body; the third, *venenata*, arifing from poifons; and the fourth, *hyfterica*, when the air is confined to the ftomach and inteftines. (See his Nofol. Method. clafs x. gen. 5.) See alfo Emphysema.

PNEUMONANTHE, in *Botany*, a name given by many botanical writers to a fpecies of gentiana, called alfo by fome the *calathian* violet.

PNEUMONIA, in *Medicine*, from πνευμων, *the lungs*, fignifies an inflammation of the lungs and its invefting membrane. It includes, therefore, both the forms of the difeafe, peripneumony and pleurify. See Peripneumony.

PNEUMONICS, Πνευμονικα, medicines proper in difeafes of the lungs, in which refpiration is affected.

The word is formed from the Greek πνευμων, *lungs*, or πνευμα, *fpiritus*, *breath*.

Of this number are fulphur, lung-wort, hyffop, ground-ivy, and colt's-foot; they are ufed in phthifes, afthmas, peripneumonies, pleurifies, &c.

PNEUMORA, in *Entomology*, a genus of infects of the order Hemiptera. The generic character is; body ovate, inflated, diaphanous; head inflected, armed with jaws; thorax convex, carinate beneath; wing-cafes deflected, membranaceous; legs formed for running. There are three fpecies of this genus, and they all appear to confift of a mere hollow inflated membrane; by rubbing together their ferrate or toothed legs, they make a fhrill kind of noife morning and evening; and they follow a light; they are fo nearly allied to the cricket tribe, that they have been ranked by Fabricius with the Gryllus genus.

Species.

Immaculata. Green fpotted with white; wing-cafes immaculate. It inhabits the Cape of Good Hope. In Fabricius it is the Gryllus papillofus.

Maculata. Wing-cafes green, with fquare white fpots.

6-Guttata. Wing-cafes green, with two white fpots; abdomen with three white fpots on each fide. 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 fpecies of earth: the terra pnigitis of Diofcorides and Pliny being a grey marle, and the pnigitis of Galen a black clay.

The laft of thefe is faid to be a very valuable aftringent, and is found in many parts of this kingdom, particularly in the neighbourhood of London, and well deferving to be introduced in the practice of phyfic.

PNIGMOS, from πνιγω, *I fuffocate*, in *Medicine*, a kind of fuffocation, from whatever caufe: it is very often ufed to exprefs that of hyfteric fits in women.

PNIX, a word ufed by phyficians to exprefs the fuffocation from hyfteric fits, or any other caufe.

PO, in *Geography*, *Padus*, (which fee,) a river of Italy, which rifes in mount Vifo, at the N.W. part of the marquifate of Saluzzo, feven miles N. of Chateau Dauphin, traverfes a part of the marquifate of Saluzzo, the province of Chieri, the duchy of Montferrat, the Milanefe, Mantuan, and Ferrarefe, and runs into the gulf of Venice, by a great number of mouths.

Po, *Department of*, one of the fix departments into which Piedmont was divided, after having been united to the French republic, Auguft 26, 1802, the other five being Doire, Sefia, Marengo, Tanara, and Stura. This department is formed of the diftrict of Turin, quatre-vallois, and the marquifate of Sufa, in N. lat. 45°, lying between Doire and Stura, and on the W. and N.W. bounded by the Alps, containing 264 fquare leagues, and 395,193 inhabitants. It is divided into three circles, *viz*. Sufa, 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 foil 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, ftone, flate, &c.

Po, *Lower*, a department of the new kingdom of Italy, compofed of the duchy of Ferrara, and the valley of Comachio.

Po, *Upper*, a department of Italy, formed of the Cremonefe, the Cremafco, and the Lodefan.

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 wideft, 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 fecond region is the tract inclofed by the Apennines, forming the Roman and Tufcan territories. The third is confined to the Campania Felix, and its immediate dependencies, fuch as the borders and the iflands of the bay of Naples, and of the plains of Pœftum. The laft confifts of Abruzzo, Apulia, Calabria, and the fouthern extremities of Italy.

The firft of thefe regions has been reprefented by many, as perhaps the moft fertile and the moft delicious territory in the univerfe. It owes this fertility to the many ftreams that defcend from the bordering mountains, and furnifh a conftant fupply to the majeftic river that interfects it. Mr. Euftace, in the fecond volume of his "Claffical Tour," avoids the name frequently given to the plains of the Po or of Milan. *Lombardy* (which fee) is, he fays, a barbarous 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° 45′. E. long. 115° 14′.—Alſo, a town of China, of the third rank, in Chan-tong; 262 miles S. of Peking. N. lat. 35° 48′. E. long. 115° 14′.

POA, in *Botany*; ποα, a general name for *graſs*, 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 *Poæ*, moſtly new, in his New Holland Prodromus.

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.)—Panicle 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*. *Panicle* 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. Ruſt. t. 113. Willd. Sp. Pl. v. 1. 426. Glyceria fluitans; Brown Prodr. N. Holl. v. 1. 179.)—Panicle branched, divaricated. Spikelets 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 *panicle* 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. *diſtans*. 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.)—Panicle 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*. *Panicle* 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. Hudſ. 42. Willd. n. 39. Ait. n. 16. Engl. Bot. t. 1140. Knapp. t. 46. Fl. Dan. t. 251.—Panicle 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 *panicle* 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. Hoſt. Gram. Auſtr. v. 2. 53. t. 73. (Cynoſurus 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 *Cynoſurus*. 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. Muf. 135. t. 95.)—Panicle lanceolate, denfe, rough, turned one way; common ftalk round. Spikelets cylindrical, of about five bluntifh, ribbed florets.—Native of fandy inundated wafte ground, near the fea, in England, Holland, and Sicily, flowering in fummer. The *root* is annual. Whole plant much like *P. dura*, but more flender, taller, and lefs rigid, with a doubly compound *panicle*, not a *fpike*, and far more numerous, fmaller, cylindrical *fpikelets*.

P. *rigida*. Rigid Meadow-grafs. Linn. Sp. Pl. 101. Willd. n. 40. Curt. Lond. fafc. 2. t. 4. Knapp. t. 48. Engl. Bot. t. 1371.—Panicle lanceolate, denfe, fmooth, two-ranked, turned one way; common ftalk bordered. Spikelets of feven cylindrical, riblefs florets.—Common on the tops of dry walls, and in barren fandy ground, annual, flowering in June. The whole plant is four or five inches high, of a peculiarly rigid, elaftic, wiry habit, and purplifh-brown hue. Every part is fmaller than in the laft.

P. *divaricata*. Straggling Meadow-grafs. Gouan Illuftr. 4. t. 2. f. 1. Willd. n. 56. Desfont. Atlant. v. 1. 75. (Gramen phalaroides, fparfâ paniculâ, minimum anguftifolium; Barrel. Ic. t. 44. f. 1.)—Panicle capillary, divaricated, with corymbofe branches. Flower-ftalks club-fhaped. Florets four. Leaves briftle-fhaped.—Native of the fouth of France and of Barbary. A fmall, delicate, flender, annual grafs, with the habit of *Aira caryophyllea*, for which the plate of Barrelier has been quoted, a circumftance that has caufed fome confufion. It flowers in the fpring, and has a very elegant afpect. The thickened *flower-ftalks*, and the crowded little fhining *fpikelets*, are characteriftic of this fpecies.

P. *Eragroftis*. 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. megaftachya; Schrad. Germ. v. 1. 288. Briza Eragroftis; Linn. Sp. Pl. 103. Willd. Sp. Pl. v. 1. 405. Schreb. Gram. t. 39. G. eranthemum, feu ερανγρωστις; Barrel. Ic. t. 43.)—Panicle erect, branched, fpreading. Spikelets linear, many-flowered. Florets tumid, with three keels. Stipula briftly.—Native of Greece, Barbary, Italy and Switzerland, though not known to Haller as a Swifs plant; fee the following fpecies. A very elegant annual grafs, with numerous *ftems*, from one to two feet high, quite fmooth. *Leaves* fpreading, grafs-green; their *ftipula* of many fine hairs. *Panicle* ample, loofe, much branched. *Spikelets* linear, alternate, ftalked, green or purplifh, fhining. *Florets* from ten to thirty-fix, imbricated, ovate, tumid, roughifh, with three diftant ribs or keels. The above two plants of Linnæus are certainly one and the fame, differing merely as to number of *florets*. The ripe *feed* being unconnected with the *corolla*, makes the plant a *Poa*, not a *Briza*.

P. *elegantiffima*. Elegant Meadow-grafs. (P. Eragroftis; Villars Dauph. v. 1. 135. Schrad. Germ. v. 1. 287. Schreb. Gram. t. 38. P. n. 1450; Hall. Hift. v. 2. 219. Gramen phalaroides, fparfâ Brizæ paniculâ minus; Barrel. Ic. t. 44. f. 2. G. paniculis elegantiffimis, minimum; Scheuchz. Agr. 192. t. 4. f. 2.)—Panicle erect, branched, capillary, fpreading. Spikelets lanceolate, fcarcely ten-flowered. Florets compreffed, keeled, three-ribbed. Stipula briftly.—Native of Switzerland, France, and Italy. About one-third the fize of the foregoing, with fharper *leaves*, dark purple tapering *fpikelets*, and about a quarter of the number of *florets*, which are compreffed and keeled, with one obfolete rib at each fide, near the edge. This is commonly taken for *P. Eragroftis* of Linnæus, but erroneoufly, he having never been acquainted with the grafs before us, though he cites fome of its fynonyms for his *P. Eragroftis* above defcribed.

P. *compreffa*. Flat-ftalked Meadow-grafs. Linn. Sp. Pl. 101. Willd. n. 42. Ait. n. 18. Knapp. t. 57. Engl. Bot. t. 365. Hoft. Gram. Auftr. v. 2. 51. t. 70.—Panicle denfe, turned one way. Stem afcending, compreffed. Florets angular, connected at the bafe by a folded web.—Common in dry fields and on walls, in Europe as well as America. Mr. Purfh fays it is known in the laft-mentioned country by the name of Blue Grafs. It flowers with us in July and Auguft, and has a perennial creeping *root*. The whole plant is rather glaucous, about a foot high, readily known by its very flat *ftem*, and denfe *panicle*, whofe branches fpread but for a fhort period, while in full bloffom. *Florets* from three to nine, clofely imbricated, ovate, angular, three-ribbed, bluntifh, purple juft under the white membranous tip, connected together at the bottom by a fet of fine cottony fibres, fhorter than in fome other fpecies.

P. *alpina*. Alpine Meadow-grafs. Linn. Sp. Pl. 99. Willd. n. 2. Ait. n. 4. Engl. Bot. t. 1003. Hoft. Gram. Auftr. v. 2. 49. t. 67. Knapp. t. 50 and t. 117.—Panicle loofe. Spikelets heart-fhaped, of about four flowers. Glumes ovate, rather falcate, not connected by a web. Lower ftipulas very fhort.—Native of the mountains of Lapland, Germany, and Scotland, as well as of the Bithynian Olympus, flowering in fummer. *Root* tufted, perennial, with fmooth fibres. *Stems* from four to twelve inches high; leafy below; fmooth, fhining, often purplifh, above. Radical *leaves* forming a denfe tuft; thofe on the ftem furnifhed with much longer *fheaths* as well as *ftipulas*. *Panicle* fpreading, fhort, fomewhat ovate, with angular, nearly fmooth, branches. *Spikelets* broad, fhining, elegantly variegated with green, white, and a purplifh brown. "*Florets* ovate, acute, membranous at the edge, the lower part of which is filky, and the keel ftill more fo:" feveral longifh hairs, but no complicated web, are found at the bafe. In wet feafons the *flowers* are changed into buds, forming young plants, as fhewn in Scheuchz. Agroft. t. 4. f. 14, and in Engl. Bot.

P. *flexuofa*. 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 denfe, fomewhat drooping, zigzag. Spikelets three-flowered. Glumes ovate, connected by a web. Stipulas all lanceolate.—Difcovered on the Scottifh mountain of Ben Nevis, by the late Mr. J. Mackay, flowering in July. Schrader mentions it as a native of various alpine fituations in Germany. The *root* is fomewhat creeping. This fpecies is of a more flender habit, and paler glaucous afpect, than the *alpina*, and differs effentially in the above characters. The glumes are not filky at the keel nor margin.

P. *bulbofa*. Bulbous Meadow-grafs. Linn. Sp. Pl. 102, α and γ, not β. Willd. n. 50. Ait. n. 21. Engl. Bot. t. 1071. Knapp. t. 53, with the root of another fpecies. (G. vernum, radice afcalonitidis; Vaill. Paris. t. 17. f. 8.)—Panicle flightly zigzag. Spikelets four-flowered. Glumes veinlefs, connected by a web. Leaves finely ferrated. Stem bulbous at the bafe.—Native of France, Italy, Germany, Switzerland, and England, in dry fandy places. With us it is found only on the fandy fea-coaft, over which its little dry bulbs are blown in various directions, during fummer, till the firft rains of autumn make them vegetate, and take deep root. The plants then yield abundance of fhort denfe herbage, a welcome fpring food for cattle, and flower in April or May; having, meanwhile, formed young bulbs, like a minute kind of garlick, which are difperfed, like their predeceffors, after the leaves wither. The *ftems* are naturally

naturally three or four inches high; in a garden they rife to above a foot, and the *leaves* are long in proportion. The ferrated *foliage*, the *bulbs*, the woolly web connecting the *florets*, and their broad veinlefs *glumes*, clearly afcertain this fpecies. The *panicle* is fmall, hoary or filvery, and purplifh. —We have gathered this grafs for the moft part in a viviparous ftate, on the open ground near St. John Lateran, at Rome, in the early fpring. This is probably the variety β of Schrader and other German authors; but the β of Linnæus is a very different, much taller, and greener grafs, with long and extremely narrow *leaves*, an elongated *panicle*, of numerous viviparous *flowers*, and peculiarly rough *flower-ftalks*. Oriental fpecimens are in the Linnæan collection, apparently fent by Haffelquift. This is what Scheuchzer has defcribed in his *Agroftographia* 211, and what Morifon has figured, fect. 8. t. 5. f. 14, after Bauhin's *Theatrum* 32. But the beft reprefentation is in Barrelier, t. 703. f. 2. We are afraid to defcribe this as a fpecies, without feeing fome fpikelets in a natural ftate; but we are perfuaded it is perfectly diftinct, and that there are, befides, other bulbous *Poæ*, hitherto confounded with the true *bulbofa*.

P. *cæfia*. Sea-green Meadow-grafs. Fl. Brit. 103. Engl. Bot. t. 1719. Ait. n. 7.—Panicle fpreading. Spikelets ovate, five-flowered. Glumes lanceolate, filky-edged, unconnected by any web. Stipula very fhort and blunt.—Native of the Highlands of Scotland, flowering in June and July. It feems unknown in every other country. The *root* is perennial, fibrous, tufted. Whole plant very glaucous. *Stems* erect, about a foot high, round, fmoothifh, with two joints near the bottom. *Leaves* bluntifh, flat, rough to the touch, except on the back near the bafe. *Sheaths* roughifh, about as long as the leaves. *Stipula* fometimes variable in fize and fhape. *Panicle* much branched, rough. *Flowers* variegated with purple, white, and green, each outer valve marked with a filky 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 ftruck out of Fl. Brit., as belonging to our *glauca*, hereafter mentioned, which Mr. Knapp has by miftake figured for *cæfia*.

P. *trivialis*. Roughifh Meadow-grafs. Linn. Sp. Pl. 99. Willd. n. 6. Ait. n. 8. Curt. Lond. fafc. 2. t. 6. Knapp. t. 54. Engl. Bot. t. 1072. (P. dubia; Leers Herborn. 28. t. 6. f. 5.)—Panicle fpreading. Spikelets three-flowered. Glumes lanceolate, five-ribbed, connected by a web. Stem roughifh. Stipula elongated.—Very general in meadows and paftures throughout Europe, particularly where the foil is moift, flowering from June to September, and forming perennial tufts of valuable herbage for the food of domeftic cattle. The *ftems* are a foot and half high, rough when drawn through the hand, by which this fpecies is known from the equally common and ufeful *P. pratenfis*. The *leaves* are grafs-green, pliant, with fheaths of their own length, crowned with an oblong pointed *ftipula*. *Panicle* ample and fpreading. *Florets* with five ftrong ribs, wanting in many of the laft defcribed. The web which connects them is copious and long. *P. fetacea* of Hudfon's firft edition is a mere variety, with narrow involute leaves.

P. *pratenfis*. Smooth-ftalked Meadow-grafs. Linn. Sp. Pl. 99. Willd. n. 8. Ait. n. 9. Curt. Lond. fafc. 2. t. 5. Knapp. t. 55. Engl. Bot. t. 1073.—Panicle fpreading. Spikelets four-flowered. Glumes lanceolate, five-ribbed, connected by a web, ftem fmooth. Stipula fhort and blunt.—Equally common with the laft, but it will grow in much drier fituations It flowers rather earlier, comes fooner into leaf, but Mr. Curtis remarks that the *trivialis* produces a better crop as the feafon advances. That excellent obferver found the fmoothnefs of the *ftem* the beft criterion for diftinguifhing this from the laft; which Hudfon and Ehrhart have likewife noted. The *panicle* of the prefent fpecies is moft inclined to affume a purple hue; and the web connecting the *florets* is peculiarly long and complicated. *P. anguftifolia*, Linn. Sp. Pl. 99, is a trifling variety, whofe lower *leaves* are narrower and more rigid, with roughifh fheaths, and the *panicle* is fmaller. This variety is figured in Leers, t. 6. f. 3.

P. *humilis*. Short Blueifh Meadow-grafs. Ehrh. Calam. n. 115. Sm. Fl. Brit. 1387. Ait. n. 10. (P. fubcærulea; Engl. Bot. t. 1004. P. cærulea; Knapp. t. 118.) —Glaucous. Panicle fpreading. Spikelets ovate, of about three acute florets, connected by a web. Stipula very fhort and blunt.—Native of mountainous paftures in Weftmoreland, Cumberland, and Anglefea, flowering in June. *Root* perennial, creeping, with villous fibres. *Stem* from four to fix inches high. Whole plant glaucous. *Florets* ribbed, green at the bafe, purple and brown in the middle, white and membranous at the margin. Schrader, who directs us to ftrike out the fynonyms of Willdenow, Haller, and Scheuchzer, quoted in Fl. Brit. (as belonging to his *fupina*, Fl. Germ. v. 1. 289.) thinks the prefent plant differs from *pratenfis* in its glaucous colour only. We agree that this is the chief diftinction, but it feems to us effential. Hudfon made our plant a variety of *pratenfis*, but he miftook it for the Linnæan *alpina*, a widely different fpecies.

P. *annua*. Annual Meadow-grafs. Linn. Sp. Pl. 99. Willd. n. 16. Ait. n. 11. Curt. Lond. fafc. 1. t. 6. Mart. Ruft. t. 98. Engl. Bot. t. 1141. Knapp. t. 52. —Panicle widely fpreading. Spikelets ovate. Florets a little remote, five-ribbed, deftitute of a web. Stem oblique, compreffed.—Common every where in wafte as well as cultivated ground throughout Europe, flowering at all times of the year when the weather is mild. In gardens it is a troublefome weed; in paftures 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 *ftems* fpread by numerous fibres, and thus the plant extends itfelf widely during fummer, as well as by fcattering abundance of feed. The herbage is bright green, not glaucous. *Leaves* flat, with a crumpled appearance here and there. *Sheaths* compreffed, crowned with a fharp *ftipula*. *Spikelets* ovate, variegated with green and white, rarely reddifh. *Florets* a little filky at the back, membranous at the edge, deftitute of a web at their bafe.

P. *glauca*. Slender Glaucous Meadow-grafs. Fl. Dan. t. 964. With. 148. Sm. Fl. Brit. 1388. Engl. Bot. t. 1720. Ait. n. 19. (P. cæfia; Knapp. t. 56. P. n. 1468; Hall. Hift. v. 2. 224. Feftuca airoides; Lamarck Dict. v. 2. 464, excluding the reference to Haller's n. 1439, which is Feftuca pumila of Willd. Sp. Pl. v. 1. 420.)—Panicle glaucous, flender, erect. Spikelets ovate, of about three flowers. Glumes bluntifh, filky-edged, unconnected by any web. Stipula very fhort.—Found on the loftieft mountains of Wales and Scotland; perennial, flowering in June. The whole plant is very glaucous, and of a much more flender habit than any of the foregoing, in which laft character it approaches the following. Schrader indeed fufpects it to be but a mountain variety of the *nemoralis*. The *fpikelets* however are more ovate and clofe, and we believe the glaucous colour to be an important diftinction. If however the proximity of this, in other refpects, to *nemoralis*, and of our *humilis* to *pratenfis*, fhould be thought to invalidate that character, we fubmit our opinion to the teft of cultivation by feed, which alone can decide the queftion.

P. *nemoralis*. Wood Meadow-grafs. Linn. Sp. Pl. 102. Willd.

Willd. n. 47. Ait. n. 20. Engl. Bot. t. 1265. Knapp. t. 58. Fl. Dan. t. 749. Hoft. Gram. Auftr. v. 2. 51. t. 71. —Panicle and leaves flender. Spikelets lanceolate, of about three flowers. Glumes acute, obfoletely five-ribbed. Stipula very fhort, notched.—This grafs compofes 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 lefs frequent, except on chalk. It is perennial, flowering in July and Auguft. The whole plant is extremely flender, grafs-green, one and a half, or two feet high. *Stems* fmooth, flattifh. *Leaves* rough to the touch, taper-pointed. *Sheaths* fmooth, tight, compreffed, fhorter than the leaves. *Stipula* very fhort, notched, or torn. *Panicle* nearly erect, loofe, capillary, zigzag, rough. *Spikelets* fmall, pale green, lanceolate rather than ovate. *Glumes* rough at the keel. *Florets* from two to four, fhining, lanceolate, filky at their backs and hairy at the bafe, but not connected by a web.

There is a ftouter variety, Hudfon's *P. anguftifolia* α, the true *nemoralis* being his β.

P. *decumbens*. Decumbent Meadow-grafs. 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. Hoft. Gram. Auftr. v. 2. 52. t. 72. (Feftuca decumbens; Linn. Sp. Pl. 110. Willd. Sp. Pl. v. 1. 424. Fl. Dan. t. 162.)—Panicle nearly fimple, condenfed, erect. Spikelets ovate, of four florets, fcarcely exceeding the calyx. Stipula briftly.—Native of fpongy bogs, in barren fandy or mountainous fituations, flowering in July. This fpecies is perennial, of a remarkably harfh and rigid habit, lying clofe to the ground, except when in flower, and of no agricultural ufe. The *roots* creep moderately, and are very ftrong. *Stems* about a foot long. *Leaves* ftraight, tapering, acute, rather glaucous, with long hairy *fheaths*, and a briftly tuft of hairs in the place of the ufual membranous *ftipula*. *Panicle* zigzag, of a very few large purplifh-glaucous *flowers*, of fo ambiguous an appearance, that botanifts have differed much about the genus of the grafs in queftion; fome making it a *Melica*, to which, as Linnæus remarks, it has a degree of affinity in habit as well as ftructure. Koeler efteems it a *Bromus*, and Bernhadi, like Decandolle, cuts the knot, by making it a new genus, we know not by what effential character. Mr. Brown is inclined to refer this puzzling plant to his own *Triodia*, Prodr. Nov. Holl. v. 1-182.

The extra-european fpecies of *Poa* afford a wide range for the botanift, too extenfive for our prefent purpofe. They require a more general inveftigation than they have yet received, though abundance of particular fpecies have been defcribed with fufficient care. Thofe of American growth agree beft, as might be expected, with our's. Some tropical ones have fo different an afpect, that it is to be wifhed they poffeffed fome generic diftinction. Many of them are fingularly elegant when minutely examined. We apprehend that a great number ftill remain undefcribed.

Poa, in *Agriculture*, a genus of graffes, which principally forms the green covering of the fields: the meadow-grafs.

There are feveral fpecies, fome of which are highly ufeful as field-graffes.

Poa *Anguftifolia*, the narrow-leaved meadow-grafs, which Mr. Sole fays is a very fweet grafs, efpecially for hay, but like the trivialis, is liable to go off after mowing. It is difperfed fparingly in the meadows about Hinton Abbey.

Poa *Annua*, the dwarf or white meadow, or Suffolk grafs, which, according to Mr. Sole, is the quickeft in growth of all the graffes, coming up, blooming, and ripening its feeds in the courfe of one month. It ought therefore to be called *menfual;* but as it will keep time with no other grafs, it is not worth fowing. It is always leaving the ground bare in patches, except there happens to be an *agroftis* to fill its place. It is however a very fweet grafs, and very generally liked by animals of moft forts.

Poa *Aquatica*, the reed meadow-grafs, which, Mr. Sole fays, is an excellent grafs in its native foil, the fens of the ifle of Ely, growing to the height of fix feet. It is ufually cut when about four feet in height, and when dry, is bound into fheaves; and it moftly undergoes a heat in the ftack that improves its quality. It is found an excellent fodder for milch cows, but horfes are not fond of it. In that place it is called *fodder* by way of eminence, other forts of coarfe hay being denominated *ftover*, which fignifies *coarfe ftuff*, and it is called *white leed*, from its drying of a white colour.

Poa *Bulbofa*, the bulbous meadow-grafs, which Mr. Sole finds to have all the good qualities of the pratenfis, in fo far as its fize will admit, and it is proper for hilly dry grounds and poor foils, where it delights to grow. It is found in the hilly dry paftures about Newton St. Loe.

Poa *Compreffa*, the compreffed, or flat ftalked meadow-grafs, which Mr. Sole thinks an excellent grafs for parks and fheep-walks, as both deer and fheep are fond of it; and as it is a dwarf grafs, the blades feldom exceeding two inches in height, it forms a fine turf, and caufes the flefh of the animal to cut fhort, and be fine flavoured. It is found in bloffom in fome places about Claverlton Down, and probably on the down itfelf, but the fheep there never fuffer a bent of it to blow.

Poa *Diftans*, the fen meadow-grafs, which Mr. Sole finds an exceedingly fweet grafs, affording very rich milk, but it is difficult to cultivate, as it delights in miry fituations. It grows in moft fea-marfhes, and abundantly about Cottenham, and the fens of Cambridgefhire.

Poa *Loliacea*, the hard or darnel meadow-grafs, which Mr. Sole thinks the moft infignificant of all the poas, but which has one good property, that of growing where no other grafs is capable of living, as in the drieft parching fea-fands.

Poa *Maritima*, the fea meadow-grafs, which the fame botanift confiders as a fine nourifhing grafs, being the principal one of our beft falt-marfhes; but from its delighting in falt, is difficult of cultivation.

Poa *Paluftris*, the marfh meadow-grafs, which Mr. Sole thinks a fine exuberant grafs, and probably the beft dairy grafs. It grows in the rich marfhes in all parts of the ifland, particularly thofe that are frequently refrefhed by the occafional overflowings of rivers. It is valuable for laying down fpongy lands. It has often the height of four or five feet; and the panicle, when full blown, is extremely fine and flowing.

Poa *Pratenfis*, the great or fmooth-ftalked meadow-grafs, which, for the purpofes of agriculture, is confidered by Mr. Sole as the moft noble of all the graffes. Its foliage begins to fhoot and put on a fine verdure early in the fpring, but not fo foon as fome other graffes. Every animal that eats grafs is fond of it; while it makes the beft hay, and affords the richeft pafture. It abounds in the beft meadows about Laycock and Chippenham, and it has the valuable quality of abiding in the fame land, whilft moft other graffes are continually changing. According to fome, it delights in rather a dry than a moift foil and fituation, on which account it keeps its verdure better than moft others in dry feafons; but it thrives moft luxuriantly in rich meadows. It has been objected to by fome from its creeping roots, which are difficult to extirpate, of courfe it is probably the moft ſuited 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 ſound 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° 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 Konigſberg.

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 Salſona.

Pobla *de Llillett*, 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 Peterſburg, 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 Puccoon.

POCHARD, in *Ornithology*, the name of a ſpecies of wild duck, called by ſome the *penelope* and *rothhals*, 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 ſacking. 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 houfes in this town were eftimated 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-ftreet, paffes within two miles to the weft of the town. Londefborough-park, which it interfects at the diftance of three miles, is fuppofed by Drake, the hiftorian of Yorkfhire, to be the ancient Delgovitia, but the circumftances upon which he founds his opinion are by no means conclufive. 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 Devonfhire, as defcendant from the daughter and heirefs of Henry Clifford, the fifth and laft earl of Cumberland. The houfe is fituated on elevated ground, and is furrounded by an extenfive and well wooded park. At Melburn, five miles to the fouth-weft of Pocklington, is the feat of fir Henry Vafavour, bart. The manfion is a large modern edifice of brick, and commands fome fine views of the weftern acclivities of the wolds. Stamford-bridge, eight miles to the north-weft, Drake conceives to be the fcite of the Derventio, but Camden fixes that ftation at Aldby, about a mile and a half to the northward. Here was fought, in 1066, one of the moft bloody battles recorded in the hiftory of England, between the forces of Harold II. and thofe of Tofti his brother, the banifhed earl of Northumberland, affifted by Harfagar, king of Norway. The conteft lafted from feven in the morning till three in the afternoon, when the Norwegians and rebels were routed with immenfe flaughter. Beauties of England and Wales, vol. xvi. by John Bigland.

POCKREKESKO, a river of North America, in New-Britain.

POCO Allegro, in the *Italian Mufic*, is not fo faft as allegro.

Poco *Largo*, intimates to play or fing a little flow. See Largo.

Poco *meno Allegro*, is ufed to fignify that the part it is joined to fhould be played or fung in a little lefs gay manner than allegro requires.

Poco *Prefto*, ferves to let us know that we ought to fing or play that part to which it is annexed, not quite fo quick as prefto requires it fhould.

POCOCK's Island, in *Geography*, an ifland in the Eaft Indian fea, S. lat. 6° 2′. E. long. 118° 12′.

POCOCKE, Edward, in *Biography*, a celebrated orientalift, was born at Oxford in 1604: he received the early part of his education at the free fchool of Tame, and in 1618 was entered a commoner of Magdalen Hall, Oxford. In 1620 he removed to Corpus Chrifti college, in which he obtained a fcholarfhip. He now began to apply himfelf to the ftudy of the oriental languages, and the ardour which he manifefted in the purfuit, caufed him to make extraordinary progrefs in a comparatively fhort time. In 1627 he began to prepare, from a MS. in the Bodleian library, a Syriac verfion of four epiftles, which were yet wanting to a complete tranflation of the New Teftament into that language. This work he finifhed in 1628, and in the fame year he was admitted probationary fellow of his college; and the epiftles coming to the knowledge of Gerard John Voffius, he carried them to Leyden, where they were printed under the infpection of Lewis de Dieu. Pococke was ordained prieft in that year; and having been appointed chaplain to the Englifh factory in Aleppo, he arrived at that city in 1630. He inftantly took advantage of the fituation; engaged a mafter in the Arabic tongue, and a fervant of the nation for the purpofe of familiar converfe in it. As a ftill furer guide, he undertook the tranflations of feveral Arabic books, among which was a collection of 6000 proverbs. Having received a commiffion from the famous Dr. Laud, bifhop of London, for the purchafe of Greek coins, and Greek and Oriental MSS., he was eager in obtaining them; though more than once the zeal which he fhewed for his employer expofed him to imminent danger from the plague. In 1636 he was nominated by the bifhop firft profeffor of the Arabic lecture founded by that munificent prelate at Oxford. He accordingly returned to take poffeffion, and in Auguft of the fame year he opened his lectures with an eloquent Latin oration, on the nature and ufe of the Arabic tongue. Having commenced his official duties, he obtained leave of abfence to embark with a learned mathematician, in 1637, for Conftantinople. Here he ftaid till 1640, and paffing through Paris on his return, he had an interview with the illuftrious Grotius, who was much gratified on being confulted by him on the Arabic tranflation of his celebrated work, "De veritate Chriftianæ Religionis."

On his arrival in England, he had the mortification and mifery to find his patron, bifhop Laud, a prifoner in the Tower. In 1643 he was prefented by his college to the rectory of Childrey, in Berkfhire, and he immediately fet himfelf to perform the functions of a parifh prieft, with all the modefty and fimplicity of his character. In the following year, the falary of his profefforfhip being feized by the fequeftrators as part of the archbifhop's eftate, Pococke was reduced to his country living. He thought it now fuitable to his fituation to marry, and in 1646 he formed an union with the daughter of Thomas Burdett, efq. of Hampfhire. Soon after this, by the intereft of the learned Selden, he obtained the reftoration of his falary, and was at the fame time completely protected from the violences of the foldiery. In 1648, the Hebrew profefforfhip at Oxford, with the prebend of Chrift-church annexed, was given to him; but as he fteadily refufed to fubfcribe the engagement, he was not deemed eligible. Attempts were made to deprive him of his prebend and both his profefforfhips; the former he actually loft, but by the interceffion of powerful friends, he was allowed to retain the latter. In 1650 he publifhed his "Specimen Hiftoriæ Arabum," and in 1652 he engaged to afford his affiftance to the editors of the Polyglott Bible, his tafk being the collation of the Arabic pentateuch. In 1654 he was in danger of being ejected from his living on account of ignorance and infufficiency; at leaft thofe were the charges preferred againft him by Cromwell's committee. Some of his Oxford friends, however, particularly Dr. John Owen, fo warmly reprefented the difgrace which would follow the rejection upon fuch grounds, of a man more eminent than almoft any other in Europe for found learning, that the profecution was abandoned. In 1655 he publifhed "Porta Mofis," being fix prefatory difcourfes of Mofes Maimonides, containing an account of the Jewifh doctrine and difcipline. Mr. Pococke added a Latin verfion, with a large appendix of mifcellaneous notes, and this was the firft fpecimen of the Hebrew prefs at Oxford. In 1659 he publifhed, according to his promife made to Selden, the annals of the patriarch Eutychius, in Arabic and Latin, with Selden's preface and notes. On the reftoration of Charles II. he obtained the reftitution of his prebend and canonry of Chrift-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 difcouragement, neverthelefs he continued through life to perform the duties of his profefforfhips. His other publications after this were "Carmen Abu Ifmaelis Tograi," Arab. et Lat.: "Gregorii Abul Farajii Hiftoria Dynaftarum," Arab. et Lat.: "Commentaries upon Micah, Malachi, Hofea, and Joel;" in thefe 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, ſive 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. Tranſ. 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 Combabec ferry, and 67 from Charleſton.

POCOMOCK, a river of the ſtate of Maryland, which diſcharges itſelf into the Cheſapeak 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. Tranſ. N° 232.

POCUTIA, or Pokucia, in *Geography*, a province of Poland, annexed to Auſtria, and included in the kingdom of Galicia.

POD, in *Botany* and *Vegetable Phyſiology*, has been conſidered as ſynonimous 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 Siliqua.

PODAGRA, ποδαγρα, thus called from πους, *foot*, and αγρα, *captura*, *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 *epilinum*, as they do the dodder growing on thyme *epithymum*; the earlier Greeks called this *linozoſtes*. 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 Cherſones as a portion. Here Podalirius built two cities, the one of which he called Syrnum, 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 Medecine, 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 ποδαλειριος, *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*, Juſſ.

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. *myrtillifolia*. 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. *ſericea*. Silky Podalyria. Ait. n. 2. (Sophora ſericea; Andr. Repoſ. 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; Saliſ. 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. *calyptrata*. Reticulated Podalyria. Willd. n. 11. Ait. n. 4. (Sophora calyptrata; 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 *calyptrata*, 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. (Sophora

(Sophora cordata; Thunb. Prodr. 79? *Brown.*)—"Leaves heart-fhaped, roundifh, nearly feflile, extremely villous. Stalks two-flowered. Calyx villous, its fegments fhorter than the wings. Sent by Mr. Maffon from the Cape to Kew, in 1794. It flowers there from May to July. We have feen neither fpecimen nor figure. Willdenow omitted Thunberg's plant, becaufe the character was not fufficient to fatisfy him refpecting it.

Lamarck reprefents, at his fig. 5, another fuppofed fpecies; a fmall fhrub, with inverfely heart-fhaped *leaves*, and folitary, nearly feflile, *flowers;* the *legume* fmall, ovate, hairy, fingle-feeded. This feems unnoticed by any fubfequent writer, nor are we acquainted with the plant.

PODANA, in *Geography*, a town of Hindooftan, in the circar of Condapilly; eight miles from Mafulipatam.

PODANG-MEW, a large and populous city of the Birman empire, not far from the city of Prome.

PODARIA, in the *Hiftory of Infects*, a claffical name comprehending all fuch infects as have limbs, but no wings. Hill. See APTERA.

Of this clafs there are two fubdivifions. 1. Such *aptera podaria* as have oblong bodies with numerous legs, or more than fix pair: thefe are the julus, or gally-worm; the fcolopendra, or centipes; and the onifcus, or wood-loufe. 2. The *aptera podaria* with fhorter bodies, and lefs numerous legs, or fewer than fix pair. This fubdivifion contains numerous genera, as the pulex; the podura or puceron, the pediculi of various kinds, the monoculi, the acari, the aranei, the fcorpio, and a great many others. See GALLY-*Worm*, SCOLOPENDRA, &c.

PODEM, in *Geography*, a town of Afiatic Turkey, in the government of Trebizond; 30 miles E. of Trebizond.

PODEMNO, a town of Ruffia, in the government of Tobolfk; 44 miles E. of Kemfkoi.

PODENDA, a town of Afiatic 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 diftrict of Bourdeaux; five miles N.W. of Cadilhau. The place contains 1425, and the canton 15,688 inhabitants, on a territory of 250 kiliometres, in 13 communes.

PODENSEE, a town of Auftria; 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 epifcopal town of Phœnicia, the epifcopate being dependent on Thefus, the fecond metropolis of the patriarchate of Antioch.

PODERIS, ποδηρης, from πους, *pes*, and αγω, *apto*, in *Antiquity*, a robe hanging down to the feet; but it is chiefly ufed to exprefs a linen garment, a furplice, a fhirt. The Jewifh priefts were covered with this kind of long furplices during the time of their attendance in the temple; and this was the proper habit of their order.

PODESTA, or POTESTA, a magiftrate, or officer of juftice and policy, in a free city.

The name is originally Italian, *podefta;* and is chiefly applied to certain magiftrates of Venice and Genoa, whofe function is to adminifter juftice in thofe republics.

The podefta in Venice correfponds to the prætor in ancient Rome, though appeals lie from his decifions to the new auditors, or the new civil quaranty. See QUARANTIA.

PODESTANA, in *Geography*, a town of Italy, in the Veronefe; 15 miles N. of Verona.

PODETIUM, in *Botany*, from πους, *a foot*, a name appropriated by Acharius to the peculiar footftalk of the tubercles in the cup lichens. See LICHENES.

PODEX, in *Anatomy*, &c. the fame with anus, or fundament.

PODGINOCK, in *Geography*, a town of Ruffia, in the province of Ufting; 100 miles E.S.E. of Uft Sifolfk.

PODGORODKOI, a fort of Ruffia, in the government of Upha, on the Ural; 92 miles E. of Orenburg.

PODGURZA, a town of the duchy of Warfaw, on the Viftula, oppofite 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 feveral kinds of *colymbi*, or divers, as they are alfo called in Englifh *arfe-foots;* from their legs being placed very backward on their bodies, by which means they have great advantages in fwimming and diving. See COLYMBUS *Podiceps*.

PODIEBRAD, in *Geography*, a town of Bohemia, in the circle of Konigingratz; 14 miles S.E. of Biezow.

PODISMUS, ποδισμος, among the Greeks, a certain fpace or number of feet laid out by furveyors: it was the fame with what the Romans call *pedatura*.

PODIUM, in the *Theatre of the Ancients*, the wall that feparated the orcheftra from the fcene. Mem. de l'Acad. vol. i. p. 190.

PODKAMIEN, in *Geography*, a town of Auftrian Poland, in Galicia; 56 miles E. of Lemberg.

PODKAMNEN, a town of Ruffia, in the government of Tobolfk, on the Tchulim; 32 miles N. of Atchinfk.

PODLACHIA, a county or palatinate of Poland; bounded on the N. by Pruffia and Lithuania, on the E. by Lithuania, on the S. by the palatinate of Lublin, and on the W. by Mafovia; annexed by the conqueft of Poland in 1596. It is alfo called the "Palatinate of Bielfk," from its capital.

PODMASCHESCHNAIA, a town of Ruffia, 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 Chrudim.

PODOLEPIS, in *Botany*, aptly fo named by Labillardiere, from πους, *a foot*, and λεπις, *a fcale*, in allufion to the numerous fcales, which clothe the flower-ftalks.—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 Theophraftus, whofe σκαλιας appears to belong to the fame tribe.)—Clafs and order, *Syngenefia Polygamia-fuperflua*. Nat. Ord. *Compofitæ capitatæ*, Linn. *Corymbiferæ*, Juff.

Gen. Ch. *Common Calyx* hemifpherical, imbricated, with numerous ftalked membranous fcales. *Cor.* compound, radiated. Florets of the difk numerous, tubular, all perfect, with five equal fpreading fegments; thofe of the radius female, ligulate, with from two to four oblong fegments. *Stam.* Filaments, in the florets of the difk only, five, capillary; anthers united into a rather prominent tube. *Pift.* in all the florets, Germen inferior, obovate; ftyle cylindrical, fcarcely fo long as the ftamens; ftigmas two, bluntifh, fpreading. *Peric.* none, except the permanent calyx. *Seeds* folitary, oblong, compreffed. *Down* feflile, capillary, roughifh. *Recept.* naked, dotted.

Eff. Ch. Receptacle naked. Down fimple. Calyx hemifpherical, imbricated, with ftalked membranous fcales.

1. P. *rugata.* Wrinkle-fcaled Podolepis. Labill. Nov. Holl. v. 2. 57. t. 208. Ait. n. 1.—Scales of the calyx rugged, obtufe.—Native of the fouth-weft coaft of New Holland. Sent to Kew by Mr. Peter Good, in 1803. It requires the fhelter of a greenhoufe in winter, and flowers in July and Auguft. *Root* perennial. *Stem* herbaceous, either quite fimple, or a little branched at the top only, about a foot high, minutely downy. *Leaves* linear, acute, entire; the lower ones fomewhat lanceolate. *Flowers* few, on long, terminal, fimple, fcaly ftalks. Their *difk* is about an inch wide; the *radius* fhort. *Calyx* of a tawny or rufty hue, fhining, chaffy; the outermoft fcales fpatulate.

2. P. *acuminata.* Sharp-fcaled Podolepis. Ait. n. 2. (Scalia jaceoides; Curt. Mag. t. 956.)—Scales of the calyx even, fharp-pointed. Gathered in New South Wales by Mr. Brown, and fent to Kew by Colonel Paterfon, in 1803. It is a hardy greenhoufe plant, flowering all through the fummer, and differs from the former chiefly in having a larger *flower*, the *radius* being confiderably longer, as well as in the fharpnefs of the *calyx-fcales.* 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 expofed to the plunder of barbarous nations, by which it has been cruelly ravaged. It abounds with a fine breed of horfes and horned cattle. The inhabitants are warlike, and were formerly governed by their own dukes or fovereigns. In the fifteenth century it was the object of violent contefts between the Lithuanians and Poles; but by the decree of a diet held at Lublin in 1569, it was annexed to Poland. Podolia confifts of two palatinates, that of Podolia and that of Braclaw; both of which are annexed to Ruffia, except a fmall 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 πες, *a foot*, and λοβος, *a pod* or *legume*, becaufe that part is elevated on a footftalk. Brown in Ait. Hort. Kew. v. 3. 9. Sims in Curt. Mag. v. 36. 1477.—Clafs and order, *Decandria Monogynia.* Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

This genus is comprehended under *Chorozema*, by the writer of the prefent article, in Tr. of the Linn. Soc. v. 9. 251, nor does he perceive a character by which they can well be feparated, though Dr. Sims and Mr. Brown have thought otherwife. The keel in *Podolobium* is rather longer than the wings; in *Chorozema* fhorter. The *leaves* are indeed oppofite in *P. trilobatum*, Curt. Mag. t. 1477, but this does not appear to be the cafe with every fpecies, nor is it very precifely or conftantly fo, even with the plant in queftion.

PODOLSK, in *Geography*, a town of Ruffia, in the government of Mofcow; 28 miles S. of Mofcow. N. lat. 53° 16′. E. long. 37° 29′.

PODOLYB, a town of Bohemia, in the circle of Konigingratz; 12 miles W.N.W. of Konigingratz.

PODOMETER, for PEDOMETER. See PEDOMETER.

PODONIPTÆ, formed from πες, ποδος, *foot*, and νιπτω, *I wafh*, in *Ecclefiaftical Hiftory*, a name given to fome of the rigid Anabaptifts, who enjoin it as an obligation upon the members of their community to wafh one another's feet, in compliance with the example of Chrift.

PODOPERURA, in *Ancient Geography*, a town of India, on this fide of the Ganges, in the country of the people called Limyrices. Ptolemy.

PODOPHYLLUM, in *Botany*, from πες, *a foot*, and φυλλον, *a leaf.* Tournefort originally called it *Anapodophyllon*, from *anas*, the Latin name for a duck; thus compofing a hybrid word, unworthy of his tafte and fcholarfhip. De Theis erroneoufly lays the blame on Catefby. The idea of this appellation arofe from a vague refemblance in the leaves, to the webbed feet of many aquatic birds, which is fufficiently 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. Purfh. v. 2. 366. Juff. 235. Lamarck Illuftr. t. 449. (Anapodophyllon; Tourn. t. 122.)—Clafs and order, *Polyandria Monogynia.* Nat. Ord. *Rhoeadeæ*, Linn. *Ranunculaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of three large, coloured, ovate, concave, afcending leaves, foon falling. *Cor.* Petals nine, orbicular, concave, plaited at the margin. *Stam.* Filaments numerous, very fhort; anthers oblong, large, erect. *Pift.* Germen fuperior, roundifh; ftyle none; ftigma obtufe, furrowed. *Peric.* Berry globofe, crowned with the permanent ftigma, of one cell. *Seeds* numerous, roundifh. *Receptacle* central, unconnected.

Eff. Ch. Corolla of nine petals. Calyx of three leaves, deciduous. Berry of one cell, crowned with the ftigma.

1. P. *peltatum.* Duck's-foot, or May-apple. Linn. Sp. Pl. 723. Willd. n. 1. Ait. n. 1. Trew Ehret, t. 29. (Anapodophyllum canadenfe; Catefb. Car. v. 1. t. 24. Aconitifolia humilis, flore albo unico campanulato, fructu cynofbati; Mentz. Pugill. t. 11.)—Native of North America, from New England to Carolina, in fhady woods, generally where the ground is moift, growing in large patches, and flowering in March and April. The fruit is the fize of a common plum, green, eatable, known by the name of May-apple: the root is fometimes ufed as Ipecacuanha. *Purfh.* This is a hardy perennial herbaceous plant, known time out of mind in our more curious gardens. The *root* creeps, and refembles that of the *Helleborus niger.* *Stems* folitary, fimple, round, fmooth, about a foot high, crowned with two large, ftalked, peltate, lobed, and jagged, fmooth *leaves*, between whofe *footftalks* grows a folitary, ftalked, drooping white *flower*, an inch and a half broad, whofe *petals* are curioufly reticulated with veins.

The other fpecies of Linnæus, *P. diphyllum*, Sp. Pl. 723, is feparated from this genus by Barton, Michaux, and Purfh, and is thus diftinguifhed.

Calyx of five leaves, deciduous. Petals eight, incurved. Capfule obovate, fomewhat ftalked, of one cell, burfting below the fummit. Seeds feveral, oblong, tunicated at the bafe.—This has received the name of *Jefferfonia diphylla.* It belongs to *Octandria Monogynia*, and appears to us a tolerably diftinct genus, though retained in *Podophyllum* by Willdenow, and confequently in Hort. Kew. See Purfh v. 1. 268.

PODOR, in *Geography*, a fortrefs of Africa, on the Senegal, built by the French, and ceded to the Englifh 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 ftamen*; fo named by Michaux on account of the ftamens being fituated on a bafe or foot, which is divided into two branches.—Michaux Boreal-Amer. v. 2. 164. Willd. Sp. Pl. v. 4. 196. Purfh. v. 1. 3.—Clafs and order, *Monoecia Diandria.* Nat. Ord. . . . . . .

Gen. Ch. Male, *Cal.* Perianth none. *Cor.* none. *Stam.* Filaments two, capillary, connected at the bafe by a common footftalk; anthers fomewhat heart-fhaped, two-celled.

Female, *Cal.* Perianth none. *Cor.* none. *Pist.* Germen feffile, ovate, with two fcales at the bafe, between which fprings the foot of the ftamens; ftyle none; ftigmas two, feffile, fomewhat thread-fhaped, a little fhorter than the germen, fpreading. *Peric.* Capfule ovate, eight-ftreaked, with two cells and two valves; partition parallel to the valves, flightly opening, not fixed. *Seeds* numerous, almoft covering each fide of the tumid partition, fomewhat imbricated downwards, nearly oval.

Eff. Ch. Male, Calyx none. Corolla none. Stamens two, on a common ftalk.—Female, Calyx none. Corolla none. Germen ovate. Stigmas two, feffile. Capfule of two cells and two valves, many-feeded.

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-fhaped, floating. *Leaves* pinnate, alternate; leaflets alternate, briftle-fhaped, much cloven. *Flowers* axillary, folitary, the males inferted at the bafe of the females.

We are unable to trace any affinity to this curious genus. It has certainly no relation to *Ruppia* as Michaux has fuggefted. Mr. Purfh places it in *Monandria Digynia.*

PODRELSKOI, in *Geography*, a town of Ruffia, 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 Ruffia, in the government of Kolivan; 220 miles S.W. of Kolivan. N. lat. 51° 20'. E. long. 78° 34'.

PODSTEPNOI, a fort of Ruffia, in the government of Kolivan; 196 miles S.W. of Kolivan. N. lat. 52° 10'. E. long. 77° 40'.

PODULLUNG, a town of European Turkey, in Moldavia; 28 miles S.W. of Jaffi.

PODURA, the *Spring-tail,* in *Entomology*, a genus of infects of the order Aptera. The generic character is, lip bifid; feelers four, fubclavate; two eyes, compofed of eight facets; the antennæ are filiform; the body is fcaly; tail forked, bent under the body and acting as a fpring; it has fix legs that are formed for running. There are about thirty fpecies enumerated by Gmelin. They are all fmall infects, which, in general, are found in damp places, under ftones, on the bark of trees, &c. When difturbed they fuddenly fpring to a fmall diftance by the help of a long fork, which is doubled under the abdomen, and which is fuddenly thrown out during the act of leaping. They feed on the leaves of various plants; the larva and pupa are fix-footed, nimble, and refemble the perfect infect.

Signata. Sub-globular, brown; abdomen with fulvous fpots at the fides.

* Viridis. Sub-globular, green, with a yellowifh head. Found on the leaves of the Polygonum fagopyrum.

* Polypoda. Sub-globular, black; antennæ as long as the body, and tipt with white. Found on various plants, in this and other countries of Europe.

* Atra. Globular, fhining brown or black; antennæ long, compofed of many articulations. It is found on the bark of trees.

* Plumbea. Round, brown, with a blue glofs. It is found in fimilar fituations with the laft.

* Minuta. Ovate, yellow, with two ferruginous fpots on the back. This and the four following are found on plants in many parts of Europe.

* Nivalis. Oblong, yellow, with two ferruginous fpots on the back. It is frequently found in the winter on the fnow in the footfteps 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 an European infect, very fmall, and found in old wood.

Pusilla. Cylindrical, bronzed with a white fork. It inhabits woods.

* Aquatica. Black, aquatic. This is one of the moft common fpecies of the genus, meafuring fcarcely the one-twelfth of an inch in length, and entirely of a black colour. It is a gregarious fpecies, and is occafionally feen affembled in vaft numbers, particularly near the brinks of ponds, covering the ground to the diftance of feveral feet, and fometimes even the furface of the water itfelf. On the ground its numbers are fo great, as to have the appearance of fcattered grains of gunpowder; and if clofely examined, will be found in an almoft perpetual fkipping motion.

* Fimetaria. White, terreftrial. This perfectly refembles the laft except in colour, and in that the fpecific difference confifts. It is found early in the fpring in frefh earth, and alfo in damp places.

Ambulans. White, with a bifid extended tail. Found among mofs in different parts of Europe.

Monura. Whitifh, with an undivided conic tail. It inhabits Auftria, and found with the laft, which it refembles, but is much lefs.

* Rufescens. Reddifh-yellow, villous; eyes black; fork whitifh. A native of Auftria, and found among ftones.

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 fulphur colour.

Aquatilis. Cylindrical, yellowifh, with black eyes, back, and fides of the abdomen.

Crystallina. Body entirely hyaline.

Longicornis. Cylindrical, yellowifh; antennæ as long as the body, and with legs cinereous.

Palustris. Yellowifh, 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 fhort, thick; body cylindrical, and growing thicker towards the tail. Inhabits Greenland, as does the next.

Maritima. Blueifh-black, with a whitifh abdomen; body nearly round, and growing thicker towards the tail.

Podura is alfo a fpecies of *Cercaria,* in the clafs of *Vermes Infuforia.*

PODURUEVA, in *Geography*, a town of Ruffia, in the government of Irkutfk, on the Lena; 12 miles N.N.W. of Vercholenfk.

POE, a river of the county of Tyrone, Ireland, which rises in the south-western part, and joins the Camerm a little below Omagh.—Also, a town of Africa, in Biol; five miles S. of Portudel.

PŒANOPSIA, ποανοψια, in *Antiquity*, a name sometimes given to the festival Pyanepsia.

PŒCILASIUM, in *Ancient Geography*, a town situated on the southern coast of the isle of Crete. Ptolemy.

PŒDICULI, or PŒDICLI, the name of one of the three people who composed the nation of the Liburni. 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 Pœdiculi, Apuli, and Calabri spoke the same language, which they retained. Strabo.

POEJANNY, in *Geography*, a town of Bengal; 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° 57′. E. long. 11° 26′.

POELEMBURG, 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 Elsheimer; 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 Poelemburg; 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 Poelemburg, 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 Poelemburg 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 Utecht, 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 Poelemburg.

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. Fuseli's Pilkington.

POELSBROICK, in *Geography*, a town of Holland; seven miles S.E. of Gouda.

POEM, POEMA, ποιημα, 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 *Archilotian*, *Sapphic*, &c. Others from their composition, as the *monocolon*, consisting of one kind of verse; *dicolon*, of two; and *tricolon*, of three kinds. Others from their entireness or deficiency; as *brachycatalectus*, which in every verse wants two syllables; *catalectus*, which wants one; *acatalectus*, none; and *hypercatalectus*, 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*, *epithalamium*, *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.

PŒNITENTES, 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. Hawkesworth's Voyages, vol. ii. p. 217.

PŒSTUM, in *Ancient Geography*, called also *Posidonia*, 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, Pœstum was founded by a colony of Dorians, from Dora, a city of Phœnicia. It was first called Pœstan, 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 Pœstum 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 Pœstum 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 Pœsti," 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 Pœstum, 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 Pœstum.

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 Pœstum, 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 relievo 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 intercolumniation is a little more than one diameter; that the order 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 to correspond in grandeur with that opposite; in which case few cities could have surpassed Pœstum 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 Pœsti," 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 Pœstan 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 Pœstano gauderi rosaria cultu
> Exoriente novo roscida 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.

Pœstum 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 Pœstum 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 Pœstum 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 Pœstum 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 salso" which falls into the Solofone close to the walls of of the city. Beyond the ruins, and feparated from them by a little ftream, now called "Paltena," rifes the hill of the Acropoli, which merits the examination of the naturalift. As the plains that extend for fome way on each fide of the Silarus are very thinly inhabited, and at the fame time covered with woods and thickets, they are become the refort of banditti and outlaws. At the mouth of the Silarus is the fcite of the temple of Juno Argiva, of high antiquity, and attributed even to Jafon. Euftace's Claffical Tour through Italy, vol. ii.

POESY, Poesis. See Poetry.

The word is formed from the Greek ποιησις, of ποιεω, *facio, fabricor, fingo, I make, I frame, I invent.*

Hence alchemy, or the art of making gold, we anciently called *poefy, chryfopoefy, &c.*

POET, Poeta, an author who compofes poems or difcourfes in verfe.

Cicero relates it as a faying of Democritus and Plato, that there could be no good poet *fine afflatu furoris, without a tincture of madnefs;* and Ariftotle calls poets exprefsly, *maniaci, maniacs, madmen.*

M. Spanheim tells us that the Arab authors are more poetically given than thofe of any other people; and adds that there are more verfes among the Arabians than among all the other nations of the world put together.

The Greek word ποιητης, *poet*, fignifies *maker*, from ποιεω, *facio, I make;* whence the poets were anciently alfo called *fatifts*. The name they were properly denoted by among the Romans, was *vates*, which fignifies alfo *prophet*.

By a law of the emperor Philip, inferted in the Code, lib. x. tom. lii. poets are exprefsly excluded from the immunities granted the profeffors of all other fciences.

Homer, Virgil, Milton, and Taffo, are the chief, almoft the only, epic poets. Sophocles, Euripides, Shakfpeare, Otway, Corneille, and Racine, are the beft tragic poets. Ariftophanes, Menander, Plautus, Terence, Fletcher, Johnfon, Moliere, &c. the chief comic poets. Horace, Cowley, Malherbe, and Rouffeau, excelled as lyric poets. And Juvenal, Perfius, Regnier, Boileau, Dryden, and Oldham, as fatiric poets.

Poet *Laureat*. See Laureat.

This title, fays Mr. Gibbon, is perpetuated by cuftom, rather than vanity, in the Englifh court; and he adds, "from Auguftus to Louis, the mufe has too often been falfe and venal; but I much doubt whether any age or court can produce a fimilar eftablifhment of a ftipendiary poet, who, in every reign, and at all events, is bound to furnifh, twice a year, a meafure of praife and verfe, fuch as may be fung in the chapel, and, I believe, in the prefence of the fovereign. I fpeak the more freely, as the beft time for abolifhing this ridiculous cuftom, 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 *Cæfia*, or *Poet's Rofemary*, in *Botany*. See Osyris.

POETICAL, ποιητικος, fomething that relates to poetry or poets. In this fenfe we fay, a poetical genius, a poetical phrafe, poetical licence, poetical fury, &c.

Poetical *Epiftle*. See Epistle, *Poetical*.

Poetical *Juftice*, is chiefly ufed in refpect to the drama, to denote a diftribution of rewards and punifhments to the feveral perfons, at the cataftrophe or clofe of the piece, anfwerable to the feveral characters in which they have appeared. See Character.

Whatever difficulties and diftreffes the virtuous and innocent may labour under, and how profperoufly foever it may go with the wicked, in the courfe of the piece; the poet ufually takes care to give each of them their due before he parts with them. But it is controverted whether this piece of juftice be indifpenfable, and whether it may not be allowed to leave virtue oppreffed, and vice flourifhing.

Poetical *Language*, is that language or ftyle, which acquires a peculiar elevation and ardour from the fentiments of a mind, fuppofed to be animated by fome interefting object that fires the imagination and engages the paffions of the poet; and this language is very different from that mode of expreffion which is natural to the mind in its calm ordinary ftate. This language of paffion or imagination is formed, *moft commonly*, into regular numbers; becaufe, though verfification be, in general, the exterior diftinction of poetry, yet there are fome forms of verfe fo loofe and familiar, as to be hardly diftinguifhable from profe, fuch as the verfe of Terence's comedies; and there is alfo a fpecies of profe, fo meafured in its cadence, and fo much raifed in its tone, as to approach very near to poetical numbers, fuch as the Telemachus of Fenelon, and the Englifh tranflation of Offian. The origin and firft ufe of poetical language, fays Dr. Lowth, are undoubtedly to be traced into the vehement affections of the mind. For what is meant by that fingular frenfy of poets, which the Greeks, afcribing to divine infpiration, diftinguifhed by the appellation of *enthufiafm*, but a ftyle and expreffion directly prompted by nature itfelf, and exhibiting the true and exprefs image of a mind violently agitated? Hence proceed fudden exclamations, frequent interrogations, apoftrophes, even to inanimate objects; for, to thofe who are violently agitated themfelves, the univerfal nature of things feems under a neceffity of being affected with fimilar emotions. Every impulfe of the mind has not only a peculiar ftyle and expreffion, but a certain tone of voice, and a certain gefture of the body adapted to it. Some, indeed, not fatisfied with that expreffion which language affords, have added to it dancing and fong; and as we know there exifted in the firft ages a very ftrict connection between thefe arts and that of poetry, we may poffibly be indebted to them for the accurately admeafured verfes and feet, to the end that the modulation of the language might accord with the mufic of the voice, and the motion of the body.

Moft languages have their poetical words, which are feldom, if ever, ufed on other occafions. Thefe words are of great ufe to the poets, who are thus enabled to raife their ftyle and diction to the poetical character with the greater eafe. The French lament the want of fuch appropriate words in their language; from a defect of which the ftyle of their poetry is not fufficiently diftinguifhed from the common language. It is too referved, not being allowed any boldnefs or flights, but fuch as might pafs in profe. To this circumftance is attributed, in a confiderable degree, the little fuccefs which their authors have met with in epic compofitions. Phrafes alfo, as well as words, which might originally have been in common ufe, are now reftricted to poetical compofitions. The language of Homer differs materially in the mode of inflexion, the fyntax, and even the words, from that which was written and fpoken in Greece in the days of Socrates; after an interval of 400 years. Homer, however, muft have written in a dialect that was intelligible, though not perhaps in familiar ufe at the period in which he wrote. Notwithftanding the change that muft have taken place, during fo long an interval, in the ftyle both of difcourfe and writing, the Iliad continued to be the ftandard of heroic poetry, and was confidered as affording a fpecimen of the moft perfect poetical language; though Ariftotle

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 proſaic, 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 rhime 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 characteriſed 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 RISING 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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