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THE ELEMENTS

OF

FOSSIL CONCHOLOGY;

ACCORDING TO

THE ARRANGEMENT OF LAMARCK;

WITH

THE NEWLY ESTABLISHED GENERA OF OTHER AUTHORS.

BY CAPTAIN THOMAS BROWN, M. P. S.

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SOCIETY OF MANCHESTER; FORMERLY PRESIDENT OF THE ROYAL
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NATURAL HISTORY SOCIETY'S MUSEUM.

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LONDON:

HOULSTON & STONEMAN, PATERNOSTER ROW.

ADAM & CHARLES BLACK, EDINBURGH.

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TO

EDWARD HOLME, M.D. F.L.S

PRESIDENT OF THE

MANCHESTER NATURAL HISTORY SOCIETY,

&c. &c. &c.

THE FOLLOWING WORK IS INSCRIBED BY

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May, 1843.

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FOSSIL CONCHOLOGY.

INTRODUCTION.

THE identification of the various formations of which the earth's crust is composed, depends mainly upon a knowledge of the Fossil Remains imbedded in their strata. An acquaintance with these instructs us, that the globe which we inhabit has been subjected to many changes from one condition to another; for we find entire races of animals have lived, perished, and become extinct, giving place to others, with an organic structure adapted to the altered conditions of our globe, at different epochs.

Although the fossils which characterize any distinct formation, or series of rocks, have general characteristics, yet in the transition from the lower to the higher strata, a difference will be found in the species, and frequently in totally distinct genera, which are peculiar to each successive bed.

In the Silurian rocks a striking modification of the distribution of species has been remarked; namely, that in the lowest beds the same species has been ascertained to pervade a much greater thickness of strata in the lower than in the higher rocks. From which it would appear, that such Mollusks must have existed through much longer periods than any species of the newer deposits. And when

we observe that a smaller number of species are to be met with in the older, than in the newer rocks, we may assume, that new forms were less frequently called into existence during the earlier geological epochs. It is evident, therefore, that each great change to which our globe was subjected, was also marked by the successive production and obliteration of certain races of Mollusks.

On a rigid examination of strata, we have incontestible proofs of the progressive development of their animal contents. We find that certain species have been endowed with powers to resist the changes which took place, or must have lived in situations remote from the active agents of destruction ; while others, of a high structure, have been swept away in comparatively short periods.

It is a remarkable fact, regarding the distribution of organic remains in the older deposits, that the same forms are found in rocks of the same age in all parts of the globe. In these strata, equivalent to our Lias and Oolite, the same forms have been found in England, Russia, Norway, Southern Africa, the Falkland Islands, (our antipodes,) and even in the Himalaya Mountains, and at Fernando Po.

Although the older strata contain vast masses of fossil remains, yet, as we have above observed, the number of species is exceedingly limited, as compared with those of the newer deposits.

Conchology was long considered as a trifling pursuit, and tending to no useful purpose ; but we have found, that through an intimate acquaintance with it, we are indebted for a more thorough knowledge of the strata which compose the different formations. The highest authorities of the present day all concur in this opinion. Professor Buchland says, "Concurrent with the rapid extension of our knowledge of the comparative anatomy of extinct families of the ancient inhabitants of the earth, has been the attention paid to FOSSIL CONCHOLOGY, a subject of vast importance in investigating the records of the changes that have occurred upon the surface of the globe." And Mr Lyell, in descanting upon fossil remains, says, "The Testacea (shells) are by far the most important class of organic beings which have left their spoils in the subaqueous deposits ; and they have been truly said to be the medals which Nature has chiefly selected to record the history of the former changes of the globe. There is scarcely any great series of strata that does not contain some marine or

fresh water shells ; and these fossils are often found so entire, especially in the tertiary formations, that when disengaged from the matrix, they have all the appearance of having been just procured from the sea."

The great utility of Fossil Shells in a geological point of view, is the perfect condition in which they are generally found, so much so, that the species can readily be distinguished, which is seldom the case with other fossils. Hence their service in identifying strata. Some of the genera are peculiar to the land, others to the fresh water, and others, again, to the sea, by means of which we are led to a knowledge of marine and fresh water deposits.

EXPLANATION OF THE DIFFERENT PARTS OF SHELLS, REPRESENTED ON PLATE I.

CLASS FIRST. — MOLLUSCA OR UNIVALVES, OR SHELLS WHICH ARE COMPLETE IN ONE PIECE.

The shells of this class are termed by Lamarck *Mollusca*. They are, for the most part, spiral ; but a few genera are destitute of a regular spire. The leading characteristics of this class are the general form of the shell, the particular shape of the aperture, the length and construction of the spire and beak, and the structure of the outer and pillar lips.

Apex. The tip of the spire, or the extremity opposite the base. Fig. 1. *a.* and fig. 17. *a.* In shells which are destitute of a regular spire, such as the PATELLÆ, &c. the vertex or highest portion is thus designated.

Base. In shells with a beak, or rostrum, the base is the extreme end of this organ. Fig. 7. *b.* and fig. 17. *b.* In those which are destitute of a beak, it is the lower portion of the body volution. Fig. 21. *a.*

Body is the lower volution, or that portion of the shell in which the aperture is situated. Fig. 1. *c.* and fig. 14. *c.*

Spire consists of all the convolutions of the shell but the lower one. Fig. 7. *d.*

Suture of the spire is that hollow spiral groove, or raised

thread-like line, which separates the volutions. Fig. 7. *e e e*.

Reversed Spire, is where the volutions revolve from right to left, the shell being held with the tip of the spire upwards. Fig. 12. *d*.

There is also another characteristic, which is, that the aperture is situate opposite the left hand of the observer when viewed in front. Reversed, or sinister shells, are rare, in comparison to those that are dextral. The genera *Clausilia* and *Physa* are permanent examples of this conformation, as also *Fusus perversus*. Fig. 12.

There are frequently reversed shells found among genera which are dextral; but these are considered *lusus naturæ*.

Depressed Spire, is exemplified in shells of the genera *Planorbis*, &c. Fig. 15.

Involute Spire, is when the volutions are concealed within the body, or external volution, as exemplified in the shells of the genus *Nautilus*, *Bellerophon*, &c. Plate II. fig. 14.

Aperture is the opening of the shell, by which the animal protrudes itself, situated on the proper left side in dextral shells, plate I. fig. 7. *f*. and in the right side in sinistral shells, fig. 12. *e*.

Outer lip or *Peristome*, the left margin of the aperture, or final termination of the body volution. Fig. 12. *c*. and fig. 21. *b*.

Inner or *Pillar lip* is that portion of the body bounded by the right side of the aperture, which is frequently covered by an enamelled thickening of testaceous matter. Fig. 7. *g*.

Columella, the lower front portion of the body volution, or external covering of the internal spiral supports of the spire, generally concealed by the *inner lip*. Fig. 7. *h*.

Umbilicus, a small concave perforation or hole generally situate at the base of the body, and in some instances at the back of the reflected *pillar lip*. Fig. 14. *a*.

Beak or *Rostrum*, a lengthened process, prolonged beyond the body volution in many genera. Fig. 1. *i*. The peculiar structure of this prolongation forms an important feature in the discrimination of species.

Canal or *Gutter*. The internal hollow or groove of the *beak*, or prolongation of the aperture at its base, formed by an extension of the outer and inner lips. Fig. 7. *k*.

Chambers. Internal portions of the shells of the genera

Nautilus and *Ammonites*, and which are divided by septæ or walls. Fig. 3. *a a*.

Septæ are the partitions which subdivide the internal portions of shells of the genera *Nautilus*, *Ammonites*, *Serpula*, &c. into distinct chambers. Fig. 3. *b*.

Front, that part of the body in which the aperture is situate. Fig. 7. *l*.

Volution, one of the turnings or whorls of the spire. Fig. 12. *e*.

Dextral, or right-handed shells, are those which have the aperture situate opposite the right hand of the observer, when the specimen looked at is held with the spire perpendicular, and with the suture, or separating line of the volutions, ascending from left to right. Fig. 7.

Sinistral, or left-handed shells, are those whose characters are the reverse of species which are *dextral*, with the aperture on the left hand of the observer when viewed in front. Fig. 12.

Operculum, a shelly or horny process attached to the foot of the animal inhabiting univalves, and which is intended to close either wholly or partially the aperture or opening of the shell. Fig. 16.

Varices are longitudinal ribs, which are formed by the periodical growth of shells. These have been severally the outer lip, to which the animal has added from time to time. Varices prevail in the genera *Triton*, *Murex*, and *Buccinum*. Some species have never more than a single *varix*.

Siphuncle, a small round tube, which perforates the septa in shells of the genera *Ammonites*, *Nautilus*, *Goniatites*, &c. Its opening or aperture is situate in the last or external volution. Its use is particularly described in the genera *Ammonites*, p. 14, and *Nautilus*, p. 18. Fig. 3. *c*. and fig. 19. *c*.

Ribs are longitudinal or transverse processes, which rise above the surface. Fig. 14. *d*.

Teeth are small processes, situated inside the lips in several univalve shells.

Plaits, found principally on the columella of shells of different genera, as *Mitra*, *Oliva*, *Voluta*, &c. Plate I. fig. 21. *c*.

Epidermis. The external skin or cuticle which invests many species of univalves, and appears destined to protect the shell from injury.

CLASS SECOND. — CONCHIFERA OR BIVALVES,

Or shells which consist of two parts or valves. These are connected by a cartilaginous process. In some species both valves are of equal size and form, while others are very dissimilar. In the genus *Chiton*, the species have generally eight valves placed transversely on the back of the animal, and inserted by their edges into a cartilaginous substance which surrounds them. They rank with univalves.

Equilateral shells are those whose sides are alike, as exemplified in the shells of the genus *Pecten*. Fig. 20.

Inequilateral shells are those bivalves which have dissimilar sides. Plate VII. figs. 15, 16, 20, &c.

Anterior slope or *side* is that side of the valve in which the ligament is situated. In looking at the *anterior slope* in front, the beaks of the shell retire from the observer.

Posterior slope or *side* is that part of the shell opposite the *anterior* side; or when viewed in front, the beaks point to the observer.

Umbo or *Bcak* is the superior portion or point situate above the hinge, and which has been termed the apex. This part is the nucleus, from which the enlargement of the valves takes place, commencing in a small concentric circle, and continuing until the completion of the shell. Fig. 22. *a.*, 20. *b.*, and 23. *b.* In some species the *umbones* are flat and hardly visible, while in others they are long, prominent, and curved, as in plate VII. figs. 24 and 26.

Hinge, the portion of the shell situate below the *umbones* or beaks, and at which part the valves are united. Some hinges are simple, while others are complex, and are furnished with teeth, which fit into cavities in the opposite valve. Fig. 22. *b.*

Ligament, a cartilaginous process, by which the valves are united, and kept in their relative positions. It is always situate near the hinge, and may be either in front or rear of the umbo.

Teeth of the Hinge, processes which are situate in the hinge of many *bivalves*. These are extremely variable in form and number, and are of much use in the generic and specific distinctions of bivalves. In some species they are large and single, (fig. 25. *a.*) while in others they are numerous and small, (fig. 23. *a.*) and, for the most part, they

lock into a cavity in the opposite valve. Those shells which have no distinct teeth, are called *inarticulate*.

Primary Teeth are those situate in the centre of the hinge, and which are usually broad and large, or elevated and acute. Fig. 22. *c*.

Cardinal or Primary Teeth. See above.

Erect Teeth are exemplified in the teeth of *Mya* and *Panopea*, fig. 25. *a*.

Lateral Teeth are those which diverge from the umbo; they are generally long and flat, seldom erect. In some species they are double. Fig. 22. *d*.

Numerous Teeth are exemplified in the genera *Pectunculus*, *Cucullea*, &c. Fig. 23. *a*.

Ears. Those processes on each or one side of the beak. Fig. 20. *c*. and *d*.

Superior Ear. Fig. 20 — *d*.

Inferior Ear. Fig. 20 — *c*.

Valves are used to denote the two pieces composing a bivalve shell. These move on a hinge, consisting of a ligament, or cartilage, or teeth, or with all of them.

Right Valve is that valve which, when viewed from the inside with the umbo uppermost, has the anterior slope pointing to the right hand.

Left Valve. The reverse of the above, or with the anterior slope pointing to the left hand, when viewed from the inside. Fig. 22.

Margin. The extreme edge of the whole shell, or circumference of the valve all round.

Crenulated Margin. Those fine numerous notches which invest the edges of many bivalves, particularly in the genus *Cardium*, and *Cypricardia*. Fig. 22. *e e*.

Length is taken from the hinge or umbo, fig. 20. *b*. to the opposite extremity, *a a*. Shells are termed longitudinal when their length is greater than their breadth. For example, the common Mussle is a longitudinal shell; as are also the shells of the genus *Pecten*. Fig. 20; and plate VII. Figs. 29 and 30.

Breadth, from the extreme of one side to that of the other. Fig. 22. *f. f*. It is not uncommon for the breadth of a shell to be greater than its length, as in the genus *Anadonta* or fresh water Mussles, and strongly exemplified in plate VII. fig. 13; plate VIII. fig. 19; and plate IX. fig. 12. In this case they are called lateral or transverse shells.

Striæ are fine or coarse thread-like lines which ornament

the outside, and sometimes the inside, of both bivalves and univalves. When the striæ are indistinct, they are said to be *obsolete*. The character and disposition of the striæ are of much consequence in the discriminations of species. When it is both longitudinal and transverse, it is called decussated striæ.

Accessory Valves are small testaceous, or shelly plates, situated at the back of the hinge of the genus *Pholas*.

Muscular Impressions. These are of much use in the generic and specific distinctions of bivalves. The most conspicuous are those of the ADDUCTOR MUSCLES, by which the valves are opened and closed. Fig. 22. *g g.* and fig. 23. *c.*

Pallial or *Mantle Impression*. In all bivalves in which there are two muscular impressions, there is a depressed line to which the mantle is attached, extending from the upper and inner edge of one muscular impression to the other; this line is frequently deeply sinuated on the posterior side. Fig. 22. *n.*

Ribs or *Costæ* are longitudinal or transverse protuberances, running from the apex to the base, fig. 20. *a a.* or across the valves from side to side. Plate VII. figs. 17 and 29; and plate VIII. fig. 22.

Base, that part of the valve opposite to the *umbo*.

PARTS OF THE ORDER CIRRIPEDES.

The shells of this order are either attached by their base to extraneous bodies, or are seated on a peduncle, which adheres to stones, wood, &c.

Base, is that part by which the shell adheres to other substances

Summit, the opposite extremity to the base.

Operculum, consists of four or more small valves, which close the cavity or opening at the summit of shells of the genus *Balanus*, &c.

Peduncle or *Pedicle* is a membranous substance, similar to a bladder, on which the genera *Pentilasmis*, *Polycipes*, &c. are seated.

All other terms peculiar to the science of Conchology, will be found in the glossary at the end of the volume.

CLASS FIRST.

MOLLUSCA.

The animals which inhabit shells of this class are soft, without articulations of any kind. They are provided with a head, which is furnished with tentacula, or having arms which are disposed in the form of a coronet. Almost all the species have eyes, and a mouth which is either elongated, short, or tubular; usually extensile, and armed with hard processes for the mastication of food. The body is generally partly invested with a process called a mantle, with free edges on the sides of the body. In some instances, the body is destitute of any shelly covering, and frequently enveloping an internal, simple, testaceous plate.

ORDER I.—HETEROPODA.

No shells of this order have been found in a fossil state.

ORDER II.—CEPHALOPODA.

The head of the animal projecting from a sack-shaped body, and provided with a series of inarticulated arms, each of which are furnished with suckers.

GRAND DIVISION I.—CEPHALOPODA SEPIARIA.

This includes the cuttle fish, which are destitute of a shelly covering.

GRAND DIVISION II.—CEPHALOPODA MONOTHALAMA.

Shell unilocular, entirely external, and enveloping the animal.

Genus I. — **BELLEROPHON.** — *Montfort.*

Generic Character. — Shell thick, univalve, unilocular, involute, umbilicated on both sides; nearly symmetrical, bicarinated, and almost spherical, the last volution enveloping the others; aperture very large, semilunate, arched, and terminated by the extremities of the columella, or axis, which is transverse, and provided with a sinus or notch in the lip between the keels.

Bellerophon hiulcus. Plate II. fig. 14.

The shells of this genus are known only in a fossil state, and are characteristic of the Carboniferous limestone, and of the strata belonging to the oldest secondary formations; in the latter situation, the shells are frequently changed into silex.

Naturalists have been much puzzled with the species of this genus. They have been described by some as chambered shells, and as provided with a siphuncle; but DeFrance has satisfactorily disproved this opinion. There can be no doubt that the animals which inhabited shells of this genus were closely allied to those of the *Argonautæ*. Dr Fleming has considered *Bellerophon* as nearly connected with *Tornatella*, and placed it accordingly after that genus in his family Tornatelladæ. We are, however, convinced, that its proper situation in the system is where we have now placed it. They differ, however, in two particulars, viz. in the nearly globular form of the shells, and in being very thick; while those of the genus *Argonauta* are very thin.

The genus consists of two sections, —

Section 1. — *With a mesial band.*

Section 2. — *Destitute of a mesial band.*

GRAND DIVISION III. — **CEPHALOPODA POLYTHALAMA.**

Shell multilocular, either entirely or partly internal, and situated on the posterior portion of the body of the animal.

The fossil shells of this division are very numerous, and widely diffused through different strata.

TRIBE I. — **AMMONACEA.**

Septa sinuous, lobed and cut at the margin, and meeting together upon the inside of the shell, where they are articulated by serrated sutures, furnished with a siphuncle, which penetrates through the whole of the partitions or septa.

In all the genera of this family, the chief variation consists in the external form of the shells; the internal structure of the whole being similar, and intended as a float, subservient to the animal inhabitants.

Genus II. — **HAMITES** — *Parkinson.*

Generic Character — Shell fusiform, cylindrical, hooked or bent into two parallel limbs, recurved at the posterior extremity; exteriorly undulated; chambered, with the

septa undulated at their margins, and the siphuncle placed at their outer edge. In some species, the siphuncle has a keel-shaped pipe raised over it; others have a series of spines on each side of the ambit, or back of the shell.

Hamites annulatus. Plate II. fig. 4. Found in the Ferruginous Oolite.

Hamites are found in the Baculite Limestone of Normandy; and a few small species are met with in the Chalkmarl of Folkstone.

The most simple form of the shells of this genus may be conceived by supposing a Baculite to be curved round near its centre, until its smaller extremity becomes nearly parallel to its larger end. Some of the species are more tortuous, and are either coiled up in the form of a *Spirula*, or considerably spiral. These two forms bear the same relation to *Ammonites*, that the shells of *Lituola* bear to *Nautilus*, each having a form as nearly as possible what these genera would respectively exhibit, if partially unrolled.

The Hamites and Baculites possess two characters which connect them with the Ammonites. First, the siphuncle is situated on the ambit or outer margin of the shell. Secondly, the transverse plates have a foliated structure at their margins, where they join the external envelop or shell. In the Hamites, the external shell is also strengthened by transverse ribs or folds, which serve not only to increase the outer chambers, but also the air chambers, upon the same principles as in Ammonites, as we have shewn at page 14.

There is a strong probability that the shells of this genus were partly internal and partly external; those with spinous appendages were, most likely, external envelops.

The Gault or Speeton Clay near Scarborough, Yorkshire, which occurs immediately under the Chalk, contains not fewer than nine species of this rare genus. Some of these (the *Hamites grandis* in particular) are as thick as a man's wrist.

No recent species of Hamites have yet been discovered.

Genus III. — BACULITES — *Lamarck*.

Generic Character.—Shell straight, conical, symmetrical, cylindrical, a little compressed laterally in some instances; partitions articulated by sinuous sutures; septa close, transverse, and imperforate with marginal lobes and laciniations; being divided into dorsal, central, and lateral lobes, the external chambers larger than the rest, swelling, and capable of containing a considerable portion of the animal; aperture elliptical, and provided with a dorsal siphon.

Baculites Faujasii. Plate II. fig. 1. Found in the mountains of St Peter, neighbourhood of Maestricht. No recent species of this genus have hitherto been discovered.

This genus may be distinguished from the Orthocera, by its septa being much lobed and sinuous.

The genus Baculites takes its name from a resemblance to a straight staff.

It may be considered as a straight Ammonite ; for, as in that genus, the transverse plates are sinuous, and terminate in foliated dentations at their union with the external shell. The species of this genus are found in the Cretaceous formation alone.

Buckland remarks, it is a singular circumstance, that this straight modification of the form of *Ammonites* should not have appeared until this family had reached the last stage of the secondary deposits, throughout which it has occupied so large an extent ; and that, after a comparatively short duration, the Baculite should have become extinct simultaneously with the last of the Ammonites, at the termination of the Chalk formation.

The outer shell of the Baculites is thin, but, like that of the Ammonites, is strengthened by oblique ribs ; near the posterior margin of the shell, the transverse plates are penetrated by a siphuncle. This character, and the sinuous form, and denticulated edges, and transverse plates, are characters common to both this genus and Ammonites.

Genus IV. — TURRILITES. — Lamarck.

Generic Character. — Shell spiral, multilocular, turreted, with contiguous volutions coiled around themselves in the form of a winding tower, and gradually diminishing towards the apex, the whole being perceptible ; walls articulated by sinuous sutures ; with close, transverse septa, lobed and lacinate at the margin ; siphuncle situate near the dorsal margin ; outer chamber large ; aperture rounded, with an expanded outer lip.

Turrilites tuberculatus. Plate II. fig. 3. Found in the Marl stratum at Middlesham, parish of Ringmer, Sussex.

The shells of the genus *Turrilites* are extremely thin, and their exterior is ornamented and strengthened with tubercles and ribs. They resemble in every respect the Ammonites, except that they are straight, with a produced spire, instead of being coiled. Their internal cavity is divided into many chambers by transverse plates with foliated edges.

The species of this genus are known only in a fossil state.

Genus V. — CRIOCERATITES.

Generic Character. — Shell multilocular, convolute, with the volutions disunited, or not rolled upon one another.

Crioceratites Duvallii. Plate VI. fig. 1.

Genus VI. — GONIATITES. — Von Buch.

Generic Character. — Shell discoidal, generally convex or nearly globose ; most of the species deeply umbilicate ; the inner volutions much or wholly concealed, being generally enveloped in the outer one ; provided with internal partitions, or septa, and lateral and dorsal lobes and sinuses ; siphuncle situate near the ambit ; it is not, however, a continuous tube, but passes naturally from the septal plate a short distance.

Goniatites Henslowi. Plate I. fig. 6. *G. sphericus*. Plate III. fig. 14.

This genus was formerly included among the Ammonites, but was separated by Von Buch. It is unknown in the superior strata. The septa, lobes, and sinuses differ from those of *Nautilus* and *Ammonites*. See plate I. fig. 2. The parts are included within lines—D the dorsal region, L the lateral region, and M the marginal or umbilical region; *a b c* marks the lobes, and *e e e* the sinuses; the siphuncle is distinguished by S, and is situated in the centre of the dorsal lobe, immediately beneath the barb of the arrow which marks its centre. This belongs to *G. striatus*.

The *Goniatites Henslowi*, plate I. fig. 6, is one of the earliest forms of this genus, and which becomes extinct with the Transition series. It is found in the Transition Limestone in the Isle of Man.

Goniatites sphericus, plate I. fig. 13, is a longitudinal view, introduced to exhibit the character of the lobes. It shews the position of the siphuncle, situate upon the dorsal margin, with its collar protruding outwards, and situate between the two simple dorsal lobes; the lateral lobes are also simple, destitute of foliations, and are pointed inwards.

Genus VII. — SCAPHITES. — Parkinson.

Generic Character.—Shell chambered, involute; its first volutions small, and increasing very gradually; its last elongated and dilated or expanded; the division of the chambers lobed and sinuous. It appears to be almost, if not wholly internal.

Scaphites equalis. Plate II. fig. 23.

This genus is allied to *Ammonites*, but differs considerably in its general form, in consequence of the singular extension and inflation of its last chamber. The species are found, very rarely, in the three contiguous strata, the Chalk, Chalkmarl, and Greensand of Wiltshire and Sussex in England, and similar beds near Rouen in Normandy.

Genus VIII. — AMMONOCERAS. — Lamarck.

Generic Character.—Shell horn-shaped, arcuated, subsemicircular; the walls articulated with sinuous, laciniate, branched sutures; provided with transverse, sinuous, and imperforate septa; having lobed, laciniate margins, furnished with a marginal siphuncle, which does not perforate the septa.

Ammonoceras glossoidea. Plate II. fig. 2. Found only in a fossil state, in the East Indies. It is of large dimensions, measuring upwards of nineteen inches in length.

Sowerby is of opinion, that this genus should be united to that of *Ammonites*, and thinks the specimen from which Lamarck took his generic character was only a worn shell of that genus.

Genus IX. — ORBULITES. — Lamarck.

Generic Character.—Shell subdiscoidal, spiral, with contiguous volutions, the last enveloping the inner ones; the

interior wall articulated by a sinuous suture; septa transverse, lobed at their circumference, and perforated by a marginal siphuncle.

Orbulites striatus. Plate II. fig. 5. Locality unknown.

Known only in a fossil state.

Sowerby thinks that this shell should not rank as a distinct genus, inasmuch as he considers the circumstance of the last volution covering the others, as an insufficient distinctive character. In this, however, we differ from him.

Genus X. — AMMONITES. — *Lamarck*.

Generic Character. — Shell discoidal, multilocular; volutions contiguous, all of them visible to a greater or less extent, gradually and spirally coiled around the first or central one, so as to exhibit each volution increasing progressively in size outwardly, and more or less compressed; inner partitions articulated by sinuous sutures; septa transverse, lobed at the circumference, and imperforated at the disk, but perforated by a single tube or siphuncle, situate near the outer margin or back of the shell; aperture in most species thickened, expanded outwards in some, and in others, contracted.

Ammonites giganteus. Plate II. fig. 17.

The situation of the siphuncle is a very decided character in this genus. It is invariably placed in the aperture, close to the dorsal margin or ambit, penetrating the transverse partitions; as exhibited in plate I. fig. 4. It is represented in black, and marked by the letters *c, d, e, f, g, h*. It is conducted through the septa by a ring projecting outwards, and may be traced penetrating through the whole transverse partitions, or plates of the figure above referred to. In most of the carinated species, the siphuncle is placed in the keel; while in the genus *Nautilus*, the siphuncle is either in the centre of the convolutions, or towards their inner sides. The body of the animal has occupied that portion of the shell from *a* to *b* in *A. Obtusus*, plate I. fig. 4.

The delicate dorsal siphuncle of the Ammonite, is not sufficient to prevent concussion of the animal within its partitions. Other means of attachment are accordingly necessary, and the following provision is found. Below each partition, there lie six lobes, symmetrically arranged around the circumference of the shell. The first or *ventral* lobe, is usually the most considerable, and rests upon the back of the convolution which precedes it. On the opposite side, the dorsal lobe advances itself towards the bottom to embrace the siphuncle, and it is thereby divided into two cones, which are more or less separated from one another. At one-third the height of the aperture from the back, the *superior lateral lobes* are placed on each side, and lower down the *inferior lateral lobes*, are similarly arranged—the latter being a little more elevated than the ventral lobe. The separation of these lobes form the *selles*, or seats, so termed because the animal rests upon them, and their distinctive names are derived from those of the lobes.

Some of the Ammonites are plain, but most of them are variously sculptured, and many are annulated like a ram's-horn, from which circumstance, in all probability, they have their common name, *Cornua Ammonis*, or Am-

mon's Horn; Jupiter being worshipped by the Egyptians, under the name of Ammon, a deity, represented by the ram. The whole of the ancient sculptural representations of Jupiter, having invariably ram's-horns, as are also those of Alexander the Great after he was deified, as the son of Ammon.

A superstitious belief prevails in England, that Ammonites are petrified snakes, founded, no doubt, upon a legend in Camden's *Britannia*, which is thus recorded. "Upon the same river Avon, which is the boundary here between this county (Somersetshire) and Gloucestershire, on the western banks of it, is Cainsham, (now Keynsham,) so termed from Keina, a devout British virgin, whom many of the last age, through an over credulous temper, believed to have changed serpents into stones, because they find sometimes in quarries some such little miracles of sporting nature. And I have seen a stone brought from thence, winded round like a serpent, the head whereof, though but imperfect, juttet out in the circumference, and the end of the tail was in the centre, but most of them want the head."

This is a most comprehensive genus, consisting of shells found only in a fossil condition. It is a remarkable circumstance, that not a single type of this extensive family exist in the present seas of our globe. In Great Britain and Ireland alone, 184 species have been ascertained and figured.* They occur in all formations from the Transition strata, and disappear with the termination of the Chalk. Besides those which are met with in the strata of Britain, there are numerous other species differing entirely from them, which occur in various quarters of the globe. M. Brochart has enumerated *two hundred and seventy species*. These Ammonites differ according to the age of the strata in which they are imbedded, and vary in size from an eighth of an inch to more than four feet in diameter. One of the earliest forms of this genus, is the *A. Henslowi*, (now *Goniatites Henslowi*,) plate I. fig. 6. which is lost with the Transition series. The *A. Nodosus*, plate III. fig. 27. is peculiar to the Muschelkalk. Other Ammonites appear only in a certain definite strata of the Cretaceous or Oolitic formations. *A. Bucklandi*, plate III. fig. 28, occurs only in the Lias, while *A. Goodhalli*, plate III. fig. 37, is peculiar to the Greensand, and *A. rusticus*, plate III. fig. 38. is met with only in the chalk. There are no single species which runs through the secondary periods, or which have passed into the Secondary from the Transition formations.

Mr Phillips gives the following distribution of Ammonites through the various geological formations. None have been found in the Tertiary series; in the Cretaceous series, 45; in the Oolitic series, 137; in the Saliferous series, 15; in the Carboniferous series, 7; and in the primary, or those strata which are included in the lower regions of the Transition series, 17; making a total of 223 species. These he divides into sections, or sub-genera. "It is easy to see," says he "how important in questions concerning the relative antiquity of stratified rocks, is a knowledge of Ammonites, since whole sections of them are characteristic of certain systems of rocks."† But recent discovery has considerably increased those numbers.

The shells of this genus have greatly perplexed conchologists and geologists; as they have never been able to account for their use and plan. Impressed by the analogies presented by the genus *Spirula*, plate III. fig. 18, (a genus known only in a recent state,) Lamarck and Cuvier considered them to be *internal* shells; that is, enveloped within the body of the animal. Cuvier was led to

* See Brown's *Illustrations of the Fossil Conchology of Great Britain and Ireland*, plates 4 to 20.*

† Philip's *Guide to Geology*, 1834, section 82.

this conclusion, from the smallness of the outer chambers. But this theory seems to have been founded on observations made on imperfect specimens. When the outer chamber is obtained in its perfect condition, it is found to be as large in proportion as the outer cell of *Nautilus Pompilius*, (plate I. fig. 3,) is to the chambered convolutions of that shell. It will be seen by our section of *Ammonites obtusus*, plate I. fig. 4, that it often occupies nearly half the circumference of the outer volution, from *a* to *b*; and in other instances it embraces nearly the entire outer volution, as represented from *b* to *i*. Unlike the thin fragile exterior chamber in *Spirula*, that of the *Ammonites* is nearly as thick and strong as the close chambered portion.

Besides what we have above shewn, the spinous exterior of many of them, such as *A. Gowerianus*, *armatus*, &c. presents a striking argument against their being internal shells; as those processes, which seem to be destined as a protection to the animals against their enemies, would not only be useless, but irritating to the soft integuments of a mollusk.

Ammonites giganteus. Plate II. fig. 17. Found in sandy limestone, in Chicks-grove quarry near Hindon, Wiltshire; it has also been met with at Purbeck Isle, Dorsetshire, Marlborough downs, and in the Chalk, near Margate. It is one of the largest of the genus. There is a specimen in the *Jardin des Plantes*, Paris, which measures four feet in diameter. We have given a representation of the winding partitions which intervene between the air chambers of *A. giganteus*, plate I. fig. 1.

A. heterophyllus, plate I. fig. 17, from the Lias at Whitby. It is a longitudinal view of the fossil, the transverse plates which approximate so closely on the sides of the shell, where it is flat and weak, are seen to be distant from each other along the dorsal region, which is strong from its convex form.

The small circular black spot marked *a*, is the siphuncle; *b* the dorsal lobe; *c* the dorsal saddle; *d* the superior lateral lobe; *e* the lateral saddle; *f* the inferior lateral lobe; *g* the ventral saddle; *h* ventral lobe; *i i i* axillary lobes. The situation in which the siphuncle passes through the partitions, is represented in plate I. fig. 19, *c*.

It has been demonstrated by De La Beche, from specimens obtained in the Lias at Lyme Regis, Dorsetshire, that the entire body of the animal was contained within the outer chamber; and that these mollusks must have been suddenly annihilated, and entombed in the earthy deposit of which the Lias is composed, before their bodies had been affected by decomposition, or had been devoured by the crustaceous carnivorous animals, which abounded in the former ocean.

There is considerable difficulty in the discrimination of species of the genus *Ammonites*, as many of them differ very materially in their progress from their infant to their adult condition.

In the *Goniatites sublaevis*,* there is a great dissimilarity of form between the young and old shells. In the infant state, when the shell is a quarter of an inch in length, it is only half that breadth, and is provided with distinctly marked transverse small ribs; as the shell advances in size, these become more rounded and obtuse, and are alternately long and short, and some of them furcated. When it has reached the length of from two and a half to three inches, these ribs become almost obsolete, and when the shell has acquired its full growth of four or five inches, they can be traced with the utmost difficulty, and sometimes are invisible; and the shell has become almost spherical.

In carefully tracing its progress, it will be observed, that the chambers

* Brown's Illustrations Foss. Conch. plate XVI. fig. 6.

become more deep and quadrangular, thus producing a new external contour in the shell.

To elucidate this subject still farther, we have given a representation of *Ammonites Murchisonæ*, plate I. fig. 18. It will be noticed, that the inner volutions in the infant state, as seen in the innermost volutions, are smooth; and afterwards in the young condition, the volutions are crossed by pretty strong, curved ribs, which are somewhat irregular in their degree of elevation. These continue until the shell has reached the diameter of about two inches, when they very suddenly become plain, exhibiting only transverse and slightly waved lines of growth.

Ammonites seem not to have been subjected to the same laws of geographical distribution as other animals, which existed along with them in the ancient world, for we find them widely spread in almost every country of the globe—the same species in strata of the same age, extending throughout Europe, Asia, and North and South America. Dr Gerard detected, in the year 1830, at an elevation of 16,000 feet, at Thibet, in the Himalaya Mountains, specimens of *Ammonites Walcotii*, plate III. fig. 26, and *A. communis*, which were identically the same with those found at Lyme Regis in Dorsetshire, and Whitby, Yorkshire. The former of these species also occurs in the Lias of Normandy, and south of France, Belfort, Haut Rhin, Boll and Ackelberg, and also in the Oolitic group of strata. The Greensand of New Jersey, like that of England, contains Ammonites, Hamites, and Scaphites. Captain Beechy and Lieutenant Belcher detected Ammonites on the coast of Chili, in lat. 36, S. in the cliffs near Concepcion.

This former universal diffusion of identical species, in organic life, differs remarkably from the existing distribution of animals and plants; for we find the geographical range of species limited with astonishing exactness, to certain parallels. Hence it seems certain, that during the Secondary and Tertiary periods, a more general diffusion of the same species prevailed than at present, through regions of the world most remote from each other.

Naturalists have divided the Ammonites into several sub-genera, depending chiefly upon their external form being more or less globular, the structure of their spiral convolutions, being furnished with single, double, or quadruple carinæ; and their external surface being knobbed, ribbed, or plain; but these are not so much to be depended upon as the sinuosity, number, general structure, and distribution of the septa.

Genus XI. — ENDOTHYRA. — *Phillips*.

Generic Character. — Shell involute, discoidal, internally concamorated, the chambers communicating by a large perforation; the septa arranged in stellated order; their emarginations on the inner part of their disk; destitute of any shelly siphuncle. Form of the septal edge unknown. Size, one-fiftieth of an inch.

Endothyra Bowmani. Plate VI. fig. 2. Found in the Mountain Limestone of Westmoreland.

TRIBE II. — NAUTILACEA.

Shell disciform, with a central spire, and short cells, which do not extend from the centre to the circumference.

Genus XII. — NAUTILUS. — *Linnaeus*.

Generic Character. — Shell suborbicular, multilocular, convolute, with contiguous volutions, and simple partitions ; septa transverse, and externally concave ; perforated in the disk ; margins entire ; aperture ample.

Nautilus striatus. Plate II. fig. 26.

This genus contains numerous fossil species, and there are two existing ones in tropical seas. The fossil Nautili afford an excellent example of the limitation of certain species to particular geological formations. The *N. multicastratus*, is confined to strata of the Transition series ; the *N. bidorsatus*, to the Muschelkalk ; the *N. obesus* and *lineatus*, to the Oolite series ; *N. elegans* and *undulatus* to the Chalks ; and the divisions of the Tertiary formations contain also species of Nautili peculiar to themselves.

On a careful review of all the fossil Nautili, and a comparison with the only two existing species of this genus, it will be found, that they have retained, through strata of all ages, their primitive simplicity of structure, down to the present time. They were among the earliest inhabitants of the ancient seas of our globe, and have preserved their generic distinctions through all the revolutions to which the earth's surface has ever been subjected. While its kindred multilocular genera have become entirely extinct. This is the more remarkable, as there are not exceeding sixty species of Nautili, while it will be seen upwards of 270 species of fossil Ammonites have been ascertained, not a single one of which has survived the wreck of the former world, nor does a type of the genus now exist.

We must explain the functions of this genus of Mollusks, by a reference to one of the only existing types, the *Nautilus Pompilius*. Plate I. fig. 3.

The only organ connecting the air chambers with the body of the animal, is the siphuncle, which penetrates the aperture, and the short projecting tube (c) running through each successive partition, till it terminates in the innermost chamber of the shell. By means of this mechanism, the animal can either augment or diminish its specific gravity, on the same principle as fishes distend or collapse their air bladders ; so that when the siphon is filled with water, the entire body is rendered specifically heavier than the surrounding fluid, and consequently sinks. When the water is expelled, it naturally rises to the surface and floats.

The Rhyncholites, or Beak-stones, found plentifully in the Oolite of Stonesfield, the lias at Bath and Lyme Regis, and in the Muschelkalk at Luneville, are the fossil beaks of Nautili and Ammonites. See plate I. fig. 5.*

The animal resides in the outer chamber only, and when too large for it, a new partition is formed of dimensions sufficiently ample to accommodate the inhabitant, and thus its former abode is converted into an additional air chamber. We have represented a cast of an air chamber. Plate I. fig. 11.

There is a beautiful contrivance in the shells of this genus, for increasing their strength, and enabling them to withstand the pressure of the fluid by which they are surrounded ; namely, the *external* transverse lines of growth or ribs, (as in plate II. fig. 26,) having a different curvature from the *internal* transverse plates or partitions ; the internal partitions being convex *inwards*, while the outer ribs of the shell are convex *outwards* ; these ribs

* For a minute detail of the construction of the shell of this animal, see the admirable "Memoirs on Nautilus Pompilius," by Professor Owen.

intersecting the curved edges of the transverse partitions at a number of points, naturally divide them into a series of curvilinear parallelograms; the two shorter sides of each parallelogram being formed by the edges of transverse septa, whilst its two longer sides are formed by segments of the external ribs and striæ, or the lines of growth.

In these Fossil Nautili which had not been fractured in the catastrophe by which they were overwhelmed, and the hydraulic actions of the siphuncle not having been affected, the air chambers are generally filled with calcareous spars, which appear to have been subsequently introduced by infiltration of water, holding in solution carbonate of lime, after the animal matter of the shell had been decomposed. In other cases, where the siphuncle had been broken, or the external shell fractured, the chambers are filled by the mud or limestone in which they were imbedded.

Two new genera have been proposed, as connected with *Nautilus*, viz.

Genus XIII. — ENDOSIPHONITES. — A discoidal, nautiliform shell, with the siphon situate close to the body volution, which constitutes its chief distinction from *Ammonites*.

Endosiphonites carinatus. Plate VI. fig. 3. Found in the Cambrian strata, Cornwall.

Genus XIV. — SIMPLEGUS. — *Blainville*. — Discoidal and multilocular, with the spire uncovered like the *Ammonites*; but having the chambers divided by simple septa, as in *Nautilus*.

Simplegus sulcata. Plate VI. fig. 4.

Genus XV. — NUMMULARIA. — *Lamarck*.

Generic Character. — Shell lenticular, disciform, or thick in the middle, and attenuated towards the margin; spire internal, multilocular, covered over by several tables; volutions generally numerous, sometimes to the number of twenty; the outer wall of the volutions complicated, extending and uniting on each side at the centre of the shell; cells very numerous, small, alternate, and formed by transverse imperforate septa, which are convex near their fronts, leaving a fissure between each of them and the preceding volutions; their sides are narrow, variously curved, and extending to the axis.

N. rotulata. Plate II. fig. 18. This species is found at Meudon, France, and is a member of the genus *Lenticulina*, now united to this genus.

Nummularia lævegata. Plate II. fig. 6 and 7.

There are but few species of this genus, and these are chiefly found in the *Calcaire Grossier*. They have a very wide geographical range, having been met with in France, Germany, Switzerland, Spain, Egypt, and England.

We have, however, but four species. *N. lævigatus*, is peculiar to the London clay, was first met with in Stubbington Cliff, and has since been found in Bricklesom Bay, Sussex. The *N. elegans*, occurs at Emsworth near Chichester, in a siliceous stone, associated with other extremely minute species of shells. The *N. variolaria* is found abundantly in the London clay, at Stubbington; and *N. Comptoni*, has been found at Earls-stoke.

Following the idea of Sowerby, we have united the genera *Nummulites* and *Lenticulina*, under the appellation of *Nummularia*, containing some recent species, as the two distinguishing characters of Lamarck are common with the genera, but were overlooked by Sowerby. The small fissure between the edge of each septum, and the margin of the preceding volution, as also the small columns which penetrate the parallel axis from one side to the other, and which sometimes form protuberances upon the surface, prevail in both genera. The volutions present the appearance of having been completed, at different periods of growth, by three or four chambers gradually diminishing from the centre, until the last one extends only to the margin of the preceding volution; and the chamber being closed by a convex septum, without a continuous margin, is not so easily detected in such species as have very small chambers in proportion to their diameter, as is the case with most of the *Nummulites*.

The want of a large external chamber has led naturalists to suppose that the shells of this genus were entirely enveloped in the integuments of the animals, while in a living condition; and this idea is farther strengthened by no siphuncle having hitherto been detected in these fossils.

The ancients considered *Nummulites* as petrified lentils. Strabo mentions a species which was found in Egypt near some of the Pyramids.

TRIBE III. — ORTHOCERATA.

Shell not spiral, — straight, or nearly so.

Genus XVI. — CONILITES. — Lamarck.

Generic Character. — Shell conical, straight, slightly inflated, having a thin external crust distinct from the nucleus or alveole which it contains; nucleus, multilocular, divided by transverse septa, which are somewhat separable.

Conilites pyramidata. Plate II. fig. 32.

This genus is distinguished from *Belemnites*, by its sheath being thin and not filled up with solid matter from the point of the nucleus to the apex of the sheath, as in *Belemnites*.

Genus XVII. — CONULARIA. — Miller.

Generic Character. — Shell conical, straight, or nearly so, hollow, multilocular, divided by transverse, imperforate septa; aperture half closed by an inflation of the lip; apex solid, obtuse; external surface covered with fine striæ.

Conularia teres. Plate II. fig. 37.

Two species only of this exclusively fossil genus are known; the *C. teres* was found at Troutie Bank, near Glasgow; the other, *C. quadrisulcata*, has been found in Ironstone nodules in the Carboniferous limestone in Renfrewshire.

Ure, in his History of Rutherglen and Kilbride, says, "it (the former) is sometimes found enclosed in Ironstone like a nucleus; at other times, found among shells, along with marine shells, &c. — specimens are very rare." It has also been met with in the Transition Limestone of Gloucestershire, and in the lowest bed of Limestone, near the Hotwells, Bristol.

Genus XVIII. — BELEMNITES. — Lamarck.

Generic Character. — Shell straight, conical, consisting of two parts; external portion or sheath forming a thick solid shield, provided with a cavity at the base, to admit the alveole, which is more mathematically conical than the sheath; and is separated into chambers by smooth simple septa, which are perforated by a lateral siphon.

Belemnites abbreviatus. Plate II. figs. 41, 42.

The Belemnites are only known in a fossil state. They have received many vulgar appellations, such as petrified fingers, petrified arrows, thunder stones, spectre candles, and devils' fingers, &c.

Genus XIX. — ORTHOCERA. — Lamarck.

Generic Character. — Shell elongated, straight, or slightly arcuated, with numerous external longitudinal grooves or ribs; chambers separated by transverse septa, these are perforated by a tube, which is either central or marginal.

Orthocera simplex. Plate II. fig. 29.

Sowerby has united this genus with the following, under the name of *Nodosaria*.

Genus XX. — NODOSARIA. — Lamarck.

Generic Character. — Shell elongated, erect, or smooth, and slightly arcuated, sub-conic, nodose, consisting of a series of spherical volutions; transverse septa perforated.

Nodosaria ——— Plate fig.

Genus XXI. — PHRAGMOCERAS. — Broderip.

Generic Character. — Shell incurved and compressed, more or less conical; septa entire at their edges, crossed externally by the lines of growth; siphuncle placed near the inner margin; aperture contracted at the middle, its outer extremity produced into a sub-cylindrical beak.

Phragmoceras ventricosum. Plate VI. fig. 5.

This genus is distinguished from *Orthocera*, by the shells being curved, and by the siphuncle being nearly marginal. The species are known only in a fossil state, and are characteristic of the Silurian system of rocks.

Genus XXII. — AMPLEXUS. — Sowerby.

Generic Character. — Shell cylindrical, multilocular,

with numerous transverse septa, which embrace each other with their reflected margins.

Amplexus Corralloides. Plate II. figs. 38, 39.

This curious fossil strongly resembles a Zoophite. It is found in the Limestone, called Black Rock, at Limerick, Ireland.

ORDER III. — FORAMENIFERA.

Shells multilocular, minute, placed internally in the animal, and destitute of an open chamber beyond the last partition.

It is the opinion of Dujardin, that the shells of this order should form a distinct class; but until they are better known, I prefer retaining them in the situation in which they were placed by Lamarck; but have adopted the order formed by D'Orbigny for their reception.

TRIBE I. — POLYSTOMATA.

Shell discoidal; spire central, with an external chamber only.

Genus I. — VORTICIALIS. — Lamarck.

Generic Character. — Shell disciform; spiral, multilocular, with contiguous volutions, which are entirely enveloped in the external one; septa transverse, imperforate, and not extending from the centre to the circumference; aperture marginal.

Vorticialis strigilata. Plate II. fig. 9.

Genus II. — POLYSTOMELLA. — Lamarck.

Generic Character. — Shell discoidal, multilocular, with continuous volutions, all enveloped in the external one; sides transversely furrowed; aperture composed of several openings variously disposed.

Polystomella crispa. Plate II. fig. 15.

Genus III. — SIDEROLITES. — Lamarck.

Generic Character. — Shell discoidal, multilocular, with contiguous volutions, enveloped in the external one; the

disk convex on both sides, and covered with tubercles ; circumference margined with unequal radiating lobes ; septa transverse, and imperforate ; aperture somewhat lateral, and distinctly developed.

Siderolites calcitrapoides. Plate II. fig. 10. Found in the Mountain of St Peter at Maestricht.

This genus is known only in the fossil state.

Genus IV.—DISCORBIS.—*Lamarck*.

Generic Character.—Shell discoidal, spiral, multilocular, with simple partitions ; all the volutions visible, exposed, and contiguous ; transverse septæ numerous, and imperforate.

Discorbis vesicularis. Plate II. fig. 11.

TRIBE II.—RADIOLACEA.

Shells discoidal, with a central spire, and elongated radiating cells, which extend from the centre to the circumference.

Genus V.—PLACENTULA.—*Lamarck*.

Generic Character.—Shell orbicular, convex above and beneath, multilocular ; aperture oblong, narrow, disposed like a radius in the inferior disk, or in both.

Placentula Astricans. Plate II. fig. 13.

Genus VI.—ROTALIA.—*Lamarck*.

Generic Character.—Shell orbicular, multilocular, spiral, convex or conical above ; flat, radiated and tubercular beneath ; aperture marginal, trigonal, and resupinate.

Rotalia trochidiformis. Plate II. fig. 16. Internal structure. Plate III. fig. 12.

TRIBE III.—SPHERULACEA.

Shell globular, spherical, or oval, with volutions mutually embracing, or with cells contiguous, and forming a tunic.

The shells of this tribe are multilocular and minute, of a spheroidal or oval form. Some are destitute of any other cavity than that of their cells, and with the volutions mutually enveloping each other ; others are provided with a particular internal cavity, consisting of a series of elongated, narrow, and contiguous cells, forming, by their union, a covering, which surrounds the central cavity.

Genus VII.—MELONIA.—*Lamarck*.

Generic Character.—Shell sub-spherical, multilocular,

with a central spire ; volutions contiguous, enveloping, tuni-
ciform ; cells narrow and numerous ; septa imperforate.

Melonia sphæroides. Plate II. fig. 22.

Genus VIII. — GYROGONA. — Lamarck.

Generic Character. — Shell spherical, concave within, composed of linear, curved, canaliculate pieces ; external surface with carinated, parallel, partly transverse ribs, and bound at the last volutions ; aperture round, terminated by a small round shell.

Gyrogona costata. Plate II. fig. 24.

D'Orbigny has instituted three genera, which he conceives connected with the present family. They are extremely obscure, and as we are informed by De Blainville, that he has ascertained from observations that the animals have no tentacula, they must be greatly removed from this family. We have merely figured them without attempting generic characters. They are,

1. *Quinquiloculina striatula*. Plate II. figs. 21 and 25.
2. *Triloculina communis*. Plate II. figs. 12 and 19.
3. *Biloculina opposita*. Plate II. figs. 20 and 28.

TRIBE IV. — CRISTACEA.

Shell semidiscoidal, multilocular, with an eccentric spire.

Genus IX. — ORBICULINA. — Lamarck.

Generic Character. — Shell sub-discoidal, multilocular, with compound contiguous volutions ; spire eccentric ; cells short, very numerous ; septa imperforate.

Orbiculina uncinnata. Plate II. fig. 31.

Genus X. — CRISTELLARIA. — Lamarck.

Generic Character. — Shell semidiscoidal, multilocular, with contiguous simple, progressively enlarging cells ; spire eccentric, sublateral ; septa imperforate.

Cristellaria squammula. Plate II. fig. 27.

These minute species are found both in a fossil and recent state.

Genus XI. — RENULINA. — Lamarck.

Generic Character. — Shell reniform, flattened, multilocular, sulcated, with linear contiguous volutions, curved round a marginal axis, the most distant from the axis being the longest.

Renulina opercularia. Plate II. fig. 34.

TRIBE V. — LITUOLACEA.

Shell partially spiral, the last volutions continued in a straight line.

Genus XII. — LITUOLA. — Lamarck.

Generic Character. — Shell multilocular, partially spiral, and disciform, with contiguous volutions, the last terminating in a straight line; cells irregular, septa transverse and simple; the last perforated by from three to six holes.

Lituola difformis. Plate III. fig. 4, and plate II. fig. 30.

Genus XIII. — SPIROLINA. — Lamarck.

Generic Character. — Shell multilocular, partially spiral, and disciform, with contiguous volutions, the last terminating in a straight line; septa transverse, perforated by a tube.

Spirolina stenostoma. Plate II. figs. 33. and 35.

TRIBE VI. — HIPPURANA.

Shells straight, or nearly so.

Genus XIV. — CLAVULINA. — D'Orbigny.

Generic Character. — Shell multilocular, straight, club-shaped, compressed.

Clavulina corrugata. Plate II. figs. 43, 44.

Genus XV. — HIPPURITES. — Lamarck.

Generic Character. — Shell cylindraceo-conical, straight, or slightly arcuated; multilocular, with transverse septa; provided with an internal lateral channel, formed by two parallel, longitudinal, obtuse, convergent ridges, the last closed by an operculum.

Hippurites Infundibuliformis. Plate II. fig. 36.

De Blainville considers this as a bivalve, and places it in the family *Rudistis*; but we consider its character too imperfectly known to warrant our placing it in that tribe.

Genus XVI. — CALCARINA. — D'Orbigny.

Generic Character. — Shell a double cone, radiated above, the radii spinous.

Calcarina rarispina. Plate II. figs. 45, 46.

ORDER IV.—TRACHELIPODA.

Posterior portion of the body spirally convolute, and separated from the foot, and always enveloped in a shell ; foot free, flattened, and attached to the inferior base of the neck, or the anterior portion of the body, and forming a member of locomotion ; shell spiral and enveloping, with a canaliculate aperture, notched or effuse at the base.

GRAND-DIVISION I.—ZOOPHAGOUS TRACHELIPODA.

Animals always inhabiting the ocean, and feed upon other animals ; provided with a protruding syphon, and respiring water only, which is conducted to the branchiæ by this syphon : they are destitute of maxillæ, and have a retractile proboscis.

TRIBE I.—INVOLUTE.

Shell without a canal, but having the base of the aperture notched or effuse ; the spiral convolutions broad, compressed, and rolled up in such a manner that the external one almost entirely envelopes the others.

Genus I.—CONUS. — *Linnæus.*

Generic Character.—Shell inversely turbate, conical ; spire generally short ; aperture longitudinal, linear, entire, narrow, and sub-effuse at the base ; columella smooth, and destitute of teeth ; outer lip sometimes emarginate above.

Section 1.—*Spire short.*

Section 2.—*Spire elongated.*

Section 3.—*Shell ventricose.*

Conus scabriusculus. Plate III. fig. 13. Found in the London Clay at Barton.

Conus antediluvianus. Plate III. fig. 19. Found in the London Clay.

The shells of this genus are marine, and are by no means numerous in a fossil state ; they are, however, found sparingly in England, in the Crag and London Clay ; the *Calcaire-grossier* of France, the *Terrains Cacareo-trapeeus* of Brongniart, and contemporaneous strata of other countries. Mr Phillips and Mr Conybeare mention some imperfect casts, which they have noticed in the Inferior Oolite ; but these are not positively ascertained to belong to this genus.

Genus II.—OLIVA. — *Bruguère.*

Generic Character.—Shell oblong, subcylindrical, convolute, smooth, and glabrous ; spire short, the volutions sepa-

rated by a narrow canal, above which the volutions are coated with a fine enamel; aperture elongated, rather narrow, and notched at the base; columella obliquely striated or plaited, its base provided with an oblique, somewhat tumid, striated, varix-like appendage.

Oliva Salisburniana. Plate III. fig. 10. Found in the London clay.

The shells of this genus bear a considerable resemblance to those of *Ancillaria*, but are readily distinguished by the canaliculate suture which separates the volutions, as well as by the striated columella; they are also recognized from the *Volutæ* and *Mitræ* by the same characters.

All the *Olivæ* are marine shells, principally natives of tropical climates. None are found in the British Seas.

But few fossil *Olivæ* are known; these are found in the London clay and *Calcaire-grossier*; and one species occurs in a sort of Greensand, near Turin

Genus III. — ANCILLARIA. — Lamarck.

Generic Character. — Shell oblong, subcylindrical; spire short, seldom more than a third of the length of the shell, the suture is not canaliculate, and is generally obscured by a coating of enamel, which frequently covers the whole spire; aperture longitudinal, narrow above, effuse and notched at the base; lower portion of the columella smooth, with an oblique tumid, usually striated varix at the base; entire outer surface smooth and glossy, supposed to be devoid of both epidermis and operculum.

The columella being devoid of plaits, distinguishes the shells of this genus from those of the genus *Oliva*; and the callous, oblique band at the base of the columella, separates them from those of the genus *Terebellum*; they have sometimes been mistaken for a species of the genus *Melanopsis* which are invariably fresh-water shells, more particularly the fossil species; but the latter genus may readily be distinguished, by the tumid upper portion of its pillar lip, and by the spiral line being distinct, and in the outer surface not being polished.

Ancillaria subulata. Plate III. fig. 33. Found in the upper marine formations.

The *Ancillaria* are marine shells, and principally inhabitants of tropical climates. The fossil species are very limited in number. They chiefly occur in the London Clay, *Calcaire-grossier*, and Greensand.

Genus IV. — TEREBELLUM. — De Montfort.

Generic Character. — Shell thin, convolute, subcylindrical, rolled around its longitudinal axis in the form of an elongated cone; spire short, sometimes hidden; aperture longitudinal, narrow above, and ascending in the form of a straitened spiral canal, defining the volutions; the outer lip entire, and not thickened, diverging as it descends, widely

expanded, and notched; columella smooth, truncated at the base.

Section 1. — Spire visible.

Terebellum fusiforme. Plate III. fig. 15. Fossil, in the London Clay.

Section 2. — Spire invisible, or slightly apparent.

Terebellum convolutum. Plate III. figs. 16, 17.

Montfort considered the concealed spire sufficient reason for forming a separate genus of this last species, under the name of *Seraphs*; but it appears to be only in the adult state that it assumes this character, because, if broken, the spiral canal is distinctly visible.

The shells of this genus inhabit the Indian Ocean, of which one recent species only is known.

Genus V. — CYPRÆA. — Linnæus.

Generic Character. — Shell strong, particularly in front, ovate, or oblong-ovate, convex behind, and somewhat flattened in front; margins involute; spire very small, generally hidden by the upper portion of the last volution, which is rolled around the under volutions, as if around a longitudinal axis, and invested by a coating of enamel in the perfect or adult condition; the whole surface usually beautifully polished, and for the most part ornamented by spots, eyes, or zigzag markings; some few are grooved or ribbed on the external surface, and these have but little polish; aperture long, narrow, extending nearly the whole length of the shell, dentate on either side, effuse at the extremities; outer lip thickened and inflexed.

Cypræa avellana. Plate IV. fig. 21.

Found in the London Clay. The species are pretty numerous in a fossil state, in the newer formations; they occur in the Crag, and in the *Calcaire-grossier* of Paris, Normandy, and Laugnan near Bordeaux.

The Cypræidæ undergo considerable change of aspect in their progress from the young to the adult state, and in their unfinished condition, may be mistaken for species of *Bullæ* and *Ovulæ*. They are oceanic shells, inhabiting the seas of the warmer portions of the globe, one species only being found in Europe.

Genus VI. — CALPURNA. — Montfort.

Generic Character. — Shell oblong, oviform, somewhat attenuated at both extremities with abbreviated canals; aperture longitudinal; outer lip smooth and thickened; columella with a notch at its base.

Calpurna Leathesi. Plate IV. fig. 9.

The *Calpurnæ* inhabit the ocean ; one species occurs in the British seas, and the *C. Leathesi* is found fossil in the Crag at Walton.

This genus was instituted by Montfort for the reception of *Ovula Leathesi*, whose characters do not agree with those of the genus *Ovula*.

TRIBE II. — COLUMELLARIA.

Shell destitute of a canal at the base of the aperture, but provided with a more or less distinct subdorsal notch, and folds upon the columella.

Genus VII. — VOLVARIA. — Lamarck.

Generic Character. — Shell cylindrical, convolute ; spire nearly hidden, and depressed, terminating in a small blunt, hardly salient apex ; aperture narrow, extending the whole length of the shell, somewhat wider and truncated at the base ; columella with three or four oblique folds near its base ; outer lip denticulated.

Volvaria acutiscula. Plate IV. fig. 22.

The shells of this genus are known only in a fossil condition, and found in the Calcaire grossier of Paris, Bordeaux, Grignon, and the London Clay at Hordwell.

Distinguished from the *Bullæ* by the plaits on the base of the columella, and by their transversely striated exterior.

Genus VIII. — MARGINELLA. — Lamarck.

Generic Character. — Shell oblong-ovate, smooth ; spire short, in some species nearly hidden ; aperture elongate, narrow, wider below than above, and slightly notched at the base ; outer lip reflected, provided with a longitudinal varix or thickening ; lower portion of the columella furnished with several folds or plicæ.

Marginella quadruplicata. Plate III. fig. 20.

Section 1. — *Spire short, distinct ; base of the columella with six plaits, the lower one largest. Marginella glabella is a type of the section.*

Section 2. — *Spire short, hardly visible, with some plicæ at the base of the columella. Type Marginella Persicula.*

The *Marginellæ* are marine shells. The only fossil species known, is the *M. quadruplicata*, plate III. fig. 20, and belongs to the latter section.

Genus IX. — VOLUTA. — Linnæus.

Generic Character. — Shell subovate, surface generally variegated with different colours and markings, for the

most part covered with a thin, fuscous, membranous epidermis; spire short, terminating in a papillary apex; aperture oblong; columella plicated, the lower plaits being the largest; base emarginate; destitute of an operculum.

Voluta lyra. Plate III. fig. 32.

The variety of forms comprehended in this genus, render it necessary to constitute five subdivisions for their reception, — viz.

SUBDIVISION I. — Papilla large and smooth.

Section 1. — Coronated.

Section 2. — Not coronated.

SUBDIVISION II. — *Vespertiliones*; papilla tuberculated.

SUBDIVISION III. — Papilla smooth, medium sized, and subacute.

Section 1. — *Ventricosiones*, or bellied species.

Section 2. — *Graciliones*, or slender species.

Section 3. — *Musicales*, or Music Volutes.

SUBDIVISION IV. — *Mammillares*. Mammillary species, with a mammiform apex.

SUB-DIVISION V. — *Mitriiformes*. Mitre-shaped.

The volutæ, in a recent state, inhabit the seas of warm climates. They are met with, in a fossil state, in the formations above the chalk, in the Calcaire grossier of Grignon and Laugnan, the London Clay and Crag; and the *Voluta Lyra* has been found in the Cornbrash under the Chalk.

Genus X. — MITRA. — *Lamarck*.

Generic Character. — Shell subcylindrical, elongated, generally covered with a thin horny epidermis; spire variable in length, but generally greater than the extent of the aperture; aperture longitudinal, elongated, notched at the base, and terminating in a very short canal; columella provided with a series of plaits, which are sharp at the edge, and the lower ones smallest; margin of outer lip usually sharp, in other species it is somewhat thickened, and crenulated, and even provided with an obtuse tooth at the upper part interiorly.

Mitra plicatula. Plate III. fig. 40. *Mitra Dufrensi*. Plate III. fig. 31. Both from the Paris basin.

The Mitræ inhabit the tropical seas; most of them in the Indian Ocean. They are found fossil in almost all the Tertiary formations.

The species are liable to considerable variations in external form; we give representations of the most conspicuous of these.

Genus XI. — COLOBELLA. — *Lamarck*.

Generic Character. — Shell oblong-ovate, invested with a thin epidermis; spire short; aperture elongated, contracted and narrow, usually about half the length of the

shell, rather narrow and notched at the base, which is more or less emarginate, and ending in a very short canal; columella somewhat contracted in the centre, opposite the internal tumour of the outer lip, and denticulated at the base; outer lip thickened and tumid, and denticulate in the centre internally; in some species the tumid part is represented by a few strong projecting teeth. Said by Adanson to be provided with a small, slender, horny operculum.

Colombella nebulosa. Plate III. fig. 36.

The *Colombellæ* inhabit the ocean. Fossil species are found in the Tertiary deposits of Italy.

TRIBE III.—PURPURIFERA.

Shell with a short canal ascending posteriorly, or provided with an oblique notch at the base of its aperture.

SUBDIVISION I.—Shells with an oblique notch, directed backwards, and furnished with a canal.

Genus XII.—TEREBRA.—*Lamarck*.

Generic Character.—Shell greatly elongated, subulate; spire very long, consisting of many flat, gradually tapering volutions, terminating in an acute apex; body very small in proportion to the spire; aperture ovate, a little contracted above, with a short, straight canal at the base; columella oblique, spiral, or twisted, frequently striated; outer lip thin and sharp at the edge; provided with a thickish, oblong operculum, which is somewhat pointed at the base, but not spiral.

Terebra plicatula. Plate V. fig. 23.

The shells of this genus and those of *Turitilla* resemble each other, but are easily distinguished by the form of the aperture, which, in the latter genus, is nearly circular, and are destitute of a canal, and the twisted columella of *Terebra*.

The *Terebræ* are oceanic shells, inhabiting principally the seas of Africa, India, and the West Indies. They occur fossil in the Newer Strata of Turin, Bourdeaux, Piucenza, and in the London Clay.

It has been proposed by Blainville to form a new genus, under the name of *Subula*, from the more ventricose species, agreeing with *Terebra maculata*; but this is quite an unnecessary alteration.

Genus XIII.—EBURNA.—*Lamarck*.

Generic Character.—Shell ovate or elongated, with a fine polished surface; outer lip simple; aperture longitudinal; emarginate at the base; columella umbilicated above, with a canal below the umbilicus.

Eburna glabrata. Plate III. fig. 25. Found in the

Chalk, Sussex. It is, however, doubtful whether this is a true Eburna.

Genus XIV. — BUCCINUM. — Linnæus.

Generic Character.—Shell subovate, or ovate-conical, seldom elongated, subturreted; apex a little obtuse; spire of medium length, somewhat abruptly acuminate, but seldom of greater length than the aperture, which is sub-orbicular, or a little longer than wide, notched at the base, and hardly acute at its upper termination, where there is sometimes a small tooth-like process, formed by the thickening of the inside of the outer lip, with frequently a similar tooth opposed to it at the superior part of the inner lip, these enclosing a small sinus; outer lip rather acute at the edge, sometimes internally and transversely grooved, and in some instances with a dentated margin; columella smooth, frequently a little roughened at its inferior extremity; canal generally very short and straight; operculum horny and thickened.

Buccinum prismaticum. Plate III. fig. 34.

The *Buccina* inhabit the African coasts, the British seas, and Northern Ocean. But few species have been found in a fossil state, and are chiefly met with in the Norfolk, Suffolk, and Essex Crag, some few occur in the London Clay and upper marine formations.

Although Lamarck has done much in distributing many of the Linnæan *Buccina* among other genera, still it would require considerable revision; many, with a lengthened canal, approach too nearly to *Fusus*, and those with a very short canal are nearly allied to *Purpura*, while others are so nearly connected with *Terebra*, that there is considerable difficulty in distinguishing them.

The *Buccinum undatum*, a common shell in the British seas, is the best type of the genus.

Genus XV. — NASSA. — Lamarck.

Generic Character.—Shell oblong, usually sub-turreted; spire generally of mediocre length, with an acute apex, or short, with an obtuse apex; aperture sub-orbicular, longer than broad, notched at the base; outer lip more or less thickened, sometimes provided with a small marginal appendage close to the upper part, and generally grooved or toothed internally; inner lip much thickened, and, for the most part, spread over the lower region of the body in front, seldom extending to the base of the shell, and frequently provided with a small tooth at the superior part immediately within the aperture; columella spiral, its lower margin acute, and sometimes ending in a strong point, not

unfrequently rough; canal very short, reflected, and never projecting beyond the base of the body volution. Furnished with a horny operculum.

Nassa reticulata. Plate IV. fig. 41. Found in the Tertiary formations in the neighbourhood of Nice.

The shells of the genus *Nassa* differ from those of *Cassis* in having mostly a longer spire, and a shorter aperture, which can hardly be called elongated; with a shorter canal, which is almost invariably attached to the back of the body; in the inner lip being less expanded, and in the varices never being formed until the shell is mature.

The Nassæ are marine shells, and inhabit the seas of almost all climates.

Most of the numerous species are grooved, granulated, tuberculated, or striated on their outside, in some few instances they are polished.

Fossil species are few, and are met with in the Crag, Greensand, London Clay, and its contemporaneous strata, in Italy and France.

Genus XVI. — DOLIUM. — Lamarck.

Generic Character. — Shell subovate, extremely ventricose, approaching to globular; thin; more or less strongly costated transversely, covered by a thin horny epidermis; spire very short, with a semitransparent apex; aperture very large, straitened above, and terminating below in a short reflected canal; outer lip thin for the most part, in some species a little thickened, reflected and crenated at the edge.

Dolium nodosum. Plate IV. fig. 19. Found fossil in the Chalk, at Hurstperpoint, Sussex, and is supposed to be the only fossil species of this genus.

The shells of this genus inhabit the ocean, chiefly the tropics. Some of the recent species approach nearly in form to the *Buccinea*, but their canal not being reflected, distinguish them from the latter genus.

Genus XVII. — HARPA. — Lamarck.

Generic Character. — Shell oval, ventricose; spire very short, with rounded volutions; body large, covered with longitudinal ribs, which are generally pointed above; aperture large, oblong ovate, much expanded, and terminating in a notched base, which can hardly be called canaliculate; outer lip thickened, and a little reflected at the edge; inner lip reflected over the columella, united to the outer lip above, and terminating in a point below.

Harpa mutica. Plate V. fig. 25. Found fossil in the *Calcaire-grossier* at Grignon, Bordeaux and Volognes, and is the only fossil species known.

The Harpæ inhabit the ocean, and are all natives of the Indian seas. They are but few in number.

Genus XVIII. — PURPURA. — Bruguière.

Generic Character. — Shell generally ovate, or oblong; spire short, mostly grooved, granose, or tuberculate, or externally spinose; aperture generally largely dilated, and ovate; margin of the outer lip usually sharp, and frequently toothed within, near the edge; emarginate at the base, where it is notched, and ending in a short canal; columella generally depressed, often internally acute at the edge, and terminating below in a sharp point; operculum horny, provided with a lateral nucleus, thinner on the margin next the columella.

Purpura tetragona. Plate IV. fig. 40. Found in the Crag near Ipswich.

The *Purpuræ* are oceanic shells, and in a recent state are very numerous, occupying a wide geographical range. The Fossil species are, however, very limited.

Genus XIX. — CASSIS. — Bruguière.

Generic Character. — Shell ventricose, gibbous, sub-trigonal for the most part; body large; spire generally very short; aperture longitudinal, narrow; in some species nearly equal to the whole length of the shell, in others proportionally wider, (in which case the aperture can hardly be considered as elongated,) with a more produced spire; base of the aperture terminating in a short canal, which is abruptly reflected, and its inner margin acute; columella twisted, provided with transverse plaits, or rugose; outer lip usually inflected, and spread over the lower portion of the body, producing a flattened disk, reaching beyond the edge of the lower varix, and internally dentated; and, in many species, forming a varix at the completion of each volution. Not known whether it is provided with an operculum.

Cassis bicatinatus. Plate III. fig. 23. Found in the Crag at Bawdsey, Sussex.

The species of this genus are numerous, they have either protuberances on the superior part of the volutions, and are decussated, cancellated, grooved and striated in various ways. They are oceanic, and inhabit the tropical climates, burrowing in the sand at a distance from the shore.

The fossil species are few, and these are found in the Tertiary formations.

Genus XX. — ONISCIA. — Sowerby.

Generic Character. — Shell oblong-ovate, subcylindrical; broad above, acuminate below, and usually cancellated, ribbed or tuberculated; spire generally short, terminating

in an obtuse apex; aperture longitudinal, elongated, somewhat contracted above and below, with a very short canal at its base; outer lip thickened, numerously toothed on its inner edge, broadly reflected on the columella, and furnished with granulations; supposed to have an operculum.

Oniscia cithara. Plate X. fig. 6. Found fossil at Belforte, Italy.

The *Oniscia* inhabit the ocean. There are but few species in the genus, and these are tropical.

Genus XXI.—CASSIDARIA.—*Lamarck*.

Generic Character.—Shell subovate, ovate, or oblong; ventricose; body very large; spire short; aperture longitudinal, narrow, terminating at the base in a recurved canal, which points upwards, when the shell is held with the aperture downwards; outer lip marginate, thickened, reflected, frequently dentated within; inner lip expanded, covering the lower portion of the body and columella, but detached from it at the base, immediately above the canal, which, in some species is rough, granular, tuberculate, or rugose; outer surface generally grooved, tuberculated, and covered with a thin, horny epidermis. Supposed to have an operculum.

Cassidaria carinata. Plate III. fig. 39. Found fossil in the London clay at Highgate Hill. Fossils of this genus are, however, very rare, and are met with only in the tertiary deposits, such as the *Calcaire-grossièr* of the Paris basin and Piacenza.

The chief difference between the shells of this genus and those of *Cassis*, consists in the beak being more abruptly curved than in the latter genus.

The *Cassidaria* inhabit the oceans of the tropics, and the species are very limited in number.

SUB-DIVISION II.—Shells destitute of a regular canal.

Genus XXII.—CALIENDRUM.—*Brown*.

Generic Character.—Shell oblong-ovate, acute; volutions deeply divided; aperture irregularly ovate, oblique, rounded above and contracted beneath; columella greatly reflected and undulous, destitute of a canal at the base; outer lip very broad, somewhat reflected, and smooth on the margin.

Caliendrum vittatum. Plate X. fig. 7. Found in the Mountain Limestone at Bolland.

Known only in a fossil state. *Buccinum vittatum*, Phillip's Geology of Yorkshire, ii. plate 16, fig. 14.

TRIBE IV.—ALATA.

Shell provided with a canal of greater or less extent at the base of the aperture ; the right lip changes its form as the animal progresses towards maturity, and is provided with a sinus towards its base.

Genus XXIII.—STROMBUS.—Linnæus.

Generic Character.—Shell oblong, subventricose ; spire more or less acutely turreted ; aperture generally elongated, and in most species with a short canal at its superior extremity, and in some cases having an elongated narrow canal, extending nearly to the apex of the spire ; outer lip sharp edged, and entire, in the young state, but dilating and thickening with age into an expanded wing, lobate at its superior edge ; sometimes with several notches both above and below ; but having a well marked sinus near the inferior extremity or base ; this is sometimes very strong, and in other instances almost obsolete ; aperture provided with a long, narrow, horny operculum.

Strombus laevis. Plate III. fig. 22. Found at Grignon.

S. pugilis. Plate X. fig. 8. Found in the Blue Marls, south of France.

The Strombi inhabit the seas of warm climates. There are many species.

Fossil species occur but seldom ; they are met with in the newer formations, above the chalk, in the Calcaire-grossièr, Paris, and in a similar formation at Bordeaux. The tertiary Traps at Vicenza, contain two or three species.

Genus XXIV.—PTEROCERAS.—Lamarck.

Generic Character.—Shell subturreted, oblong-ovate subventricose ; spire short ; body very large, its base terminating in an elongated, generally recurved pointed canal ; aperture oblong, its superior extremity extended into a canal, which is sometimes double ; outer lip thin, acute at the edge when young, but, in the adult state, thickened, and dilated into a wing-shape, its margin provided with a series of digitations or horns, and with a deep sinus near the lower extremity, but not close to the base ; outside usually tuberculated, coated by a thin, horny epidermis ; operculum horny, thick, oblong, rounded above, and pointed below. One or two species have a single horn-shaped process inserted between the basal sinus and the lower canal.

Pteroceras Oceani. Plate VI. fig. 9. Found in the Kimmeridge Clay at Havre and the Jura.

The position of the sinus, near the extremity of the outer lip, and it also being digitated, together with the short spire, distinguish the shells of this genus from those of *Rostellaria*; and the lobes and curved canal separate them from the Strombi.

There are but few species of *Pteroceras*, and these inhabit the tropical seas.

The fossil species are rare, and are met with in the rocks of the Oolitic group.

Genus XXV. — APORRHAI. — Petiver.

Generic Character. — Shell turreted, fusiform; aperture subquadrate, ending above in a canaliculate groove, and below in a slightly twisted beak, which is canaliculate within; the outer lip expanded, and its margin provided with digitated lobes; inner lip broad, with a thick coating of enamel, extending the whole length of the body.

Aporrhais calcarata. Plate IV. fig. 37. Found in the Whetstone pits at Blackdown; the fossil species are only known in the newer formations.

The shells of this genus inhabit the ocean, and are principally European, as none are known to exist south of the Mediterranean.

Genus XXVI. — HIPPOCHRENES. — Montfort.

Generic Character. — Shell oblong-ovate; body large; spire of medium length, smooth and taper; aperture long, narrow, ending in a straitened canal, both above and below; outer lip large, and much expanded, and but slightly reflected; columella provided with a thick glazing, which usually extends high upon the spire, sometimes beyond its tip.

Hippochrenes macroptera. Plate III. fig. 24. Found in the London Clay at Hordwell and Highgate Hill.

The shells of this genus are marine, and only occur in a fossil state.

Genus XXVII. — ROSTELLARIA. — Lamarck.

Generic Character. — Shell turreted, or fusiform; spire uniformly longer than the aperture; the superior volutions generally longitudinally grooved, aperture oblong, its upper parts prolonged into an elongated narrow canal, which, in some instances, extends to the apex of the spire, and not unfrequently turns down on the opposite side; base with a more or less lengthened canal, pointed beneath; outer lip in the infant state, thin, but becomes greatly dilated with age, entire, or dentated at its lower margin, or digitated; outside covered with a thin, horny epidermis; aperture

provided with a thick cornuous operculum of an oblong form, rounded at one end, and pointed at the other.

Rostellaria lucida. Plate III. fig. 29. Found in the London Clay at Highgate Hill.

The sinus close to the pointed canal distinguishes this genus from the genera *Strombus* and *Pteroceras*; these having the sinus remote from the lower canal.

The *Rostellariæ* inhabit the ocean. They are not numerous.

Fossil species are found in the London Clay, the Greensand, *Calcaire-grossier* of Paris, and in the Tertiary formations of Bordeaux, and Italy.

TRIBE V.—CANALIFERA.

Shell with a more or less lengthened canal at the base of the aperture, and of which the right margin does not change its form as the animal advances in age.

SUB-DIVISION I.

Shell provided with a permanent varix on the outer lip, and varices on the spire.

Genus XXVIII.—TRITON.—*Lamarck*.

Generic Character.—Shell ovate or oblong, thick; with interrupted varices, situated at irregular distances, one or two on each volution; spire prominent, and mammillated at the apex; aperture round or oval, terminating above in an ascending canal, and below in an elongated and reflected beak; outer lip thickened, reflected, and generally denticulated within; whole surface covered with a strong, horny epidermis, which is frequently provided with a fringe of long ciliated hairs on the outer lip and base of the volutions. Operculum thick and horny.

Triton canaliculatum. Plate V. fig. 27. Found in the London Clay at Barton Cliff and Muddiford.

The rugose inner lip, and the varices never exceeding two on the volutions, distinguish the shells of this genus from those of *Murex*.

The Tritons inhabit the seas of the East and West Indies, and South Seas. The species are but few. Fossil Tritons occur only in the Tertiary formations, in the London Clay and Greensand.

Genus XXIX.—MUREX.—*Linnæus*.

Generic Character.—Shell oblong, subturreted; spire frequently prominent, with an acute apex; furnished with three or more rough, spinous or muricated varices, frequently digitated, or spinous, or with fringed projecting foliations; aperture suborbicular; columella smooth; base

with a lengthened canal, sometimes very long, frequently recurved ; outer surface protected by a thick horny epidermis ; aperture provided with a horny operculum.

Murex Cristatus. Plate VI. fig. 10. Found in the London Clay at Highgate Hill.

There is some difficulty in discriminating the Murices ; they are distinguished from the *Tritonice* by the smooth columella, instead of being rugose, and in always having three varices at least ; they differ from *Fusus* and *Fasciolaria* in their general shape, and again in the varices, of which those genera are always destitute ; and *Ranella* has but two rows of varices ; the general shape, and elongated canal, remove them from *Ricinula* ; and the shorter proportion of the spire, separates them from *Cerithium*, in which it is invariably longer than the aperture.

The species of this genus are very numerous, and inhabit the seas of almost all countries.

Fossil Murices are tolerably abundant, and occur in the London Clay, Blue Chalk Marle, South of France ; the Super Cretaceous Rocks of Bordeaux and Dax, also in the Cretaceous and Oolitic groups of rocks.

Genus XXX. — TYPHIS. — Montfort.

Generic Character. — Shell subcylindrical, subturreted ; volutions provided with numerous cylindrical, pervious processes ; aperture suborbicular ; beak short, with a closed tubular canal.

Typhis fistulosus. Plate III. fig. 35. Found in the London Clay at Barton Cliff.

The shells of this genus seem only to be found in a fossil state, and in the newer formations ; namely, the Super Cretaceous rocks of Bordeaux and Dax, &c.

Genus XXXI. — RANELLA. — Lamarck.

Generic Character. — Shell oval, or oblong ; subcompressed ; with depressed straight or slightly oblique distichous, and frequently spinous varices, situated at intervals of half a volution, forming a continuous longitudinal row on each side ; aperture subovate ; base canaliculated ; and frequently with a small canal above, at the junction of the outer and inner lips ; outer lip grooved, with its edge crenated, or dentated ; inner lip usually rugose, the outside more or less tuberculate, frequently set in small bead-like rows, and generally covered with a thickish olivaceous epidermis.

Ranella Bartonensis. Plate III. fig. 41. Found in the London Clay at Barton Cliff.

The two lateral rows of varices at once distinguish this genus, as well as their general construction. The only genus with which they may be confounded is

Triton, and that will be with those very few species, wherein the varices are more remote from each other than half a volution; but attention to the other characters will lead to the distinction.

The *Ranellæ* are not numerous, and are natives of the East Indian Ocean.

Fossil species are very rare, and hitherto have been found, principally, in the London Clay; the Blue Marls of France; the Super Cretaceous rocks of Bordeaux, Dax, &c.

SUBDIVISION II.

Shells without a constant ridge on the outer lip.

Genus XXXII. — PYRULA. — *Lamarck*.

Generic Character. — Shell thin, pyriform, oblong, ventricose above, somewhat attenuated below, and usually very regular in form; spire short, rounded, and consisting of few volutions; aperture wide, terminating in an elongated, narrow, open canal, wider towards the aperture, and narrowing as it descends; outer lip thin, sharp on the margin, and minutely crenulated; columellar lip tortuous and smooth, and spreading over the front a thin enamel, which, in some instances, is hardly perceptible; outside generally cancellated, but entirely destitute of varices or umbilicus, and covered with an excessively thin epidermis.

Pyrula nexilis. Plate IV. fig. 25. Found in the London Clay at Barton Cliff.

The shells of this genus are few, and chiefly inhabit the Indian Ocean, as well as the coasts of South America.

In a fossil state, the *Pyrulæ* are met with in the newer formations, namely, the London Clay, Blue Marls of France, and the Super Cretaceous rocks of Bordeaux and Dax, and *Calcaire-grossier*.

Genus XXXIII. — FUSUS. — *Lamarck*.

Generic Character. — Shell fusiform, or subfusiform; spire usually turreted with many rounded volutions, and gradually acuminate, generally terminating in a pointed apex, although it is sometimes mamillary; for the most part, with longitudinal ribs and spiral grooves; aperture elliptical, ending in a lengthened straight canal; furnished with a horny operculum, having its nucleus at its acuminate lower extremity; outside covered by a rough epidermis.

Fusus Parkinsonii. Plate III. fig. 30. Found in the Essex Crag.

Fusus contrarius. Plate I. fig. 12. Found in the Suffolk Crag.

Fusus longævus. Plate I. fig. 7. Found in the London Clay at Barton Cliff, &c.

This genus may be properly arranged in the following sections:—

Section 1.—*Spire and canal of equal length; aperture elliptical; body ventricose; base of the aperture suddenly contracted into a straitened canal; as in F. Colus.*

Section 2.—*Subpyriform; spire short; body tuberculate, and ventricose above, sometimes with vaulted spines, encompassing the volutions, and the aperture ending in a short spire; as in F. Colosseus.*

Section 3.—*Bucciniform; with spire longer than the canal, which is short, and somewhat oblique; shell most ventricose below the centre of the body; as in F. Lignarius.*

Section 4.—*Fusiform; columella with two or three transverse folds, immediately above the commencement of the canal; as in F. Infundibulum, (the Turbinella Infundibulum of Lamarek.)*

The shells of this genus are numerous, and inhabit the seas of almost all countries.

Fossil *Fusi* are numerous, and occur in the London Clay, the *Calcaire-grossière*; and the English Crag; Blue Marls of France; the Super Cretaceous rocks of Bordeaux, and Dax, also in the Cretaceous group of rocks.

Genus XXXIV. — FASCIOLARIA. — Lamarek.

Generic Character.—Shell elongated, fusiform; the spire generally of equal length with the canal; aperture oblong-ovate, generally acuminate both above and below, ending in a nearly straight canal, provided with three oblique plaits at the base of the columella, the lower one generally largest; operculum horny, thick, oval, and acuminate below.

Fasciolaria Turbinelloides. Plate V. fig. 34.

In their general form, the shells of this genus much resemble those of *Fusus*, but their want of the oblique folds, so conspicuously marked in *Fasciolaria*, at once render the difference obvious. They are distinguished from *Turbinella* by the great obliquity of the plicæ, and in the lower one being always largest.

The species are not numerous, and are principally inhabitants of the East and West Indian Seas.

The Fossil species are few, and occur chiefly in the new formations, namely, the Super Cretaceous rocks of Bordeaux, and Dax.

Genus XXXV. — CANCELLARIA. — Lamarek.

Generic Character.—Shell oval, thick, subturreted; spire short in most species, but produced in a few; body large, ventricose, greatly exceeding the spire in length; aperture subovate, not quite entire, the base being, for the most part, somewhat extended into a canal, distinct in most cases, but always short and recurved; outer lip transversely sulcated within; inner lip reflected over the columella, and

part of the front of the body ; columella plaited, varying in number and size ; for the most part, they are large, compressed, and much developed ; in some instances they are small, few, and placed far within the columella, so as to be nearly obscured ; at other times low down.

Cancellaria evulsa. Plate IV. fig. 35. Found in the London Clay at Barton Cliff.

Sowerby proposes that this genus should be separated into the following sections ;—

1. The canal short, recurved, and produced ; the superior fold on the columella compressed.

2. The canal short, recurved, and produced ; the columella with two plaits, the lower one largest ; the varices few, and irregular.

3. Aperture terminating in a produced canal ; columella three-plaited ; with distinct cleft varices.

4. Aperture terminating in a produced canal ; columella two-plaited, and inflected towards the outer lip.

The genus consists of but few species, which are natives of the coasts of America, Africa, and the Indian Seas.

Fossil species are not uncommon, and occur in the London Clay at Hordwell, and in the same formation at Piacenza ; the *Calcaire-grossièr* of Bordeaux, Cotentin, and Paris.

Bruguière placed several species of this genus among his *Mitræ*, as also some of the *Marginellæ*, *Ancillæ*, and *Colombellæ* ; some of the *Cancellariæ* approach near to some species of the genus *Turbinella*, but the transverse grooves on the outer lip is a strong distinguishing feature in the *Cancellaria*.

Genus XXXVI. — PLEUROTOMA. — Lamarck.

Generic Character. — Shell fusiform, thick, turreted ; spire generally longer than the body ; aperture oval, with a canal more or less elongated at the base ; outer lip thin, with a notch or fissure at the upper part, contiguous to the suture ; columella smooth and nearly straight ; operculum horny, acuminate ; its nucleus situate at the lower extremity. Some of the species are covered with a thin epidermis.

Pleurotoma priscus. Plate IV. fig. 4. Found in the London Clay at Hordwell.

The *Pleurotomæ* are Oceanic shells, inhabiting the seas of Southern Europe, and the warmer portions of the globe.

Fossil species are only met with in the Tertiary formations, namely, the London Clay, *Calcaire-grossièr*, with other contemporary strata of Bordeaux, and the Apennines.

Genus XXXVII. — CERITHIUM. — Bruquière.

Generic Character. — Shell greatly lengthened, or turreted ; with numerous volutions, more or less tubercular, or spinous, or rough, in a very few instances smooth, or

spirally grooved; aperture subquadrate, or ovate, its upper part modified within by the abdominal region of the body, with the peritreme a little thickened, and sometimes broadly reflected, and a groove at its upper extremity; columella arcuated, with a sharp spiral plica at its base, and forming the upper margin of the canal, which is somewhat short, truncated, and generally reflected; provided with a small horny operculum.

Cerithium pyramidalis. Plate IV. fig. 1. Found in the London Clay at Barton Cliff and Hordwell.

The species are very numerous, and subject to great variety in form; they inhabit the seas of almost all countries. The following are the principal peculiarities which they exhibit.

1. Outer lip considerably dilated and reflected, prolonged over the canal at the anterior extremity, and connected to the termination of the columella; producing in the not reflected canal a circular aperture, with a sharp margin; external surface ribbed and decussated. *C. sulcatum*.

2. Canal very short, with a prominent callosity at the posterior region of the inner lip. *C. tuberculatum*.

3. Spire very short; aperture almost circular, and extremely short; the canal not protruding; surface gronose. *C. breviculum*.

4. Apex decollated in the adult shell; outer lip greatly dilated and reflected; almost no canal, the aperture nearly quite orbicular; outer surface longitudinally ribbed. *C. decollatum*.

5. Outer lip thickened, but not reflected; hardly any canal; with numerous varices. *C. varicosum*.

6. Posterior part of inner lip with a callosity; canal almost straight, and somewhat elongated; one varix opposite to the aperture; outer surface rugose. *C. mutatum*.

7. Outer lip hardly thickened; inner lip thickened and prolonged; canal elongated and reflected; columella often with a plait in its centre. *C. columna*.

8. Canal wide, very short, both sides of equal length; outer lip dilated towards the anterior part, and externally provided with one row of tubercles. *C. Pacificum*.

The *Cerithia* seem intermediate between the genera *Terebra* and *Planaxis*, they are, however, distinguished from the latter by having a canal, of which it is destitute, and from *Terebra* by the form of the columella, and reflected canal; and although somewhat related to *Pirena*, they will at once be recognized, by the back part of their outer lip being entire.

Fossil species are very numerous, and occur in the Blue Marls, south of France, the Super Cretaceous rocks of Bordeaux, and Dax, the Cretaceous and Oolitic groups of rocks.

Genus XXXVIII. — POTAMIS. — Brongniart.

Generic Character. — Shell turreted; body short; spire long; aperture nearly semicircular, but destitute of a canal in the upper angle; base contracted into a short, slightly truncated beak; outer lip dilated; operculum corneous.

Potamis cinctus. Plate V. fig. 36. Found in the upper marine formation at Headon Hill, and also in the same formation, Isle of Wight.

This genus of fresh water shells is closely connected with *Cerithium*, differing, however, in the epidermis being corneous, generally decollated; the beak very short, and not recurved; in being destitute of a well defined canal; but instead of it, a groove in the lip, in some species, and the aperture considerably shorter in proportion to its size than in *Cerithium*. Supposed to be a fresh water genus of shells.

The genus consists entirely of fossil species, which seem to belong to the upper and lower fresh water formations; the London and Plastic Clay, &c.

Genus XXXIX. — NERINÆA. — Defrance.

Generic Character. — Shell turreted, oblong, sub-canaliculated, with numerous volutions; body large, but somewhat contracted near the aperture; aperture small, oblique, subquadrate; columella provided with a strong fold, one on the inner lip, at the edge of the body volution, and one on the outer lip, which is thin.

Nerinæa Mosæ. Plate IV. fig. 38. Found in the *Calcaire-grossière*, Paris Basin.

This genus is known only in a fossil state, and are peculiar to the Oolitic group of rocks. The prominent and large folds, on the superior angles of the aperture, distinguish it from all others.

GRAND-DIVISION II. — PHYTIPTHAGA.

Animals destitute of a projecting syphon, and generally respire by an orifice; provided with jaws, and usually feed on vegetable substances; shell with the aperture entire, being devoid of a notch or canal.

TRIBE I. — TURBINACEA.

Shell turreted, or conical, with an oblong or rounded aperture, and the margin disunited.

Genus XL. — TURRITELLA. — Lamarck.

Generic Character. — Shell turreted; spire greatly elongated, consisting of many volutions; body small in proportion to the spire; aperture entire, orbicular, or sub-angulated; its margin disunited above, but not reflected; outer and inner lips with a slight sinus, situated generally near the upper parts, well marked in some species; a more or less distinct sinus at the inferior and inner part of the lip, which is here very slightly reflected, but not turned back; aperture furnished with a horny operculum.

Turritella proto. Plate V. fig. 33. Found in the Tertiary deposits, and is characteristic of the Miocene strata of Lyell.

Most of the *Turritellæ* are externally striate, or ridged, and the base of the volutions in some have a carinated ridge. The sinus on the outer lip is not so apparent in many specimens, as the lip is so seldom met with entire; but if the direction of the lines of growth are carefully examined, its existence will at once be recognized; the lower part of the lip is more produced in proportion as the depth of sinus increases.

This genus consists of many species, which are found in the seas of almost all quarters of the globe.

The Fossil *Turritellæ* are numerous, they occur in the London Clay, Greensand, and in almost all the strata of the newer formations, namely, Barton, Hordwell, Bordeaux, and Grignon.

Genus XLI. — TUBA. — *Lea.*

Generic Character. — Shell oblong, turbate; body and spire nearly of equal length, and acute; aperture subovate, slightly contracted, both above and below.

Tuba striata. Plate IV. fig. 42. Found in the Tertiary formations of Pennsylvania, North America.

Genus XLII. — TURBO. — *Linnæus.*

Generic Character. — Shell turbinated, spiral, solid; spire most commonly of mediocre length, sometimes very short; aperture nearly circular, but sometimes a little transverse, and slightly trapizoidal; outer lip acute, but not reflected, and subeffuse at the base; operculum solid, testaceous, covered internally with a spiral horny plate, which is extremely variable in its aspect.

Turbo Tiara. Plate V. fig. 10. *T. conicus.* Plate IV. fig. 39, 40. The former from the Mountain Limestone at Preston, and the latter from the Greensand of Blackdown.

The Turbines are liable to much variety of shape, sometimes being Trochiform, at others conical, with a greatly flattened base, and a carinated margin. All those shells which are provided with a thick testaceous operculum are the only true Turbines, which renders it necessary to withdraw some of Lamarck's Trochi, and Monadentæ, and to place them in the genus Turbo. The side of the thick testaceous operculum in the Turbines, on which is impressed the spiral line, is that side which is attached to the foot of the animal inhabitant, while in the thin horny opercules of the Trochi, the line is external, or contrary to those of the genus Turbo.

The species of this genus are oceanic shells, inhabiting the warmer seas of the globe. They are abundant in the Mediterranean, India, and New Holland.

Fossil species are rare, and are confined to the newer formations.

Genus XLIII. — PHASIANELLA. — *Lamarck*.

Generic Character. — Shell oblong, smooth; spire regular, somewhat acuminate; volutions rather ventricose, but the suture not well defined; aperture oblong, entire, contracted and acutely angulated at the upper part, and rounded at its base; outer lip not continuous with the pillar lip above; inner lip white and thickened, especially at the base of the columella; operculum testaceous, thick, spiral, externally convex, with its spire on the inner side, to which the foot of the animal is adherent.

Phasianella rigidus. Plate IV. fig. 26. *P. turbinoides*. Plate V. fig. 15. Both from the *Calcaire-grossiér* of Paris.

This genus is nearly related to *Bulinus* in form, but the latter are all land shells, whereas the *Phasianellæ* inhabit the ocean.

Small fossil species of *Phasianellæ* are found in the London Clay, and in the *Calcaire-grossier* of Paris.

Genus XLIV. — PYRAMIS. — *Brown*.

Generic Character. — Shell generally subulate, gradually tapering to a point; body usually short; spire long; volutions but slightly divided by the sutural line, and seldom much inflated; aperture mostly oblong-ovate, placed nearly perpendicular, with its upper angle contracted for the most part; outer lip not continuous.

Pyramis nitidus. Plate V. fig. 28.

The shells of this genus inhabit the ocean, many of the species are found in the British Seas. They are rare in a fossil state, and are met with only in the newer formations.

Genus XLV. — LITTORINA. — *Ferussac*.

Generic Character. — Shell turbinated, generally ovate, or oblong-ovate, for the most part thick and solid; spire usually acuminate and subturreted, in some species very short, and obtuse at the apex; aperture entire round, or slightly elliptical, sometimes a little acute above; outer lip sharp-edged, thickened within; columella somewhat flattened; operculum horny, spiral, consisting of a few rapidly enlarging volutions, and furnished with a central nucleus.

Littorina rudis. Plate V. fig. 8. Found in the Crag at Aldborough.

The *Littorinæ* have been scattered among the genera *Turbo*, *Phasianella*,

and Neritina of Lamarek. So closely are many of the Littorinæ allied in form to species of the preceding genus, that it is impossible to distinguish them without the aid of the operculum, which is horny. The operculum of the Trochi is also horny, but has more convolutions than that of Littorinæ. They inhabit the sea-shores of almost all countries. The tropical species are thinner than those of northern latitudes.

Fossil species occur in the Tertiary formations, the Coral Rag, and Inferior Oolite.

Genus XLVI. — TROCHUS. — Linnæus.

Generic Character. — Shell conical; the spire elevated, sometimes abbreviated; aperture more or less transversely and obliquely depressed, frequently quadrangular, or trapeziform; its edge being oblique to the direction of the last volution, exhibiting the inferior portion of the columella; base generally flattish, discoidal, or, in some instances, concave; columella more or less arcuated, and its base truncated in some species; operculum horny, circular, and spiral, with many close-set volutions, and separated by an external spiral line; outside frequently covered with a horny epidermis.

Trochus lævigatus. Plate VI. fig. 12. Found in the Crag pits at Holywell.

The operculum of this genus is invariably thin and horny, but in the species of Turbo it is thick and testaceous, while it is distinguished from that of Littorinæ by its more numerous convolutions. The general conical form and angulated aperture of the Trochi distinguish them from the Turbines, and being destitute of a notch at the base of the columella, they are known from the Monodontæ.

The Trochi are numerous, and inhabit the ocean, in almost all quarters of the globe; and many of the tropical species grow to a large size.

Fossil Trochi are numerous, occurring in the newer formations, namely, the *Calcaire-grossier*, the Greensand, London Clay, the Crag, and some few as low as the Lias.

Genus XLVII. — SOLARIUM. — Lamarek.

Generic Character. — Shell subdiscoidal beneath; spire obtusely conical, in some instances of a more lengthened conical form; the lower margin of the body angular, and rather sharp; umbilicus broad and deep, and reaching to the apex; its margin crenulated, and exhibiting the internal edges of the superior volutions in the form of a winding gallery; aperture wide, trapeziform, with its angles somewhat rounded, and the outer lip thin and sharp; outside covered with a horny epidermis, more or less spiral and variable in form; outer side flat; inner side furnished with an irregular, nearly lateral tubercle.

Solarium plicatum. Plate IV. fig. 6, 7. Found in the London Clay at Barton Cliff.

The species of *Solarium* are few, and are inhabitants of tropical seas. They occur fossil in the Tertiary formations, and are also found as low as the Mountain Limestone.

Genus XLVIII. — BIFRONTIA. — Deshayes.

Generic Character. — Shell discoidal, planorbicular ; volutions disunited ; provided with a deep umbilicus, carinated at the margin ; aperture longitudinal, subtriangular, somewhat dilated ; outer lip acute, separated by a deep notch at both extremities.

Bifrontia Deshayesii. Plate VI. fig. 13.

This is exclusively a fossil genus, the species are few, and are chiefly met with in the Paris Basin.

Genus XLIX. — ORBIS. — Lea.

Generic Character. — Shell discoidal, planorbicular, volutions flat, rolled upon each other, and quadrate ; deeply umbilicate ; aperture square.

Orbis rotella. Plate VI. fig. 14, 15.

This genus is known only in a fossil state, and belongs to the newer formations of North America.

TRIBE II. — SCALARIDES.

Shell destitute of plicæ or folds on the columella ; margins of the aperture united in a circular form.

Genus L. — DELPHINULA. — Lamarck.

Generic Character. — Shell subdiscoidal, or subconic ; solid, rugose, and umbilicated ; spire small, depressed ; volutions few, angular, and branched ; aperture entire, angular, round, and sometimes trigonal, or subquadrate, with the sides united, and generally provided with a fringe, or a thick marginal ridge ; operculum horny, with numerous close-set convolutions.

Delphinula calcar. Plate V. fig. 16. *D. conica*. Plate V. fig. 7. Found in the *Calcaire-grossier*. Paris basin.

There are but few species, and those inhabit tropical seas.

Fossil *Delphinulæ* are found in the Tertiary formations, but are very limited in number.

Genus LI. — PLANARIA. — Brown.

Generic Character. — Shell discoidal, depressed on both sides ; volutions conspicuous, both above and below ; spire

very slightly produced above; concave below; aperture ovate; edges of the outer lip acute, and very slightly reflected. Destitute of an operculum.

Planaria nitens. Plate VI. fig. 19.

This genus strongly resembles *Planorbis*, but the species are marine. We are only acquainted with two in a recent state, which were found in the Frith of Forth, near Dunbar.

One fossil species, *the nitens*, has been found in North America, by Isaac Lea, Esq. of Philadelphia.

Genus LII. — SCALARIA. — *Lamarck.*

Generic Character. Shell turreted, oblong or ovate; body short; spire long, composed of gibbous, distinctly defined volutions, which are, in some species separated; with longitudinal, elevated, subacute, interrupted, oblique ribs, in some instances so thickened as to assume a varicose appearance; aperture almost orbicular, but mostly a slight degree longer than broad, with a thickened reflected margin; lower part of the columella, formed into a subcanaliculate shape; outer lip continuous, entire; operculum horny, thin and spiral.

Scalaria tenuelamella. Plate V. fig. 20. Found in the Chalk of the Paris basin.

In one or two species the ribs are indistinct, being hardly elevated above the volutions; and the reflected margin of the outer lip is most apparent in those species, in which the volutions do not touch each other.

This genus contains but few species, and these inhabit the ocean. Fossil species occur in the *Calcaire-grossièr* of Grignon, the newer formations of Italy, the Crag of England, and London Clay.

Genus LIII. — RISSOA. — *Fremenville.*

Generic Character. — Shell oblong or turreted, and much acuminate; body short, spire long, consisting of numerous volutions, aperture entire, oval, oblique, dilated, rather angulated above, with a slight sinus at the base of the columella; lips nearly united; outer lip slightly thickened, but its edge not reflected; operculum horny.

Rissoa acuta. Plate IV. fig. 16. Found in the great Oolite at Ancliffe.

The outer lip being more thickened than the ribs, but not producing varicose sutures, together with the obscure sinus, or truncation at the base, are well-marked characters of this genus. The species are all small, inhabiting the ocean; and are pretty numerous in the Mediterranean.

Fossil species are only found in the great Oolite, and newer strata of the Tertiary formations.

Genus LIV. — EUOMPHALUS. — *Sowerby.*

Generic Character. — Orbicular, conical, spire short, con-

sisting of three or four volutions, imbricated above, smooth below; aperture of a round polygonal form; umbilicus large; penetrating to the apex of the shell.

Euomphalus pentangularis. Plate V. fig. 1. Found in the Carboniferous Limestone of Ireland.

The shells of this genus are entirely fossil, the species strongly resembling those of *Delphinula*; the volutions of which, however, increase in size more rapidly than in *Euomphalus*. They are met with in the Carboniferous Limestone, the Chalk, and Chalk Marl.

Genus LV.—EULIMA.—*Risso*.

Generic Character.—Shell elongated, pyramidal, smooth; spire long, formed of numerous angulated volutions, terminating in an acute slightly tortuous apex; aperture oval, anteriorly rounded, acute at the posterior union with the body volution; outer lip slightly thickened; columella smooth.

Eulima labiosa. Plate VI. fig. 15.

Found only in a fossil condition.

Genus LVI.—CIRRUS.—*Sowerby*.

Generic Character.—Shell spiral, conical, with a hollow funnel-shaped axis; volutions contiguous, numerous, rounded, or slightly angulated.

Cirrus depressus. Plate V. fig. 3. Found in the Chalk, Sussex.

This genus consists entirely of fossil species, and are all nearly allied to *Trochus*, but may be distinguished by their funnel-shaped umbilicus. The species are chiefly met with in the Cretaceous and Oolitic groups of rocks.

Genus LVII.—VERMETUS.—*Adanson*.

Generic Character.—Shell thin, tubulose, loosely spiral in the lower part, the three or four superior volutions regularly spiral; aperture orbicular, margins united, and provided with an operculum.

Vermetus Bognorensis. Plate V. fig. 30. Found in the Sandstone rocks of Bognor, at Highgate, and Isle of Sheppy.

The shells of this genus are marine, and adhere to extraneous bodies by the attenuated and pointed extremity of the spiral part. They are found in the warmer regions of the globe. In their external form they resemble *Serpula*. Fossil species are met with in the Cretaceous and Oolitic groups of rocks.

TRIBE III.—PLICACEA.

Shells with the aperture somewhat contracted, and the columella plaited.

Genus LVIII. — PYRAMIDELLA. — *Lamarck.*

Generic Character.—Shell turreted, smooth, polished, destitute of epidermis; body small; spire long, consisting of numerous volutions, terminating in an acute apex; aperture small, somewhat modified by the base of the body; a little oblong, and posteriorly rounded; outer lip sharp, slightly expanded, turned upwards at the base, and united to the columella; columella tortuous, and provided with several transverse plaits.

Pyramidella terebellata. Plate V. fig. 26.

The Pyramidellæ are very limited in number, and are marine shells, chiefly inhabiting the warmer portions of the globe.

Fossil species are rare, and met with only in the Cretaceous group of rocks.

Genus LIX. — TORNATELLA. — *Lamarck.*

Generic Character.—Shell subcylindrical, oval or oblong; usually transversely striated, and destitute of an epidermis; spire generally very short, and somewhat obtuse, in a few species a little elongated, and subacute; aperture longitudinal and elongated, occupying about two-thirds the length of the shell, contracted and acute above, widened and rounded below, outer lip plain, sharp on the edge, and a little thickened in the centre; inner lip thin, slightly reflected on the columella, which is thickened, spiral, and provided with one or two plaits near its base.

Tornatella cuspidatus. Plate IV. fig. 23. Found in the Oolite at Ancliffe.

The Tornatellæ are distinguished from the Volvariæ, by the former being destitute of a notch at the base of the aperture; and its short spire, striated or grooved external surface, and its considerably lengthened aperture, are characters which remove it from the Pyramidellæ.

This genus is rather limited in species; they inhabit the Indian Ocean, European seas, and one is found on the British coasts.

Fossil Tornatellæ occur in the *Calcaire-grossier* at Bordeaux and Paris; and they are met with in England in the Crag, London Clay, and Inferior Oolite.

Genus LX. — MONOPTYGMA. — *Lea.*

Generic Character.—Shell elongated; spire conical, tapering to an acute apex; aperture long, narrow, terminating

below in a sharp point ; pillar lip with a strong oblique fold at its centre.

Monoptygma elegans. Plate VI. fig. 16.

The shells of this genus are exclusively fossil, and have hitherto only been met with in the United States, North America.

TRIBE IV.—MACROSTOMA.

Shells auriform, with the aperture very wide, and the margin disunited ; destitute of a columella, or operculum.

Genus LXI.—PLEUROTOMARIA. — *De France*.

Generic Character. — Shell turbinated ; for the most part trochiform, usually abruptly conical, in others subturreted ; aperture generally subquadrangular, in other species somewhat rounded, considerably flattened, and largely umbilicate at the base ; outer lip sharp edged, furnished with a deep notch at its upper extremity, near the suture.

Pleurotomaria sculpta. Plate V. fig. 2 ; *P. lirata*, fig. 11.

The *Pleurotomariæ* having a much deeper fissure, and being destitute of a canal, at once distinguish them from the *Pleurotomæ*. In their general contour they nearly resemble the *Trochidæ*.

The shells of this genus have only been found in a fossil state. Casts of them have been discovered in a stratum of limestone, in Normandy ; and they occur in the Kimmeridge Shale, or Oxford Clay ; and in the Inferior Oolite.

Genus LXII.—SCISSURELLA. — *D'Orbigny*.

Generic Character. — Shell with a depressed spire, consisting of few volutions ; aperture nearly orbicular ; lips separated from each other at the upper part on the left side ; outer lip sharp on the edge ; an oblong foramen near the upper part on the right lip, conforming to the growth of the volutions, placed nearly parallel with the suture, and forming a sort of keel upon the back of the shell ; destitute of a canal.

Scissurella concinna. Plate VI. fig. 17.

The species of this genus are minute, and are chiefly found on the shores of the Mediterranean. One species, however, was found by Dr Fleming in sand, from Noss, Zetland, after a storm, viz. *Scissurella crispa*.

They have been found fossil in the *Calcaire-grossier* of Grignon, and in fossil sand at Castel Arquato.

Genus LXIII.—STOMATIA. — *Lamarck*.

Generic Character. — Shell suborbicular or oblong, generally ear-shaped and depressed ; pearlaceous within, and usually coloured externally ; spire with from two to

four volutions, in most species prominent, but not produced nor elongated; in some instances it is very small, marginal, and hardly perceptible; aperture always very large, its margin entire, and united above, longitudinal for the most part, and in some species almost orbicular, in others more elongated; and hardly modified or altered in form by any portion of the body volution; internal cavity marked by two muscular impressions, seldom distant, nearly marginal.

Stomatia inconspicua. Plate V. fig. 12. Found in the mountain limestone, at Bolland.

The above generic character combines the *Stomatia* and *Stomatella* of Lamarck, as neither of these have distinctions sufficient to entitle them to be separated, and we have followed Sowerby in forming a union between these genera.

All the shells of this genus are marine, and inhabit the East Indian seas, and coasts of New Holland.

This is the only fossil species with which we are acquainted, it is the *Pleurotomaria inconspicua* of Phillips.

Genus LXIV. — SIGARETUS. — Lamarck.

Generic Character. — Shell suborbicular, oblique, ear-shaped, for the most part depressed; spire very small, depressed, consisting of one or two rapidly enlarging volutions, and situate near the margins; aperture entire, large, much expanded, oblique, and longer than wide, with its margins disunited above, in consequence of the outer lip embracing its increment, the lower portion of the body; two muscular impressions within, the one at the upper and the other at the lower end; outer lip smooth on the margin; inner lip spirally twisted, for the most part reflected above, and when largely so producing a small sub-umbilicus behind.

Sigaretus canaliculatus. Plate IV. fig. 22. Found in the London Clay at Hordwell.

The Sigareti bear a general resemblance to the Stomatia, but the substance of them is totally different, those of the present genus being always thick, and never pearlaceous internally; besides, the aperture is always modified by the body, and they are known from *Natica* by the width of their aperture.

The species of Sigareti are few in number, they inhabit the ocean, and are internal, or subinternal shells.

Fossil species occur in the London Clay at Barton, and in the contemporaneous formations of Italy and France, also in the *Calcaire-grossier* at Grignon, in France.

Genus LXV. — NATICA. — Adanson.

Generic Character. — Shell subglobose, oval, or oblong,

umbilicate; spire short, sometimes very short, with the apex very rarely pointed; aperture large, semi-circular, and but seldom effuse; outer lip sharp edged, smooth within; columellar lip oblique, its edge nearly straight, destitute of teeth, generally thickened, and sometimes with a coating of enamel spread thickly over the umbilicus; umbilicus usually large, having a spiral callosity within, which sometimes increases so as to cover it, and is sometimes very small, in a few instances nearly obsolete, so much so as hardly to be perceptible; operculum testaceous in some species, and horny in others.

Natica epiglottina. Plate IV. fig. 39.

The species are numerous, and inhabit the ocean, the East and West Indies, Mediterranean, and British Coasts.

There are also many fossil species, whose forms bear a remarkable similitude to the recent species, and even some of them retain their colours. They are chiefly met with in the newer formations over the chalk, more particularly in the Crag, London Clay, and *Calcaire-grossier*.

Genus LXVI. — NERITA. — Lamarck.

Generic Character.—Shell solid, generally thick, semi-globular, or obovate; spire very short; base of the body, for the most part, flattened beneath, but destitute of an umbilicus; aperture semicircular; outer lip sharp in the margin, and crenulated or toothed on the inner side; inner lip generally flattened, sharp on the margin, which lies oblique to the axis of the shell, and, for the most part, dentated or crenated; a small prominence exists at the lower extremity of the inner lip, between which and the inner lip, the small appendage to the operculum slides, as the animal opens or closes the aperture for egress, moving in the same manner as a door on its hinges, when the animal protrudes its body; operculum testaceous.

Nerita aperta. Plate V. fig. 6. Found in the London Clay at Barton, and Cowell Bay, Isle of Wight.

The Neritæ are distinguished from the Neretinae by the thickness of their shell, the teeth on the margin of the pillar lip, and in being destitute of the thick horny epidermis which invests the Neretinae; and from *Natica* by the flattened area which is produced by the thickened columella.

The Neritæ are marine shells, and the species are pretty numerous, principally inhabiting the seas of the tropics, and the warmer parts of Europe.

Fossil species are met with in the London Clay, and contemporaneous formations of France and Italy.

Genus LXVII. — PILEOLUS. — Cookson.

Generic Character.—Shell concave; spire internal,

very short ; with a subcentral erect vertex ; base concave, nearly orbicular, and somewhat cushion-shaped ; aperture semicircular, situate in the lower disk, and provided with a crenulated internal lip ; external lip furnished with a raised margin.

Pileolus plicatus. Plate IV. fig. 10 and 33.

Only two species of this curious genus have been discovered ; they are both fossil, and were met with together at Ancliffe, in the coarse upper stratum of the Great Oolite, immediately under the Bradford Clay, and have since been found at Charter-House, Hinton, Somersetshire.

Although these shells bear a strong resemblance to Patellæ, their internal concealed spire connects them with the genus *Nerita*.

Genus LXVIII. — NERITOPSIS. — Gray.

Generic Character. — Shell subglobose, thick and cancellated ; spire very small, consisting of three or four rapidly diminishing volutions ; aperture entire, transverse, oblique, suborbicular, or ovate ; outer lip thickened internally, somewhat grooved and acute on its outer edge ; columellar lip thick, rather flat, and provided with a large broad double notch, a little rounded, above the centre of its inner edge.

Neritopsis cancellata. Plate VI. fig. 18.

The shells of this genus are distinguished from those of *Nerita* by that strongly marked character, the notch on the columella.

The *Neritopsi* inhabit the seas of tropical climates. They have been found fossil in the Tertiary formations at Turin, Bordeaux, and several parts of Normandy.

Genus LXIX. — NERITINA. — Lamarck.

Generic Character. — Shell thin, external surface generally smooth, and frequently covered with a strong horny epidermis ; spire mostly very short, sometimes nearly concealed, and at others obsolete ; aperture semicircular ; outer lip plain, sharp, and destitute of teeth, or crenulations, internally, but within the lower region of the aperture it is provided with a somewhat elongated, transverse prominence, which seems the fulcrum for the articulation of the operculum ; inner lip flattened, and reflected on the columella, and placed obliquely to the axis of the shell ; edge generally sharp, and dentated or crenulated ; as the animal increases in dimensions, part of the columellar lip is absorbed, which makes it appear as having no columella ; operculum testaceous, semicircular, closing the aperture entirely, covered with a horny epidermis, and provided internally, at the lower end, with a tooth-like appendage, which fits into a hollow between the prominence and lip.

Neritina concava. Plate IV. fig. 28. Found in the London Clay at Muddiford, and Highgate Hill.

This genus and *Nerita* are closely allied, and some attention is required to distinguish them. In the *Nerita*, the inner side of the outer lip is generally provided with numerous transverse teeth, or plicæ, and are, for the most part, stronger shells, being frequently striate, grooved, or tuberculate externally.

The *Neritinæ* inhabit fresh waters; the species are met with in almost all countries.

They occur fossil in the newer formations above the London Clay, and in the Upper Marine formations, and in the Woolwich beds; as also in the same strata of Germany and France:

TRIBE IV. — PERISTOMIDA.

Shell conoidal, or subdiscoidal, with the margins of the aperture united, provided with an operculum; animals fluviatile, respiring in water.

Genus LXX. — AMPULLARIA. — *Lamarch*.

Generic Character. — Shell globular, or globularly discoidal, or discoidal and umbilicate; spire short, the volutions ventricose; aperture entire, oblong, oblique, and its length considerably exceeding its breadth; operculum testaceous, annular, with its nucleus nearly central, but placed rather nearer the inner side, and covered by an olive green horny epidermis, and exactly fitting the aperture.

Ampullaria ambulacrum. Plate V. fig. 29. Found in the London Clay at Hordwell.

The shells of many of this genus, and those of *Planorbis*, are so similar in external form, that considerable attention is necessary to distinguish them. *Lamarch*, the founder of this genus, has himself run into error in this respect. The chief difference in the discoidal species and the *Planorbis* consists in the aperture, and in being opercular. The aperture in *Ampullaria* is oblong, entire, and longer than it is wide, and is provided with a testaceous operculum; in *Planorbis* the aperture is always transversely elongated, and destitute of an operculum; besides, their spire is always reversed. The *Ampullariæ* may also be confounded with the shells of *Natica* and *Helix*, especially when the shells have not the operculum to assist in determining them. They differ from *Natica* in being devoid of the testaceous callosity on the side of the umbilical region; and from *Helix*, in not having a thickened and revolute outer lip.

Several of the species are reverse or heteroclitical shells.

The *Ampullariæ* inhabit rivers and lakes, in tropical climates, and are not numerous.

Fossil species have been found in the *Calcaire-grossier* near Paris; at Hordwell in the London Clay; and in the fresh water formation at Headon Hill, Isle of Wight.

Genus LXXI. — PALUDINA. — *Lamarch*.

Generic Character. — Shell ovate or oblong; spire

somewhat turreted; the volutions smooth, rounded, and subcarinated; aperture subrotund, ovate, or oblong, a little angulated above, slightly modified on the inner side by the gibbosity of the body volution; operculum corneous with concentric lines of growth, and provided with a sublateral nucleus.

Paludina Deshayarsii. Plate IV. fig. 2.

In some species the spire is much depressed. The Paludinæ are somewhat allied in form to the genera *Ampullaria*, *Valvata* and *Cyclostoma*. They differ from *Ampullaria* in having a horny operculum in place of a testaceous one, as also in their general form; and they are distinguished from the two latter genera by their concentric operculum, whereas theirs is spiral.

The species of this genus are not numerous, and inhabit lakes and rivers, in almost all tropical and temperate climates.

In a fossil state they abound in a thin stratum immediately over the upper fresh water formation at Headon Hill, and are the chief mollusks in the Petworth Marble.

TRIBE VII.—MELANIDES.

Fluviatile shells, with the margins of the operculum disunited, and the right one acute at the edge; animal furnished with two tentacula.

Genus LXXII.—MELANOPSIS.—Ferussac.

Generic Character.—Shell oblong, fusiform, or conico-cylindrical; spire with from four to fifteen volutions, terminating in a pointed apex; but decollated in some species; body frequently equal to two-thirds of the whole shell; aperture oblong-ovate, pointed at the upper extremity; outer lip somewhat thickened, and slightly inflected, and deeply notched above; columella twisted, solid, callous, and separated from the exterior margin at the base, by a deep sinus in most species, but devoid of it in some; callosity thickest at its junction with the upper extremity of the aperture; operculum spiral corneous, and not quite fitting the aperture.

Melanopsis carinata. Plate IV. fig. 15. Found in Greensand, Isle of Wight.

The apex in the shells of this genus is very subject to erosion, seldom being met with complete.

The Melanopsi inhabit lakes and rivers; the species are but few, and are confined to the fresh waters of India, Africa, and the south of Europe.

In speaking of this genus Baron d' Audebard De Ferussac says, "The genus *Melanopsis* is one of the most interesting of the Mollusca, in consequence of the important facts proved by its fossil species, in connection with the history of the Tertiary formations. It equally merits attention in a Zoological

point of view, because it exhibits a kind of transition from the operculated to the semi-operculated Pectinibranchia, that is, from those Pectinibranchia whose shells are furnished with an entire aperture, without a canal at its base, and whose operculum entirely covers the aperture, to those with a more or less distinct canal at the base of the aperture, destined to receive a fold of the mantle, which conveys the water to the branchial cavity, and whose operculum is neither so large nor of the same form at the aperture."*

The fossil shells of the genus *Melanopsis* are invariably found associated with species which inhabit fresh waters, and it may be therefore considered as certain, that the strata in which they are found belong to the fresh-water formation.

Genus LXXIII. — MELANIA. — *Lamarck*.

Generic Character. — Shell turreted or sub-turreted; spire for the most part elongated, with the volutions divided by a deep suture, and generally terminating in an acute apex; aperture entire, oval or oblong, in most species acuminate at the superior extremity, and rounded below; with an indistinct canal at the base of the columella; outer lip simple and somewhat sharp; columella smooth, and incurved; outside covered with a strong horny, olivaceous, brown or black epidermis; operculum horny, oblong, spiral, with two or three volutions.

Melania costellata. Plate V. fig. 19.

In some few instances the upper part of the aperture is separated from the body; sometimes they are externally smooth, but for the most part they are grooved, tuberculated, or granulated, at others, with spinous granulations.

The *Melaniæ* are all fresh water shells, inhabiting the rivers of warm countries; and the species are not numerous. They are very subject to erosion in the superior volutions, and frequently so much so that the apex and some of the upper volutions are entirely decomposed, to such an extent as to render it completely truncated.

In general form the *Melaniæ* bear a strong resemblance to the *Turitellæ*, but the orbicular aperture of the latter, and being devoid of an epidermis, will at once distinguish them; they are also somewhat allied to the shells of the genus *Terebra*, but attention to the distinct canal of the latter, will render their difference obvious.

Fossil *Melaniæ* are plentiful in the fresh water formation at Headdon Hill, Isle of Wight, Charleton, near London, and in the same kind of formation in Normandy, and vicinity of Paris.

Genus LXXIV. — PASITHÆA. — *Lea*.

Generic Character. — Shell, pyramidal; body and spire about equal in length, tapering to an acute apex, the volutions being flat-sided; aperture oblong-ovate, contracted above, and terminating in a very short canal below; outer lip thin, and not reflected.

* De Ferussac, "Memoires de la Société d'Histoire Naturelle de Paris, 1807, p. 133.

Pasithæa striata. Plate IV. fig. 43.

The shells of this genus are known only in a fossil condition, and occur in a marine formation, North America.

TRIBE VIII. — LYMNÆCEA.

Shells spiral, generally smooth on the external surface; margin of the outer lip always acute, and not reflected. The animals of this tribe are amphibious, and usually destitute of an operculum.

Genus LXXV. — LYMNÆA. — *Lamarck.*

Generic Character. — Shell oblong, thin, sometimes elongated, and acutely turreted; spire always produced; aperture large, entire, oblong, generally straitened and somewhat acuminate above, and rounded below; outer lip acute; the lower part of the inner lip ascending on the columella, forming an oblique plait or fold and rising, spreads more or less over the columella or front of the body volutions; external surface smooth, frequently polished. Destitute of an operculum.

Lymnæa pyramidalis. Plate IV. fig. 13. Found in the fresh water formation of Headon Hill, Isle of Wight.

We cannot concur with Sowerby in uniting the genus *Physa* with the present, nearly allied as they unquestionably are; the circumstance of the convolutions of the spire being invariably reversed or heterostrophe, proves that there must be a distinct conformation in the animals.

The genus *Lymnæa* may be subdivided as follows,—

Section 1. — *Shells oblong and turreted. L. Stagnalis and its congenerous species.*

Section 2. — *Shells greatly elongated. L. elongata, &c.*

The shells of this genus inhabit ditches, ponds, lakes, and rivers, in almost all countries.

Fossil species occur in the fresh water formations in the vicinity of Paris, and at Headon Hill, Isle of Wight.

Genus LXXVI. — PHYSA. — *Lamarck.*

Generic Character. — Shell sinistral, very thin, polished, and transparent; body somewhat longer than the spire, which consists of few reversed volutions; aperture oblong; inner lip spread over the columella; outer lip very thin, but not reflected. Destitute of an operculum.

Physa columnaris. Plate V. fig. 21. Found fossil in the new formation at Epernoy, France.

The shells of this genus inhabit fresh waters, in all temperate climates, they

are exceedingly thin and delicate; and are at once distinguished from the *Lymnæa*, by the convolutions being reversed.

Genus LXXVII. — *PLANORBIS*. — *Müller*.

Generic Character. — Shell discoidal, umbilicate; spire and base depressed; apex always distinct; the volutions turning nearly on the same plane, from right to left, so that when the spire is held upwards, and the aperture next the observer, it is situate on the left hand side; volutions ventricose in many species, often carinated, either above or below; aperture entire, obliquely semilunate, its length and breadth being nearly equal, but broader than long in some instances; outer lip sometimes thickened; umbilicus very wide. Destitute of an operculum.

Planorbis rotundatus. Plate V. fig. 4. Found in the London Clay, at Hordwell Cliff.

Section 1. Volutions not carinated, rounded both above and below; the spire flattened, and slightly concave. Example, P. rotundatus.

Section 2. Carinated, volutions flat above. Example, P. marginatus.

Section 3. Pellucid, spire deeply umbilicate; volutions slightly carinated, and lenticular. Example, P. nitidus.

The upper side or apex of the shells of this genus, is that in which the volutions terminate in the centre, generally in a point, with the aperture next the left hand; the umbilicus will be found on the opposite side.

The shells of this genus are found in stagnant waters, ditches, lakes, and also in slow running streams. Their geographical range seems limited to Europe and America, and those of the latter country have a thickened lip.

Fossil species are found in the fresh water formations at Paris, and the Isle of Wight.

TRIBE IX. — COLIMACEA.

Shell spiral; external surface smooth, exhibiting only the lines of growth; right margin of the aperture frequently reflected outwards; animals terrestrial, with cylindrical tentacula, some species with an operculum, and others devoid of one.

SUB-DIVISION I. — Animals with two tentacula.

Genus LXXVIII. — *CYCLOSTOMA*. — *Lamarck*.

Generic Character. — Shell thin, turbinated, variable in shape, the apex in most species obtuse, and the volutions ventricose; aperture entire, circular, or nearly so, in the

adult state ; peritreme, or outer lip, more or less angular at the upper parts united all round, sometimes thickened, usually reflected, and frequently externally fringed ; operculum spiral, generally horny, but inclining to testaceous in some species ; consisting of a few depressed convolutions, provided with a simple testaceous internal coating.

Cyclostoma antiqua. Plate IV. fig. 5.*

Several of the species approach nearly in form to the Paludinæ and Valvatæ, but the orbicular aperture, and entire outer lip at once distinguish the Cyclostomata from the shells of these genera, independently of their being fluviatile.

The Cyclostomata are all land shells, and the species very numerous, amounting to about ninety. They chiefly inhabit India, the West Indies, and South Sea Islands ; a few are natives of Europe, and three are found in Britain.

Various species are known in a fossil state, and these are only met with at Grignon, in the Calcaire-grossier.

Genus LXXIX. — NEMATURA. — Benson.

Generic Character. — Shell thin, almost oval, a little compressed from back to front ; body large, contracted near the aperture ; spire small, consisting of few inflated volutions terminating in an acute apex ; aperture small, oblique, rounded below, and a little contracted above ; outer lip continuous, and thin ; operculum horny, spiral, with few convolutions.

Nematura Deltæ. Plate VI. fig. 20.

A distinguishing character of the shells of this genus is the contraction of the body volutions near the aperture. They are all very minute.

The Nematuræ are marine shells, and but two recent species are known. One fossil species only has been discovered.

Genus LXXX. — AURICULA. — Lamarch.

Generic Character. — Shell solid, oval, or oblong-ovate, cylindrical, or conic ; body large, spire very small, obtuse ; aperture elongated, narrow, generally contracted near the centre, and rounded below ; inner lip with two or three strong plaits ; outer lip thickened, reflected or denticulated ; covered with a horny epidermis.

Auricula ventricosa. Plate IV. fig. 31. Found in the Crag at Ipswich.

Section 1. — Shells conical, with two or more folds on the inner lip ; aperture narrow, outer lip thickened.
Example A. ventricosa.

Section 2. — Shells somewhat round ; only one fold on

the pillar lip, and the outer lip thin. Example, A. Dombeyana.

The auriculæ are land shells, and are found in the warmer countries of the globe. The species are very limited in number.

Fossil species are rare, and are met with in the newer formations.

SUB-DIVISION II. — Animals provided with two tentacula.

Genus LXXXI. — BULINUS. — Bruguière.

Generic Character. — Shell oval or oblong, generally thin, and covered with a slender epidermis; spire obtuse, variable in length and number of its volutions, which for the most part are few; aperture oval, wide, anteriorly rounded; outer lip simple, reflected, continuous, and joining the columellar lip without an emargination, and reflected over part of the body; columella smooth, straight, without a truncature, or widening at the base.

Bulinus costellatus. Plate IV. fig. 12. *B. cylindracea.* Plate V. fig. 5. The former is from the fresh water formation, Isle of Wight.

The Bulini are distinguished from the Achatinæ by being destitute of the notch at the junction of the outer and pillar lips. They are land shells, the species are numerous, and inhabit almost all countries.

Fossil species are only met with in the fresh water formations.

Genus LXXXII. — AGATHINA. — Deshayes.

Generic Character. — Shell oblong-ovate; smooth and polished, body and spire nearly of equal length; volutions inflated, and terminating in an acute apex; aperture oblong, narrow, contracted above, and truncated below; outer lip acute, but never reflected.

Agathina pellucida. Plate V. fig. 22. Found in the Calcaire-grossier at Paris.

Known only in a fossil state.

Genus LXXXIII. — HELIX. — Linnæus.

Generic Character. — Shell orbicular, thin, subglobose; body very large, spire short, and small in proportion to the body; aperture oblique; outer lip reflected, and interrupted by the bulging of the body; columella confluent with the outer lip, and situate on the lower portion of the axis. Destitute of an operculum.

Helix turtonensis. Plate IV. fig. V. Found in the Calcaire-grossier.

The Helices are land shells, and have been met with in almost all portions

of the world. The genus is very comprehensive, and may be divided into the following sections:—

Section 1. Body large, and destitute of an umbilicus. Example, *Helix aspersa*.

Section 2. Body large, provided with an umbilicus at the base.

Section 3. Body large, outer lip thickened, and provided with teeth. Example, *Helix nux denticulata*.

Section 4. Body very large, carinated; spine short, conical, and depressed. Example, *Helix lapicida*. *Caracolla lapicida*, of Lamarck.

The Baron De Ferussac has united the following genera under the generic name *Helix*, namely, *Helix*, *Bulinus*, *Clausilia*, *Achatina*, *Anastoma*, *Lapicida*, *Azeca*, &c. These he has again formed into sub-genera.

Genus LXXXIV. — STROPHOSTOMA. — *Deshayes*.

Generic Character. — Shell pyramidal, depressed; body very large; spire very small, consisting of few rapidly diminishing volutions; base of body nearly flat, with a carinated margin, and provided with a pretty large and deep umbilicus; aperture sublunate, and obliquely turned upwards towards the spire; lips entire; provided with an operculum.

Strophostoma ferussina. Plate VI. fig. 25.

This is exclusively a fossil genus, and closely connected with *Anostoma*, but is distinguished from that genus by being umbilicated.

ORDER V. — GASTEROPODA.

Animals with the body straight, never spiral, nor totally enveloped in their shell; the foot or disc situated under the belly, and united to the body nearly its whole length, and serving as an organ of locomotion.

GRAND-DIVISION I. — PNEUMOBANCHIÆ.

Branchiæ in the form of a vascular net, on the wall of a particular cavity, opening by a hole which the animal contracts or dilates at pleasure. They respire air.

TRIBE I. — BULLACEA.

Shells greatly distended, and without any apparent columella.

Genus I. — BULLA. — Linnæus.

Generic Character. — Shell convolute, oval, with a depression above in place of a spire ; aperture longitudinal, as long, or longer than the convolutions, straitened above, and expanded beneath, where it is effuse ; outer lip thin ; columellar lip generally reflected with a coating of shelly matter.

Bulla attenuata. Plate IV. fig. 11.

The Bullæ are marine shells common to tropical climates, as well as to almost all countries. Several inhabit the British seas.

Sowerby has united the *Bulla* and *Bullæa* of Lamarck, in which we have followed him.

The fossil Bullæ are found in the Tertiary formation, and in the Green Sand.

Genus II. — UTRICULUS. — Brown.

Generic Character. — Shell small, oblong-ovate ; body very large, spire very short, with rounded volutions ; aperture as long as the body, narrow above, wide, and rounded at the base ; outer lip thin, and slightly inflected ; inner lip not reflected on the columella.

Utriculus glaber. Plate V. fig. 9.

The shells of this genus are marine, the recent type of the genus is the *Bulla retusa* of Montagu. Fossil species occur in the Oolite, at Cloughton and Brandsby, and in the inferior Oolite, at Cloughton.

The shell we have figured is the *Acteon glaber* of Phillips, but it is inadmissible into that genus, being destitute of a fold on the columella.

TRIBE II. — CALYPTRACEA.

The branchiæ of the animal situated in a dorsal cavity near the neck, and included in the cavity, or projecting beyond its shell, which is invariably exterior.

Genus III. — ANCYLUS. — Müller.

Generic Character. — Shell thin, obliquely conical, patelliform ; vertex somewhat pointed, short, turned backwards, and slightly inwards, but not spiral ; aperture oval, or oblong, with the margins simple and entire.

Ancylus elegans. Plate IV. fig. 14.

Two recent species of this genus inhabit the fresh waters of Europe, and both are natives of Britain. They differ from the Patellæ in the apex being turned backwards.

Fossil species occur in the *Calcaire-grossier*.

Genus IV. — CALYPTRÆA. — Lamarch.

Generic Character. — Shell conical, vertex subcentral; imperforate and acute; base or aperture orbicular, or nearly so, its margins sharp and entire; internal cavity provided with a lateral salient appendage, or septum, which varies much in form in different species: various species have a strongly marked, muscular impression, just above the fold of the inner lip; in other species, it is situate on the outside of the inner cup; but never within it.

Calyptræa Trochiformis. Plate V. figs. 17 and 24. *C. rectum.* Plate IV. fig. 3.

The internal appendage varies much in form; in some it is tongue-shaped, emanates from, and is fixed near the summit, with both edges turned inwards; in others it is small, and irregularly triangular, attached by its largest side to the internal cavity of the shell; in other species it is cup-shaped; in another division, this consists of a spiral plate, reflected at the upper part, so as to form an umbilicus. They are mostly thin shells, with the outside either smooth or covered with spinose points, or murications, radiating or concentric striæ or ribs. The outside is invested externally with a thin epidermis. They are subject to great variety of form, arising from their being stationary, and taking the shape of the substances to which they attach themselves.

The genus does not consist of many species, they are all Marine, inhabiting the shores of America and South Seas; one species, the *C. Sinense* is a native of Britain.

Fossil species occur in the *Calcaire-grossier* at Paris, and London Clay.

Genus V. — PILEOPSIS. — Lamarch.

Generic Character. — Shell obliquely conical, posteriorly recurved, with an uncinat spiral apex, the volutions serrated and rolled inwards; aperture large, ovate, anterior margin shortest, the posterior one large and rounded, inside with two elongated, arcuated, muscular impressions, situated under the posterior margin; external surface covered with a thick, horny, somewhat pilous epidermis.

Pileopsis vetusta. Plate IV. fig. 21. Found in the Black Limestone, Queens County, Ireland.

The species of this genus are few and are marine shells. They inhabit the Pacific Ocean, East and West Indies, Europe, and one species, the *P. ungarica* is a native of the British Seas. They are found in deep water, adhering to oysters and stones.

Several species are found fossil, in the Tertiary formations.

Genus VI. — FISSURELLA. — Bruguière.

Generic Character. — Shell oblong, shield-shaped, or

conically depressed; concave within; destitute of spiral convolutions, but with the vertex perforated, and directed towards the front of the shell: the perforation is subovate or nearly round; margin of the shell thickened around the inside, and generally crenulated; muscular impression visible near the inner edge, all round, widest on the sides near the front; outer surface striated, grooved, or radiated from the vertex to the margin, and generally decussated by lines of growth.

Fissurella græca. Plate IV. figs. 18 and 24. Found in the Crag at Ipswich.

This is a genus of marine shells, and consisting of nearly forty species. They inhabit the seas of every quarter of the globe; and one species is found on the British coasts.

A few fossil species have been found in the marine formations above the chalk.

Genus VII. — SIPHO. — *Brown*.

Generic Character. — Shell subconic, vertex reflected, and slightly spiral, with a small dorsal fissure near the apex, terminating interiorly by a rhombic funnel-shaped syphon; base ovate.

Sipho clathrata. Plate IV. fig. 8. Found in the Oolite at Ancliffe.

They inhabit the sea, and one species, the *S. striata*, has been found in the Clyde, and in a sub-fossil state, at Dalmuir, near Glasgow.

Genus VIII. — EMARGINULA. — *Lamarch*.

Generic Character. — Shell conical, shield-shaped; vertex inclined to the posterior extremity; anterior margin with a fissure, or notch; internal cavity simple; anterior sides of the muscular impression interrupted, expanded, and not continued across the front.

Emarginula tricarinata. Plate IV. fig. 20.

Sowerby has, in our opinion, most improperly reunited this genus and *Parmophorus*. Both genera have peculiarities of structure, by which they may at once be recognized, and consequently, the reunion must tend to confound, rather than improve the arrangement.

The species of *Emarginulæ* do not exceed four or five; they are marine shells, and inhabit the seas of almost all climates; one of them, *E. fissura*, is a native of the British coasts.

Fossil species are not plentiful, they occur in the *Calcaire-grossier* at Grignon, and other contemporaneous formations; also in the Crag of Essex, Norfolk, and Suffolk, and the Bath Oolite.

TRIBE III. — PHYLLIDIACEA.

The branchiæ of the animals situated beneath the margin of the mantle, in a longitudinal series around the body ; they respire in water. Shell simple.

Genus IX. — PATELLA. — Linnæus.

Generic Character. — Shell ovate or oblong, more or less of a conical form, sometimes, although rarely, pyramidal, vertex rarely central, generally placed anteriorly, with its apex inclined towards the head of the animal ; concave within, and the margin entire ; muscular impressions distinct, and same form as the shell, placed about half way betwixt the summit and the margin, interrupted in front, where the head of the animal is situated ; external surface striated, or ribbed, in a variable manner, from the apex to the base, in the latter case, the margin is variously dentated or crenulated.

Patella striata. Plate IV. fig. 17. Found in the London Clay at Stubbington, and at Valognes and Hautville, France.

This is a marine genus, consisting of numerous species, for the most part subject to great variety of form, depending on the local situation in which they are placed. They are met with on the coasts, adhering to stones and rocks. Their geographical range is very wide, being found in almost all climates.

Fossil species are however not common, and occur only in the Great Oolite, the *Calcaire-grossier*, and in the Crag of England.

Genus X. — METOPTOMA. — Phillips.

Generic Character. — Shell subconical, depressed ; vertex subcentral ; face under the apex truncated, general form somewhat shield-shaped.

Metoptoma pileus. Plate V. fig. 18. Found in the Mountain Limestone Bolland.

The shells of this genus are entirely fossil, and are at once distinguished from the *Patellæ* by their truncated end.

CLASS SECOND.

CONCHIFERA.

Animals soft, with articulations, destitute of a head or organs of vision, and always fixed within a BIVALVE shell ; provided with external branchiæ ; a simple circulation and a unilocular heart.

All the species are aquatic, living either in the sea or fresh water. None of the animals have an internal shell, the body is invariably soft, and the mouth is situated near the left side of the hinge.

Lamarek divides this class into two orders, with the following characters : namely,

I. MONOMYARIA. — With one muscle of attachment ; the shell marked interiorly with one subcentral muscular impression.

II. DIMYARIA. — Provided with at least two muscles of attachment ; shell marked interiorly with two separate and lateral muscular impressions.

GRAND-DIVISION I.

Ligament none, or unknown, or in its stead a tendinous chord, which supports the shell.

ORDER I. — MONOMYARIA.

Animals provided with but one muscle of attachment, or adductor muscle, which leaves one subcentral muscular impression inside of each valve.

TRIBE I. — BRACHIOPODA.

Shell bivalve, adhering to extraneous marine bodies, either by the shell itself being in contact with them, or attached by a tendinous chord. Shells not quite equivalve, and open by a hinge.

Genus I. — LINGULA. — Bruguière.

Generic Character. — Shell equivalve, equilateral, oblong-ovate ; compressed ; thin ; acute and gaping at the um-

bones ; slightly truncated or trilobate at the base : muscular impressions situate towards the centre of the valves ; external surface covered with a glossy, thick epidermis ; hinge destitute of teeth ; shell suspended by a cylindrical fleshy tendinous pedicle, attached to the umbones.

Lingula Mytilloides. Plate VII. fig. 3. Found in the Carboniferous Limestone, at Wolsingham, county of Durham.

When the valves of this shell are closed, they are compressed, and have much the appearance of a duck's bill. They are attached to each other by the internal muscles. They vary considerably in their internal and external conformations ; one valve having in its interior an elongated projection between the two muscular impressions, lying in a longitudinal direction ; the other valve is destitute of this, and also wants the testaceous matter at the points of the valves.

The recent species of *Lingulae* are few, and inhabit the Mollucca Islands.

Fossil species of *Lingulae* are found in the sandy indurated Marl at Bagnor ; in the Carboniferous Limestone of Durham, and in the shale of the Vale of Todmorden.

Genus II. — PYCNODONTA. — *Fischer*.

Generic Character. — Shell inequivalve, transverse, equilateral ; hinge arcuated, extending considerably, and ending in subauriform lobes ; numerous small, close-set, curved, lamelliform teeth, with a transverse, ovate pit at the centre for the reception of the ligament ; beaks small and but slightly produced.

Pycnodonta radiata. Plate XI. fig. 16.

Genus III. — CRANIA. — *Retzius*.

Generic Character. — Shell inequivalve, suborbicular, mostly equilateral, slightly irregular ; upper valve patelliform, very convex, interiorly provided with two projecting callosities, its umbo placed rather behind the centre ; lower valve adherent, nearly flat, pierced on its end or surface with three unequal and oblique holes ; each valve with four muscular impressions ; two of those in the upper valve, are situate near the posterior margin, the other nearer the centre, but always close to each other ; in the lower valve two are almost marginal, and remote, but the other two are nearly central, and so close together that they seem united ; with usually a small projection between them ; destitute of a hinge. Animal without a byssus.

Crania striata. Plate VIII. figs. 6, 7.

The lower valve in this genus is exceedingly variable in thickness ; in some

species it is so thin that it is hardly observable; yet this valve is the most characteristic of the genus; it has the property of adhering to other substances by its own surface; it is wholly destitute of a hinge, teeth, or ligament. It has four strong impressions by which the tendinous muscles are attached, and by which it is at once united to the animal, and the upper convex valve; two of these muscular impressions are situate at a distance from each other, near the margin, which is usually nearly straight between them, the others are towards the centre of the disk, merely separated from one another by a slight prominence in the under valve, while they are more remote in the upper valve; the inner surface, particularly about the margin, is granulated; produced from the structure being cellular, instead of foliaceous. The vertex of the upper valve is nearly central; it is generally thin in substance, and presents the same granulated surface near the margin, as the lower valve, although not quite so conspicuous. The cellular structure of the shells of the genus *Crania*, at once serve as an unvarying mark whereby to distinguish them from all other genera. They also differ from *Hipponyx*, in having four muscular impressions in place of two.

The *Crania* are marine shells, and very limited in number; they inhabit the Mediterranean, and British seas.

There are only five or six fossil species of this genus; and these are found in the *Calcaire-grossier* near Paris, and one at Népou, department of la Manche, another at Mendon; and one also in Sweden.

Genus IV. — THECIDIUM. — *Defrance.*

Generic Character.—Shell inequivalve, somewhat irregular, and nearly equilateral; umbones acute, imperforate; attached by the outside of the convex valve; lower valve provided with two internal, short cardinal processes, and an external triangular area, rather irregular in its form, and extending to the umbo; upper valve somewhat flattened, with a small, short obtuse appendage, situate externally, at its base; furnished with two small lateral, cardinal processes internally, and with variously curved laminæ, invariably adhering to the inner disk of the valve; hinge destitute of a ligament, but the valves are kept together by the attachment of the lateral processes.

Thecidium recurvirostrum. Plate IX. figs. 1 & 8.

The shells of this genus have considerably the aspect of several of the *Terebratulæ*, but may at once be distinguished by their being devoid of an umbonal perforation in the convex valve; which is an invariable characteristic of that genus.

This is a marine genus, and fossil species have been found in the Chalk of Orglandes, in Normandy, and at Maestricht.

Genus V. — SPIRIFER. — *Sowerby.*

Generic Character.—Shell transverse, equilateral, inequivalve, hinge straight, linear, widely extended equally on both sides of the umbones, which are more or less

remote, being separated by an intermediate flattened area, varying considerably in breadth, in different species, and consists of three triangular parts, a central and two lateral ones; this area is divided in the centre by a triangular pit for the passage of the byssus; within the smaller valve, and near the umbo, two spiral testaceous appendages are attached, whose convolutions diminish in size as they diverge from the centre of the shell.

The central part seems to have been an aperture for the passage of a byssus, by means of which the animal probably attached itself to rocks and stones in the sea.

Spirifer cuspidatus. Plate VII. fig. 8. Figs. 7, 9, and 10 represent two spiral appendages.

No recent species of the *Spirifer* are known, being only found in a fossil state. They are very numerous, and abound in the Mountain or Carboniferous Limestone, the Transition Limestone, and the Old Red Sandstone; but none of them have been met with above the Magnesian Limestone; most of the species are ribbed, grooved, or striated externally.

Attention to the area between the beaks, and their internal spiral appendages, will at once distinguish the shells of *Spirifer* from the *Terebratulæ*, to which they are somewhat allied.

This genus is properly divided into six sections, by Professor Phillips.

Section 1. Cuspidatæ. Beaks imperforate, separated by a wide triangular area, the lower one not incurved; upper valve convex; hinge line generally straight, and equal to the breadth of the shell.

Section 2. Augustatæ. Cardinal line as wide as the shell; valves with incurved beaks; mesial fold defined between two deeper furrows on the upper valve.

Section 3. Radiatæ. Cardinal area not so wide as the shell; surface radiated.

Section 4. Glabratae. Cardinal area not so wide as the shell; surface plain.

Section 5. Terebratuliformis. Devoid of a cardinal area.

Section 6. Filosæ. Surface with prominent radiating threads.

Genus VI. — GYPIDIUM. — Sowerby.

Generic Character. — Shell inequilateral, inequivalve, the larger valve with an incurved umbo, remote from the hinge; one valve divided by a central septum into two parts; the other by two septa into three unequal parts; umbones imperforate and incurved.

Gypidium Aylesfordii. Plate VII. fig. 19. Found in the Dudley Limestone, and is a characteristic member of the Silurian rocks.

This genus was established by Sowerby under the name of *Pentamerus*, but as that name is preoccupied by a genus of insects, we have adopted the name of *Dalman*; who also denies that the shells of this genus are quinquelocular.

Genus VII. — MAGUS. — Sowerby.

Generic Character. — Shell inequivalve, equilateral ; one valve convex, provided with an angular sinus along an incurved beak ; line of the hinge, and back of the other valve straight, with two projections near the centre ; a partial longitudinal septum attached to the hinge within.

Magus plumulus. Plate VII. fig. 15.

This genus has much the general form of some of the smooth *Terebratulæ*, but will readily be distinguished from the shells of that genus by an examination of the parts about the hinge. The beak is destitute of perforation, but there is a large quadrangular foramen, two sides of which are formed by two ridges from the straight back of the depressed valve, and other two run along to the point where they meet ; on the side of it there is a flattened space, emanating from the hinge line, which is considerably longer than the foramen, and terminates in the apex. On separating the valves the foramen is divided into two angular sinuses, that in the beaked valves being considerably larger than the other. A thin longitudinal septum is situate in the middle of the shell, reaching from one valve to the other, the upper part of it extending in an arcuated form over the hinge, and having a perpendicular front, with two shelf-like appendages, placed one above another, the upper ones attached by slender testaceous processes to the hinge.

Known only in a fossil state, and is found in the Chalk near Maudesley, Norwich, and but one species has been discovered.

Genus VIII. — TRIGONOSEMUS. — König.

Generic Character. Shell inequivalve, equilateral ; sub-trigonal ; one valve generally more convex than the other ; one of them prolonged into a lengthened beak, truncated at the point, and perforated for the passage of a tendon, by which the animal attached itself to extraneous bodies ; hinge destitute of a ligament, but provided with two teeth, in one valve, which lock into corresponding cavities in the other ; two muscular impressions, situate near the centre of both valves.

Trigonosemus lyra. Plate XI. fig. 15.

Found in the Greensand of Chute Farm, near Horningsham.

This is exclusively a fossil genus ; which is formed of *Terebratula lyra* of Sowerby, and other corresponding species.

Genus IX. — ORTHIS. — Dalman.

Generic Character. — Shell inequivalve, with a rectilinear hinge ; umbones distant ; larger valve with a transverse smooth area, and a triangular pit.

Orthis canalis. Plate XI. fig. 14.

Found in the Wenlock Shale, which is a member of the Silurian series.

Genus X. — LEPTÆNA. — Dalman.

Generic Character. — Shell equilateral, and inequivalve; one valve being convex for the most part, and very rarely somewhat depressed; its anterior edge rounded, very thin, bent downwards, and produced into an irregularly cylindrical form, a little expanded towards its lower edge, the opposite valve is usually flat, or slightly concave on the outside, with its anterior margin reflected, so that its inner edge lies against the inside of the concave valve; the cardinal margin is transverse, parallel and linear, sometimes so much produced on both sides as to give it a winged appearance.

Leptæna scarbiculus. Plate VII. fig. 16.

No remains of a ligament have been noticed, but there have been observed indications of internal processes near the hinge of the depressed valve; like all the other Brachiopoda, the texture is granose within, with the external surface frequently spinose. The shell possesses a very singular peculiarity; namely, that of its anterior margin being produced beyond that part occupied by the animal.

The shells of this pretty numerous genus are known only in a fossil state, and are peculiar to the strata of the secondary formation, and which they in a great measure characterize; more especially the Carboniferous limestone; they are also met with in the older Transition limestone, the Seatoschist of Snowden; the Magnesian limestone of Breden, Derbyshire.

I have adopted this generic name instead of *PRODUCTA* of Sowerby, as it is ingrammatical.

Genus XI. — CYRTIA. — Dalman.

Generic Character. — Shell longitudinal, inversely pyramidal, inequivalve, subequilateral; one valve considerably depressed, the other convex; hinge line rectilinear; beaks in one valve only, and slightly incurved.

Cyrtia cuspidata. Plate XI. fig. 11.

Found in the Carboniferous Limestone, St Vincents Rock, near Bristol.

This genus consists exclusively of fossil species. Our type of the genus is *Spirifer cuspidatus* of Sowerby.

Genus XII. — ATRYPA. — König.

Generic Character. — Shell longitudinal, equivalve, equilateral; hinge line slightly curved, umbones small, and not incurved.

Atrypa reticularis. Plate XI. fig. 12.

Genus XIII. — TEREBRATULA. — Bruguière.

Generic Character. — Shell inequivalve, equilateral,

generally trigonal and gibbous; attached by a short peduncle to extraneous marine bodies; the larger or upper valve, with a projecting umbo, frequently bent, and perforated at its apex, or notched at its inner edge, and having a small curved tooth on each side of its hinge, which fits into a corresponding pit in the opposite valve; the inside of the smaller valve is provided with two slender testaceous processes, which are sometimes simple, short and recurved; at others considerably elongated, branched, bent in various directions, and anastomosing for the most part; sometimes they are situate near the centre of the valve, and in other instances are united by their points to the shell; these usually emanate from each side of the hinge; both valves provided with two nearly obsolete muscular impressions, but sometimes they are strongly developed; those of the larger or perforated valve are oblong, central, and close to each other; in the smaller valve they are triangular, with their angles rounded, also nearly central, but more distant than in the other valve.

Terebratula semiglobosa. Plate VII. figs. 17, 18; and *T. inconstans*. Plate VII. fig. 28.

The Terebratulæ are extremely variable in their general shape, being sometimes oviform, sometimes much depressed, more especially in their young state. The peduncle is formed of numerous closely united fibres, which are separated at their outer end, by which they are attached. The manner in which the teeth are fitted, renders it impossible to detach the valves, without either breaking them or the edges of their sockets.

The shells of this genus are distinguished from the Anomiæ, by their form being quite regular; by their having a perforated produced beak in one valve, from whence emanates the fibrous pedicle by which they are attached, whereas the Anomiæ are attached by means of a testaceous plug; and they are divested of the internal appendages which are peculiar to the Terebratulæ; they cannot be mistaken for Lingulæ or Orbiculæ, as these shells have no hinge; and they will be distinguished from *Hipponyx*, *Thecidea* and *Crania*, because these genera are always attached to marine bodies by their flat valve.

The Terebratulæ are Oceanic shells, adhering to extraneous substances. They are very numerous, and inhabit the seas of all countries; two or three are natives of the British seas. They are subject to considerable variety in form and markings.

Fossil species are still more numerous than the recent ones. They are of the utmost importance to geologists, as they occur in all the Secondary, and Tertiary strata, commencing with the earliest, excepting those of fresh water origin, and they have never been detected in the upper marine formation. Particular species distinguish certain strata.

Section 1. Smooth, generally oblong; the middle of the front even or depressed.

Section 2. Plaited, generally oblate; the middle of the front even or elevated.

Section 3. Adhering to marine bodies by their flattened valve.

Genus XIV. — ORBICULA. — Cuvier.

Generic Character. — Shell inequivalve, nearly orbicular, compressed, generally irregular in form, adherent, flat, and attached by means of a fibrous substance passing through an orifice near the centre of the lower valve; upper valve patelliform, its vertex posterior or nearly central; each valve provided with four muscular impressions, two of which are large, approximate, and situate near the centre, and two smaller and more distant placed near the posterior margin; those of the lower valve not so well defined as the others; near the inner extremity of the orifice there is an obtuse testaceous process; destitute of hinge teeth or a ligament.

Orbicula granulata. Plate IX. fig. 10. Found in Argillaceous Ironstone nodules in Alum Bay, Isle of Wight.

The Orbiculæ are oceanic shells, consisting of only two or three species, inhabiting the European seas.

Fossil species are limited, and met with in the Coral Oolite of Yorkshire, and the Great and Inferior Oolite of Wiltshire and Yorkshire.

TRIBE II. — RUDISTA.

Animal unknown, as are also the ligament and hinge; shell with very unequal valves, and destitute of distinct umbones.

Genus XV. — HIPPONYX. — DeFrance.

Generic Character. — Shell bivalve, adherent, inequivalve, irregular; muscular impressions in both valves horse-shoe shaped; lower valve affixed to marine bodies, orbicular, much compressed, and considerably thickened in some instances, with its margins always elevated, particularly in front, its muscular impression consisting of two contiguous semilunar portions, which are distant, broad and rounded in front, nearly confluent and narrow behind; upper valve patelliform, generally subconic, in some instances compressed, with a posteriorly submarginal umbo pointing backwards; muscular impression situate near the posterior margin, with its two lobes considerably more remote and obliquely truncated in front, but entirely confluent behind; hinge destitute of a ligament or teeth.

Hipponix cornucopia. Plate X. fig. 2, upper valve; and under valve, fig. 2.*

The fibres in the muscular impressions are placed in a different direction from those of the other portions of the shell, and seem to be more liable to decomposition. In fossil species these present cavities.

One species only is known in a recent state, namely, the *Hipponyx mitratus*, which inhabits the West Indian Seas. Several fossil species have been detected in the Calcaire-grossièr of France.

The *H. mitratus* was, until lately, considered a univalve, and has been figured and described as *Patella mitrata*. The fossil species have been also included by Lamarck among his *Patellæ*.

Genus XVI. — CALCEOLA. — Lamarck.

Generic Character. — Shell equilateral, inequivalve, triangular; umbones separated by a large, depressed, irregularly and transversely striated, trigonal area in the lower valve, which is the larger of the two, and very deep, funnel-shaped, and obliquely truncated at its upper side; hinge margin transversely straight, linear, notched, and slightly toothed in the centre; the upper edge arcuated; upper or smaller valve semiorbicular, semicircularly striated, and serving as a lid to the lower valve; internal cardinal edge furnished with two lateral tubercles, a central pit and smaller plate.

Calceola Sandalina. Plate IX. figs. 2, 3.

The very peculiar form, and other characteristics, of the *Calceola*, distinguishes it from all other bivalves; namely, its great thickness and solidity, its being striated internally, from the centre to the circumference, and being destitute of a ligament. In general form it has much the appearance of a lady's slipper. It is supposed to have been attached by the beak or umbo of the larger valve.

There is but one species of this genus, and it is fossil, found in the neighbourhood of Juliers in the Mountain Limestone. The only fossil to which the *Calceola* bears the slightest resemblance is *spirifer cuspidatus*. Plate VII. figs. 8, 9, 10.

Genus XVII. — RADIOLITES. — Lamarck.

Generic Character. — Shell inequivalve, and interiorly striated, radiating from the inside of the umbones; both valves somewhat turbinated and conical, the lower one larger than the upper, which has the appearance of a lid.

Radiolites ventricosus. Plate VIII. fig. 3.

Known only in a fossil state, and it is even doubtful whether the *Radiolites* are really testaceous shells.

Genus XVIII. — SPHÆRULITES. — Lamarck.

Generic Character. — Shell greatly inequivalve, orbicular or suborbicular, two valves when united forming a double cone; upper valve lid-shaped, and generally depressed above, with two unequal tubercles within; under valve cup-shaped, subventricose, with scales radiating beyond the

margin, and forming a ridge, the whole external surface covered with projecting laminæ; inside partly striated; external surface covered with foliations. Structure of the hinge unknown.

Sphærulites foliacea. Plate VIII. fig. 5; and *S. inequilobus*. Plate IX. fig. 24.

The latter species formed the genus *Birostrites* of Lamarck, but it has been recently ascertained to be only a cast of a Sphærulite. Found at Aix in France.

GRAND-DIVISION II.

Ligament not marginal, but placed in a short hollow under the beak, always perceptible, and not forming a tendinous chord beneath.

TRIBE I.—OSTRACEA.

Ligament placed either interiorly or nearly so; shell irregular in form, foliaceous and sometimes papyraceous.

SUB-DIVISION I.—Ligament placed interiorly; shell thin, papyraceous.

Genus XIX.—ANOMIA.—*Linnæus*.

Generic Character.—Shell inequivalve, irregular, operculated; under valve flattened with a large circular or ovate perforation near the hinge, and its edges turned back, through which protrudes a testaceous, or bony, straight, elliptical operculum or plug, with a dilated base, by which the shell adheres to extraneous bodies; upper valve the larger, concave and entire; ligament large, transverse, internal, placed within the upper valve, at the umbo, and attached to a prominent, expanding appendage in the depressed valve; lower valve with a single, orbicular, nearly central muscular impression; upper valve with three impressions, situated contiguous to each other, the largest is next the base of the shell, which is connected, by means of its muscle, with the plug, and the other two are also connected, by the medium of their muscle, with the single impression in the lower or flattened valve.

Anomia lineata. Plate IX. fig. 13.

The Anomiæ are liable to considerable modifications of form, depending upon the shape of the substance to which they are attached. But, although the lower valve is in close juxtaposition with such substance, yet it does not adhere to it, but is attached simply by the testaceous plug or operculum. This appendage seems to be a testaceous prolongation of the abductor muscle of the animal. The shells of this genus will at once be distinguished from the *Placuna*

and *Terebratula* by the structure of its hinge and very peculiar muscular impressions, and neither of these genera have a perforation near the hinge, as in the *Anomia*.

The species are limited in number, and inhabit the ocean; they are met with in almost all climates.

Anomia are rare in a fossil state, and occur in the marine formations above the chalk in France, and the Crag and London Clay of England.

SUB-DIVISION II. — Ligament semi-interior; shell foliaceous, frequently very thick.

Genus XX. — VULSELLA. — Lamarck.

Generic Character. — Shell longitudinal, equivalve, sub-irregular; beaks equal, somewhat separated; between these lies the useless and decayed remains of the ligament; valves united at the hinge by a semi-internal ligament, affixed in each valve to a subtriangular tripartite disk, one of its points reaching close to the beak, and a little inclined to one side; its central portion hollow, and forming a projecting callosity within the shell, with the chief part of the ligament attached to this conical hollow; each valve is provided with a single lateral muscular impression, which is oblong and contracted towards the base.

Vulsella depridita. Plate IX. figs. 30, 31, 32. Found fossil in the Calcaire-grossier at Grignon.

The *Vulsellæ* differ from the *Crenatulæ* chiefly in the hinge being provided with only one callosity, while there are many in *Crenatula*.

Sometimes the species of this genus gape posteriorly. They are but few, and inhabit the ocean, chiefly the Indian seas; and one is found in New Holland.

Genus XXI. — OSTREA. — Linnæus.

Generic Character. — Shell inequivalve, irregular, and foliaceous; umbones somewhat separated, and of unequal size; lower valve largest, concave and adherent; upper valve smallest, and somewhat plain; hinge destitute of teeth; ligament partly external; the facet to which it is attached is subtrigonal and tripartite, and is divided by two elevated lines which divaricate from the umbo; each valve provided with two muscular impressions, the one large, suborbicular, and nearly central; the other very small and situate near the hinge.

Ostrea gigantea. Plate VII. fig. 14.

All the shells of the genus *Ostrea* are of a laminated foliaceous structure. These lamina are composed of perpendicular fibres; the points of the umbones are always apart from each other, and in some instances very remote, becom-

ing more distant and unequal by age. The lower valve is always the largest of the two, and generally the most concave; and in the young condition they usually adhere to marine bodies. There are, in many species, a series of small denticulations situate near the hinge, which, however, cannot properly be considered as teeth. The ligament can only be reckoned as sub-external, although it is always concealed when the valves are closed; it is invariably placed in a subtriangular tripartite disk, one of its angles being always close to the umbo, from which diverge two somewhat elevated lines.

Section 1. With simple margins, or slightly undulated; as in the *O. gigantea*.

Section 2. With the margins plicated, as in *O. carinata*.

There are several genera which may be confounded with this, as follow: *Crenella* and *Perna* have a series of longitudinal grooves; *Pedum* and *Malleus* are invariably attached by a byssus, while the *Ostrea* adhere by the external surface of their shells; *Lima* and *Pedum* are always regularly formed bivalves, and attached by a byssus, the *Vulsellæ* adhere by their hinge, and are usually found enveloped in pieces of sponge; besides, the central portion of the hinge in the *Vulsellæ* forms an internal projecting callosity.

The *Ostreae* are marine shells, and are met with in all climates.

Fossil species are numerous, but difficult to make out.

The *Ostrea pulchra* is found in the Plastic Clay, and *O. deltoidea*, characterizes the Kimmeridge Clay.

Mr Gerard, who traversed the snowy mountains of Thibet, in May, 1830, met with fossil shells at the amazing height of 16,000 feet above the level of the sea, and in reference to those of this genus he says, "Just before crossing the boundary of Ludak into Brussalier, I was exceedingly gratified by the discovery of a bed of fossil oysters, clinging to the rocks as if they had been alive. In whatever point of view we are to consider the subject, it is sublime to think of millions of organic beings lying at such an extraordinary altitude, and of vast cliffs of rocks formed out of them, frowning over the illimitable and desolate waters, where the ocean once rolled."

Genus XXII. — EXOGYRA. — Say.

Generic Character. — Shell inequivalve, and unequal sided, attached to extraneous bodies; umbones spirally turned to one side; pit of the hinge curved and nearly linear; the flat, free valve, provided with an obtuse tooth, which fits into a cavity parallel with the hinge pit in the convex attached valve; each valve furnished with one muscular impression.

Exogyra conica. Plate VII. fig. 32, 33. Found at Blackdown, Parham Park, Chute Farm and Warminster.

The shells of this genus are distinguished from those of *Ostrea*, which they somewhat resemble, by their impressed lateral spiral umbones, and the consequent linear form of the hinge pit, and by the parallel furrow in the attached valve, which receives the opposite striated tooth. It differs also from *Gryphæa*, being devoid of the lobe of that shell.

Genus XXIII. — GRYPHÆA. — Lamarck.

Generic Character. — Shell free, inequivalve, upper valve small, flat, and acting apparently as a lid to the under one, which is large, concave, and arcuated; with an incurved prominent umbo; hinge destitute of teeth, with a curved depressed area; provided interiorly with one muscular impression.

Gryphæa incurva. Plate VIII. fig. 23.

This species is found in the Lias of Yorkshire, and South of England, various parts of Scotland, and in the inferior Oolite of France and Germany. The shells of this genus are extensively scattered through different rocks of the Cretaceous group, namely, upper and lower Greensand, Speeton Clay, and Chalk of all countries, as well as in the rocks of the Oolitic series.

The genus is only known in a fossil condition. The species have a considerable affinity to the *Ostræa*, but are at once distinguished by their more regular form, and remarkable curvature of the beak.

TRIBE II. — PECTINIDES.

Ligament placed interiorly, or partly so; shell in general regular, compact and not foliaceous.

Genus XXIV. — SPONDYLUS. — Linnæus.

Generic Character. — Shell inequivalve, subirregular; umbones unequal, and distant, separated from each other by a triangular, flat area, and provided with small auricles on each side; hinge of the lower valve with two very strong and greatly recurved teeth, separated by a deep central pit, which is the termination of a groove emanating from the point of the flattened area; this pit is for the reception of the ligament; and two lateral hollows for receiving the teeth of the upper valve; the hinge of which is furnished with two strong reflected lateral teeth, and two intermediate cavities for receiving the teeth of the lower valve; the ligament pit is in both valves, and the ligament is for the most part internal, but is also external; muscular impression single, suborbicular, and somewhat lateral; the pallial impression being continuous with, and surrounding the other.

Spondylus crassicosta. Plate VIII. fig. 18. *S. truncata*, fig. 11.

The Spondyli are marine shells, and inhabit the warmer portions of the globe; they are conspicuous for the beauty of their colours, and their remarkable forms, which are generally somewhat irregular, and usually attached to

marine bodies. Their external surface is invariably rough, and clothed with spines or foliations. The upper valve is always more intense in its coloration than the lower one.

The teeth of the lower valve are so much arcuated, and inserted so peculiarly into their receiving sockets in the opposite valve, that it is impossible to separate the valves without either breaking them, or the margins of the pits. Although the ligament appears to be entirely internal, it is in fact also partly external, which portion is but very slender, and attaches the valves to each other along their linear margins.

Fossil Spondyli are rare, and occur in the Blue Marls, south of France, and in the Supercretaceous rocks of Bordeaux and Dax.

Genus XXV. — PLICATULA. — *Lamarck*.

Generic Character. — Shell irregular, inequivalve, and destitute of ears, attenuated at the base, rounded and plaited at the upper margin; umbones unequal and entire; hinge with two strong, generally perpendicularly grooved teeth in each valve, with their points recurved, and a central cavity or pit for the reception of the ligament, which is internal; under valve generally more convex than the upper one; muscular impressions strong, orbicular, and situate near the centre of the valves.

Plicatula spinosa. Plate VII. fig. 2. *P. Pectinoides*, Plate VIII. fig. 14.

This genus has some affinity to that of *Spondylus*, in which it was, for the most part, included, until separated by Lamarck, but it will at once be distinguished by its being destitute of ears, and in never having the recurved teeth of that genus, nor are the valves separated by an external area. The teeth of this genus are so fitted into their receiving pits that they cannot be separated without injuring the shells; nor will they even admit of the valves being opened wide. The shells of this genus inhabit the seas of tropical and intertropical regions.

Some Fossil species occur in the Lias, the Blue Marls of France, in the Sussex Chalk, and in the Oolitic group of rocks.

Genus XXVI. — PLAGIOSTOMA. — *Lluyd*.

Generic Character. — Shell inequilateral, sub-equivalve, oblique and provided with small ears, mostly higher than long; generally covered with grooves or striæ diverging from the umbones, and passing to the ventral margin; base of the hinge transverse, straight, and destitute of teeth; umbones remote; depression for the ligament, either straight, or slightly angular.

Plagiostoma punctata. Plate VII. fig. 5.

The Plagiostomata, seem to have been attached by a byssus in their living condition, there being a passage through the anterior part of the shell, which in most of the species is rather open.

The shells of this genus are known only in a fossil state, and most important

in a geological point of view ; as different species characterize the various strata of limestone, from the carboniferous limestone up to the chalk. The Oolitic beds which intervene betwixt these abound with Plagiostomæ. *P. giganteum* is abundant in the Lias, and the *P. spinosum* is met with in great profusion in the upper chalk.

Genus XXVII. — DIANCHORA. — Sowerby.

Generic Character.— Shell inequivalve, subtriangular, oblique, adherent ; attached valve provided with an angular hiatus, instead of an umbo ; the other valve auriculated, and with an obtuse umbo ; hinge destitute of teeth.

Dianchora striata. Plate XI. figs. 1, 3.

The Dianchoræ strongly resemble the Plagiostomata, but differ in being always attached, and in being provided with an opening instead of an umbo in the attached valve. The genus is known only in a fossil state, and occurs in the Greensand.

Genus XXVIII. — PECTEN. — Bruguière.

Generic Character.— Shell inequivalve, the under valve generally more convex than the upper, subequilateral, with many grooves or ribs radiating from the umbones to the margins ; provided with two ears, which are usually unequal in size ; close below one of them in the upper valve is a small notch for the passage of a byssus ; muscular impression large, placed somewhat to one side ; pallial impression destitute of a sinus ; hinge linear, without teeth ; ligament consisting of three portions, of which the two lateral parts are elongated, and follow the hinge line, the third portion thick, triangular, and fitted into a central, triangular, shallow pit, within the hinge.

Pecten cornea. Plate VII. fig. 11 ; and *P. Dabisoni.* Plate VII. fig. 6.

This genus, consisting of numerous species of marine shells, may be separated into the following sections :—

Section 1. Both valves somewhat convex, and not uniting all round, as in *Pecten pleuronectus*.

Section 2. One valve flat, the other deep and convex, as in *P. Jacobæus*.

Section 3. Both valves convex, equal in size or nearly so, as seen in *P. turgidus*.

Section 4. Both valves convex, but unequal in size, as in *P. bifrons*.

Section 5. Irregular, and seemingly adherent by their outside, to other bodies, as *P. Dabisoni*. Plate VII. fig. 6. The Baron de Ferussac formed a genus from this section under the name of Hinnites, but we do not consider there are sufficient distinctive characters to warrant the adoption of the genus.

The Pectens inhabit the seas of almost all countries, and are remarkable for

the beauty and diversity of their colours and markings; the valves, in most instances, being of different shades and hues.

They abound in a fossil state from the Crag to the Oolitic series of strata.

Genus XXIX. — LIMA. — Bruguière.

Generic Character. — Shell longitudinal, equivalve, inequilateral; sides somewhat thickened, and gaping; umbones divergent, their internal facets inclined outwards; hinge provided with two lateral teeth, one on each side in both valves, which become nearly obsolete in adult shells; area between the beaks, to which the ligament is attached, is divided; tripartite; the middle or hinge pit is rounded above, and contains the chief portion of the ligament, the remaining portions are attached to the somewhat elongated, linear divisions; muscular impression lateral, suborbicular, from the inner margin of which the muscular impression of the mantle emanates, and traversing the other side of the valves in a circuitous form, appears to terminate near the beak; external surface covered with a very thin epidermis.

Lima gibbosa. Plate VII. fig. 1.

The Limæ are marine shells, and inhabit the seas of almost all countries. They may be distinguished from the *Ostrea* by their regularity of form, and by never being attached externally. Their oblique form separate them from *Pecten*. The Limæ are supposed to be attached to other bodies by a byssus.

The shells of this genus abound in a fossil state; they are met with in the inferior Oolite, the Calcaire-grossier of France, and in the same strata of Italy, and the London Clay of England. They have not, however, been observed in any of the strata below the Lias.

GRAND-DIVISION III.

Shells with an elongated marginal ligament.

TRIBE I. — MALLACEA.

Shells foliaceous, more or less inequivalve, with the ligament marginal, partly linear, and either simple or interrupted by crenulations.

Genus XXX. — AVICULA. — Lamarch.

Generic Character. — Inequilateral, inequivalve, foliaceous, sub-quadrate and oblique, pearlaceous within; hinge rectilinear, and produced on each side into straight auriform appendages, with a small indistinct tooth in both valves, an elongated, marginal ligamentiferous area, widened near its centre.

Avicula echinata. Plate VIII. fig. 15. Found in the Cornbrash Limestone of Wiltshire and Dorsetshire.

Sowerby has united this genus with *Meleagrina*, and remarks that the general form of these shells is somewhat square, with their superior angles rounded. The *Meleagrinae* approach nearer the circular form than the *Aviculæ*, which is a little more transverse. In the latter genus, the two valves are rather more conspicuously unequal than in *Meleagrina*, which is distinctly marked by their pearly interior. The line of the hinge in *Aviculæ* is transverse and straight, but in some species its extremities are very short as in *Meleagrina*, but extremely variable in length, and sometimes excessively prolonged. The left hand valve is contracted and notched at the posterior side near the base; which is less observable in the right hand valve; this is destined for the passage of the byssus. Each valve is generally provided with a single small tooth, placed immediately within the beaks; and is frequently met with in the *Meleagrinae*, contrary to the assertion of Lamarck. The area of the ligament is marginal, linear, narrow, and dilated in the centre; which is very conspicuous in old shells, forming an obliquely triangular pit, emanating from below the beaks, and increasing gradually in width towards the centre of the valves. This is common to both *Avicula* and *Meleagrina*. The external rows of imbricated scales are also common to both genera; the muscular impression large, suborbicular and in both nearly central, with a row of minute ones running from the inner edge to the umbo.

The shells of this genus are oceanic, principally inhabiting the seas of tropical climates; a few species are found in Europe, and two are known to exist in the British Seas.

Fossil species occur in the Supercretaceous rocks of Dax and Bordeaux, also in the Cretaceous series, and are rather plentiful in the Oolitic group.

Genus XXXI. — GERVILLIA. — *Defrance.*

Generic Character. — Shell oblong, nearly equivalve, greatly inequilateral and oblique; hinge line rather long, linear and nearly straight, with numerous irregular, somewhat transverse, small pits, and teeth situate below the dorsal edge.

Gervillia aviculoides. Plate VII. figs. 30, 31. Found in the Shanklin sand, Shotover Hill, Oxford, and in the Greensand near Lyme Regis.

It is not known whether this shell is furnished with a byssus, and the ligament cannot be described. It resembles an *Avicula* in general form, and the hinge approaches to that of a *Perna*.

Known only in a fossil state; and from the shells with which it is found associated, is supposed to be a marine species. They are met with in all the strata from the Lias to the Baculite Limestone.

Genus XXXII. — CRENATULA. — *Lamarck.*

Generic Character. — Shell sub-equivalve, flattened, somewhat distorted and lamellar; hinge lateral, linear, marginal, and internally crenulated; the crenulæ formed in a continuous series along the hinge, each of them presenting a small rounded callosity, and excavated for the reception

of part of the ligament ; muscular impressions almost obsolete, of an oblong form, and situate near the anterior margin of the pearlaceous substance.

Crenatula ventricosa. Plate IX. fig. 18.

The greater portion of the shell of the *Crenatulæ* consists of a foliaceous substance, composed of perpendicular fibres, like the *Pernæ*, *Ostræa*, &c. They are distinguished from the *Pernæ*, by being destitute of a passage for a byssus ; and the hinge of the latter genus has a series of straight ligamentary grooves placed across it. The *Crenatulæ* are obliquely elongated shells, while the *Pernæ* are rather transverse.

They occur but rarely in a fossil condition, and chiefly in the Oolitic group of rocks.

Genus XXXIII. — CATILLUS. — Brongniart.

Generic Character. — Shell thick, inequivalve, subequilateral ; triangular, deep, with incurved umbones ; hinge consisting of a series of transverse grooves.

Catillus Lamarchii. Plate VIII. fig. 17. *C. sulcatus*. Plate VII. fig. 20. The first is found in the chalk of Sussex, and the latter in the chalk marl.

Section 1. — Beaks short ; valves nearly equal.

Section 2. — Beaks elongated ; valves unequal.

This genus consists entirely of fossil species, which are chiefly found in the chalk ; a few shells have, however, been found agreeing with the *Catillæ* in the Todmorden shales, which I have referred to this genus.

Genus XXXIV. — PERNA. — Bruguière.

Generic Character. — Shell subequivalve, flattened, and somewhat irregular, a little distorted, thickish, and externally lamellar ; the laminæ composed of minute perpendicular fibres ; beaks small, nearly equal, and situate at the posterior extremity of the hinge margin ; hinge linear, marginal, with numerous transverse, parallel, opposite grooves, which, together with flattened ridges between them, are destined for the reception of the ligament ; the anterior extremity of the hinge is narrower than its posterior termination ; situate immediately under the extremity of the hinge margin is a posterior sinus, for the passage of the byssus ; with a parietal callosity, which is more distinct in the right hand valve than in the opposite ; the interior pearlaceous substance of the shell is spread out almost in the same form as the exterior, fibrous, and more extended portion ; one distinct, somewhat oblique and irregular muscular impression, and a series of small dots, are placed at

the posterior side, near the sinus for the byssus, which answer as points of attachment for a part of the mantle.

Perno maxillata. Plate VIII. fig. 30.

The elevations between the sulci do not fit into the grooves of the opposite valve, when the shell is closed, in the manner as cardinal teeth, but rest against the corresponding ones in the opposite valve.

The front extremity is often protruded in the form of a pointed lobe, but this is not a constant generic character.

The shells of this genus may be confounded with those of *Crenatula*, but that genus is destitute of the sinus through which the byssus passes, and its hinge is lateral. The parallel grooves in the *Pernæ* contain the *principal* portion of the ligament, whereas this portion is situate in the crenulations of the *Crenatulæ*; which latter genus consists of much more fragile shells than those of *Perna*. In the *Crenatulæ* the pearly interior occupies a much smaller portion of the shell, seldom exceeding more than half the dimensions of the valves, extending along the hinge margin, and forming an oblique parallel line from the beak to the extreme point of the valve.

The *Pernæ* inhabit the ocean, and are found only in the seas of New Holland and India.

Shells of this genus are also known in a fossil state, and are met with in the Calcaire-grossier, the Clunch Clay, the London Clay, and in the Oolitic group of rocks.

Genus XXXV. — PLUVINITES. — DeFrance.

Generic Character. — Shell inequivalve, very inequilateral, compressed, and thin; anterior side gaping a little; one valve much flattened; the other a little convex; hinge linear, short, situate immediately behind the umbones, and divided by perpendicular grooves; each valve furnished with two small muscular impressions, one of which is very minute, and placed close below the hinge, the larger one lower down, and almost central; ligament supposed to be internal.

Pluvinites Adansonii. Plate IX. figs. 5, 6.

This shell, the only one of the genus, is closely allied to both *Crenatula* and *Catillus*, and is known only in a fossil state. It is found in a stratum of *Baculite* limestone, near Fresville, at Volognes, Normandy.

TRIBE II. — MYTILACEA.

Hinge, with the ligament sub-interior, marginal, linear, very entire, occupying a great portion of the anterior border; shell rather foliaceous.

Genus XXXVI. — PINNA. — Linnæus.

Generic Character. — Shell equivalve, longitudinal, oblique, wedge-shaped; beaks forming an elongated point;

posterior side generally truncated, and always gaping ; the anterior margin nearly a straight line, and a little open in the centre for the passage of the byssus ; hinge without teeth ; ligament margin greatly lengthened and linear ; ligament partly internal, and continuing along the whole dorsal margin ; two muscular impressions in each valve, the posterior one very large, almost central, the anterior one terminal, and sometimes double ; muscular impressions of the mantle destitute of a sinus.

Pinna lanceolata. Plate VIII. fig. 28. *P. margaritacea*. Plate IX. fig. 7.

The shells of this genus cannot be mistaken, their characters being so dissimilar to all others. There are some of the more produced Mytili, which bear a distant resemblance to them, but these are at once distinguished by their basal termination being closed. Some of the Pinnæ grow to a large size, exceeding two feet in length. They are extremely brittle, from their fibres being perpendicular, and arranged alongside of each other, and but slightly attached. A very thin pearly substance is spread over the inside, but hardly extends beyond the muscular impression of the mantle, and merely covering that portion of the shell occupied by the animal.

The Pinnæ are marine shells, and are found in most seas. Three species inhabit the British coasts.

Several fossil species are met with in the tertiary and secondary strata of marine origin. The London Clay contains one species, and one also occurs in the Calcaire-grossier of France.

Lamarck applies the specific term *subquadrivalvis* to some of the Pinnæ, and *tetragona* to another, which seems to have been suggested to him by the circumstance of the pearly substance of their interior being longitudinally divided, taking its rise at the internal anterior point, and continuing somewhat more than half-way towards the centre of the posterior side ; an external organ corresponding to this is frequently observable ; and such shells easily break in the direction of this line.

Genus XXXVII. — MYTILUS. — *Linnæus*.

Generic Character. — Shell equivalve, regular, longitudinal, somewhat wedge-shaped, with the beaks terminating in a pointed summit ; posterior side rounded, and closed ; base forming a continuous line with the interior margin in a direction oblique to the hinge line ; anterior margin gaping slightly in the centre, for the passage of the byssus ; hinge destitute of teeth ; ligament marginal, linear, greatly elongated, and subinternal ; outside covered with a strong horny epidermis ; two muscular impressions, the posterior one large and irregular, the anterior very small, and terminal ; muscular impressions of the mantle irregular ; destitute of a sinus.

Mytilus antiquorum Plate VIII. fig. 19.

The shells of the genera, *Modiola* and *Lithodomus*, may be mistaken for *Mytili*; but will be at once recognized by their umbones not being terminal as in the *Mytili*.

The shells of this genus are all marine. They abound on all rocky shores, and in the estuaries of rivers.

Some of the species are provided with minute denticles within the point close below the beaks, which, however, have no connection with, or influence upon, the hinge.

A few fossil species of the genus *Mytilus* are known, they are met with in the Crag, and occur in the strata both above and below the Chalk.

Genus XXXVIII. — MODIOLA. — *Lamarck*.

Generic Character. — Shell subtransverse, equivalve, regular, oblique; form oblong, somewhat wedge-shaped, and greatly inequilateral; anterior side very small and obtuse; posterior side rounded and closed; anterior margin slightly gaping for the passage of the byssus, and forming with the base a line oblique to the dorsal one; beaks nearly lateral; outside covered with a strong horny epidermis; hinge without teeth; ligament elongated and subexternal; two muscular impressions, the posterior one large, sublateral, elongated, and irregular, the anterior one small and terminal; the pallial impression irregular, and destitute of a sinus.

Modiola cuneata. Plate VIII. fig. 22.

The *Modiolæ* are distinguished from the *Mytili*, by their beaks not being terminal, but placed a little within the posterior or smaller side of the valves.

The shells of this genus inhabit the ocean, and four species are found in the British Seas. They occur fossil in the Oolitic series, and also in other beds both above and below the Chalk.

Genus XXXIX. — LITHODOMUS. — *Cuvier*.

Generic Character. — Shell transverse, equivalve, regular, elongated, and of a cylindrical form when the valves are shut; rounded at both extremities; anterior side very short; external surface covered with a strong horny epidermis; beaks placed anteriorly, and hardly prominent; hinge destitute of teeth, linear, the hinge line forming a greater or less obtuse angle with the posterior margin; ligament linear and internal, with a small portion exposed externally; two indistinct muscular impressions, the anterior one very small, the posterior one large and oblong.

Lithodomus antiquus. Plate X. fig. 27.

The *Lithodomi* are all sea shells, inhabiting the West Indies, Mediterranean, and all coral rocks.

Fossil shells of this genus are plentiful, especially in the Great Oolite, Pisolite, and Coral Rag ; they also occur in the marine Tertiary beds, and have by several authors been mistaken for *Fistulanæ*, owing to the decomposition of the *Madrepora* which they inhabited, surrounding them, and producing the appearance of their being encased in an echinated sheath.

ORDER II. — DIMYARIA.

Shells with two distinct, remote, muscular impressions ; which are widely separated, and inserted towards the lateral extremities of the valves.

GRAND-DIVISION I.

Shells irregular, and always inequivalve.

TRIBE I. — CHAMACEA.

Shell inequivalve, irregular, attached to other bodies ; hinge with one or more large teeth, and provided with two separate lateral muscular impressions.

Genus I. — CHAMA. — Bruguière.

Generic Character. — Shell irregular, thick, usually very inequivalve, for the most part covered with irregular spines, or foliated processes ; umbones distorted, unequal, distant, and involute ; that of the attached valve salient at the base, and in some instances projecting considerably beyond it, the other is for the most part reflected over upon its valve, appearing as if imbedded in it ; hinge with one strong, thick, irregular, oblique, striated, and generally crenated tooth in one valve, which fits into an irregular striated groove in the opposite valve ; each valve provided with two distant, lateral, muscular impressions ; line of the mantle attachment entire ; ligament external, subdivided at its posterior extremity ; one of the segments decurrent to the point of the umbo in each valve.

Chama Haliotoidea. Plate VII. fig. 4. *C. Ponderosa.* Plate IX. figs. 27, 28.

The Chamæ are distinguished from the shells of the genus *Diceras*, by the latter having large, conical, divergent, spiral horn-shaped umbones, and in its larger valve having a large, subauriculate, concave, and prominent tooth ; *Isocardia* is more regular in form ; *Spondylus* will be distinguished by its triangular area between the umbones ; and although the *Cleidotheras* has

some resemblance to a Chama, it is provided with a separate bony appendage ; the hinge, and its elongated muscular impressions will serve farther to distinguish it.

There are numerous fossil Chamæ, which are found in the Calcaire-grossier, Greensand, and London Clay.

Genus II. — DICERAS. — Lamarck.

Generic Character. — Shell inequivalve, inequilateral, the one valve larger than the other ; attached to extraneous substances by the point of the beak of the larger valve, which is provided with one very large, concave, somewhat auriform, and thick cardinal tooth ; each valve furnished with two lateral, remote, muscular impressions ; umbones large, very prominent, divaricated, and somewhat irregularly and spirally twisted.

The united valves of this shell present the appearance of Ram's horns.

Diceras acutus. Plate VIII. fig. 2. *D. Lonsdalii.* Plate XI. fig. I. 1.

Only two species of this genus are known ; they are fossils ; the former found in the Granular Limestone of Normandy, and in the neighbourhood of Geneva ; the latter in the Greensand of North Wiltshire.

GRAND-DIVISION II. — LAMELLIPEDES.

The foot of the animal depressed, lamelliform, and not posterior.

TRIBE I. — NAYADES.

Shells inhabiting fresh waters, — Hinge sometimes provided with an irregular, simple, or divided tooth, and a longitudinal prolonged one ; sometimes toothless ; some have irregular, granulated tubercles, extending the whole length of the hinge line ; provided with a compound muscular impression ; the umbones frequently decorticated.

Genus III. — ANODON. — Bruguière.

Generic Character. — Shell equivalve, inequilateral, and transverse, for the most part very thin ; hinge line nearly straight ; destitute of cardinal teeth ; the hinge being glabrous with smooth lamina, truncated, or forming a sinus at the anterior end, terminating the apex of the shell ; two lateral remote muscular impressions, the posterior one being compound ; muscular impressions of the mantle entire, and

seldom distinctly marked : ligament linear, external, sunk in a cleft at the anterior extremity.

Anadon Cordierii. Plate XI. fig. 2. Found in the Calcaire-grossier at Paris.

The shells of this genus are fluviatile, inhabiting lakes, rivers, and canals in all countries, but they are chiefly found in still waters, adhering to the mud at the bottom, generally a little sunk into it. They are at once distinguished from their congeneric genera, *Hyria*, *Unio*, *Iridina*, and *Megadesma*, by being totally devoid of teeth.

Fossil Anodons are very rare.

Genus IV. — UNIO. — *Bruguère*.

Generic Character. — Shell transverse, equivalve, inequilateral, free, sometimes subcordate, or suborbicular; pearl-aceous within; generally covered with a dark olivaceous epidermis, which is usually decorticated on the umbones, which are prominent; hinge provided with a short, irregular, simple, or a double compound tooth, which is almost always striated; with two elongated, compressed, lateral teeth, the front one produced, sometimes obsolete; two muscular impressions in each valve, the superior one compound, or composed of several divisions; ligament external.

Unio subtruncatus. Plate XI. fig. 3.

The teeth vary considerably in their progress from the young to the adult condition.

Fossil species are numerous.

The species of this genus are very numerous, inhabiting lakes, rivers, and canals in almost every quarter of the globe. The great rivers of America are very rich in species. They vary considerably in their external form, being sometimes nearly cordate; for the most part thick, and oftentimes very ponderous for their size.

TRIBE II. — TRIGONACEA.

Primary teeth lamelliform, and transversely striated.

Genus V. — TRIGONIA. — *Bruguère*.

Generic Character. — Shell equivalve, inequilateral, transverse, trigonal, sometimes suborbicular; cardinal teeth oblong, laterally compressed, divergent, two in the right valve transversely grooved on both sides; the grooves regularly marked, each forming the segment of a circle; four teeth in the left valve grooved in one side only, but these alternately in pairs; consequently the four teeth of this valve receive within their grooved sides the two teeth of the right valve; two principal muscular impressions, the

lateral ones very distinct, one of which is situate close to the superior end of the cardinal tooth, and a little behind it; the other somewhat more distant, with a minute one between it and the cardinal tooth; mantle muscular impressions almost entire; ligament marginal, thick, rather short, and external.

Trigonia costata. Plate VIII. fig. 29. *T. politus*. Plate VII. fig. 27.

Only one recent species of this genus is known, which inhabits the seas of New Holland. Many fossil species are found in the Lias, the upper and lower Oolites, and Greensand, and characterize the strata above the Lias, and below the Chalk.

TRIBE III. — ARCACEA.

Shells provided with numerous small primary teeth, disposed in a straight or interrupted line in each valve.

Genus VI. — NUCULA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, transverse, oval, trigonal. or oblong; generally covered with an epidermis; hinge linear, narrow, divided into two parts by an oblique, produced, nearly central pit, which is destined for the reception of the ligament, the one anterior, and the other posterior; lateral teeth on each side numerous, acute, elevated, somewhat recurved, those of the opposite valves locking into the intervening spaces; umbones contiguous, and not separated by an intervening area; two simple muscular impressions; mantle impression destitute of a sinus.

Nucula Cobboldiæ. Plate VIII. fig. 20.

The shells of this genus are marine. Many fossil species have been discovered; they occur in the Crag, London Clay, and Chalk Marl, of England, France, and Italy; especially in the Calcaire-grossier of Bordeaux, Volognes, and Paris; and also in our Greensand.

In the species *N. lanceolata*, *fluviatilis*, *pella*, *rostrata*, *tellinoides*, and *oblonga*, there is a small sinus in the muscular impression of the mantle.

Genus VII. — MYOPARA. — Lea.

Generic Character. — Shell inequivalve, inequilateral, subtransverse; beaks elongated and incurved; teeth numerous, placed in a divergent, interrupted series on each side of the pits, formed for the reception of the ligament; margins of valves smooth.

Myopara costatus. Plate XI. fig. 4.

Known only in a fossil condition, in the United States of America.

Genus VIII. — PECTUNCULUS. — Lamarck.

Generic Character. — Shell orbicular, subequilateral, with the valves close ; umbones near to each other, and separated by a narrow facet, or area ; hinge semicircular ; teeth numerous, arcuated, oblique, serrated, placed in two rows, one on each side of the umbones, and are separated by a small triangular disk in each valve, which contains the ligament, those of the opposite valves alternately inserted between each other, and becoming nearly obsolete towards the umbones ; two lateral, strongly marked, distant, muscular impressions, which are united by an uninterrupted pallial impression ; ligament external.

Pectunculus Plumstedensis. Plate VIII. fig. 25.

The well marked characters of this genus will distinguish it from all others.

The Pectunculi are covered with a pileous epidermis ; they inhabit the ocean, occupying a wide geographical range, being met with in almost all countries. Fossil species occur in the Calcaire-grossier, and London Clay, and are numerous in the Crag.

Genus IX. — ARCA. — Linnæus.

Generic Character. — Shell transverse, or subequivalve, inequilateral, trapeziform, or subquadrate ; slightly ventricose ; some are greatly ventricose ; generally angular at both ends of the hinge line, much rounded in some species ; umbones small, remote, separated by the area to which the external ligament is affixed : hinge line rectilinear ; teeth numerous, small, serrated, close-set, alternately inserted in the opposite valves ; two lateral and distant muscular impressions, ligament external.

Arca appendiculata. Plate VIII. fig. 13.

The Aræ are marine shells, inhabiting the coasts of all climates, and bury themselves in the sand, in the same manner as the Cardiaæ. Several species, such as the *Arca Noë*, and its congeners, are affixed to extraneous substances by a strong tendinous byssus ; such species having an open space or commissure between the front part of the valves, for its passage. This section has been formed into a distinct genus under the name of Byssio-arca.

Fossil Aræ occur numerously in the Tertiary deposits, and some few are found in the inferior Oolite.

Genus X. — CUCULLÆA. — Lamarck.

Generic Character. — Shell subequivalve, trapeziform, or subquadrate ; very ventricose ; beaks distant, separated by a flat, external area, on which the ligament is placed ; two muscular impressions in each valve, of which the anterior

one is elevated into a sharp-edged plate or ledge projecting from the side of the shell; margin angulated, or with an eared, produced border, hinge rectilinear, or with a series of angular, somewhat irregular teeth, set transversely, very small near the umbones, longer and more oblique towards both extremities: covered by an epidermis.

Cucullæa glabra. Plate VIII. fig. 12.

A small portion of the anterior side of the area remains uncovered by the ligament; the area increases in size by age, and is transversely grooved in the adult state: an obtuse angle renders the anterior portions of the shells distinct, and when the valves are shut, and that side alone presented to view, it is cordiform, and longitudinally produced in the centre. The larger valve is more intensely coloured, with stronger markings inside; the smaller one being paler in colour, with more distinct and closer set striæ than the opposite valve.

Only one recent species of *Cucullæa* is known, it inhabits the Ocean. Several fossil species have been found in the Greensand and in the inferior Oolite of Britain, and at Grignon, Bordeaux, and Beauvais, France.

Genus XI. — AXINUS. — Sowerby.

Generic Character. — Shell equivalve, transverse, free, posterior side very short, rounded; hinge provided with a long, oblique ligament, situate in a furrow, stretching along the whole edge; anterior side considerably produced, angulated, and somewhat obliquely truncated, with a flattish lunette near the beaks.

Axinus obscurus. Plate IX. fig 9.

Known only in a fossil state.

Found in the Magnesian Marl, at Colyhurst, near Manchester, and at Garforth Cliff, near Leeds.

TRIBE III. — CARDIACEA,

Primary teeth irregular both in form and situation, and in general accompanied by one or two lateral teeth.

Genus XII. — PACHYMYA. — Sowerby.

Generic Character. — Shell very thick, equivalve, transversely elongated; sublobate, with the umbones situate near the anterior extremity; ligament short, partly internal, and attached to a prominent process, or fulcrum; close at both extremities.

Pachymya gigas. Plate VII. figs. 12, 13

This singular bivalve has considerably the aspect of a *Modiola*, but differs from that genus in the ligament being attached to a prominent fulcrum: the position of the umbones, the elongate shape, and partial separation of the anterior portion into a sublobate form, all connect it with *Modiola* but the

position and manner of attachment of the ligament bring it near *Cypricardia*, but it is distinguished from the latter genus by its great thickness, depth, and oblique ridge which crosses the valves.

Known only in a fossil condition, and is found in the lower portion of the Chalk at Lyme Regis.

Genus XIII. — HIPPODIUM. — Conybeare.

Generic Character. — Shell equivalve, obliquely transverse, very thick, deep, and inequilateral; umbones incurved; ventral margin sinuated so as to produce a bilobate appearance; hinge much thickened, and furnished with one rugged oblique tooth.

Hippodium ponderosum. Plate VII. figs. 21 and 23.

Found in a fossil state only. They occur in the upper beds of the Lias.

Genus XIV. — HIPPAGUS. — Lea.

Generic Character. — Shell equivalve, elongated, cordiform, ventricose, with incurved beaks: destitute of cardinal teeth.

Hippagus Isocardioides. Plate XI. fig. 5.

Known only in a fossil state.

Genus XV. — MEGALODON. — Sowerby.

Generic Character. — Shell bivalve, equivalve, longitudinal, acuminate towards the beaks; a large bifid tooth placed upon a septum across the beak of the right valve, and one irregular and more acute tooth, similarly situate in the left valve; a small pit near the teeth for the reception of the ligament, which is anterior, long and external.

Megalodon cuculatus. Plate VII. fig. 29.

This genus is nearly allied to *Mytilus*, but is at once distinguished by the large teeth at the hinge, and its ponderous valves. It has also some relation to *Myochoncha*, but the only muscular impressions which are visible, from their situation, more nearly connect it with the *Mytili*.

Known only in a fossil condition, and found in the Limestone at Bradley, near Newton Bushel, Devonshire.

Genus XVI. — ISOCARDIA. — Lamarck.

Generic Character. — Shell equivalve, heart-shaped, ventricose; beaks very distant, divergent, and involute; hinge with two primary compressed teeth in each valve, the one next the apex inflected under the umbo; and with one elongated, lateral tooth, situate immediately before the ligament, which is external, and divided into two ligaments at its posterior extremity, both of which are divergent to the

point of the beak in each valve; both valves provided with two lateral, remote, muscular impressions, the linear impression of the mantle is entire, and extending from one muscular impression to the other.

Isocardia minima. Plate VIII. fig. 24.

The *Isocardia* are distinguished from the shells of the genera *Chama* and *Diceras*, by being equivalve, and in the ligament being dichotomous, and extending to the point of the umbo.

The *Isocardia* are Oceanic shells, and the recent species are few. Fossil species occur in the Kelloways rock, the Crag and London Clay: and in a yellow coloured Limestone at Coutances in France.

Genus XVII. — CYPRICARDIA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, subquadrate, obliquely or transversely elongated; posterior side very short; hinge with three teeth in each valve, situate immediately within and behind the umbo; and one rather lengthened lateral tooth extending towards the anterior side; each valve with two somewhat irregular, lateral muscular impressions; mantle or pallial impression very indistinct and nearly obsolete; ligament external.

Cypricardia carinata. Plate X. fig. 5.

The *Cypricardia* inhabit the ocean, and are distinguished from the *Cardita*, which they resemble very nearly in form, by having *three* cardinal teeth situate under the beaks. It is supposed that they affix themselves to marine bodies by a byssus.

Fossil species occur in the Blue Marls, south of France, and in the Silurian rocks of Britain.

Genus XVIII. — CARDITA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, suborbicular, subquadrate, transversely oblong, in some instances; more or less grooved exteriorly, emanating from the umbo, and terminating in the margin: lips crenulated interiorly; two generally oblique teeth in the left valve, one of which is elongated, thick, and for the most part curved; and in the right valve one elongated, thick, and oblique tooth, with a deep, lengthened cavity, for the reception of the large tooth of the opposite valve; in some species there is an additional indistinct tooth in this valve; two somewhat ovate lateral muscular impressions in each valve; mantle muscular impression entire; ligament external.

Cardita lunulata. Plate VIII. figs 26, 27.

Distinguished from the *Cypricardia* by the number of the cardinal teeth; and although closely allied to *Cardium*, the shells of that genus are nearly

equivalve, and besides having two cardinal teeth, there are remote lateral teeth on each side of the beaks.

The Carditæ inhabit the ocean, and fossil species are met with in the newer beds above the Chalk, the Crag, *Calcaire-grossier*, and London Clay.

Genus XIX. — CARDIUM. — *Linnaeus*.

Generic Character. — Shell equivalve, nearly equilateral, and more or less gaping posteriorly; generally with strong ribs radiating from the umbones to the margins; inside of the lips crenulated, or dentated, corresponding in size to the ribs; two approximate oblique cardinal teeth in both valves, locking into each other cross-ways; and with two remote lateral teeth in both valves; two lateral distinct muscular impressions in each valve; mantle impressions entire; ligament external.

Cardium Parkinsoni. Plate VIII. fig. 21.

For the most part, there is a slight difference in the form of the two valves of the Carditæ, and in some few instances the external surface is smooth, and destitute of ribs, but they have invariably a toothed or crenulated internal margin, the crenulations being always small in the smooth species. Although a very natural genus, there is nevertheless considerable variety in external form: the *C. tuberculatum* is almost globular; some are considerably longitudinal as *C. soleniforme*, and others are deeper than wide as *C. biradiatum*, and the *C. Cardissa* has its sides considerably compressed.

The Carditæ inhabit the ocean, generally lurking in the sand near low-water-mark. Fossil species are met with in nearly almost the whole fossiliferous series, from the Mountain Limestone upwards; and are very numerous in the newer formations, such as the English Crag, London Clay, and Greensand.

Genus XX. — HIPPOCARDIA. — *Brown*.

Generic Character. — Shell transversely elongated; hinge line long, rectilinear; anterior side with a short prolongation; posterior side lengthened into an acute, wing-shaped auricular process; generally longitudinally ribbed; beaks but slightly produced.

Hippocardia Hibernica. Plate VIII. fig. 10.

Found only in a fossil state in the Mountain Limestone.

We have instituted this genus for the reception of several remarkable fossils, which are met with in the Mountain Limestone. The type of the genus is the *Cardium Hibernicum* of Sowerby.

Genus XXI. — CARDIOLA. — *Broderip*.

Generic Character. — Shell equivalve, oblique, inequilateral; beaks prominent and curved; surface concentrically furrowed; hinge line long, with a flat area.

Cardiola fibrosa. Plate XI. fig. 6.

The shells of this genus are highly characteristic of the lower members of the upper Silurian Rock, and are spread over a wide extent of country.

No recent species have been met with.

Genus XXII. — MYOCONCHA. — Sowerby.

Generic Character. — Bivalve, equivalve, oblique, sides very unequal; hinge with an elongated oblique tooth in the left valve, and provided with an external ligament; beaks placed close to the posterior extremity; destitute of a sinus in the impression of the mantle.

Myoconcha crassa. Plate VII. fig. 34.

In its general contour this shell resembles those of *Modiola*; and in the form of the hinge is somewhat allied to the genus *Crassina*; and to the *Conchæ* generally; but is, however, destitute of lateral teeth, and deficient in the posterior lobe; the posterior muscular impression is strongly indented. There is but one species known, and it occurs in a fossil state at Dundry, near Bristol.

TRIBE V. — CONCHACEA.

Shells with three primary teeth at least in one valve, and the other generally with the same number, but in some instances fewer.

SUB-DIVISION I. — MARINE. — Generally destitute of lateral teeth.

Genus XXIII. — VENERICARDIA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, sub-orbicular, the surface generally with longitudinal radiating ribs or furrows; two oblique primary teeth, directed to the same side.

Venericardia planicosta. Plate VII. fig. 26. Found fossil in the London Clay, Hampshire. It is also met with in the neighbourhood of Paris, at Piedmont, and Florence. Several other species occur in the London Clay, and Crag of England, as also in the Supercretaceous rocks of Dax and Bordeaux.

The *Venericardiæ* are marine shells; one recent species only is known, which is peculiar to the seas of New Holland.

Genus XXIV. — PULLASTRA. — Sowerby.

Generic Character. — Shell equivalve, transverse, inequilateral, the anterior side being the shorter; three diverging cardinal teeth in both valves, situate near to each other, and generally with a notched or cleft termination; and in a few

species the central tooth is deeply so; two lateral, somewhat rounded muscular impressions in each valve; mantle muscular impression with a large sinus; ligament external, and partly concealed by the dorsal margins of the valves.

Pullastra recondita. Plate IX. fig. 26. *P. globosa.* Plate X. figs. 3 and 6.

This genus was established by Sowerby for the reception of Lamarck's *Venus Pullastra*, *Virginica decussata*, and their congenerous species, to which he has most properly united the whole of the species forming Lamarck's genus *Venerupis*, whose characters entirely agree with the above named Veneres; and the animals are also of the same natural genus.

The Pullastræ are marine shells. They occur in a fossil state, and are only found in the Tertiary formation.

Genus XXV. — VENUS. — *Linnæus*.

Generic Character.—Shell smooth, equivalve, inequilateral, transverse, subglobose or suboval; external surface sometimes rugose, margin close; three divergent cardinal teeth in each valve, all approximate; umbones prominent for the most part, with a cordiform depression immediately below them; two lateral, remote, somewhat orbicular muscular impressions, united by a pallial impression, which is generally sinuated behind; ligament external, although sometimes almost hidden by the extension of the outer edge of the shell.

Venus incrassata. Plate VIII. fig. 4.

This extensive genus requires to be separated into the following sections.

SUB-DIVISION I. — Lunule distinctly circumscribed by an impressed line.

Section 1. Somewhat cordiform, generally a little acuminate and rounded anteriorly, sinus of the pallial impression nearly obsolete; each valve with two large distinct divergent teeth, and a small tooth which is anterior in the right valve, and posterior in the left; as in *V. Paphia*.

Section 2. Subovate, anterior side considerably shorter than the posterior; generally lamellose or longitudinally grooved externally; each valve with three strong divergent cardinal teeth, the two anterior ones emarginate in one valve, and the two posterior ones in the other, with a moderately sized siphonal impression, and a little rounded. *V. purpurata*, illustrates this section.

Section 3. Like those of section 2, but with external, thin, remote lamellæ; pallial impression anteriorly acuminate, and very small; central cardinal teeth large and thick; the others small and thin; the anterior somewhat curved, as exemplified in *V. lamellosa*.

Section 4. Exteriorly rough and cancellated; the central and posterior teeth in the right valve large, thick, and emarginate, the anterior linear and thin; in the left valve the central tooth is thick and emarginate, while the anterior is elongated, thick and linear; posterior tooth small, linear, thin and nearly obsolete; pallial sinus rounded in front, and of moderate size.

Section 5. In the right valve the posterior teeth are very large and thick, and the two anterior teeth small and contiguous, the intervening space only fitted to receive the thin lamellar anterior tooth of the left valve; central tooth of the left valve thick and double, and the posterior elongated, and narrow, somewhat lamellose, muricated or externally cancellated; siphonal impression large and acuminate.

SUB-DIVISION II. — Lunule not circumscribed by an impressed line.

Section 6. External form nearly orbicular; three divergent teeth in the hinge; pallial sinus large and acute at its anterior end, with a flattened space under the fulcrum, to which the ligament is attached: surface almost smooth.

Section 7. External form ovate, and very thin; right valve, with the two anterior teeth thin, lamellar and contiguous, the intervening cavity receiving a thin tooth of the opposite valve, the posterior tooth double, thin, and elongated; left valve with a thick, and large central tooth, and having a very thin and linear posterior tooth; siphonal impression large.

Section 8. External form approaching the Cythereæ, surface smooth; pallial impression with a small rounded sinus; right valve with three teeth, the posterior two large, and the anterior very small; left valve with three large teeth

The Veneres are marine shells, inhabiting the shores of almost all countries, and bury themselves in the sand.

Fossil shells of this genus are found in the beds of the Tertiary formation.

Genus XXVI. — CYTHEREA. — *Lamarck*.

Generic Character. — Shell bivalve, equivalve, generally more or less equilateral, or obtusely trigonal and transverse, or ovate; smooth, or variously striated; with three or more short divergent cardinal teeth; and one anterior approximate lateral tooth in both valves, situate near the primary teeth; two remote, lateral muscular impressions, united by a pallial impression; ligament external.

Cytherea polita. Plate X. fig. 15.

The shells of this genus are distinguished from those of *Venus*, by their lateral teeth.

This comprehensive genus may be properly separated into the following sections.

Section 1. Agreeing in general character with the shells of the genus *Venus*, the only difference being in the species of this section having a distinct, blunted, lateral tooth, and in the pallial impression being destitute of a sinus; most of the species are smooth on the external surface; some few have divergent striæ and ribs; and others are concentrically striated; with their beaks inclined forwards; lunule more distinctly marked than in their congeners. *C. scripta*, and *ornata*, &c. illustrate this section.

Section 2. External surface smooth, and provided with a thin corneous epidermis; three divergent cardinal teeth in each valve, and a lateral anterior tooth situate under the elongated, and indistinct lunule; muscular impression of the mantle provided with a small sinus; general shape obtusely trigonal; anterior side shortest; umbones with a slight inclination forwards. *C. lusoria*, and *petechialis*, illustrate this section.

This may be considered the typical group of the Cythereæ.

Section 3. External surface smooth and covered by a thin velvety epidermis; four or five divergent cardinal teeth; an elongated, nearly lamellar anterior lateral tooth; muscular impression of the mantle with a large rounded sinus; lunule elongated and indistinct; beaks less inclined forwards than in the preceding section. Illustrated by *C. corbis*.

Section 4. External form nearly oval, anterior side much shorter than the posterior; outside smooth, and covered by a thin corneous epidermis; a few, however, are grooved longitudinally; three divergent cardinal teeth in each valve, and a closely approximated, blunted lateral tooth; pallial impression very large, and usually pointed at its anterior end. *C. Erycina*, and *Chione*, are examples of this group.

We have removed those shells of a lenticular form, such as *C. exoleta*, and its congeners, and constituted a new genus with them, under the title of *Artemis*. * This genus was instituted by Poli.

The Cythereæ inhabit the ocean; and are distinguished from the Veneres, and the Cyprinæ, by having a lateral tooth; and from the Lucinæ, by the form of the muscular impression.

Fossil shells of this genus are principally met with in the Tertiary formations, the London Clay, Calcaire-grossier, and Greensand; and several species occur in the Oolitic group of rock.

Genus XXVII. — ARTEMIS. — Poli.

Generic Character. — Shell nearly lenticular, externally and concentrically grooved; beaks much turned to one side, beneath which is a short, strongly-marked cordiform depression; three cardinal teeth in each valve, two of which are contiguous, and the other divergent, which is broad in the right valve, cleft in the centre, to receive that of the opposite valve, which is slender, with a small lateral and closely approximated tooth; pallial impression with a large oblique and straight-sided sinus; cartilage external.

Artemis lentiformis. Plate X. fig. 16.

The shells of this genus are marine, and live in deep water. Fossil species are rare, and occur in the Crag of Essex and Sussex.

Genus XXVIII. — CYPRINA. — Lamarck.

Generic Character. — Shell ventricose, equivalve, inequilateral, suborbicular, obliquely heart-shaped; umbones obliquely curved, anteriorly; three cardinal teeth in each valve, approximated at their bases, and divergent above, with a posterior lateral tooth remote from the primary teeth; external surface covered by a thick, rough, dark, horny epidermis; each valve with two lateral, remote, muscular impressions; pallial impression with a slight sinus; ligament

* Genus EXOLETA, of our "Illustrations of the Conchology of Great Britain and Ireland," first edition, and of our "Conchologist's Text Book."

external, inserted into a deep, marginal, posterior, dorsal sinus.

Cyprina equalis. Plate X. fig. 14.

The *Cyprinae* are marine shells; three species only are known, and they inhabit the Northern hemisphere. Several fossil species occur in the Tertiary formations.

They may at once be distinguished from the *Venus* and *Cytherea* by their thick epidermis, and remote lateral teeth.

SUBDIVISION II. — FLUVIATILE. — Shells covered with a spurious epidermis, and the hinge provided with lateral teeth.

Genus XXIX. — CYRENA. — *Lamarck*.

Generic Character. — Shell suborbicular, subtrigonal, equivalve, ventricose, inequilateral, and solid; external surface covered with a strong epidermis, and the umbones usually decorticated; three cardinal, and two remote lateral teeth in each valve; in one valve the posterior one is situate near the primary teeth, the anterior one being more remote, and placed before the ligament; in the opposite valve a deep groove intervenes between two teeth, one of which is large, and the other nearly obsolete; two lateral remote muscular impressions; pallial impression destitute of a sinus; ligament external.

Cyrena cuneiformis. Plate IX. fig. 33.

This genus is divided into two sections.

Section 1. With the lateral teeth crenulated, striated, or serrated.

Section 2. Lateral teeth entire, and destitute of striæ, or crenulations.

The species of this genus have a considerable similitude to those of *Venus*, *Cyprina*, *Cytherea*, and *Cyclas*. From the former three they are distinguished by their two remote lateral teeth, and by the thickness of their shell from *Cyclas*.

The *Cyrenæ* are all fluviatile shells, and entirely inhabitants of tropical climates. They occur abundantly in a fossil state, in the upper Marine formation of the Isle of Wight, at Woolwich, Hordwell, and neighbourhood of Paris.

Genus XXX. — CYCLAS. — *Bruguère*.

Generic Character. — Shell generally suborbicular; ventricose, equivalve, nearly equilateral, transverse, and thin, covered with a delicate olivaceous epidermis; two very minute, divergent, cardinal teeth in both valves, one of which is double in the left one; lateral teeth, two remote and a little elongated, laminar, compressed, and acute; and four in the other, two of which are very small, situate on each side of the hinge; two lateral ovate muscular impres-

sions in each valve, that of the mantle entire, and destitute of a sinus; ligament external and slender.

Cyclas deperdita. Plate VIII. fig. 1. *C. lævigata*. Plate X. fig. 7.

The Cyclades appear to be found only in the continents of Europe and America. They inhabit lakes, ponds, ditches, and slow running streams. Fossil species occur in the recent lacustrine formations, and the Blue Marls of France.

GRAND-DIVISION III. — TENUIPEDES.

The mantle barely united before; foot small, narrow, and compressed; shell having but a moderate gape.

TRIBE I. — NYMPHACEA.

Having never more than two primary teeth in the same valve; shell often gaping slightly at the lateral extremities; ligament external; umbones generally projecting outwards.

SUBDIVISION I. — Destitute of lateral teeth.

Genus XXXI. — CRASSINA. — Leach.

Generic Character. — Shell suborbicular, transverse, equivalve, inequilateral; hinge with two strong, divergent, cardinal teeth in the right valve, and two unequal primary teeth, and one small, nearly obsolete tooth, together with an indistinct lateral one in the left valve; two ovate or oblong, remote, lateral, simple muscular impressions in each valve, with a third very small one, situate immediately below the indistinct lateral tooth, or at the end of the posterior external depression, and in some instances mingling with the lower termination of the posterior muscular impression, which is always simple and not sinuated; ligament external.

Crassina lurida. Plate VIII. fig. 8.

The Crassinæ are marine shells, and do not appear to be met with in the tropics. One species inhabits the Northern Ocean. They are distinguished from *Crassatella* by their external ligament.

Fossil species are numerous, and occur in the lower Oolite, the English Crag, and Greensand.

Genus XXXII. — PACHYODON. — Stutchbury.

Generic Character. — Shell transverse, elliptical, equi-valve, inequilateral, thick; hinge very strong, with one oblique, thickened, cardinal tooth in the right valve, with a

pit for its reception in the left valve; anterior lateral tooth in the right valve obtusely conical; the posterior tooth in the left valve elongated, and attenuated towards the umbo; right valve with a flattened fold lying parallel to the ligament, and divided obliquely near the umbo by a faint groove; from the anterior extremity of this fold a depression extends beneath the lunule, in front of the anterior lateral tooth, with a corresponding elevation; umbones closely approximating; muscular impressions deep; pallial impressions entire, deeply defined, and destitute of a sinus, ligament external, situate in a deep, marginal, dorsal sinus.

Pachyodon crassissima. Plate VIII. fig. 16.

This is entirely a fossil genus, the species hitherto have been considered and described as belonging to the genus *Unio*, they occur in the Oolitic group, and in the Lias. The difference between *Unio* and *Pachyodon* is, that the cardinal tooth is frequently obsolete, the anterior lateral tooth thick, simple, and destitute of striæ, is situated in the right valve, with a hollow for its reception in the left valve; the posterior lateral tooth is placed in the left valve, and the sulcus for its reception in the right; the two muscular cicatrices are very deep, with a small round impression above the anterior one in the left valve. They are also destitute of any erosion at the umbo, so common in fluviatile bivalves; and the lines of growth are very strongly marked.

SUB-DIVISION II. — With one or two lateral teeth.

Genus XXXIII. — DONAX. — *Linnæus*.

Generic Character. — Shell transverse, trigonal, equi-valve, inequilateral, outer surface generally covered with a thin horny epidermis, anterior side for the most part the shorter; left valve with two more or less distinct cardinal teeth; right valve with only one cardinal tooth, which is generally cleft at its extremity; lateral teeth variable, either two or one very minute and remote; muscular impression of the mantle with a large sinus. Ligament external and short.

Donax retusa. Plate IX. fig. 20.

In some there are two lateral teeth, one of which being placed on each side of and near to the primary teeth; one valve is provided with a linear posterior process, remotely situated from the other lateral teeth, and between which and the margin of the shell there is a groove for the reception of the teeth of the other valve; the anterior lateral tooth can alone be distinguished in each valve in other species, together with the linear process; in other species there are two lateral teeth in one valve, the posterior one more remote than the anterior, while in the opposite valve there are only slight indications of them; and in some species the lateral teeth are nearly obsolete. The ligament is generally short, and in some instances very much so, the greater portion of it

is situate anteriorly;* but in most of the species a small portion of the ligament is likewise placed behind the beaks. The shells of this genus are for the most part wedge-shaped.

Some species of *Erycinæ* may be mistaken for *Donaces*, but the ligamentary pit in the hinge of the former genus, will at once distinguish it from the latter; the *Capsæ* have also a strong resemblance to this genus, but are always devoid of the short anterior side, and crenated margins which characterize the *Donaces*.

The *Donaces* inhabit the Ocean. Fossil species are few and rare. Broechi mentions only two, and Sowerby one from Bordeaux.

Genus XXXIV. — LUCINA. — Bruguière.

Generic Character. — Shell equivalve, inequilateral, usually orbicular, lenticular, and subdepressed; teeth variable, most commonly two minute cardinal teeth, divergent from the umbo, frequently nearly obsolete; in one valve one lateral tooth on each side of the umbo, and two on each side in the other; the anterior lateral ones being situate near the primary teeth, and the posterior immediately behind the ligament: two muscular impressions remote from each other, the anterior one generally extruded backwards and downwards in the form of an elongated band; pallial impression destitute of a sinus; ligament external, elongated, and partly hidden by the inflected margins of the valves when closed, consequently, the internal tendinous portion is frequently sunk into a deep, elongated cavity, situate between the teeth and hinge-margin.

Lucina mites. Plate IX. fig. 25.

Although the general form of the *Lucinæ* is lenticular, they are subject to considerable variety; some species, — the *L. Columbella* for example, is nearly globular. The teeth also differ considerably in number and size, but never in position; some species have cardinal teeth only, while in others the lateral are more distinct than the cardinal teeth; in a few species both are considerably developed, and in others they are all nearly obsolete.

The *Lucinæ* have much of the general aspect of the *Amphidesmæ*, but are distinguished by their anterior muscular impression being ligulate; the *Amphidesmæ* have a very large sinus in the muscular impression in the mantle, and the tendinous part of the ligament entirely internal. This ligulate muscular impression distinguishes them from the *Cythereæ*.

The *Lucinæ* inhabit the ocean. Fossil species are numerous, and occur in the beds of the Tertiary formations, of which they are a characteristic type.

Genus XXXV. — CORBIS. — Cuvier.

Generic Character. — Shell transverse, equivalve, free, oval, thick, extremely ventricose and subequilateral; um-

* Contrary to Lamarck, we consider the side in which the ligament is situate, to be the anterior side, and it are only lead to confusion to make an exception in this genus.

bones small and incurved, two cardinal and two lateral teeth in each valve, the posterior one placed nearer to the cardinal teeth than the other, which is rather remote from the umbones, and situate near the termination of the ligament: two lunulate muscular impressions in each valve, simple, somewhat oblong in form, and placed close behind the umbones; pallial impression entire, and destitute of a sinus. Ligament external, the parts to which it adheres forming a deep groove when the valves are closed.

Corbis laevis. Plate IX. fig. 17.

The shells of this genus are somewhat allied to the *Lucinæ*, but may be distinguished by their more oval form, by the simple, rather oblong muscular impressions: they are also something like the *Tellinæ*, but are destitute of the fold of the anterior margin of that genus; some species of *Cythereæ* and *Venus*, resemble *Corbis*, but the lateral teeth, and entire pallial impression, will at once distinguish them.

Only one recent species of this genus is known, which inhabits the Indian Ocean. Lamarck describes two species, from the newer formations above the Chalk, at Grignon and Granville in France.

Genus XXXVI. — TELLINA. — *Linnaeus*.

Generic Character. — Shell compressed, transverse, sub-equivalve, inequilateral; posterior side usually rounded; the anterior somewhat produced, or beaked and angular; anterior ventral margin with an irregular flexuosity; generally with two cardinal teeth in each valve, but only one in some instances, usually two lateral teeth in both valves, but sometimes only one, and for the most part remote from the primaries; two distant muscular impressions; pallial impression with a very large sinus: ligament external.

Tellina patellares. Plate IX. fig. 29. *T. ovata*. Plate VIII. fig. 9.

Section 1. Shells transversely oblong; as in T. Spengleri and rostrata.

Section 2. Shells ovate, with a rough exterior, as exemplified in T. Lingua Felis.

Section 3. Shells nearly orbicular; as T. carnaria and scobinata.

Section 4. With one valve more flattened than the other, as in T. opercularis.

Section 5. Both valves remarkably convex, as in T. lacunosa.

The irregular fold in the anterior margin, is a striking characteristic of this genus.

The Tellinæ inhabit the sea, burrowing in the sand, generally on flat shores. The recent species are numerous, and but few have been found in a fossil state: these are peculiar to the newer Tertiary formations.

SUB-DIVISION III. — SOLENAIRES.

Genus XXXVII. — PSAMMOBIA. — Lamarck.

Generic Character. — Shell transverse, oblong, somewhat angular, gaping at each extremity, and covered with a thin horny epidermis; with two short, bifid, cardinal teeth in the left valve, and one in the right valve; two distant, suborbicular, muscular impressions in both valves, situate near each end of the valve; pallial impressions with a very large sinus; ligament external, and supported upon a prominent fulcrum.

Psammobia solida. Plate IX. fig. 14. *P. dubia.* Plate X. fig. 1.

The Psammobiæ are marine shells; and inhabit the tropical as well as the temperate seas. They are distinguished from the Tellinæ by being destitute of the anterior marginal fold. Only a few species have been found in a fossil condition; in the Blue Marls of France, and in the Oolitic group of rocks.

The genus *Psammotæa* of Lamarck is suppressed, and its species united with those of this genus.

Genus XXXVIII. — SANGUINOLARIA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, transverse, subelliptical, or ovate; compressed, sometimes transversely oblong, and for the most part thin, and generally covered with a glossy, olivaceous epidermis; length of the two sides of each valve varying in different species, and gaping at both extremities; margins generally rounded, but not parallel to each other; both valves provided with two cardinal teeth, but destitute of lateral teeth; ligament external, the fulcrum or space to which it is attached, generally prominent; two very irregularly shaped, lateral muscular impressions in each valve, the pallial impressions with a large sinus.

Sanguinolaria Hollowaysii. Plate X. fig. 12.

The shells of this genus inhabit the seas of tropical climates. They are but few in number. Fossil *Sanguinolaria* are rare, and occur in the Oolitic group.

Genus XXXIX. — EGERIA. — Lea.

Generic Character. — Shell generally subtriangular; two divergent cardinal teeth in each valve, one of which is cleft;

with or without lateral teeth ; internal margins crenated in some species ; ligament external.

Egeria triangulata. Plate XI. fig. 7.

The species of this genus are all fossil, and have only been met with in the Tertiary formation of Alabama, America.

Genus XL.—GRATELOUPIA.—*Moulin.*

Generic Character.—Shell equivalve, inequilateral, sub-cuneiform, anteriorly rounded, posteriorly subrostrated ; hinge with three cardinal teeth, a series of five or six irregular, small divergent teeth behind the umbones, and one lateral, anterior tooth in each valve ; ligament external ; muscular impressions two ; pallial impression situate posteriorly.

Grateloupia Moulinii. Plate XI. fig. 8.

Known only in a fossil state.

TRIBE II.—LITHOPHAGI.

Boring shells, destitute of accessory pieces, and more or less gaping at their anterior side ; ligament of the valves external.

Genus XLI.—PETRICOLA.—*Lamarck.*

Generic Character.—Shell equivalve, inequilateral, transverse, for the most part rather triangular, but some species are transversely elongated, and others subquadrate ; posterior side rounded ; anterior side somewhat produced, more or less attenuated, and generally gaping ; each valve provided with two cardinal teeth ; which in some instances are curved and acute, especially the posterior tooth in the left valve, and the anterior tooth in the right ; the teeth are sometimes grooved internally, and the anterior tooth in one valve is broad and bifid ; and in some instances the teeth are obtuse and short : two muscular impressions in each valve, that on the posterior side somewhat oblong, and the anterior one suborbicular ; pallial impression with a large sinus ; ligament external, but in some species nearly concealed by the prominent anterior margin of the valves near the beaks.

Petricola laminosa. Plate IX. fig. 22. Distinguished from the *Saxicava* by having hinge teeth, and in being more regular in form.

The *Petricolæ* inhabit the Ocean, and burrow in cavities of rocks, or wood.

They are rare in a fossil state, and the species figured is met with in the Suffolk Crag.

Genus XLII. — SAXICAVA. — Lamarck.

Generic Character. — Shell transverse, irregular in form, generally oblong, inequilateral, subequivalve, gaping anteriorly; ligament exterior; two lateral muscular impressions in each valve, pallial impression interrupted but not sinuated; hinge in the young condition, with sometimes two or three minute, obtuse, mostly indistinct cardinal teeth, which become obsolete in the adult.

Saxicava rugosa. Plate IX. fig. 21.

The *Saxicavæ* are marine shells, and seem principally confined to temperate climates, they burrow in wood, clay or limestone, and other soft rocks. Fossil species are met with in the Suffolk Crag, and newer formations.

TRIBE III. — CORBULACEA.

Shells inequivalve; the ligament interior.

Genus XLIII. — PANDORA. — Bruguière.

Generic Character. — Shell free, thin, internally pearly, inequivalve, transverse, inequilateral, the anterior side the longer, subrostrated and slightly gaping at its extremity; one valve flat, with two internal anterior ribs, and with its anterior margin turned downwards, provided with a single oblong, obtuse cardinal or hinge-tooth, situate behind the ligament; the opposite valve concave and destitute of teeth, but furnished with an indistinct cicatrice on which the tooth of the flat valve rests, when the shell is closed; in each valve are two distant, lateral muscular impressions, ligament internal, its sides lodged in, and attached to an elongated cicatrice, which lies inclined to the anterior side of the valves; in some species the cicatrice is produced into an elongated divergent lamina, stretching from the umbo towards the anterior side of the shell, and terminating near the inner side of the anterior muscular impression.

Pandora Defranci. Plate X. figs. 8, 9.

This genus is distinguished from *Tellina* by its internal ligament, and from *Corbula* by its single obtuse tooth in one valve only.

The *Pandoræ* are marine shells; and have been found in a fossil condition, in the Calcaire-grossier.

Genus XLIV. — CORBULA. — Bruguière.

Generic Character. — Shell inequivalve, one valve being generally small and flattened, the other large and convex;

subequilateral, transverse, generally gibbose and close; each valve usually furnished with a single conical, recurved, ascending, pointed tooth, at the side of which is a small concave depression, — very deep in some species, which serves either for the reception of the ligament, or the tooth of the opposite valve; two distant, lateral, somewhat irregular muscular impressions in each valve; pallial impression posteriorly angulated, with a very small sinus; ligament internal, fixed to the tooth of the lesser valve, and inserted in the depression by the side of the tooth, in the larger valve.

Corbula revoluta. Plate X. fig. 10.

The Corbulæ inhabit the ocean, and are pretty numerous. They are frequently found in a fossil state in the English Crag, Greensand and London Clay, and contemporaneous formations.

The shells of this genus differ from those of *Mya*, in having a sinus in the pallial impression, and in their prominent ligamentiferous tooth in each valve, while the *Myæ* have only one.

TRIBE IV. — MACTRACEA.

Shells equivalve, often gaping at the lateral extremities; ligament interior, or partly external; animal with the foot small and compressed.

SUBDIVISION I. — Ligament seen externally or double.

Genus XLV. AMPHIDESMA. — *Lamarch.*

Generic Character. — Shell equivalve transverse, slightly inequilateral, somewhat ovate or orbicular; some species gaping at the sides; each valve provided with one, or in some instances two small, slender, cardinal teeth; and two distinct elongated, lateral teeth, situate near the hinge in one valve, and are nearly obsolete in the other; pallial impression with a very large sinus; ligament double, its external portion slender, and rather short, and the internal cartilage generally longer and larger, adherent in both valves to an elongated groove or pit, which varies in length in different species, and takes its rise immediately within the umbo, and is prolonged within the anterior lateral tooth.

Amphidesma decaratum. Plate IX. fig. 8.

The larger species of this genus are provided with a flexure in the anterior margin of both valves, as in the *Tellinæ*.

The inner portion of the ligament being at a distance from the cartilage, distinguishes the shells of this genus from all others, because in most univalves the cartilage and ligament are united in one mass, or situated close to

each other. Although the Lutrariæ have a tendency to this structure, they differ from that genus in their lateral teeth, and by the valves being almost entirely close, while in the Lutrariæ they gape widely at one end.

The Amphidesmæ are Oceanic shells, inhabiting the seas of all countries. Fossil species, (if they really are true Amphidesmæ) are exceedingly rare, and occur in the Cornbrash, Kelloways rock, and upper liasshale; the *A. decaratum* belongs to the Cornbrash.

SUBDIVISION II. — Shell not gaping at the sides; ligament external.

Genus XLVI. — ERYCINA. — Lamarck.

Generic Character. — Shell smooth, transverse, ovate, or triangular, equivalve, generally inequilateral; and one valve with two unequal, thick, divaricate, cardinal teeth, with an intermediate pit for the reception of the ligament, and two oblong, compressed, short lateral teeth, situate near the primary teeth; the opposite valve is destitute of cardinal teeth, or they are quite obsolete; in some instances one of them is united to the anterior lateral tooth, which is always very short, and thus increases its thickness; the lateral tooth in this valve is compressed and oblong; two lateral pallial muscular impressions, with a small sinus, ligament internal, affixed in each valve into a narrow, concave space between the teeth.

Erycina fragilis. Plate X. fig. 13.

The Erycinæ are distinguished from the Crassatella, Lutraria and Mactra by the manner in which the teeth are situate on each side of the ligamentiferous pit, while in the two latter genera they are both situate on the anterior side; it is known from the former genus by the sinus in the mantle muscular impression and its distant and compressed lateral teeth.

The shells of this genus are marine, and have been met with in a fossil state in the supercretaceous rocks of Bordeaux and Dax. The species are very rare in a fossil condition.

Genus XLVII. — CRASSATELLA. — Lamarck.

Generic Character. — Shell thick, equivalve, transverse, inequilateral; external surface generally covered with a brown horny epidermis, and more or less transversely grooved; one valve provided with two strong cuneiform, rugose cardinal teeth, which are sometimes perpendicularly grooved; and one primary tooth in the opposite valve; lateral teeth wanting or nearly obsolete, two strong oblong depressions, the one on the anterior side of the umbo somewhat elongated, and not so well marked as that in the posterior side; two remote, lateral, rather oblong muscular impressions; ligament internal, attached to a concave pit situate on the anterior

side of the hinge, this space is divided by a rib into two portions, the outer half of the ligament is externally visible when the valves are closed.

Crassatella sulcata. Plate IX. fig. 16.

The *Crassatellæ* are marine shells, and principally inhabit the coasts of New Holland.

Fossil species are met with in the London Clay, and Calcaire-grossier, near Paris.

Genus XLVIII. — THETIS. — Sowerby.

Generic Character. — Shell equivalve, subequilateral, more or less orbicular and convex; ligament marginal; hinge with three or four acuminate cardinal teeth, but destitute of lateral teeth; pallial impression with a deep sinus extending nearly to the beak; muscular impressions round, small and remote from the hinge; ligament external.

Thetis minor. Plate VII. figs. 22, and 25.

The shells of this genus are all fossil, and occur principally in the lower greensand of Sussex, Lyme Regis, and Isle of Wight.

SUBDIVISION III. — Ligament internal; shell gaping at the sides.

Genus XLIX. — MACTRA. — Linnæus.

Generic Character. — Shell generally thin, sometimes thick; equivalve, for the most part nearly equilateral, and more or less regularly triangular; slightly gaping at one end, and almost imperceptibly so at the other; each valve with one V shaped cardinal tooth, the point being next the umbo, and diverging from it, and in some species the limbs are disunited at the base, so as to give the appearance of two distinct teeth; close on the posterior side is situate a very thin sharp tooth; immediately behind the angular tooth is situate the pit for the reception of the ligament, and projecting somewhat within the shell; one valve with two lateral teeth on each side, and one on both sides in the other, diverging from the beaks, placed near the margin of the shell and fitting into the space between the two in the opposite valve; two lateral, remote muscular impressions; mantle muscular impression with a small sinus; ligament consisting of two portions, the one considerably larger than the other and internal, and the other half external.

Mactra semisulcata. Plate X. fig. 11.

In the thick species the lateral teeth are perpendicularly striated; these are generally elongated, with the inner ones more prominent than the outer; they are quite short in some species, such as the *M. Spengleri*. The beaks are

separated in some species, and the ligament placed in a groove or pit extending both internally and externally to the beak.

The Mactræ inhabit the seas of almost all climates. Fossil species are found in the Secondary and Tertiary formations, especially in the Oolite of the former.

Genus L. — LUTRARIA. — Lamarck.

Generic Character. — Shell equivalve, inequilateral, thin, transversely ovate or oblong ; gaping at both sides ; the posterior side generally the longer, and always gaping more than the other ; one valve with two thin laminar teeth, one of which is sometimes compound ; the opposite valve with three teeth, the central one compound in some instances, and the posterior one slender and compressed ; two distant lateral muscular impressions ; muscular impression of the mantle with a large sinus ; ligament internal, situate in a deltoidal oblique, internally projecting spoon-shaped pit, with a prominent margin placed next to the teeth in each valve.

Lutraria sulcata. Plate XI. fig. 9. Found in the Mountain Limestone, Northumberland.

The Lutrariæ are distinguished from the Mactræ, by their wanting lateral teeth, and the large sinus in the mantle muscular impression. The internal ligament removes them from the Anatinæ.

The shells of this genus inhabit the sea ; and it is quite uncertain if any true Lutrariæ have been found in a fossil state ; although several species have been described as such.

GRAND-DIVISION IV. — CRASSIPEDES.

Mantle entirely or partly united before, foot thick, placed posteriorly, shell gaping when closed.

TRIBE I. — MYARIA.

Ligament internal ; a broad, spoon-shaped tooth in each valve, or in one only ; shell gaping at both sides, or at one only.

Genus LI. — MYA. — Linnæus.

Generic Character. — Shell transverse, nearly equivalve, gaping at both extremities, but widest at the posterior side ; one valve with one large, compressed, dilated, hollow, spoon-shaped, perpendicular, vertically projecting tooth ; the opposite valve destitute of teeth ; the cartilage placed in a narrow suture ; two lateral, distant, large muscular impressions, the anterior one narrow, and the posterior almost orbicular ; pallial impression with a large sinus ; ligament

internal, large, and fixed in the cavity of the tooth in one valve, and to a large subumbonal cicatrix in the other.

Mya lata. Plate X. fig. 22.

The *Myæ* are easily distinguished, by the large upright tooth in one valve only; they are marine shells, and inhabit the seas of the Northern Hemisphere.

They are found in a fossil state in the Crag, the Blue Marls of France, and also in the Cretaceous and Oolitic group of rocks.

TRIBE II. — SOLENIDES.

Shell transversely elongated, destitute of accessory pieces, and gaping only at the lateral extremities; ligament external.

Genus LII. — PANOPÆA. — *Mesnard*.

Generic Character. — Equivalve, oval, inequilateral, gaping unequally at both extremities; hinge with an acute primary tooth in each valve, and a large callosity near the umbones, supporting the ligament; two distant, oval, muscular impressions, pallial impression with a large sinus; ligament large, external, adhering to an ample prominent fulcrum.

Panopæa biconæ. Plate XI. fig. 10.

The shells of this genus bear a general resemblance to those of *Mya*, but differ in having a sharp tooth, and external ligament, instead of the broad, spoon-like process in the hinge of *Mya*.

They inhabit the ocean, and one species has been dredged off Scarborough.

In a fossil state they are met with in the Blue Marls of France, the supercretaceous rocks of Bordeaux and Dax, and in the Greensand.

Genus LIII. — SOLEN. — *Linnæus*.

Generic Character. — Shell equivalve, transversely elongated, subcylindrical, prodigiously inequilateral, umbones nearly terminal, situate close to the anterior side, and gaping widely at both extremities; truncated, or subtruncated, sometimes rounded; hinge linear, with several small cardinal teeth, various in form, often acute and recurved; lateral teeth somewhat elongated and crooked; muscular impressions distant, tongue-shaped, the anterior one joined a little behind the umbones; the posterior one irregular and sub-oval; pallial impression elongated, straight and bifurcated behind; ligament long and exterior; external surface covered with a thick horny epidermis.

Solen fragilis. Plate X. fig. 19.

The above generic character embraces only those shells whose general form

corresponds with *Solen siliqua*. The others are separated under different generic appellations.

The Solens inhabit the ocean, concealing themselves in sand.

But few fossil species have been found, and these occur in the London Clay, and Calcaire-grossier of France.

Genus LIV. — PHOLADOMYA. — Sowerby.

Generic Character. — Shell transverse, inequilateral, equivalve, ventricose, very thin and hyaline, anterior side more or less elongated and gaping; posterior side, sometimes very short, rounded; upper edge slightly gaping; hinge with a small, rather elongated triangular pit, and a marginal lamina in each valve; to the outer surface of which is attached a somewhat short external ligament; inside pearlaceous; two indistinct muscular impressions, muscular impression of the mantle nearly obsolete, and with a large sinus.

Pholadomya angustata. Plate IX. fig. 19. *P. lirata*. Plate IX. fig. 23.

The *P. candidæ* is the only recent species of the genus known, it is found on the coast of the Island of Tortola. The umbones are so close to each other, that they are worn through by the attrition of opening and shutting of the valves.

The shells of this genus partake of the characters of *Anatina* and *Pholas*, but may be distinguished from them by the external ligament; and the want of accessory valves; in the structure of the hinge they are allied to *Panopæa*, but differ in their extreme thinness, transparency, and pearly texture; and from *Mya*, in wanting the unequal teeth of that genus.

Fossil species are pretty numerous, and occur in the Inferior Oolite, Cornbrash, Fuller's Earth, the London Clay, Lias, and the Sutherland coal-field.

TRIBE III. — PHOLADARIA.

Shell bivalve, with accessory pieces to the valves; gaping much anteriorly.

Genus LV. — PHOLAS. — Linnæus.

Generic Character. — Shell transversely oblong, equivalve, greatly inequilateral; nearly the whole species gaping at both ends, and most of them with the opening very large at the anterior end, and extending along the basal margin; in some species, however, it is nearly closed by a testaceous, almost smooth, somewhat tubular prolongation of the valves; hinge in various species with an unequally sized small recurved tooth in each valve; external surface generally roughened with muricated striæ, presenting a rasp or file-like appearance; most of the species provided with a

greater or lesser number of accessory valves, situate near the fulcrum of the hinge, and connected with the shell only by the epidermis, which passes over them; each valve furnished with a long curved, flat, tooth-like testaceous process, projecting from the interior of the shell, immediately within the umbones; in some species this is expanded, and spoon-shaped; anterior dorsal margin near the beaks reflected, close, and flattened down upon the umbones in some species, and in others a second margin is produced, situate remote from the first, with the intervening space divided by a series of transverse septa; two principal impressions, formed by the adductor muscle, one of which is placed on the reflected margin over the beaks, and the other intermediate, between the umbones and the posterior side; muscular impression with a large sinus in its narrower part, the impression being somewhat expanded near to the sinus.

Pholas aperta. Plate X. figs. 20, 21, and 28.

The Pholades differ from the Teredines, chiefly in the latter having a testaceous tube situate *behind* its valves, in having no accessory appendages or valves, and when the valves are closed, they assume nearly a globular form. Turton's genus, *Xylophaga*, is provided with accessory valves, but is destitute of the testaceous tube, and the internal shelly tooth-like process of *Teredo* and *Pholas*.

The Pholades inhabit the ocean, and are found in the seas of all countries, burrowing in limestone rocks, wood, or clay. They are rare in a fossil state, and those known have been found in the English Crag, in the Calcaire-grossier of France, and its contemporaneous formations in Touraine and Italy. Some of these have been found in the cavities which they themselves have made.

TRIBE IV. — TUBICOLA.

Animal contained in a testaceous sheath, distinct from its valves, incrustated entirely or in part in the wall of this tube, or projecting outwards.

Genus LVI. — GASTROCHÆNA. — *Spengler.*

Generic Character. — Shell equivalve, inequilateral, somewhat wedge-shaped; anterior side rounded, when viewed in front, and posteriorly acuminate; anterior side gaping widely, its aperture being subovate, and acute behind; hinge marginal and linear, destitute of teeth, but in their stead a small laminated appendage, emanating from the umbo, allied to the same tooth-like process in the genus *Pholas*; ligament external.

Gastrochæna contorta. Plate XI. fig. 14.

This shell is enclosed in a testaceous, irregular, claviform

tube, situate at its broader extremity; it is open and attenuated anteriorly, with an oblong, bilobate aperture, which is nearly subdivided by a projecting septum, that does not quite reach across the opening; these serve for the passage of the two tubes of the animal; the posterior end of the tube is closed. This club-shaped tube is found either within the perforated cavities of rocks, or in old shells or corals, the testaceous tube always protruding beyond the surface.

The *Gastrochæna* are readily distinguished from the *Pholades* by their testaceous tube, and by wanting accessory valves; they seem the connecting link between the *Pholadaria* and *Tubicola*. They differ from the *Fistulanæ* in the oval form of the valves, and in the curvature of the tube, from *Clavagella* and *Aspergellum* in both valves being free, and from *Galcomma* in the shell being free and oblique.

The shells of this genus inhabit the ocean, and only one fossil species has been found, attached to the inside of other fossil shells in the Calcaire-grossier at Grignon, France.

Genus LVII. — TEREDINA. — Lamarck.

Generic Character. — Shell orbicular, and entirely external, equivalve, inequilateral; umbones greatly incurved, and covered by a somewhat quadrangular, accessory process, which seems to be fixed to the valves in front of the beak, with a subulate process in front, and gaping at both extremities; anterior opening angular at the back, and the posterior rounded in front; tube thick, fistulous, posterior extremity smaller, and open, and nearly divided into two from an interior projection on both sides, and provided with an operculum; anterior termination of the tube entirely closed by a trapezoidal plate, which fills up the space left by the sinus in the two valves.

The posterior portion of the tube is of a different consistence from the anterior part, having a horny texture and appearance; the interior of the valves is thickly lined with the same testaceous matter as the tubes. This testaceous substance is generally so much thickened in front, that it almost entirely conceals the tooth-like processes.

Teredina personata. Plate X. figs. 23 and 25.

The shells of this genus are known only in a fossil state, and seem to have been gregarious. They are found plentifully in the Ferruginous sand.

Genus LVIII. — FISTULANA. — Bruguière.

Generic Character. — Shell equivalve, inequilateral, transversely elongated, and gaping widely at the basal

margin; anterior side very short; valves attached by a ligament, and situate in the lower part of a testaceous tube, which is closed at the lower or anterior extremity, and to which they are confined by the septum, and open at the centre; the posterior end attenuated and open.

Fistulana pyriformis. Plate X. figs. 17, 18.

We exclude all the Lamareckian species of *Fistulanæ* except *Fistulana Clava*, which is the type. *F. Lagenula*, *Appularia*, and *Pyrum*, are *Gastrochæna*. *F. corniformis* is a *Teredo*, and *F. gregata* is a *Teredina*.

Distinguished from the *Gastrochæna* by the oblong shape of the valves and straightness of the tube.

The *Fistulanæ* are marine shells, and are few in number. Fossil species are also few, and occur in the Calcaire-grossier.

Genus LIX. — CLAVAGELLA. — Lamarck.

Generic Character. — Shell consisting of a testaceous tube, somewhat attenuated, and open at its anterior extremity, irregularly ovate, subcompressed, claviform, and closed at its lower end, excepting by a number of irregularly formed minute tubes; clavate termination provided with an irregular, thin, flattened, pearly adherent valve, on one side; with a loose, extremely thin valve at the bottom of the tube, which is supposed to be united to the fixed valve by a ligament in a living state; an irregular muscular impression near one side.

The tube of the *Clavagellæ* is sometimes free, and at others it lines submarine bodies, such as madrepores, stones, and clay.

Clavagella Coronata. Plate X. fig. 26.

The shells of this genus inhabit the ocean; and they have been met with in a fossil condition in the London Clay, and in the supercretaceous rocks of Bordeaux.

CLASS THIRD.

CIRRIPEDES.

The animals are soft, destitute of a head, and consequently eyes, covered with a shell, and are incapable of locomotion, being always affixed to extraneous bodies. The whole of the Cirripedes are multivalve, that is, consisting of more than two pieces, or valves.

ORDER I. — PEDUNCULATA.

Body supported on a tubular, membranaceous, moveable peduncle, the base of which is affixed to stones and other marine bodies, or timber floating in the ocean.

Genus I. — POLLICIPES. — Leach.

Generic Character. — Body covered by a shell, and supported by a tubular, tendinous, squamiferous peduncle, which seldom exceeds two inches in length; shell multivalve, compressed on the sides, with the valves nearly contiguous and unequal; valves thirteen or more in number, those on the sides smallest; five upper valves much larger than the others, the anterior pair conical, elongated, with their sides reflected backwards, situate on each side of the opening; the central, or terminal pair largest, and trapeziform, with an acute angle at the posterior extremity; dorsal valve greatly elongated, broad at the base, rounded in the back, with an acute apex; between these, in the peduncle, are a number of smaller, testaceous, generally triangular, studs.

Policipes sulcatus. Plate V. fig. 31; figs. 38 and 40, two of its valves. *P. reflexus*, two of its valves, figs. 37 and 39.

The *Policipes* are marine shells; a very few species are known in a fossil condition; these have been met with in the Suffolk and in the Norfolk Chalk, also in the Gault and Greensand of England.

ORDER II. — SESSILIA.

Destitute of a peduncle ; body enclosed in a multivalve shell, attached by its base to marine bodies ; mouth situated at the upper and interior portion of the body.

Genus I. — BALANUS. — Lamarck.

Generic Character. — Shell sessile, conical, or subconic, closed at the base by a testaceous plate, which adheres to extraneous substances, consisting of four articulated valves ; aperture subtrigonal, or elliptical, and shut by an operculum composed of four valves.

Balanus tessilatus. Plate X. fig. 4.

The Balani are exceedingly variable in form, depending upon the shape of the substance to which they are affixed. Fossil species occur in the newer formations, the one we have figured was found at Bramerton, Norfolk. They also occur in the marine sands of the Blue marls of France and Italy.

CLASS IV.

ANNELIDES.

Animal with a more or less elongated body, having no blood, and inhabiting a testaceous tube, from which they never depart.

ORDER I.—SEDENTARIA.

Tube elongated and testaceous.

TRIBE I.—SERPULACEA.

Tube solid and calcareous.

Genus I.—SERPULA.—*Linnæus.*

Generic Character.—Shell tubular, narrow, gradually widening towards the aperture, and pointed towards the apex; attached irregularly to other bodies; sometimes wound spirally; keeled, imbricated, or plain; aperture round, for the most part, or angulated in the ribbed species.

Serpula tricarinata. Plate V. fig. 34. *S. diplixa,* fig. 32.

We have united the genera *Serpula* and *Vermilia*, there not being sufficient distinctive generic characters for both. They are extremely variable in form, and are met with in all seas. We have given an example of the expunged genus *Vermilia*, viz. *V. Sulcata.* Plate V. fig. 35.

Fossil *Serpulæ* are extremely abundant, and occur in almost all formations, from the newest to the Grawacke group. They are among the few shells which have existed through all ages to the present time.

Genus II.—SPIRORBIS.—*Lamarch.*

Generic Character.—Shell consisting of a testaceous tube, spirally twisted into an orbicular form or a horizontal plane, depressed, and adhering below; the aperture terminal, rounded, or angular.

Spirorbis tenuis. Plate XI. fig. 13.

Found in the Silurian series of rocks.

TRIBE II. — MALDANIÆ.

Branchiæ of the animal intermediate, tube open at both ends.

Genus III. — DENTALIUM. — *Linnæus*.

Generic Character. — Shell tubular, open at both ends, arcuated, increasing in the diameter towards the wider extremity, where the aperture is large and round ; opening of the pointed end very small, and with a lateral fissure in some species ; external surface ribbed, striated, or smooth.

Dentalium nitens. Plate X. fig. 24.

The shells of this genus have the miniature form of an elephant's tusk. They inhabit all seas, and are pretty numerous in species. They occur in a fossil state in the Blue Marls of France, the London Clay at Highgate Hill, and Avignon, France ; Folkstone, and Barton Cliffs, and a few are met with in the Limestones of Baguor and Exmouth.

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GLOSSARY

OF

TERMS USED IN THE SCIENCE OF CONCHOLOGY.

A

ABBREVIATED, shortened, cut short.
Abdomen, the belly.
Accessory valves, small plates attached to the outer surface of the hinge line of the Pholas, &c.
Aculeated, provided with prickles, prickly.
Acuminated, sharp pointed, acute.
Adductor muscle, that by which bivalves close and open their shells, and leaves a mark inside, termed the *muscular impression*. See page 8.
Adnate, adhering, growing together.
Alated, winged, applied to shells with an expanded lip, or other portion spread out, as in the genus Strombus, &c.
Alveole, an internal nucleus.
Ambit, the back of shells of the genus Nautilus, Ammonites, &c.
Ambitus, circumference or outline of bivalves.
Analogous, a term applied to such fossil shells as resemble certain species of recent ones, but which are not ascertained as identical.
Annulated, formed or divided into rings.
Annulations, rings.
Anterior side in bivalves, is that in which the ligament is situate. See page 6.
Antiquated, is applied to longitudinal furrows, which were once the margin, but have been covered up by a new deposit of shelly matter; and are become out of date, or useless.
Aperture, the opening of the shell in univalves, whereby the animal extends itself, and again recedes. See page 4.

Apex, the tip or point of the spiral convolutions. See page 3.
Apical, belonging to the apex of the shell.
Apophysis, an excrescence.
Aquatic, belonging to fresh water, or standing pools of salt water; in contradistinction to oceanic.
Approximating, approaching near to, or near together.
Arcuated, bent in the form of an arch.
Area, the surface contained between lines or boundaries.
Arenaceous, of a sandy texture; frequently applied to indicate that the animals burrow in sand.
Arenose, sandy.
Areola, a small area or circle.
Articulated, jointed; applied to such shells as their valves are joined, in the manner of those of Balanus, Chiton, &c.
Ascititious, supplemental, additional.
Attached, applied to such shells as are adhering to other bodies. Some are attached by means of a byssus, and others by shelly agglutinations.
Attenuated, thin, slender, drawn out.
Auricles, small ears.
Auriculated, eared, as in Pecten, &c.
Auriform, ear-shaped.
Axis, an imaginary line around which the volutions of a univalve revolve.

B

Barb, any thing that grows in place of a beard.
Base, in univalves, opposite the apex; in bivalves, the extreme edge of the valves opposed to the umbones, in Cirripedes, the part by which the shells are attached to marine bodies.

Beak, in univalves, that portion of the base of the body which is drawn out into a rostrated form. See page 4.
 In bivalves, the points of the umbones. See page 6.
Beard, the process by which shells of the genera *Mytilus*, *Pinna*, &c. adhere to rocks, composed of silky filaments. See *Byssus*.
Bi, prefixed to any word signifies two or double.
Biangular, having two corners or angles.
Biauriculated, having two ears or auricles.
Bicuspid, having two points.
Bidentate, with two teeth.
Bifarious, parting in opposite directions.
Bifid, divided or cleft; double.
Bifurcate, double-pronged, or two pointed.
Bilabiated, having a double lip or edge, or with an outer and inner lip, as in some bivalves.
Bilobate, divided into two lobes, or prominences.
Bimarginate, furnished with a double margin.
Bipartite, composed of or divided into two parts; double.
Biradiated, doubly rayed.
Birostrated, double-beaked.
Bivalve, a conventional term, applied to shells consisting of two parts, embracing the whole of the class *Conchifera*. See page 6.
Blotched, applied to shells which are spotted in an irregular manner.
Blunt, obtuse, opposed to acute.
Borer, a shell which pierces rocks, wood, &c. and forms a habitation therein, as *Pholas*, *Saxicava*, &c.
Byssus, a beard, by which shells of the genera *Mytilus*, and *Pinna*, &c. are attached to marine bodies.

C

Calcareous, relating to lime, of a limy nature. This term is applied to the operculæ of univalves, when composed of carbonate of lime with animal matter, as opposed to those which are of a horny texture.
Callosity, a protuberance, applied to the bumps on the outer surface; the coating on the umbilicus of the *Natica*, &c.
Campanulate, bell-shape.
Canal, the groove, which is a prolongation of the aperture in univalves, and situate in the inside of the beak. See page 4.
Cancellated, longitudinally and transversely ribbed.

Carina, a keel.
Carinated, having a thin ledge passing spirally round the volutions in univalves, and also on the back or ambit of the symmetrical univalves, such as *Ammonites*, &c.
Cartilage, a flexible, fibrous substance, by which the valves in the *Conchifera* are united, situate near the beak. See *Ligament*, page 6.
Chambered, those shells which are divided into distinct compartments, are called chambered, viz. the genera *Nautilus*, *Ammonites*, &c. See page 4. Some species of *Calyptrea* are chambered.
Cicatrix, the glossy impression in the inside of the valves, to which the muscles of the animal are affixed.
Ciliated, edged with parallel hairs, bristles, or appendages, like the eyelids.
Cinereous, ash-coloured, of the colour of wood ashes.
Clausium, a bony plate situate in a groove on the columella of the genus *Clausilia*.
Clavate, when a shell is attenuated at one extremity, and the other becomes suddenly thickened, it is clavate, or club-shaped.
Clavicle, a little key. Applied to the bony appendage of the hinge of some *Anatina*, &c.
Claviform, club-shaped.
Clypeiform, shield-shaped.
Columella, the upright spiral pillar in the centre of most of the univalve shells. See page 4.
Columellar lip, the inner lip, situate in front of the body on the right side of the aperture in univalves. See *Inner lip*, page 4.
Commisure, a joint or seam formed by the junction of the valves in the *Conchifera*.
Complicated, doubled together.
Compressed, perpendicularly squeezed together, in opposition to depressed, which is horizontally flattened.
Concamerated, arched over, vaulted.
Concamerations, divided into compartments, as in the *Nautili*.
Concentric, running to a centre, as the transverse striæ or ribs in the *Conchifera*, in opposition to longitudinal.
Conchæ, shells consisting of two or more pieces or valves, bivalves, or multivalves.
Cone, the form of a sugar-loaf.
Confluent, running together.
Conoid, a figure like a cone, sugar-loaf-shaped.
Contorted, twisted, or incumbent on each other, in an oblique direction.
Convolute, rolled upon itself, twisted

spirally, like a piece of paper rolled between the finger and thumb.
Cordate, heart-shaped.
Cordiform, resembling the form of a heart.
Coriaceous, of a leather-like consistence.
Corneous, of a horny colour or consistence, resembling horn.
Coronal, relating to the crown or top.
Coronated, crowned, or girt towards the apex. See **Coronated spire**, pl. 12, fig. 10.
Corpus, the body of the shell, the last or greater wreath or volution in which the aperture is situate.
Cortex, the anterior skin or epidermis.
Costated, ribbed.
Crassated, thickened.
Crenated, notched.
Crenulated, notched at the margin, scalloped.
Crispated, rough with waving lines.
Cuneiform, shaped like a wedge.
Cylindrical, round like a cylinder or a roller.
Cymbiform, boat-shaped.

D

Decollated, when the tip of the spire is broken off, as in some species of *Bulinus*.
Decorticated, worn, divested of epidermis or skin.
Decussated, generally applied to striæ or lines, which are crossed, or which intersect each other perpendicularly and horizontally.
Deflexed, bent aside.
Deltoidal, triangular, in the form of the Greek letter Δ , *delta*.
Dentated, having teeth.
Dentile, a small tooth, such as the tooth of a saw.
Denticulated, set with small teeth, as in the genus *Arca*.
Depressed, pressed down horizontally, low, shallow, flat.
Dexter valve, is the right valve.
Dextral shells, are those which have the aperture on the left side of the shell when the spire is held uppermost.
Diaphanous, transparent, clear, pellucid.
Diaphragm, the septa, which divides the chambers of multilocular shells of the genera *Nautilus*, &c.
Diffuse, a term applied to the lips of univalves, when spread out or digitated.
Digitated, fingered or clawed, as in the lobes of the outer lip of the *Strombi*, &c.
Discoidal, is when the volutions are

horizontally convolute, and forming a flattened spire, as in *Ammonites*, &c.
Disk, the middle part of the valves, or prominent portion which lies between the umbo and the margin.
Distant, the teeth in bivalves are said to be distant when remote from the umbones.
Divaricated, straddling, spreading out widely.
Divergent, tending to various parts or directions from one point.
Duplicated, divided into plaits or folds.
Duplicature, a fold, any thing doubled.

E

Echinated, bristled like a hog, set with spines.
Effuse, spread out.
Elliptical, having the form of an ellipsis, oval.
Elongated, lengthened, drawn out.
Emarginate, { with the margin or
Emarginated, { edge notched, or hollowed out.
Ensiform, sabre-shaped.
Entire, whole, uninterrupted, not divided.
Epidermis, the outer coating or scarf skin of the shell, called by some authors the *Periostracum*.
Epiphragm, a calcareous or membranaceous process, which forms a door to the aperture of some *Helices*, when they retire to hybernate.
Equidistant, being at the same distance, one part from another.
Equilateral, having both sides alike.
Equivalve, having both valves of equal dimensions.
Exoleted, worn or faded.
Exserted, standing out, protruding.
Extraneous, not belonging to a particular thing.

F

Falcated, bent or hooked like a scythe.
Fasciated, filleted, or banded.
Fasciculated, consisting of little bundles.
Ferruginous, of an iron colour, or rust coloured.
Filament, a slender thread-like process.
Filliform, thread-shaped, slender, and of equal thickness.
Fimbriated, fringed.
Fissure, a cleft, slit, or narrow chasm.
Flexuous, with angles and bendings.
Flexure, a bending.
Fluviatile, belonging to fresh water.
Foliaceous, consisting of laminæ or leaves.
Foliated, bent into laminæ or leaves.
Fornicated, arched or vaulted, as in

the exfoliations on the ribs of *Tri-dacna elongata*, &c.

Free shell, one that is not attached to other substances.

Free valve, the valve which is unattached, when one of them is so.

Front, in univalves, when the aperture is turned towards the observer.

Fulcrum, in bivalves, is the tumid part in which the ligament is situate.

Furcated, forked.

Furrow, a small trench or hollow.

Fusiform, spindle-shaped, intermediate between the conical and oval.

G

Gap, an opening in bivalves when the valves are shut, as in the *Pholades*, *Myæ*, &c.

Gaping, applied to bivalves, when their margins do not meet all round.

Geminated, marked with double elevated striæ, connecting the wreaths.

Geniculate, keeled.

Genus, an assemblage of species, possessing certain characters in common, by which they are distinguished from all others.

Genera, the plural of genus.

Gibbous, bulged or swelling.

Glabrous, smooth.

Globose, globular, spherical.

Granulated, beaded, in small grains or bead-like processes.

Groove, a hollow channel.

H

Haliotoidal, ear-shaped.

Hamiform, curved at the extremity.

Hemispherical, in the shape of a half globe.

Hirsute, rough, beset with strong hairs.

Heteroclitical, reversed.

Heterostrophe, reversed, applied to shells whose spires turn in a contrary direction to the usual way.

Hispid, hairy.

Hyaline, glassy, thin, transparent.

I & J

Jagged, denticulated, uneven, toothed like a saw.

Imbricated, placed like the tiles of a house.

Imperforated, not pierced with a hole, wanting an umbilicus.

Incrassated, thickened.

Inner lip, is placed on the right side of the aperture, see page 4.

Inequilateral, when the anterior and posterior sides make different angles with the hinge; or with the sides dissimilar in length.

Inequivalve, where one valve is more convex or less than the other, or dissimilar in other respects, as in the common oyster.

Inarticulate, indistinct, not properly formed.

Incumbent, one lying over the other.

Incurved, } bent inwards, crooked.

Indented, unequally marked, hollowed.

Inflated, tumid, swollen, blown out.

Inflexed, bent inwards.

Inflexed, bent towards each other.

Intercostal, placed between the ribs.

Internode, the space between one knot or joint and another.

Interrupted, divided, separated.

Interstice, space between one part and another, a crevice.

Intortion, the turning or twisting in any particular direction.

Involucre, a covering.

Involution, that part which involves or inwraps another.

Involute, where the exterior lip is turned inwards, at the margin, as in the *Cypræa*.

Isabella-colour, a brownish yellow with a shade of brownish red.

K

Keel, the prominence on the back of the *Argonauta*, *Ammonites*, &c.

Knob, a protuberance, any part bluntly elevated above the rest.

L

Labra, the lips.

Lacinate, jagged, or cut into irregular segments.

Lamellar, consisting of films on plates.

Lamellated, divided into distinct plaits or foliations.

Laminæ, thin plates, laid one coat above another.

Lanceolate, oblong, and gradually tapering like the head of a lance.

Lateral, extending to one side, from the centre, as the remote teeth in bivalves. When a shell is broader than long, it is called a lateral shell.

Latticed, having longitudinal lines or furrows, decussated by transverse ones.

Lenticular, doubly convex, of the form of a lens.

Ligament, a solid body, softer than a cartilage, but harder than a membrane, which connects the valves in bivalves.

Limb, the margin of bivalve shells.

Linear, composed of straight lines.

Linguiform, tongue-shaped.

Lip, the outer edge of the aperture of univalves.
Littoral, of or belonging to the shore.
Lobated, divided at the edges into parts.
Longitudinal, the length of the shell from the apex to the base.
Lunated, formed like a half moon.
Lunulated, crescent-shaped.
Lunule, a crescent-like mark or spot, situated near the anterior sides in some bivalve shells, as in *Venus*, &c.
Luniform, in the shape of a crescent.

M

Maculated, spotted, or patched with colour.
Mammillated, applied to the apex of a spiral univalve, when it terminates in the form of a teat.
Margaritaceous, having a pearly lustre.
Margaritiforous, applied to pearl-bearing shells.
Margin, the whole circumference or outline of the shell in bivalves.
Marginated, having a prominent or thickened margin or border.
Membranaceous, consisting of membranes.
Mucronate, ending in a sharp rigid point.
Multilocular, many-chambered, consisting of several divisions.
Multivalve, shells consisting of more pieces than two.
Muricated, clothed with sharp spines.
Muscular impressions, are marks left inside of bivalves, to which the adductor muscles were attached, see page 8.

N

Nacred, pearly, pearlaceous, shining like mother of pearl.
Nemoral, of or belonging to a wood.
Nited, glossy.
Nodose, knotty, tubercular.
Nucleus, a kernel, a central part.

O

Ob, prefixed to words is used for inversely or inverted; as *obconic*, inversely conic; *obcordate*, inversely heart-shaped.
Oblong-ovate, egg-shaped or oval.
Obsolete, indistinct, not well defined, worn out.
Ocellated, applied to eye-like spots.
Ochreous, of the colour of yellow ochre.
Olivaceous, being of a greenish olive colour.
Operculum, a lid which closes the

aperture of some turbinated univalves; and also some of the tops of multivalves. See page 5.
Orbicular, spherical, circular, round.
Order, a secondary division of the animal kingdom. Orders are made up of a plurality of genera.
Orifice, an opening or perforation.
Ovate, shaped like the longitudinal section of an egg.
Oviparous, those mollusks which produce their young in eggs.
Ovoid, oval.
Outer lip, the outer margin of the aperture in univalves, see page 4.

P

Pallial impression, the impression of the mantle in bivalves, see page 8.
Palmated, webbed, as in the feet of some water birds, viz. Ducks, &c.
Papillæ, small dots or pimples.
Papillary, } having the surface covered
Papillose, } with dots or pimples.
Papillose, pimpled, dotted.
Papyraceous, thin as paper; paper-like.
Parasitical, living on some other body.
Parietal valves, in multivalve shells, are those which surround the body of the animal.
Patulous, gaping, open.
Pearlaceous, of or like mother-of-pearl.
Partitions, calcareous processes, dividing the shells of the genera *Nautilus*, *Serpula*, &c.
Pectinated, toothed like a comb.
Pedicle, { the support of the Pentel-
Peduncle, { asmis and its congenerous
species, by which they are
attached to wood, &c.
Pediform, foot-shaped.
Pelagic, belonging to the deep sea.
Pellicle, the skin or film.
Pellucid, transparent, clear, bright.
Pentagonal, having five angles.
Perforated, pierced with holes.
Periostracum, the epidermis or membranaceous substance which covers the exterior of many shells.
Peritreme, the whole circumference of the aperture of a univalve shell.
Phosphorescent, emitting light in the dark.
Pillar, in univalves is the internal continuation of the columella, or inner lip, and extends from the base to the apex.
Pinnated, formed like the fin of a fish.
Pisiform, pea-shaped.
Plaited, folded.
Plane, flat, as in the pillar lip of the genus *Purpura*.
Plicated, folded or plaited, as in the pillar of the volute tribe.
Plumose, having a feathery appearance.

Polythalamous, divided into several chambers.

Prismatic, generally applied to the colours of shells being like those of the prism; iridescent.

Produced, lengthened out.

Protrude, to thrust forward.

Protuberances, plaits higher or more elevated than the parts adjoining.

Punctated, with small hollows like the punctures of a thimble.

Pyramidal, in the form of a pyramid.

Pyriform, pear-shaped.

Q

Quadrangular, having four right angles.

Quadruplicated, having four plaits.

R

Radiated, furnished with rays.

Radicated, is when the shell is fixed by the base to another body.

Rectangular, having right angles.

Rectilinear, in a straight line.

Recurvated, } turned backwards,

Recurved, } bowed back.

Reflected, thrown backwards, or bent back.

Reflex, } the same as *recurvated*.

Reflexed, } the same as *recurvated*.

Refracted, abruptly bent, as if broken.

Reniform, kidney-shaped.

Repand, with a serpentine margin.

Replicated, folded or plaited, so as to form a groove or channel.

Reticulated, formed like a piece of net work.

Retroflected, bent backwards.

Retrousse, cocked up, turned up.

Retroverted, turned back.

Retuse, ending in an obtuse sinus.

Retundated, blunted, or turned at the edge.

Reversed spire, is when the volutions turn the reverse way of a common cork-screw, or to the sun's apparent motion.

Revolute, rolled backwards.

Rhomboidal, having a rhombic, or four-sided form.

Ribbed, having longitudinal, or transverse ridges.

Ridge, the upper part of a slope.

Rima, the interstice between the valves when the hymen is removed.

Rostrated, beaked, the receptacle for the canal in univalves, and is applied to some bivalves where one of the sides is prolonged, as in *Tellina rostrata*.

Rostrum, the beak; the extension

of the base of the shell, in which the canal is situated.

Rotund, round, circular, spherical.

Rudimentary, the commencement, or first elements of any thing; generally applied to the indistinct teeth of shells.

Rufous, reddish brown.

Rugose, rugged, full of wrinkles.

S

Salient, prominent, jutting out.

Sanguineous, of a blood colour.

Scabrous, rough, rugged, or like a file.

Scalloped, indented at the edges.

Scrobiculate, pitted, having the surface covered with hollows.

Scrobiculous, a depression or cavity.

Scutellated, } shield-shaped.

Scutelliform, } shield-shaped.

Seam, the line formed by the union of the valves.

Securiform, hatchet-shaped.

Semi, is used in composition in the sense of half.

Semi-cordate, half heart-shaped.

Semi-cylindrical, half cylindrical, cut through length-ways.

Semi-orbicular, the shape of a half globe.

Semi-lunar, the shape of a half moon.

Semi-pellucid, somewhat pellucid, or shining.

Septiform, in the shape of a partition.

Serrated, like the teeth of a saw.

Serrulated, very minutely serrated.

Sessile, sitting or seated.

Seta, a bristle.

Setaceous, bristly, covered with bristles.

Setiferous, bearing bristles, hairy.

Setose, covered with bristles.

Sinister valve, is the left valve.

Sinus, a groove or cavity.

Siphon, a pipe or tube; as in the genera *Ammonites*, *Nautilus*, and *Endosiphonites*, &c.

Siphuncle, a cylindrical canal perforating the partitions in polythalamous shells; as in the *Spirula Peronii*, *Ammonites*, *Nautilus*, &c.

Solitary, generally applied to a single tooth in bivalves.

Spatulate, rounded and broad at the top, and becoming narrow like a spatula or battledore.

Species, the division of a family or genus, containing such as agree with it in general characteristics, but disagreeing in particular parts; or such as are derived from one common parentage.

Spiny, { thorny, covered with
Spinous, { thorn-like processes, like
a hedgehog.

Spire, all the volutions of univalve shells, excepting the one in which the aperture is situated, which is termed the *body*.

Spiral, twisted like a cork screw, or revolving upon its nucleus like the spring of a watch.

Squamose, scaly.

Stellated, starred, consisting of star-like figures.

Striated, scored, or covered with fine thread-like lines.

Sub, in composition, means almost, or approaching to; as sub-globose, somewhat globular.

Sub-arcuated, somewhat arched.

Sub-conic, somewhat conical.

Sub-diaphanous, somewhat transparent or clear.

Subrotund, nearly globular.

Subulate, awl-shaped.

Sulcated, furrowed or grooved.

Sulci, furrows or grooves.

Summit, the tip or apex.

Suture, a hollow line or division in univalve shells, the spiral line of which separates the volutions.

T

Tabulated, is applied to a spire whose volutions are flattened at top, and square on the edges.

Tentacula, the feelers or horns of mollusks which inhabit shells.

Terebrating shells, are those which burrow in rocks, clay, and wood.

Terminal, when the umbones of bivalves are placed at the extreme point as in *Mytilus*, *Pinna*, &c. they are said to be terminal.

Tesselated, chequered like a chess-board.

Testacea, molluscous animals which are covered with a testaceous shell, Carbonate of lime and gelatin.

Testaceous, consisting of carbonate of lime and animal matter.

Tetragonal, four cornered.

Torose, swelling into knobs or protuberances.

Tortuosity, wreath, flexure.

Tortuous, twisted, wreathed, winding.

Transverse, placed across, or crossways. When the breadth of a shell is greater than its length, it is called a transverse shell.

Trapeziform, having four unparallel and unequal sides.

Trigonal, having three angles, triangular.

Trilobate, divided into three principal parts or lobes.

Tripartite, divided into three separate parts.

Trochiform, top-shaped.

Truncated, stunted, cut short or abruptly off at the end.

Tubercle, a little knob or pimple.

Tuberculated, knobbed, pimpled.

Tuberosities, prominent knobs or excrescences.

Tubular, shaped like a hollow tube.

Tubulate, tubulous or hollow.

Tumid, swollen, blown out, bellied.

Tunicated, coated.

Turbinated, shaped like a top or pear.

Turgid, swollen, inflated.

Turreted, is applied to the spire of univalves which have the appearance of little turrets.

U and V.

Valve, the whole of univalve shells, or shells in one piece, and the half of bivalves, or shells in two divisions, &c. The term is conventional, and not used in the common sense.

Varex, a longitudinal rib, which formed the outer lip before the shell was enlarged.

Varices, longitudinal ribs in univalve shells.

Varicose, warted.

Variety, is when a shell differs some little degree from that of the ordinary character of the species, either in colour or form.

Vaulted, like the roof of one's mouth.

Venter, the belly, situated in the body of the shell; being the most prominent part, when the aperture is turned to the observer.

Ventral, belonging to the belly.

Ventricose, inflated, swelled in the middle, bellied.

Vermicular, } worm-shaped and tu-

Vermiform, } bular.

Vertex, in the *Patella* the top, apex, or most prominent part, situated in general nearly in the middle. In the genus *Bulla* it is used for the apex.

Viviparous, animals bringing forth the young perfectly formed alive.

Umbilicated, having a depression in the centre like a navel.

Umbo, in bivalve shells, the round part which turns over the hinge, being the nucleus of the shell, on which the whole superstructure is built, see page 6.

Umbonate, bossed, having a raised knob in the centre.

Undated, waved.

Undulated, with little waves.

Ungulate, shaped like a horse's hoof.

Unilocular, with a single chamber or compartment.

Univalve, a shell consisting of one piece.

Upper valve, if one valve is attached to other bodies, the free one is the upper valve.

Volutions, the wreaths, or spiral turnings of the shells of univalves.

Urcelate, swelling in the middle like a pitcher.

Vulva, a spatuliform mark or depression in several bivalve shells ;

formed when the valves are united on the posterior and anterior slopes.

W

Whorl, a term used by some conchologists for volution, or one of the wreaths or turnings of the spire of univalves.

Z

Zigzag, having contrary turnings and windings.

Zoned, surrounded with one or more girdles or bands.

REFERENCE TO THE PLATES.

PLATE I.

1. *Ammonites giganteus*, exhibiting the winding partitions between the air chambers.
2. The lobes and sinus of a *Goniatite*, *D*, the dorsal region; *L*, the lateral region; *M*, the marginal or umbilical region; *a b c*, the lobes; *e e e*, the sinuses; *S*, the siphuncle; the barbed arrow head points towards the aperture, and marks the centre of the lobes and sinuses. See page 13.
3. *Nautilus Pompilius*. A section exhibiting the internal structure, *a a*, the chambers; *b b*, the septæ; *c*, the siphuncle; *A*, the animal. See page 18.
4. *Ammonites obtusus*, exhibiting the internal structure. From *a* to *b* is the portion occupied by the animal, denominated the outer chamber, which sometimes extends as far as *i*. The letters *c d e f g h*, shew the siphuncle, which is always situate in the back or ambit in the *Ammonites*. See page 14, &c.
5. Upper view of a *Rhyncholite*, from Luneville.
6. *Goniatites Henslowi*, exhibiting the slipper-shaped lobes on its sides.
7. *Fusus longævus*, *a*, the apex; *b*, the base, or termination of the beak, in which is situate the canal; *c*, the body; *d*, the spire; *e e e*, the suture of the spire; *f*, the aperture; *g*, the inner or pillar lip; *h*, the columella; *i*, the beak, or rostrum; *k*, the canal; *l*, the front of the shell.
8. A cast of a single chamber of *Nautilus ziczac*, shewing the deep curvature backwards of the two ventral lobes, *a a*.
9. A longitudinal section of the calcareous sheath and alveolus of a *Belemnite*; *a*, the alveolus, or internal shell, divided by transverse septa into air chambers; *b*, the siphuncle, passing along the margin of the air chambers; *c*, the apex of the fibro-calcareous sheath, or solid cone of the *Belemnite*.
10. Section of an *Orthocera*.
11. Portion of *Ammonites varicosus*, shewing the transverse plates, *a a*; and siphuncle, *b*. See page 5.
12. *Fusus contrarius*; a reversed shell, exhibiting the volutions turning in a contrary direction; *e*, a single volution; *d*, reversed spire; *e*, the outer lip of a reversed aperture; *a*, the apex; *b*, the base of the beak. See page 4.
13. *Goniatites sphaericus*, a back view, shewing the lobes and saddles.
14. Shell of the genus *Littorina*; *a*, the umbilicus; *c*, the body, including the aperture; *d*, transverse or spiral ribs; *b*, aperture internally striated.
15. A shell exhibiting a depressed spire. *Planorbis cylindricus*.
16. A multispiral operculum.
17. *Ammonites heterophyllus*; *a*, the siphuncle; *b*, the dorsal lobe; *c*, the dorsal saddle; *d*, the superior lateral lobe; *e*, the lateral saddle; *f*, the inferior lateral lobe; *g*, the ventral saddle; *h*, the ventral lobe; *i i i*, axillary lobes; *k*, the back, or ambit.
18. Exhibits the internal volutions of an *Ammonite* (*A. Murchisonæ*), enveloped by the external one; *a*, the carina or keel. See page 17.
19. A transverse section of *Goniatites reticulatus*; *a* and *b* exhibits the deep umbilicus on both sides, which is highly characteristic of the shells of this genus; the small circular mark at *c* shews the situation of the siphuncle, which can also be seen in all the other convolutions.
20. A shell of the genus *Pecten*, shewing the longitudinal ribs, *a a*; the umbo, *b*; the superior ear, *d*; the inferior ear, *c*.
21. A shell of the genus *Auricula*; *a*, entire or continuous lips; *b b b*, the outer lip, or peritreme; *c*, plaits on the columella, or pillar lip; *a*, the base; *d* exhibits a transversely or spirally striated outer surface.
22. A bivalve shell. The left valve; *a*, the umbo; *b*, the hinge; *c*, pri-

mary, or cardinal teeth; *d*, lateral or remote teeth; *e e*, a crenulated margin; *f f*, sides; *g g*, muscular impressions; *h*, pallial, or mantle impression.

23. A hinge, which consists of numerous teeth, as in the genus *Arca*, &c.; *b*, the umbo; *c*, muscular impression. It is by these, called the adductor muscles, that the animal opens and closes its shell.
24. An inequivalve shell of the genus *Terebratula*.
25. Valve of a *Panopæa*, exhibiting an erect tooth, *a*.

PLATE II.

1. *Baculites Faujasii*.
2. *Ammonoceras glossioidea*.
3. *Turrilites tuberculatus*.
4. *Hamites annulatus*.
5. *Orbulites striatus*.
6. *Nummularia lævigata*.
7. Do. internal structure.
8. *Bellerophon Cornu* — *Arietis*.
9. *Vorticialis strigilata*.
10. *Siderolites calcitrapoides*.
11. *Discorbis vesicularis*.
12. *Triloculina communis*, and 19.
13. *Placentula astricans*.
14. *Bellerophon hiuleus*.
15. *Polystomella crispa*.
16. *Rotalia trochidiformis*.
17. *Ammonites gigas*.
18. *Nummularia rotula*.
19. *Triloculina communis*, and 12.
20. *Biloculina apposita*, and 28.
21. *Quinqueloculina striatula*, and 25.
22. *Melonia sphæroidea*.
23. *Scaphites æqualis*.
24. *Gyrogonia costata*.
25. *Quinqueloculina striatula*, and 21.
26. *Nautilus striatus*.
27. *Cristellaria squammula*.
28. *Biloculina opposita*, and 20.
29. *Orthocera simplex*.
30. *Lituola difformis*.
31. *Orbiculina uncinnata*.
32. *Conilites pyramidatus*.
33. *Spirolina stenostoma*, and 35.
34. *Renulina opercularis*.
35. Aperture of *spirolina stenostoma*.
36. *Hippurites infundibuliforme*.
37. *Orthocera cordiformis*.
38. *Amplexus Corraloides*.
39. Do. do.
40. *Conularia teres*.
41. *Belemnites mucronatus*.
42. *Belemnites abbreviatus*.
43. *Clavulina corrugata*.
44. Aperture of do.
45. *Calcarina rarispina*.
46. Do. do.
47. *Beloptera anomala*.

PLATE III.

1. *Ammonites funatus*.
2. *Cristellaria acuturicularis*.
3. *Melonites sphæroidea*. Internal structure.
4. *Lituola deformis*.
5. *Orbiculina angulata*.
6. Do. internal structure.
7. *Siderolites calcitrapoides*, internal structure.
8. *Nodosaria clavatus*, internal structure.
9. *Vorticialis marginata*.
10. *Oliva Salisburniana*.
11. *Cristellaria plumula*.
12. *Rotalites trochiformis*, internal structure.
13. *Conus Scabriusculus*.
14. *Goniatites sphaericus*.
15. *Terebellum fusiforme*.
16. *Terebellum convolvulus*.
17. Do. do.
18. *Conus antediluvianus*.
19. *Marginella quadruplicata*.
20. *Strombus lævus*.
21. *Cassidaria bicarinatus*.
22. *Rostellaria macroptera*.
23. *Eburna glabrata*.
24. *Mitra Dufrenoyi*.
25. *Voluta lyra*.
26. *Rostellaria lucida*.
27. *Murex rugosus*?
28. *Ancillaria subulata*.
29. *Buccinum prismaticum*.
30. *Murex tubifer*.
31. *Colombella nebulosa*.
32. *Cassidaria carinatus*.
33. *Mitra plicatula*.
34. *Ranella Bartonensis*.

PLATE IV.

1. *Cerithium pyramidalis*.
2. *Paludina Deshayarsii*.
3. *Infundibulum rectum*.
4. *Pleurotoma priscus*.
5. *Helix Turtonensis*.
6. *Solarium plicatum*.
7. Do. do.
8. *Sipho clathrata*.
9. *Calpurnia Leathesi*.
10. *Pileolus plicatus*, and 33.
11. *Bulla attenuata*.
12. *Bulinus costellatus*.
13. *Lymnæa pyramidatus*.
14. *Ancylus elegans*.
15. *Melanopsis carinata*.
16. *Rissoa acuta*.
17. *Patella striata*.
- 18 and 24. *Fissurella Græca*.
19. *Dolium nodosum*.
20. *Emarginula tricarinata*.
21. *Pileopsis vetusta*.
22. *Volvaria acutiscula*.

23. *Tornatella cuspidatus*.
24. *Fissurella Græca*.
25. *Pyrula nexilis*.
26. *Phasianella rigida*.
27. *Sigaretus canaliculatus*, and 32.
28. *Neritina concava*.
29. *Turbo sculptus*.
30. Do. do.
31. *Auricula ventricosa*.
32. *Sigaretus canaliculatus*.
33. *Pileolus plicatus*.
34. *Fasciolaria turbinelloides*.
35. *Cancellaria evulsa*.
36. *Cypræa avellana*.
37. *Aporrhais calcarata*.
38. *Nerina Mosæ*.
39. *Natica epiglottina*.
40. *Purpura tetragona*.
41. *Nassa reticulata*.
42. *Tuba striata*.
43. *Psithæa striata*.

PLATE V.

1. *Euomphalus pentangulatus*.
2. *Pleurotomaria sculpta*, see 11.
3. *Cirrus depressus*.
4. *Planorbis rotundatus*.
5. *Bulinus cylindracea*.
6. *Nerita aperta*.
7. *Delphinula conica*.
8. *Littorina rudis*.
9. *Utriculus glaber*.
10. *Turbo tiara*.
11. *Pleurotomaria lirata*.
12. *Stomatella inconspicua*.
13. *Bullæa striata*.
14. Do. do.
15. *Phasianella turbinoides*.
16. *Delphinula calcar*.
17. *Calyptræa trochiformis*, and 24.
18. *Metoptoma pileus*.
19. *Melania costelata*.
20. *Scalaria tenuilamella*.
21. *Physa columnaris*.
22. *Agathena pellucida*.
23. *Terebra plicatula*.
24. *Calyptræa trochiformis*, and 17.
25. *Harpa mutica*.
26. *Pyramidella terebellata*.
27. *Triton canaliculatum*.
28. *Pyramis nitidus*.
29. *Ampullaria ambulacrum*.
30. *Vermetus Bognorensis*.
31. *Polycipes sulcatus*.
32. *Serpula dixipha*.
33. *Turritella proto*.
34. *Serpula tricarinata*.
35. *Vermilia sulcata*.
36. *Potamis cinetus*.
37. *Pollicipes reflexus*, and 39.
38. *Pollicipes sulcatus*, and 40.
39. *Pollicipes reflexus*.
40. *Pollicipes sulcatus*, and 38.
41. *Vermicularia nodus*.

PLATE VI.

1. *Crioceratites Duvallii*.
2. *Endothyra Bowmanii*.
3. *Endosiphonites carinatus*.
4. *Simplagus Blainvilli*.
5. *Phragmoceras ventricosum*.
6. *Oniscia cithara*.
7. *Caliendrum vittatum*.
8. *Strombus pugilis*.
9. *Pteroceras Oceani*.
10. *Murex cristatus*.
- 11.
12. *Trochus lævigatus*.
13. *Bifrontia Deshayesii*.
14. *Orbis rotella*.
15. *Eulima labiosa*.
16. *Monoptygma elegans*.
17. *Scissurella concinna*.
18. *Neritopsis cancellatus*.
19. *Planaria nitens*.
20. *Nematura Deltae*.
- 21.
- 22.
- 23.
- 24.
25. *Strophostoma ferrusina*.

PLATE VII.

1. *Lima gibbosa*.
2. *Plicatula spinosa*.
3. *Lingula mytilloides*.
4. *Chama Haliotoidea*.
5. *Plagiostoma punctata*.
6. *Pecten Dabisoni*.
7. *Spirifera cuspidatus*.
8. Do. do.
9. Do. do.
10. Do. do.
11. *Pecten cornea*.
12. *Pachymya gigas*.
13. Do. do.
14. *Ostrea gigantea*.
15. *Magus plumulus*.
16. *Leptæna Scarbiculus*.
17. *Terebratula semiglobosa*.
18. Do. do.
19. *Gypidium Aylesfordii*.
20. *Catillus sulcatus*.
21. *Hippidium ponderosum*, and 23.
22. *Thetis minor*, and 25.
23. *Hippidium ponderosum*, and 21.
24. *Sphæra corrugata*.
25. *Thetis minor*, and 22.
26. *Venericardia planicostata*.
27. *Trigonia politus*.
28. *Terebratula inconstans*.
29. *Megalodon Cucullatus*.
30. *Gervillia aviculoides*.
31. Do. do.
32. *Exogyra conica*.
33. Do. do.
34. *Myoconcha crassa*.

PLATE VIII.

1. *Cyclas lævigatus*.
2. *Diceras ungaricus*.
3. *Radiolites ventricosus*.
4. *Venus incrassata*.
5. *Sphærulites foliacea*.
6. *Crania striata*.
7. *Crania striata*.
8. *Crassina lurida*.
9. *Tellina ovata*.
10. *Hippocardia Hibernica*.
11. *Spondylus truncata*.
12. *Cucullæa glabra*.
13. *Arca appendiculata*.
14. *Plicatula pectenoides*.
15. *Avicula echinata*.
16. *Pachyodon crassissima*.
17. *Catillus Lamarekii*.
18. *Spondylus crassicosta*.
19. *Mytilus antiquorum*.
20. *Nucula Cobboldiæ*.
21. *Cardium Parkinsoni*.
22. *Modiola cuneata*.
23. *Gryphæa incurva*.
24. *Isocardia minima*.
25. *Pectunculus Plumstedensis*.
26. *Cardita lunulata*.
27. Do. do.
28. *Pinna lanceolata*.
29. *Trigonia costata*.
30. *Perna maxillata*.

PLATE IX.

1. *Thecidium recurvirostrum*, and 4.
2. } *Calceola Sandalina*.
3. } *Thecidium recurvirostrum*, and 1.
4. } *Pluvenites Adansoni*.
5. } *Pinna margaritacea*.
6. } *Amphidesma decoratum*.
7. } *Axinus obscurus*.
8. } *Orbicula granulata*.
9. } *Solenimya præmeva* ?
10. } *Thecidium recurvirostrum*, and 1. 4.
11. } *Anomia lineata*.
12. } *Psammobia solida*.
13. } *Gastrochæna contorta*.
14. } *Crassatella sulcata*.
15. } *Corbis lævis*.
16. } *Crenatula ventricosa*.
17. } *Pholadomya angustata*.
18. } *Donax retusa*.
19. } *Saxicava rugosa*.
20. } *Petricola laminosa*.
21. } *Pholadomya lirata*.
22. } *Birostrata inequibata*.
23. } *Lucina mites*.
24. } *Pullastra recondita*.
25. } *Chama ponderosa*.
26. } *Tellina Patellaris*.

30. }
31. }
32. }
33. *Cyrina cuneiformis*.

PLATE X.

1. *Psammobia dubia*.
2. *Hipponyx cornucopia*.
3. *Pullastra globosa*, and 6.
4. *Balanus tessellatus*.
5. *Cypricardia carinata*.
6. *Pullastra globosa*.
7. *Cyclas lævigata*.
8. }
9. }
10. *Pandora DeFrancii*.
11. *Corbula revoluta*.
12. *Maetra semisulcata*.
13. *Sanguinolaria Hollowaysii*.
14. *Erycina fragiles*.
15. *Cyprina equalis*.
16. *Cytherea polita*.
17. *Artemis lentiformis*.
18. }
19. }
20. }
21. }
22. *Fistulana pyriformis*.
23. *Solen fragilis*.
24. }
25. }
26. }
27. }
28. }
29. *Pholas aperta*, and 28.
30. }
31. }
32. }
33. }
34. *Mya lata*.
35. *Teredina personata*, and 25.
36. *Dentalium nitens*.
37. *Teredina personata*, and 23.
38. *Clavagella coronata*.
39. *Lithodomus antiquatus*.
40. *Pholas aperta*, and 20, 21.

PLATE XI.

1. 1. *Diceras Lonsdalii*.
2. *Anodon Cordierii*.
3. *Unio subtruncatus*.
4. *Myopara costatus*.
5. *Hippagus Isocardoides*.
6. *Cardiola fibrosa*.
7. *Egeria triangulata*.
8. *Gratloupia Moulensii*.
9. *Lutraria sulcata*.
10. *Panopæa bionæ*.
11. *Cyrtia cuspidata*.
12. *Atrypa reticularis*.
13. *Dianchora striata*.
14. *Orthis canalis*.
15. *Trigonosemus lyra*.
16. *Pycnodonta radiata*.

PLATE XII.

Exhibiting the parts of univalves.

SPIRES.

1. Acute spire. — Volutions not deeply divided. — *Terebra maculata*.
2. Obtuse spire. — Volutions well defined, and longitudinally ribbed. — *Murex vitulinus*.

3. Papillose spire. — *Voluta scapha*. — The pillar lip is very broadly reflected on the columella, which is obliquely plaited.
4. Mammillated spire. — *Cymba porcina*.
5. Decollated spire. — Volutions nearly flat-sided, and but slightly divided by the sutural line. — *Bulinus decollatus*.
6. Discoidal spire. — *Conus Virgo*.
7. Canaliculate spire. — Volutions of the spire spirally surrounded at their base by a deep and wide channel. — *Eburna spirata*.
8. Turreted and coronated spire. — *Fusus corona*.
9. Turreted spire, with the volutions tabulated, or parallelly flattened above. — *Fusus scalaris*.
10. Corinated spire, the volutions deeply divided. — *Fusus colus*.
11. Concave spire, the volutions sunk below the body of the shell. — *Planorbis corneus*.
12. Depressed spire. — *Purpura lineata*.
13. Reversed spire. — The volutions winding in a contrary direction from the ordinary course. — *Lymnæa columna*.

APERTURES.

14. Transversely oval aperture. — *Stomatia inconspicua*.
15. Orbicular or circular aperture. — *Turbo smaragdus*.
16. Pyriform aperture. — *Phasianella varia*.
17. Semilunar aperture. — *Helicina festiva*. See also fig 11.
18. Superiorly contracted aperture. — Pillar or columellar lip with folds or pleats. — *Auricula Auris* — *Midæ*.
19. Longitudinally oval aperture. — *Murex frondosus*.
20. Trigonal aperture. — *Trochus zizyphinus*.
21. Semicircular aperture. — *Natica monilifera*.
22. Linear aperture. — Toothed or denticulated on both lips. — *Cypræa tigris*.
23. Turned up aperture, or opening towards the spire, which is contrary to almost all other uni-

valves, the apertures opening towards the base. — *Anastoma depressum*.

OUTER LIPS.

24. Dentated outer lip. — Aperture straitened. — *Rostellaria Provisii*.
  25. Alated, or winged outer lip, — *a* exhibits an enamelled extension of the columellar lip, which frequently covers the suture of the spire. — *Strombus Auris* — *Dianæ*.
  26. Horned outer lip. — This horn-like process is an elongation of the internal enamel of the shell, and always placed near the base of the outer lip. — *Monoceras narval*.
  27. Digitated outer lip. — These spinous processes always emanate from the external surface of the lip, contrary to the process in No. 26. — *Ranella spinosa*.
  28. Reflected outer lip. — *Helix Senegalensis*.
  29. Internally and externally denticulated outer lip. — *Triton cutaceum*.
- Involute and denticulated outer lip. — See No. 22, *a*.

COLUMELLAR OR PILLAR LIPS.

30. Columellar lip with oblique plaits. — *Turbinella umbilicaris*.
31. Columellar lip with parallel plaits. — *Cassis tuberosus*.
32. Tortuous pillar lip. — *Ancillaria glabrata*.

CANALS AND BEAKS.

33. Closed canal. — *Typhis hemitripiterus*.
34. Recurved beak. — *Cerithium aluco*.
35. Recurved, varicose beak. — *Nassa Clathrata*.
36. Truncated beak. — *Fasiolaria trapezium*.

OPERCULI.

37. Multispiral Operculum.
38. Articulated Operculum.
39. Radiated Operculum.
40. Lamellated Operculum.
41. Concentric Operculum.
42. Unguolated Operculum.

EDINBURGH:

PRINTED BY ANDREW SHORTREDE,
GEORGE IV. BRIDGE.

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