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ELEMENTS OF CONCHOLOGY,

INCLUDING

THE FOSSIL GENERA

AND

THE ANIMALS.

By T. EDWARD BOWDICH, Esq.

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WETTERAVIAN SOCIETY OF HANAU. MEMBER OF THE GEOGRAPHICAL SOCIETY
OF PARIS. CONDUCTOR OF THE MISSION TO ASHANTEE.

PART I. UNIVALVES.

WITH UPWARDS OF 500 FIGURES.

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P R E F A C E.

THIS Manual, like those of the *Mammalia* and the *Ornithology* already published, originated in the notes and drawings collected during a study of the subject, preparatory to a second travel in Africa. I had intended to arrange the similar materials for the publication of the *Reptiles* and *Fish* before the *Mollusca*, until a further progress in the study of Geology convinced me that the present Manual was not wanting to the Zoologist alone.

M. Brongniart has shown that the *Formations* containing the remains of *marine* shells, very rarely, and then under peculiar and evident local causes, present those of *fresh-water* shells; and that the contrary had been alleged, because Genera containing both *marine* and *fresh-water* shells, differing not merely in specific but in generic characters, had not been reformed or subdivided. M. Lamarek acknowledged the justice of the observation, and resumed his labours, which had previously advanced this branch of Natural History considerably towards perfection, by establishing separations of *marine*, *fresh-water*, and *terrestrial* shells; but, unfortunately, his *Extrait du Cours de Zoologie*, published in 1812, contains the mere outline of his system, without the descriptions of the genera; and the 1st and only part (which appeared two years ago) of the 6th volume of his *Histoire Naturelle des Animaux sans Vertebres*, without figures, contains merely the three or four first genera of the *Univalves*, and reminds us so frequently of the melancholy affliction which has now compelled this illustrious Naturalist to depend entirely on the eye-sight of others, that the appearance of the remain-

ing parts, if they should appear, must be hailed by the friends of science with much less confidence, although with equal admiration and gratitude.

The system of classification desirable to the Geologist, is that by which a shell may be readily and accurately determined, without considering the animal which has inhabited it. Such a system is equally convenient to the Conchologist, when each genus is followed by a reference to the place which the animal occupies in the Natural System, which should always be adjoined. To be unable to determine the shell, unless we found the animal, would be like having no other aid than Crystallography for the study of Minerals.

These elements are principally compiled from Cuvier's "*Mémoires pour servir à l'Histoire et à l'Anatomie des Mollusques*," and the 2d vol. of the "*Règne Animal*" of the same author; M. Lamarck's "*Mémoires sur les Fossiles des Environs de Paris*;" M. Brongniart's "*Mémoires sur des Terrains qui paroissent avoir été formés sous l'Eau Douce*," and others on the same subjects, scattered through the 22 quarto volumes of the "*Annales du Museum*;" M. Blainville's and M. DeFrance's articles in the "*Dictionnaire des Sciences Naturelles*;" M. de Ferussac's "*Histoire Naturelle, générale et particulière, des Mollusques Terrestres et Fluviales*;" and many other rare and costly works, collected in the splendid library of Baron Cuvier, to which I have had access at all hours, with the liberty of taking home whatever I pleased, for the last two years.

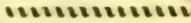
The figures which illustrate the system of M. de Ferussac have been copied from those which accompany his work, with the exception of such as were to be found in the Museum. Almost all the other figures of the recent, and some few of the fossil shells, have been drawn from the objects themselves; which I have invariably been permitted to take home from the Museum for that purpose, without being limited either to time or number. I have occasionally been favoured with such specimens as were not to be found there, from the cabinets of MM. Lamarck and Dufresne.

The remaining part will contain the *Bivalves*, *Multivalves*, and the *Sub-Coronalia* and *Vermicularia* of Lamarck (the *Brachiopoda* and *Tubicolæ* of Cuvier): a figure of the entire shell, of each valve, and of the hinges and teeth, when at all complicated, will be given. The Animals and Fossil Genera will also be included.

I beg to repeat that this Manual, as well as the others, has been compiled for those of my countrymen, whose remote situations in our colonies do not permit of their acquiring so desirable a species of knowledge, by the study of collections; as well as for those who, like myself, may cultivate Natural History, as the most agreeable *delassement* to mathematical studies.

Paris, November 8, 1821.

INTRODUCTION.



Fossil shells, being necessarily without brilliance, colours, or beauty, and frequently imperfect, were formerly rejected from collections as destitute of interest; but since it has been observed that these fossils are precious monuments for the study of the revolutions undergone by different points on the surface of the globe, they have become objects of the greatest interest to the Naturalist (1).

It appears to have been proved that the *shells*, *testaceous vermicularia*, *echini*, and different species of *polypi* which are found so profusely in the fossil state beneath the soil or on its surface, even in the middle of continents and on the highest mountains (2), are the remains of multitudes of marine animals which lived in these places, and that several of the species are analogous to those now inhabiting the seas (3). For, as the quantity of these remains is enormous, since we know of masses nearly a hundred miles in extent, and as shells of an extreme thinness and fragility are found entire amongst them, we cannot but conclude that their animals have really lived in these parts of the globe, and, consequently, that the sea has formerly been stationary there (4).

(1) Conchology, when rendered subservient to geognostic investigations, assumes the rank of an useful science, and then becomes a subject of the highest importance. *Bulimus trifasciatus*, a very common West Indian shell, occurs imbedded in the same limestone which incloses the fossil human skeleton, lately sent to the British Museum, from the *grande terre* of Guadaloupe, by Sir A. Cochrane, proving that rock to be of modern date, and contemporaneous with the existing creation of animals.—*Leach's Zoological Miscellany*. Vol. i, p. 42.

(2) According to Ulloa, shells have been found at the height of 14,220 feet above the sea, on a mountain in Peru.

(3) M. DeFrance has discovered at least 500 species of fossil shells in the *calcaire grossier* at Grignon, the equivalent of the *London clay*.

(4) Les terrains les plus bas, les plus unis, excavés jusqu'à de très-grandes profondeurs, ne montrent que des couches horizontales de matières variées, enveloppant presque toutes d'innombrables produits de la mer. Des couches

The shells whose analogous species do not live in our seas, but in those of warm climates, form a part of the fossils found in the north of Europe. The *Nautilus Pompilius* found at Courtagnon, and the remains of which are not uncommon at Grignon, is one of the

pareilles, des produits semblables, composent les collines jusqu'aux plus grandes hauteurs. Quelquefois les coquilles sont si nombreuses, qu'elles forment à elles seules toute la masse du sol. Presque partout elles sont si bien conservées, que les plus petites d'entre elles gardent leurs parties les plus délicates, leurs crêtes les plus subtiles, leurs pointes les plus déliées. Elles s'élèvent à des hauteurs supérieures au niveau de toutes les mers, et où nulle mer ne pourroit être portée aujourd'hui par des causes existantes. Elles ne sont pas seulement enveloppées dans des sables mobiles, mais les pierres les plus dures les incrustent souvent et en sont pénétrées de toute part. Toutes les parties du monde, tous les hémisphères, tous les continens, toutes les îles un peu considérables présentent le même phénomène. On est donc bientôt disposé à croire, non seulement que la mer a envahi toutes nos plaines, mais qu'elle y a séjourné longtemps et paisiblement pour y former des dépôts si étendus, si épais, en partie si solides, et contenant des dépouilles si bien conservées. Le temps n'est plus où l'ignorance pouvoit soutenir que ces restes de corps organisés étoient de simples jeux de la nature, des produits conçus dans le sein de la terre par ses forces créatrices. Une comparaison scrupuleuse de leurs formes, de leur tissu, souvent même de leur composition chimique, ne montre pas la moindre différence entre ces coquilles et celles que la mer nourrit ; elles ont donc vécu dans la mer ; elles ont été déposées par la mer : la mer existoit donc dans les lieux où elle les a laissées ; le bassin des mers a donc éprouvé au moins un changement, soit en étendue, soit en situation. Voilà ce qui résulte déjà des premières fouilles, et de l'observation la plus superficielle.

Les traces de révolutions deviennent plus imposantes quand on s'élève un peu plus haut, quand on se rapproche davantage du pied des grandes chaînes.

Il y a bien encore des bancs coquilliers ; on en aperçoit même de plus épais, de plus solides : les coquilles y sont tout aussi nombreuses, tout aussi bien conservées ; mais ce ne sont plus les mêmes espèces ; les couches qui les contiennent ne sont plus aussi généralement horizontales. Elles se redressent obliquement, quelquefois presque verticalement. Au lieu que, dans les plaines et les collines plates, il falloit creuser profondément pour connoître la succession des bancs, on les voit ici par leur flanc, en suivant les vallées produites par leurs déchiremens. D'immenses amas de leurs débris forment au pied de leurs escarpemens des collines arrondies, dont chaque dégel et chaque orage augmentent la hauteur.

Et ces bancs redressés, qui forment les crêtes des montagnes secondaires, ne sont pas posés sur les bancs horizontaux des collines qui leur servent de premiers échelons ; ils s'enfoncent au contraire sous eux. Ces collines sont appuyées sur leurs pentes. Quand on perce les couches horizontales dans le voisinage des couches obliques, on retrouve celles-ci dans la profondeur : quelquefois même, quand les couches obliques ne sont pas trop élevées, leur sommet est couronné par des couches horizontales. Les couches obliques sont donc plus anciennes que les couches horizontales ; et, comme il est impossible qu'elles n'aient pas été formées horizontalement, il est évident qu'elles ont été relevées, qu'elles l'ont été avant que les autres s'appuyassent sur elles.

Ainsi la mer, avant de former les couches horizontales, en avoit formé d'autres, qu'une cause quelconque avoit brisées, redressées, bouleversées de mille manières. Il y a donc eu aussi au moins un changement dans le sein de

numerous instances (1). The fragments of palm-trees; the fossil masses of gum-elastic; the impressions of exotic ferns in slate and coal; and the fossil bones of the Elephant, Crocodile, etc. found in England, France, Germany, and other parts of Europe, seem to attest a mutation of climate (2).

Cuvier and Brongniart were the first who announced the existence of formations, anterior to history, composed in the same manner and presenting the same characters, although situated at great distances from each other, and containing *Terrestrial* and *Fresh-Water* instead of *Marine* productions (3). It is impossible to admit the hypothesis of the transport of these terrestrial productions to the sea by means of rivers. They might have carried into the sea some remains of vegetables and some fluviatick and terrestrial shells, but then the formations which are composed of them ought

cette mer qui avoit précédé la nôtre; elle a éprouvé aussi au moins une catastrophe; et comme plusieurs de ces bancs obliques qu'elle avoit formés les premiers s'élèvent au-dessus de ces couches horizontales qui leur ont succédé, et qui les entourent, cette catastrophe, en rendant ces bancs obliques, les avoit aussi fait saillir au-dessus du niveau de la mer, et en avoit fait des îles, ou au moins des écueils et des inégalités, soit qu'ils eussent été relevés par une extrémité, ou que l'affaissement de l'extrémité opposée eût fait baisser les eaux; second résultat non moins clair, non moins démontré que le premier, pour quiconque se donnera la peine d'étudier les monumens qui l'appuient.—*Cuvier, Discours sur la Théorie de la Terre.* Paris, 1821.

(1) See the note on that singular shell the *Trochus agglutinans*, p. 35.

The *Terebellum perditum* (the analogous living species of which is not known) is found in great numbers and of all ages at Grignon, which M. Lamarck considers would not have been the case unless the enormous quantity of marine shells had lived in that region, instead of being accumulated there by some great catastrophe. At Courtagnon, near Rheims, an enormous bed of fossil shells discovers itself in several points; it proceeds from east to west, appears again at Grignon and some other places, and from M. Lamarck's comparison of the species with those found in Hampshire, appears to have extended to that part of England. If so, there is reason to believe that this bed has been divided by the Channel since its formation: and, consequently, that its formation was anterior to the last invasion of the sea.

(2) The rocks of the western coasts of France are interlarded with Gryphites, Ammonites and other shells (*coquilles pelagiennes*) known to inhabit the sea only at great depths. Recent littoral shells have been found fixed on these fossil deep-water shells, which are also common in the hills called *Vaches-Noires*. There is a pottery in that neighbourhood which is supplied with clay from that part of the beach which is uncovered at low water; this clay, which is said to be very superior, contains quantities of deep-water fossil shells. It would seem, therefore, that these parts are not now subjected to the sea for the first time. Again, the fossil marine shells found more than 60 feet deep in the earth, probably were not deposited during the last invasion or passage of the sea.—*Hydrogeologie*, par J. B. Lamarck. Pages 85, 86.

(3) Lamanon is said to have observed immense beds of fresh-water shells on beds of marine shells in the mountains of Provence.

to present the forms and all the characters of *alluvium*; that is to say, a mixture of all sorts of heterogeneous matters, more fragments than entire bodies, coarse sands, unequal and irregular strata. We find nothing of this kind in the Fresh-Water Formations; the limestone is almost pure, every thing is in its place and perfectly entire, the most delicate shells present themselves in complete preservation; indeed, fragments of them are scarcely to be found in this formation, whilst, in the marine, fragments are met with in large quantities. We must, therefore, suppose a great tranquillity in the waters wherein these shells have lived. They are deposited in beds, often very thin and perfectly horizontal, like the masses of limestone and the zones of silex which they contain; the silex is in beds, frequently continuous, and never in rolled pieces. The disengagements of gas, indicated by the *tubulures*, have almost always been made vertically, and have often proceeded from the same plane, which is a further proof of the tranquillity of the liquid and the homogeneity of the Formation. Lastly, the immense extent of these deposits, which occupy spaces of more than 1200 square leagues, and which in so great a surface do not present any trace of disorder, renders this hypothesis perfectly admissible (1).

The extent of these masses of Fresh-Water Formation ought not to astonish us; we know of others at least as vast in North America. If the lakes Superior, Michigan, Huron, Erie, and Ontario deposited stony layers on their beds and became dry, they would leave Fresh-Water Formations more extensive than any of those just described (2).

Among the different stages of alteration in which we find fossil shells, the most frequent is that in which only the animal part has

(1) M. Brongniart remarks that marine and fresh-water shells have in no instance been found mixed together, except in the quarries of *Grès* at Beauchamp near Pierrelaie, where the cause is local; for the fresh-water limestone, which forms the surface of the soil, reposes immediately on the marine sand which forms the bed or *fond*; the mixture of the two, therefore, in this point of contact is natural. M. DeFrance has since adduced and explained another instance; see note on the Genus *Helix*. At Montmartre the *Calcaire Marin* forms a kind of *mamelon* or small hummock, and the gypsum in depositing itself on these beds, which are porous and friable, has enveloped the marine shells which they contain. Indeed, there is no proof that gypsum may not be a salt-water deposit; the upper marine formation contains small beds of gypsum at intervals, and the *oysters* are often covered with crystals of selenite. There are only 3 fresh-water genera of bivalve shells, and it is remarkable that no species of either has been found in the Fresh Water Formation.

(2) Fresh-water deposits must not be determined by the presence of *doubtful* shells, but, like that of the environs of Paris, on the constant presence of a considerable majority of shells not found elsewhere, and on the constant absence of all marine bodies. See Pl. 4.

been destroyed, that is to say, the gelatinous or membranous portion which is mixed with the cretaceous part ; so that after its destruction the shell is almost exclusively composed of calcareous matter. It has lost its brilliance, its colours, and often even its mother of pearl, if it had any, for it owed all these to the presence of the animal part. It has generally become quite white, but sometimes, having been long buried in a slime containing coloured particles, it has acquired a peculiar hue, not its own. Other fossils have not only lost the animal part, but even their substance has been transformed into siliceous matter ; in this case, the closer approximation of the component parts leaves a small void space around the shell, in the stone wherein it is imbedded, more or less interrupted by lateral adherences. Shells have sometimes been so peculiarly disposed by volcanic eruptions, as to preserve their natural colours even in the fossil state.

We scarcely condescend to examine *microscopic shells*, from their insignificant size ; but when we reflect that it is by means of the smallest objects that Nature every where produces the most astonishing and remarkable phenomena, they become highly interesting, from their multiplication or abundance, and their consequent influence on the composition and extent of the masses composing the exterior crust of the globe. Whatever Nature may seem to lose in point of volume in the production of such bodies, is amply made up by the number of the individuals, which she multiplies with admirable promptitude to infinity. The remains of these minute animals, therefore, have much more influence on the surface of the globe than those of Elephants, Hippopotami, or Whales.

UNIVALVE SHELLS.

DIVISIONS.

Symmetrical	} not concave, form		} flat $\frac{2}{3}$		Sepiacea,	p. 14.																																																																			
		} concave.		} discous		Nummulacea.	p. 15.																																																																			
} multilocular.	} monolocular.	} straight or almost straight.	} partly straight.	} volute; with whorls {	} not adhering	} adhering	} touching.	} penetrating	Spirulacea.	p. 21.																																																																
									} volute	} arched	} straight; in the form of a	} sheath.	} shield.	} Argonautacea.	} p. 22.	} p. 22.	Argonautacea.	p. 23.																																																								
																	} very large	} moderate	} elliptical	} semi-round	} round	} Carinacea.	} p. 23.	} p. 23.	Carinacea.	p. 23.																																																
																									} conical or spiral; mouth	} channelled	} angular.	} Gynostomata.	} Syphonostomata.	} Clypeacea.	} p. 24.	} p. 24.	Gynostomata.	p. 25.																																								
																																	} notched	} entire	} Megastomata.	} Ellipsostomata.	} Hemicyclostomata.	} p. 27.	} p. 27.	} p. 27.	Megastomata.	p. 25.																																
																																									} involute, or entirely flat	} moderate	} elliptical	} semi-round	} round	} Carinacea.	} p. 23.	} p. 23.	Ellipsostomata.	p. 27.																								
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								} moderate	} elliptical	} semi-round	} round	} angular.	} Gynostomata.	} p. 35.	} p. 35.	Angyostomata.																																																										

DIVISION I. SEPIACEÆ.

GENERA.

1. LOLIGO. *Lam.* CALMAR.

A plate of horn on the back, instead of a shell, in the form of a sword or lancet. Pl. 1, fig. 2.

V. Animal, p. 54.

2. SEPIA. *Lam.*

Shell oval, thick, gibbous; composed of an infinity of very thin calcareous plates, parallel, joined together by innumerable little hollow columns. Pl. 1, fig. 1 (1).

V. Animal, p. 54.

(1) Being friable, from its structure, it is employed to polish various substances; it is also given to young birds to sharpen their beaks.

DIVISION II. NUMMULACEÆ.

GENERA.

1. NUMMULA. Lam. CAMERINA. Brug.

Exterior form lenticular, without any apparent opening; a spiral cavity divided by septa into an infinity of small chambers (1).

No siphon.

Marine.

a. Perfectly discous. Pl. 1, fig 3, 4. (2)

Only one row of chambers to each turn of the spire.

Fossil and living.

b. (Siderolites, Lam.)

The edge with blunt or sharp rays. Pl. 1, fig. 23.

Microscopic.

c. (Renulites, Lam.)

Several rows of chambers to each turn of the spire.

..... - -

2. DISCORBITES. (3) Lam.

Spiral, all the turns visible and exposed. (4) Pl. 1, fig. 5.

No siphon.

(1) The *Nummulites* are amongst the most widely-spread fossils, forming, almost exclusively, entire chains of calcareous hills and immense beds of building stone. The Pierre de Laon is composed of *Nummulites*; the pyramids of Egypt were constructed with stone of this nature, and are raised upon the rocks which supplied it. They were formerly considered, by some, to be *Lusus Naturæ*, by which portions of calcareous matter assumed the form of organised bodies; by others, as petrified seeds, opercula, bivalve shells, etc. etc. Breynius, in 1732, and Gesner, in 1758, concluded them to be univalve shells, very analogous to the *Ammonites*. Bruguiere thought that the animal was contained in the last chamber of the shell. Cuvier considers them to be interior shells. To observe the chambers more distinctly, let a drop of ink fall on the worn face, and when it is quite dry, rub the Nummulite delicately on a stone to take off the exterior black, after which all the points which have retained the ink become evident on a white ground, and the interior organization is perfectly discovered. This practice is useful for recognising several other delicate fossil shells.

(2) These are the most common and the largest amongst the fossil species, but the living species are very small.

(3) The termination *ites* distinguishes the *Genera* exclusively fossil, no analogous living species having been yet discovered.

(4) This character distinguishes them from the *Spiralinites*, the absence of the siphon from the *Nautili*.

DIVISION III. SPHERULACEÆ.

GENERA.

1. MILIOLA. Lam.

Oval, globulous, or oblong; subtrigonal; the spiral turning around an axis perpendicular to the planes of the turns; divided into 2 or 3 chambers, the last pierced by a lateral hole, which is the only aperture. Pl. 1, fig. 6.

With chambers.

Marine. Some species found on *Fuci*, in the neighbourhood of *Cor-sica* (1).

2. POLLONTES. Montf.

Resembling the *Miliola*, but the chambers pierced alternately towards both ends of the shell, and the last open the whole breadth. Pl. 3, fig. 16.

On the shores of the *Mediterranean Sea* and *Indian Ocean*.

3. ARETHUSA. Montf.

Chambers rolled obliquely (making the shell turreted) and only the last perforated. Pl. 3, fig. 17.

Microscopic. On the shores of the *Adriatic*.

4. MELONITES. Lam.

No apparent mouth; consisting of numerous tubes or siphons united in a plane rolled on itself. Pl. 2, fig. 1.

Without chambers.

5. GYROCONITES. Lam.

Hollow spheroids, composed of several linear pieces, curved, joined at the sides, the extremities terminating in the poles; the surface furrowed in transversal circles (2). Pl. 1, fig. 14.

Scattered throughout the masses of *silex* belonging to the *First and Second Fresh Water Formation* of the environs of *Paris*.

(1) The fossil species have formed, exclusively, immense beds of stone, especially in the quarries of the environs of *Paris*.

(2) Only one species known, the size of a pin's head, *G. medicaginula*, Lam.

DIVISION IV. ORTHOCERACEÆ.

GENERA.

1. BELEMNITES. *Boet. de Boet.*

A thin double case, composed of two cones united at their bases; the interior cone much shorter than the other, divided within by parallel septa, concave towards the base; only one chamber (conical) apparent, the older ones being successively effaced by the piling up and contiguity of the septa. Pl. 1, fig. 9, 22, etc.

A siphon extending from the summit of the exterior to the same part of the interior cone, whence it continues either along the edge or through the centre of the septa.

Very abundant, especially in strata of *Chalk* and *Compact Limestone*.

a. Elongated in cylinders, sharpened at the end only.

b. Narrowed towards the base, like a distaff or lance.

2. ORTHOCERATITES. *Brenn.*

Straight or slightly bent; chambered; margins of the septa even, or with 1 or 2 small undulations. Pl. 1, fig. 25. Pl. 2, fig. 11.

A siphon central or lateral.

Said to characterise the *Transition Rocks* of *Werner*.

3. CONULARITES. *Miller.*

Concave, hollow, mouth half closed by an inflexion of the lip. Pl. 3, fig. 19, 21.

Septa imperforate.

In *Transition Limestone*, in *Ironstone*, in *Schale*, with *marine shells*.

4. AMPLEXITES. *Sowerby.*

Nearly cylindrical; divided into chambers by numerous transverse septa embracing each other with their reflected margins. Pl. 2, fig. 10.

In the *Limestone* of the *Black Rock* at *Limerick*.

5. NODOSARIA. *Lam.*

Straight, chambered, slender, with a contraction at each septum.

Akin to the *Raphanis-*ter (Pl. 2, fig. 15), *Echid-*nus (Pl. 2, fig. 14), and *Telebois* (Pl. 3, fig. 22) of *Montfort*?

- a. Contractions moderate. Pl. 2, fig. 9.
 b. Contractions so deep that the septa are united by the siphon only and appear as if strung together. Pl. 2, fig. 12.

6. HIPPURITES. *Lam. CORNU-COPIÆ. Thomson.*

Thick, cylindrical or conical, with irregular septa traversing two longitudinal cylindrical projections adhering to one of the sides; mouth closed by an operculum. Pl. 1, fig. 21, 26, 28, 31, 33. Pl. 2, fig. 18.

A siphon, a gutter instead of a siphon, or both. Several large species in the older *Secondary Mountains*.

- a. Conical, more or less arched. Pl. 1, fig. 21.
 b. Batholites, *Montf.* Straight, cylindrical.

7. BACULITES. *Faujas. HAMITES. Parkinson.*

Straight, cylindrical, a little conical, fusiform, hooked or bent, compressed: septa transverse, undulated at the margins. Pl. 1, fig. 17, 19. Pl. 2, fig. 16. Pl. 3, fig. 18, 23.

Maëstricht. In the clay at *Folkstone*. In the chalk at *Hamsey* and at *Horton*.

- a. With a siphon at the outer edge of the chambers.
 b. Without

8. TURRILITES. *Montf.*

Spiral, turreted; with chambers divided by sinuous septa: the turns contiguous, all visible: mouth round. Pl. 1, fig. 16.

Septa pierced in their disks. *St. Catherine's Mount near Rouen.* In the green sand at *Horningsham, Wilts.* *Hamsey Marl Pit.*

Belemnites.

According to M. Beudant, they have never been found in *transition limestone*, or *grey wacke*, but first appear in the *argillaceous iron stone* which alternates with *bituminous slate*. The interior of the two testaceous cones is filled with a solid substance, presenting either radiating fibres or conical beds enveloping each other, and their bases corresponding with the edges of the septa of the interior cone: this solid part is sometimes found alone; at others, the kernels of the chambers of the interior cone or the alveoli are also met with. Pl. 1, fig. 9. Most frequently the alveoli and the chambers themselves have left no other traces than some projecting circles within the interior cone; but we sometimes meet with the alveoli still piled on one another, but detached from the double conical case which envelops them. The exterior cone has generally a notch on one side of the base continued in a longitudinal furrow. Klein, in 1734, was the first who considered the fusiform *Belemnites* to be spines of *Echini*, from the similar exterior form, and the radiation presented in

both on fracture, Pl. 1, fig. 8. pl. 2, fig. 7 : it does not appear, however, that he thought of making a longitudinal section of the Echinus, such as M. Beudant has submitted, pl. 1, fig. 8. pl. 2, fig. 8. A *Belemnite*, in the collection of the *Conseil des Mines*, which has not entirely passed into the calcareous state, presents in some of its parts the same spongy and radiated tissue which we observe in the spines of the *Echinus*. This *Belemnite* also offers the peculiarity of a nipple at the base, with projecting sides, striated transversely, and diverging from the centre to the circumference ; the centre is perforated by a small shallow round hole : the summit sometimes terminates in folds. Pl. 1, fig. 10, 11, 12. Some present a large conical cavity at the base, which has been often considered as the last chamber or dwelling of the animal ; others have none, or at least a very small cavity. Theophrastus's description of the lynx stone is not applicable to the *Belemnite* : it would seem that we owe the first notice of it to Pliny, but it is not quite clear whether his *dactylus idæus* (l. 37, c. 10) which he clearly distinguishes from the lynx stone (l. 8, c. 38) was a fossil species of *Echinus* or *Belemnite*. In the 15th century they were considered to be meteoric stones, and marvellous medicinal virtues were ascribed to them. Boetius de Boot, in his *Treatise on Stones*, pronounces them to be petrified darts, and it was not until the end of the 16th century that they were first regarded as natural organised bodies. Erhart, in 1724, appears to have been the first who concluded them to be shells akin to the *Nautilus*. Deluc insisted that the *Belemnite* was an organised bone, like that of the *Sepia* ; and they have been concluded by other authors to be stalactites ; petrified wood ; the teeth or the back bones of fish ; the tusks of the *Narwal* ; *Crocodile's* teeth ; tubulites, etc. etc. *Curvier, Règne Animal*, t. 2. p. 371. *Sage, Jour. de Phys. ventose*, an. x. *Beudant, Observations sur les Belemnites. Ann. du Mus.* t. 16. p. 77. *Faure Biguet. Considerations sur les Belemnites*, etc. Lyon, 1819.

Orthoceratites.

Mr. Farey " finds them referable to twenty different places in the *British series of strata* ; extending from (1st) the *London clay above the chalk*, to (20th) the *limestone resting on slate*." According to Spallanzani, the islands of the coasts of *Dalmatia* are masses of orthoceratites. M. Sage thinks, from the sections he has made, pl. 1, fig. 24, that the *Orthoceratites* are alveoli of different species of *Belemnites*, and contained within the funnel, pl. 1, fig. 29, which, however, according to M. Beudant, does not always exist. This opinion has not been generally adopted. Deluc, in particular, combated it (*Journ. de Phys. vent. an. 12.*), asserting that the alveoli of the *Belemnites* have no siphon. M. Sage considers the organization of the siphon to be evident in pl. 1, fig. 27, and in the centre of fig. 25, which is confirmed by Platt and Beudant : Montfort seems to have viewed the alveoli as the envelope of a parasite. Breynius submits fig. 30 as an orthoceratite, with the siphon passing through the axis ; fig. 35, as the convex front of the last articulation, with the siphon, of a species found most frequently in the marble of Oeland, on the coast of Sweden, four feet long, and only two inches in diameter at the base ; fig. 34, or the same part of another species, whose diameter is three inches, whence he infers its length to be more than five feet ; fig. 11, p. 2, is that of a species from Gothland, with a large siphon at the circumference, and remarkable for the projecting rays, sometimes filled with crystals of fluor, the proportion between the length and the diameter appeared to be 10 : 1. *Dissertatio Physica de Polythamniis. Gedani, 1732.* Some are smooth, others have circular sides ; both kinds are found in the greyish marble of Norway ; they are of a whitish calcareous spar, with a case or envelope of a reddish brown ; the chambers are separated by hemispherical yellowish lines.

Hippurites.

Some consider what we call the operculum to be the last septum, in which case the shell may be interior, unless it is hereafter discovered to be a bivalve : fig. 26, pl. 1, shows the gutter or canal, c. which replaces the siphon ; fig. 28 is the under part of a convex operculum, with two prolongations having the appearance of a

hinge ; whether this is natural or accidental to the petrification cannot be decided, for no other example is known amongst the various species which have been found ; fig. 31 is a Hippurite, with a gutter, a, and a siphon, b ; its surface is smooth and the septa are concave : fig. 33 is one of the most singular species which have yet been discovered ; the operculum is entire, and pierced with two eyes ; it is only six lines in depth and fifteen in diameter : fig. 18, pl. 2, found in a considerable bed on the mountain of *Montferrand* is sometimes a foot and a half long, the diameter not exceeding an inch ; the operculum has been destroyed by long exposure ; M. de la Peyrouse observes, that their situation in the rock clearly indicates that they have been petrified in the same position and in the same place in which they had originated. *De novis quibusdam Orthoceratitum et Ostracitum speciebus Dissertation-cula*, Erlangæ, 1700. Dr. Thomson, formerly Professor of Anatomy at Oxford, saw several species in the cabinet of M. Chiarelli, at Palermo, in 1789, in the form of the femur of a cow or horse, which had been found entire at Cape Passora (the ancient Pachynus), with no bones whatever in their neighbourhood. Dr. Thomson, on visiting the spot expressly, could only meet with species in the form of a case or sheath, and equal in dimension to the horn of a bull about three years old ; the interior hollow, and containing two cylindrical bodies, like two candles. The base of this cone is closed by a species of lid, similar to that of a powder horn. The internal structure resembles a heap of egg shells, broken transversely, and piled up so as to touch each other, but leaving a void space in the middle. These plates are so flexible that they allow the concave part of the horn to bend inwards when squeezed. Their disposition has some resemblance to the diaphragm of the human body. The Hippurite, therefore, is not entirely divided into concamerations, and has no tubes of communication, or siphons, as we find in the Ammonites, Belemnites, and Orthoceratites. The texture of this case, as it exists in a fossil state, is scaly lengthwise and across. The transversal fracture, when it is fresh, appears to be strong, and composed of concentric layers ; but after having been some time exposed to the air, this fracture appears rotten and spongy, so that in the part changed by the air, it becomes ramified like an animal substance, which gives it the appearance of a bone. This fossil case is closed by an operculum, the internal surface of which is imbricated in converging rays, like the shell of the Pecten. The thickness of the operculum led Dr. Thomson to conclude that this case was inhabited by one animal only, and that it was not the nest of several.

DIVISION V. LITUACEÆ.

GENERA.

1. LITUUS. *Breynius*.

The last turn elongated.

a. Lituites, *Montf.*

Turns contiguous. Pl. 1,
fig. 7.

b. Hortolus, *Montf.*

Turns separated. Pl. 1,
fig. 32.

China : Foss. in the red limestone of *Oeland* ; *Meudon* ; in the limestone at *Namur*.

2. SCAPHITES. *Parkinson*.

The last turn (after being enlarged and elongated) diminished and reflected inwards. Pl. 2, fig. 6.

In the *London lCay* ; *Crag Marl* ; *Melbury Marble*.

DIVISION VI. SPIRULACEÆ.

GENERA.

1. SPIRULA. (1) *Lam.*

The turns of the spire not touching; divided transversally into chambers. Pl. 1, fig. 18.

Siphon occupying the middle of each chamber and continued to the extremity of the shell.

Austral Seas. Gulph of *Florida.* V. Animal, p. 54.

2. SPIROLINITES. *Lam.*

The turns of the spire touching; the septa projecting in a small degree, so as to divide the exterior surface of the spire by crests or striæ. Pl. 1, fig. 13.

Siphon traversing the septa and chambers.

Grignon. (2)

3. AMMONOCERATITES. (3)
Lam.

Septa numerous, undulated at the margins. Pl. 3, fig. 14.

Siphon marginal, interior.

Rolled on itself in the same plane?

(1) Peron's discovery of the animal of the *Spirula*, so nearly akin to the *Nautilus* that Linnæus placed it amongst them, has thrown much light on all the multilocular univalves: thitherto, it was a question whether the animal inhabited the last chamber of the shell; whether it was contained entirely or partly within it; or whether the shell was enveloped more or less completely by the animal. The animal of the *Spirula* is perfectly analogous to the *Sepia*, and its shell is enchased in the posterior extremity of the body, and only visible in part. There is now very little, or no doubt, therefore, that the *Rotalites*, *Belemnites*, *Hippurites*, etc. etc. were more or less enchased in the posterior extremity of the animal, a portion of whose body was enveloped in the last chamber, and connected, probably, by a tendinous filament inserted at the extremity of the siphon, similar to that of the *Nautilus*. Breynius, on the authority of Woodward (*Catalogue of English Fossils*, Part I, p. 113), says, that the shells of the *Spirula* abound on the shores of Jamaica, Barbadoes and the Bahamas: he adds, "de figura autem animalculi domicilium hoc testaceum curiosissimum inhabitantis, altum apud omnes silentium." p. 22.

(2) Lamarck has mentioned the genus *Cristellaria* (Pl. 3, fig. 13), but without defining it, and there are none in the Museum. These shells are cretaceous, and almost microscopic. Fossil species, pyritous or ferruginous, are found in Tuscany; and M. DeFrance possesses others, which are said to have been brought up with the soundings off *Teneriffe*.

(3) The locality is unknown. M. Lamarck purchased it by accident: he kindly allowed me to take it home, in order that the figure, which is the first that has been made, might be as accurate as possible.

DIVISION IX. ARGONAUTACEÆ.

GENERA.

1. ARGONAUTA.

Very thin; the last turn so disproportionately large as to give the spire the appearance of the poop of a ship. Pl. 13, fig. 4.

Mediterranean. Atlantic. Fossil species between *Rouen* and *St. Ouen* (Pl. 3, fig. 9), and at *D'Anvers*. V. Animal, p. 55.

DIVISION X. CARINACEÆ.

GENERA.

1. CARINARIA. *Lam.*

Conical, flattened at the sides. The summit an involute and very small spire; the back with a *dentated keel*: very thin. Pl. 5, fig. 16.

Mouth entire, oval, oblong, narrowed towards the angle of the keel.

Mediterranean, Atlantic, Indian Seas. V. Animal, p. 72.

DIVISION XI. VAGINACEÆ.

GENERA.

1. VAGINELLITES. *Daudin.*

Tubular, oblong; thin and pointed at one end, and an enlarged mouth at the other. Pl. 3, fig. 10.

A superior but no lateral aperture.

In the interior of the fossil shells of the environs of *Bourdeaux*.

2. CLEODORA. *Peron.*

Cartilo-gelatinous; like a reversed truncated pyramid. Pl. 5, fig. 2.

Seas of warm climates. V. Animal, p. 56.

3. CYMBULIA. *Peron.*

Cartilo-gelatinous, very transparent, crystalline, oblong, like a truncated *sabot* or boat. Pl. 5, fig. 3.

Aperture lateral and anterior.

Mediterranean, near Nice. V. Animal, p. 56.

4. HYALEA. *Lam.*

Horny, oval-globulous; tridentated posteriorly. Pl. 5, fig. 1.

Mediterranean, Atlantic, etc. V. Animal, p. 56.

DIVISION XII. CLYPEACEÆ.

GENERA.

1. PATELLA. (1) *Lin.*

Oval or almost orbicular, in dilated cones, more or less obtuse and concave beneath. Pl. 5, fig. 5, 6.

Mostly marine, adhering to the rocks and other hard substances bordering the sea.

V. Animal, p. 73.

2. FISSURELLA. (2) *Lam.*

A small hole at the summit. Pl. 5, fig. 10. *Marine.* V. Animal, p. 72.

3. EMARGINULA. (3) *Lam.*

A notch at the posterior edge. Pl. 5, fig. 11. *Marine.* V. Animal, p. 72.

4. SCUTUS. *Montf.* PARMAPHORA. *Blainv.*

Elongated, flattened; summit apparent towards the posterior part, which is rounded; the anterior truncated. Pl. 5, fig. 4.

Marine. New Zealand. *Fossil* species at Grignon. Animal unknown.

5. SEPTARIA. *Feruss.* NAVICELLA. *Lam.*

Summit symmetrical, inclined towards the posterior edge: an operculum. Pl. 5, fig. 23.

A horizontal plate within. In the rivers of warm climates.

V. Animal, p. 72.

6 ANCYLUS. *Geoff.*

Conical.

V. Animal, p. 63.

a. Pl. 5, fig. 7.

Fresh-water.

b. Plectrophorus, *Fer.*

With an interior winding impression. Pl. 6, fig. 2, 3. *Terrestrial.* Tenerife. Maldives.

(1) The animal of the fresh-water Patella differs from that of the marine, although the shell has scarcely any distinguishing character. The fossil species *P. cornucopiæ* (pl. 5, fig. 6.) resembles a cap, and is of considerable thickness. *Foss.* in *Alluvia*; *Crag Marl*; *Chalk Marl*; *Clunch Clay*; *Alum Shale of Whitby*; *Forest Marble*.—*Grignon*; *Houdan*; *Pontoise*.

(2) *Foss.* in the beds of coarse marine limestone at Grignon, and in the marl-pits of Touraine.

(3) *Foss.* in Limestone analogous to that at Grignon.

DIVISION XIII. MEGASTOMATA.

GENERA.

A. *In the form of a shield or cap.*1. CAPULUS. *Montf.*

Conical, the summit curving spirally. Pl. 5, fig. 13.

Marine.
Mediterranean. Barbadoes.
V. Animal, p. 71.

2. HIPPONYX. (1) *De France.*

Conical, summit inclined backwards. Pl. 6, fig. 1.

Support adherent and bearing (as well as the shell) a muscular impression in the shape of a horse-shoe.

Marine.

3. CREPIDULA. *Lam.*

Oval or oblong, the summit obtuse, inclined towards the edge. Pl. 5, fig. 12.

Half closed by a horizontal plate.

Marine.
On the rocks of the Caribbean Sea. Mediterranean.
V. Animal, p. 72.

4. CALYPTRÆA. (2) *Lam.*

Conical, the summit vertical and pointed.

Marine.
Atlantic, Indian Seas.

a The plate (adhering to the bottom of the cone) folded, and descending vertically. Pl. 5, fig. 8.

b Infundibulum. *Montf.* The plate simple, almost horizontal, adhering to the sides of the cone, which has a spiral line on the exterior. Pl. 5, fig. 20.

5. UMBRELLA. *Lam.*

Orbicular, slightly convex above, a small apex near the summit. Pl. 5, fig. 15.

A callous, colored disk within.

Marine.
Mediterranean, Indian Seas.

(1) Several valves of different sizes having been found at *Grignon*, in the *marl-pits* of *Hauteville*, *Montmirail*, etc. they were considered by some naturalists as the type of the genus *Acardo*. M. De France having remarked a similar support adhering to a recent shell (*Patella mitrata*, *Gm.*), foresaw that some other *Patellæ* were to be separated from that Genus to form the present. His conjectures were afterwards realised by finding one of the fossil species on its support.

(2) *Foss. Grignon.*

(3) *Foss. in the London Clay; Crag Marl; Woolwich Loam; Green Sand.*

B. *In the form of an ear.*

7. HALYOTIS. *Lam.*

Spire or spiral apex flattened, exceedingly small.

Marine.

a. *Halyotis, Lam.*

Pierced by a series of holes. Pl. 5, fig. 24.

Adhere to the rocks like limpets, but inhabit deep water, generally at a short distance from the shore (1). V. Animal, p. 77.

b. *Padolla, Montf.*

A deep furrow without, forming a ridge without. Pl. 6, fig. 4.

Almost all the holes obliterated.

Coasts of Africa. Animal unknown.

c. *Stomatia, Lam.*

Spire more prominent; shell deeper. Pl. 5, fig. 21.

No holes.

Animal unknown.

d. *Stomatella, Lam.*

Whorls carinated. Pl. 5, fig. 22.

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8. SIGARETUS. *Adans.*

Ditto; mouth very deep; shell hidden within a spongy buckler. Pl. 5, fig. 25.

No holes.

Seas of warm climates. V. Animal, p. 71.

9. TESTACELLA. *Lam.*

Oval, spire very small; semi-corneous, transparent. Pl. 5, fig. 9. Pl. 6, fig. 7, 8, 9.

Terrestrial. South of France. Teneriffe. V. Animal, p. 61.

10. PARMACELLA. *Cuv.*

Oblong, flat, with a slight commencement of a spire behind. Pl. 6, fig. 10.

Terrestrial, Mesopotamia. V. Animal, p. 61.

11. VITRINA. *Draparn.*
HELICO-LIMAX. *Feruss.*

Very thin, transparent, flattened. Pl. 5, fig. 14.

The mouth (diminished by the projection of the penultimate whorl of the spire) in the form of a crescent, broader than deep.

Terrestrial. Those of Europe live in humid places and are very small; those of warm climates are larger.

(1) They are found on the coasts of Brittany, Asia Minor, Barbary, Western Africa, India, New Holland, New Zealand, and California. Luid and Scheuchyer report that they have found the *Halyotis* in a fossil state. Bertrand, in his *Dictionnaire Oricologique*, says that he possesses a shell of this Genus, brought from Virginia, resembling a ferruginous stone.

DIVISION XIV. ELLIPSOSTOMATA.

GENERA.

A. *Longitudinally volute; the last whorl considerably larger than the preceding.*

1. LYMNEUS. (1) *Lam.*

Spire oblong; thin; no operculum. Pl. 6, fig. 12. Columella* with a longitudinal fold entering and obliquely into the mouth. In stagnant waters and marshes. V. Animal, p. 63.

2. PHYSA. *Drap.*

Spire short or moderate; very thin; no operculum. Pl. 6, fig. 13. Columella simple. In springs. V. Animal, p. 63.

3. MELANIA. (2)

Outer lip advancing and narrowing the mouth; an operculum. Marine and Fresh Water. V. Animal, p. 67.

a. *Melania, Lam.*

Peristoma complete, effusive (3) at the base of the columella; black. Pl. 6, fig. 14. Turreted. Fluvialic. Isle of France. Madagascar. East Indies.

b. *Melantho.*

Peristoma incomplete, not effusive; very thick: white. Pl. 6, fig. 15. Sub-globular. Marine.

c. *Melanopsis, Lam.*

Peristoma incomplete, inner lip very broad, reflected, effusive; black. Pl. 6, fig. 18. Turreted. Fluvialic.

d. *Melanella, Dufresne.*

Semi-transparent, mouth invaded by the last whorl; white. Pl. 6, fig. 17. Turreted; spire curved. Marine.

(1) *Foss.* in the *Cowes Rock of Limestone; Grignon; 1st and 2nd Fresh Water Formations* of the environs of Paris. * See the section Pl. 12, fig. 16.

(2) I have ventured to separate the marine *Melania*, under the name of *Melantho*, the *Melanella* (in the cabinet of M. Dufresne), and the *Melanamona*; adding the name of *Melanatria* to Lamarck's *Pyrene*, in order to indicate its connexion with the others. *Foss.* in the *London Clay; Purbeck Limestone; Coral Rag; Blue Lias; at Grignon, Courtaignon, Houdan, Parnes and Ponchartrain.* The fossil species of *Melania* found at *Grignon* differ remarkably from the fresh water species. In the *M. costellata*, pl. 13, fig. 14, the peristoma is continuous, but the mouth is not circular, and it is entirely detached from the columella towards the upper part of the lip. In the *M. cochlearella*, pl. 13, fig. 13, the lip is prolonged like a spoon; in the *M. marginata*, pl. 13, fig. 10, the peristoma is margined or thickened. The fluvialic *Melania* brought by Olivier from the East are very distinct in appearance from all other species: see Pl. 8, fig. 14, 17. This Genus is, probably, entirely foreign to Europe.

(3) *Versante* is the French term, which they explain by saying if the shell were laid on its back and filled with water, it would run out at this part of the mouth: this has been concluded to be the meaning of Linnæus's term *Effusus*, but it appears improbable that he should take a perfect instead of a present participle, when we consider his Latinity.

c. Melanamona.

Effusive, with one very deep sinus; black. Pl. 6, fig. 19.

Turreted.

Fluviatic.

f. Melanatria. Pyrene.

Lam.

With 3 undulating sinuses: black. Pl. 6, fig. 20.

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4. PHASIANELLA. (1) *Lam.*

Oblong: operculum, calcareous. Pl. 6, fig. 21.

Columella simple, flattened at the base.

Marine. Indian Seas. Shores of New Holland. V. Animal, p. 67.

5. AURICULA. (2)

Oval or oblong, outer lip thickened. Pl. 6, fig. 22.

Columella, with large oblique channellings or folds; no umbilicus.

Mostly *Fresh Water*, but some *Marine*. V. Animal, p. 63.

6. SCARABÆUS. *Montf.*

Oblong-oval, spire acute; outer lip thickened, dentated. Pl. 6, fig. 23.

Inner lip toothed, with a hollow below the middle.

On *herbs* in the *Moruccas*. The *marshes*, *woods*, and *mountains* of *Asia*. *Animal* unknown.

7. CARYCHIUM. *Muller.*

Oval or oblong, spire obtuse; outer lip thickened, margined; penultimate whorl much larger than the preceding, but considerably less than the last; no operculum. Pl. 6, fig. 24.

Inner lip plicate with a hollow below the middle, the upper part wanting.

The *Woods* of *Europe*, under *moss*. *St. Vincent's*.

8. CONOVULUS. *Lam.*

MELAMPUS. *Montf.*

An inverted cone; lip finely striated; no operculum. Pl. 6, fig. 25.

Columella with projecting folds.

Rivers of the *West Indies*. V. Animal, p. 63.

9. ACHATINA. (3) *Lam.*

ACATHINA.

Oval or oblong.

Columella truncated at the end.

Trees and *sands* of *warm climates*. V. Animal, p. 62.

(1) *Foss.* in the *Cowes Rock of Limestone*.

(2) *Foss.* in the *London Clay*; *Green Sand*; at *Grignon*.

(3) A smooth, thin, globulous shell is found in the *marine* deposits of *Plaisantin*, approaching very nearly to the *Achatina*, but without the *columella* being truncated at the base, pl. 8, fig. 22. *Brocchi* calls it *Bulla Helicoides*.

a. *Liguus*, *Montf.*

A callosity within the last whorl. Pl. 6, fig. 26.

b. *Polyphemus*, *Montf.*

The end of the columella curving inwards. Pl. 12, fig. 11.

10. *BULIMUS*. (1)

Oval, or oval oblong.

Columella smooth.

On *rocks* and *trees* in cool shady places. Large species in warm climates. V. Animal, p. 62.

a *Bulimus*, *Lam.* Outer lip thick, blunt, pl. 6, fig. 27.

b *Bulimopsis*, *Lam.* Outer lip thin, sharp, pl. 4, fig. 15.

c *Bulimulus*, *Leach.* Outer lip thin, sharp; inner lip inflected, pl. 6, fig. 28.

11. *AMPHIBULIMA*. *Lam.*

SUCCINEA. *Drap.*

Elongated or oval; spire, short, of 2-4 whorls, the last forming almost the whole of the shell. Pl. 6, fig. 5, 6. Pl. 7, fig. 5, 6.

V. Animal, p. 62.

12. *TORNATELLA*. *Lam.*

ACTÆON. *Montf.*

Spire projecting but little; mouth elongated, enlarged below. Pl. 6, fig. 29.

Columella with one or two large folds.

Marine.

Coasts of Africa.

V. Animal, p. 63.

B. *Longitudinally volute; the last whorl very little larger, or less, than the preceding.*

13. *CLAUSILIA*. *Drap.*

Slim, long, pointed; the last whorl contracted, compressed; mouth edged with a callous pad. Pl. 6, fig. 36.

With or without teeth or projecting plates.

In *mosses* at the feet of trees.

V. Animal, p. 62.

(1) Fossil species have been found in the *2d Fresh Water Formations* of the environs of Paris. The marine species at Grignon have not the same generic character as the *Bulimi*, according to Brongniart, and ought to be referred to the *Phasianellæ*. Lamarck has observed that only terrestrial shells have the lip reflected. The *Bulimus dombeyanus*, *B. octonus*, and *B. terebraster*, pl. 13, fig. 15, and many other species which inhabit Asia, Africa, or America, are turreted with numerous whorls; others are of a conical form, as the *Bulimus trochoides* of Bruguiere. See the singular species, and its monstrosity, Pl. 6, fig. 35. 31.

14. ODOSTOMIA. *Fleming.*

Spire produced; mouth contracted, subangular, distinct from the body whorl.

With teeth or plates.

The greater number *terrestrial*; under stones, on rocks, and in mosses. Animal unknown.

a. Spire dextral. Pl. 8, fig. 28.

b. .. sinistral. Pl. 8, fig. 23.

15. PUPA. (1) *Lam.*

Summit obtuse; mouth narrowed by a callous pad, and diminished on the side of the spire by the preceding whorl. Pl. 6, fig. 37, 34.

With or without teeth or plates.

Marine and *Terrestrial.*

V. Animal, p. 62.

- | | | |
|--------------|---|---|
| Cylindrical. | { | a Without a tooth, pl. 8, fig. 29. |
| | | b A tooth in the part of the mouth invaded by the penultimate whorl, pl. 8, fig. 32. |
| | | c Teeth within the outer lip, pl. 6, fig. 37. |
| Oval. | { | d Chondrus, <i>Cur.</i> Teeth at the lip, or plates within the mouth, pl. 8, fig. 24. |

C. *Horizontally volute; mouth transversally elliptical.*16. PLANORBIS. (2) *Brug.*

Rolled almost in the same plan; the whorls increasing gradually; no operculum. Pl. 6, fig. 32.

Stagnant waters.
V. Animal, p. 63.

17. HELIX. (3)

Globulous or subconical, spire depressed; mouth somewhat diminished by the projection of the penultimate whorl. Pl. 7.

Terrestrial.
V. Animal, p. 62.

(1) The shells of the *marine* and *terrestrial* Pupæ are similar, but an experienced Conchologist may always distinguish them: the animal of the former is not known. Lamarck doubts the *Pupa numia* to be *marine*. Foss. in the *2d Fresh Water Formation*.

(2) Fossil species have been found in the *Limestone of Fontainebleau (2d Fresh Water Formation)*; in the *Silex near Palisau (2d Fresh Water Formation)*; in the *Marne Blanche* covering the *Gypsum at Pantin and Chaumont (1st Fresh Water Formation)*; in the *Coves Rock of Limestone; London Clay; Green Sand; Under Oolite; Derbyshire Peak Limestone*. Neither of the three *Planorbes* cited at *Grignon* can be exactly referred to this Genus; the *Carinata* resembles the *Delphinula*.

(3) The distinction of fresh water formations, so precisely established by Geologists, has made it indispensably necessary to study this Genus attentively. An arrangement with a view of easily distinguishing the species is difficult, from the great accumulation, for whilst the shells present the greatest varieties of form, the animals offer no differences of any importance. As M. de Ferussac appears to have studied the excessively numerous species of this Genus more completely than any other author, accompanying the publication of his system, which comprehends all the known species, with accurate and beautiful engravings, I shall adjoin his

- a Helix, Lam.* Globulous, pl. 7, fig. 9.
b Caracolla, Lam. Carinated, conical, pl. 7, fig. 22.
c Anostoma, Lam. Mouth dorsal, toothed, pl. 7, fig. 20.

18. HELICINA. (1) *Lam.*

Subglobulous or conical; spire a little depressed; inner lip enlarged at the base in a callous pad entirely covering the umbilicus; a small blunt angle at the base of the right lip. Pl. 12, fig 6.

Columella callous.

Terrestrial.

V. Animal, p. 66.

19. HELICARION. *Ferruss.*

Very thin, transparent.

Columella spiral, solid, formed by the inner lip and confounded with the whorl of the mouth.

Marine.

Australasia.

V. Animal, p. 62.

20. AMPULLARIA. (2) *Lam.*

Round and ventricose, spire short; umbilicate; operculum horny.

Columella umbilical.

a.

Mouth narrower, more elliptical, thinner. Pl. 9, fig. 1.

Inner lip sharp.

Fresh Waters of warm climates.*b. Ampullina.*

Considerably thick-er. Pl. 9, fig. 2.

Marine.

V. Animal, p. 67.

method of distribution, impressing that it is purely artificial. The *Helices* being *terrestrial* shells, it appears extraordinary that we should meet with them in the fossil state in *marine* deposits; but when that happens they have been brought there by floods or rivers, or by some irruption of the sea, attesting that previously to these deposits there had been dry land in the same places, whereon the animals lived which formed the shells. The *Marl Pit* of *Touraine* is the only place on record where they thus occur, and there they are frequently filled with the remains of *Polypi* and marine shells. Fossil *Helices* are generally found in *Fresh Water Formations*, and often accompanied by *Lymnæi* and *Planorbis*. We meet with them in *breccia*, and sometimes in the districts which have been overthrown by *volcanoes*. In England they have been found in the *Cowes Rock of Limestone*, in the *Green Sand*, and in the *Derbyshire Peak Limestone*.

(1) *Foss. Blue Lias Limestone.*

(2) Their opercula, being horny, are never found, although these shells are very common in beds of coarse, calcareous, shelly matter; whilst the opercula of the *Naticæ*, to which some authors would refer them, are very frequently met with, from their being calcareous. Fossil *Ampullariæ* are also found in the *extinct volcanoes* of the valley of *Ronca*, where they have been so disposed by the eruptions as to preserve their colours. M. Faujas found a species of *Ampullaria*, with a very thick shell, at St. Paulet, near Pont St. Esprit, in *bituminous marl*, above a mine of *fossil coal*; the upper edge of each whorl bears an ascending keel, and it differs from all that are known, by an oval mouth, pl. 12, fig 12, 13, 14.

DIVISION XV. HEMICYCLOSTOMATA.

GENERA.

NERITA, *Lin.*

Semi-globulous ; mouth semi-circular or semi-elliptical, closed entirely by an operculum ; spire almost effaced. Columella in a straight line.

a. *Natica*, (1) *Lam.*

Operculum horny, Columella umbilicate. *Marine.*
Pl. 9, fig. 24. V. Animal, p. 67.

b. *Nerita*, (2) *Lam.*

Operculum stony, Columella umbilicate, *Marine.*
shell thick. Pl. 9, fig. 20. dentated. V. Animal, p. 67.

c. *Neritina*, *Lam.*

Operculum horny, Columella rarely den- *Fluviatic.*
shell thin. Pl. 9, fig. 21. tated. (3) V. Animal, p. 67.

(1) In the fossil state, in the *London Clay* and *Crag Marl*; at *Grignon*.

(2) In the fossil state, at *Retheuil*, *Courtagnon*, *Houdan*, *Grignon*.

(3) Those with the columella dentated form the genus *Clithon* of Montfort, whose *Clithon corona*, pl. 9, fig. 23, differs from the *Clithon coronata* of Leach.

DIVISION XVI. CRICOSTOMATA.

GENERA.

1. **TURBO.** (1) *Lam.*
 Round or oval; thick. Mouth completed by the penultimate whorl. *Marine.*
V. Animal, p. 65.
- a. Meleager, Montf. Umbilicate. Pl. 9, fig. 3.*
b. Turbo, Montf. Not umbilicate. Pl. 12, fig. 15.
2. **TURRITELLA.** (2) *Lam.*
 Spire elongated like an obelisk; thin: operculum horny or cartilaginous. Pl. 9, fig. 12. Pl. 12, fig. 17. Mouth completed by the penultimate whorl. *Marine.*
V. Animal, p. 65.
3. **VERMICULARIA.** *Adanson.*
 Whorls not touching, irregularly curved. Pl. 9, fig. 17. Ditto. *Marine.*
V. Animal, p. 65.
4. **DELPHINULA.** (3) *Lam.*
 Thick; rolled almost in the same plane. Pl. 9, fig. 16. Mouth entirely formed by the last whorl. *Marine.*
V. Animal, p. 65.
5. **SCALARIA** (4) *Lam.*
 Turreted, with projecting sharp longitudinal ribs. Pl. 9, fig. 6. Ditto; but margined. *Marine.*
V. Animal, p. 65.
6. **ACIONA.** (5) *Leach.*
WENDLETRAP.
 Ditto, but whorls distinct and distant; no columella. Pl. 9, fig. 5. Mouth entire and margined. *Marine.*
Animal unknown.

(1) *Foss. in the Crag Marl; at Presles; Grignon.* No fossil species of this genus has been discovered in the *Fresh Water Formations*; the little shell of the ponds of *Havre* and *Magentone* have been erroneously referred to it.

(2) *Foss. in the London Clay; Crag Marl; at Grignon, Chaumont.*

(3) *Foss. Grignon, Courtagnon.*

(4) *Foss. in the London Clay; Crag Marl; at Grignon, Presles.*

(5) "The museum of Mr. Bullock contains the largest known specimen of the *Aciona Scalaris*, which was purchased at a sale for twenty-seven pounds; but it is now estimated at worth more than double that sum."—*Leach's Zoological Miscellany*, vol. 2. 1815.

7. CYCLOSTOMA. (1) *Lam.*

Oval - spiral, mouth round or nearly round, closed entirely by a round, thin, calcareous operculum : peristoma complete. Pl. 9, fig. 13, 14.

Mouth bordered by a callous pad.

Terrestrial and aquatic.

V. Animal, p. 66.

8. VALVATA. *Muller.*

Rolled almost in the same plane. Pl. 9, fig. 22.

Fresh waters.

V. Animal, p. 66.

9. PALUDINA. (2) *Lam.*

VIVIPARA. *Montfort.*

Oval - spiral; operculum with an angle like that of the mouth. Pl. 9, fig. 15.

Mouth with a small angle towards the upper part.

Marine, and in stagnant waters.

V. Animal, p. 66.

10. MONODONTA. *Lam.*

Oval, or conical; operculum round, horny. Pl. 9, fig. 25.

A blunt and slightly projecting tooth at the base of the columella. Base flat or concave.

Marine.

V. Animal, p. 66.

(1) Young *Cyclostoma* may sometimes be confounded with the shell of the genus *Turbo*; for the upper part of the peristoma is not completed, that is to say, the lips do not join, before the adult state; in the *Turbo* they always remain separated. The *Missenau* chain of hills near *Mayence* is composed of fossil *Cyclostoma*, not of *Bulimi*, and of two species which, according to M. de Ferussac, are again found in *Quercy*, *Aginois*, and in *Silesia*. M. Brongniart expects that the *Cyclostoma* will hereafter be divided into two genera; the one *aquatic*, the other *terrestrial*. The *C. mumia*, Lam. pl. 4, fig. 1, belongs to the latter; it has only been found as yet in the 1st or *Lower Fresh Water Formation* in the environs of Paris; M. Brongniart conceives that on further investigation it may be found to characterise it: the enlargement or projection of the upper part of the peristoma is not unfrequent in the living species. All those indicated at *Grignon* differ from true *Cyclostoma*. The *Cyclostoma carinata* of the canals of Egypt, Pl. 13, fig. 9; *C. bulimoides* of the environs of Alexandria, Pl. 8, fig. 13; *C. unicolor*, Pl. 8, fig. 15; and the *Helix crenelata*, Pl. 12, fig. 10; brought by Olivier, differ in form from all the other *fresh-water* shells yet known, and, as M. Brongniart justly observes, if found in the fossil state, would certainly have been considered as *marine*.

(2) *Foss. in Gravel and Alluvial Clay; London Clay; Crag Marl.*

DIVISION XVII. GONYOSTOMATA

GENERA.

1. TROCHUS. (1) *Lam.*

Conical; mouth more or less quadrangular, in an oblique plane to the axis of the shell; operculum thin, horny, orbicular.

Base flat or concave.

Marine, or inhabiting the *brackish ponds* communicating with the sea.
V. *Animal*, p. 66.

- | | | | |
|-----------------|---|---|--|
| Not umbilicate. | { | a | The columella, in the form of a concave arch, continued with the outer lip. Pl. 9, fig. 7. |
| | | b | Calcar, <i>Montf.</i> Flattened; lip sharp, like the rowel of a spur. Pl. 9, fig. 10. |
| | | c | With a small prominence, or vestige of a tooth, towards the base of the columella. |
| | | d | Mouth much broader than long; base concave. Pl. 9, fig. 9. |
| | | e | Mouth much broader than long; and the columella in the form of a spiral canal. |
| | | f | Turreted. |
| Umbilicate. | { | g | No projection to the columella. |
| | | h | Flattened; the exterior angle edged. |
| | | i | Flattened; the lips rounded. |
| | | k | Columella with a prominence towards the base. |
| | | l | Columella embattled lengthwise. |

2. CIRRITES. *Sowerby*,

Conical; whorls united. Pl. 9, fig. 4.

No columella: umbilicus funnel-shaped.

In the *Chalk Marle*, under *Oolite*, and *Derbyshire - Peak Limestone*.

3. SOLARIUM. (2) *Lam.*

Spire like a dilated cone. Pl. 9, fig. 11.

A very large umbilicus, hollowing out the base.

Marine.
V. *Animal*, p. 66.

4. EUOMPHALITES. *Sowerby*.

Rolled almost in the same plane, depressed above. Pl. 9, fig. 18, 19.

Concave or largely umbilicate underneath.

In the *Limestone Shale*; in the *1st or Upper Grey* and in the *Peak Limestone of Derbyshire*.

5. IANTHINA. *Lam.*

Subglobulous, horizontally volute; no operculum. Pl. 9, fig. 26.

Columella prolonged beyond the mouth.

Marine.
Mediterranean. Australasia.
A floating shell.
V. *Animal*, p. 67.

(1) *Foss* in the *London Clay*; *Crag Marl*; *Under Oolite*; *Blue Lias*; at *Grignon*; near *Pont Chartrain*; *Longjumeau*. The *Trochus agglutinaus*, Pl. 9, fig. 8, is remarkable for its habit of agglutinating to, and even of incorporating with, its shell, during the growth, small pebbles, fragments of other shells, sand, etc. etc. It often covers the umbilicus with a testaceous plate. A fossil variety of this curious shell, which inhabits the seas of South America, is found at *Grignon*.

(2) *Foss*, in the *London Clay*; *Purbeck Limestone*; at *Grignon*.

DIVISION XVIII. SYPHONOSTOMATA.

GENERA.

A. *With varices.* (1)1. MUREX. (2) *Lam.*

Oval or oblong; turbinated, canal projecting and straight; operculum horny. Varices in two opposite rows. *Marine.*
V. Animal, p. 70.

- a* Murex, *Montf.* Canal long and slim; varices spinous. Pl. 10, fig. 3.
b Brontes, *Montf.* Canal long and slim; varices knotty.
c Typhis, *Montf.* Canal moderate; varices spinous, with projecting tubes between, penetrating the shell. Pl. 12, fig. 7.
d Chicoraceæ, *Montf.* Canal moderate or long, with folded leaves notched or divided. Pl. 10, fig. 5.
e Aquila, *Montf.* Canal moderate or short; varices knotty; umbilicate.
f Lotorium, *Montf.* Canal moderate or short; varices knotty; not umbilicate.
g Tritonium, *Montf.* Canal moderate or short; varices simple; spire elevated; mouth generally wrinkled transversely on both lips. Pl. 10, fig. 4.
h Trophones, *Montf.* Canal moderate or short; varices numerous, compressed, almost membranous.
i Canal moderate or short; varices few, very much compressed, projecting considerably.

2. RANELLA. *Lam.*

Turbinated; canal short; surface armed with tubercles; lips of the mouth wrinkled. Pl. 10, fig. 6. Varices bordering both sides. *Marine.*
V. Animal, p. 70.

- a* Apollo, *Montf.* Umbilicate.

B. *Without varices.*3. FUSUS. (3) *Lam.*

Fusiform, peristoma entire; spire elevated. Columella simple. *Marine.*
V. Animal, p. 70.

- a* Fusus, *Montf.* Umbilicate.
b Lathires, *Montf.* Not umbilicate. Pl. 10, fig. 7.

(1) *Varices* are projecting callous pads with which the animal edges the mouth or aperture of its shell, each time that it suspends the growth. V. Pl. 10, fig. 2, *a. b. c. d. e.*

(2) *Foss.* in the *London Clay*; *Crag Marl*; *Woolwich Loam*; *Green Sand*; at *Grignon*, *Courtagnon*. The *Murex tripteris*, living in the Indian Seas, near Batavia, is very common at *Grignon*.

(3) *Foss.* in the *London Clay*. In France they are found in the *newest Shelly Limestone*, and are much more abundant in that than in any other formation. Although the fossil species are numerous, we meet with scarcely any which are perfectly analogous to those now found in the recent state. These remarks also apply to the *Fasciolaria*.

4. FASCIOLARIA. *Lam.*

Subfusiform. Pl. 10, fig. 14. Columella with oblique folds at the base. *Marine.*
V. Animal, p. 70.

a. Fulgur, *Montf.* Whorls of spire flattened at top ; striated within the mouth.

5. TURBINELLA. *Lam.*

Turbinated or subfusiform. Pl. 10, fig. 15. Columella with large transverse folds. *Marine.*
V. Animal, p. 70.

6. PYRULA. (1) *Lam.*

Subpyriform : spire flattened or rounded. Columella simple. *Marine.*
Generally in warm climates.
V. Animal, p. 70.

a. Umbilicate. Pl. 10, fig. 8.

b. Not umbilicate.

7. PLEUROTOMA. (2) *Lam.*

Fusiform ; a notch in the right lip towards the spire ; canal long : operculum horny. Pl. 10, fig. 13. Ditto. *Marine.*
V. Animal, p. 70.

8. CLAVATULA. (3) *Lam.*

Subturreted ; a notch in the right lip towards the spire ; left lip excavated ; spire pointed. Pl. 13, fig. 8. Columella toothed. *Marine.*
Coasts of Africa.
Animal unknown.

(1) *Foss.* at *Grignon* ; *Courtagnon* ; *Houdan* ; *Parnes*.

(2) *Foss.* in the *London Clay* ; *Green Sand* ; at *Grignon* ; *Betz*, near *Crepy* ; *Parnes*.

(3) There is no *Clavatula* in the Museum ; I was therefore compelled to copy the obscure figure of *Seba*.

DIVISION XIX. ENTOMOSTOMATA.

GENERA.

A. *Turreted.*

1. *EBURNA*. *Lam.*
Shell smooth. Pl. 10. Columella deeply and broadly umbilicate. *Marine.*
fig. 9. V. Animal, p. 69.
2. *ANCILLARIA*. (1) *Lam.*
ANCILLA.
Oblong, spire short. A callous pad on the base of the columella. *Marine.*
Pl. 10, fig. 10.
3. *MITRA*. (2) *Lam.*
Turreted or sub-fusiform; spire pointed, mouth oblong. Pl. 10, fig. 11. Columella with large folds, the largest nearest the spire. *Marine.*
Warm climates.
V. Animal, p. 69.
4. *PYRAMIDELLA*. *Lam.*
Mouth broad, crescent shaped. Pl. 10, fig. 12. Columella with the base twisted obliquely in sharp, spiral folds. *Marine.*
V. Animal, p. 63.
5. *TEREBRA*. (3) *Brug.*
Spire at least double the greater diameter of the mouth: no operculum. Pl. 10, fig. 20. Columella convex or naked, the visible part very short. *Marine.*
V. Animal, p. 70.
6. *CERITHIUM*. (4) *Brug.*
Mouth oval, curved to the left at the notch: operculum round and horny. A gutter in the upper part of the right lip. *Marine.*
V. Animal, p. 70.
- a. With varices, but no fold on the columella.
b. With folds on the columella. Pl. 13, fig. 2.
c. No folds on the columella; no varices. Pl. 10, fig. 19.
- (1) *Foss.* in the *London Clay*; at *Grignon*; *Courtagnon*; *Environs of Paris*.
(2) *Foss.* at *Grignon*; *Parnes* near *Maguy*.
(3) *Foss.* at *Grignon*; *Parnes*.
(4) This genus of univalves presents more species in the fossil state than any other. There are already upwards of a hundred in the cabinet of M. De France: they are almost all found in the *newest formations*. M. de Gerville, however, reports that he has found four species in the bed of *Ammonites* and *Belemnites*, in the environs of *Bayeux*.—*Journal de Physique*, October, 1813. They have been found in England, in the *London Clay* and in the *Chalk Marl*. The *Cerithium Gigas*, pl. 13, fig. 2, is sometimes from fifteen to sixteen inches long, and four in diameter at the last whorl.

7. POTAMIDES. (1) *Brongn.*

Notch less apparent, right lip dilated. Pl. 10, fig. 18.

No gutter.

Salt-water marshes, or the brackish waters of the mouths of rivers.

8. ROSTELLARIA. (2) *Lam.*

Fusiform; a second canal, ascending along the spire, formed by the outer lip and by the continuation of the columella. Pl. 10, fig. 16.

Marine.

V. Animal, p. 70.

B. *Oval, sub-conical, or sub-globulous.*9. BUCCINUM. (3) *Lam.*

Oval or elongated; mouth notched below; lips simple: operculum cartilaginous. Pl. 10, fig. 21.

Columella convex, naked.

Marine.

V. Animal, p. 69.

10. DOLIUM. *Lam.*

Ventricose; sub-globulous; outer lip undulated, notched below. Pl. 10, fig. 22.

Columella twisted or sharp at the base.

Marine.

V. Animal, p. 69.

11. HARPA. (4) *Lam.*

Oval or gibbous; with longitudinal or oblique sharp ribs, the last forming a callous pad at the lip; mouth oblong, simple, notched below. Pl. 11, fig. 1.

Columella smooth.

Marine.

Generally in warm climates.

V. Animal, p. 69.

(1) This Genus is founded on the habits of the animal, rather than on the importance of the character of the shell. Fossil species are found in formations presenting only terrestrial and fresh-water shells. *P. Lamarchii*, pl. 4, fig. 6, is found in the *opaque silex* which covers the sand at *Longjumeau*; in the forests of *Montmorency*; above *St. Cloud*; mixed with *Lymnæi*, *Planorbis*, and stalks of reeds in the *Limestone*, east of *Aurillac*, in *Cantal*; in the compact limestone beds (with the *Helix Cocquii*, pl. 4, fig. 20), at *Nonette*, near *Issois*, in *Puy de Dome*. It resembles the *Cerithium radula*, figured by *Lister* as a fresh-water shell; and, in a lesser degree, the *Bulimus auritus* of *Bruguiere*, from the interior of *Africa*.

(2) *Foss.* in the *London Clay*; at *Courtagnon*; *St. Germain en Laye*; *Parnes*.

(3) *Foss.* at *Grignon*.

(4) Although the *Harpa* are by no means rare in the seas of warm climates, only two species have as yet been found in the fossil state, and those in the *course Shelly Limestone* at *Grignon* and *Hauteville*.

12. *NASSA*. Lam.

Oval; mouth terminated below by a deep notch. Pl. 10, fig. 23. Columella covered with a plate. *Marine*. V. Animal, p. 69.

13. *PURPURA*. (1) Lam.

Oval. Pl. 11, fig. 2. Columella naked, flattened. *Marine*. V. Animal, p. 69.

a. *Purpura*.

b. *Monoceros*, Montf. A spine projecting from the base of the outer lip. Pl. 11, fig. 3.

. *Ricinella*, Lam. Lip of the columella toothed. Pl. 11, fig. 4.

14. *CONCHOLEPAS*. (2) Lam.

Patelliform; outer lip dentated; spire very small: operculum oval, horny. Pl. 10, fig. 17. A furrow from the cavity of the summit terminating between the two anterior teeth of the mouth. *Marine*. Coast of Peru. Animal unknown.

15. *CASSIDARIA*. Lam. MORIO. Montfort.

Conical; mouth effusive; notch terminating in a small canal reflected to the left at the base. Pl. 11, fig. 6. Columella covered by a simple plate formed by the left lip. *Marine*. V. Animal, p. 70.

16. *CANCELLARIA*, (3) Lam.

Oval, last whorl ventricose, right lip furrowed within the mouth; almost entire at the base. Pl. 11, fig. 6. Columella with compressed folds and a plate formed by the inner lip. *Marine*. V. Animal, p. 69.

(1) *Foss.* at Courtagnon.

(2) Lamarck placed the *Concholepas* with the *Patella*, but most zoologists seem now to agree with Bruguiere in approaching it to the *Buccinum*, since, according to Dombey's report, the animal is furnished with a tendinous operculum, which only partly closes the shell. The muscular impression, like a large horse-shoe open in front, has some resemblance to that of the *Calyptrea*.

(3) *Foss.* at Grignon; Piedmont; Environs of Florence.

DIVISION XX. ANGYOSTOMATA.

GENERA.

A. *With folds, plaits, or wrinkles, on the columella.*1. CASSIS. (1) *Brug.*

Oval; mouth oblong or narrow; the notch terminating in a short canal reflected towards the left at the base; right lip wrinkled transversally. Columella covered with a plate formed by the left lip, wrinkled transversally. *Marine.* Generally in warm climates, at some distance from the shore, in sandy bottoms.

V. Animal, p. 70.

a. The callous pad of the lip dentated exteriorly towards the notch. Pl. 11, fig. 11.

b. The callous pad of the lip not dentated exteriorly towards the notch.

2. CYPRÆA. (2) *Lam.*

Oval, gibbous in the middle, and narrowed at both ends; lip rolled inwards: no epidermis. Pl. 11, fig. 7, 9. *a, b, c.* Mouth long, narrow, wrinkled transversally on both sides. *Marine.* V. Animal, p. 68.

3. OLIVA. (3) *Lam.*

Sub-cylindrical; notched at the base; mouth narrow; channels between the whorls of the spire. Pl. 11, fig. 13. Columella striated obliquely. *Marine.* In warm climates. V. Animal, p. 68.

4. CONOELIX. *Swainson.*

Coniform; spire very short; mouth linear, narrow. Pl. 12, fig. 1. Columella plaited. *Marine.* Pellew Islands, Otaheite.

5. VOLUTA. (4) *Lam.*

Oval; spire varying in projection, summit obtuse or nipped. Pl. 12, fig. 2, 3, 4, 5. Columella with folds, the lowest the largest. *Marine.* Generally in warm climates. V. Animal, p. 68.

a *Cymbium, Montf.* The last whorl ventricose

b *Voluta, Montf.* The last whorl conical, narrowing at the ends.

(1) The fossil species (and amongst them the *Cassis Harpaformis*, pl. 11, fig. 12) are found only in the *newest formations*, and it is remarkable that they are very small, compared with the living ones, which are sometimes of a considerable size. They have been found in *England* in the *London Clay* and in the *Crag Marl*.

(2) In the infant state, the *Cypræa* resembles a small thin *Ancillaria*, curved and truncated at the base, pl. 11, fig. 9, *a*; in the middle age, it is thin, with a projecting spire, pl. 11, fig. 9, *b*; when adult, it is thicker, and the spire is covered, pl. 11, fig. 9, *c*. Foss. in the *London Clay*; at *Grignon*.

(3) Foss. at *Grignon*; *Aumont*, near *Montmorency*.

(4) Foss. in the *London Clay*; in the *Crag Marl*; at *Grignon*; *Courtagnon*; *Chaumont*; *Beauvais*.

6. MARGINELLA. (1) *Lam.*

Oblong-oval; a projecting callous pad on the outer lip; mouth scarcely notched at the base: no operculum.

Columella with folds.

Marine.

Seas of warm climates, principally in the neighbourhood of the Senegal. V. Animal, p. 69.

a Spire conical. Pl. 11, fig. 20.

b Spire obscure. Pl. 11, fig. 19.

c Colombella, *Lam.* The callous pad of the right lip swelled in the middle; folds of the columella numerous. Pl. 11, fig. 17.

7. VOLVARIA. (2) *Lam.*

Cylindrical, no apparent spire; mouth narrow, as long as the shell. Pl. 11, fig. 18.

Columella with one or several folds at the base.

*Marine.*B. *Columella simple.*8. STRUTHIOLARIA. (3) *Lam.*

Turreted: 3 undulating sinuses. Pl. 12, fig. 9.

Columella covered with a plate formed by the left lip.

Marine.

Animal unknown.

9. STROMBUS. (4) *Lam.*

Ventricose, with a short canal; notched or truncated at the base; right lip dilated in a wing (in the adult), with a sinus towards the base: operculum horny, long, narrow. Pl. 11, fig. 15.

Columella truncated below.

Marine.

Generally in warm climates.

V. Animal, p. 70.

10. TEREHELLUM. (5) *Lam.*

Oblong or sub-cylindrical; mouth narrow above, simple, enlarged towards the base, notched. Pl. 11, fig. 14.

Ditto.

Marine.

V. Animal, p. 68.

(1) *Foss.* at *Grignon.*

(2) *Foss.* at *Grignon.*

(3) The Museum gave 100 francs for the type of this new genus, which is now figured for the first time.

(4) *Foss.* in the *London Clay*; at *Grignon.*

(5) *Foss.* at *Grignon*; *Environs of Paris.* The *Terebellum perditum* (the analogous living species is not known) is found in great numbers, and of all ages, at *Grignon.*

11. PTEROCERA. *Lam.*

Ventricose, with an elongated canal; right lip dilated in a wing (in the adult) divided into long, narrow digitations. Pl. 11, fig. 16.

Marine.

V. Animal, p. 70.

12. CONUS. (4) *Lam.*

Like inverted cones, or cylindrical; mouth longitudinal, narrow, simple, effusive at the base: operculum small, horny.

Marine.

Generally within the tropics, at ten or twelve fathoms deep, near sandy coasts.

V. Animal, p. 68.

a Conical spire, crowned with tubercles. Pl. 11, fig. 21.

b Conical spire, not crowned with tubercles. Pl. 11, fig. 22.

c Sub-cylindrical spire, not crowned with tubercles.

13. OVULA. *Brug.*

Gibbous, elongated in a point at each end; mouth longitudinal. Pl. 11, fig. 8, 10.

Both lips rolled inwards.

V. Animal, p. 68.

14. AKERA. *Muller.*

Oval-oblong or oval-concave; more or less rolled on itself; no projecting spire; mouth as long or almost as long as the shell, without notch or canal.

Right lip sharp.

Marine.

In the muddy bottoms of the seas of all climates.

V. Animal, p. 61.

a Bullæa, *Lam.* Contained within the mantle, too small to hold the animal. Pl. 5, fig. 18.

b Bulla (5), *Lam.* Covered with a thin epidermis, large enough to contain the animal, and turned more than the BULLÆA. Pl. 5, fig. 17.

C. Almost flat.

15. APLYSIA. *Lin.* LAPLISIA. *Lam.*

A little convex within, obliquely conical; base thin, summit thickened and obscurely spiral. Pl. 13, fig. 5.

Horny.

Marine.

V. Animal, p. 60.

(4) *Foss. at Courtagon; Grignon.* The *Conus deperditus*, *Lam.* found in the calcareous shelly matter in the environs of Paris, is, according to Bruguiere, the analogous fossil of the *Conc treillisc*, which lives in the Pacific Ocean, in the neighbourhood of Otaheite.

(5) *Foss. at Grignon.*

16. *DOLABELLA*. *Lam.* Pl.
13, fig. 6.

Ditto, but base more enlarged in proportion; summit more prolonged and curved.

Calcareous.

Marine.
Mediterranean, Indian Seas.
V. *Animal*, p. 60.

17. *PLEUROBRANCHUS*. *Cuv.*
An oval plate.

Marine.
V. *Animal*, p. 60.

18. *PLANOSPIRITES*. (1)
Faujas.

Sub-orbicular; a spiral cord-like ridge on the inferior surface. Pl. 4, fig. 20.

Maestricht.

(1) This is one of the rarest and most singular shells found at *Maestricht*, only three having as yet been met with. It seems impossible to determine whether it is an univalve or a bivalve; for although it resembles the valve of an oyster in form and thickness, it wants the little hollow found at the summit of that shell and serving to lodge the ligament which characterises the genus; neither has it any apparent muscular impression. If it be a bivalve, it is nearest to the genus *Acardo* of Lamark, but its spiral cord or ridge, with the absence of the hollow and muscular impression, lead us to conclude that it is an univalve.

GENUS HELIX. (1) FERUSSAC.

SUB-GENERA.

A. *Horizontally volute.*1. HELICOGENA. *Fer.*

Globulous or elliptical; Umbilicus masked.
peristoma simple.

a Collumellatæ. Columella solid and twisted. Pl. 7, fig. 7, 8.

b Acavæ. Umbilicus entirely covered by an expansion of the columella. Pl. 7, fig. 11, 14.

c Perforatæ. Umbilicus appearing in part, like a cleft, behind the expansion of the columella. Pl. 7, fig. 9, 10.

d Imperforatæ. Depressed, umbilicus closed. Pl. 7, fig. 15, 16, 18.

2. HELICODONTA. *Fer.*

More or less globulous Mouth generally tooth-
and depressed; peristoma ed in the perfect state.
reflected or thickened.

a Personatæ. Peristoma sinuous and thick; or reflected with teeth, plates, or folds. Pl. 7, fig. 17.

b Lamellatæ. Mouth with one or more elongated internal plates. Pl. 7, fig. 19, *a, b, c, d, e.*

c Maxillatæ. Peristoma with large teeth; a gutter at the base of the columella. Pl. 7, fig. 21.

d Anostomæ. Tomogeres, *Montf.* Mouth reversed or dorsal, with elevated folds or teeth. Pl. 7, fig. 20.

e Impressæ. Inner lip with longitudinal elevated folds. Pl. 7, fig. 23.

3. HELICIGONA. *Fer.* CA-
RACOLLA. *Lam.*

Carinated, sometimes
conical.

a Caracollæ. Umbilicus covered. Pl. 7, fig. 22; pl. 8, fig. 1, 2.

b Vortices, *Ocken.* Umbilicus masked or visible. Pl. 8, fig. 3.

4. HELICELLA. *Fer.* VOR-
TEX. *Ocken.*

Elliptical or flattened. Umbilicus exposed.

a Lomastomæ. Peristoma reflected. Pl. 8, fig. 8.

b Aplostomæ. Peristoma simple. Pl. 8, fig. 4.

c Marginatæ. Peristoma margined. Pl. 8, fig. 5, 7, 18.

(1) *Vide* p. 30.

5. HELICOSTYLA. Fer.

Elliptical or trochiform. Columella solid.

- a* Aplostomæ. Columella straight; peristoma simple Pl. 8, fig. 6.
b Lamellatæ. Columella straight, round; peristoma simple; an internal plate on the last whorl. Pl. 8, fig. 9, 10.
c Canaliculatæ. Columella twisted, as if truncated at the base, or with an internal spiral rib forming a gutter, under the form of a tooth or callosity. Pl. 13, fig. 1.
d Marginatæ. Columella flattened, without teeth or plates; peristoma reflected. Pl. 8, fig. 11.

6. HELICOPHANTA. Fer.

Spire depressed; volutions rapidly increasing horizontally; mouth very large and oblique; only three to three and a half whorls; the last enormous. Perforated or umbilicate.

- a* Vitrinoides. Peristoma simple. Pl. 7, fig. 2.
b Vesiculæ. Peristoma thickened and sub-reflected. Pl. 7, fig. 3, 4.

B. *Longitudinally volute.*

7. COCHLOHYDRA. Fer.

AMPHIEULIMA. Lam. SUC-
CINEA. Drap.

Elongated, oval; volutions rapidly increasing vertically; spire short, with 2 to 4 whorls, the last forming almost the whole of the shell; mouth very large. Pl. 6, fig. 5. Pl. 7, fig. 5, 6. Peristoma simple.

8. COCHLOSTYLA. Fer.

Elongated or ventricose; spire elevated: whorls increasing rapidly. Columella solid, not truncated at the base.

- a* Lomastomæ. Peristoma reflected. Pl. 8, fig. 27.
b Aplostomæ. (1) Peristoma simple.

9. COCHLITOMA. Fer.

ACHATINA. Lam.

Conical or very ventricose, solid, little transparent. Columella solid, flat, and truncated at the base.

- a* Liguus, Montf. Base conical; mouth short; outer lip advanced. Pl. 8, fig. 26.
b Achatina, Montf. Ventrical; mouth very large; outer lip vertical. Pl. 13, fig. 3.

(1) The *Sultana* (*Helix Gallina Sultana*, Chem.) was sold, at the sale of the Count de Latour d'Auvergne, for 560 francs.

10. COCHLICOPA. *Fer.*
(ACHATINA. *Lam.*)

Oviform or turreted; Columella solid, flat,
thin, transparent; mouth truncated, and arched at
narrow. the base.

a Polyphemus, *Montf.* Oviform; mouth long; outer lip vertical. Pl. 8,
fig. 22.

b Styloides, *Columna, Perry.* Turreted; mouth short; outer lip a little
advanced, Pl. 8, fig. 19.

11. COCHLICELLA. *Fer.*
(BULIMUS. *Brug.*)

Conical or turreted; Columella twisted and
perforated; whorls nearly hollow.
equal, or the last shorter
than all the others toge-
ther. Pl. 6, fig. 38.

12. COCHLOGENA. *Fer.*
(AURICULA. *Lam.* BULI-
MUS. *Lam.*)

Oblong or oviform; last Columella hollow,
whorl of the spire gene- twisted, straight, perfor-
rally longer and larger rated, umbilicate.
than all the others toge-
ther; mouth elongated.

a Umbilicatæ. Columella straight. Pl. 8, fig. 20.

b { Perforatæ.
Bulimulus, *Leach.* } Columella twisted. Pl. 6, fig. 28.

c Lomastomæ. *Bulimus, Lam.* Columella twisted; peristoma reflected.
Pl. 6, fig. 27.

d Helicteres. *Turbo, Chemn.* Mouth short, crescent-shaped. Pl. 12, fig. 15.

c Stomatoides. *Auricula Lam.* Mouth elongated, angular at its extremi-
ties, or effusive in the upper part; peristoma thickened and reflected;
columella large, more or less spiral, sometimes forming a fold in
the mouth. Pl. 6, fig. 22, 31.

f Dontostomæ. Mouth crescent-shaped; peristoma margined, a little re-
flected; columella twisted, hollowed, flattened at the base, or forming
a protuberance; often perforated. Pl. 8, fig. 23.

13. COCHLODONTA. *Fer.*
(PUPA. *Lam.* ODOSTO-
MIA. *Fleming.*)

Cylindrical or fusiform; Columella solid or
whorls equal, numerous, nearly hollow.
narrow; mouth short, al-
most as broad as deep in
the direction of the axis;
several inner teeth or thin
plates; peristoma reflected.

a Pupa, *Lam.* Cylindrical. Pl. 6, fig. 34, 37; pl. 8, fig. 32.

b Chondrus, *Cuv.* Fusiform. Pl. 8, fig. 25; pl. 13, fig. 12.

14. COCHLODINA. *Fer.*CLAUSILIA. *Drap.* VOL-
VULUS. *Ocken.*

Cylindrical or fusiform; whorls equal, numerous, narrow; mouth generally with elevated plates, and always with one or two gutters. Columella solid, often with plates. A pedunculated elastic operculum.

a Pupoides. Mouth without teeth or plates; peristoma not continuous.

b { Tracheloides. }
 { Cyclostoma, *Lam.* } Peristoma continuous. Pl. 8, fig. 31.

c { Anomales. }
 { Pupa, *Drap.* } Mouth without plates. Pl. 8, fig. 29.

d Clausilia, *Drap.* Mouth with plates. Pl. 6, fig. 36.

15. VERTIGO. *Muller.*

Cylindrical, very spiral; volute increasing gradually; mouth narrow, short in the direction of the axis, often dentated. Peristoma often sinuous and reflected.

a Mouth not dentated. Pl. 8, fig. 34.

b Mouth dentated. Pl. 8, fig. 35, 36.

16. PARTULA. *Fer.*

Oval, pointed; spire conical; last whorl gibbous and longer than all the others together; mouth short in the direction of the axis, sometimes dentated or with elevated plates; peristoma generally much reflected. Pl. 8, fig. 30. Columellar side callous at base.

SHELLS.

Shells are envelopes, formed by a calcareous substance, of a foliated texture, and almost as heavy and hard as marble. They form coverings for a great number of animals of the class of *Mollusca*; and every one knows that the variety of their forms, their more or less vivid colours, and the brilliancy of their mother of pearl, constitute some of the finest ornaments of the cabinets of virtuosi. We have sufficiently explained these forms, and we shall presently show their relation with the Orders and Genera of the animals which inhabit them: at present we have only to consider their texture, their growth, and the manner in which they are united to the rest of the body.

They are composed, like bones, of a calcareous matter: intimately connected with a gelatinous substance, and which may be, in like manner, separated by means of acids; but this matter is not disposed in lamina, or in fibres: it is uniformly extended throughout the whole body of the shell.

It is only in some species that we find strata easily separated, and, as it were, agglutinated to each other like the leaves of paper in the formation of pasteboard. We know, from observation, that these strata do not all exist in young animals; they have only the most external, which are, at the same time, the smallest. In proportion as the animal increases in age, it forms a new stratum on the internal surface of the shell, which extends beyond the edges of all the preceding strata, so that each operation of this kind adds to the size of the shell, in length, breadth, and thickness. These are certain facts; to prove them it is only necessary to compare some shells of the same species that have belonged to individuals of different ages; the fewest strata will always be found in the shells of the young. Muscles, which may be observed when very young, and even before they quit the matrix of their mother, have, at that period, shells consisting of one stratum only; but the shell is not therefore soft and gelatinous; it possesses the same firmness as the adult shell, and its greater fragility is merely owing to its thinness.

But are the strata which thus successively augment the dimensions of shells, produced by development, or by a simple juxta-position? Do the nutritive vessels deposit the calcareous juice at different points, or does it only transude through the skin of the animal, and attach itself to the pre-existing strata? These are questions with respect to which physiologists are not agreed.

The body of the snail appears to adhere to its shell only where the muscles are attached; but Reaumur having placed thin pellicles between the body and parts of the shell, which he purposely broke, these fractures were not repaired; but when this, or any other obstacle, no longer prevented the juices flowing from the surface of the skin, the injured part was speedily regenerated.

These facts favour the idea of the simple juxta-position of a transuded matter: we observe, however, on the other hand, that the oyster and muscle adhere to the shell not only by their muscles, but by the whole border of their mantle; besides, the oyster has always between the two last strata of the convex valve, a considerable vacuity, which is filled with a fetid acrid liquor, and which communicates with the interior of the body by a particular aperture. How is this vacuity produced? and, above all, how is it removed upon the formation of each new stratum, if the arterial and absorbent vessels do not penetrate into the centre of the strata, to regulate its position, and to remove, from time to time, the particles of the shell?

Some observations seem to prove that there are testaceous animals, which,

at certain periods, cast their old shells entirely off, and acquire new ones; but this re-production may also take place by development, as in the horns of the Deer. If the internal strata of those shells which are not cast off, be produced by a development of this kind, it may be compared to that which forms the internal laminae of the hollow horns of the Ox, Sheep, and other Ruminating Mammalia, and even to that by which the epidermis is produced in all animals; that is to say, there must take place a withering, or, as it were, the death of a membrane, which seems to preserve a sort of organization while it remains unexposed to external elements, or while it has not acquired its proper degree of solidity.

In this manner, it appears, are produced all the hard parts which may be regarded as the bones of animals that have no vertebræ. In cray-fish, for example, the calcareous crust which, in them, is at once skin and skeleton, grows no more after it is completely indurated. The animal, however, continues to increase in all its soft parts; and when these become too much confined by the envelope, the latter splits and is detached: but a new covering is found below the old one, which is formed while the latter loses its connection with the body, and as it were dies. The new envelope is at first soft, sensible, and even provided with vessels: but a quantity of calcareous particles, previously accumulated in the stomach, is soon deposited in this covering, hardens it, obstructs the pores and the vessels, and renders it in every respect similar to the shell it has replaced.

The induration of the covering of insects is not completed until they acquire their last form, after which they have no longer any occasion to change their skin: but all their skins they previously cast, though soft, are dead, and already replaced by others, which develop themselves underneath that which is destined to fall off.

All the hard parts, therefore, of white blooded animals, whatever may be their consistence and chemical nature, ought to be compared with respect to the manner of their growth to the epidermis, to nails, and to hollow horns, rather than to real bones. The same remark should perhaps be applied to certain external parts of fishes, though their substance is strictly osseous; for instance, to the bucklers of the Sturgeon and Cyclopterus, and the spinous tubercles of the Ray.

Some white blooded animals have also hard parts internally; but they are not articulated in such a manner as to form the bases of moveable members, and their texture differs considerably from that of ordinary bones. The most remarkable of these hard parts are the teeth in the stomach of the lobster.

The common Cuttle-fish (*Sepia officinalis*) contains in the flesh of the back an oval substance, convex before and behind, white, solid, friable, and of a calcareous nature. This substance is not attached to the flesh, but has the appearance of a foreign body introduced into it. There is no indication of any vessel or nerve penetrating it, nor is any tendon affixed to it. It is composed of thin parallel lamellæ, which are not in immediate contact with each other. The intervals are occupied by an infinite number of small hollow columns standing perpendicular between one lamella and another, and arranged in a very regular *quincunx*.

As the superficies of the lamellæ are plane, and those of the bone itself convex, they necessarily intersect each other: the points of intersection are marked on the surfaces of the bone by regular curvilinear striæ. These bones have a kind of wings which are of a less opaque nature, less brittle, and have greater resemblance to thin elastic horn. than the body of the bone.

To this last substance the parts called the bone in the Calmar (*Sepia loligo*) bear a resemblance: they are transparent, elastic, and very brittle:

their shape is sometimes that of a leaf, and sometimes it is similar to a sword blade. Their connection with the soft parts is the same as the bone of the Cuttle-fish.

We also find a small semi-cornuous and semi-friable plate in the body of the fleshy lobe which covers the branchiæ of the *Aplysia*, and there is one still smaller in the cloak of the Slug.

Every thing tends to convince us that those hard parts which are found within *Mollusca*, grow by strata, like their external envelope, and that they are a kind of internal shells.

MOLLUSCA. *Cuvier*. (1)

Without vertebræ or articulated members; with blood vessels and nerves (2); a simple spinal marrow; lymph, chyle and blood of the same color (a bluish white); generally with salivary glands; a voluminous liver furnishing a great quantity of bile; no pancreas or mesentery; muscles (3) attached to the skin, which forms a soft envelope, contractile, engendering (in several species) stony plates or shells; the viscera and nervous system within this envelope, the latter composed of scattered masses united by nervous filaments, the principal of which, placed on the œsophagus, are called the brain; a complete system of circulation; respiratory organs; organs of digestion and secretion almost as complicated as in vertebrated animals (4).

(1) Before *Cuvier*, naturalists divided all the *invertebral animals* into two classes, *Insects* and *Worms*.

(2) *Humboldt* has adopted an ingenious method of distinguishing the nerves from the arteries, or other parts, in the smallest animals. He uses two needles, one gold, the other silver: a point of one is applied to the muscles, and a point of the other to the filament, the nature of which he wishes to discover, while the other extremities of these instruments are brought in contact. If the filament be a nerve, contractions immediately take place in the muscular fibre.

(3) The *Mollusca* with an exterior shell, as *Helices*, *Bulimi*, *Volutæ*, etc. have but one muscle which attaches their body to the shell, by a small part of the back and nearly in the middle of its length. This muscle forms a considerable tendon, similar to a thin ribband, which divides itself into two or three principal ribbands. Each of these subdivides itself into several smaller, which disperse and distribute themselves into all parts of the body. The *Mollusca* with a univalve shell furnished with an operculum, have two muscles of attachment: one of these muscles unites the animal to its shell and resembles that just described in the univalves without opercula; the other, which adheres to the operculum, is generally round, very wide, but not thick.

(4) The *Mollusca* with a trunk, as the *Buccini*, *Volutæ*, etc. are carnivorous; they make use of their trunk as a gimblet, and even bore through other shells and suck the flesh of the animals within. Those which have strong horny jaws and a beak like a parrot, are also carnivorous or nourish themselves with animal substances, like the *Cephalopoda*. The *Mollusca* which have a muffle and two jaws, one of which at least is furnished with small teeth, are herbivorous or frugivorous, such as the *Limaces*, *Helices*, *Bulimi*, etc.

MOLLUSCA.

CLASSES.

A. *With univalve shells, or none.*

1. CEPHALOPODA.

Body in the form of a bag, open before, containing the branchiæ.	A head covered with large, long, fleshy productions, serving for locomotion and prehension.	Sexes separate.
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2. PTEROPODA.

Body entirely closed.	Appendages of the head small or none; organs of movement two wings or membranous fins on the side of the neck, and frequently bearing the branchial tissue.	Hermaphrodite.
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3. GASTEROPODA.

Creep on the fleshy disk of the belly, sometimes compressed into a fin (2).	A head distinct and anterior, or none.	Hermaphrodite and sexes separate.
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(1) These are the only Mollusca in which organs of hearing have been discovered, and which have the brain (sending forth innumerable optic nerves from the two ganglions) within a cartilaginous box: they are called Cephalopoda because they have the feet on the head. They have three hearts; they respire in water by branchiæ; their mouth is placed in the centre of their feet, and resembles a beak; the head is also distinguished by very large eyes, and has the ears placed internally; the stomach is muscular like a gizzard, the liver very voluminous. A particular gland secretes a black liquor, which they throw out, and which darkens the water around them whenever they wish to conceal themselves. They swim with their head behind; and walk in all directions with the head below and the body above. Aristotle remarked, that certain herbs, which have a strong odour, were avoided by *cuttle-fishes* and the *octopus*.

(2) They are so called because they crawl on their bellies; the head is movable, and frequently provided with tentacula; the heart is single.

When the name of the genus appears in the following tables without any characteristic particulars, the animal is very imperfectly known.

B. *With bivalve shells, or none.*

4. ACEPHALA.

No apparent head ; mouth hidden in the bottom or between the folds of a two-lobed mantle containing the branchiæ and viscera.

Branchiæ composed of large leaves covered with vascular network, upon or between which the water passes.

Hermaphrodite.

5. BRACHIOPODA.

Mantle lobed ; mouth exterior, between the bases of two long fleshy arms supplying the place of a foot and with numerous filaments.

Branchiæ composed of small leaves, ranged round the edge of the inner face of each lobe.

Fixed, without the power of locomotion.

6. CIRRHOPODA.

With numerous hairy filaments, in pairs, composed of small articulations representing feet or fins, towards the orifice of the shell ; mouth at the bottom of the shell.

Ditto.

CLASS I. CEPHALOPODA.

GENERA.

A. *No exterior shell.*

1. OCTOPUS. *Lam.* (Poly-
pus of the Ancients.)
(1). Pl. 14, fig. 11.

Bag oval, without fins. 8 Feet, very large in $\frac{2}{3}$ Small conical horny
proportion to the body, grains on each side of
and united by a mem- the back.
brane at their base.

2. LOLIGO. *Lam.*

Bag with two fins to- 8 Feet with little A horny plate within
wards the point. Pl. 14, suckers (or short pedi- the back.
fig. 1, 10. cles), and two arms to
the head, much longer
than the feet, with suck-
ers at the end only (2).

3. SEPIA. (3) *Lam.*

A fleshy fin along each Ditto. Shell oval, thick, gib-
side of the bag. bous.

B. *Shells interior ; chambered.*

4. SPIRULA. *Lam.*

Ditto. Pl. 14, fig. 3.

5. NAUTILUS.

Ditto. Mouth with several A ligament from the
circles of numerous back passing through-
small tentacula without out the syphon, and at-
suckers. taching the animal. (4)

(1) The reservoir for the ink is enchased in the liver. Some believe that the *Sepia rugosa* is the species which furnishes the Indian ink. The Mediterranean produces a species remarkable for its musky odour.

(2) They make use of these as anchors.

(3) They lay their eggs attached to one another like bunches of grapes, which has given rise to the vulgar name of Sea-grapes.

(4) According to Rumphius ; who says that the animal of the *Nautilus Pompilius* is partly lodged in the last chamber of the shell, and has the bag, eyes, parrot-beak and funnel of the other *Cephalopoda*. It is also probable that the epidermis is prolonged on the exterior of the shell.

C. *Shells exterior; not chambered.*

6. ARGONAUTA. (1)

Ditto.

Two of the tentacula
with a membranous en-
largement.

(1) The animal uses its shell as a boat, and when the sea is calm it is seen navigating on the surface, employing six of its tentacula as oars, and raising two, which, from the considerable membranous enlargement, serve as sails. Pl. 15, fig. 1. If the waves are agitated, or any danger appears, the Argonaut draws its tentacula or arms within the shell, concentrates itself, and sinks to the bottom. The ancients were acquainted with this singular animal and its manœuvre; it is their Nautilus and Pompilus.—*Plin.* IX, cap. 29. Blainville and Dr. Leach consider the animal found in the *A. argo* (Pl. 15, fig. 2) to be parasitical, and allied to the *Octopus*, under the name of *Ocythoë*.

CLASS II. PTEROPODA.

GENERA.

A. *Head distinct.*1. CLIO. *Lin.*

No mouth; head formed by two rounded lobes; tentacula small. Pl. 15, fig. 3.

Fins with a vascular network instead of branchiæ.

No shell.

2. CLEODORA. *Peron.*

Two membranous wings, with the mouth between, having a small lip.

An envelope. Pl. 5, fig. 2.

3. CYMBULIA. *Peron.*

A large fin with three lobes, two tubercles and a small fleshy beard at the base of the smallest.

Envelope cartilaginous or gelatinous. Pl. 5, fig. 3.

4. LIMACINA. (1) *Cuv.*

Head and wings resembling those of the *Clio*: body terminated by a spiral tail lodged in a very thin shell.

A shell.

5. PNEUMODERMON. *Cuv.*

Branchiæ on the surface of the body; fins small; a small lobe or fleshy tentaculum beneath the mouth. Pl. 15, fig. 4, 5.

No mantle.

No shell.

B. *Head indistinct.*6. HYALEA. *Lam.*

Two large wings; mantle cleft at the sides, branchiæ within the clefts. Pl. 14, fig. 8.

A shell.

(1) This animal also uses its shell as a boat, and its wings as oars, when it swims on the surface of the sea. The species known (*Clio Helicina* of *Phipps. Gmel. Argonauta arctica, Fabric Faun. Grænt.* 387) is scarcely less abundant in the northern seas than the *Clio borealis*, and, like it, is said to be one of the principal aliments of the whale.

CLASS III. GASTEROPODA.

ORDERS.

1. NUDIBRANCHI. (1)
No shell. Pl. 15, fig. 7, 8, 9. Branchiæ naked, dorsal. Hermaphrodite.
2. INFEROBRANCHI.
Ditto. Pl. 15, fig. 10, 11, 12. Branchiæ naked, under the edges of the mantle. . . .
3. TECTIBRANCHI.
Shell more or less developed, within the mantle. Pl. 16, fig. 1, 2, 3. Branchiæ covered by the mantle. . . .
4. PULMOBRANCHI.
A great number with turbinated shells, always without opercula. A cavity for respiration, opened and shut at will. . . .
5. PECTINIBRANCHI.
Shells completely turbinated, and generally more or less closed by an operculum attached to the posterior part of the foot. Branchiæ hidden in a dorsal cavity open above the head. Pl. 13, fig. 18. Sexes separate.
6. SCUTIBRANCHI. (2)
Shells very open, often in the form of a shield, without opercula. Pl. 14, fig. 20. Ditto. Hermaphrodite.
7. CYCLOBRANCHI.
Shells of one or several pieces, never turbinated, without opercula. Branchiæ around the foot, under the edges of the mantle. Pl. 14, fig. 5, 6.

(1) The greater number swim reversed, the foot (concave like a boat) on the surface, aiding themselves with the edges of their mantle and using their tentacula as oars.

(2) The heart is traversed by the rectum, and receives the blood by two auricles, as in the greater number of *Bivalves*.

ORDER I. NUDIBRANCHI.

GENERA.

1. DORIS. (1) *Cuv.*

Branchiæ posterior,
ranged in a circle.

2 Small conical ten-
tacula to the mouth,
and 2 club-shaped from
the upper part of the
mantle.

Mouth a small trunk
on the fore part of the
mantle.

2. POLYCERA. *Cuv.*

Branchiæ as in *Doris*,
but more simple and with
two membranous plates
covering them in the mo-
ment of danger.

2 Club-shaped tenta-
cula before; 4 or 6
others simply pointed.

3. TRITONIA. (2) *Cuv.*

Branchiæ ranged along
the two sides of the back.

Ditto.

Mouth with large
membranous lips.

4. THETHYS. *Lin.*

Two rows of branchiæ
the whole length of the
back, like bunches of fea-
thers; a large, membra-
nous, fringed veil on the
head.

2 Compressed tenta-
cula, with a small conical
point on the edge.

Mouth a membranous
trunk without jaws.

5. SCYLLÆA. (3) *Lin.*

Body compressed; foot
narrow, with a furrow
for seizing the stems of
fuci: two pair of mem-
branous crests on the
back. Pl. 15, fig. 7, 8, 9.

Ditto.

Mouth like a small
trunk.

6. GLAUCUS. (4)

Body long, slim; three
or four branchiæ on each
side, formed of long
thongs, disposed like fans
and serving as fins.

4 Very small conical
tentacula.

Swim on their back.

(1) A peculiar liquor issues from a gland interlaced with the liver. They are found in all seas. Their spawn is spread like gelatinous bands on stones, varces, etc.

(2) The orifice for the liquor is pierced to the right, and their mouth is armed within by two lateral jaws, horny and sharp, and resembling shears.

(3) The middle of the stomach is furnished with a fleshy ring, armed with sharp horny blades like knives.

(4) They are beautiful little animals inhabiting the Mediterranean and the Ocean, agreeably coloured with azure and mother of pearl, and swim on their back with great swiftness. They have not yet been dissected, and the species are not very clearly distinguished.

7. EOLIDIA.

Branchiæ like plates or leaves, in transversal rows on the two sides of the back. Pl. 15, fig. 6.

8. TERCIPES. *Cuv.*

A row of branchiæ (1) along each side of the back.

2 Tentacula.

Walk on their back.

ORDER II. INFEROBRANCHI.

GENERA.

1. PHYLLIDIA. (2) *Cuv.*

Mantle naked, generally coriaceous. Pl. 15, fig. 10, 11, 12.

1 Tentaculum on each side of the mouth, and 2 from above the two small cavities of the mantle.

Mouth a small trunk.

2. DIPHYLLIDIA.

Mantle more pointed behind: head semicircular.

1 Pointed tentaculum and a slight tubercle on each side of the head.

(1) These are each terminated by a little sucker, and serve as feet for walking on the back.

(2) Their heart is towards the middle of the back, the stomach is simple and membranous, and the intestine short.

ORDER III. TECTIBRANCHI.

GENERA.

1. PLEUROBRANCHUS. (1)
Cuv.

Body as if between two shields formed by the foot and the mantle; the latter sometimes containing an oval calcareous plate.

2 Tubulous and cleft tentacula on the mouth (a small trunk), surmounted by a lip.

Branchiæ along the left side, in the furrow between the mouth and the foot.

2. APLYSIA. (2) *Lin.*

Edges of the foot turned up, flexible, encircling the back in every part: head borne on a neck. Pl. 14, fig. 2, 11,* 14.

2 Superior tentacula, hollowed like the ears of a quadruped, with the eyes at the base; 2 others flattened and at the edge of the lower lip.

Branchiæ on the back and attached to a stem covered by a small membranous mantle, containing a hollow flat shell.

3. DOLABELLA. *Lam.*

Body resembling a truncated cone; shell calcareous.

Ditto.

Branchiæ at the posterior extremity of the body.

4. NOTARCHUS. *Cuv.*

Mantle with an oblique cleft above the neck communicating with the branchiæ.

Ditto.

Branchiæ as in *Aplysia*.

(1) They have four stomachs; the second is fleshy, sometimes armed with bony pieces, and the third furnished interiorly with longitudinal projecting plates; the intestine is short.

(2) An enormous membranous crop conducts to a muscular gizzard, armed with sharp crooks, and a fourth in the form of a cœcum: the intestine is voluminous. These animals feed on fucus. A peculiar gland furnishes, by an orifice situated near the womb, a limpid humour, which is said to be sour in some species; a deep purple liquor issues abundantly from the edges of the mantle, with which the animal colors the water to a considerable distance on the approach of danger. When Apuleius was accused of magic and poisoning, it was reported as a principal evidence that he had engaged some fishermen to procure him an *Aplysia* (*Sea-Hare*); and it is to the following part of his description that we owe the only characteristic which has enabled us to recognise so celebrated an animal. "It has an extraordinary property, of which my predecessors have been ignorant, which is, that being otherwise destitute of bone, it has twelve small ones in its belly, similar to the astragali of the hog, attached and tied together." The form of the *Aplysia* explains the name of *Sea-Hare*; and their smell, and the liquor which they produce, account for the pernicious properties attributed to them.

5. AKERA. (1) Muller.

Tentacula so short and broad as to appear wanting or replaced by a fleshy rectangular shield. Pl. 16, fig. 1, 2, 3, 4, 5.

ORDER IV. PULMONACEÆ.

GENERA.

A. Terrestrial; shell interior; almost all with 4 tentacula.

1. LIMAX. (2) Lin.

Body elongated; a fleshy disk instead of a mantle, anterior and covering the pulmonary cavity only. Pl. 13, fig. 18. Pl. 15, fig. 13.

Orifice of respiration on the right side towards the front.

2. TESTACELLA. (3) Lam.

Mantle very small, posterior. Pl. 16, fig. 18.

Orifice of respiration posterior.

3. PARMACELLA. Cuv.

Mantle membranous, with the edges flaccid. Pl. 14, fig. 9. Pl. 16, fig. 9.

Orifice of respiration under the right side of the middle part of the mantle.

B. Terrestrial; shell exterior; almost all with 4 tentacula.

4. VITRINA. Drap. HELICO-LIMAX. Ferus. (4)

Body protected in front by a sort of cuirass, and behind by a thin shell which may be partly covered by the lobes of the collar or mantle. Pl. 14, fig. 12.

Body too large to enter entirely within the shell.

(1) Their hermaphroditism, the position of their two sexes, the complication and armour of their stomach, the purple liquor produced by several of their species, approach them to the Aplysia.

(2) Their mouth has only an upper jaw, in the form of a dentated crescent, which enables them to gnaw herbs and fruits.

(3) The *T. haliotidea* lives under ground, and feeds principally on worms. M. de Ferussac has observed, that its mantle expands extraordinarily when it is in too dry a place, affording it a sort of shelter.

(4) The mantle has a double edge; the upper, which is divided into several lobes, can extend far beyond the shell, and fold back to rub and polish it.

5. HELICARIÓN. *Ferus.*

Body truncated behind, with a cuirass in front, under the anterior edge of which it retires its head : shell posterior ; foot separated from the body by a furrow and with a mucous pore at its extremity. Pl. 14, fig. 7. Pl. 16, fig. 6.

6. HELIX. (1) *Lin.*

Body with a muscular disk or foot, sometimes pediculated, more or less gibbous and spiral above.

Mantle forming a kind of ring or collar (at the point of junction of the two parts of the body), in which is pierced the round orifice of the respiratory cavity.

Head indistinct, with two pair of retractile tentacula, the posterior the larger, and bearing the eyes at the summit ; mouth with a pair of short appendages.

a. *Bulimus*, *Lam.* (2)

b. *Pupa*, *Lam.*

c. *Scarabæus*, *Montf.*

d. *Chondrus*, *Cuv.*

e. *Amphibulima*, *Lam.* (3) Inferior tentacula very small.

f. *Clausilia*, *Drap.* (4)

g. *Achatina*, *Lam.* (5)

(1) V. p. 74.

(2) Large and beautiful species are found in warm countries : some are remarkable for the size of their eggs, the shell of which is stony ; and others for their sinistral shell. The *Helix decollata* has the singular habit of breaking the whorls at the top of its spire, proving that the muscles of the animal can detach themselves from the shell without injury, and that they adhere to different points of the shell successively. How is it that they thus effect the separation of the vessels from one part to implant them in another? for it sometimes happens that this *Helix* or *Bulimus* has but one of the original whorls of its spire left. Some species of *Pupa*, *Clausilia*, and *Melania* are found in the same state. The *Kambeul* of Adanson appears to pass the dry season in a deep trance, like the *Limax* of Europe, for he found several half buried after the month of September. Some had even already began to close the mouth of their shell with a whitish plastery matter, to defend themselves from the long drought, which continues at Senegal from October to the following June.

(3) This animal may perhaps be considered as a *Testacella* with a large shell. Its inferior tentacula are very small, and it lives on herbs and bushes by the side of streams, which has caused it to be thought an amphibious genus.

(4) In the narrow part of the last whorl we generally find a small plate, slightly curved like an S : its use to the animal is unknown.

(5) At the extremity of the truncated columella we find the first indication of the notches in the shells of the marine *Gasteropoda*.

C. *Aquatic ; 2 tentacula.**Without a shell.*5. ONCHIDIUM. (1) *Buchanan.*

A broad fleshy mantle.
Pl. 16, fig. 8.

2 Long retractile tentacula, and two triangular lips.

Orifice of respiration under the posterior part of the mantle.

*With shells.*6. ANCYLUS. *Geoff.*

Eyes at the inner base of the tentacula.

7. PLANORBIS. (2) *Brug.*
Pl. 16, fig. 10.

Tentacula thin, filiform.

Ditto.

7. LYMNÆUS. (3) *Lam.*

Tentacula compressed, broad, triangular.

Eyes near the base of the inner edge.

8. PHYSA. (4) *Drap.*

Two dentated lobes to the mantle.

Tentacula thin, pointed.

Eyes at the inner base, which is much enlarged.

9. AURICULA. *Lam.*10. CONOVULA. *Lam.*11. TORNATELLA. *Lam.*12. PYRAMIDELLA. *Lam.*

Animals unknown, but (from the form of the shell and the absence of the operculum) approximating to the *Auricula*.

(1) The ^{de}mollusca, destitute of jaws, have a muscular gizzard, followed by two membranous stomachs.

(2) A red and abundant liquor exudes from the edges of its mantle, but it is not their blood; they are the constant companions of the *Lymnæi* in all stagnant waters.

(3) We find them floating on the surface of the water with the foot turned upwards, and very rarely creeping on hard substances; when disturbed they fall or sink, and remain a long time immoveable before they reappear at the surface.

(4) This animal, when it swims or creeps, covers its shell with the two dentated lobes of its mantle.

ORDER V. PECTINIBRANCHI.

FAMILIES.

1. TROCHOÏDA.

Shell spiral, mouth entire, without notch or canal. Pl. 9, fig. 7.

An operculum.

2. BUCCINOÏDA.

Shell spiral, with a notch or canal for the passage of the siphon, which is a prolonged fold of the mantle. Pl. 10, fig. 21.

3. SIGARETOÏDA.

Shell flattened, hidden during life within a spongy buckler which is the true mantle. Pl. 5, fig. 25. Pl. 14, fig. 15, 16.

FAMILY I. TROCHOÏDA.

GENERA.

1. TURBO. *Lin.*

Shell turbinated. mouth
round.

Marine.	{	a. Turbo, <i>Lam.</i> (1)		
		Membranous wings on the side of the foot. Pl. 17, fig. 6, 7, 8, 9, 10.	2 Long tentacula.	Eyes on stems at the outer bases of the tenta- cula.
		b. Delphinula, <i>Lam.</i>		
		c. Vermicularia. Pl. 19, fig. 8, 9.	2 Triangular, flattened, small tentacula.	Ditto.
		d. Turritella, <i>Lam.</i>		
		e. Scalaria, <i>Lam.</i> (2) Pl. 17, fig. 1.	2 Long, slim tentacula.	Ditto.

(1) To these belong the thick, strong opercula, so frequently found in collections, which were formerly employed in medicine under the name of *unguis odoratus*.

(2) The mouth is encircled by a callous pad, which the animal repeats from space to space as its shell increases, so as to give the appearance of ladders.

Fresh-water and Terrestrial.	f. <i>Cyclostoma</i> , Lam.	A vascular net-work on the partitions of the pectoral cavity, instead of branchiæ; respiratory cavity communicating with the exterior air by a lateral cleft.	2 Tentacula terminated by blunt tubercles.	Eyes on two tubercles near the base of the tentacula.
	g. <i>Helicina</i> , Lam. (1)	Head probosciform, bilabiate; respiratory cavity as in <i>Cyclostoma</i> .	2 Filiform tentacula.	Eyes at the outer base.
	h. <i>Valvata</i> , Muller. (2)	With branchiæ.	2 Slim tentacula.	Eyes at the superior base.
	i. <i>Paludina</i> , Lam. (3)	With branchiæ; a very short trunk. Pl. 14, fig. 49. Pl. 17, fig. 2.	2 Pointed tentacula.	Eyes at the outer base.
	j. <i>Monodonta</i> , Lam.	Animal more ornamented, generally with three filaments on each side as long as the tentacula.		

2. *TROCHUS*. Lin.

Mouth of the shell angular, more or less quadrangular, oblique to the axis. Three filaments at each edge of the mantle, or appendages to the foot. Pl. 17, fig. 3, 4, 12*, 13.

a. *Trochus*.b. *Solarium*.

(1) M. Blainville is convinced that this is the place of the *Helicina*: but M. de Ferussac says that it has a collar, with the respiratory hole pierced to the left.

(2) In the *V. cristata* the branchiæ, formed like a feather, proceed from underneath the mantle, and float beyond it with a vibratory motion when the animal wishes to breathe; on the right side of the body is a filament resembling a third tentaculum.

(3) The female of the *P. vivipara* produces living young, which are found in her oviductus, in the spring, in all the stages of development. Spallanzani asserts that these young separated at the moment of their birth, and nourished apart, reproduce without fecundation like those of the Vine-fretter. The *P. cristata* one of the small species found in salt water ponds, and described by M. Beudant, moves its tentacula incessantly as oars when it sails on the surface of the water.

3. CONCHYLUM. *Cuv.*

Entirely aquatic or breathing by branchiæ.

a. Ampullaria.

Animal not yet described, but probably resembling the Paludina.

b. Melania.

Animal not well known.

c. Phasianella.

Double lips notched and fringed, each wing with three filaments.

2 Long tentacula.

Eyes on two tubercles at the outer base of the tentacula.

d. Ianthina. (1)

A vesicular organ under the foot, like a frothy ball but solid, which admits of floating but not of creeping; head like a cylindrical trunk, mouth with little faugs. Pl. 14, fig. 13.

4. NERITA. *Lin.*

Shells with the columella straight, the mouth semi-circular or semi-elliptic, and closed entirely by an operculum.

a. Natica, *Lam.*

Foot large; operculum horny. Pl. 17, fig. 17, 18.

Tentacula simple.

Eyes at the base of the tentacula.

b. Nerita, *Lam.* (2)

Foot moderate; operculum stony. Pl. 17, fig. 11, 12.

.. ..

Eyes on stems at the side of the tentacula.

c. Neritina.

Foot moderate; operculum horny.

.. ..

.. ..

(1) The common species (*Helix Ianthina*, *Lin.*) *List.* 572, 24, is a pretty violet-coloured shell, abounding in the Mediterranean. When the animal is touched, it sheds a thick liquor of a deep violet colour, which tints the sea around it.

(2) The opercula of some univalve shells, particularly of the *Nerita*, are articulated by ginglymus.

FAMILY II. BUCCINOÏDA.

GENERA.

1. CONUS. *Lin.*

Trunk elongating considerably ; operculum placed obliquely on the foot, narrow, too short to close the mouth of the shell ; a long respiratory tube. Pl. 16, fig. 12.

Tentacula elongating considerably.

Eyes near the points on the outer side of the tentacula.

2. CYPRÆA. (1) *Lin.*

Mantle large enough to curl up and envelope the shell : foot thin ; no operculum. Pl. 16, fig. 11.

Tentacula moderate.

Eyes at the outer base.

3. OVULA. *Brug.*4. TERESELLUM. *Lam.*5. VOLUTA. *Lin.*

Shell terminated by a notch, with projecting and oblique folds on the columella. Pl. 18, fig. 1, 2.

a. Oliva, *Brug.*

A tube above the head for respiration.

2 Long pointed tentacula.

Eyes towards the middle of the tentacula.

b. Voluta.

An elongated trunk, cylindrical and retractile, with small crooked teeth ; a respiratory tube projecting obliquely behind the head ; foot very large ; no operculum. Pl. 18, fig. 2.

2 Pointed tentacula, from a veil on the head.

Eyes at the outer base.

c. Cymbium.

A very large foot ; no operculum. Pl. 18, fig. 1.

2 Tentacula, from a veil on the head.

Eyes on the veil outside the tentacula.

(1) The mantle is sufficiently large to turn back upon the shell and envelope it ; at a certain age it covers the shell with a layer of another colour, so that this difference, added to the form assumed by the aperture, might cause the adult to be taken for another species. V. p. 41.

d. Marginella.

Foot very large, partly covers the shell by raising the lobes of the mantle ; a retractile trunk, a respiratory tube above the head ; no operculum.

Eyes on the outer base of the tentacula.

*e. Mitra.**f. Cancellaria.*

6. BUCCINUM.

Shells without folds on the columella ; with a notch or short canal inflected towards the left, for the passage of the respiratory tube. Pl. 10, fig. 21.

a. Buccinum.

No veil to the head ; a trunk ; a respiratory tube formed by the mantle ; operculum horny. Pl. 17, fig. 15, 16. Pi. 13, fig. 16, 19, 20.

2 Conical tentacula far apart.

Eyes on the outer side of the tentacula.

*b. Eburna, Lam.**c. Dolium, Lam.**d. Harpa, Lam.**e. Nassa, Lam.*

Ventral disk enlarged, truncated anteriorly, prolonged beyond the head ; a tube above the head formed by the mantle.

2 Pointed tentacula.

Eyes in the middle part of the tentacula.

f. Purpura, Brug. (1)

Foot elliptical ; respiratory tube prolonged above the head ; operculum cartilaginous. Pl. 17, fig. 14.

Ditto.

Eyes in the middle of the outer part of the tentacula.

(1) The animal furnishes a matter fit for dying red, which the ancients used, and which is still employed in the north of Europe.

g. *Cassis*, Brug.

Animal resembling the Buccinum, but the operculum horny and dentated in order to pass between the wrinkles of the outer lip. Pl. 18, fig. 7.

h. *Cassidaria*, Lam.

Animal resembling the Buccinum.

i. *Terebra*, Lam.

7. CERITHIUM.

Shell with a turreted spire, mouth oval, canal short, curved to the left or backwards; operculum round and horny. Pl. 13, fig. 17. Pl. 18, fig. 3.

A veil on the head.

Two tentacula, far apart, with the eyes at the side.

8. MUREX. Lin.

Canal of the shell projecting, straight; operculum horny. Pl. 10, fig. 2.

No veil.

2 Long tentacula, near to each other, with the eyes at the exterior side.

a. *Murex*, Lam.

A retractile trunk; a tubulous prolongation of the mantle; operculum small, horny. Pl. 18, fig. 4, 6. Pl. 19, fig. 2.

b. *Ranella*, Lam.

c. *Fusus*, Lam. Pl. 18, fig. 5.

d. *Turbinella*, Lam.

e. *Pleurotoma*, Lam.

f. *Pyruca*, Lam.

g. *Fasciolaria*, Lam.

9. STROMBUS. Lin.

Canal straight or inflected towards the right; lip dilating with age but preserving a sinus near the canal, under which the animal passes its head.

a. *Strombus*, Lam.

Operculum horny, long, narrow; foot small. Pl. 19, fig. 1.

b. *Pterocera*, Lam.

c. *Rostellaria*, Lam.

FAMILY III. SIGARETOÏDA.

GENERA.

1. SIGARETUS. *Cuv.*

A notch and semi-canal in front, conducting the water into the branchial cavity. Pl. 14, fig. 15, 16.

Tentacula conical.

Eyes at outer base of the tentacula.

2. CRYPTOSTOMA. *Blainv.*

Foot enormous, four or five times larger than the body; mouth hidden under the anterior edge of the shell.

Tentacula short, conical, with appendages at the base.

ORDER VI. SCUTIBRANCHII

GENERA.

1. HALYOTIS. *Lin.*

Shell turbinated. Pl. 5, fig. 24.

a. Halyotis. Lam. (1)

Mouth a short trunk. Pl. 13, fig. 21. Pl. 14, fig. 20. Pl. 19, fig. 3, 4, 5.

Tentacula long, some at the edges of the cavity of the branchiæ, and passing through the last holes of the shell. Eyes on two cylindrical stems.

*b. Padolla.**c. Stomatia. (2)*2. CAPULUS. *Montf.*

Shell conical; branchiæ on the anterior edge of the cavity; trunk rather long; a folded membranous veil under the neck. Pl. 16, fig. 7.

2 Conical tentacula.

Eyes on the outer base of the tentacula.

(1) The mantle is deeply cleft on the right side, and the water which passes through the holes of the shell, proceeds by this cleft into the branchial cavity. There are three or four filaments along the edges of the mantle, which the animal has the power of pushing out through the holes.

(2) The animal is not known - it may possibly belong to the *Pectinibranchii*.

3. CREPIDULA. *Lam.*

Shell with an oval base; the abdominal bag) containing the viscera) on the plate of the shell; the foot beneath; the head and branchiæ in front. Pl. 16, fig. 15, 16, 17.

Shells, and the position of the heart and branchiæ, symmetrical.

4. FISSURELLA. *Lam.*

A conical shell on the middle of the back, with a small hole at the summit (for the passage of the water for respiration) extending to the cavity of the branchiæ on the fore part of the back; a branchial comb on each side; with filaments on the sides of the foot. Pl. 16, fig. 14. Pl. 19, fig. 6, 7.

2 Conical tentacula.

Eyes at the outer base of the tentacula.

5. EMARGINULA. *Lam.*

A fissure instead of a hole, for the same purpose; edges of the mantle covering a great part of the shell. Pl. 16, fig. 13.

Eyes on a tubercle at the outer base of the tentacula.

6. SEPTARIA. *Fer.* NAVICELLA. *Lam.*

A moveable, angular, testaceous plate (besides the shell) hidden in the back of the abdominal bag.

7. CARINARIA. (1) *Lam.*

A compressed, muscular portion under the belly, serving as a fin; shell attached on the branchiæ; a trunk; head furnished with tubercles. Pl. 14, fig. 17.

2 Tentacula.

Eyes at the base of the tentacula.

8. CALYPTREA. *Lam.*

(1) The skin of these animals is almost gelatinous, and has a layer of fibres under it, which, when they are taken, contracts so much as to tear the body and let out the intestines.

ORDER VII. CYCLOBRANCHI.

GENERA.

1. PATELLA. (1) *Lin.*

Shell of a single piece ; a cord of small branchial leaves under the edges of the mantle ; a thick, short trunk. Pl. 14, fig. 5, 6.

2 Pointed tentacula.

Eyes at the outer base of the tentacula.

2. CHITON. (2) *Lin.*

A range of testaceous, symmetrical scales along the back of the mantle. ; A membranous veil on the mouth instead of tentacula.

(1) The mouth is fleshy, and contains a spiny tongue, lengthened posteriorly, and folded deeply within.

(2) The shell of the *Chiton* will be figured and described with the *Multivalves*.

SYNOPTIC TABLE

PTEROPODA..... { No foot for crawling; no arms for dragging or seizing prey. Two fins, alike and opposite, for swimming..... } Shell enshathing; of one

GASTEROPODA..... { Body straight, never spiral or with a shell capable of containing it; a muscular foot united to the body in its whole length, placed under the belly, for crawling. } Shell without columella or operculum; not forming a complete spire, unless rolled.....

TRACHELOPODA..... { Greater part of the body twisted in a spire, separate from the foot, and always enveloped in a spirivalve shell; foot free, flat, attached to the inferior base of the neck, for crawling... } Shell always spiral, whorls generally numerous, with either a columella or an operculum.....

CERPHALOPODA..... { Lower part of the body contained in a mantle formed like a bag; head projecting from this bag, crowned by arms, not articulated, furnished with suckers surrounding the mouth; 2 horny jaws..... } Shell regularly multilocular; or, if unilocular, whorled in the same plane; the spire entering into the mouth or inclining towards it.....

OF LAMARCK'S SYSTEM.

piece, never spiral, always exterior..... 1.

- Shell exterior, covering: in one piece in the form of a shield, cap, or sandal; or in several imbricated pieces: imperfectly or not at all spiral..... 2.
- Shell partly or completely interior; cavity simple or none; only forming a spire when the whorls completely cover each other..... 3.
- Shell exterior; not capable of entirely containing the animal; the spire imperfectly formed of two whorls..... 4.

- Mouth of the shell entire; no notch or canal at the base..... 5.
- Shell channelled or notched, or effusive* at its base.....
 - A channel more or less long at the base of the shell; outer lip not changing with age..... 6. CANALIFERE.
 - A channel more or less long at the base of the shell; outer lip changing its form with age and having a sinus below..... 7. ALATE.
 - A short channel ascending towards the back, or an oblique notch sub-ascending at the base of the shell..... 8. PURPURIFERE.
 - No channel, a notch at the base of the mouth; folds on the columiella..... 9. COLUMELLATE.
 - No channel, the base of the mouth notched or effusive; the whorls large, rolled round the axis..... 10. INVOLUTE.

- Multilocular, with septa...
 - Septa simple at the edges, sutures neither notched or undulated on the internal partition of the testaceous covering.....
 - Shell straight or almost straight; no spire..... 11. ORTHOCERACE.
 - Shell partially spiral, last whorl terminating in a straight line... 12. LITUOLACE.
 - Shell semi-discoïd, spire eccentric 13. CRISTACE.
 - Shell globulous spheroidal or oval; whorls of the spire enveloping, or cells united within a covering } 14.
 - Shell discoïd, spire central, cells radiating from the centre to the circumference..... } 15. RADIATE.
 - Shell discoïd, spire central, cells in a spiral line, not extending from the centre to the circumference..... } 16. NAUTILACE.
 - Septa notched at the edges, united against the internal partition of the testaceous covering and articulated in sinuated sutures notched like parsley leaves..... 17. AMMONACE.
- Unilocular, univalve, involute; spire entering the mouth or tending towards it..... 18.

* V. Note, p. 27.

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BY THE AUTHOR.

An ANALYSIS of the NATURAL CLASSIFICATIONS of MAMMALIA, including the Systems of Cuvier and Illiger, and illustrated by upwards of 200 figures (comprehending the Extinct or Fossil Genera and Species), principally from the objects themselves in the Gallery and Cabinet of Comparative Anatomy of the Jardin des Plantes. Price 15s.

An INTRODUCTION to the ORNITHOLOGY of CUVIER, illustrated by 261 figures (including several anatomical), principally from the objects themselves, and drawn off on tint. Price 15s.

These two works have been adopted as text books by Professor Jamieson of the Edinburgh University.

An ESSAY on the SUPERSTITIONS, CUSTOMS, and ARTS common to the Ancient EGYPTIANS, ABYSSINIANS and ASHANTEES: with coloured figures of part of the objects of manufacture presented by the Author to the British Museum. 4to. Price 8s.

It is presumed that this little Essay will prove, by a variety of curious Evidence, that Abyssinia is not the only part of Africa which has been partly civilised by an intercourse with colonists and emigrants from ancient Egypt, and that much light may be reflected on Antiquity as well as Natural History and Physical Science, by pursuing the British Discoveries in the interior of Africa, gradually and in detail.

An ENQUIRY into the BRITISH and FRENCH EXPEDITIONS to TEEMBO, with remarks on Civilisation in Africa. Price 2s.

An ESSAY on the GEOGRAPHY of NORTH WESTERN AFRICA, with a 2-sheet lithographic map, constructed by the Author from original Itineraries, and detailing the Arabic Itinerary from Ashantee to Mecca, which was mislaid at the time of the publication of the *Mission to Ashantee*. Price 10s. 6d.

“ M. Bowdich a donné à part une carte speciale du pays des Aschantis, basée sur ses propres observations, sur des itinéraires détaillés et sur la comparaison qu’il en a faite avec les cartes de d’Anville et les relations des autres voyageurs. Cette partie de son travail, ainsi que ce qu’il a donné sur les environs de Gaboon, sont des acquisitions précieuses pour la géographie. Le reste de la carte de M. Bowdich est beaucoup plus hypothétique, et se fonde sur des documents plus incertains.— Malgré tant de causes d’imperfection, la carte de M. Bowdich sera utile, parce qu’à beaucoup de sagacité l’auteur a joint une profonde étude de son sujet, et qu’elle offre des recherches, des rapprochements curieux, et des conjectures probables, présentés d’une manière claire et méthodique. Tout ce que M. Bowdich écrira sur l’intérieure de l’Afrique, sera toujours un objet d’attention pour tout homme instruit.”—*Walckenaer* (Président de l’Académie des Inscip. et des Belles Lettres) *Recherches sur l’Afrique*, p. 326, 330, 344.

The CONTRADICTIONS in PARK’S LAST JOURNAL EXPLAINED, and his Astronomical Observations in 1796 re-established, by the corrections necessitated by his having reckoned on the 31st of April. *Answers to the Proof.*

The ELEMENTS of ALGEBRA, with Historical and Explanatory Notes, and a Supplementary Volume containing calculations and notes for the aid of Students (who are out of the reach of a Tutor) in reading Le Gendre’s *Trigonometry*, Biot’s *Analytical Geometry*, La Croix’s *Calcul Differential et Integral*, and Poisson’s *Mechanics*.

During a residence of two years and a half at Paris, with the view of perfecting

himself in Mathematics and Physical Science, as necessary for the greater scientific results of a second travel in Africa, the Author has had occasion to read the greater number of the French works on the elementary parts of mathematics, and to compare them with our own. He was astonished to find that England, which has produced Harriot, Wallis, Barrow, and Newton who may be considered as the father of analysis; that England, possessing at the present moment so many illustrious men of science, does not afford elementary books enabling students to read the works of Euler, Lagrange, Laplace, Legendre, Poisson, and the later English publications, without being arrested by difficulties every moment.

He is aware that the illustrious Professors of Mathematics at our Universities, supply that in their lectures which is wanting in their books; but he recollects also, from experience, that there are a great number of students throughout the three kingdoms, and especially in our colonies, who are denied the enviable advantages of attending University lectures.

In the hope of remedying this inconvenience in some degree, that is as far as his limited means permit, the Author is induced to publish a course of Algebra, assembling and connecting the materials scattered through the works of La Croix, Bourdon, Boisbertrand, Garnier, etc. etc.

He is not so presumptuous as to believe that this Essay is the best the subject admits of, but he will feel grateful for every candid critic, sufficiently recompensed if it leads to the production of a better work on the same subject; his sole object being to offer something useful to his countrymen.



PLATE I.



1. Shell of the *Sepia rugosa*.
2. Shell of the *Calmar. Loligo sagittata*, Lam.
3. 4. *Nummulites*, with sections.
5. *Discorbite*.
6. *Miliolite cœur de Serpent*.
7. *Littorite*.
8. Transverse and longitudinal sections of a *Belemnite*.
9. 10. 11. 12. *Elemnites*.
13. *Spirolinites*.
14. Upper and under view, with a section, of the *Gyrogonites medicogula*.
15. *Simplegades colubrinus*.
16. *Turritites compressus*.
17. *Baculites vertebralis*.
18. a. *Spirula fragilis seu australis*.
b. The siphon traversing the chambers.
c. Section magnified.

19. *Baculites gigas*.
20. *Planospirites ostracinus*.
21. *Hippurites cornu-copiae*.
22. *Belemnite*.
23. *Siderolites calcitrapoides*.
24. Section of a *Belemnite*.
25. *Orthoceratite*.
26. *Hippurite* with a gutter, *c*.
27. *Hippurite* with a siphon.
28. Under view of the operculum of a *Hippurite*, shewing the two prolongations resembling a hinge.
29. *Belemnite*.
30. Section of an *Orthoceratite* with a siphon passing through the axis.
31. *Hippurite*, with a gutter, *a*. and a siphon, *b*.
32. *Lituites Breynii*, found in the marble of Oeland: the shaft or straight part extends in a length equal to the depth of the Plate, gradually enlarging towards the base.
33. *Hippurite*, the operculum pierced with two eyes.
34. 35. *Orthoceratites* with a siphon towards the edge or periphery.

PLATE II.

1. *a. b. c. d. Nautilus melo*, with sections.
2. Section of *Nautilus flammatus*, shewing the siphon.
3. Section of *Nautilus caudatus*, Lister (*N. major seu crassus*, Rumph.) shewing the siphon passing through the chambers. 1-4th.
4. *Nautilus Pompilius*.
5. *Nautilus auricula*.
6. *Scaphites Defrancii*.
6. *a. b. c. d. Scaphites æqualis*.
7. 8. Transverse and longitudinal sections of the spine of the *Echinus cidaris*.

9. *Nodosaria (Nautilus rophanus)*.
10. *Amplexus coralloides*.
11. *Orthoceratites Gothlandie*, 1-2.
12. *Molossus gracilis*.
13. *Rotalite*.
14. *Echidnis diluvianus*.
15. *Raphanister campanulatum*.
16. *Hamites gibbosus*.
17. *Lenticulite*.
18. *Hippurites organicus*.



PLATE III.

1. *Helix Lemani*, in the 2d Fresh-Water Formation.

2. *Helix Menardi*, in the limestone near Mans.

Second Fresh-Water Formation.

3. Oval grain found in the *silex* at Longjumeau.

4. Cylindrical, channelled grains, found in *opaque silex* at Longjumeau.
They have no resemblance to any genus now known.

5. 6. Small cylindrical stems, with a channel in the centre, and divided by transverse partitions.

7. A body in the form of a *date*, with sinuous channels.

8. The ear of a plant (which may be compared to certain species of *Paspalum*) found in the *silex* at Longjumeau.

9. *Argonautites levis*.
 10. *Vaginella depressa*.
 11. 12. *Orbulites*.
 13. *Cristellaria*
 14. *Ammonaceras* Lamarekii, 1-3d. s. siphon.
 15. *Ellipsolites compressus*.
 16. *Pollontes vesicularis*.
 17. *Arethusa corymbosa*.
 18. *Baculites vertebralis*. Montf.
 19. *Conularia quadrisulcata*.
 20. *teres*.
 21. *quadrisulcata*.
 22. *Telebois annulatus*.
 23. *Tiranites gigas*.



PLATE IV.

First Fresh-Water Formation.

1. *Cyclostoma mumia.*
2. *Lymnæus strigosus.*
3. . . . *longiscatus.*
4. . . . *acuminatus.*
5. *Planorbis lens.*
6. An articulated stem (with projecting papillæ), resembling the root of an *Equisetum.*

Second Fresh-Water Formation.

1. 2. *Lymnæus ovum*.
3. *Bulimus pusillus*.
4. . . . *atomus*.
5. *Cyclostoma elegans antiquum*.
6. *Potamides Lamarckii*.
7. 8. *Planorbis rotundatus*.
9. . . . *cornu*.
10. . . . *Prevostinus*.
11. *Lymnæus corneus*.
12. . . . *Fabulum*.
13. . . . *ventricosus*.
14. . . . *enflatus*.
15. *Bulimus pygmaeus*.
15. . . . *terebra*.
16. *Lymnæus palustris antiquus*.
17. *Pupa Defrancii*.
18. *Helix Ramondi*.
19. . . . *Desmarestina*.
20. . . . *Cocquii*.
21. . . . *Moroguesi*.
22. . . . *Tristani*.



PLATE V.

1. *Hyalea tricuspidata*.
2. *Cleodora pyramidalis*.
3. *Cymbulia proboscidea*.
4. *Parmaphora elongata*.
5. *Patella elongata*.
6. . . . *cornucopia*.
7. *Ancylus fluviatilis*.
8. Upper and under view of the *Calyptræa equestra*.
9. of the *Testacella haliotideæ*.
10. *Fissurella* (*Patella Græca*, List.).
11. *Emarginula clypeata*.
12. Under and side view of the *Crepidula porcellana*.
13. of the *Capulus tortus*.
14. *Vitrina pellucida*.

15. *Umbrella Indica*.
 16. *Carinaria vitrea*.
 17. *Dolabella*.
 18. *Bullea*.
 19. *Bulla aperta*.
 20. *Infundibulum echinulatum*.
 21. *Stomatia phymotis*.
 22. *Stomatella imbricata*.
 23. *Septaria* seu *Navicella* (*Patella Borbonica*).
 a. Back view.
 b. Under . .
 c. Side . .
 d. Operculum.
 24. *Halyotis vulgaris*.
 25. *Sigaretus concavus*.

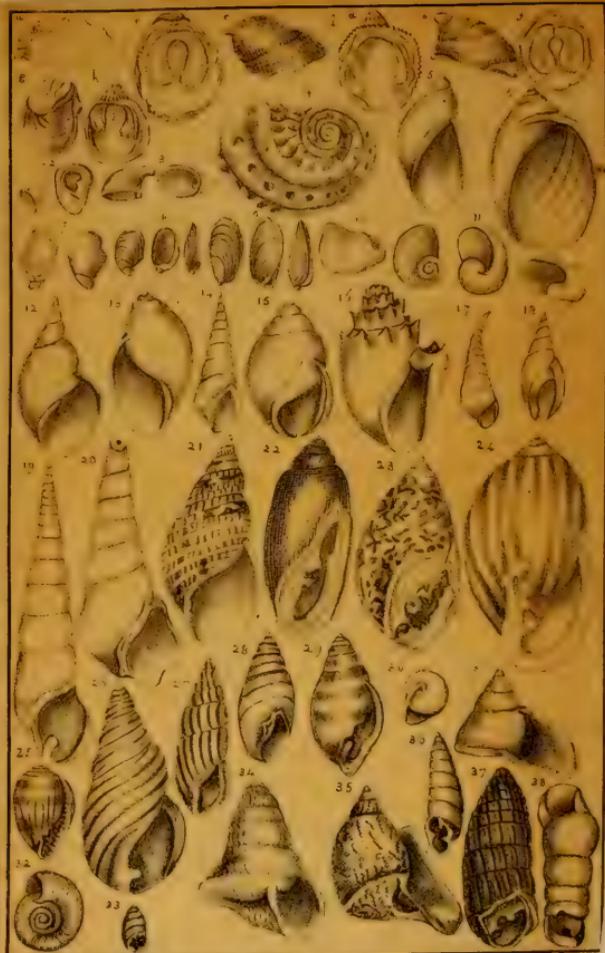
Some of the figures in this Plate are inadvertently reversed.



PLATE VI.

1. *Hipponyx cornucopiæ*, Defr.
 - a. In profile, 1-2.
 - b. Shewing the support within, 1-2.
 - c. In profile, without the support, 1-2.
 - d. Seen within.
 - e. On its support, as it was found.
 - f. The support seen within.
 - g. *Hipponyx mitrata*, Defr. a recent shell, with its support.
 - h. *Hipponyx cornucopiæ*, shewing the mouth.
- 2 *Plectrophorus costatus*, Feruss.
- 3 . . . *orbignii*, Feruss.
- 4 *Padollus scalaris*, Leach.
- 5 *Ambrette Succinea*, Drap. (*Amphibulima*, Lam.)
- 6 *Amphibulima*, Lam.
- 7 *Testacellus ambiguus*, Feruss.
- 8 . . . *haliotideus*, Feruss.
- 9 . . . *Maugei*, Feruss.
- 10 *Parmacella Olivierii*, Feruss.
- 11 *Helicarion Cuvierii*, Feruss.
- 12 *Lymnæus stagnalis*.
- 13 *Physa N. Hollandica*.

14. *Melania*.
15. *Melantho*.
16. *Melania amarula*.
17. *Melanella Dufrenoyi*.
18. *Melanopsis*.
19. *Melanamona*.
20. *Pyrene*, Lam. *Melanatria*.
21. *Phasianella picta*.
22. *Auricula Judea*.
23. *Scarabius imbricum*, Leach.
24. *Carychium undulatum*, Leach.
25. *Conovula coniformis*.
26. *Achatina Virginiana*.
27. *Bulimus radiatus*.
28. *Bulimulus trifasciatus*.
29. *Tornatella fasciata*.
30. *Helicina neritella*.
31. *Bulimus auris-leporis* (moust.).
32. *Planorbis*.
33. *Bulimus ovularis*.
34. *Pupa modiolinus*.
35. *Bulimus auris-leporis*.
36. *Clausilia*.
37. *Pupa*.
38. *Bulimus decollatus*.



J. Bowdich Lithog.

PLATE VII.

1. *Helico-Limax elongata*, Feruss.
2. *Helix brevipes*, Drap.
3. 4. *Cornu giganteum*, Chemm. in the young and in the adult state; one of the smaller figures represents the egg entire, and the other the animal in its shell coming out of the egg: 1-2 the natural size.
5. *Bulimus patulus*, Brug. (*Amphibulima cucullata*, Lam.)
6. in the young state.
7. *Helix naticoides*, Drap.
8. . . *Listeri*, Feruss.
9. . . *ligata*, Muller.
10. . . *deformis*, Feruss.

11. *Helix aspersa*, Muller.
 12. 13. 14. (monstrosities).
 15. Pouchet Adans (*Turbo variegatus*, List.)
 16. *Helix alonensis*, Feruss.
 17. *Helix plicata*, Lin.
 18. . . . *aspersa*, List.
 19. . . . *carabinata*, Feruss.
 20. . . . *ringens* (*Tomigeres ringens*, Leach. *Anostoma*, Lam.).
 21. . . . *imperator* (*Polydotes imperator*, Montf.).
 22. . . . *carocolla*, Chemn. (*Carocolla*, Lam.)
 23. . . . *sorora*, Feruss.

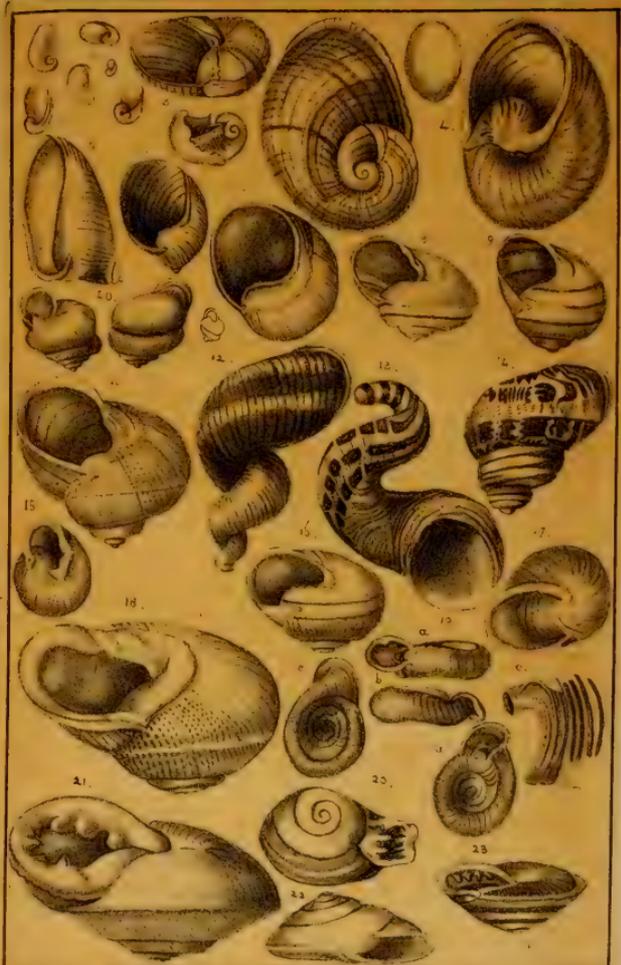


PLATE VIII.

1. 2. *Helix pyrostoma*, Feruss.
3. . . *Madagascariensis*, Lam.
4. *Helicella lævipēs*, Feruss. *Helix spadicea*, Gmel.
5. *Helix sub-dentata*, Feruss.
6. . . *albella*, Chemn. side view.
7. . . *planata*, Chemn.
8. *Helicella sepulcralis*, Feruss.
9. *Helix ochroleuca*, Feruss. *Helix albella*, Chemn.
10. . . *epistylum*, Gmel.
11. . . *strobilus*, Feruss.
12. . . *nitida*, Drap.
13. *Cyclostoma bulimoides*, Oliv.
14. *Melania buccinoidea*.
15. *Cyclostoma unicolor*, Oliv.
16. *Bulimus labrosus*, Oliv.
17. *Melania costata*, Oliv.
18. *Helix villosa*, Drap.

19. *Bulimus acicula*, Drap.
 20. *Buccinum majus*, List. (*Kambeul*, Adanson.)
 21. *Bulimus Dufresnii*, Leach.
 22. *Bulla helicoides*, Brocchi.
 23. *Bulimus montanus*, Drap.
 24. *Pupa quadridentata*, Drap.
 25. . . *granum*, Drap.
 26. *Helix regina*, Feruss. *Achatina*, Lam.
 27. . . *frater*, Feruss.
 28. *Cyclostoma Odostomia*. (*Auris Midæ*, etc. Chemn.)
 29. *Pupa fragilis*, Drap.
 30. *Partula australis*, Feruss. (*Auris Midæ fasciata*, etc. Chemn.)
 31. *Cochlodina Blainvilliana*, Feruss. (*Cyclostoma*, Lam.)
 32. *Pupa modiolus*.
 33. *Clausilia plicata*, Drap.
 34. *Pupa edentula*, Drap.
 35. . . *vertigo*, Drap.
 36. . . *antivertigo*, Drap.

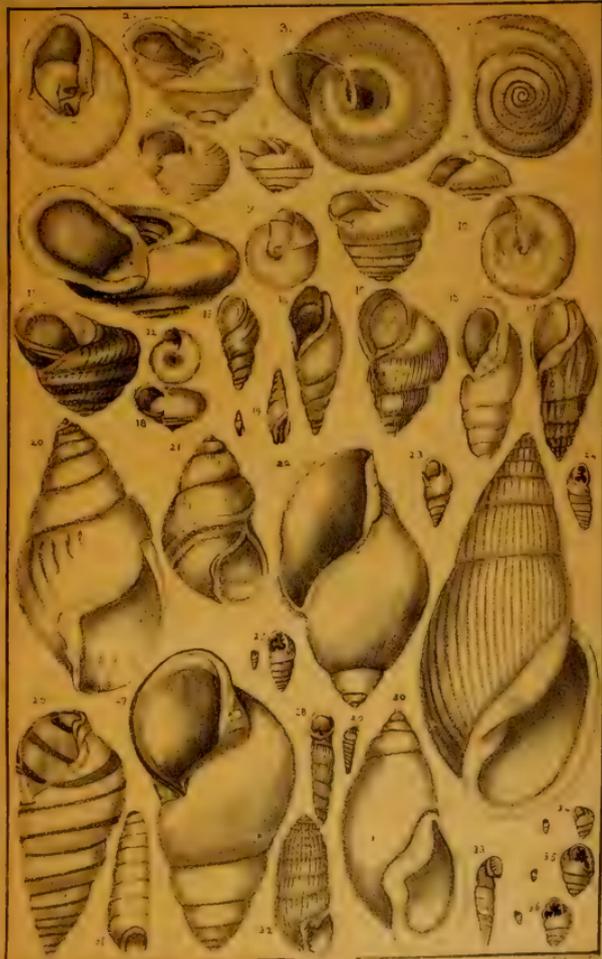
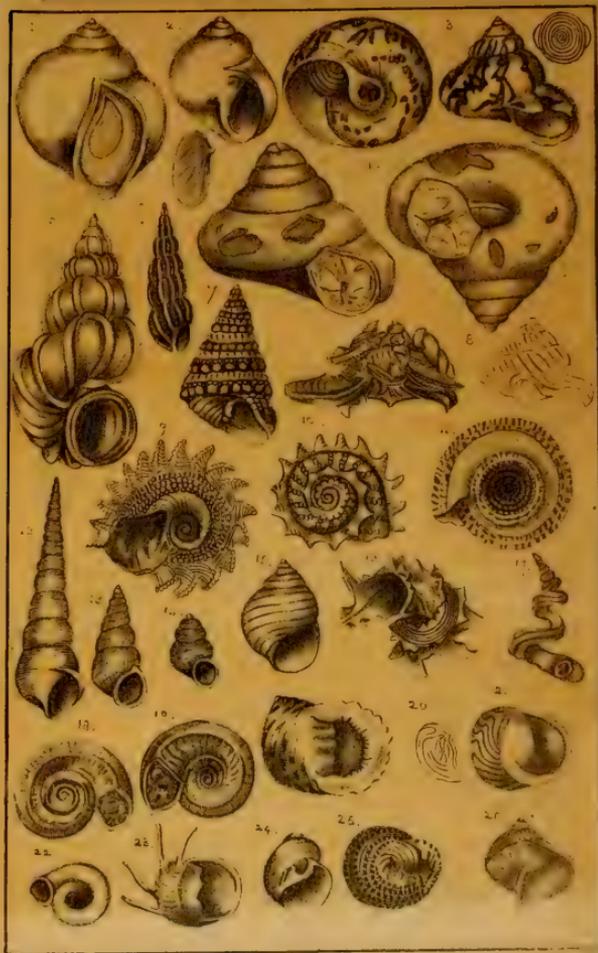


PLATE IX.

1. *Ampullaria*.
2. *Ampullina*.
3. *Turbo picta*, with its operculum.
4. *Cirrus acutus*, Sowerby.
5. *Aciona scalaria* (*Wendletrap*), Leach.
6. *Scalaria clatrata*.
7. *Trochus crenularis*.
8. . . *agglutinans*, with and without the adhering substances.
9. . . *imperator* (*Imperator coronatus*, Montf.)
10. . . *calcar*.
11. *Solarium perspectivum*.
12. *Turritella*.

13. *Cyclostoma mumia*.
14. . . . *elegans*.
15. *Paludina fasciata* (*Helix vivipara*, Lin.)
16. *Delphinula*.
17. *Vermetus*, Adans.
18. *Euomphalus pentangulatus*, } Sowerby.
19. . . . *catillus*, }
20. *Nerita Malaccensis*, and its operculum.
21. *Neritina zebra*.
22. *Valvata spirorbis*, Drap.
23. *Clithon coronata*.
24. *Natica*.
25. *Monodonta*.
26. *Ianthina fragilis*.



S. Smith Lithog.

PLATE X.

1. *Murex lampas*.
2. . . . *Tritonia*.
3. . . . *Brandaris*.
4. *Tritonia Atlantica*, Montf.
5. *Murex frondescens*.
6. *Ranella Buffonia*.
7. *Fusus*.
8. *Pyrula melongena*.
9. *Eburna areolata*.
10. *Ancillaria cinamomea*.
11. *Mitra*.

12. *Pyramidella dolabrata*.
13. *Pleurotoma tigrina*.
14. *Fasciolaria tulipa*.
15. *Turbinella scolyma*.
16. *Rostellaria subulata*.
17. *Concholepas Peruviana*.
18. *Potamides Lamarkii*.
19. *Cerithium*.
20. *Terebra lanceolata*.
21. *Buccinum undatum*.
22. *Dolium variegatum*.
23. *Nassa Thersita*.



PLATE XI.

1. *Harpa mutica*.
2. *Purpura patula*.
3. *Monoceros*.
4. *Ricinula horrida*.
5. *Cassidaria echinophora*.
6. *Cancellaria reticulata*.
7. *Cypræa moneta*.
8. *Ovula gibbosa*.
9. a. *Cypræa* in the infant state.
 b. middle ..
 c. adult ..
10. *Ovula oviformis*.

11. *Cassis glauca*.
12. . . *harpæformis*.
13. *Oliva litterata*.
14. *Terebellum punctatum*.
15. *Strombus pugilis*.
16. *Pterocera lambis*.
17. *Colombella hilaris*.
18. *Folvaria monilis*.
19. *Marginella bimarginata*.
20. . . *sub-cerulea*.
21. *Conus nocturnus*.
22. . . *betulinus*.

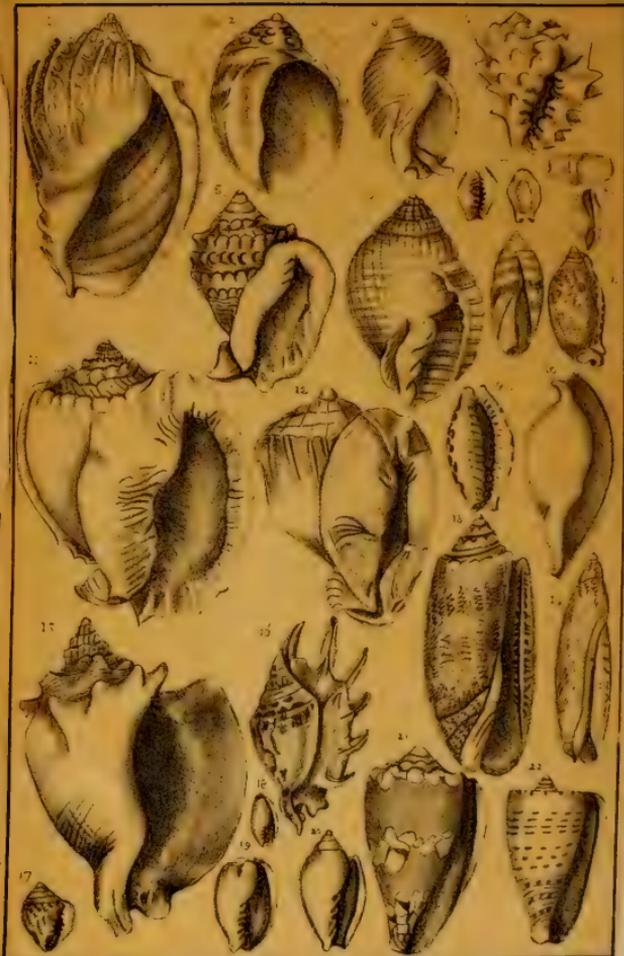


PLATE XII.

1. *Conelix lineatus*, Swainson.
2. *Voluta rugifera* seu *musica*.
3. . . . *volvacea*.
4. . . . *vespertilio*.
5. . . . *olla*.
6. *Helicina neritella*.
7. *Murex tubifer*.
8. *Bulinus zebra*, Oliv.
9. *Struthiolaria Lamarckii*.

10. *Helix crenelata*, Oliv.
 11. *Polyphemus Bruguireus*.
 12. *Ampullaria* (found in bituminous marl above a mine of fossil coal).
 13. compressed laterally; giving it an accidental, elongated form.
 14. vertically; changing the form of the mouth, and giving it the appearance of another species.
 15. *Turbo lugubris*, Chemn.
 16. Section of a *Pyramidella*, to shew the columella.
 17. *Turritella*. (au jour).
 18. *Cyclostoma bulimoides*, Oliv.



PLATE XIII.

1. *Helix unidentata*, Chemn.
2. *Cerithium gigas*, 1-4th.
3. *Achatina fulica*, Lam.
4. *Argonauta. tuberculata*
5. *Aplysia*.
6. *Dolabella*.
7. Interior mould of a *Cerithium gigas*, 1-4th.
8. *Clavatula scabra*.
9. *Cyclostoma carinata*, Oliv.
10. *Melania marginata*.
11. *Helix conoïdea*, Drap.
12. *Pupa avena*, Drap.
13. *Melania cochlearella*.
14. . . . *costellata*.
15. *Bulimus terebraster*.
16. *Buccinum Barbadense*, Lister.
 - h. The head.
 - tt. .. tentacula.
 - m. .. mouth.
 - T. .. trunk.
 - ee. .. eyes.
 - f. .. foot.
 - o. .. operculum.

17. *Cerithium*. (*Buccinum Africanum*, Lister.)

- h.* The head.
- tt.* .. tentacula.
- m.* .. mouth.
- ee.* .. eyes.
- T.* .. trunk.
- f.* .. foot.
- o.* .. operculum.

18. *Limax phosphorescens*, 1-2.

19. 20. *Yetus*, Adans. (*Buccinum Persicum*, Lister.)

- h.* The head.
- tt.* .. tentacula.
- m.* .. mouth.
- ee.* .. eyes.
- T.* .. trunk.
- k.* .. extremity of the mantle, forming a sort of pipe.
- nn.* .. membrane accompanying the mantle.
- f.* A part of its enormous foot.

21. *Halyotis*.

- h.* The head.
- tt.* .. four tentacula.
- ee.* .. eyes.
- n.* .. membrane which attaches the lower tentacula to the head.
- l.* .. two anterior extremities of the mantle, coming out of the second hole of the shell.



PLATE XIV.

1. The hearts of the *Calmar*.

<p><i>a.</i> The hollow vein. <i>bb.</i> .. lateral hearts. <i>cc.</i> .. pulmonary arteries.</p>	<p><i>dd.</i> The place of the branchiæ. <i>ee.</i> .. pulmonary veins. <i>f.</i> .. middle heart. <i>gg.</i> .. aorta.</p>
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2. The heart of the *Aplysia*.

<p><i>a.</i> The hollow vein. <i>d.</i> .. branchiæ.</p>	<p><i>e.</i> The auricle and pulmonary vein. <i>f.</i> .. heart. <i>g.</i> .. arteries.</p>
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3. *Spirula fragilis* with its shell.
4. *Tapada putris*, with its shell.
5. The under side of a *Patella*, the head bent towards the foot.

<p><i>a.</i> The foot. <i>b.</i> .. mouth. <i>cc.</i> .. tentacula. <i>d.</i> .. anus and orifice of generation.</p>	<p><i>e.</i> The pericardium. <i>f.</i> .. trunk of the branchial vein. <i>ggg.</i> .. circular part of the above vein. <i>hh.</i> .. branchiæ. <i>ii.</i> .. branchial artery.</p>
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6. A *Patella* of the species in which the branchiæ are interrupted.

<p><i>a.</i> The mouth. <i>bb.</i> .. tentacula. <i>c.</i> .. fleshy mass. <i>d.</i> .. nervous collar. <i>f.</i> .. ovarium.</p>	<p><i>gg.</i> The intestines. <i>h.</i> .. branchiæ. <i>ii.</i> .. branchial veins. <i>qq.</i> .. oviductus.</p>
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7. *Helix brevipes*, with its shell.
8. *Hyalea australis*, with its shell seen on the side of the projecting valve.

a. b. c. The projecting points of the flat or ventral valve.
d. The dorsal valve.
ff. .. mantle coming out from the interstice between the valves, close to which are the branchiæ.
l. m. .. fins.
n. .. mouth.

9. *Parmacella Olivieri*, Cuv. opened.

<p><i>a.</i> The mouth. <i>bb.</i> .. great horns. <i>c.</i> .. brain. <i>d.</i> .. salivary glands. <i>e. ff.</i> .. organs of generation. <i>g.</i> .. bag for the colouring liquid. <i>h.</i> .. stomach.</p>	<p><i>ii.</i> The retracting muscles. <i>kk.</i> .. liver. <i>l.</i> .. lungs. <i>m.</i> .. auricle. <i>n.</i> .. heart. <i>o.</i> .. intestine. <i>z.</i> .. mantle turned back.</p>
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10. *Calmar (Sepia Loligo)*.

<p><i>a.</i> The head. <i>b.</i> .. eyes. <i>c.</i> .. feet. <i>d.</i> .. arms.</p>	<p><i>e.</i> The funnel. <i>f.</i> .. abdomen. <i>g.</i> .. fins.</p>
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11. Brain of the *Polypus*;
 a. The ring round the œso- phagus.
 b. .. brain.
 c. .. optical ganglions.
 dd. The lateral ganglions.
 e. .. abdominal plexus.
- 11.* Brain of the *Aplysia*.
 a. The ring round the œsophagus.
 b. .. brain.
 c. .. abdominal ganglion.
12. The animal and shell of the *Helico-Limax elongata*.
13. *Janthina penicephala*, with its vesicular appendage (*spuma cartilaginea*) attached to the posterior part of the foot.
14. *Aplysia*.
 a. The head.
 b. .. inferior tentacula.
 c. .. superior ..
 d. .. eyes.
 e. .. mantle.
 f. .. operculum of the branchiæ.
15. The female *Sigaretus* seen underneath: the head and foot a little bent, to shew the entrance of the branchial cavity.
 a. The notch. | b. The anus.
16. The male *Sigaretus* seen underneath.
 a. The notch. | d. The anterior part of the foot cleft
 bb. .. tentacula. | transversely.
 cc. .. foot. | e. .. organs of generation
 ff. .. edges of the mantle.
17. *Cavaria Mediterranea*.
18. *Plectophorus* with its shell.
19. The female *Vivipara* taken out of its shell.
 a. The foot partly folded in two.
 b. .. operculum attached to the posterior part.
 c. .. head with the tentacula and trunk.
 d. .. little siphon prolonged under the right tentaculum.
 e. .. lateral membrane of the left side.
 f. .. edge of the mantle.
 g. A small portion of the branchiæ shewing itself from underneath.
 h. The orifice of the womb and anus.
20. *Halyotis*, drawn from the living animal, with all its ornaments.

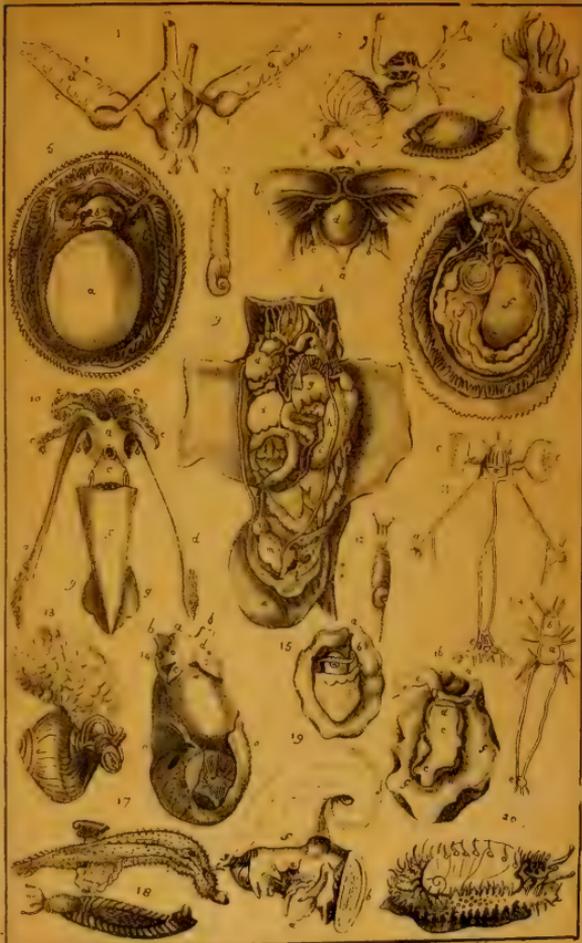


PLATE XV.

1. The *Argonauta argo* sailing.
2. *Ocythoë Cranchii*, Leach, sitting within the shell.
3. *Clio Borealis*.
 - a. The body.
 - b. .. viscera seen through the common coverings.
 - cc. .. tubercles of the head, and the holes into which the three tentacula on each side retire.
 - dd. .. branchiæ and fins.
4. *Pneumodermon*, front view.

a. The body.	e. The chin or pointed fleshy appendage. ff. .. fins. g. .. branchiæ. h. .. trunk of the branchial vein.
b. .. head.	
c. .. mouth.	
dd. .. lips.	
5. *Pneumodermon*, with the skin divided to shew the position of the pericardium and fleshy tunic.
 - i. The auricle.
 - k. .. pericardium.
 - ll. .. fleshy tunic with its longitudinal fibres.
6. The *Eolis*, placed obliquely, shewing the belly and right side.
7. *Scyllæa pelagica*, on the right side.
 - HH. The under surface of the foot hollowed into a deep furrow, by which it suspends itself.
 - G. .. mouth.
 - AA. .. two tentacula.
 - BC. Two pair of membranous flexible wings.

These and the back bear the branchiæ in the form of little fibrous tufts.

 - D. A crest on the tail.
 - E. The orifice of generation.
 - F. .. orifice of the anus.

8. *Scyllaea pelagica* seen on the side of the belly.
9. *Scyllaea pelagica* suspended to a branch of the *Fucus natans*.
10. *Phyllidia trilineata* seen on the upper side.
 aa. The indentations for the upper tentacula.
 b. of the anus.
11. An upper tentaculum magnified.
12. *Phyllidia trilineata* seen underneath.
 aa. The inferior tentacula, between which is the mouth.
 b. .. branchia of the left side.
 c. .. orifice of generation.
13. A *Limax* seen on the right side, the tentacula half developed.
 aa. The great tentacula.
 bb. .. smaller ..
 c. .. mouth, between which and the small tentacula are seen the papilla of the upper lip.
 dd. .. foot
 e. .. posterior point of the back, whence issues the mucosity by which it suspends itself.
 f. .. mantle.
 g. .. orifice for respiration.
 h. generation.



PLATE XVI.

1. *Bulla aperta* entire, seen on the back.
 - a. The fleshy plate which covers the front of the body, or the tentacular disk
 - c. .. part containing the shell.
2. *Bulla aperta* on the right side, with the ventral fleshy plate separated from the dorsal, to shew what is between them.

<ol style="list-style-type: none"> a. The tentacular disk. b. .. plate serving as a foot. 	<ol style="list-style-type: none"> e. The anus. f. .. common orifice of the male organ and oviductus.
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3. *Bulla aperta*, seen underneath.
 - b. The plate serving as a foot.
 - c. .. part containing the shell.
 - d. A part of the branchiæ.
4. *Bulla aperta*, partly dissected.

<ol style="list-style-type: none"> a. The stomach. b. .. œsophagus. d. .. branchiæ. 	<ol style="list-style-type: none"> e. The heart. f. .. liver. g. .. intestine. h. .. testicle.
--	--
5. The tongue of the *Bulla aperta* greatly magnified.
6. *Helix pomatia*, taken from its shell, and seen on the left side: a large portion of the covering of the pulmonary cavity has been taken away to shew its position; also the teguments of the remainder of the spire, to shew the situation of the heart, the bag of viscous matter, etc.

<ol style="list-style-type: none"> a. The large right tentaculum half developed. b. .. hole whence the left tentaculum issues. c. .. hole for the small tentaculum of the same side. dd. .. two lobes of the veil or upper lip. eee. .. edges of the foot. ff. Two of the lobes placed under the collar. gg. The pad of the collar. hh. .. place where the covering of the pulmonary cavity has been cut away. i. .. rectum. 	<ol style="list-style-type: none"> k. The hole for respiration seen within the pulmonary cavity. l. .. diaphragm. mn. .. heart and auricle in their proper place in the open pericardium. o. .. commencement of the great artery of the spire. p. .. bag of viscous matter. q. .. first part of the intestine. r. .. second part. ss. .. lobes of the liver.
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7. *Capulus*, Mont. (*Patella Hungarica*, Lin.) detached from its shell, and seen on one side.
- | | |
|---|--|
| a. The foot. | d. The trunk. |
| b. A sort of ruff which this foot has in front. | ee. .. tentacula. |
| c. The muscle which attaches the foot to the shell. | f. .. liver and a part of the viscera, which occupy the bottom of the shell. |
8. *Onchidium*, under view.
9. *Parmacella*, seen on the back: the shell has been taken away, and only its impression remains.
10. The horned *Planorbis*, with its shell.
11. The animal of the *Cypræa*.
12. *Conus*.
13. *Emarginula* entire.
14. Nervous system of the *Fissurella*.
15. Animal of the *Crepidula*, detached from its shell, seen above; the abdomen and branchial cavity in their natural position.
16. Shell of the *Crepidula* seen underneath.
- a. Plate which retains the point of the abdomen.
17. Animal of the *Crepidula*, detached from its shell, and the upper partition of its branchial cavity turned back to shew the branchiæ.
18. *Testacellus hatyotideus*, animal and shell.



... ..

PLATE XVII.

1. *Scalaria*.

2. The female *Vivipara* taken out of its shell, and the branchial cavity opened.

- | | |
|---|--|
| <p><i>a.</i> The foot folded in two.</p> <p><i>b.</i> .. operculum attached to its posterior part.</p> <p><i>c.</i> .. head, with the tentacula and trunk.</p> <p><i>d.</i> .. little siphon prolonged under the right tentaculum.</p> <p><i>e.</i> .. lateral membrane of the left side.</p> <p><i>f.</i> .. edge of the mantle.</p> <p><i>g.</i> .. branchiæ.</p> <p><i>h.</i> .. womb swelled by the fœtus within.</p> | <p><i>h.</i> The orifice of the womb.</p> <p><i>h.</i> .. part situated under the spire.</p> <p><i>i.</i> .. anus.</p> <p><i>l.</i> .. canal of viscous matter.</p> <p><i>m.</i> .. projecting line, forming a semi-canal, which terminates at the siphon <i>d.</i></p> <p><i>n.</i> .. heart and its auricle.</p> <p><i>o.</i> .. parts of the liver and intestine.</p> |
|---|--|

3. *Trochus*. (*Cochlea sublivida*, Lis.)

- | | |
|---|--|
| <p><i>h.</i> The head.</p> <p><i>tt.</i> .. tentacula.</p> <p><i>ee.</i> .. eyes.</p> | <p><i>p.</i> The languette.</p> <p><i>P.</i> .. foot.</p> <p><i>o.</i> .. operculum.</p> |
|---|--|

4. Do. seen underneath.

- | | |
|----------------------------|-----------------------------|
| <p><i>f.</i> The foot.</p> | <p><i>m.</i> The mouth.</p> |
|----------------------------|-----------------------------|

5. Animal of the *Trochus pharonius*, taken out of its shell, with its operculum.

6. 7. . . . *Turbo littoreus*.

8. 9. 10. . . . *Turbo chrysostomus*.

11. . . . *Nerita canrena*, taken out of its shell.

12. . . . *Nerita exuvia*, with its operculum.

13. . . . *Trochus*, Gualt.

13. *Trochus levis*, List.

h. The head.

ee. .. eyes.

tt. .. tentacula.

p. .. male organ.

P. The foot.

f. .. filaments.

o. .. operculum.

14. *Purpura*.

h. The head.

ee. .. eyes.

tt. .. tentacula.

T. The trunk.

p. .. foot.

o. .. operculum.

15. *Buccinum undatum*, half the natural size, seen on the left side; the trunk drawn in, and the male organ turned back, and hidden in the branchial cavity.

a. The male organ.

c. .. siphon.

dd. .. position of the branchia.

e. The position of the heart,

f. .. mucous plates placed to the right of the branchia.

16. *Buccinum undatum*, with the trunk and male organ extended.

a. The male organ.

b. .. trunk.

c. .. siphon.

17. *Natica* .. *Fossor*, Adan. magnified.

h. The head.

ee. .. eyes.

ll. .. fleshy appendages at the base of each tentaculum.

tt. The tentacula.

o. .. operculum.

18. *Natica* ..

m. The mouth

f. .. foot.



1. *Voluta Ethiopica*, 1-2.
2. *Voluta*.
3. *Cerithium*.
4. *Aquila*.
2. *Fusus*.
6. *Murex decussatus*.
7. *Cassis glaucus*.

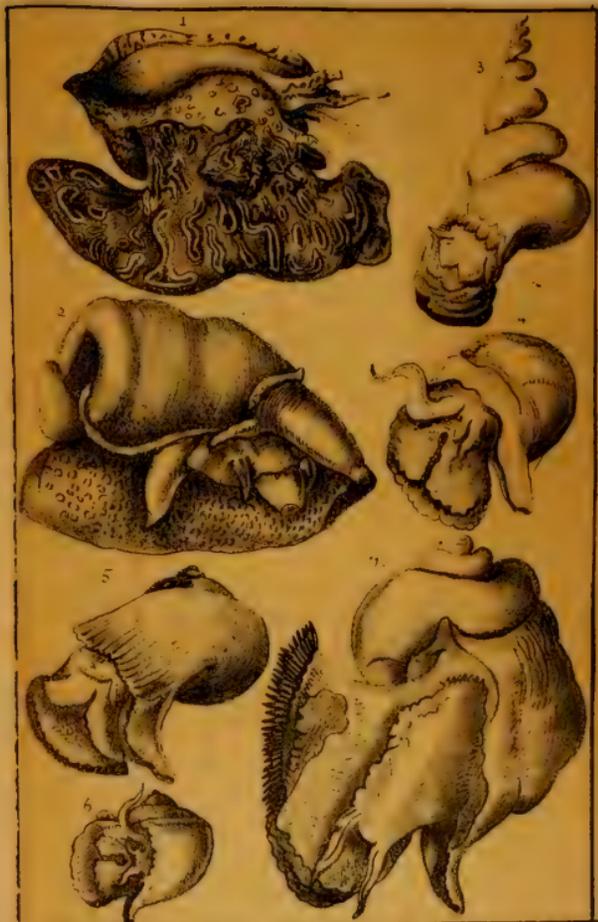


PLATE XIX.

1. *Strombus pugilis*.

2. *Murex saxatilis*.

3. *Halyotis vulgaris*, its shell taken away, seen on the back, and the edges of the branchial cavity put asunder.

A. The large muscle which attaches the animal to the shell.

a. The anus.

bb. .. branchiæ.

c. The viscous organ.

d. .. heart in its pericardium.

4. *Halyotis, etc.* the pericardium and branchial cavity opened.

A. The large muscles above.

a. .. anus.

bb. .. branchiæ.

c. .. viscous organ.

d. The heart.

e. .. right auricle.

f. .. left auricle.

g. .. heart surrounding the rectum.

ii. .. branchial arteries.

5. The heart and large vessels magnified.

a. i. As the preceding figure.

h. The right branchial vein.

6. *Fissurella* entire, covered with its shell, which is set in the edges of its mantle.

7. .. open.

a. The disk of the foot.

bb. .. circular muscle which joins it to the shell, and which has been cut.

b. A portion of this muscle remaining with the mantle.

cc. The mantle thrown back, and seen on the under side.

d. .. hole with which it is pierced.

ee. .. branchie.

f. .. anus.

g. The heart.

hh. .. auricles.

ii. .. intestine.

k. .. oesophagus.

l. .. pharynx.

nm. .. salivary glands.

nn. .. lateral ganglions of the brain.

o. .. extremity of the tongue.

pp. .. liver.

q. .. ovarium.

8. *Vermetus*, Adanson.

c. The tentacula.

Y. .. eyes.

P. .. foot.

F. Cylindrical filaments.

o. Operculum.

M. Mantle.

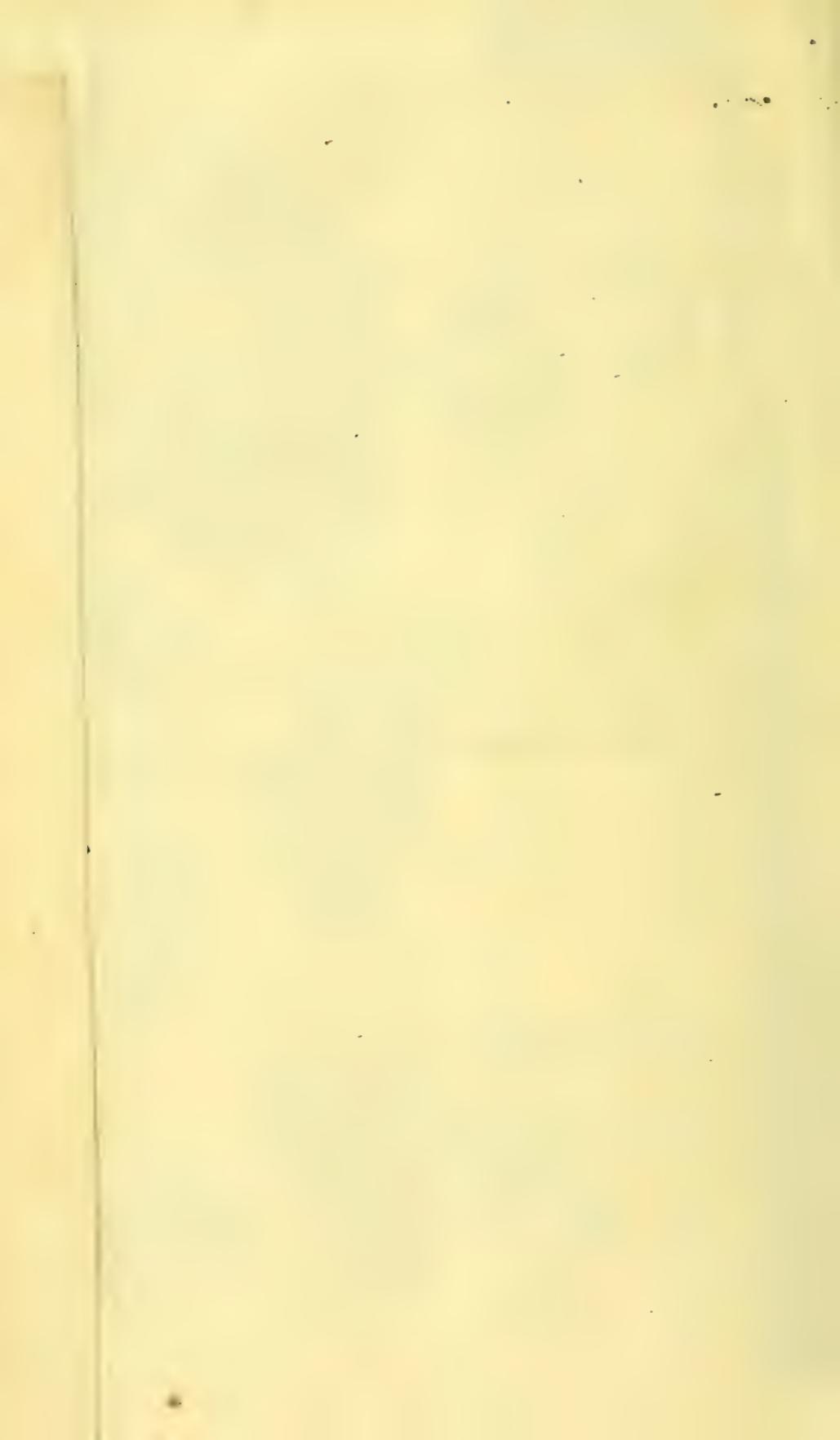
A. Aperture by which the animal breathes.

9. The same animal seen underneath.

p. The foot put on one side, to make it more apparent.

B. The mouth.











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