B. Corbould del.

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Conchology.

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COMPILED, DIGESTED, AND ARRANGED,

BY JOHN WILKES, OF MILLAND HOUSE, IN THE COUNTY OF SUSSEX, ESQUIRE;

ASSISTED BY EMINENT SCHOLARS OF THE ENGLISH, SCOTCH, AND IRISH, UNIVERSITIES.

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1810

*Non audiendi sunt homines imperiti, qui humano ingenio majorem, vel inutilem, et rebus gerendis adverſam* πολυμαθειαν *criminantur. Eſt ſcilicet quædam Scientiarum cognatio et conciliatio; unde et* Εγκυκλοπαιδειαν *vocant Græci; ut in unâ perfectus dici nequeat, qui cæteras non attigerit.*—Morhofi Polyhistor, l. i. c. i. s. i.

Those inexperienced perſons, who make it a charge of accuſation againſt variety and extenſive learning, that it exceeds the compaſs of human ability, or is uſeleſs, or that it is an impediment to tranſacting buſineſs, deſerve no attention. For there is between the Sciences a degree of natural and cloſe connexion; from which the Greeks uſe the term "Encyclopædia;" so that no one can be perfect in any one Science, who has not attained to ſome knowledge of the reſt.

# DESCRIPTION OF THE FRONTISPIECE ILLUSTRATING CONCHOLOGY.

NEPTUNE, AS THE SOVEREIGN OF THE OCEAN, APPROACHING THE LAND IN HIS CHARIOT, CONSTRUCTED OF A CHAMA SHELL, DRAWN BY SEA-HORSES; ATTENDED BY MERMAIDS EMPLOYED IN BRINGING UP SHELLS FROM THE BOTTOM OF THE SEA. IN FRONT A MERMAN, BLOWING THE CONCH TRUMPET, FAMED, IN THE ANCIENT HINDOO CEREMONIALS, FOR DRIVING AWAY EVIL DEMONS, AND ASSEMBLING THEIR PROTECTING GENII; AS WELL AS FOR SOUNDING THE CALL TO ARMS, AND THE TRIUMPH OF VICTORY. IT IS THE MUREX TRITONIS OF LINNÆUS. ON THE SHORE, TWO OF THE NEREIDES, ATTENDANTS ON NEPTUNE, IN THEIR CLASSICAL CHARACTER. DELINEATED WITH SILVERY WHITE VESTMENTS, AND HEADS BOUND ROUND WITH FUCI, OR SEA-WEED; SHELTERED IN A GROTTO, BENEATH IMPENDING ROCKS, AND BUSIED IN ASSORTING BEADS AND FESTOONS FROM THE MINUTER SHELLS. IN THE FORE-GROUND, A GROUP OF SELECTED SHELLS, EMBLEMATICAL OF THE CHOICE ARRANGEMENT REQUIRED TO FORM A CABINET OF CONCHOLOGY.

direction, having numerous bays on the weſt ſide, on which are two ſettlements, Carboniere and Havre de Grace. Settlements were made here in 1610, by about forty planters, under governor John Guy, to whom king James had granted a patent of incorporation.

CONCEP'TION, by the Indians called *Penco*, a city in Chili, South America, belonging to the Spaniards, ſituated on the edge of the ſea, at the mouth of a river, and at the bottom of a bay of its own name. It was ſeveral times deſtroyed by the powerful confederacy of the Indians, and as often repaired. In 1751 it was deſtroyed by an earthquake, or rather ſwallowed up by the ſea, and ſince that rebuilt, at three leagues diſtance from the old city. It is within the audience and juriſdiction of St. Jago, and is governed by a correſſidor. The Spaniſh inhabitants here, are the moſt warlike and hardy of any in South America; they are all trained to arms from their childhood, to be ready to reſiſt the attacks of the Chileſe Indians, whom, according to Perouze, who viſited Chili in 1786, they have reaſon to conſider as a formidable enemy. The native inhabitants, and even the women, excel in horſemanſhip; they are very dextrous in managing the lance or nooſe; and it is very rare to ſee them miſs their aim, though at full ſpeed, with the nooſe, which they throw forty or fifty yards, and ſo halter the object of their diverſion or revenge. This nooſe is made of thongs of cow hide; theſe they twiſt with oil, till rendered ſupple and pliant to command; and ſo ſtrong that, when twiſted, they will, it is ſaid, hold a wild bull, which would break a halter of hemp of twice the thickneſs. The ſoil here is fruitful, abounding with corn and excellent wine. The fruit trees bear ſo luxuriantly here, that they are forced to thin the fruit, otherwiſe the branches would break, nor could the fruit come to maturity. This city has a church, and ſix very famous monaſteries; but the dwelling houſes make no great appearance. Here the women go out in the night to the ſhops, to buy ſuch neceſſaries as they want for their families, it being contrary to the cuſtom of this country for women of any character to go abroad in the day-time on ſuch affairs. It is an open town; and the few batteries it has, are kept in very indifferent order. Lat. 36. 35. S. lon. 55. 10. W. Ferro.

CONCEP'TION, a river of America, on the iſthmus of Darien, which runs into the Spaniſh main. Lat. 9. 4. N. lon. 78. 15. W. Greenwich.

CONCEP'TION, or CONCEPTION DE LOS PAMPAS, a town of South America, in Paraguay, on the ſouth ſide of the river Plata. Lat. 36. 30. S. lon. 39. 25. W. Ferro.

CONCEP'TION (La), a ſeaport town of America, in the province of Veragua, on the Spaniſh main, with a harbour, formed by the river Veragua: ninety miles weſt of Panama. Lat. 8. 52. N. lon. 64. 5. W. Ferro.

CONCEP'TION OF SALAYE, a ſmall town of North America, in the province of Mechoacan, in Mexico, built by the Spaniards, as well as the ſtations of St. Michael and St. Philip, to ſecure the road from Mechoacan to the ſilver mines of Zacatea. They have alſo given this name to ſeveral towns of America; as to that in Hiſpaniola iſland, and to a ſeaport of California, &c.

CONCEP'TION DE LA VEGA (La), a town of the iſland of St. Domingo.

CONCEP'TIOUS, *adj.* [*conceptum*, Lat.] Apt to conceive; fruitful; pregnant:

Common mother,
Enfear thy fertile and *conceptious* womb;
Let it no more bring out to ingrateful man. *Shakeſpeare.*

CONCEP'TIVE, *adj.* [*conceptum*, Lat.] Capable to conceive.—In hot climates, and where the uterine parts exceed in heat, by the coldneſs of this ſimple they may be reduced into a *conceptive* conſtitution. *Brown.*

*To* CONCE'RN, *v. a.* [*concerner*, Fr. *concerno*, low Lat.] To relate to; to belong to.—This place *concerns* not at all the dominion of one brother over the other. *Locke.*



Gracious things
Thou haſt reveal'd; thoſe chiefly which *concern*
Juſt Abraham, and his ſeed. *Milton.*

To affect with ſome paſſion; to touch nearly; to be of importance to.—Our wars with France have affected us in our moſt tender intereſts, and *concerned* us more than thoſe with any other nation. *Addiſon.*

I would not
The cauſe were known to them it moſt *concerns*. *Shakeſ.*

To intereſt; to engage by intereſt.—Providence, where it loves a nation, *concerns* itſelf to own and aſſert the intereſt of religion, by blaſting the ſpoilers of religious perſons and places. *South.*

Above the reſt two goddeſſes appear,
*Concern'd* for each; here Venus, Juno there. *Dryden.*

To diſturb; to make uneaſy.—In one compreſſing engine I ſhut a ſparrow, without forcing any air in; and in an hour the bird began to pant, and be *concerned*, and in leſs than an hour and a half to be ſick. *Denham.*—*To concern himſelf.* To intermeddle; to be buſy.—Being a layman, I ought not to have *concerned myſelf* with ſpeculations which belong to the profeſſion. *Dryden.*

CONCE'RN, *ſ.* Buſineſs; affair: conſidered as relating to ſome.—Religion is no trifling *concern*, to be performed in any careleſs and ſuperficial manner. *Rogers.*

Let early care thy main *concerns* ſecure,
Things of leſs moment may delays endure. *Denham.*

Intereſt; engagement.—When we ſpeak of the conflagration of the world, theſe have no *concern* in the queſtion. *Burnet.*

No plots th' alarm to his retirements give;
'Tis all mankind's *concern* that he ſhould live. *Dryden.*

Importance; moment.—The mind is ſtunned and dazzled amidſt that variety of objects: ſhe cannot apply herſelf to thoſe things which are of the utmoſt *concern* to her. *Addiſon.*

Myſterious ſecrets of a high *concern*,
And weighty truths, ſolid convincing ſenſe.
Explain'd by unaffected eloquence. *Roſcommon.*

Paſſion; affection; regard.—Why all this *concern* for the poor? Where the plough has no work, one family can do the buſineſs of fifty. *Swift.*

Ah, what *concerns* did both your ſouls divide!
Your honour gave us what your love deny'd. *Dryden.*

CONCERNANCY, *ſ.* [a word coined by *Shakeſpeare*, and put into Hamlet's mouth when ridiculing affected phraſeology.] Concernment.—The *concernancy*, ſir? *Shakſ.*

CONCERN'EDLY, *adv* With affection; with intereſt.—They had more poſitively and *concernedly* wedded his cauſe, than they were before underſtood to have done. *Clarendon.*

CONCERN'ING, *prep.* [this word, originally a participle, has before a noun the force of a prepoſition.] Relating to; with relation to.—The ancients had no higher recourſe than to nature, as may appear by a diſcourſe *concerning* this point in Strabo. *Brown.*

CONCERN'MENT, *ſ.* The thing in which we are concerned or intereſted; affair; buſineſs; intereſt.—Our ſpiritual intereſts, and the great *concernments* of a future ſtate, ſhould doubtleſs recur often. *Atterbury.*

Yet when we're ſick, the doctor's fetch'd in haſte,
Leaving our great *concernment* to the laſt. *Denham.*

Relation; influence:

He juſtly fears a peace with me would prove
Of ill *concernment* to his haughty love. *Dryden.*

Intercourſe; buſineſs.—The great *concernment* of men is with men, one amongſt another, *Locke.*—Importance; moment.—I look upon experimental truths as matters of great

*concernment* to mankind. *Boyle.*—Interpoſition; regard; meddling.—He married a daughter to the earl, without any other approbation of her father, or *concernment* in it, than ſuffering him and her to come into his preſence. *Clarendon.*—Paſſion; emotion of mind.—While they are ſo eager to deſtroy the fame of others, their ambition is manifeſt in their *concernment. Dryden.*

*To* CONCE'RT, *v. a.* [*concerter*, Fr. from *concertare*, Lat. to prepare themſelves for ſome public exhibition, or performance, by private encounters among themſelves.] To ſettle any thing in private by mutual communication, To ſettle; to contrive; to adjuſt:

Mark how, already, in his working brain,
He forms the well-*concerted* ſcheme of miſchief. *Rowe.*

CON'CERT, *ſ.* Communication of deſigns; eſtabliſhment of meaſures among thoſe who are engaged in the ſame affair.—All thoſe diſcontents, how ruinous ſoever, have ariſen from the want of a due communication and *concert. Swift.*—A ſymphony; many performers joining in the ſame tune.

CONCERTA'TION, *ſ.* [*concertatio*, Lat.] Strife; contention.

CONCER'TATIVE, *adj.* [*concertativus*, Lat.] Contentious; quarrelſome; recriminative.

CONCER'TO, *ſ.* [Ital.] A piece of muſic compoſed for a concert. It is now generally uſed for a piece intended to diſplay the powers of one particular inſtrument or performer, the reſt of the band joining occaſionally in concert.

CONCES'SION, *ſ.* [*conceſſio*, Lat.] The act of granting or yielding.—The *conceſſion* of theſe charters was in a parliamentary way. *Hale.*—A grant; the thing yielded.—I ſtill counted myſelf undiminiſhed by my largeſt *conceſſions*, if by them I might gain the love of my people. *King Charles.*

CONCES'SIONARY, *adj.* Given by indulgence or allowance.

CONCES'SIVE, *adj.* Implying conceſſion.—Hypothetical, conditional, *conceſſive*, and exceptive, conjunctions, ſeem in general to require a ſubjunctive mood after them. *Lowth.*

CONCES'SIVELY, *adv.* By way of conceſſion; as, yielding; not controverting by aſſumption.—Some have written rhetorically and *conceſſively*; not controverting, but aſſuming the queſtion, which, taken as granted, advantaged the illation. *Brown.*

CONCET'TO, *ſ.* [Ital. and keeps its plural.] Falſe conceit.—There is a kind of counter-taſte, founded on ſurpriſe and curioſity, which maintains a ſort of rivalſhip with the true, and may be expreſſed by the word *concetto. Shenſtone.*—The ſhepherds have their *concetti* and their antitheſes. *Cheſterfield.*

CONCE'ZE, a town of France, in the department of the Correze, and diſtrict of Brive: ſix leagues north-weſt of Brive.

CONCH, *ſ.* [*concha*, Lat.] A ſhell; a ſea-ſhell:

He furniſhes her cloſet firſt, and fills
The crowded ſhelves with rarities of ſhells:
Adds orient pearls, which from the *conchs* he drew,
And all the ſparkling ſtones of various hue. *Dryden.*

CON'CHE, a ſmall village in Maritime Auſtria, half in the territory of Padua, and half in that of Venice.

CON'CHES, a town of France, in the department of the Lower Pyrenees, and chief place of a canton, in the diſtrict of Pau: ſix leagues north-north-eaſt of Pau.

CON'CHES, a town of France, in the department of the Eure, and chief place of a canton, in the diſtrict of Evreux: three leagues ſouth-weſt of Evreux.

CON'CHOID, *ſ.* or CONCHILES, the name of a curve invented by Nicomedes. It was much uſed by the ancients in the conſtruction of ſolid problems. See FLUXIONS.

CONCHO'LOGY, *ſ.* [from κογχη, a ſhell, and λογος, a diſcourſe.] The ſcience which teaches an inveſtigation of the nature and properties of ſhells. This is a very pleaſing and curious department of natural hiſtory; for, in the infinite variety of ſhells diſperſed over the univerſe, the hand of the Supreme Artiſt has diſplayed every gradation of beauty which can exiſt in a permanent form. From the moſt rude and miſhapen oyſter, ſcarcely to be diſtinguiſhed from its native rock, the ſcale regularly aſcends, till it arrives at perfection in the elegant *nautile*, or ſuperior ſymmetry of the ſpiral ſnail; whoſe convolutions commencing in a point, and winding with the eaſy flow of the moſt beautiful undulating wreath, inſenſibly dilate themſelves as they advance, till the whole aſſumes the elegant taper of the cone. From this admired ſtructure, it is imagined, the Greeks preſerved it in one of their temples conſecrated to Venus, as the emblem of that goddeſs; for we find united in this ſhell all thoſe lines or figures, which mathematicians pronounce to be the moſt beautiful.

Da Coſta ſtates the definition of a ſhell as follows: A kind of ſtone-like calcareous covering or habitation, in which the whole animal, otherwiſe quite naked or fleſhy, lives included as in a houſe; whereas the cruſtaceous animals, as lobſters, crabs, &c. are not naked, but have every particular limb or part ſeparately covered with the cruſt, which conſequently is formed into many joints, inſomuch that the whole animal ſeems as it were loricated, or in a coat of mail. All ſhell animals are exanguious, that is, have no blood ſimilar to that of quadrupeds, birds, fiſhes, or reptiles; and therefore properly appertain to Linnæus's ſixth claſs of animals, or vermes. They are alſo deſtitute of any bones; thoſe fulcra or props to the muſcles of the animal ſtructure, being exterior in theſe creatures, in their ſhells; and not interior, as all bones of other animals are placed. However, they are endowed with the principal parts, as the mouth, lungs, heart, &c. beſides other parts ſuitable to their mode of life.

It has been a ſubject of ſome debate among naturaliſts, Whether the methodical ſyſtem or arrangement of teſtaceous animals ſhould be formed from the living animals themſelves, or from their habitations or ſhells? The former method ſeems moſt ſcientifical; but the latter, from the ſhells, is univerſally followed for the purpoſes of conchology; and for many reaſons. The vaſt number of ſpecies hitherto diſcovered, and the numerous collections made, exhibit only the ſhells or habitations, the animals themſelves being ſcarcely known or deſcribed. Of the ſhells we daily diſcover, few are fiſhed up living; the greater number are found on ſhores, dead and empty. Accurate deſcriptions of animals, whoſe parts are not eaſily ſeen or obvious, and anatomical reſearches, are not in the capacity of every one to make; nor are the particular parts and their reſpective functions ſo eaſily cognizable to any but expert, aſſiduous, and philoſophical, enquirers. How is it poſſible, then, to arrange a numerous ſet of the ſhells of animals, by characters or parts we can with difficulty, if ever, get acquainted with, in the far greater number of the ſpecies we collect or diſcover?

All other ranks of animals are arranged into ſyſtems by obvious and external, not by ſcientifical, characters. Quadrupeds are methodized by their teeth, horns, hoofs, and hides, or coverings; birds by their plumage, beaks, and claws; reptiles and inſects by like particulars; the very fiſhes, though of a different element, undergo arrangements by their fins; and the vegetables are diſtinguiſhed by their flowers and fruits. All theſe arrangements are on the principles of external and obvious characters. Why then ſhould it be required to arrange by ſcientifical or difficult characters, the ſhells of animals who chiefly live in the depths of the ſea, that have hardly a progreſſive motion, and are, for the greater part, difficultly, if ever, within our reach? Why ſhould naturaliſts demand of ſuch animals only, a ſyſtem or arrangement, the moſt difficult to attain, while all the other orders of animals, whoſe arrangements by ſuch methods are more eaſily attainable, are methodized only, and with univerſal

conſent

conſent, by the obvious characters of teeth, plumage, and fins; characters that cannot be held in any other light, than as analogous to the external characters, or the ſhells of teſtaceous animals? Such an abſtruſe method, were it even attainable, is the leſs neceſſary, becauſe every accurate and judicious naturaliſt may always be capable of diſtinguiſhing the ſpecies by the ſhells alone, though he has many of the ſame kind, and of very different appearances, before him; for every ſpecies of ſhell has one or more particular ſpecific character, either in work, colour, or ſubſtance, which it retains through all its various ſtages and forms, and is therefore always to be diſtinguiſhed and known by it.

Mr. Adanſon drew a concluſion of the different ſhells he propoſes for the ſpecies of the black limpet, from the ſituation of its eye or beak being at two-thirds of the length of the ſhell. This ſituation of the eye, he, for want of accuracy, thought to be a particular character of the black limpet; but he overlooked that the eyes or beaks of many other ſpecies of limpets are placed in like manner, or at two-thirds the length of the ſhell. He therefore erred as much in making that particular the criterion of the ſhell, as in making the fiſh only, the criterion of the whole animal, or fiſh and ſhell. But there are, on the contrary, many infallible characters upon ſhells, by which the family or genera may be diſtinguiſhed from all others. The goat's-eye limpet wears, perhaps, as many different appearances as any ſpecies of ſhell, and even often greatly reſembles others; but look only on its ridges, the character of which is to be three-edged, like a triple-edged ſpear or ſword, and it is immediately recognized through all its different appearances. The garnet limpet has, in like manner, many different appearances; nevertheleſs its elegant garnet-like ſemi-tranſparent eye or top always characterizes it through all its colours and forms. The ſmall blue-rayed limpet of our own coaſt is, when young, thin, horny, and very conical; when old, thick, flattiſh, and miſshapen; yet its few blue ſtreaks always characterize it. The bloody-tooth nerit is known through all appearances, by the blood-like ſpots on its teeth. Each volute has ſome particular ſtreak, band, ſpot, or colour, which it uniformly preſerves through all its ſtages. Even the rocks or murices, the ſpiders, and the winged ſhells, whoſe appearances in their ſeveral growths, above all other ſhells, are ſo extremely different, that when young they have narrow, ſharp, even, thin, and ſmooth, lips, and the opening is pretty clear or free; when old, this lip is greatly extended, very thick, pronged, or ſet with large ſpikes, and almoſt cloſes their mouth or opening. Yet even all theſe ſhells, either in the turban, body, tip, work, or colour, have conſtant and fixed characters, which diſtinguiſh them throughout all theſe extremely different appearances. But it has been objected, that the ſhells alter in every ſtage of the animal's growth; and that hence enſues a very conſiderable change in the forms and colours of the ſhells. If ſo, it evidently follows, that the animals themſelves muſt undergo as material changes in their forms. It cannot be otherwiſe; for the ſhell muſt always anſwer to the animal, and its mode of life; therefore, if great changes happen to the animal as well as to the ſhell, we remain in equal uncertainty as to an arrangement by the fiſh, as by the ſhells; but as the ſhells have the moſt obvious and eligible characters, and are more eaſily attainable, the methodical arrangement of the ſubjects in conchology ſhould be made from the ſhell. The inveſtigation of the included living animals, forms a branch of Ichthyology, and will accordingly be found under their generic names in this work, taken from the Linnæan claſſification.

## On the FORMATION, GROWTH, and COLOURS, of SHELLS.

P. Wolfgang Knorr, in his *Delices de la Nature*, has given the following account of this department of animal phyſiology. Every ſhell animal, like the other vermes, is at firſt very minute, and ſprings from little eggs or ſpawn formed in a kind of froth, which is expelled by the parent animal. This froth conſiſts of a great many cells or cavities, reſembling the honeycomb of bees, and is called *melicera*. The largeneſs of the ſpawn is proportioned to the natural ſize of the ſhell; and it is taken for granted that the ſpawn of a large buccinum, ought to be larger than that of a little nerite, for the ſame reaſon that the egg of an oſtrich differs in ſize from that of a goldfinch. But the ſubject has not yet been ſufficiently examined to make this part of conchology clear and obvious. What we have noticed on this head, is nevertheleſs worthy of conſideration and regard.

The ſmalleſt ſnails are formed with their ſhell, but which at firſt is ſo fine and brittle, as not to bear the ſlighteſt touch of the finger. The animal alſo is delicately faſhioned. The manner of the proceſs is certainly enveloped in darkneſs, and we yet want many experimental obſervations on the formation and growth of ſhells. Every ſhell-animal ſeems to be the architect of its own habitation; and, although this may appear doubtful with regard to the paper nautilus, yet there is a mode in which we may ſhew, as far as obſervation goes, the conformation and growth of that ſhell. The animal is obviouſly compoſed of different fibrous, muſcular, and membranous parts; it has many ſeparate organical reſervoirs, humours, and pores, and alſo a clammy ſubſtance, which covers the whole fleſh, and makes it ſlippery and tenacious. This is nothing but the moiſture that flows continually from the whole body, perhaps from millions of pores, and is found all over the ſurface of the animal; and being of a calcareous nature, it in time gets hard; and, in proportion as it is forced out ſucceſſively by the humid liquor, it at length detaches itſelf entirely from the body, and thus becomes as it were a diſtinct covering. It is probable that the ſhell is not ſolid throughout, but that it contains a number of minute ſpaces, anſwering to the pores of the animal, from whence flow the matter which forms the ſhell; conveying a portion of juice ſucceſſively to the inner ſurface of the ſhell, penetrating through theſe ſpaces to the upper or external ſurface, and thus making it both harder and firmer.

The conſtruction of the ſhell muſt neceſſarily follow the natural conformation, and hence it will be ſmooth, tuberculated, ſtriated, curled, rough, or wrinkled, according as the animal is to be in time evolved. As ſoon as the creature has taken ſo much growth that it can no longer lodge in the ſhell, the increaſe is ſaid to be made after the following manner: It thruſts from the orifice that part of the body which it can no longer contain in the ſhell. That ſurface being naked, continues to diſcharge the ſame moiſture, which hardens, and, uniting with the edge of the orifice, forms a new portion of ſhell, which preſently becomes exactly fitted to that piece of the body, which, from the place being too narrow, it obliged him to expoſe. When the animal is attached to the inner part of the ſhell, the moiſture diſſolves in the former tubercles, and makes that firm. From thence ariſe the ſpires in ſnail ſhells, and the rings in the helices; the mark of addition to which we may always ſee, although the bed for the new moiſture, which is depoſited on the edge, being hardened afterwards, is very narrow and fine. In ſome of theſe animals, when they arrive at a certain age, the ſtructure at the extremity is changed by the addition of new lobes, as it happens in many other parts which do not grow but in a certain age; as the horns, the teeth, &c. ſo the mouth of the ſhell neceſſarily takes a different form thereby. This may be obſerved in ſome ſpecies of the buccinum, which have at firſt the mouth united, but afterwards forms a projecting lobe, and are wry-mouthed, wrinkled, or broad, ſo as to be taken by ſome naturaliſts for a different genus; on the ſame ground of error, which led ſome of the early naturaliſts to rank a ſtag with horns under a diſtinct ſpecies, in order to diſtinguiſh it from a fawn, whoſe horns had not begun to ſhoot forth.

According

According to this opinion of Knorr, the ſhell increaſes by addition or aggregation; but it is more conſonant to the ſimple operations of nature to ſuppoſe, that it is by extenſion that the ſhell takes the ſize adapted to the ſpecies, as well as to the growth of the animal. There is certainly a ſyſtem of arteries, as in all ſolid parts and bones of animals, conjoined in the ſhell, by which the nouriſhing moiſture paſſes to or from the inhabitant; and, according to this generical formation, every ſyſtem of arteries, with its particular organs, conforms to the ſtructure and wants of the included animal.

As to the beautiful deſigns and colours of ſhells, Knorr proceeds to explain them on the principles of animal fluids. He ſays that a matter flows from the animal into the ſhell, of a conſiſtency like foam; different, at times, in the ſame animal, according to the difference of the particular humours, and organical reſervoirs; juſt as in other creatures, where the blood is red, the bile green, the urine yellow, the chyle white, &c. Now, if the organical reſervoirs, and the ſmall veins, which ramify thence near to the ſurface of the ſhell, are diſpoſed in circles, lines, or figures, the moiſture being of another colour, cannot preſent itſelf on the ſurface but in the ſame colour. This moiſture being hardened and augmented by continual addition through the ſpaces of the ſhell, and thus more diſſolved, and as it were brought to perfection, it muſt be that the ſketch or outline of the ſhell will ſhew the true diſpoſition of the fibres, veins, &c. though only of a hair's breadth, and alſo the pores. It cannot appear improbable that this ſhould be the true conſtruction of theſe creatures, becauſe we ſee different ſtriated and ſpeckled ſnails, with and without ſhells; and alſo ſimilar lines and decorations in a great many ſpecies of caterpillars. Hence, as the colours ſpring from the reflection of the rays of light, perpetually made on the plates of the ſurface, and which ariſe from the different diſſolutions of the ſmalleſt particles, this author does not heſitate to attribute the colours of ſhells to the ſtructure of their organical ſecretories. And as every animal is ſubject to certain diſeaſes, which can change and alter the colour of their humours, and alſo by the functions of digeſtion, diſſolution, ſecretion, &c. ſo without doubt ſea animals are ſubject to the ſame mutabilities of nature, which thus become the cauſes of their great variety of colours. Thoſe who, in order to explain the formation and growth of ſhell-fiſh, ſuppoſe a ſyſtem of arteries, ſay that the liquors which flow from the animal into the ſhell, although of one and the ſame colour, can, by the petrification that takes place ſucceſſively in the extremities of the ſmalleſt veins towards the exterior ſurface, take different colours; juſt as the ſame nouriſhing juices of the human body can be differently coloured by the mixtures and ſecretions. The above reaſoning is no leſs applicable to figures and paintings, or to ſmall variations of ſtructure; for the body or fibres of an animal may be badly formed; it may have the pores ſtraight and large, ſo that it cannot fail to produce a difference in the external appearance of the ſhell, which muſt not on that account be taken for a different or ſubordinate ſpecies. This remark ſeems the more neceſſary, in order that ſuch things might not contribute to increaſe the genera and ſpecies of ſhells unneceſſarily, in a ſyſtematical diviſion. From a bare calculation made by Knorr, the data of which he formed from the diverſities of the colours of thoſe ſhells he had only in his own poſſeſſion, he makes it appear that there would be two thouſand different ſhells, without counting the ſpecies which muſt be buried in the bottom of the ſea, and which we know nothing of but by the petrifications, which prove to us their exiſtence.

M. de Reaumur appears to have given a ſatisfactory account of the formation of the ſhell of the garden ſnail, founded on a courſe of very ingenious experiments, related in the Paris Memoirs. He there ſupports the theory of Knorr, by endeavouring to ſhow, that this ſubſtance is produced merely by the perſpirable matter of the animal condenſing and afterwards hardening on its ſurface, and accordingly taking the figure of its body, which has performed the office of a mould to it; in ſhort, that the ſhell of a ſnail, and, as he ſuppoſes, of all other animals poſſeſſed of ſhells, was only the product of a viſcous tranſudation from the body of the animal, containing earthy particles united by mere juxtapoſition.

But it was M. Heriſſant, in the Memoirs of the Academy of Sciences for 1766, who firſt diſcovered the ſtructure of ſhells to be organical. In the numerous experiments that he made on an immenſe number, and a very great variety, of animal ſhells, he conſtantly found that they were compoſed of two diſtinct ſubſtances; one of which is a cretaceous or earthy matter, and the other appeared, from many experiments made upon it by burning, diſtillation, or otherwiſe, to be evidently of an animal nature. Theſe two ſubſtances he dexterouſly ſeparated from each other by a very eaſy chemical analyſis; by the gentle operation of which they were exhibited diſtinctly to view, without any material alteration from the action of the ſolvent, or inſtrument employed for that purpoſe. On an entire ſhell, or a fragment of one, contained in a glaſs veſſel, he poured a ſufficient quantity of the nitrous acid, conſiderably diluted either with water or ſpirit of wine. After the liquor has diſſolved all the earthy part of the ſhell, which may be collected after precipitation by a fixed or volatile alkali, there remains floating in it a ſoft ſubſtance, conſiſting of innumerable membranes of a retiform appearance, and diſpoſed, in different ſhells, in a variety of poſitions, which conſtitutes the animal part of it. This, as it has not been affected by the ſolvent, retains the exact figure of the ſhell; and, on being viewed through a microſcope, exhibits ſatisfactory proofs of a vaſcular and organical ſtructure. He ſhows that this membranous ſubſtance is an appendix to the body of the animal, or a continuation of the tendinous fibres that compoſe the ligaments by which it is fixed to its ſhell; and that this laſt owes its hardneſs to the earthy particles conveyed through the veſſels of the animal, which fix themſelves into, and incruſt, as it were, the meſhes formed by the reticular filaments of which this membranous ſubſtance is compoſed. In the ſhell called *porcelain*, in particular, the delicacy of theſe membranes was ſo great, that he was obliged to put it into ſpirit of wine, to which he had the patience to add a ſingle drop of ſpirit of nitre day by day, for the ſpace of two months; leſt the air generated, or let looſe by the action of the acid on the earthy ſubſtance, ſhould tear the compages of its fine membranous ſtructure, which it certainly would have done, in a more haſty or leſs gentle diſſolution. The delicate reticulated film, left after this operation, had all the tenuity of a ſpider's web; and accordingly he does not attempt to delineate its organization. In other ſhells he employed even five or ſix months in demonſtrating the complicated membranous ſtructure of this animal ſubſtance by this kind of chemical anatomy. In general, however, the proceſs does not require much time.

Of the many ſingular configurations and appearances of the membranous part of different ſhells, which are deſcribed in this memoir, we ſhall mention only, as a ſpecimen, the curious membranous ſtructure obſerved in the laminæ of mother-of-pearl, and other ſhells of the ſame kind, after having been expoſed to the operation of the author's ſolvent. Beſides the great variety of fixed or permanent colours with which he found the animal filaments of theſe ſhells to be adorned, it is known, that the ſhell itſelf preſents to the view a ſucceſſion of rich and changeable colours, the production of which he eaſily explains from the configurations of their membranes. Nature, he obſerves, always magnificent in her deſigns, but ſingularly frugal in the execution of them, produces theſe brilliant decorations at a very ſmall expence. The membranous ſubſtance above-mentioned is plaited and rumpled, as it were, in ſuch a manner, that its exterior laminæ, incruſted with their earthy and ſemi-tranſparent matter, form an infinite

number of little prifms, placed in all kinds of directions, which refract the rays of light, and produce all the changes of colour obfervable in thefe fhells.

With refpect to the figures and colours of fhells, it is obferved, that river fhells have not fo agreeable or diverfified a colour as the land and fea fhells; but the variety in the figures, colours, and other characters, of fea fhells, is almoft infinite. The number of diftinct fpecies we find in the cabinets of the curious is very great; and doubtlefs the deep bottoms of the fea, and the fhores yet unexplored, contain multitudes ftill unknown to us. Even the fame fpecies differ in fome degree in almoft every individual; fo that it is rare to find any two fhells which are ftrictly alike in all refpects. This wonderful variety, however, is not all the produce of one fea, or of one country; the different parts of the world afford us their different beauties. Bonani obferves, that the moft beautiful fhells we are acquainted with, come from the Eaft Indies and from the Red Sea. This is in fome degree countenanced by what is found to this day; and, from the general obfervations of the curious, it feems, that the fun, by the great heat that it gives to the countries near the line, exalts the colours of the fhells produced there, as it does the rich plumage of birds, and the more elegant decorations of ferpents; and hence gives them a luftre and brilliancy that thofe of colder climates always want: and it may be, that the waters of thofe vaft feas, which are not fubject to be weakened by freth rivers, give a nourifhment to the fifh, that may add to the brilliancy of their fhells.

## Of the PARTS and CHARACTERS of SHELLS.

In every fyftem of conchology, it is neceffary to fix fome ftandard or eflential characters to all fhells, by which they may be divided into families or claffes, genera and fpecies. Thefe characters muft always be formed from the chief parts of the fhells, the differences of which, in fhape, fize, fituation, or other marks or particularities, enable us to form refpective families or claffes, and to refolve thofe families into genera, and afterwards into fpecies, by other fubordinate characters. Thus in univalves there are five ftandard or eflential characters for the claffes or families: thefe are, 1. Simple or not turbinated. 2. Turbinated, with a fingle continued cavity. 3. Turbinated and chambered, or with many compartments or cavities. 4. The peculiar fhape. 5. The aperture, mouth, or opening of the fhell. The fubordinate characters for genera and fpecies in univalves, are, 1. The number of fpires, convolutions, rounds, or wreaths. 2. Whether operculated, or covered with a lid, or not operculated. 3. The fhelly fubftance, whether opake, horny, pearly, &c. 4. The epidermis. 5. The head, beak, or tip. As thefe characters include the principal parts of all univalves, they of courfe conftitute the rudiments of the fyftem; which rudiments ought to be well inveftigated by every collector of fhells. It is laudable to collect; but when a collector alfo makes it his ftudy to contemplate fcientifically the natural curiofities he acquires, he then claims the refpect of mankind, in addition to the praife already gained by his aflduity.

The particular parts which enter into the conftruction of a fhell, are as follow: 1. The epidermis, or periofteum. This part is common to bivalves as well as univalves. It is a rough covering or fkin, which moft, but not all, fhells have; and only on the outfide, never withinfide, the fhell. The epidermis, perhaps, is a periofte or membrane, that covers the fhells to defend them from exterior accidents, to preferve them, and aid their growth. In that it does the fame office as the periofte or membrane which covers the bones of other animals; for the fhells of thefe fifhes may be confidered, and indeed are, quite analogous to the bones of other animals. The epidermis feems as much a genuine covering of the fhell formed by the fifh, as the fhell itfelf. And, could we fee the recent fifh, and examine its organs, there is no doubt but we fhould find the rudiments of a proper apparatus for making the epidermis, as well as the fhell. The ftructure of the epidermis is very different in different genera. In fome it is laminated, in others fibrous and brufh-like. It deferves to be more minutely examined, and it feems not improbable but among the feveral ufes of this covering, the two following may deferve conlideration: 1. To prevent the falt water from corroding the fhell; for all fhells that have an epidermis have a fcabrous furface. 2. To prevent other fhell-fifh or marine infects from fixing their habitations on thefe fhells, as they do upon all bodies in the fea, where there is not a power of defence. And this renders it very probable, that all fifhes inhabiting naturally fmooth fhells, are capable of not only adding to the extent and growth of their fhells, but can likewife, from time to time, add a freth polifhed covering to the whole fhell; at leaft their organs feem to extend to fuch a length, as to clear away all impurities from their fhells. We feldom find any cowries with coral, or extraneous bodies adhering to any part of them.

The head, *(apex,)* of an univalve, is the part juft over the mouth or aperture. The bafe, end, or tip, *(bafis, feu acumen,)* is that part of the other end oppofite to it, or the end of the turban; though fome authors have given them quite contrary names, by calling the tip or turban the part over the mouth. In fpeaking of fhells it may be underftood, that when the upper or under fide, or ends, are mentioned, it is fuppofed that the fhell lies on its mouth upon a table, with the head towards the right hand, and the end or tip towards the left.

The body of the fhell, *(corpus,)* is that part which runs from the top to the extreme limits of the aperture, and occupies the fpace between the bafe or turban, and the apex. A whirl, turn, fpire, or wreath, *(fpira, anfractus,)* denotes each fingle or feparate turning or circumvolution; as in the turban of the whelk, or common fnail. The difpofition of the fpires, fays Mr. Adanfon, is not the fame in all fhells; it varies according to the different plans they turn on, and they can turn on four different plans, which are; 1, the horizontal; 2, the cylindric, or fpreading on a cylinder; 3, the conic; and, 4, the ovoid plan. From thefe four difpofitions of the fpires, all the different forms or figures of fhells proceed. Thefe are the principal difpofitions of the fpires; but there are many intermediate ones, which proceed from different degrees and combinations of thefe four. The number and forms of the fpires vary in the fame fpecies, either in their different growths or fexes. Young fhells have always a lefs number than the old ones; the reafon is, becaufe all turbinated or fpiral fhells take their growth from the tip or end, to the mouth or upwards. Some fhells, though of the fame age, fometimes have not the fame number of fpires: this is to be attributed to difeafe; or, perhaps, it may be an effect of fex. Thus, in the purpuræ, the buccina, and in fome other kinds, it is common for the males to have their fpires lefs numerous, more ftender and lengthened, or lefs fwelled; and the whole fhell fmaller than in the females. This obfervation is always found to be conftant.

The turban, or clavicle, *(clavicula,)* is the aggregate or whole fet of the whirls, and always forms the *lower* part of the fhell. A flat turban, or helix, *(clavicula helix,)* is fo flightly prominent, as to be nearly on a level with the bafe of the fhell. There are likewife feveral other degrees of them, as the fhort turban, *(clavicula depreffa;)* the produced turban, *(clavicula longiore;)* the long turban, *(clavicula longiffima;)* all which are explained by the very names they bear.

The pillar, *(columella,)* is the middle part, or axis, which runs through the fhell, or from top to bottom, and from which all the fpires commence and turn round, and which forms the fupport or bafis of them. It always lies afide the mouth, and though not feen in all the fhells, yet in many it is the moft obvious part of the mouth next the lip. The mouth or aperture, *(apertura,)* needs no explanation.

planation. The lip, *(labium,)* ſimply, is the mere outer contour of the mouth or aperture; but the inner, or columella lip, *(labium interius vel columellæ,)* is the poliſhed or ſmooth part oppoſite to the lip, and is always ſpread on the columella.

The beak, *(roſtrum,)* is that prolonged and furrowed part, extended ſtraight upwards from the top of the aperture like a horn, more or leſs in the different families. It is by ſome authors called the tongue or bore, eſpecially when ſpoken of the purpuræ; as it is imagined they bore through the ſhells of the fiſh they feed on, with this appendage.

The ſcoop, *(ſinus,)* is the hollowed or gutter-like proceſs placed ſideways of the beak, and lower down on the very lip; which is peculiar to the ſpiders, &c. Such ſhells have been called, from theſe two-fold proceſſes, the beak and ſcoop, *buccina bilinguia.*

The claws or prongs, *(digiti, dactyli, unguli,* or *appendices,)* are the proceſſes that iſſue from the contour of the lip, as in the ſpider-ſhells.

Umbilicated ſhells, *(cochleæ umbilicatæ,)* are thoſe that have a navel or hollow on the firſt or body whirl, or in the center, which penetrates the ſhell deeply, or its length. This is moſtly ſeen in cochlea, trochi, and ſome buccina.

The helix, or helices, are thoſe ſhells that have their whirls or turnings lying, as it were, between two flats or levels, as ſome river ſnails, poſt-horn ſnails, ammonitæ, and others.

Revolved ſhells, *(univalvia turbinata, clavicula intus recondita, vel ita in ſe contorta, ut eorum circumvolutiones nulla ex parte promineant,)* are thoſe that turn or revolve withinſide, or whoſe whirls or turnings are hidden or abſorbed within the body of the ſhell, ſo that only the outer whirl is ſeen, and they have no clavicle: ſuch are the nautili and the cowries.

Winged ſhells, *(alatæ,)* are thoſe whoſe lips expand greatly outwards, and form large flaps or wings; as the plough, the duck's wing, the ſpiders, and many others.

Right-handed ſhells, *(heteroſtropha,)* are ſuch whoſe whirls, or convolutions, turn from right to left, or contrary to the moſt general manner of turbinated univalves.

Operculated ſhells, *(cochleæ operculatæ,)* are ſuch as have a looſe piece, which ſhuts up or covers the aperture or mouth of the ſhell, like a lid. So that the ſhell really conſiſts of two ſeparate and very unequal pieces; viz. one piece flat and ſmall, the other large and ſpiral; the former being the lid, the latter the ſhell itſelf. None but turbinated univalves have opercula or lids. Theſe opercula are ſmall, in compariſon to the ſhells; and of different ſubſtances, as ſhelly, leathery, or horny. This texture may be illuſtrated by the operculum, or lid, which is conſtantly found to incloſe the common perriwinkle. They are alſo of different forms, as perfectly round, ſimilunar, elliptical, oval, or very lengthened; and they are generally wrought with a ſpiral work, or with concentric circles. The operculum, or lid, is always fixed on the upper part of the pedeſtal of the fiſh. In ſome at the outer end or extremity, ſo that it retires conſiderably from the ſhell when the animal moves. In others it is placed at the inner extremity or root. The operculum exactly covers or cloſes the ſhell in thoſe whoſe mouths are round, ſemicircular, or oval, as the nerits, turbines, purpuræ, &c. but in thoſe ſhells that have very lengthened or narrow mouths, as the volutes, it is not eaſy to conceive what uſe the opercula are of; for they ſeem not to ſhut or cover much above the fifth part of the mouth. Yet ſurely all the operculæ ſerve as covers, and entirely ſhut up the fiſh; therefore, though they do not ſeem to fit the outer mouths or apertures of the ſhells, yet the fiſh retires within the ſhells, ſo far as to make it fit, or cloſe exactly to where he retires. The above applies only to ſea univalves, whoſe opercula are a part of the animal, and brought forth with it. The operculated land univalves are very different; they form a new lid, or operculum, every year, or oftener; and that is only at ſuch times that the animals require to ſhelter themſelves from the injuries of the weather. It is compoſed of a viſcous matter, which iſſues from the body of the animal, which condenſes into a kind of toughiſh coriaceous or leather-like ſubſtance, and is pretty thick. This lid, or cruſt, is never attached to the body of the animal, as in the ſea univalves, but merely covers the mouth; nor is it ever wrought with a ſpiral or with concentric circles, or, indeed, any other regular work. All ſhell-like opercula are of a calcareous nature, and diſſolve in acids. It is therefore that, when put in vinegar or other acids, they move briſkly to and fro for ſome time, by the ebullition; from which particular, among the common people fond of curioſities, they have obtained the name of *creeping ſtones.* The horny and leathery opercula reject acids. They have a kind of greaſineſs or unctuoſity, which, when they are burnt, exhales a ſtrong ſmell, ſometimes agreeable, but moſt generally fœtid. The blatta byzantia, conchylium, or unguis aromaticus of the ancients, and greatly valued, till of late, in the Materia Medica, was of this latter kind. It was called unguis, becauſe imagined to reſemble the talons of a bird of prey. Dioſcorides mentions two kinds; one from the Red Sea, white and greaſy, which was the moſt eſteemed; the other black and not ſo large, which came from Babylon. Of later times they have uſed indifferently the ſmall round opercula of purpuræ, &c. by the name of blatta byzantia. When burnt they exhale a ſmell ſomewhat like that of caſtoreum, and their ſmoke was held good for vapours and the epilepſy, and in decoctions they were reckoned laxatives; but at preſent theſe medicines are deſervedly exploded.

The moſt general ſtructure of teſtaceous animals is to be attached to their ſhells, and to be always fixed in them by one or more ligaments or muſcles. This fixation certainly anſwers to reaſon; for theſe creatures can never be imagined to form their ſhells, and augment them when neceſſary, had not the animal itſelf a fixed and common communication with its ſhell, to tranſmit the proper juices for the increaſe of it. Yet, however, it is averred, that the fiſh of three families are not always affixed by muſcles to their ſhells, and thoſe are the vermiculi or ſerpula, the dentalia, and the paper nautili. The paper nautilus certainly appears not to be fixed by any one part to its ſhell, and is very frequently ſeen without it. The fiſhermen muſt be very expert to catch the fiſh in its ſhell, becauſe they quit their ſhells with ſuch facility. The dentalia are found floating, as it were, in their ſhells, no ways fixed, but quite looſe and free, like any thing in a ſheath. However, to reconcile this difference, and, perhaps, it is the real ſtate of the caſe, it is reaſonable to ſuppoſe that theſe animals are not abſolutely looſe from their ſhells, but rather that they are very ſlightly connected to it; and, perhaps, when the ſhell is complete or full grown, they detach themſelves from the muſcles. Analogous to what lobſters and other cruſtaceous fiſh do when they caſt their yearly cruſts; that is, they detach the muſcles of the old cruſts, to affix them on their new ones.

There is another obſervation to be made with regard to vermiculi, or ſerpulæ, viz. that theſe teſtaceous animals border on, or connect ſo cloſely to, the corals, that it was long before conchologiſts could fix their limits, ſo as to pronounce definitively whether corals ſhould be ranked as teſtaceous animals, as Martini has done in ſome particulars; or, whether the ſerpula ſhould be rather ranked as corals, and expunged the teſtacea. Linnæus has thought it right to ſeparate them, and make the ſerpula and dentalia teſtaceous animals, and the corals a ſeparate and diſtinct order. Another diſpute remained long unſettled in regarded to the echini. The echini were very indefinitely placed by naturaliſts; many ranking them as cruſtaceous, many as teſtaceous, and others as animals of an order diſtinct from either. Thus Liſter and Adanſon take no notice of them among the teſtacea. Rumphius and Seba place them with the ſea ſtars and cruſtacea. Linnæus

claſſes

claſſes them under molluſca, diſtinct from ſhells; while, on the other hand, Buonanni and Grew, who rank them with the teſtacea, place them as univalves; and Woodward, Argenville, Gualtieri, Breynnius, Davila, and Meuſchen, rank them as multivalves. This latter diſpoſition is certainly very erroneous; for, though they define the many ſutures ſeen in echini as ſo many valves, yet they cannot in anywiſe be reckoned as ſuch, for they have no play or motion whatever, as valves, but are mere joinings of ſeveral pieces, always permanent and fixed. Neither, indeed, would the name of multivalves anſwer to all echini, could the ſutures be termed valves; as only ſome genera, not all echini, are compoſed of ſuch ſutures.

It was a long time before any regular or ſyſtematic arrangement of ſhells took place. The moſt general manner of the old authors has been to divide all ſhells into ſimple, turbinated, and bivalve: but it is evident that this diviſion was very erroneous, becauſe it excluded the multivalves. Succeeding naturaliſts, inſtead of this arrangement, ſubſtituted three other diviſions, viz. univalves, in which they comprehend both the non-turbinated and turbinated; bivalves, or double ſhells; and multivalves, conſiſting of many parts. This being now the generally-received diviſion, on which cuſtom and philoſophy have ſtampt an authority, we ſhall adhere to it in this treatiſe.

Each of the above three general diviſions contains many families, genera, and ſpecies. Mr. Tournefort obſerves, that there ought to be certain principles or characters in every ſyſtem or method; which principles or characters ſhould always be taken from the chief part of the objects, and not from ſeveral parts. This character ſhould alſo be the conſtant one through the whole ſyſtem, to preſerve a perfect regularity. Thus all bodies which agree in one fixed character form the claſs, and the affinities or differences of thoſe bodies to each other in the leſs principal parts, create the ſubordinate genera and ſpecies. On this maxim Da Coſta has founded his ſyſtem; for all the turbinated univalves, he has fixed on the aperture or mouth of the ſhell as its eſſential character. For the bivalves, on the hinges; and for the multivalves, on the number of valves. The ſimple figure, the chambered ſtructure, and the latent whirls of the revolved ſhells, which are the only remaining univalves not characterized by the mouth, ſuch as the limpets, ammonia, and cowries; thoſe are the eſſential characters for ſuch families. In the ſubordinate diviſions of genera or ſpecies, the following characters are ſufficient: 1. The figure or ſhape. 2. The turban or clavicle. 3. The work on the ſhell. 4. The other leſs eſſential particularities; as, thickneſs or thinneſs of the ſhell, the epidermis, and the ſubſtance, whether pearly, horny, or opake.

## *Of UNIVALVES, or SINGLE SHELLS.*

Writers on conchology have laid down one natural method for the arrangement of univalve ſhells, which ought to be adhered to as ſcrupulouſly as poſſible; that is, to begin with the ſimpleſt forms, and proceed upwards to thoſe which are the moſt complex. According to this method, the vermiculi, or worm-ſhells, which include the ſerpula, toredo, and ſabella, undoubtedly ſtand firſt; then the dentalia, or tuſk-like ſhells; next follows the patella, or limpet; and then the aures-marinæ, haliotis, or ſea-ears. Theſe conſtitute four families, and form the firſt general diviſion, called *ſimple* univalves.

The ſhells of the next ſimpleſt configuration are claſſed, by Da Coſta, under one family, and divided into ſix genera, viz. the orthoceratites; the lituitæ, or croziers; the turbines polythalmi; ammonia; ammonoidæ; and the nautilus, or nautile. Theſe being all of them chambered ſhells, form the next general diviſion, which is called *concamerated* univalves.

Next follows the ſixth family of ſhells, which is divided into three genera, viz. bullæ, called pewit's eggs, or dippers; ſemiporcellanæ, which are alſo the bulla kind, but greatly reſembling the porcelains; cypreæ, the porcelain ſhells, or cowries. This family conſtitutes the third general diviſion, called *revolved* univalves.

The next arrangement of ſhells Da Coſta forms into ten diſtinct families, making in the whole ſixteen families of univalves. In this arrangement he places firſt, the argonaut, or paper nautilus; ſecond, the aures-cochleæ, or eared ſnails; third, the olives, a ſpecies of volutes, called cylindars; fourth, the volutæ, or cones, called admirals, &c. fifth, globoſæ, or globoſe ſhells, ſuch as the tuns, melons, Perſian crowns, &c. ſixth, caſſides, or helmets, which are a ſpecies of buccinum; ſeventh, trochi, or tops, ſhells of a top-like or pyramidal ſhape; eighth, cochleæ, or ear-formed ſnails; ninth, buccina, or whelks; and, tenth, murices, or rock-lice ſhells. Theſe families are ſubdivided into many genera, and conſtitute the fourth and laſt general diviſion of the firſt order of ſhells, called *turbinated* or *ſpiral* univalves. We now proceed to explain theſe diviſions in their natural order.

## *OF SIMPLE UNIVALVES.*

The moſt ſimple ſhells are certainly thoſe that envelope the vermiculi or ſea-worms, which, in their generic character, are called *terebella*, the piercer or borer; and they are, in many reſpects, very deſtructive creatures. The eſſential character of this family is thus defined by Da Coſta: tubular cylindric ſhells, ſingle, often in maſſes together, or adhering to other extraneous bodies; variouſly ſinuous, by winding or twiſting to and fro, in various contortions; whence they are of no determinate or regular ſhape; or they are rather of divers ſhapes and forms. Dr. Gmelin divides them into the three following genera:

### SERPULA, TOREDO, AND SABELLA.

The firſt genera of theſe cruſtaceous worms produce their ſhells in very great variety; and in their windings and convolutions are ſometimes ſo regularly ſpiral, as almoſt to emulate the moſt perfect turbinated ſhells; but this is, perhaps, quite accidental. The moſt general form in which theſe ſhells are found, is ſimply tubular, and in cluſters; variouſly coloured, and of different ſizes, which indicate their progreſſive ſtate of growth. They are found from the ſize of a ſtalk of graſs, to that of a ſwan-quill; and ſometimes as large as a man's finger. Some are of a dull white, others grey, yellowiſh, and brown. As they are often found in large lumps, attached to other bodies in a ſpiral form, and other ſhells as frequently attached to them, they were long miſtaken by the earlier naturaliſts for a ſpecies of coral. They inhabit various parts of the European ſea; and thoſe deſcribed by Davila are natives of the Mediterranean and the Venetian gulf. They are alſo found on the coaſts of Coromandel and Malabar, in the Indian ocean, and in the African, Aſiatic, and American ſeas. There are thirty-eight ſpecies of them.

The TEREDO is that pernicious animal ſo deſtructive to the bottoms of ſhips. The ſhell is tapering, flexile, and capable of penetrating wood. There are only three ſpecies known, the *navalis*, *utriculus*, and *clava*. The navalis is the ſhip-worm; whence it takes its ſpecific name. It is an inhabitant of the Indian ſeas; and from thence it was firſt imported into Europe. It penetrates eaſily into the ſtouteſt oak-planks, and produces dreadful deſtruction to the ſhips by the holes it makes in their ſides; and it is to avoid the effects of this creature that veſſels require ſheathing. The head is well prepared by nature for the hard offices which it has to undergo, being coated with a ſtrong armour, and furniſhed with a mouth like that of the leech; by which it pierces wood, as that animal does the ſkin; a little above this it has two horns which ſeem a kind of continuation of the ſhell; the neck is as ſtrongly provided for the ſervice of the creature as the head, being furniſhed with ſeveral ſtrong muſcles; the reſt of the body is only covered by a very thin and tranſparent ſkin, through which the motion of the inteſtines is plainly ſeen by the naked eye; and by means of the microſcope ſeveral other very remarkable particulars become

viſible there. This creature is wonderfully minute when newly excluded from the egg; but it grows to the length of four or ſix inches, and ſometimes more. When the bottom of a veſſel, or any piece of wood which is conſtantly under water, is inhabited by theſe worms, it is full of ſmall holes; but no damage appears till the outer parts are cut away: then their ſhelly habitations come into view; in which there is a large ſpace for incloſing the animal, and ſurrounding it with water. There is an evident care in theſe creatures never to injure one another's habitations; by this means each caſe or ſhell is preſerved entire; and in ſuch pieces of wood as have been found eaten by them into a ſort of honeycomb, there never is ſeen a paſſage or communication between any two of the ſhells, though the woody matter between them often is not thicker than a piece of writing-paper. They penetrate ſome kinds of wood much more eaſily than others. They make their way moſt quickly into fir and alder, and there grow to the greateſt ſize. In the oak they make leſs progreſs, and appear ſmall and feeble, and their ſhells are much diſcoloured. Since each of theſe animals is lodged in a ſolitary cell, and has no acceſs to thoſe of its own ſpecies, it has been matter of ſurpriſe how they ſhould increaſe to ſo vaſt a multitude. Upon diſſecting them, it appears that every individual has the parts of both ſexes, and is therefore ſuppoſed to propagate by itſelf. Theſe ſea-worms appear to have the ſame office allotted them in the waters, which the termites have on the land. They will appear, on a very little conſideration, notwithſtanding they are ſo pernicious to ſhipping, to be moſt important beings in the great chain of creation, and pleaſingly demonſtrate that infinitely wiſe and gracious Power which formed, and ſtill preſerves, the whole in ſuch wonderful order and beauty; for, if it was not for the rapacity of theſe and ſuch animals, tropical rivers, and, indeed, the ocean itſelf, would be choked with the bodies of trees which are annually carried down by the rapid torrents, as many of them would laſt for ages, and probably be productive of evils, of which, happily, we cannot in the preſent harmonious ſtate of things form any idea; whereas now, being conſumed by theſe animals, they are more eaſily broken in pieces by the waves; and the fragments which are not devoured become ſpecifically lighter, and are conſequently more readily and more effectually thrown on ſhore, where the ſun, wind, inſects, and various other inſtruments, ſpeedily promote their entire diſſolution.

The SABELLA is a ſimilar creature, the ſhell of which is tubulous, and formed of grains of ſand cemented together and hardened into a cruſtaceous covering, by the mucous matter which iſſues from the included inhabitant. There are twenty-five ſpecies, of various ſizes, from half an inch to nine inches long. Some of them inhabit the Britiſh ſeas, the coaſts of Norway and Greenland, and the Cape of Good Hope; others, of the larger ſize, are found in the Indian ocean, and in the South Sea; on the coaſts of America, and in the ſalt lakes of Thuringia.

Gualtieri ranks the famous ſhell the wentletrap, or ſtaircaſe, with vermiculi: he gives for reaſon, that the ſpires of this ſhell are mere looſe ones, not produced from, or anyway connected or ſupported by, a pillar or columella, running through the middle of the ſhell its whole length, as is the conſtant and true ſtructure of all turbinated ſhells. Davila places it among his vermiculares, without giving any reaſon for ſo doing. There are alſo vermiculi which have concamerations, or are divided into chambers by a few or many tranſverſe plates running acroſs the tube; but they are ſeldom regular, or ſet at equidiſtant intervals and are not pierced by a pipe or ſiphunculus, that communicates from chamber to chamber, ſo as to permit the fiſh to penetrate more than one chamber or incloſure at a time, in which particulars they eſſentially differ from the concamerated ſhells. Beſides, theſe concamerations do not ſeem conſtant to any particular ſpecies, and appear rather the cloſing up, and deſerting the old place of habitation of the fiſh, when it augments its ſhell; juſt like the bottom ſpires of a turbinated ſhell, which the animal fits up as it grows bigger, and enlarges it habitation. The vermiculi are frequently found in the foſſil ſtate; but we do not recollect any ſpecies, but what is known in a living ſtate recent from the ſea.

## DENTALIA, OR TUSK-LIKE SHELLS.

This family of ſimple ſhells is likewiſe of the terebella or piercer ſpecies; but is ſeparated from the preceding genera, on account of the difference in its conformation. The eſſential character of this ſhell is, that it is ſimple, tubular; of a regular, determinate, curved, conical, ſhape; and open at both ends. This ſhell is found from one to four or five inches long. There are twenty-one ſpecies, which are natives of the Indian ocean, the Mediterranean ſea, the Engliſh channel, and moſt of the ſea coaſts in different parts of the world.

The Conchology-Plate I. exhibits different figures of the vermiculi, or ſea-worm ſhells. Fig. 1. A cluſter of the ſerpula contortuplicata, from Knorr. Fig. 2. The large green-furrowed dentale of the Eaſt Indies. Fig. 3. The ſmooth yelloviſh dentale of the Engliſh ſea.

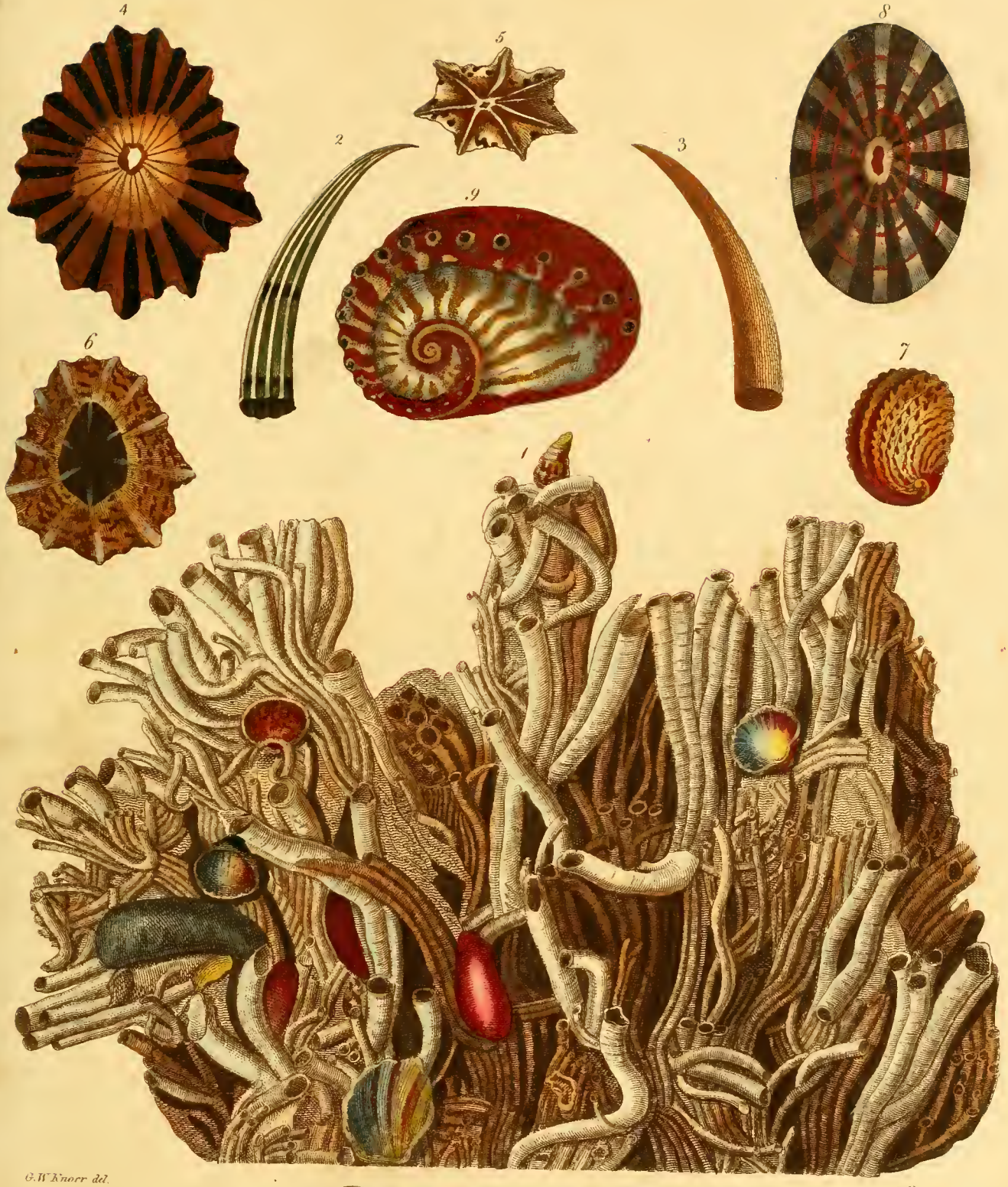
## THE PATELLA, OR LIMPET.

This family derives its generic name from its reſemblance to a little plate; like this utenſil, the limpets are for the moſt part round, or oval, or approaching thereto; the part that contains the fiſh is concave, ſmooth, and often finely waſhed with colours. The ſhell is more or leſs conical; it has no contour, but the rock or other hard body to which it adheres, ſerves as a kind of ſecond or under ſhell, to preſerve it from injury. On this account Aldrovandus and Rondeletius claſſed the limpets among the bivalves; but in this error they have not been followed by any other writer. The apex, or eye of the limpet, is either whole or perforated, and is ſeldom placed exactly in the middle of the ſhell, but moſt commonly inclines towards one end; that is, taking it in its longeſt dimenſions. The rim of the ſhell, which forms its baſe, is likewiſe various, ſometimes without any prominencies or ſmooth, ſometimes with large ones or jagged, and ſometimes with ſlits only, or crenated. Their external ſurface is often rough and ſcabrous, and their apices often imperfect; for, moſt of this family adhering to the rocks, they are much expoſed to the ſun during ebb, and to all the violences that render dead ſhells unacceptable to the curious. Though it commonly happens, that the ſhells moſt remarkable for the brilliancy of their colours are of the ſimpleſt form, as the nerits, olives, volutes, &c. yet this tribe ſeems an exception. It is true there are conſiderable numbers that have very lively colours; yet, in general, they abound with leſs variety than moſt other ſhells. In ſome parts of England the limpets have obtained the name of *nipple-ſhells*; becauſe its convexity terminates in a kind of papilla near the center.

The limpets are very numerous, conſiſting of no leſs than 238 ſpecies, which Da Coſta divides into three genera of ſhells, viz. 1. Whole or entire limpets, *(patellæ vertice integro,)* or that are not perforated or open at the top. 2. Chambered limpets, *(patellæ concameratæ ſive cavitate ſtylo interno donata.)* 3. Pierced or perforated limpets or maſks, *(patellæ vertice perforato,)* that have their tops perforated with a hole pierced quite through the ſhell. The firſt genus, or whole limpet, is very numerous. The ſecond, or chambered limpet, has many ſpecies: but the third genus, or perforated limpet, or maſks, has but few ſpecies. Europe, however, affords but very few. The fineſt and largeſt are from the Eaſt Indies and Africa, eſpecially from the Cape of Good Hope. America has many of the chambered and ſmaller kinds: and late diſcoveries have brought ſome large and fine limpets from the Streights of Magellan and the South Sea.

Theſe are all the notices that occur relative to the recent limpets, or thoſe known from ſea. But there are many foſſil ſhells which are not yet diſcovered or known

in




G.W.Knorr del. I.Chapman sc

1 The Serpula Contortuplicata. 2 & 3 Dentalis. 4 The Goats Eye. 5 The stellated. 6 & 8 The granulated Limpets.
7 The aculeated chambered Limpet. 8 The rayed musk Limpet. 9 An Haliotis or Sea Ear.

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G.W. Knorr del. J. Chapman sc.

1 & 2 The Orthoceros. 3 & 4 Crozers. 5 The Polythalmus. 6 & 7 The Cornua - Ammonis. 8 The Ammonoides. 9 The - Nautilus.

in a living ſtate. For not only ſingle ſpecies of foſſil ſhells yet remain undiſcovered in their living ſtate; but genera, and even whole families, ſtill exiſt in the ſeas, which are not yet known to us, otherwiſe than in the foſſil ſtate. Foſſil limpets are very rarely met with; however, there are two kinds, which deſerve particular notice. The firſt is a ſmall ſpecies called the fool's cap. It ſeems different from the Weſt Indian kind, but approaches it nearly. This is not unfrequently found in the calcareous ſoils of France. The ſecond is a very curious and remarkable ſhell, and the fragments of it, called by foſſilogiſts trichites, are found in great abundance in the Engliſh chalk-pits; yet the ſhells are ſo rarely to be met with entire, that we have heard of only four, which were found in the cliffs near Dover. Theſe limpets are very large, and nearly reſemble a ſingle ſhell of a bivalve. They ſeem to be of two kinds, and are more irregular than that ſhell; and, inſtead of being fulcated lengthwiſe, they are circularly wrought, or in a tranſverſe manner, with very high irregular ridges, not thickly, but rather thinly, ſet. Theſe ſhells are very thick. One ſort is high, or coped, the other is broad or flatiſh. The inſide is quite ſmooth, the edges turn outwards, and, under the beak, or that part which anſwers to the hinge in bivalves, they ſtretch out, towards the ſame ſide, into a broad flat ledge, the perpendicular ſide of which is curiouſly worked with ſtraight and parallel furrows, like the hinge of a multarticulate bivalve. On the top or beak it has a large, wide, roundiſh opening, which, from its remarkable thinneſs, makes it difficult to determine whether it be a natural perforation, or an accidental fracture; though, by its regular edge, and being quite alike in all the four ſpecimens, one would incline in favour of the former. Figures of the limpet are exhibited in the engraving.

## HALIOTIS, AURES MARINÆ, OR SEA EARS.

The eſſential character of this family is as follows: ſhells of an ear-like form, flattiſh, almoſt wide open, or hollow, for, from the apex or head, all along one ſide, it has only a broad ledge or margin. The apex has alſo a ſingle perfect whirl; and a curved row of holes, or perforations, runs its length, from the head to the oppoſite end. Theſe ſhells, in appearance and nature, approach very nearly to the limpets, and, in like manner, affix themſelves to rocks. However, they cannot truly be called ſimple, or ſhells that are no way ſpiral; becauſe at their head they have as perfect and fine a whirl as any turbinated ſhell: but, as nature in her works has made ſuch ſlight tranſitions from one link to another, it is almoſt impoſſible to fix them by human definitions. Thus, ſeveral of the chambered limpets have only ſuch ſingle whirls; and the trocho patella, and cochlea patella, are often ſo greatly ſpiral, as exteriorily to reſemble a trochus or a ſnail; yet they are true limpets. It is therefore impoſſible to regulate natural objects to a perfect preciſion, by the moſt elaborate and minute definitions.

The ſpiral head of the haliotis has induced many authors not only to ſeparate them from the limpets, but alſo to reject them from the ſimple ſhells. Thus Liſter places them in his Hiſtoria Conchyliorum among the turbinated ſhells, after the nautili, the ſnails, and the nerits, and preceding the trochi. He does the ſame in his work de Animalibus Angliæ, wherein he ſays, it is ſpiral at the clavicle in the ſame manner as other turbinated ſhells, and therefore by ſome is wrongly placed among the ſimple ſhells. Gualtieri ranks them among the ſnails with depreſſed or flatted clavicles; and Adanſon and Meuſchen take them from the ſimple ſhells, and place them as the firſt family of the ſpiral ſhells: Dr. Gmelin has placed them the laſt of the ſpiral ſhells. Linnæus allows no ſhell to be of the haliotis family, without having the row of perforations; which is an eſſential character. Thus the Venus ear, ranked by ſome as a haliotis, Da Coſta and Linnæus ſeparate from them. But there is alſo another character, which ſeems to belong to this family; that is, their inſide is always of the fineſt or moſt orient pearl; and even pearls are often bred in them. This is another reaſon why the Venus ear belongs not to this family, for it wants the pearly inſide, as well as the perforations. In the row of holes which conſtitute theſe perforations, there are generally ſix or ſeven quite perforated, or very open; the reſt are cloſed, and appear rather like tubercles than holes; for it is ſaid the fiſh always cloſes one towards the end, as he increaſes in ſize; and by theſe holes he caſts forth his excrements.

There are but few ſpecies of this family. It is even doubted, whether ſome of thoſe propoſed by different authors, are not rather varieties: but they are found in great abundance in moſt parts of the world, in their uſual and cuſtomary kind. Dr. Gmelin enumerates nineteen ſpecies. There is no inſtance on record of a haliotis being found foſſil. A figure of the haliotis is given in the engraving.

## *OF CONCAMERATED UNIVALVES.*

The ſecond diviſion of univalves, contains the concamerated or chambered ſhells, that have many regular and nearly equidiſtant cells or chambers, and a pipe or ſiphunculus, that opens into, and communicates from, chamber to chamber. This ſtructure forms the eſſential and ſpecific character of the ſhells of this diviſion; for there occur among them not only revolved and turbinated ſhells, but even quite ſimple, or no-wiſe turbinated ones. The ſhells of this conformation conſtitute the fifth family of univalves, and is divided by Da Coſta into ſix genera, one genus whereof, viz. the orthoceratites, is of a ſimple figure; four genera, as the lituitæ, or croziers, polythalami, turbines ammonia and ammonoides, are all turbinated; and the other genus, or nautilus, is revolved.

For the arrangement of theſe chambered ſhells, we are obliged to have recourſe to the foſſil kingdom; ſince there are only two genera out of the ſix, viz. the lituitæ and the nautilus, that are known recent from the ſea.

Yet it is ſurprizing, that theſe genera, which are found foſſil in ſuch amazing abundance all over the globe, and form numerous families, have to this hour eſcaped the endeavours of mankind to obtain them living. Beſides other reaſons that have been given, their being pelagian ſhells, or ſhells that inhabit the very deepeſt receſſes of the ſea, ſeems one principal cauſe; as thoſe ſituations are not ſubject to the agitations of the great tempeſts, and other violent ragings of that immenſe maſs of waters; and therefore theſe ſhells ſeem conſtantly to remain undiſturbed in thoſe immenſe deeps.

## THE ORTHOCEROS.

Theſe are ſimple ſtraight conical ſhells, no-wiſe turbinated; and gradually tapering from a broad end to a ſharp-pointed top, like a ſtraight horn, whence their name. They are chambered from bottom to top, and have a ſiphunculus, or pipe of communication, from chamber to chamber. Planchus, in his book de Conchis minus notis littoris Ariminenſis, deſcribes ſome recent minute kinds of this genus, which he found in great quantities in the ſea ſediment, at Rimini, in Italy. The orthoceroſes he diſcovered were ſpecies ſo very minute, leſs than one quarter of an inch, and not thicker than a pin, that they demanded the aid of the microſcope to aſcertain their ſtructure. Linnæus, in his order of ſhell-fiſh, ranks them as the nautilus orthocera.

How different theſe living ſpecies are from thoſe found foſſil, is extremely ſtriking; the recent ſpecies are ſo very minute, as to demand the microſcope to examine them; the foſſil ones, on the contrary, are moſtly very large, frequently above a foot in length, and above an inch and a half over; even the ſmalleſt kinds, as the alveoli, are ſeldom leſs than an inch long, and a quarter of an inch over: and beſides their great difference in ſize, they no wiſe correſpond in other particulars with the larger, ſo as to be imagined young ones of the ſame ſpecies. Brey-

nius, who firſt formed this genus in his work, de Polythalamiis, propoſes nine kinds; theſe are divided into two ſections, viz. 1ſt, thoſe that have the ſiphunculus placed on or near the edge; and 2dly, thoſe that have it central, or near the center. It is proper to obſerve, that theſe foſſils are almoſt always caſts of ſtone, or replacements of ſparry matter. For a view of the orthoceros, ſee the Conchology-Plate II. where fig. 1 repreſents the recent ſhell, cut open, to ſhew the concamerations or chambers: this ſhell is greatly magnified; but a figure nearly of its natural ſize is placed by its ſide. Fig. 2, a fragment of a foſſil orthoceros, ſhewing its ſiphunculus or pipe of communication, which in both theſe figures is in the center. This fragment belongs to a very large ſpecies, though it is here ſhewn on a ſmall ſcale.

## LITUUS, THE CROZIER.

This ſhell much reſembles a biſhop's crozier in ſhape, having a long cylindric ſtem, one end whereof turns in a ſpiral manner; but the ſpires are few, ſeparated, and recede from each other. Breynius deſcribes and figures a ſingle ſpecies, ſo that it is an extremely rare foſſil. But there is a ſmall recent ſhell, commonly called the *ram's horn*, or nautilus ſpirula of Linnæus, found in great abundance both in the Eaſt and Weſt Indies, which is ranked by moſt authors as a nautilus or ammonis, and is the identical ſpecies with the foſſil kind. We only ſee the ſpiral end of this recent ſhell in our collections, and never with its ſtem. However, the view alone of it evinces its analogy; for as the ſpires are few, and greatly recede from each other, it muſt follow that the outer ſpire will at laſt inſenſibly fall into a ſtraight line or a ſtem: and the reaſon we never find it with the ſtem, probably, is owing to the thinneſs and brittleneſs of the ſhell; ſo that the agitation of the waves, for it is only found caſt up on the ſhores, eaſily breaks off this ſtem or cylindric part. Fig. 3, in the engraving, ſhews the entire ſhell; and fig. 4, is the ſame cut open, to ſhew its chambered ſtructure.

## TURBO POLYTHALAMUS, OR CHAMBERED TURBINE.

This genus was founded by Da Coſta. It is only found foſſil; and even in that ſtate but one ſpecies is known. It is a turbinated or ſpiral ſhell, of a produced or lengthened ſhape, exactly like a buccinum in appearance, but is concamerated or chambered, and the diaphragms or partitions are cut and jagged, like the foliaceous ſutures of the ammonia. Caſts of ſtone of this kind are found in Dorſetſhire, France, and Swiſſerland, but never in any great degree of perfection. Fig. 5, in the engraving ſhews a turbo polythalamus, of the ſize uſually found in Dorſetſhire.

## CORNUA AMMONIS, OR AMMONIA.

The ſhells of this genus are perfect helices, the ſpires uſually lying between two flats or levels. The ſpires are cylindric, and connected to each other. They gradually diminiſh or taper, on both levels equally alike, from the circumference to the center; ſo that by the gradual tapering of the ſpires to the center, the centers of both flats are concaves. The inner ſtructure is chambered; but the diaphragms, or partitions of the cells or chambers, are not roundiſh and with an even edge, as thoſe of the orthoceros and nautilus, but are flatted, or jagged, into proceſſes or appendages, which laid together tally and cloſe into one another ſo ſtrongly and curiouſly, that, when joined, the flats or ſurfaces of the whole ammonis are embelliſhed with a beautiful leaved work, exactly ſimilar to that on the ſculls of animals: and this by foſſilogiſts is called the foliaceous ſutures of the ammonites. But this foliaceous work does not ſeem to be a particular character of the ammonia, for the turbines concamerati, or preceding genus, have it; and there are ſpecies of orthoceratitæ and foſſil nautili with the ſame work.

The ſiphunculus, or pipe of communication from chamber to chamber in the ammonia, ſeems to be placed on the back of the ſpires, and not near the edges, or in the center of them; but, as this concluſion is drawn from foſſil ſhells, which are very rarely ſo perfect as to ſhew the pipe diſtinctly, we muſt yet remain uncertain in regard to ſome of their particular characters. It is however, a matter of aſtoniſhment, that in this and other families of teſtacea, in general the moſt common foſſil ſhells are the ſcarceſt in the recent ſtate, and *vice verſa*. It could be readily explained, were all the foſſil kinds, not known recent, reckoned pelagian ſhells, as the ammonia certainly are: but then what reaſon can be given for the limpets, ſea ears, volutes, cowries, &c. which, though in extreme plenty recent, are very rarely found foſſil, with many other parallel inſtances. The foſſil ammonia, or ammonitæ, are found in great abundance, and of many ſpecies, in moſt parts of the world; from the ſmall ſize of a pea, through all the gradations of ſizes, to above a yard in diameter, and proportionably thick. Theſe are not objects that eſcape the eye by their minuteneſs; yet, nevertheleſs, all the living ſpecies of them ſtill remain to be diſcovered, except one very minute kind. This living ſpecies of ammonis is ſo very minute, as hardly to exceed the bigneſs of a turnip ſeed, and does not weigh the hundredth part of a grain; therefore demands the aid of the microſcope to examine it. It was found by Plancus with the recent orthoceroſes above-mentioned in the ſea-ſediment at Rimini: he has deſcribed and figured it in his work. Linnæus ranks it among the nautili. It is very remarkable, that this recent ſpecies is a diſtinct kind from any of the foſſil ones known. It not only differs in particular circumſtances, but even in an eſſential character; which is, that as all the foſſil ones, or ammonitæ, have a concave center, this recent kind has a very prominent or projecting one.

Da Coſta has fixed the ſpecific characters of the foſſil ammonitæ, to be taken from the work on the back of their ſpires; as being the moſt obvious, conſtant, regular, and certain diſtinction. On this character he divides the ammonia into eight claſſes, viz. 1. Ammonia whoſe backs are quite ſmooth and plain: ammonia dorſo lævi. 2. Ammonia whoſe backs are ſtriated, ſulcated, or ribbed: ammonia dorſo ſtriato, ſulcato, vel coſtato. 3. Ammonia that have a plain prominent ridge along the back: ammonia limbo prominulo per totum dorſum ducto. 4. Ammonia with a plain prominent ridge between two furrows: ammonia limbo prominulo inter duos ſulcos erecto. 5. Ammonia with a prominent ridge, not plain, but wreathed or twiſted like a rope: ammonia limbo tæniolatu. 6. Ammonia with a plain furrow or channel along the back: ammonia ſulco unico per dorſum ducto. 7. Ammonia whoſe backs are ſtudded or ſpiked: ammonia dorſo tuberculato vel aculeato. 8. Ammonia whoſe backs are deeply notched or toothed like a ſaw: ammonia dorſo dentato. Theſe include all the foſſil kinds hitherto diſcovered. Fig. 6, in the copper-plate, repreſents the cornu ammonis, in its entire foſſil ſtate, as found at Draycot, in Wiltſhire. Fig. 7, is the ſame ſhell, cut open to ſhew its chambered ſtructure.

## AMMONOIDES.

The definition of this genus is, that, in all other reſpects except ſhape, it reſembles the ammonitæ; for theſe bodies are quite globoſe like nautili, and not flat like ammonitæ. The outer ſpire alone makes above one half of the body; and all the other ſpires are very ſmall, and taper into a concavity, ſo that the center is deeply hollowed or umbilicated. Linnæus claſſes theſe among his nautili. Theſe elegant foſſils are found with the preceding, at Draycot in Wiltſhire, and in Swiſſerland. Fig. 8, in the engraving, is an exact delineation of this curious ſhell.

## THE NAUTILUS.

The nautili are defined to be ſhells, whoſe ſpires never appear

W Kiverr del. J. Chapman sc

*Two interior lamina of the Nautilus Shell to shew its pearly substance & chambered Structure.*

Published as the Act directs June 14.1802 by J. Wilkes.


Albertus Seba del. J. Chapman sculp.

1 The Dipper, or Pewits Egg, and all in the circle are back Views of the same. 2 The Argus Cowry, and all in the middle and corners are different species of Cowries. 3 The Weavers Shuttle.

London Published as the Act directs 1st Jan.y 1.1802 by J. Wilkes.

appear externally, but lie latent or quite hidden within the body of the ſhell: Turbinata, volutæ apice non eminente, vel clavicula intus recondita. The nautili are of a chambered ſtructure; the partitions of the cells or chambers being concave-convex roundiſh plates. However, there are foſſil kinds with foliaceous ſutures like the ammonitæ; which implies, that all the ſpecies have not ſuch regularly round partitions: and, indeed, Breynius, on this account, divides the nautili into two orders; thoſe with concave-convex ſemilunar diaphragms, and thoſe with jagged or ſinuated diaphragms.

The paper nautile, though claſſed by moſt authors as a nautilus, is of a different genus, as not being of a chambered ſtructure. Authors make two varieties of the Eaſt Indian or pearly kind, viz. the umbilicated and the non-umbilicated; but Gmelin conſiders them as the ſame animal, and places them both under the ſpecific name of *nautilus pompilius*. This is by ſeveral authors erroneouſly called *nautilus Græcorum*: whereas the nautilus of the Greeks was the paper nautilus, or argonaut.

The animal belonging to this ſhell is ſaid to inhabit only the uppermoſt or open chamber, which is much larger than the reſt. The others remain empty, except that the pipe, or ſiphunculus, which communicates from chamber to chamber, is filled with an appendage or tail of the animal, like a gut or ſtring. The ſiphunculus is a dilatable tube under the command of the animal. When it is dilated, like the ſwimming-bladder of a fiſh, it renders the nautilus buoyant. When it is contracted, the fiſh and ſhell ſink, and juſt to ſuch a degree as the preſent occaſions of the animal require.

There are two remarkable foſſil kinds of nautili yet undiſcovered in a living ſtate, viz. One about the ſize of a pippin, quite pyritical, without the ſlighteſt veſtiges of the natural ſhell. It is deeply umbilicated, has fine foliaceous ſutures in ſeveral parts, and is thickly and finely ridged acroſs from ſide to ſide; the ridges not ſtraight, but curved, the curvature tending downwards, or from the mouth. The other, a ſmall kind, with undulated ſutures, found in the limeſtone of Derbyſhire, and in Germany.

The nautilus has been always eſteemed, as well for the elegance of its ſhell, as for the beautiful mother of pearl which it produces. Fig. 9, in the ſecond plate of conchology, exhibits Knorr's correct drawing of this ſhell, in its natural ſtate. The ground-colour is a yelloviſh-white, approaching, at the extremities to a light orange. In the center it is radiated with flame-colour, from whence proceed ſtriated irregular bands of deep red in all directions. The inſide is lined with moſt beautiful pearl. The black which riſes over the ſpiral concamerations is perfectly natural, and is occaſioned by a mucous matter which the animal throws out, ſimilar to the cuttle-fiſh. The bottom of the ſhell is rounded in a beautiful form, and meaſures about a foot and a half in diameter; and is of the thickneſs of a half-crown piece. It inhabits the Indian ocean, and is found on the ſhores of Africa, particularly near the Cape of Good Hope, where, quickly after a ſtorm, they are ſeen to ſwim about in conſiderable numbers, and are then taken only by the moſt expert fiſhermen.

The ſuperb cordated ſtructure of the interior part, with its materials of orient pearl, has induced us to give the Conchology-Plate III. for the more perfect illuſtration of this celebrated ſhell. Fig. 1, repreſents the ſhell with its exterior lamina or covering taken off, to ſhew the beautiful pearl of which the interior ſubſtance is compoſed. A ſilvery luſtre, with undulating waves, on which a pale delicate red expands itſelf, and at every movement changes to a different colour, gives this ſhell a magnificent appearance. Formerly artiſts ſpent much time in working theſe ſhells, to increaſe their beauty, either by decorations in baſs-relief; or by ſimply engraving lines, which they rubbed over with various tints. Hence we often find theſe ſhells ornamented with emblematical figures, ſuch as the bacchanals, hunting, fiſhing, foliage, ſymbols, arms, creſts, and other decorations. Sometimes they are mounted with gold or ſilver, and converted into drinking veſſels; for they will hold more than a quart. In the figure there is a large brown ſpot in the middle of the ſhell, which it is neceſſary to explain, becauſe it turniſhes a character, by which the nautile is diſtinguiſhed from the cornu ammonia. In all the latter, the circles are apparent in the ſame place near the center of the firſt whirl; but the nautile has the ſhell cloſed. Fig. 2, repreſents an inſide view of the ſame ſhell, whereby the cordated work, and all the partitions, may be ſeen, even to the ſmalleſt, which is in the center. It is to that only that the animal is faſtened by a tendon. This tendon paſſes through all the diviſions, in a ſiphon, faſtened in the middle of the partitions, quite to the principal one, which is the largeſt, and properly the animal's abode. The other partitions do not appear to be of much real uſe to the fiſh; for it has never been found in any of them. The fleſhy part, or body of the animal, fills up all the interior of the largeſt chamber; but at the approach of danger, or when it perceives an enemy, it contracts itſelf into a very ſmall ſold, and lies hid below the ſhell. There may be ſome doubt whether the tendon which paſſes through the partitions, does not receive a great part of the animal's interior ſubſtance on theſe occaſions; which circumſtance ſeems neceſſarily to follow from the diminution of the body.

## *Of REVOLVED UNIVALVES.*

Revolved ſhells are thoſe whoſe ſpires are latent, or hidden within the body, and do not in any manner appear externally; ſo that they have no clavicle or turban. The nautilus pompilius is alſo a revolved ſhell; but, being more remarkable for its chambered ſtructure, it is arranged in the preceding claſs. This diviſion contains the ſixth family of the univalves, which Da Coſta forms into three genera, viz. nuces or bullæ, the pewit's eggs, or dipping ſnails; ſemiporcellanæ, or ſhells nearly reſembling the porcellains; cypreæ or porcellanæ, the cowries.

### BULLA, THE DIPPER, OR PEWIT'S EGG.

The firſt genus, or bullæ, beſides their common names of pewit's eggs, and dippers, are alſo called *ſea-nuts*. The definition of this genus is as follows: they are moſtly of an oval ſhape, and umbilicated at the bottom. The mouth is very patulous, eſpecially at the top, for it narrows greatly downwards. The lip is thin, ſharp, and naked, or without any border or other work; and with a ſmall facing or columella lip on the upper part of the mouth. The arrangement of this genus is much confuſed in authors, by their ſeeming connection with the two following genera of ſemiporcellanæ and cypreæ. Liſter makes them a genus of cowry, and calls it *concha veneris baſi umbilicata*. Grew and Buonanni place it with the ſnails. Rumphius, with his cochleæ globoſæ; Argenville, Davila, and Meuſchen, do the ſame; and, indeed, Linnæus's genus of bulla includes the figs, turnips, &c. as well as the dippers. Gualtieri makes it a genus preceding the cowries, and following the paper nautilus.

The arrangement that Rumphius, Argenville, Linnæus, Davila, and Meuſchen, give them as cochleæ globoſæ, or tuns, is very ſurpriſing, and extremely erroneous; ſince they have a very different eſſential character, though all have patulous or very large mouths. For the nuces, or bullæ, like the cowries, have no clavicle or turban, becauſe their ſpires lie within their bodies; whereas the conchæ globoſæ, as the partridges, tuns, &c. are really turbinated ſhells, and have a very fair and ſtrong external clavicle; but it is generally flattiſh, or not much produced. Though there is a vaſt difference of colouring in the dippers, it ſeems, nevertheleſs, that they are only varieties, and that this genus is not numerous. The Conchology-Plate IV. exhibits ſpecimens of theſe dipping-ſhells, or pewit's eggs, from Seba.

The ſecond genus in this family is the ſemiporcellanæ, or ſhells greatly reſembling the cypreæ or cowries in their appearance. Their aperture, however, is not ſo narrow, but more open, neither are the lips toothed or dentated; which are the differential characters eſtabliſhed between the two genera. We have ſeen that Grew, Rumphius, Seba, Argenville, Gualtieri, and others, have ranked them as cowries. Liſter calls them *concha veneris aperturâ non dentatâ*. Linnæus ranks them under bulla, with the nuces or dippers above deſcribed. Davila, refining on Argenville, divides the cowries into two genera, of toothed and not toothed; which latter is this kind; and Meuſchen, in like manner, makes them a diviſion of cowries, by the name of ſemiporcellanæ. The ſpecies of this genus are not very numerous; but among them Da Coſta reckons the poached egg, the weaver's ſhuttle, and a few other rare and curious ſhells; ſome of which are delineated in the engraving.

## CYPREÆ, PORCELLANÆ, OR COWRY SHELLS.

The porcellain or cowry ſhells are generally ſemi-oval, whoſe flat part is the mouth. The ſpires of the cowries in no wiſe appear externally, but make their revolutions quite latent, or within the body of the ſhell. The aperture is on the flat ſide; it is a narrow opening, or vent, the length of the ſhell. The lips are near together, broad, turning inwards, and toothed; the two ends, or extremes on the upper part, are very bumped and prominent. At one extreme it has a wry gutter, or opening, like the mouth of a ſoal or other flat fiſh; the other extreme has alſo a gutter, but it is ſtraight or perpendicular; and beſide it, in ſome kinds, there is another protuberance like a ſmall rude clavicle or turban.

The particular character of this genus is the deep toothing on the inner edges of the lips, which diſtinguiſhes it from the foregoing genus of ſemiporcellanæ. Linnæus has adopted this character; but Grew, Liſter, Argenville, Gualtieri, and others, not regarding it, have confounded them all together. The cowries are extremely numerous; and moſt of the ſpecies very beautiful in colour, and high in poliſh, whence they got the name of porcellain, or China ſhells. They have this elegant poliſh naturally from the ſea, entirely without the aid of art; and were they not common ſhells, they would, perhaps, be as highly valued as the volutes, or others of the curious or ſcarcer kind. They appear to be litoral ſhells, and chiefly inhabit the ſeas round iſlands; for the greateſt number of them are found at the Moluccas, the Maldives, Madagaſcar, the Eaſt and Weſt-India iſlands, and on the ſhores of South America, Aſia, and Africa.

Though the cowries are found in immenſe abundance in the living ſtate, they are very rarely ſeen foſſil; and, as they loſe their colours when in the foſſil ſtate, it is impoſſible to determine whether any of them are ſpecies yet undiſcovered alive. However, the kinds found foſſil near Turin, and in France, ſeem to be well known in the living ſtate.

Theſe ſhells being found ſo plentifully on all the coaſts of the Indian countries, became very early a ſubſtitute for money; and are ſtill uſed in traffic among the people of Hindoſtan, of Perſia, China, &c. In South America, and in Africa, they are not only uſed as a circulating medium; but their beautiful poliſh, variety in ſize, and diverſity of glowing colours, have induced the natives to uſe them as ornaments, appended either to the noſe or ears, or ſtrung as beads, and worn round the neck, arms, body, and legs. Specimens of this ſhell are exhibited in the Conchology-Plate IV.

## *Of TURBINATED or SPIRAL UNIVALVES.*

The turbinated ſhells, properly ſo called, are thoſe whoſe ſpires are external, contrary to the preceding diviſion, and which ſhew themſelves on the outer part of the ſhell, in what is called the clavicle or turban; which is either produced ſhort or flat, according to the ſeveral genera or ſpecies. Theſe turbinated univalves are the moſt difficult to arrange, and therefore authors, in their different ſyſtems, have diſplayed different methods. No wonder, ſince they only contain myriads of ſpecies more than all the other three diviſions put together; but beſides the characters of them are fraught with innumerable difficulties, chiefly owing to the contradictory opinions of ſo many different writers. Conchologiſts have moſtly formed their methods from one ſingle, or from a combination, of characters; but Da Coſta has fixed on the aperture, or mouth of the ſhell, for the eſſential character, in his arrangement of turbinated univalves. The aperture or mouth is therefore the diſtinguiſhing mark of the families; and the ſhapes, clavicles, colours, and works, of the ſhells, are uſed only as ſubordinate characters.

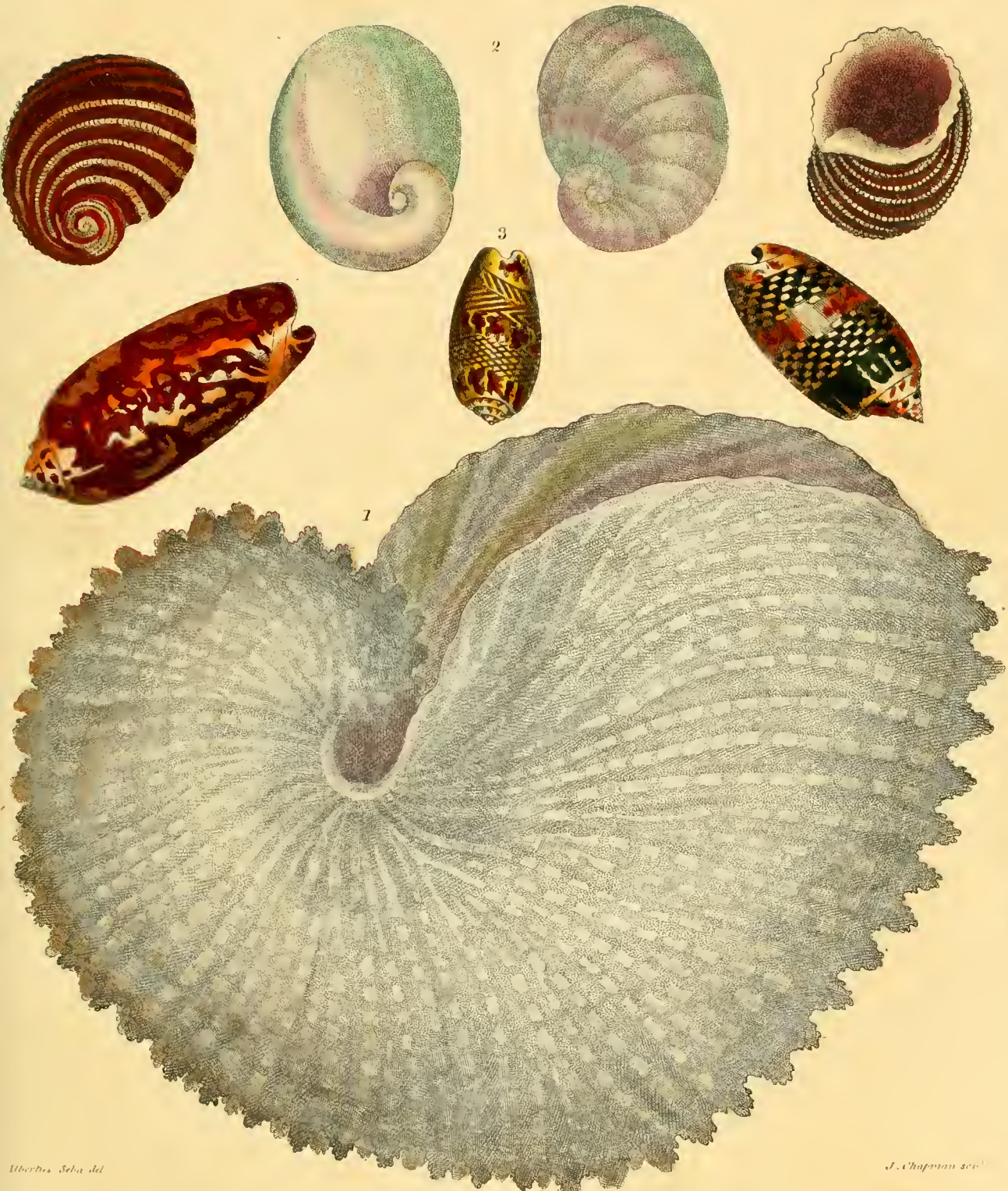
The families which conſtitute this diviſion of univalves, are, 1, the argonauts; 2, the aures-cochleæ, or ear-form ſnails; 3, the cylindars, or olives; 4, the volutes and cones; 5, the globoſæ, or rounded ſhells; 6, the caſſides, or helmets; 7, the trochi, or tops; 8, the cochleæ, or ſnails; 9, the buccina, or whelks; 10, the murices, or rock-like ſhells; all of which we ſhall explain in their order.

## THE ARGONAUT, OR PAPER NAUTILUS.

This family has no external ſpires, nor indeed is it, ſtrictly ſpeaking, a turbinated ſhell, except at the very head, which turns in one ſpire only; but, the ſhell being quite open, this ſpire is expoſed to view; for it is evident, if the ſhell was not open, or vaſcular, but, on the contrary, was cloſed or ſhut up, it would come under the claſs of revolved univalves; becauſe the ſpires, like as in the common or pearly nautilus, would be latent, or turn within the body of the ſhell. But though it is ſo unlike the nautilus in not being chambered, yet, in form and other particulars, it much agrees with that genus of ſhells. The definition of the argonaut, or cymbium family, is ſtated thus: they are ſhells, in their external ſhape reſembling a boat, whoſe upper part or head is narrow, turns ſpirally, and is like the ſtern; the reſt of it widens to the other end, is quite hollow, forms a horizontal aperture, and lies lower than the ſtern or ſpiral end. The ſpecies of this family amount only to five, of a browniſh or whitiſh ſtone-colour, and thin almoſt as paper, whence they obtained the name of *paper nautili*. Theſe ſhells are by moſt authors ranked with the common nautilus-fiſh, by the name of *nautili vacui*, on account of their ſailing; but it is evident, that in ſtructure they have not the leaſt affinity to one another.

Gualtieri firſt made them a ſeparate genus, under the name of cymbium, and Linnæus alſo makes it a diſtinct genus, and calls it argonauta. It is this fiſh that is the true ſailor, the nautilus of the Greeks and Latins, and which our celebrated Engliſh poet refers to when he ſays, "Learn of the little nautilus to ſail:" for it does not appear in any ſatisfactory manner, that the other kind, or pearly nautilus, ever ſails, or navigates his ſhell. Pliny gives a conciſe and elegant recital of its mode of navigation. It ſails, ſays he, after having diſcharged or pumped out the water from its ſhell, aloft on the ſea, extending a membrane of an admirable thinneſs, and caſting backwards two of his tentacula or arms; for he rows with the others; he ſteers his courſe, till, refilling his ſhell with water, he chooſes to ſink himſelf to the bottom.

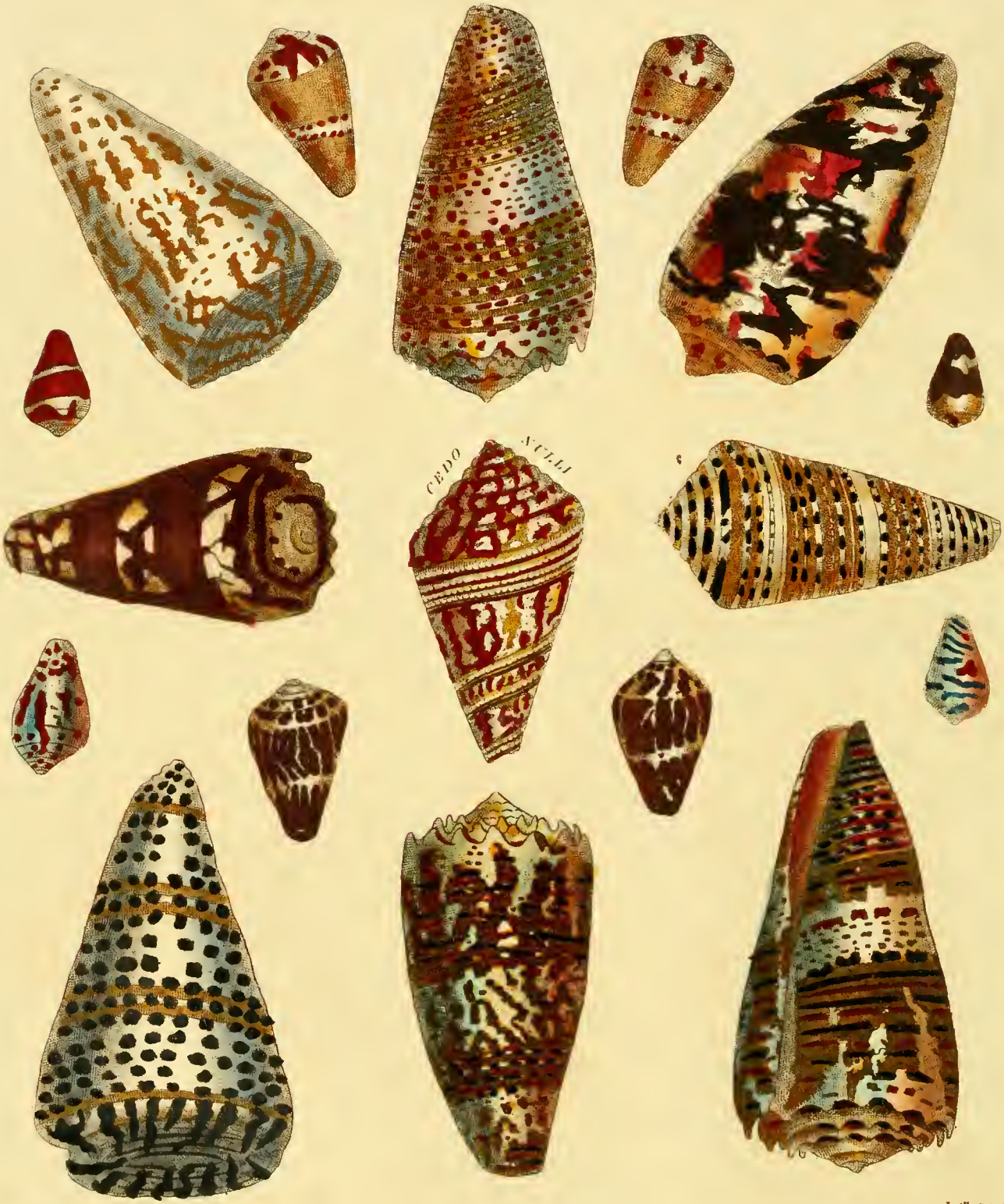
Theſe ſhells are found in many parts of the Mediterranean, and alſo in the Eaſt-Indian ſeas. Argenville, in his Zoomorphoſe, gives a recital of the liteſt obſervations relative to the animal and its ſailing. The fiſh is of the ſepia kind; its head is pretty big, with two large eyes; it has eight arms or tentaculæ, of a ſoft fleſhy ſubſtance; they are thicker towards the body, and are connected or webbed together by a ſlight membrane. They are of a ſilvery colour, ſet with ſuckers or knobs on the ſides, flatted like oars, which ſerve him to ſwim; and with theſe he ſeems to row and ſteer his veſſel. The ſix foremoſt are ſhort,




Uberties Seba del. J. Chapman sculp.

1. The Argonaut or Paper Nautilus. 2 Venus's Ear Shell. Sea Ears. 3 Cylindri or Olives.

London Published as the Act directs 1 July 1776 by T. Wilkes




J. Chapman sc.

Conus - The Cedo Nulli Imperial Crowns, & other curious Admirals.

London Published as the Act directs Sept.1st. 1810 by J. Wilkes.

ſhort, and he balances himſelf and extends them as he ſwims. The two hinder ones, longer than the others, he plunges in the ſea, to ſerve as a rudder; and theſe uphold the ſkin, or membrane, which he uſes for a ſail to catch the wind. Thus equipped, he navigates in calm weather; when fearful of danger, he retires within the ſhell, by which action it gains water, and ſinks. He often pumps the water out, and alſo quits the ſhell, which, floating empty, is carried by the waves, and either thrown on ſhore, or daſhed to pieces on the rocks.

The fiſh can quit the ſhell at pleaſure, for he appears not to be attached to it by any part of its body. Frequently he turns himſelf and ſhell topſy-turvy, and riſes with his head downwards from the bottom of the ſea; and, when he has gained the ſurface of the water, he turns his ſhell very nimbly, empties the water, extends his arms, and ſets ſail. They are frequently taken without their ſhells; and the fiſhermen muſt be extremely expert to catch them in it. This account, however, ſeems ſomewhat doubtful, becauſe we know not of any animals that have proper domicilia, who quit them voluntarily. Fear or neceſſity may poſſibly cauſe this ſeparation ſometimes. Beſides, as this animal may be ſuppoſed to frame its own habitation, like others of the teſtaceous kind, it ſeems neceſſary to have an attachment, however ſlight, to ſome one point, as that from which it uniformly extends itſelf for the formation of its ſhell: if this were not the caſe, is it poſſible to conceive, that a ſhell ſo delicate, ſo regular in every reſpect, could be fabricated? Knorr endeavours to account for this phenomenon, by ſuppoſing that the tentacula or arms of theſe animals, and even their fibres, act as ſuckers, and that they thus keep themſelves attached to their ſhell. For it is well known, that in this manner, if two ſmooth adheſive bodies touch one another in many places, they make a coheſion nearly as ſtrong as though they were united together: and who can decide whether the inhabitant of this ſhell does not ſtick by fibres infinitely ſmall in the cavities of the ſerratures which are found on the keel? and whether theſe fibres do not conſiſt of a viſcous liquor, which preſently diſſolves; and for that reaſon cannot ſo readily be obſerved? The uncertainty, however, of the mode of contact between this animal and its ſhell, has rendered the manner in which it conſtructs its abode very queſtionable; for there are ſome naturaliſts who ſcarcely conceive, by the formation of the ſhell, that a coheſion of any part of the animal's body therewith can be at all neceſſary; for in that caſe, ſay they, it would contract the growth of that part of the ſhell which adheres to the animal: yet they cannot explain how the part which is free from the ſhell can increaſe itſelf, though there are ſimilar proceſſes obſerved in nature. As when, for inſtance, a ſilk-worm is changed into the cryſalis or aurelia, it conſtructs its ſhell from its external ſkin; and taking the form of a butterfly, it keeps itſelf during the laſt period in this ſhell, without being attached, and afterwards freely comes out at its own pleaſure. Now, might not the paper nautilus conſtruct alſo a covering round its body from its own viſcous moiſture, which, afterwards growing hard, would come off from the animal entirely, and leave him a free habitation? This might really be the caſe, though it is offered as a mere ſuggeſtion. The animal being now diſengaged, the ſhell becomes thicker by the viſcous matter, which runs through the pores of the animal, or which it receives from the orifice of the new additions or folds, as the ſize of the fiſh increaſes. There is no foundation to ſuppoſe that the polype, ſometimes taken in this ſhell, is its natural inhabitant. And although we all agree that this creature is faſtened leſs firmly to its ſhell than other teſtaceous animals, yet we cannot but ſuppoſe that it is united, and has contact by ſome effectual means, though as yet undiſcovered, and unaſcertained by man. How elſe are we to explain the increaſe of its elevated ſides; the growth of the blunt teeth ſymmetrically ranged; and the organical ſtructure diſcovered by Mr. Heriſſant, without a ſuppoſition of there being a ſyſtem of veins or arteries within the ſhell, eſpecially ſince the animal has a form ſo totally different from that of its abode?

For a correct view of this ſhell, which is the argonauta argo of Linnæus, ſee the Conchology-Plate V.

## AURIS COCHLEÆ, or EAR-SHAPED SNAIL-SHELLS.

The eighth family is formed of the ear ſnails, or auris-cochlea, a combination of two names, which expreſſes the affinity theſe ſhells have to the ſea ears, while, at the ſame time, they are truly a kind of cochlea or ſnails. To this claſs belongs the Venus ear. Their ſhape ſo much reſembles the ſea ears, that moſt authors have ranked them in that family, and call them non-perforated ſea ears. Liſter and Gualtieri rank them as cochleæ, and Linnæus places them in his genus helix. Da Coſta defines the auris-cochleæ as follows: ſhells ſo wide and open as to reſemble ſea ears, but are not perforated or ſet with a row of holes. They have a broad ledge along one ſide, which projects over the cavity, and turbinates into one ſingle flat ſpire, quite even or level with the bottom of the ſhell. This ſpire is alſo very wide; and extends to near the middle of the bottom or under part: ſo that this family abſolutely participates of the characters and ſhapes of the ſea ears, and of the ſnails, and is, as it were, a combination of thoſe two families, as alſo one of the innumerable inſtances of the inſenſible progreſſions nature takes from one family to another; which progreſſions baffle human abilities to limit, or the refined definitions of the moſt accurate naturaliſts. Though there are great numbers of theſe ſhells, yet there are not many different ſpecies of them. They are figured in the engraving as the next in order to the argonaut, or paper nautilus.

## The CYLINDRI, or OLIVES.

Theſe ſhells are a ſpecies of voluta, and conſtitute Da Coſta's ninth family. They are of a cylindric form, and pointed at the lower end; the mouth is long, narrow, and notched on the top; the notch turning backwards, is large and ſomewhat awry, like the mouth of a flat fiſh; the pillar is faced half way down, and is greatly wrinkled or plaited; the turban is generally ſhort, very pointed, with the whirls or ſpires nearly level, or merely prominent one from the other; and the turban itſelf is divided from the body by only a mere prominent line.

This family, in moſt authors, is claſſed nearly in the ſame manner. Liſter calls them, rhombi five ſtrombi cylindracei. Rumphius forms a genus of them which he calls cylindri. Argenville makes them his eleventh family, and names them rhombus, cylindrus, or olea. Davila places them as two genera of volutes, viz. as the ſecond genus or cylindrical volutes or rouleaux, and as the third genus or dentated volutes or olives: and Meuſchen, whoſe ſeventeenth genus they are, alſo calls them cylindri five dactili. Gualtieri names them cochleæ cylindroideæ, and places them the next genus after the volutes; and Linnæus ranks them in his genus of voluta, by the name of cylindroideæ.

This family admits of being divided into two genera, viz. 1. Cylindri emarginati, or ſuch whoſe edge is quite even and ſharp. And, 2. Cylindri marginati, or ſuch whoſe edge is not ſharp and ſmooth, but has a very thick border, which turns over into a very prominent ledge on the back like the helmets. The ſpecies of this family are numerous, and are very beautiful ſhells. Specimens of them are given in the copper-plate.

## The VOLUTES and CONES.

The tenth family of this diviſion of univalves is the volutes and cones. It is very numerous in its ſpecies, and is the family which, for richneſs and beauty of colouring, ſurpaſſes almoſt all the other univalves, and is reckoned the great ornament or capital object of collections. The far greater number of cones always bear a

value; ſome kinds, as the admirals, &c. have borne aſtoniſhing prices when perfect; and the cedo nulli is ſo extremely rare and beautiful, that this ſhell alone has been rated at the prodigious ſum of one hundred guineas! See Conchology-Plate VI. for this great curioſity.

The volutes are ſhells of a pyramidal or conic ſhape; the baſe is flat and wide, and the body riſes gradually into a ſharp point at the top. The turban is the baſe, and all the whirls are diſtinguiſhed by ſlight linear prominences: ſome kinds have this baſe quite flat, or a perfect helix; in others it prolongs into a ſharp clavicle, as in the imperial crown, and many other ſimilar ſpecies. However, theſe differences of the turban, or clavicle, are not eſſential enough to cauſe a ſubdiviſion into different genera; though Davila's ſecond genus of volutes which he calls rouleaux, is formed on theſe differences. The aperture of the volutes runs the whole length of the ſhell; it is ſo extremely narrow as to be linear, being all along of an equal breadth. The volutes have no inner lip.

Dr. Liſter calls the volutes rhombi, or ſtrombi cylindro-pyramidales. Linnæus makes the volutes and cones two diſtinct genera. In the genus conus he places the moſt convoluted and turbinated of theſe ſhells; and adapts the name of voluta to the mitres, cylindars, and other ſpiral univalves, that have their pillar plaited or wrinkled. Gualtieri calls them cochleæ conoideæ, or cochleæ longæ; and moſt other authors, as Rumphius, Argenville, &c. make a diſtinct genus of them, by the eſtabliſhed name of voluta. Correct figures of theſe ſhells are exhibited in the annexed engravings.

## GLOBOSÆ, OR GLOBULAR SHELLS.

The eleventh family conſiſts of ſhells of a ſomewhat globoſe ſhape; the body being greatly ſwelled, or rounded, from whence they acquire the name of *globoſæ*, or *tuns*. They have ſhort turbans; the mouth is extremely patulous or wide, and very large; the upper part of it ends in a wry channel, like a ſoal's mouth, which is very ſhort, and turns backwards. None have a pillar or columella lip; though in ſome, as the Perſian crowns and melons, the columella or pillar itſelf is wrinkled or plaited.

The ſpecies which compriſe this family, are the tuns, partridges, figs, harps, Perſian crowns, and melons. The rank of this family, in ſyſtematical authors, is, that Liſter places thoſe with a wrinkled or plaited pillar, as the Perſian crowns, &c. among his wheiks of the ſame ſtructure; the tuns and figs among his buccina ampullaceæ; and the partridges, in a ſeparate claſs. Linnæus likewiſe places thoſe with a wrinkled or plaited pillar, on account of that ſtructure, in the genus voluta; and the partridges, tuns, harps, &c. among his buccina. Rumphius calls them cochleæ globoſæ; as does Argenville, who makes them his fourteenth family; Davila his ninth family, and divides them into three genera; Gualtieri has placed the figs as cochleæ pyriformes; and the tuns he calls cochleæ caſſidiformes, and caſſida. This family is not very numerous; but contains many extremely beautiful and curious ſhells; ſome of which are correctly figured in the copper-plates.

## CASSIDES, OR HELMET-FORMED SHELLS.

The twelfth family is the caſſides, or helmets. Theſe are ſhells ſemi-globoſe, the back being very convex or round, the under, or mouth part, flat. They have either flat or very ſhort clavicles or turbans. The mouth is long, rather narrow, and ends at the top in a gutter, which turns very large, ſtrong, and wry on the back; the lip is always ſtrongly and thickly toothed, and riſes into a high thick border, or ledge, on the upper part or back; and the pillar is moſt generally ſtrongly toothed, ridged, or ſet with ſmall bumps or aſperities.

Some ſyſtematical authors have agreed with Da Coſta in making a diſtinct or particular family of theſe ſhells, and call them caſſides. Such are Rumphius, Meuſchen, and Gualtieri. Linnæus ranks them as buccina; Argenville and Davila as murices; and Liſter among his buccina, by the name of bellied or ſwelled whelks, with a wry mouth. This genus is not numerous; but ſome of the ſpecies are extremely large and heavy. See the annexed engraving.

## TROCHI, OR TOP-LIKE SHELLS.

The thirteenth family is the trochi or tops. Theſe are ſhells of a conic or pyramidal ſhape, the top being broad and flatiiſh, and gradually tapering thence to a very ſharp point. The aperture, or mouth, is moſt generally angular, low, and narrow. It is remarkable, that all the authors who have written on conchology agree in this genus, and in its characters; ſo that few trochi are found miſplaced. It is a very numerous family, and abounds with curious and elegant ſhells.

There is a foſſil ſpecies of trochus, which ſeems yet undiſcovered in a recent ſtate. It is a large kind, flattiſh, and like a cochlea helix, generally about two inches in diameter, and ſtrongly and thickly wrinkled, with ſharp prominent ridges like plates, which are ſpiked at regular diſtances; theſe run acroſs the ſpires; but the whole ſhell is likewiſe ſlightly ſtriated. This trochus is found in the limeſtone of Coalbrookdale, in Shropſhire; and Dudley, in Staffordſhire. Figures of different ſpecies of the trochus are delineated in the annexed engraving.

## COCHLEÆ, OR SNAIL-SHELLS.

The fourteenth family conſiſts of the cochleæ, or ſnails; the character of which is a round mouth, or approaching thereto, perfectly bordered, circumſcribed, or defined, *(ore integro.)* This family is divided into five genera; viz. 1. Nerits, or ſnails with ſemicircular mouths. 2. Helices, or ſnails that are flattiſh, and whoſe ſpires lie, as it were, between two plains or levels. 3. Snails with a ſhort or flat turban. 4. Turbo, or ſnails with a produced or lengthened turban; hence called *turbines*. 5. Cochleæ ſtrombiformes, or ſnails whoſe turbans are extremely long and ſlender. All theſe we ſhall ſeparately deſcribe.

## NERITA, THE NERIT.

The nerits are ſhells whoſe mouths are a half circle, the columella or inner lip running diametrically acroſs it in a ſtraight line. This lip is very broad or faced, and extends greatly on the columella. They are very full-bodied ſhells, nearly globoſe; and the turban is never much produced, but lies flat or level with the bottom. The nerits are generally toothed on both lips.

The arrangement of this genus in all authors is near to or with the ſnails; and they are moſt generally called nerits. Rumphius calls them cochleæ valvatæ, and by many they are called ſemilunares. The ſpecies of this genus are very numerous, admit of great variety, and are generally beautiful ſhells.

There is found, in a calcareous ſubſtance in France, a large kind of foſſil nerit, called *limpet-like nerits*. It is a very thick ſhell, ſize of an apricot, and rather flattiſh. The upper ſide is a fine cheſnut brown, ſomewhat convex, and riſes to a knob or point which is not central, but placed ſideways. It is this upper ſide that reſembles a limpet. The under part is milk white, flattiſh, and round; the mouth ſemicircular, the inner lip riſes or ſwells, expands or faces quite to the upper ſide, and is armed with two ſtrong teeth. It is a very curious ſpecies, and is ſtill undiſcovered in a recent ſtate from the ſea. Several ſcarce and beautiful ſpecies of the nerit are given in the annexed copper-plate, from Albertus Seba.

## THE HELIX, OR SPIRAL SNAIL.

The eſſential character of this genus is, that they are moſt generally round-mouthed ſnails, whoſe ſpires lie horizontal, or between two levels. Moſt of them, being land or freſh-water ſhells, are placed by Liſter among the terreſtrial

Albertus Sohn del. J. Chapman sculp.

Volutes.—An Assemblage of Mitres and Papal Crowns

London Published as the Act directs August 25. 1822. by J. Wilkes.


Globoso. 1. The Persian or Ethiopian Crown. 2. A Harp. 3. A Cassida or Helmet. 4. A Partridge. 5. A Butterfly. 6. A Fig. 7. A Tun. 8. A Helon. 9. The Prepuce or Glans.

London Publish'd as the Act directs Oct.r 2.d 1802, by J.W.Wilkes.

terreſtrial and fluviatil ſnails; and the delphinus, a ſea kind, he has placed among the ſea ſnails. Gualtieri, like Liſter, places many among the land and river ſhells; and the ſea ſpecies he ranks as cochleæ depreſſæ. Argenville and Davila place them with the cochleæ ore depreſſo, or trochi; and the other authors rank them indiſcriminately with ſnails, by the names of poſt-horns and lamps. Dr. Gmelin has arranged them in a diſtinct genus. There are many curious ſpecies of them, ſome of which are exhibited in the annexed engraving.

The third genus of ſnails has a very ſhort, or but little produced, turbau; and that is their only character, as they agree in the mouth and other particulars with the reſt. Indeed this genus was formed by Da Coſta more for regularity and clearneſs in the method, than on account of its having any eſſential diſtinct character; and in moſt authors they are indiſcriminately intermixed with all the ſnail kind. This genus is very fertile in ſpecies, as it comprehends the land ſnails, and many others.

## TURBO, THE WREATHED OR TURBINATED SHELLS.

The ſnails with a produced or lengthened clavicle or turban, called turbo, form the fourth genus. Theſe have generally a perfect round mouth; the columella, or inner lip, is not much faced outwards, and the body-ſpire is very rotund, ſo that the turban is not inſenſibly, but ſuddenly or diſproportionately, produced from it, as in the buccina. The arrangement and names this genus bears with ſyſtematiſts are as follow: Liſter places them as a ſection of the ſnails; Gualtieri calls them cochleæ marinæ terreſtriformes; Rumphius, Argenville, Davila, and Meuſchen, cochleæ lunares, or round-mouthed ſnails; and Linnæus places them under a diſtinct genus of ſhell-fiſh he calls turbo.

There is a vaſt number of ſpecies of this genus, and moſtly very fine ſhells. Among them is the gold mouth, the ſilver mouth, the ſerpents ſkin, the Midas ear, &c. And that valuable ſhell the wentletrap is ranked by Linnæus in this genus, under the name *turbo ſcalaris*. It is an anecdote of the wentletrap worthy to be tranſmitted, as it ſhews the value of particular ſpecies at times, that, in 1753, at the ſale of commodore Liſle's ſhells at Langford's, four wentletraps were ſold for ſeventy-five pounds twelve ſhillings. Elegant ſpecimens of the turbinated ſhells are given in the copper-plates, from Seba and Knorr.

## STROMBIFORMES, OR NEEDLEFORM SHELLS.

The fifth and laſt genus of ſnails is called cochlea ſtrombiformes. They are very long and ſlender, tapering to a ſharp point, reſembling the ſtrombi, or needles; whence they are named *ſtrombiformes*. Theſe ſnails have a perfect round mouth, well defined or bordered, by which particular alone they are immediately diſtinguiſhed from the ſtrombi, or needles, which is a ſpecies ſtill more ſlender and delicate; but the mouths of the ſtrombi are long, and have a very thick columella beſide them, erect, and ſomewhat twirled; and many kinds are prolonged into a wry gutter, turning backwards, like the mouth of a ſoal, or other flat-fiſh. The firſt, or body-whirl or ſpire, is not more than proportionably ſwelled, ſo that the whole ſhell gradually tapers to a ſharp point. Liſter, who is critically methodical, has arranged this genus as ſnails with a very long and ſlender turban. Rumphius intermixes them, as does Argenville, Gualtieri, and Davila, who call them turbo or ſtrombus. Da Coſta places the ſtrombi amongſt the buccina. Meuſchen intermixes them; and Linnæus ranks them in his genus turbo. Seba divides them into two beautiful claſſes, as ſhewn in the annexed engraving.

A foſſil kind is found in the ſand-pits at Woolwich, in Kent, in immenſe quantities, which ſeems to be a ſpecies yet undiſcovered in a living or recent ſtate from the ſea. Da Coſta calls it cochleæ ſtrombiformis, clavata, from one inch and a half to two inches long, wrinkled, or ſtriated the whole run of the ſpires; and each ſpire is alſo circularly ſet with a row of depreſſions, like the mark of heads of nails.

## BUCCINUM, THE WHELK.

The fifteenth family of univalves is the buccina or whelks. It is chiefly this family that has created ſo many differences among writers on conchology. The immenſe quantity of ſpecies it contains, and the many ſubordinate characters of them; which ſubordinate characters moſt authors having attended to, and made them eſſential inſtead of ſubordinate, has produced all the perplexity and confuſion we meet with relative to this family. The error of authors in ſetting aſide the figure of the mouth, and framing their genera from ſubordinate characters, is not more viſible in any family of the teſtaceous animals, than in this. For the ſhells called buccina by the ſeveral conchologiſts, inſtead of being ſimilar mouthed ſhells, is a jumble of ſeveral families placed confuſedly together: and Liſter, though erroneous in ſome particulars, by ranging many kinds not truly buccina, ſeems, with Davila, to be the only authors who have arranged this family with any propriety or order.

Argenville, after criticiſing Liſter, makes the eſſential character of buccina to be a broad and very lengthened mouth; but he nowhere diſtinguiſhes the ſeveral genera, and therefore it becomes a ſcene of confuſion. Davila, who follows and corrects his method, defines them to have a large oblong aperture, and divides them into four genera; but the firſt genus which he calls whole-mouthed, without a tail or gutter, are not buccina, for their mouth is perfectly circumſcribed or bordered: ſuch are the Midas's ear, and others; for theſe ſhells, though in ſhape and appearance reſembling buccina, yet their mouth being perfectly circumſcribed or bordered, and devoid of gutter or beak, ſtrongly ſeparates them. Linnæus defines the buccina extremely well by an oval aperture ending in a gutter; but his ſelections of them are rather perplexed. The other authors, as Buonanni, Rumphius, &c. give no character for buccina, but range ſhells as ſuch, only as their fancy ſurmiſes.

Da Coſta defines all buccina to be ſhells whoſe mouths are an oblong or very lengthened oval, the upper part whereof is produced or lengthened into a gutter or ſlight beak: all other characters are ſubordinate, and ſerve only to conſtitute the different tribes of the ſame family. He therefore divides them into ſix genera, viz. 1. Buccina canaliculata, or guttered whelks; ſo called, becauſe the top of the mouth prolongs itſelf into a nearly ſtrait cylindric gutter, and the inner or columella lip is always extremely ſmooth. The ſpecies of this genus are very numerous. The varieties of work and ſhape, which are only ſubordinate characters, are amazing. The rank theſe guttered buccina hold in ſyſtematical authors, is as follows: Liſter's ſection xiv. of his fourth book, is, for the greater part, of this genus. Gualtieri places thoſe with ſhort clavicles or turbans, among what he calls cochleæ pyriformes; and thoſe with produced turbans he calls buccina. Davila makes them the third genus of buccina, which he calls buccina whoſe mouths terminate in a ſhort tail. Linnæus intermixes them among his ſeveral ſections; and the other authors place them indifferently, and only as buccina.

2. *Buccina recurviroſtra ſive plagioſtoma, buccina oris apice quaſi abſciſſo, roſtro vel canaliculo parvulo recurvo, & extrorſum correcto*: Wry-mouthed whelks. The top of the mouth of this genus is not prolonged or extended forward, but has a notch or crooked gutter, which turns outwards on the back, and exactly reſembles the mouth of a ſole or other flat fiſh. The ſpecies of this genus are very numerous; and the varieties of their ſhapes and works are vaſtly diverſified. Liſter and Davila have made a ſeparate genus of theſe whelks, ſolely on account of this character. Liſter calls them whelks whoſe tops are ſhort, or do not extend beyond the mouth. Davila makes them his

his ſecond genus, which he calls whelks with a notched mouth without any beak.

3. Buccina longiroſtra, ſuch as the purpuræ, tower of Babel, crane, thorny woodcock, and others having a very long and extended beak. Da Coſta ſays he does not meet with any author except Davila, who agrees with him in this genus; and he makes them his fourth genus, which he calls buccina whoſe mouths are furniſhed with a very long tail or beak. The purpuræ are properly to be placed with theſe buccina longiroſtra, and not form a diſtinct genus, for the diſtinctions between them are not built on real or deciſive characters. The purpuræ prey on other ſhell-fiſh, and for that purpoſe bore a round hole in the ſhells of the fiſh they feed upon, by paſſing their tongue, which is hard, bony, long, and ſharp, through the hole it bores. This practice of the animal was obſerved by the antient naturaliſts; Ariſtotle *de part animal.* and *Plinii hiſt. nat.* The latter ſays, the tongue of the purpura is a finger's length, by which it preys in boring or perforating other ſhells, it is of ſuch hardneſs. Some authors conclude that it performs this action of perforating other ſhells, by virtue of ſome menſtruum it emits through the tongue, whereby it ſoftens or corrodes the other ſhell, and then digs out the corroded ſubſtance with the beak, and all this without any verſatile or other ſtrong motion. Others contend, that to make this hole it is not neceſſary that the fiſh ſhould have a rotatory motion; or that, like a wheel, the tongue ſhould always move circularly the ſame way. It is ſufficient that it turns briſkly backwards and forwards. And, if the holes, which are moſt commonly found in ſome ſpecies of the chamæ, and the ſcrew ſhells particularly, are examined with a glaſs, they will be found to be ſo finely circular, that it is impoſſible to conceive any menſtruum ſhould act upon it in ſo regular a manner. Further, it does not ſeem concluſive that the purpura extracts its food by this hole. It is rather done with a view, either to force the animal out of its ſhell, or to kill it, that it may devour it at leiſure. There ſeems to be a wiſe choice in that part fixed upon. It is in ſuch a part of the ſcrew ſhell that the animal cannot crowd itſelf below the perforation, and eſcape the piercer: ſo likewiſe in the chamæ and other ſhells there is not the leaſt reaſon to apprehend a menſtruum.

Liſter has ſeveral ſhells he calls purpuræ, but theſe more eſpecially are his buccina ampullacea, Rumphius and Linnæus place them among the murices. Gualtieri calls them purpuræ. Argenville makes his thirteenth family purpuræ, but gives no definition for them: and Davila follows him, except that it is his eighth family, and that he forms two genera of them. The purpuræ obtained their name from the purple juice or dye the fiſh yields, which is ſo famous in hiſtory, by the name of the tyrian purple; becauſe it is imagined that a ſhell of this kind was firſt diſcovered to afford it: but indeed moſt turbinated ſhells yield a purple liquor. This genus of buccina longiroſtra contains many ſpecies very rare and curious.

4. Buccina umbilicata; umbilicated whelks, or thoſe that have a perpendicular hollow or navel aſide the columella or pillar-lip, on the firſt or body whirl. This is the poſitive character of the genus; and all buccina or whelks that have a hollow or navel, rank under it, whether guttered, wry-mouthed, or beaked, &c. No author beſides Da Coſta has formed a genus from this ſecond character, ſo that the ſhells herein ranked are generally diſperſed among the other buccina.

5. Buccina columella dentata vel plicata; whelks with a wrinkled or plaited pillar. The ſhells of this genus have the inner or pillar-lip wrought with one or more high or prominent tranſverſe ridges or plaits. Theſe tranſverſe prominent ridges on the inner or pillar-lip, are the ſtandard character of this genus; for all whelks, whether beaked, guttered, &c. if the pillar is thus plaited, range herein; and there are of all kinds with this character. However, it is very proper to obſerve, that it is only the whelks whoſe pillars are plaited, that are to be arranged in this genus; for there are other families of ſhells, as the Perſian crowns, the murices or rocks, &c. which have their inner or pillar-lip wrinkled or plaited in the ſame manner. Thoſe are to be placed in their reſpective families, and not here, ſolely on that account. Liſter and Linnæus are the only authors who have agreed with Da Coſta in ranging ſhells by this ſubordinate character. It is Liſter's buccina columella dentata: but he has not only arranged the buccina therein, but likewiſe all other ſhells whoſe pillars are plaited. Linnæus has done the ſame; and from this ſingle character of *columella plicata*, he has formed his genus voluta; in which not only buccina are included, but alſo olives, ſome murices or rocks, the Perſian crowns, Midas's ear, and other ſhell-fiſh of different families.

6. Strombi, or buccina with an exceeding long and very taper clavicle or turban. They have a wry-mouth exactly the ſame as the ſecond genus, which ſometimes extends or turns ſo far on the back, as to be like a ſpur. All ſhells ſo prodigiouſly tapering and long have been generally held as a particular family, by the name of ſtrombi, or needles, only on account of their taper ſhape, and without regard to the contour of their mouth. However, Da Coſta has only placed thoſe ſhells here, which have a wry-mouth like the ſecond genus; all thoſe that have a perfect round mouth, he has ranked among the ſnails, by the name of *cochleæ ſtrombiformes*. Liſter calls them whelks with an extreme lengthened and tapering turban: however, he has erroneouſly placed them among the whelks with a plaited pillar. Gualtieri and Seba have arranged all the taper ſhells together, and calls them turbo, or cochleæ with a ſmall mouth, and remarkable lengthened or taper body. The French authors Argenville and Davila call them all, turbo and ſtrombus (*la vis*, or *ſcrews*;) and Rumphius likewiſe calls them ſtrombus. Liſter has called the olives rhombi or ſtrombi; but Linnæus has changed the old name of ſtrombus, always uſed for theſe taper ſhells, to others of a quite different form; his ſtrombi, except ſome few, being winged ſhells, or alatæ.

The elder conchologiſts ranked in this genus the chank ſhells, or *tritonis* of Rumphius, ſo much revered in Hindooſtan, and other parts of Aſia. They are called *ſiankos*, or oblation ſhells; and are in great requeſt with the Mahometans, for making bracelets and thumb-rings, which are made uſe of in drawing the bows. The Hindoos employ them to hold oil, to illuminate their pagodas. Linnæus, in his ſhell-fiſh, has claſſed it under murex. It was uſed by the Romans in their earlier days, as a trumpet of war:

*Buccina jam priſcos cogebat ad arma Quirites.*

This ſhell is very common in India, Africa, and on the ſhores of the Mediterranean ſea; where it is ſtill uſed as a trumpet for ſounding alarms, and giving ſignals. It ſends forth a hollow, deep, ungrateful ſound.

There are ſome foſſil kinds of the buccina, hitherto undiſcovered in their living ſtate. Firſt, the buccinum heteroſtrophum, or other handed whelk; becauſe the whirls and mouth lie to the right-hand inſtead of the left; which is the moſt uſual manner of turbinated ſhells. This ſpecies belongs to the firſt genus, and is found in great plenty, in the foſſil ſtate, in the counties of Eſſex and Suffolk. Another foſſil buccinum from France, and Hampſhire, is a ſpecies of the fifth genus, or with a wrinkled or plaited pillar, but hitherto unknown recent. It is in Brander's Foſſ. Hanton. The annexed engravings exhibit an aſſemblage of different ſpecies of buccina.

## MUREX, THE ROCK-SHELL.

The murices conſtitute the ſixteenth and laſt family of univalves, according to Da Coſta's claſſification. As they conſiſt of many ſhells that have very different ſubordinate characters, Da Coſta forms different genera of them; but the fixed or eſſential character is an oblong

Albertus Seba Del. J. Chapman sc

Trochi, or Top shaped Shells.

London Published as the Act directs Oct.26.1802 by J.Wilkes.


Albanus Seba del Chapman sc

1 to 6, Nerits. 7 to 11, Helices. 12 to 16, Turbinated Shells: viz. the pearl-spotted Sarmaticus: the Gold-mouth: the Silver-mouth Chinese Bonnets: and 17, the Wentletrap.

London Published Dec.r 24 1801 by J. Wilkes

and equally narrow mouth lengthways, which runs into a ſhort gutter at the top. Moſt authors have added another character, that is, of always being thorny or ſpiked, bumped, or otherwiſe rough all over the ſurface, like the ſpikes or aſperities of rugged rocks, from which it obtained the Latin name of *murex*, the Engliſh one of *rocks*, and the French name of *rochers*; but this character does not hold throughout the genus.

The murices are divided into four genera, viz. 1. Murex, or rock-ſhells, whoſe mouth is oblong, narrow, and ends in a gutter at the top; the clavicle or turban being generally ſhort or nearly flat, and the pillar wrinkled or plaited. They are moſt commonly very thick ſhells, and extremely rugged on the outſide, from being wrought with humps, prongs, foliations, and other ſimilar works. This genus is very numerous, and ſome of the ſpecies are vaſtly large and heavy.

2. Rhombi, or ſhells whoſe ſubordinate character is to have always a rhombic ſhape or contour, from which particular alone, as it carries an idea of the ſubjects propoſed, they have the name of rhombi. In the elder authors we find ſhells called rhombi, but which appears to be a mere name without meaning or application. Thus Columna makes rhombus, turbo, ſtrombus, and trochus, all ſynonymous. Liſter calls the volutes and olives, rhombi, or ſtrombi; and Sibbald, Woodward, &c. do the ſame; but in the modern authors, we ſeldom ſee the name of rhombus uſed. This confuſion apparently ariſes from the double meaning of the Latin word *rhombus*, which not only ſignifies a lozenge or rhombic figure, but alſo a reel, a ſpinning-wheel, a whirl, or other rolling inſtrument; and it is from this laſt ſimilitude the olives and ſuch like ſhells have been called rhombi, by the elder authors, and not from a lozenge or rhombic figure, as ſome have erroneouſly imagined. This genus is not ſo numerous as the preceding, but contains many beautiful ſhells; and ſome very large and heavy. There is an elegant foſſil ſpecies of rhombus, not yet diſcovered in a living ſtate, found in France, and in Hordell cliffs near Chriſtchurch, in Hampſhire. It is curiouſly figured in Brander's Foſſilia Hantonienſia.

The third genus is the alatæ, or winged rocks; ſo named by moſt authors from their lip being greatly extended, or expanded outwards, like a flap or wing. Some few kinds have the wing quite ſimple, or with the edges even; but the greater part of theſe, as alſo of the aporrhais, have alſo near the top of the mouth a broad hollowed ſinus, called the *ſcoop*, from which appendage Liſter names them *purpuræ ſeu buccina bilinguia*. Rumphius and Meuſchen make a diſtinct genus of them, which they call alatæ. Davila ranks theſe by themſelves in the third genus of his murices, by the name of ſimple winged ſhells; and Linnæus ranks all the winged ſhells together in his genus ſtrombus. This genus is very numerous, and contains many beautiful and coſtly ſhells. An elegant and large foſſil kind of this ſhell, not yet diſcovered living, is alſo found in Hordell cliffs in Hampſhire, and figured in Brander's Foſſilia Hantonienſia.

The fourth genus of murices is the aporrhais, or ſpider-ſhells, whoſe edges are ſet with ſtrong and large prongs or fingers; hence they are called ſpider-ſhells, devil's-claws, &c. Davila makes theſe his fourth genus of murices, which he calls winged murices with prongs or fingers; but all the other authors have intermixed them with the alatæ. The ſpecies are few, but they are elegant ſhells.—See ſpecimens of them in the annexed copper-plates. A ſpecies of murex has been found on the coaſts of Guayaquil and Guatimala in South America, which is ſaid to produce a purple colour ſuperior to the famed Tyrian dye. The abbé Raynal ſays of it, that no colour yet known can be compared with this, either as to luſtre, liveline's, or duration. The progreſs of modern chemiſtry, however, in the art of dying, has ſuperceded all theſe far-fetched encomiums. Theſe terminate all the families and genera of univalve ſhells. They are certainly the moſt numerous of the teſtaceous animals, and greatly exceed the two general diviſions of bivalves and multivalves joined together. In this aſſemblage of univalves the ſtupendous works of the creation are ſingularly manifeſted, by the immenſity of beauties in their colours and ſtructures. On this account it is that univalves are in general the choiceſt objects of collectors, and bear more value than bivalves or multivalves.

### *Of BIVALVES, or DOUBLE SHELLS.*

Theſe are compoſed of two pieces, or parts, which, by means of a connexion by hinges, play on each other, ſo as to open or ſhut, and perform all other functions neceſſary to the economy or way of life of the animal included in them. In relation to the fiſhes which inhabit them, they are deſcribed under their generic names, from the ſyſtem of Linnæus; it being the buſineſs of conchology to deſcribe the ſhells, and not the animals, or any of their parts.

This diviſion of bivalves may be arranged under three general heads, viz. ſhells that have *unequal* valves, and ſhut cloſe; as the eſcallops, oyſters, anomiæ, &c. ſhells that have *equal* valves and ſhut cloſe; as the cockles, tellens, muſcles, &c. and ſhells with valves that *never ſhut cloſe*, but are always open or gaping in ſome part; as the tridacnæ, baſon-ſhells, or bears paws, the chamæ, pinnæ, ſolenes, &c. Under theſe three arrangements all the bivalves yet known may be ranked. Theſe three arrangements are alſo general ones; but the chief or eſſential character of bivalves is their cardo, or hinge; and therefore by that character alone the families are diſtinguiſhed.

Liſter begins his hiſtory of ſhells with the bivalves, which he divides into two parts, and into twelve families. In his arrangement he has great regard to the character of the hinge, though he does not entirely build upon it. His method, however, wants correction in his third family, or margaritiferæ; in his ſeventh family, his placing the Noah's arks or boats, as muſcles; in his ninth family of tellens, which is not truly defined; and, laſtly, in his making two families of the chama and chama pholas, which in reality have no poſitive character to diſtinguiſh them. Dr. Grew, in his Muſeum Regalis Societatis, gives, as his ſeventh ſcheme of ſhells, that of the bivalves and multivalves; but it is ſo confuſed as to be uſeleſs as a ſyſtematic work; however, his two chief diviſions of bivalves are into inarticulate, and articulate, hinges. Breynius's ſcheme of bivalves is very jejune and uſeleſs. Argenville divides all his bivalves into ſix families, viz. oyſters; chamæ; muſcles, tellens, and pinnæ, cordiformes, or cockles; eſcallops; and ſolens. This author's method is entirely arbitrary; nor does he characterize a ſingle family by the cardo or hinge.

Gualtieri forms his method from thoſe whoſe valves and ſides are equal or ſimilar, which is his firſt claſs; his ſecond claſs conſiſts of thoſe whoſe valves are equal, and their ſides unequal or diſſimilar; and his third claſs is of ſhells with unequal valves. By this arrangement he rejects the hinges as characters, and mixes all the families together, ſolely on account of their ſimilar or diſſimilar ſides; ſo that it is impoſſible to collate his method in ſuch a manner as to be of much utility to the learner of conchology. The method of Mr. Tournefort divides all bivalves into two parts: firſt, ſuch as ſhut cloſe all round; and, ſecond, ſuch as are always open or gaping in ſome part. This diviſion, though good, is incomplete, and his families and genera are very arbitrary. Linnæus, in deſcribing the included animals or fiſh, divides all bivalves into fourteen genera, which he characteriſes by their hinges in a very accurate manner; and his method ſeems to be the moſt perfect of any yet publiſhed. His arrangement is as follows: Mya, the pearl-oyſter; ſolen, the knife-handle; tellina, the tellen; cardium, the cockle; mactra, the pellucid oyſter; donax, truncated or flat-ſided cockle; Venus, or concha-venerea, gaping ſhells, ſo named from their reſemblance to the pudenda of women; ſpondylus, the thorny oyſter; chama, ſhells of the

cockle form, but immenſely large; arca, ſhells formed like an ark; oſtrea, the eſcallop, common oyſter, &c. anomia, the beaked cockle; mytilus, the muſcle; pinna, the ſea-wing or ham. He alſo very accurately deſcribes the ſingular habits and curious economy of many of theſe ſhell-fiſh, which ſee under their reſpective names in this work.

Dr. Woodward, in his catalogue of foſſils, has given a very good method of bivalves, on the character of the hinges, and alſo on the form; but his ſyſtem of univalves is very faulty and imperfect. The technical terms commonly uſed for deſcribing the parts of bivalves, and which are requiſite for making their deſcriptions intelligible, are as follow: The ſummit, *(apex,)* is the part whereon the teeth, joints, or properly the hinges, are placed. The beaks, *(umbones,)* are the peaked ends of the ſhell, which moſt generally ſtand behind the ſummit, or that part which anſwers to it. The margins, or borders, *(margines,)* are the edges or contour of the ſhell, produced from the beak or hinge on either ſide. The ſurfaces, *(ſuperficies,)* concavitas & convexitas concharum; the convex expreſſes the exterior or convex ſide of the ſhells, and the concave, the inſide. The *length* of a bivalve is from the beak or hinge to the very oppoſite extreme. The *breadth* is from ſide to ſide. The margins or borders are ſaid to be *ſimilar*, if equally produced or extended from the ſummit, or of equal length; and *diſſimilar*, if unequal or more extended on one ſide than on the other. The hinge, *(cardo,)* is the part that connects the two valves together, that is to ſay, the joints on which they play in the actions of opening and ſhutting. A hinge is ſaid to be *inarticulate*, when not ſet with any viſible joints or teeth; *articulate*, when ſet with ſome few; *multarticulate*, when ſet with many, or a large number. The furrow, *(ſulcus canaliculus,)* is the gutter or furrow, when the ſhells are cloſed, that is extended, or runs along parallel to the hinge. The ſlopes, *(declivitas,)* are the places which ſlope or ſlant from the beak down the ſides, and generally are ſlightly flatted, ſhallow, or concave. The vent, *(rima,)* is the opening of the ſhells on the ſlopes. The cartilage, *(cartilago,)* joins the valves together at the furrow and at the ſlopes. The flat, *(planities, latus complanatum,)* is that ſide of thoſe ſhells that is flat; as the flats of the heart cockles, bears paws, &c.

## BIVALVES WITH UNEQUAL VALVES.

Theſe conſiſt of ſhells that have irregular valves, and ſhut cloſe. The firſt family conſiſts of the pectens, or eſcallops. Though ſome ſpecies of them have equal valves, yet, as the far greater number have unequal valves, viz. a flat and a concave ſide, they are ranged under this general head. The ſame particular likewiſe occurs in the families of the ſpondyles and oyſters.

ESCALLOP.—The eſſential character of the eſcallop family, is a trigonal ſinus, and an elaſtic cartilage for its hinge in the very center of the top of the ſhell. The ſubordinate characters of eſcallops are their being eared; indeed moſt authors have injudiciouſly made it the *chief* character, whereas there are other eared ſhells beſides eſcallops, as the ſpondyles, margaritiferæ, &c. and, *vice verſa*, there may be eſcallops without ears. The other ſubordinate character is to have the top run into a perfect ſtrait line, and thence gradually widen to a round bottom. The ſpecies are numerous, ſome whereof are very curious, and of great beauty, as the ducal mantle, the compaſs or ſole, the duck's foot or coral-eſcallop, &c.

It is worthy of remark, that the colours of the under ſhells of eſcallops are always fainter than the colours of the upper ſhells, and ſometimes the valves are differently coloured, as the compaſs or ſole, which has one valve of a cheſnut brown, the other valve milk white. Moſt authors rank theſe ſhells as a particular family, and call them pectens. Gualteri makes different genera of thoſe with equal, and thoſe with unequal, valves; the former he calls pecten, the latter concha pectinata; and the eſcallops with unequal or ſingle ears, he calls pectunculi. Linnæus makes them a genus of oyſters, and has accordingly arranged them under the generic name OSTREA. It is ſaid, that eſcallops will move ſo ſtrongly as ſometimes to leap out of the baſket wherein they are placed when taken: their mode of leaping, or raiſing themſelves up, is by forcing their under valve againſt the body whereon they lie.

The chief kinds of foſſil eſcallops yet in an undiſcovered ſtate, are as follow: The firſt is about the ſize of the common oyſter, with large but unequal ears, of a perfectly round contour; the ſurface tranſverſely thick ſet with prominent ſharp thin ridges, like plates. The valves are equal. Theſe are found very frequently in the quarries at Thame in Oxfordſhire. A ſecond kind, very elegant, is about double the ſize of a cockle, the valves unequal, one being quite flat, the other exceedingly concave. It is thickly ridged lengthways, with many common ridges and intermediate ones, that are very prominent or high, and the furrows are broad and deep. It is found in the quarries of Dorſetſhire, Wiltſhire, and the adjacent counties; and ſometimes in the chalk-pits of Kent and Surrey.

SPONDYLE.—The ſecond family in this diviſion is the ſpondyli. The ſpondyles are moſt generally eared ſhells with unequal valves, rude or uncouth in ſhape, partaking of the ruggedneſs of the oyſter, with ſomewhat of the eſcallop form, ſo as to produce a medium between the two families. However, the ſpondyles, like the eſcallops, have ſome ſpecies with equal valves, and without ears. The eſſential character is the hinge, which in the upper ſhell conſiſts of a triangular hollow and cartilage, like the eſcallop, in the very center; on each ſide of which is a large deep cavity, and a very large thick and prominent tooth or joint lies on each ſide of the cavity. The ſummit and beak of the under valve is alſo extremely thick and ſtrong, and extends from the hinge outwards into a broad triangular ſlope or flat.

Some kinds of ſpondyles are thickly and curiouſly ſet with long thorns or ſpikes; theſe are generally called *thorny oyſters*, and, when perfect, are greatly valued. This family is not very numerous in its ſpecies. Liſter, Woodward, Gualtieri, Linnæus, and Meuſchen, all rank them as a particular genus, by the name of ſpondylus; but Rumphius, Argenville, and Davila, rank them very erroneouſly as oyſters.

OYSTER.—The third family in this diviſion is the oſtreum, or oyſter. The oyſters have unequal valves, though there are ſome ſpecies that have equal valves, but none are eared. The hinge of this family has not any teeth, but conſiſts of one large inarticulate gutter running the length of the top of the ſhell, in both ſhells alike, and is covered and filled with a ſtrong cartilage. The ſpecies are very numerous; ſome of which are curious, though not beautiful, and bear a large price, as the hammer oyſter, the cockſcombs, &c. This family is ranked as a diſtinct one by all authors, but with many additions or omiſſions: as for example, Linnæus ranks the eſcallops with them, and Argenville and others the ſpondyles, while Liſter ranks the hammer oyſter, and ſome others, as eſcallops.

It is not uncommon to ſee on oyſter-ſhells, when in a dark place, a ſhining matter or bluiſh light like phoſphorus, which ſticks to the fingers when touched, and continues ſhining and giving light for a conſiderable time, though without any ſenſible heat. This ſhining matter being ſubjected to the microſcope, is found to conſiſt of three kinds of animalcules; the firſt whitiſh, and having twenty-four or twenty-five legs on a ſide, forked, and a black ſpeck on the head, the back like an eel with its ſkin ſtripped off. The ſecond ſort is red, reſembling the common glow-worm, with folds on its back, and legs like the former, a noſe like a dog, and one eye in front of the head. The third kind is ſpeckled, with a head like a ſole, with many tufts of whitiſh hairs on the ſides of it.

The foſſil oyſters yet undiſcovered in a recent or living ſtate,

*Alberto Seba del.* *J. Chapman sc.*

*Turbo Delphinus. The most scarce and beautiful of the Turbinated Shells.*

*Published Jan.ʸ 25.ᵗʰ 1765 by J. Wilkes*

Albertus Seba del. J. Chapman sc.

*Strombiformes, or Needle-shaped Shells.*

London Published as the Act directs Nov.r 6 1802 by J.Wilkes.

ſtate, are very many; the chief of them are the gryphytæ of the foſſilogiſts, of which there are ſeveral ſpecies: and a very large flat kind with equal valves, found in Shotover and Heddington quarries, in Oxfordſhire. But the largeſt bed that is known of foſſil oyſters, is that near Reading, in Berkſhire. They are entirely ſhaped, and have the ſame ſubſtance with the recent oyſter-ſhells; and yet, ſince the oldeſt hiſtories that mention the place, give an account of them, we muſt ſuppoſe they have lain there in the ſame ſtate for a long time. They extend over no leſs than ſix acres of ground; and juſt above them is a large ſtratum of a greeniſh loam, which ſome writers call a green earth, and others a green ſand. It is compoſed of a crumbly marle, and a large portion of ſand. Under them is a thick ſtratum of chalk. They all lie in a level bed; and the ſtrata above the ſhells are natural, and appear never to have been dug through till the time of finding the ſhells. The oyſter-ſhells and green earth united make a ſtratum of about two feet thick; and over this there is a much thicker ſtratum of a bluiſh and very brittle clay; but neither has this ever been dug through, except where the ſhells are found. This is vulgarly denominated *piercy-clay*, and is eſteemed uſeleſs. This clay-bed is about a yard deep, and above it is a ſtratum of fuller's earth, about two feet and a half deep; it is extremely good, and is uſed by the clothiers. Over this there lies a ſtratum of a fine white ſand, unmixed either with the clay or fuller's earth: this is near ſeven feet deep, and above it is a ſtratum of a ſtiff red clay, of which tiles are made. This is again covered with a little vegetable mould; the depth, however, of this ſtratum of tile-clay cannot be aſcertained, on account of the unevenneſs of the hill. Theſe oyſters are occaſionally found whole, but moſt frequently in ſingle ſhells. When they are in pairs, there is generally ſome of the green ſand found within them: they ſeldom ſtick very faſt together; ſo that, unleſs very carefully taken up, it is not eaſy to preſerve them in pairs.

ANOMIA.—The fourth and laſt family in the diviſion of ſhells with unequal valves, and that ſhut cloſe, is the anomiæ. This family has long been known foſſil, and contains a great number of ſpecies, all of which, except three or four, remain yet undiſcovered in a living ſtate; and even the few known are diſcoveries made within the laſt forty years. Columna firſt mentioned ſome foſſil ſpecies, and he being convinced that all foſſil ſhells were real exuviæ or ſpoils of animals, and not finding theſe deſcribed or noticed by conchologiſts as ſhells, called them conchæ rariores anomiæ; which word *anomia* has ſince been ſo generally uſed for them, that it is now become the univerſal and eſtabliſhed name of the family.

Columna deſcribed and figured ſome foſſil kinds. Liſter has alſo figured ſeveral in his Appendix de Conchitis to his Hiſtoria Conchyliorum; but no recent kind being diſcovered ſo early, is the reaſon that neither he, Buonanni, Rumphius, nor other early authors, have taken any notice of them. Dr. Woodward was the firſt who arranged the anomiæ from the foſſil ſhells. He kept the eſtabliſhed name, and ranked them with ſhells of unequal valves, and not eared; and further defined them to have both valves convex, and one of them beaked. He then arranged them into ſmooth, ſtriated, and fulcated, each of which articles has ſeveral neceſſary ſubdiviſions. Woodward had only foſſil ſhells to inſpect, conſequently he could not accurately define their peculiar interior ſtructure, or their hinge: his definition, however, is very juſt, except that he makes both ſhells convex, which is not ſo in ſeveral ſpecies.

Gualtieri, who figures three recent kinds, has made a particular genus for them, and calls it *terebratula*. He defines them, very erroneouſly, as ſhells with equal valves, and diſſimilar ſides, of a peculiar ſtructure, for inſtead of a beak it has a perforation, and alſo has a very ſingular articulation or connection within-ſide. Linnæus, to eſtabliſh his uſual preciſion, poſſeſſed ſome of the living ſhells, and made them his genus 314 anomiæ. He has mixed the recent with the foſſil kinds, and defines them to be ſhells with unequal valves, one valve being flattiſh, the other convex, the beak perforated, and the hinge inarticulate or toothleſs. However, he miſtook ſome ſpecies; for he propoſed the gryphites, which, by all its characters, is a true oyſter, and the pellucid or glaſs Chineſe oyſter, improperly ſo called, as ſpecies of anomiæ. Davila treats this claſs ſyſtematically, and as a genus of his firſt family of oyſters. He defines them as ſhells whoſe beak or top of the under valve is perforated, and riſes curved up on the upper valve. He does not, however, particularize any characters of the hinge, though he gives an excellent figure of the inner ſtructure, or appendices. He deſcribes them in the following manner: the hinge of the under valve is compoſed of two ſmall hooks, which are taken in or hinged into the ſinuſes or cavities of the upper valve; and it has two interior appendages fixed towards the top of the upper valve: this ſtructure he obſerved in two ſpecies. In another ſpecies, the hinge was nearly the ſame, but had two long and narrow ſide appendages proceeding from the top of the upper valve, which extend themſelves to the middle of it, where they are bound or ſtopped by two ſmall ligaments, and then return again towards the top, in a very remarkable and curious manner. And a third ſort, (which is that of Gualtieri,) has an interior appendage, ſomewhat like a perpendicular gutter or pipe, fixed at the top, and running down to the middle of the upper valve.

Da Coſta defines the anomiæ as follows, bivalves with unequal valves and never eared, the beak of the largeſt or under valve is greatly produced, and riſes or curves over the beak of the ſmaller or upper valve, and is perforated or pierced through like a tube, from which particular they have alſo obtained the name of *terebratulæ*. The hinge is inarticulate or toothleſs, and they have always a remarkable interior ſtructure. Yet, by what obſervations can be made, ſome of the foſſil kinds have an evident multarticulate or many-toothed hinge. It ſeems therefore, that the valves of the anomiæ are connected together in two ways, inſtead of being only inarticulate, viz. 1. By an inarticulate hinge; and, 2. By a multarticulate hinge. The firſt ſet have no teeth or joints on the hinge; but the ſmaller or upper valve is always indented into a wide ſinus, or opening of the larger or under valve, in which it plays like a joint, when the exigencies of the animal require opening or ſhutting. The ſecond ſet have a viſible and regular multarticulate hinge; exactly like that of the Noah's arks, or the multarticulate cockles.

On a due conſideration of the deep grooves, the indentings, the undulated margins, and other diſtortions, of theſe ſhells, more than in any other genera, and by the beak, which is perforated or tubular quite within, it would appear that theſe animals ſeldom open their ſhells, as moſt others do, to take their food; but nouriſh themſelves through the tube or perforated beak only. By obſervations made on the few living ſpecies lately diſcovered, this opinion ſtands in ſome meaſure confirmed; as the living anomiæ have all been found lurking in the nooks between the branchings of corals, or cavities of rocks. They lie therein lifted upon their flat ſurfaces horizontally, without any prop or ſolid body to reſt on, but are upheld or ſuſtained only by a ſtrong adheſion of their tubes or perforated beaks to the ſides of the cavities, as if in the action of ſucking; and this poſition is the general one of the recent kinds. It appears likewiſe that the hole in the beak of the conchæ anomiæ is for the purpoſe of tranſmitting a ſtrong ligament or griſtly ſubſtance, by which they adhere firmly to the rocks, corals, &c. in the ſame manner as that claſs of ſhells commonly called bears paws; at leaſt ſome ſpecies of them have an opening between the two valves on one ſide the hinge, through which paſſes, from the inſide of the ſhells, a ſtrong ligament, whereby the fiſh adheres firmly to any contiguous body. The interior ſtructure of one of the living kinds ſeems alſo not at all particularly adapted

to the especial use of opening the shells. It consists of a gristly or bony thin string, which twists in and out to above half-way within the shells, like the twistings of ribbands, vulgarly called *true lovers knots*. This is the second sort mentioned by Davila. The other structure, which is Davila's third sort, is a guttered triangular appendage, with a cut or vent half-way down it, fixed perpendicularly on the upper valve, from the top or beak, to the middle of the shell.

A very surprising and unaccountable circumstance, relative to the fossil and recent testaceous animals, already noted, is, that all those found in immense quantities in the fossil state, are hardly known recent; and *vice versa*. This is instanced in the ammonia, which are found in incredible quantities fossil all over the world, though none are yet discovered recent or living; and this family of anomia, though also found fossil in an astonishing abundance, has very few living species yet discovered. See the article ANOMIA, vol. i. p. 741.

Da Costa divides this family of anomiæ into two genera, viz. 1. Inarticulate anomiæ, or those in which the hinge of the under valve is of a large sinus or cavity, the corners whereof form two prominencies or joints; and the upper valve is indented into it by a correspondent prominency to the cavity, and by two small hollows, answerable to the two prominencies or joints. 2. Multarticulate anomiæ, or those whose hinge lies on a long straight line, and is set with many teeth, exactly like the Noah's arks.—See figures of this division of bivalves, in the annexed engravings.

## BIVALVES WITH EQUAL VALVES.

These consist of shells that have equal sides, and shut close; such as the cockles, tellens, muscles, &c. These again admit of three divisions, viz. 1. Multarticulate, or with a great number of teeth or articulations on the hinges. 2. Articulate, or with few teeth; and, 3. Inarticulate, or without any teeth. The multarticulate shells are called leptopolyginglymi, and consist of the three following families.

PECTINOIDÆ.—These are shells with equal valves, generally very flat; the hinge lies on a straight line like the escallop, but is set with several parallel and straight ridges and intermediate furrows, and the sides are dissimilar. There are but few species of them. Lister ranks the two kinds he figures by the name of pectines margaritiferæ polyginglymi. Woodward, among his pectunculi leptopolyginglymi figura oblonga. Gualtieri figures a kind, and calls it concha longa brachiata; and Seba figures some among the pinnæ, and calls them volsella: but they are not methodized in any other writer on conchology. There is a very large and extremely thick species of this family not yet known in a living state, found fossil at Bononia in Italy, which is fully described and figured in the memoirs of the Bononian Institute.

PECTUNCULI POLYGINGLYMI.—The shells of this family resemble the cockle in all respects except the hinge; which in these is multarticulate, or furnished with a great number of teeth, but in the cockles there are only a few. The rank these shells hold in Lister, is pectunculi leptopolyginglymi margine rotundâ. Woodward places them in his class 3, on account of their being of a roundish shape, *(figura subrotundâ.)* Linnæus ranks them among his arcs; and the other authors have mixed them indiscriminately with the common articulate cockles.

ARCA.—This family contains Linnæus's genera of arks or boats, which are such shells as have their hinges on a perfect straight line, and are of a somewhat squarish figure, or oblong; as the Noah's ark, square cockle, &c. Lister puts some of this kind among the multarticulate cockles; and the Noah's arks he places among the muscles, by the name of many-toothed muscles. Woodward ranks them among his polyginglymi formâ oblongâ. Argenville places them in his fourth family of heart-shaped cockles; but Davila makes them a distinct genus of his fourth family, and calls them arks. Gualtieri forms a genus of them by the name of concha rhomboïdalis; and Meuschen also ranks them as a distinct genus of arks. Dr. Gmelin enumerates forty-three species, some of which are very curious and valuable shells. To this family of arks Da Costa imagines the fossil hippocephaloidæ belongs, and that they are a species of it yet undiscovered living from the sea: his reason for ranking them with the arks, and not the cunei, is, that they appear to be multarticulate shells.

COCKLE.—The essential character of these shells is, a curved or semilunar hinge, set with from two to four strong teeth. This family is so extremely numerous, and has besides such striking or remarkable subordinate characters, that it is with great propriety divided into three genera, viz. 1. The cardium, or common cockle. 2. The pectunculus, or Venus-shell. 3. The donax, or truncated cockle. These are as follow:

CARDIUM.—The common cockle. This genus is every where known, and esteemed as food, being found on the loose sandy coasts of most countries. The shells are equally raised, dentated, and concave, and some are extremely handsome. Dr. Gmelin, in his new edition of the Systema Naturæ, describes sixty-seven species.

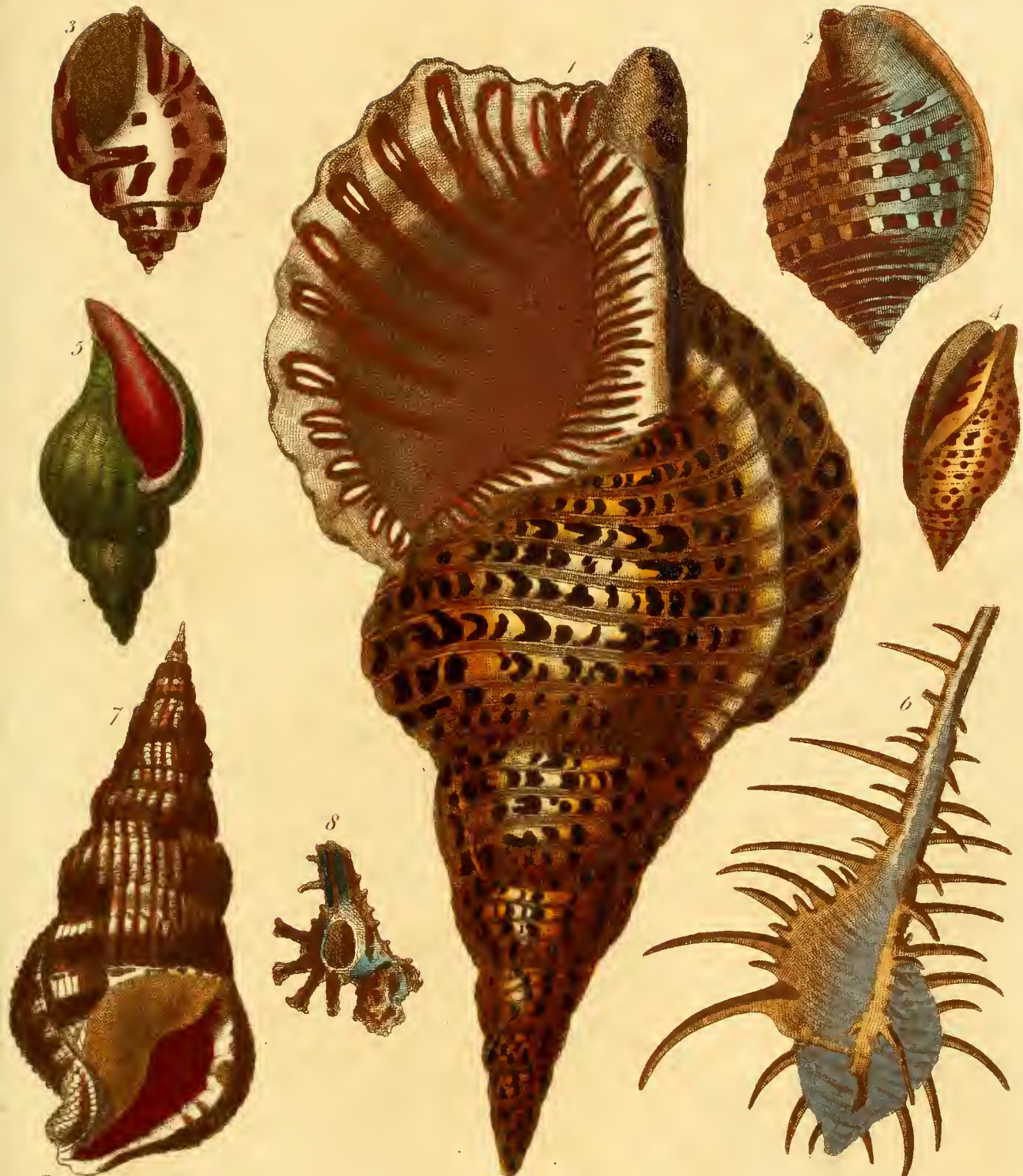
VENUS.—Concha veneris, pectunculus, cordiform cockle, or Venus-shell; so called, from the singular conformation of its aperture, and resemblance of the sexual parts of females. The shells are mostly of a cordiform or oblong shape, and with similar and dissimilar sides, whose beaks are not very peaked or prominent. Lister intermixes them with the two following genera, all by the name of pectunculi, and he has also placed several among his tellens. Argenville, Davila, and Meuschen, call them cames; and Davila divides them into four genera. Of this genus there are one hundred and fifty-four species, some of which, as the Venus, Dione, &c. are very curious and valuable shells.

DONAX.—The truncati, or flat-sided cockles. These are such as are truncated, or have one side flat, and, as it were, cut off. These shells rank in most authors with the cockles in general. Davila and Linnæus only, have made a distinct genus of them. There are, according to Gmelin, nineteen species.

TELLENS.—The tellinæ, or tellens, are shells more broad than long, rather flat, and the hinge has two teeth set close together. This family is divided into two genera, viz. 1. Tellinæ with similar sides, whose beak and hinge are central. 2. Cunei, or wedge-shaped shells, having dissimilar or unequal sides, whose beak and hinge are placed near to, or quite at one end: but these genera are by most authors promiscuously mingled together. Lister places them after the pinnæ; and defines them to be shells shaped like wedges. Woodward makes a genus of them, and says they have few teeth on the hinge, and are oblong shells, or with lengthened sides. Rumphius, Gualtieri, Linnæus, and Meuschen, have all a genus they call tellina; Davila also, but he defines them very inaccurately, and includes the solens as a species of them. Argenville ranks them among the muscles. There are several kinds of fossil cunei, which remain yet undiscovered in a recent or living state; and some are very elegant and curious, particularly the studded kind. There are ninety species of them described by Gmelin.

MACTRA.—The placenta, or pellucid oyster. These are shells with equal valves, whose hinge or cardo lies quite within the shell, and on one valve consists two straight linear ridges, pretty prominent, and laid obliquely to each other, so as to meet at one end in a very acute angle; and the other valve has two correspondent furrows. There are twenty-seven species now known, one of which is found in the river Tees, in England. The next in order are those bivalves that are inarticulate, or have no teeth on their hinge; as the margaritiferæ, muscles, &c.

MYA, the PEARL OYSTER.—The margaritiferæ, or pearl oysters, are eared shells with equal valves, and their




Alberus Sc. del.t

I. Chapman sc.

*Buccina.—1. The Triton, or Trumpet of War. 2. The Wry-mouthed; 3. Umbilicated; 4. Plicated; 5. Gallerea; Whelks. 6. The longirostra, or Thorny Woodcock. 7. & Strombus. 8. & Purpura.*

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Albertus Seba del. J. Chapman. Sculp.

*Murices.*—1, a Rock shell 2, to 4, a Porrhais; a Devil, a Pelican's Foot, & a Spider. 5, a Rhombus, 6, a ditto, the Tower of Babel, 7, an Alatæ, or winged Shell, 8 & 9 Ducas.

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hinge is merely a gutter or ſlight furrow without a ſingle tooth. The ſpecies of this family are, the mother of pearl ſhells or pearl oyſters, the ſwallow, &c. Da Coſta and Linnæus make a diſtinct genus of them; but Liſter calls them pearly eſcallops. Rumphius, Davila, and Meuſchen, rank them as common oyſters. Woodward forms a genus he calls margaritiferæ; and defines it as eared ſhells with a ſmooth hinge; and Gualtieri defines them by placing the pearl ſhells in one genus, by the name of conchæ inæquilateræ; and the ſwallow in another genus, he calls conchæ aliformes.

The mya margaritifera is the fiſh that produces the Britiſh pearls. It has a very thick, coarſe, opaque ſhell, often much decorticated, oblong, bending inward on one ſide, or arcuated, black on the outſide; uſual breadth from five to ſix inches; length two and a quarter. It inhabits ſeveral of the principal rivers of Great Britain, and is noted for producing quantities of pearl. There have been regular fiſheries for the ſake of this precious article; and ſixteen have been found within one ſhell. They are the diſeaſe of the fiſh, analogous to the ſtone in the human body. On being ſqueezed, they will eject the pearl, and often caſt it ſpontaneouſly in the ſand of the ſtream. The river Conway was noted for them in the days of Cambden. A notion alſo prevails, that ſir Richard Wynne of Gwydir, chamberlain to Catharine queen to Charles II. preſented her majeſty with a pearl (taken in this river) which is to this day honoured with a place in the regal crown. They are called by the Welſh *cregin diluw*, or "deluge ſhells," as if left there by the flood. The Irt in Cumberland was alſo productive of them. The famous circumnavigator, ſir John Hawkins, had a patent for fiſhing in that river. He had obſerved pearls plentiful in the Straits of Magellan, and flattered himſelf with being enriched by procuring them within his own iſland. In the ſeventeenth century, ſeveral of great ſize were got in the rivers of the counties of Tyrone and Donegal, in Ireland. One that weighed thirty-ſix carats was valued at forty pounds, but being foul, loſt much of its worth. Other ſingle pearls were ſold for ten pounds each. One was ſold to lady Glenlealy, who put it into a necklace, and refuſed eighty pounds for it from the ducheſs of Ormond. Suetonius reports, that Cæſar was induced to undertake his Britiſh expedition for the ſake of our pearls; and that they were ſo large, that it was neceſſary to uſe the hand to try the weight of a ſingle one. Mr. Pennant imagines that Cæſar only heard this by report; and that the cryſtalline balls called *mineral pearl*, were miſtaken for them. We believe that Cæſar was diſappointed of his hope: yet he carried home a buckler made with Britiſh pearls, which he dedicated to, and hung up in, the temple of Venus Genetrix: a proper offering to the goddeſs of beauty, who ſprang from the ſea. This is ſuppoſed to have been rather a contrivance, to impreſs the minds of the Roman citizens with the importance of his conqueſts in Britain. It may not be improper to mention, that notwithſtanding the claſſic authors honour our Britiſh pearls with their notice, yet they report them to have been ſmall and ill-coloured, an imputation that in general they are ſtill liable to. Pliny ſays, that a red ſmall kind was found about the Thracian Boſphorus, in a ſhell called *mya*; but does not give it any mark to aſcertain the ſpecies.

Linnæus made a remarkable diſcovery relating to the generation of pearls in this fiſh. It will bear removal remarkably well; and it is ſaid, that in ſome places they form reſervoirs for the purpoſe of keeping it, and taking out the pearl, which, in a certain period of time, will be again renewed. From obſervations on the growth of their ſhells, and the number of their annular laminæ or ſcales, it is ſuppoſed the fiſh will attain a very great age; fifty or ſixty years are imagined to be a moderate computation. The diſcovery turned on a method which Linnæus found, of putting theſe ſhell-fiſh into a ſtate of producing pearls at pleaſure, though the final effect would not take place for ſeveral years. He ſays, that in five or ſix years after the operation, the pearl will have acquired the ſize of a vetch. We are unacquainted with the means by which he accompliſhed this extraordinary operation; but it was probably publiſhed at the time, and conſidered as important, ſince it is certain that the author was rewarded with a munificent premium from the ſtates of Sweden on this account. It is ſaid that the method conſiſted in injuring the ſhell externally by a perforation; and it has been obſerved, that theſe concretions in ſhell-fiſh are found on the inſide, exactly oppoſite to perforations and injuries made from without, by ſerpulæ and other animals. Gmelin enumerates twenty-four ſpecies of mya.

MYTILUS, the MUSCLE.—This conſtitutes the laſt family of bivalves with equal valves; they are not eared; are moſt generally very convex, of a long and narrow ſhape, and the hinge is a mere ſlight furrow without any tooth, and is ſituated not at the top of the ſhell, but a little way down one of the ſides. All conchologiſts agree in the claſſification of this family of ſhells; and Dr. Gmelin enumerates fifty-eight ſpecies. Several of them are remarkable for the beauty of their internal ſhell, and for the pearls which are ſometimes found in them.

The edulis, or eatable muſcle, is plentiful in England, the beſt of which are thoſe called *kookers*, found in immenſe beds on the coaſt of Cumberland. They are taken out of the ſea, and placed in the river Were, within reach of the tide, where they grow very fat and delicious. This ſpecies is alſo found in all the European and Indian ſeas. The moſt valuable of theſe ſhells is the *mater perlarum*, or mother-of-pearl ſhell, deſcribed by Rumphius. It is nearly orbicular, compreſſed, and flat, the baſe tranſverſe, and imbricated with dentated coats. On the inſide it is exquiſitely poliſhed, and of the whiteneſs and water of pearl itſelf. It has alſo the ſame luſtre on the outſide, after the external laminæ have been taken off by aquafortis and the lapidary's mill.

## BIVALVES WITH GAPING VALVES.

Theſe are termed *conchæ hiantes*, or bivalves whoſe ſhells never ſhut quite cloſe, but are open or gaping in ſome part. This family conſiſts of three genera, viz. 1. Chamæ, the gapers or baſon-ſhells. 2. Solens, the ſheaths or knife-handles. 3. Pinnæ, the ſea-wings or hams.

CHAMA.—The gaper, or baſon-ſhell. Theſe are of equal valves and diſſimilar ſides, in hinge and appearance like the cordiform cockles, but on the longeſt ſide, from the beak to near the extreme margin, the two ſhells do not cloſe, but leave an oval opening or gap, the lips whereof are very broad, and turn up on the edges. This hiatus, or gap, is uſed by the animal to put forth or protrude its tentaculæ or feelers, in ſearch of food; and alſo to faſten itſelf upon any piece of rock or ſolid body, ſo as to counteract the impulſe of the waves. There are twenty-ſix ſpecies, ſome of which are nearly in the ſhape of eſcallops, and immenſely large; others are of an oblong form, very thick and rotund, ſo that, when opened, the ſhells form large capacious baſons. Others reſemble the rocky murices, or thorny oyſters; only that the ſpiracles or fangs are much harder, firmer, and of a ſtone-like conſiſtence. The chama gigas, found in the ſeas of Aſia, are more than four feet over, and weigh from three hundred and a half to ſix or ſeven hundred weight. Their capacity renders them extremely valuable to the Aſiatics, who uſe them as watering-troughs for their cattle; and they almoſt ſupply the place of tanks, on the ſhores of thoſe dry and thirſty regions. Theſe ſhell-fiſh, when arrived at mature age, are capable of pinching off a ſhip's cable as large as a man's arm. The chama trapezia is alſo a very large and curious ſhell, of great weight, and eaſily formed into capacious baſons. The chama cor is a rare and curious ſhell; the beak is hooded, and curvated like the bill of a parrot. The lazarus is rocky and full of prickles; the barbator is beautifully ſtriated and fringed.

SOLEN, the KNIFE-HANDLE.—Theſe are alſo called ſheaths and razor-handles. Theſe ſhells are open at both ends;

ends; the hinge has a tooth ſhaped like an awl, bent back, often double, and not inſerted, into the oppoſite ſhell: the rim at the ſides appears ſomewhat worn away, and has a horny cartilaginous articulation. Three of them, the ſiliqua, vagina, and criſpus, are found among the ſand on the Britiſh coaſt, and generally in an erect or perpendicular direction. The fiſh has two pipes, each compoſed of four or five rings or portions of a hollow cylinder, of unequal lengths, joined one to another; and the places where they join are marked by fine ſtreaks or rays. Of this genus there are twenty-three ſpecies, the moſt prized of which is the radiatus. This ſhell is of a light violet ground, with ſilvery white rays diverging from the hinge to each extremity, ſomewhat reſembling the ſun when ſhining through the clouds, and, what is vulgarly called, drawing water. This knife-handle is very rare, and found only in the Indian ocean.

PINNA, or SEA-WING.—The pinnæ, ſea-wings or hams, are ſhells of a ſomewhat triangular ſhape, widening from a pointed or narrow top to a very broad end, which broad end is always open. The hinge is inarticulate, or hinge without a tooth. The animal this ſhell incloſes is a kind of ſlug. The ſhell is fragile, and furniſhed with a beard. Theſe are found on ſome parts of the coaſts of France, Italy, and the Indian ocean. The largeſt and moſt remarkable are found in the Mediterranean. The animal is blind, as are all of the genus; which conſiſts of eighteen ſpecies. It is furniſhed with very ſtrong calcareous valves; and they have the faculty of attaching themſelves firmly to the rocks. Theſe ſhells are often valuable, on account of producing many beautiful pearls. Thoſe moſt prized by conchologiſts are the pinna muricata, rotundata, and nobilis.

## *OF MULTIVALVES, OR SHELLS OF MANY PARTS.*

The third general diviſion of teſtaceous animals is into multivalves, or thoſe ſhells that are made up of many diſtinct pieces. There are three families in this diviſion, viz. 1. Pholas, the piddock. 2. Lepas, the barnacle and acorn ſhell. 3. Chiton, the oſcabrion.

PHOLAS, the piddock.—Theſe ſhells are trivalves, having two large valves, with a ſmall valve placed between them, near to the hinge. The hinge turns up on the outer part of the ſhell, and under it, within the ſhell, is a long curved tooth or ſpur. The word *pholas* is derived from the Greek, and ſignifies ſomething which lies hid. This name they derive from their property of making themſelves holes in the earth, ſand, wood, or ſtone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can with certainty ſuppoſe, is, that they muſt have penetrated theſe ſubſtances when very ſmall; becauſe the entrance of the hole in which the pholas lodges, is always much leſs than the interior part of it, and, indeed, than the ſhell itſelf. Hence ſome have ſuppoſed that they were hatched in holes accidentally formed in ſtones, and that they naturally grew of ſuch a ſhape as was neceſſary to fill up the cavity.

The holes in which the pholades lodge, are uſually twice as deep as the ſhells are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their poſition is uſually ſomewhat oblique to the horizon. The openings of theſe holes are what betray the pholas being in the ſtone; but they are always very ſmall in proportion to the ſize of the ſhell. There ſeems to be no progreſſive motion of any animal in nature ſo ſlow as that of the pholas; it is immerſed in the hole, and has no movement, except a ſmall one downwards, and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only ſinks itſelf deeper in the ſtone as it increaſes in bulk. That part by means of which it performs this operation, is a fleſhy ſubſtance placed at the lower extremity of the ſhell; it is of the ſhape of two points or claws turned towards each other, and is conſiderably large in proportion to the ſize of the animal; and though it be of a ſoft ſubſtance, it is not to be wondered that in ſo long a time it is able, by conſtant work, to burrow into a hard ſtone. The manner of their performing this may be ſeen by taking one of them out of the ſtone, and placing it upon ſome ſoft clay; for they will immediately go to work in bending and extending that part allotted to dig for them; and in a few hours they will bury themſelves in the mud in as large a hole as they had taken many years to make in the ſtone. They find little reſiſtance in ſo ſoft a ſubſtance; and the neceſſity they feel for hiding themſelves evidently makes them haſten their work. The body of the animal is lodged in the lower half of the hole in the ſtone, and the upper half is occupied by a trunk of a fleſhy ſubſtance and conical figure; this they uſually extend to the orifice of the hole, which cloſes or cruſts over, ſo as to leave the point or top of this inſtrument naked or bare. This trunk, though it appears ſingle, is, in reality, compoſed of two tubes, or at leaſt it is compoſed of two parts ſeparated by a membrane. The artifice of this double inſtrument is ſimilar to that in many other ſhell-fiſh, namely, to take in ſea-water by one tube, and, when digeſted, to reject it by the other. This truncated fleſhy inſtrument is uſually about five inches long, and from the ſimilarity of its appearance, has acquired to this fiſh the trivial name of the *ſea-penis*. In the middle of their bodies they have a ſmall green veſicle, the uſe of which has not yet been diſcovered. This, when plunged in ſpirit of wine, becomes of a purple colour: but its colour on linen will not become purple in the ſun like that of the murex; and even if it would, its quantity is too ſmall to make it worth preſerving.

The pholas ſhell, as well as the included animal, is remarkable for its luminous quality. That the fiſh is luminous, was noticed by Pliny, who obſerves that it ſhines in the mouth of the perſon who eats it; and if it touch his hands or clothes, it makes them luminous. He alſo ſays that the light depends upon its moiſture. The light of this fiſh has furniſhed matter for various obſervations and experiments to M. Reaumur and the Bolognian academicians, eſpecially Beccarius, who took ſo much pains with the ſubject of phoſphoreal light. M. Reaumur obſerves, that whereas other fiſhes give light when they tend to putreſcence, this is more luminous in proportion to its being freſh; that when they are dried, their light will revive if they be moiſtened either with freſh or ſalt water, but that brandy immediately extinguiſhes it. He endeavoured to make this light permanent, but none of his labours ſucceeded.

The attention of the Bolognian academicians was engaged to this ſubject by M. F. Marſilius, in 1724, who brought a number of theſe ſhell-fiſhes, and the ſtones in which they were incloſed, to Bologna, on purpoſe for their examination. Beccarius obſerved, that though this fiſh ceaſed to ſhine when it became putrid, yet that in its moſt putrid ſtate it would ſhine, and make the water in which it was immerſed luminous, when it was agitated. Galeatius and Montius found that wine or vinegar extinguiſhed this light; that in common oil it continued ſome days; but, in rectified ſpirit of wine or urine, it exiſted hardly a minute. In order to obſerve in what manner this light was affected by different degrees of heat, they made uſe of a Reaumur's thermometer, and found that water rendered luminous by theſe fiſhes increaſed in light till the heat arrived to forty-five degrees; but that it then became ſuddenly extinct, and could not be revived again. In theſe experiments of Beccarius, a ſolution of ſea-ſalt increaſed the light of the luminous water; a ſolution of nitre did not increaſe it quite ſo much. Sal-ammoniac diminiſhed it a little, oil of tartar *per deliquium* nearly extinguiſhed it, and the acids entirely. This water poured upon freſh calcined gypſum, rock cryſtal, ceruſe, or ſugar, became more luminous. He alſo tried the effects of it when poured upon various other ſubſtances; but


G.W. Knorr del J. Chapman sculp

Bivalves. 1. The ducal. Mantle. 2 The coral Escallop 3 The Spondyle or thorny Oyster. 4 The radiated Tellen. 5. The radiated Solen 6. Venus Dione. 7 The aculeated Cockle. 8. Noahs Ark. 9. The Sea Ham or Pinna.

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Alborus Sculp.

J. Thompson sc.

Bivalves and Multivalves. 1 The Chama Gigas 2. Mytellus Arcuale the Swallow Muscle. 3 The crested Cock Muscle. 4 The Chiton 5 The Indian Crown Barnacle. 6 to 9 different Species of Barnacles. 10 The Duck or Goose Barnacle. 11 and 12. The Pholas 13 The Anomia. 14 The Bears Paw.

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but there was nothing very remarkable in them. Afterwards, uſing luminous milk, he found that oil of vitriol extinguiſhed the light, but that of tartar increaſed it.

This gentleman had the curioſity to try how differently coloured ſubſtances were affected by this kind of light; and having, for this purpoſe, dipped ſeveral ribbons in it, the white came out the brighteſt, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light, that was perceived in this caſe. He then dipped boards painted with the different colours, and alſo glaſs tubes filled with ſubſtances of different colours, in water rendered luminous by the pholades. In both theſe caſes the red was hardly viſible, the yellow was the brighteſt, and the violet the duſkeſt. But, on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glaſſes, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the moſt luminous. A ſingle pholas made ſeven ounces of milk ſo luminous, that the faces of perſons might be diſtinguiſhed by it, and it looked as if it was tranſparent. Air appeared to be neceſſary to this light; for, when Beccarius put the luminous milk into glaſs tubes, no agitation would make it ſhine, unleſs bubbles of air were mixed with it. Alſo Montius and Galeatius found, that, in an exhauſted receiver, the pholas loſt its light, but the water was ſometimes made more luminous; which they aſcribed to the riſing of bubbles of air through it. Beccarius, as well as Reaumur, had many ſchemes to render the light of theſe pholades permanent. For this purpoſe he kneaded the juice into a kind of paſte with flour, and found that it would give light when it was immerſed in warm water; but it anſwered beſt to preſerve the ſhell and fiſh in honey. In any other method of preſervation, the property of becoming luminous would not continue longer than ſix months, but in honey it had laſted above a-year; and then it would, when plunged in warm water, give as much light as ever it had done. Twelve ſpecies of the pholas are now aſcertained by Dr. Gmelin.

LEPAS, the acorn and barnacle ſhells.—Theſe ſhells are moſtly quinque-valves, and are made up of two large valves with two ſmall ones beneath them, and a long narrow ſpur-like valve which connects them together, and runs lengthwiſe. The Latin name *anatifera*, was given to ſome of this ſpecies from the fabulous ſtory of their becoming geeſe; as was alſo the Engliſh name *barnacle*, from the ſame origin; becauſe the birds they were ſuppoſed to produce were the barnacles or brent geeſe.

The balani are made up of many valves lying parallel to each other, and in a perpendicular poſition, contrary to the poſition of all other valves, which lie horizontally. The top is open, and the fiſh performs its neceſſary functions by that aperture; for the valves never open or ſeparate, as they have no hinges. The bottom is the part by which they affix themſelves to other bodies; for the balani are never found looſe, but affixed to large ſhells, ſtones, or other ſolid bodies. There are twenty-eight ſpecies of theſe ſhells; of which the diodema, and anatifera, are thought the moſt curious.

CHITON, the oſcabrion. This ſhell conſiſts of many parts, loricated, and tied together by articulations, ſo that the valves fold over each other tranſverſely, like a coat of mail. Theſe ſhells have till lately been rejected by conchologiſts, as approaching too nearly to the cruſtaceous animals; but Linnæus and Dr. Gmelin have finally decided their ſtructure to be clearly that of multivalve ſhells. There are twenty-eight ſpecies, ſome of which are found near Scarborough, and on other parts of the Britiſh coaſt. They appertain not only to the European ſeas, but are found on the coaſts of Africa and America, and in the Indian ocean. The moſt valued ſhells are the aculeated or prickly chiton; the oſcabrion properly ſo called; the magellanic, and ſerpentine diadem. Theſe cloſe the diviſion of multivalves, which terminates our enumeration of all the ſhells at preſent known in the univerſe.

The reader will have noticed what has already been obſerved with reſpect to cruſtaceous animals, viz. that though they are very nearly allied to the teſtaceous tribes, and in their gradation form ſo cloſe an affinity with each other, yet the great difference in their exterior coverings, and the want of thoſe diſtinctive characters in the cruſtaceous families, which peculiarly appertain to ſhells, have induced all the modern naturaliſts to reject them from every ſyſtem of conchology. There are ſome, however, who ſtill inſiſt, that the alterias, or ſea ſtars; the medusa, echinus, &c. are real ſhells, and ſhould, in ſpite of ſyſtematic arrangements, be included as ſuch in all our collections. This opinion may in ſome meaſure be deemed arbitrary, and therefore every naturaliſt will decide for himſelf. It is our province to follow ſtrictly ſyſtematic writers, eſpecially when arrived at ſo much accuracy and preciſion, that diſtinctive rules and eſſential characters are eſtabliſhed, whereby the moſt minute objects in the creation are aſſigned their proper ſcale in the order of nature, and whereby the mind is enabled to comprehend and appreciate the different claſſes of animated beings, and ſurvey without diſorder or confuſion the boundleſs works of the Creator; who, in the mechaniſm of the ſmalleſt animalcule, has evinced the ſame inimitable contrivance, that we find in the ſtructure of the moſt perfect animals. We nevertheleſs pay due attention to an illuſtration of the cruſtaceous tribes, as arranged in the Linnæan ſyſtem by Dr. Gmelin; in proof of which we beg to refer the reader to the articles ASTERIAS, CANCER, ECHINUS, &c. In the preſent treatiſe we have principally followed Da Coſta, in the great view of enabling the young conchologiſt to diſtinguiſh readily, and with preciſion, the varying names, and diſcordant methods, of all the principal writers on ſhells. At the ſame time we have directed a clear and obvious reference to the terms of the Linnæan ſyſtem, now univerſally received; and where the reader will find, under their reſpective titles in this work, the natural hiſtory and habitudes of thoſe numerous animals, which are the humble architects of theſe curious and beautiful ſuperſtructures.

The trivial or technical names of ſhells, ſo long in uſe among conchologiſts, have ariſen from their fancied reſemblance to other objects, or from the marks and colours of their external coverings. Thus the Panama camp has marks upon the ſhell formed like the tents of common ſoldiers; the pewit's egg, ſpeckled exactly like the eggs of the plover; the goat's eye, the garnet, &c. limpets, from the ſimilarity of the apices of thoſe ſhells to a garnet or a goat's eye; ſo of the ſhield, and Turk's-cap, limpets. Venus's ear, Midas's ear, and the ſea ears, are ſo called from their reſemblance to the helix of the ear; poſt-horns, from their ſimilitude to a French horn; elephant's tooth, from its cylindric tapering form and curvature; the ram's-horn, is a name for the lituus, on account of its convoluted ſhape; the name of gallery, from its chambered ſtructure, is given to the nautilus; the gondola, and ſailer, are names for the argonaut, or paper nautilus. Cowries or money ſhells, and porcelains, from having the poliſh and beauty of china, are names for ſhells of the cypreæ genus. The weaver's ſhuttle is formed much like that inſtrument; the ſea-nuts, the tops, the ſtrawberry, and onyxes, from an external affinity to thoſe objects; the ſnake, the magpye, the painted cockle, &c. from their pied or party-coloured ſpots; the ray and the tulip, are names for ſpecies of tellens, from a likeneſs to that flower, and to the broken rays of the ſun. Partridges, are ſhells ſo called, having a beak or mouth curiouſly turned like the beak of thoſe birds; literals, are ſhells ſo named, becauſe their ſpots or marks reſemble the letters of ſome alphabets. The ducal mantle, is a ſpecies of eſcallop, ſo named from the richneſs of its colours; the glaſs-oyſter, from the tranſparency of its valves; Venus's, imply

ſhells

ſhells which have the appearance of a vulva; croſiers, mitres, papal crowns, Perſian and Ethiopian crowns, tower of Babel, &c. are very beautiful and coſtly ſhells, bearing ſimilitude to the orders from whence they take their name. The tiger, the bear's paw, the crane, the duck's foot, the ſpur, the ſpoon-hinge, the tun, the baſon, the acorn, green peas, the barnacle, the knife-handle, the gaper, the plough, the cock's-comb, the ſwallow, the melon, the helmet, the cylinder, the needle, the ribbon, the furbelow, the grimace, the maſk, the olive, the cone, the poached egg, the fig, the turnip, the harp, the gold-mouth, the ſilver-mouth, the dolphin, are all ſhells merely deſignative of the things after which they are named, and wherein are formed ſome kind of reſemblance. The buccina and murices are many of them ſhells of ſuch ſtrange figures, that they have given riſe to appellatives equally ſtrange and vulgar; ſuch as devils, ſpiders, hump-backs, devil's-claws, prongs, ſkeletons, the grubs, the thorny woodcock, &c. Hence it is evident that trivial names may be applied to ſhells as far as the ſpecies go, or as that the fanciful imagination and invention of man can poſſibly extend.

The aſſimilation of the names of ſhells to ſo many common objects, is ſuppoſed to have firſt introduced to the ingenuity of man, the notion of ſhell-work; many elegant ſpecimens of which are to be ſeen in the collections of conchologiſts; in ornamental devices in noblemen's ſeats; in hermitages, and in grottos. One of the moſt magnificent decorations of this kind in England, is the grotto at Goodwood Park in Suſſex, called Carneus ſeat, or grove of Apollo, executed with ſuperior judgment and taſte by the delicate hand of the late ducheſs of Richmond.

## Of COLLECTING, CLEANING, and PRESERVING, SHELLS.

Conchologiſts who are judicious in the choice of ſhells, and who value them in proportion to their firmneſs and elegance of decoration, always endeavour to obtain ſuch as have been fiſhed up alive; for it is found that live ſhells only bear the full glow of their natural colours. All ſpecies of ſhell-fiſh, like other animals, have their particular reſorts; ſome are pelagian, or inhabit only the deeps of the ſea; others keep in leſs depths; ſome in ſhallows and in bays; and ſome are littoral, or inhabit the very ſhores. However, let their reſorts be where they may, all ſhells ſhould be procured from the deepeſt parts of thoſe reſorts, and immediately after ſtorms on the ſea beaches and ſhores; becauſe, if much expoſed to the ſun, their colours fade, and they are liable to other accidents that injure them. In order to kill the fiſh, without injury to the ſhell, Da Coſta adviſes to give them a quick dip in boiling water, and when they are cooled, to lay them in cold water till they are cleaned; and in this operation they ſhould not be touched with aquafortis, or any other acid, nor expoſed to the heat of the fire and ſun.

The art of poliſhing ſhells has but lately arrived at its preſent high ſtate of perfection; and as the taſte for collecting ſea-ſhells is become ſo general, it may not be diſagreeable to the reader to find ſome inſtructions in executing ſo pleaſing a method of adding to their natural beauty, the rules for which are at preſent little known, though the effect be ſo much eſteemed. Among the immenſe variety of ſhells which preſent themſelves to our reſearch, ſome are taken out of the ſea, or found on its ſhores, in all their native perfection and beauty; their colours being all ſpread upon the ſurface, and their natural poliſh ſuperior to any thing that art could give. Where nature in herſelf is thus perfect, it were madneſs to attempt to add any thing to her charms; but in caſes where the beauties are latent and covered with a coarſer ſkin, art is to be called in, and the outer veil removed, that all the internal beauties may appear.

Among the ſhells which are found naturally poliſhed are the porcelains, or cowries; the caſſides; the conchæ globoſæ, or tuns; ſome buccina, the volutes, and the cylinders, or olives, or, as they are often, though improperly, called the *rhombi*; excepting only two or three, as the tiara, the plum, and the butter-tub rhombus, where there is an unpromiſing film on the ſurface, hiding a great ſhare of beauty within. Though the ſhells of theſe genera are taken out of the ſea in all their beauty, and in their utmoſt natural poliſh, yet there are ſeveral other genera, in which all or moſt of the ſpecies are taken up naturally foul, and covered with an epidermis, or coarſe outer ſkin, which is in many very opaque and rough. The tellinæ, the muſcles, the cochleæ, and many others, are of this kind. Rigid naturaliſts inſiſt upon having all ſhells in their native and genuine appearance, as they are found when living in the ſea; but the judicious conchologiſt contrives to have the ſame ſhells in different ſpecimens both rough and poliſhed; becauſe, by this means, beſides knowing the outſide of the ſhell, he becomes better acquainted with its internal ſtructure, and has the additional pleaſure of comparing the beauties of the ſhell, in its wrought ſtate, to the coarſe appearance nature has given it. How many elegancies in this part of the creation would be wholly loſt to us, if it were not for the aſſiſtance of an art of this kind! Many ſhells in their native ſtate are like rough diamonds; and we can form no juſt idea of their beauties, till they have been poliſhed and wrought into form.

Though the art of poliſhing ſhells is evidently a valuable one, yet it is very dangerous to the ſhells; for without the utmoſt care, the method uſed to poliſh and beautify a ſhell, often deſtroys it. When a ſhell is to be poliſhed, the firſt thing to be examined is, whether it have naturally a ſmooth ſurface, or be covered with tubercles or prominences. A ſhell which has a ſmooth ſurface, and a natural dull poliſh, need only be rubbed with the hand, or with a piece of chamois leather, with ſome tripoli, or fine rotten ſtone, and it will become perfectly bright and of a fine poliſh. Emery is not to be truſted on this occaſion, becauſe it wears away too much of the ſhell. This operation requires the hand of an experienced perſon, that knows how delicate the work muſt be, and where he is to ſtop; for in many of theſe ſhells the lines are only on the ſurface, and the wearing away ever ſo little of the ſhell deſaces them. A ſhell that is rough, foul, and cruſty, or covered with a tartareous coat, muſt be left a conſiderable time ſteeping in hot water; when it has imbibed a large quantity of this, it is to be rubbed with rough emery on a ſtick, or ſcraped with a knife, in order to get off the coat. After this, it may be dipped in diluted aquafortis, ſpirit of ſalt, or any other acid; and after remaining a few moments in it, be again plunged into common water. This will add greatly to the ſpeed of the work. After this it is to be well rubbed with linen cloths, impregnated with common ſoap; and, when by theſe means it is made perfectly clean, the poliſhing is to be finiſhed with fine emery and a hair-bruſh. If after this the ſhell, when dry, appears not to have ſo good a poliſh as it ought, it muſt be rubbed over with a ſolution of gum arabic; and this will add greatly to its gloſs, without doing it the ſmalleſt injury. The gum-water muſt not be too thick, and then it gives no ſenſible coat, only heightening the colours. The white of an egg anſwers this purpoſe alſo very well; but it is ſubject to turn yellow. If the ſhell has an epidermis which will by no means admit the poliſh, it is to be dipped ſeveral times in diluted aquafortis, that it may be eaten off; and then the ſhell is to be poliſhed in the uſual way with putty, fine emery, or tripoli, on the hair of a fine bruſh. When it is only a pellicle that hides the colours, the ſhells muſt be ſteeped in hot water, and after that the ſkin worked off by degrees with a ſmooth file. This is often the caſe with ſeveral of the cylinders, which have not the natural poliſh of the reſt.

When a ſhell is covered with a thick and fatty epidermis, as in ſeveral of the muſcles and tellinæ; in this caſe aquafortis will do no ſervice, as it will not touch the ſkin; then a rough bruſh and coarſe emery are to be uſed; and

if this does not ſucceed, ſeal-ſkin, or fiſh-ſkin, and pumice-ſtone, are to be employed. When a ſhell has a thick cruſt, which will not give way to any of theſe means, the only mode left is to plunge it ſeveral times into ſtrong aquafortis, till the ſtubborn cruſt is wholly eroded. The limpets, aures marinæ, helmet-ſhells, and ſeveral other ſpecies of this kind, muſt have this ſort of management; but as the deſign is to ſhow the hidden beauties under the cruſt, and not to deſtroy the natural beauty and poliſh of the inſide of the ſhell, the aquafortis ſhould be uſed in the following manner: A long piece of wax muſt be provided, and one end of it made perfectly to cover the whole mouth of the ſhell; the other end ſerves as a handle, and the mouth being ſtopped by the wax, the liquor cannot get in to the inſide to ſpoil it; then there muſt be placed on a table a veſſel full of aquafortis, and another full of common water. The ſhell is to be plunged into the aquafortis, and after remaining a few minutes in it, is to be taken out, and plunged into the common water. The progreſs the aquafortis makes in eroding the ſurface is thus to be carefully obſerved every time it is taken out: the point of the ſhell, and any other tender parts, are to be covered with wax, to prevent the aquafortis from eating them away; and if there be any worm-holes, they alſo muſt be ſtopped up with wax, otherwiſe the aquafortis will quickly eat through in thoſe places. When the repeated dippings into the aquafortis ſhow that the coat is ſufficiently eaten away, then the ſhell is to be wrought carefully with fine emery and a bruſh; and when it is poliſhed as high as it will bear, it muſt be wiped clean, and rubbed over with gum-water, or the white of an egg. In this ſort of work the operator ſhould wear gloves, otherwiſe the leaſt touch of the aquafortis will burn the fingers, and often, if not regarded, eat away the ſkin and the nails.

Theſe are the methods to be taken with ſhells which require only a moderate quantity of the ſurface to be eaten off; but there are others which require to have a larger quantity taken off, and to be uncovered deeper: this is called entirely ſcaling a ſhell. This is done by means of a horizontal wheel of lead or tin, impregnated with rough emery; and the ſhell is worked down in the ſame manner in which ſtones are wrought by the lapidary: both figures of the nautilus-ſhell given in the Conchology-Plate III. were worked down in this manner. Nothing is more difficult, however, than the performing this work with nicety; very often ſhells are cut down too far by it, and wholly ſpoiled: and to avoid this, a coarſe vein muſt be often left ſtanding in ſome place, and taken down afterwards with the file, when the cutting it down at the wheel would have defaced the adjacent parts.

After the ſhell is thus cut down to a proper degree, it is to be poliſhed with fine emery, tripoli, or rotten ſtone, with a wooden wheel turned by the ſame machine as the leaden one, or by the common method of working with the hand with the ſame ingredients. When a ſhell is full of tubercles, or protuberances, which are to be preſerved, it is then impoſſible to uſe the wheel; and if the common way of dipping into aquafortis be attempted, the tubercles being harder than the reſt of the ſhell, will be eaten through before the reſt is ſufficiently ſcaled, and the ſhell will be ſpoiled. In this caſe, induſtry and patience are the only means of effecting a poliſh. A camel's-hair pencil muſt be dipped in aquafortis, and with this the intermediate parts of the ſhell muſt be wetted, leaving the protuberances dry; this is to be often repeated, and after a few moments the ſhell is always to be plunged into water, to ſtop the too great eroſion of the acid, which would otherwiſe penetrate too deep, and deſtroy the beauty of the ſhell. When this has ſufficiently taken off the foulneſs of the ſhell, it is to be poliſhed with emery of the fineſt kind, or with tripoli, by means of a ſmall ſtick, or the common poliſhing-ſtone uſed by the goldſmiths. This is a very tedious and troubleſome operation, eſpecially when the echinated oyſters and murices, and other ſimilar ſhells are to be wrought; and what is worſt of all, is, that when this labour has been employed, the buſineſs is not ſufficiently done; for there ſtill remain ſeveral places which could not be reached by any inſtrument, ſo that the ſhell muſt be rubbed over with gum-water or the white of an egg, in order to bring out the colours, and give a gloſs; in ſome caſes it is even neceſſary to add a coat of varniſh.

Theſe are the means uſed by artiſts to brighten the colours and add to the beauty of ſhells; and the changes produced by poliſhing in this manner are ſo great, that the ſhell can ſcarcely be known afterwards to be the ſame; and hence we ſometimes hear of new ſhells in the cabinets of collectors, which have no real exiſtence as ſeparate ſpecies, but are ſhells diſguiſed by poliſhing, and are thus fraudulently impoſed upon the haſty and unwary collector. To caution the young conchologiſt againſt errors of this kind, it may be proper to mention the moſt remarkable ſpecies thus uſually altered. The onyx-ſhell or volute, called the *purple* or *violet-tip*, which in its natural ſtate is of a ſimple pale brown, when it is wrought ſlightly, or poliſhed with only the ſuperficies taken off, is of a fine bright yellow; but when it is eaten away deeper, it appears of a fine milk white, with the lower part bluiſh: it is in this ſtate called the *onyx-ſhell*; and it is preſerved in many cabinets in its rough ſtate, and in its yellow appearance, as different ſpecies of ſhells.

The violet ſhells, ſo common among the curious, is a ſpecies of porcelain, or common cowry, which does not appear in that elegance till it has been poliſhed; and the common auris marina ſhows itſelf in two or three different forms, as it is more or leſs deeply wrought. In its rough ſtate it is duſky and coarſe, of a pale brown on the outſide, and pearly within; when it is eaten down a little way below the ſurface, it ſhows variations of black and green; and when ſtill farther eroded, it appears of a fine pearly hue within and without. The nautilus, when it is poliſhed down, appears all over of a fine pearly colour; but when it is eaten away but to a ſmall depth, it appears of a fine yellowiſh colour with duſky hairs. The burgau, when entirely cleared of its coat, is of the moſt beautiful pearl-colour; but when ſlightly eroded, it appears of a variegated mixture of green and red, whence it has been called the *parroquet*. The common helmet-ſhell, when wrought, is of the colour of the fineſt agate; and the muſcles, in general, though very plain ſhells in their common appearance, become beautiful when poliſhed, and ſhow large veins of the moſt elegant colours. The Perſian ſhell, in its natural ſtate, is all over white, and covered with tubercles; but when it has been ground down on a wheel, and poliſhed, it appears of a grey colour, with ſpots and veins of a bright and highly poliſhed white. The limpets, in general, become very different when poliſhed, moſt of them ſhewing bright and elegant colours; among theſe the tortoiſe-ſhell limpet is the principal; it does not appear at all of that colour or tranſparence till it has been wrought.

That elegant ſpecies of ſhell called the *jonquil-chama*, which has deceived ſo many into an opinion of its being a new ſpecies, is only a white chama with a reticulated ſurface; but when this is poliſhed, it loſes at once its reticular work and its colour, and becomes perfectly ſmooth, and of a fine bright yellow. The violet-coloured chama of New England, when worked down and poliſhed, is of a fine milk white, with a great number of blue veins, diſpoſed like the variegations in agates. The aſſes-ear ſhell, when poliſhed after working it down with the file, becomes extremely gloſſy, and obtains a fine roſe-colour all about the mouth. Theſe are ſome of the moſt frequent among an endleſs variety of changes wrought on ſhells by poliſhing; and we find there are many of the very greateſt beauties of this part of the creation which muſt have been loſt but for this method of ſearching deep into the ſubſtance of the ſhell for them.

The Dutch are very fond of ſhells, and are very nice in their manner of working them: they are under no re-

ſtraint, however, in their works; but uſe the moſt violent methods, ſo as often to deſtroy all the beauty of the ſhell. They file them down on all ſides, and often take them to the wheel, when it muſt deſtroy the very characters of the ſpecies. Nor do they ſtop at this: but, determined to have beauty at any rate, they are for improving upon nature, and frequently add ſome lines and colours with a pencil, afterwards covering them with a fine coat of varniſh, ſo that they ſeem the natural lineations of the ſhell: the Dutch cabinets are by theſe means made very beautiful, but they are by no means to be regarded as inſtructors in natural hiſtory. There are ſome artificers of this nation who have a way of covering ſhells all over with a different tinge from that which nature gives them; and the curious are often enticed by this artifice, to purchaſe them as great curioſities. There is another kind of work beſtowed on certain ſpecies of ſhells, particularly the nautilus; namely, the engraving on it lines and circles, and groups of figures, ſtars, and other things. This is too obvious a work of art to ſuffer any one to ſuppoſe it natural. Buonani and Seba have figured ſeveral of theſe wrought ſhells; but they are now principally done in the Eaſt Indies.

Shells are ſubject to ſeveral imperfections; ſome of which are natural, and others accidental. The natural defects are the effect of age, or diſeaſe in the fiſh. The greateſt miſchief happens to ſhells by the fiſh dying in them. The curious in theſe things pretend to be always able to diſtinguiſh a ſhell taken up with the fiſh alive from one found on the ſhores: they call the firſt a *living*, the ſecond a *dead* ſhell; and find that the colours are always much fainter in the dead ſhells. When the ſhells have lain long dead on the ſhores, they are ſubject to many injuries, of which the being eaten by ſea-worms is not the leaſt: age renders the fineſt ſhells livid or dead in their colours.

Beſides the imperfections ariſing from age and ſickneſs in the fiſh, ſhells are ſubject to other deformities, ſuch as morbid cavities, or protuberances, in parts where there ſhould be none. When the ſhell is valuable, theſe faults may be in ſome degree removed, and much added to the beauty of the ſpecimen, without at all injuring it as an object of natural hiſtory, which ſhould always be the great end of collecting theſe articles. The cavities may be filled up with maſtic, diſſolved in ſpirit of wine, or with iſinglaſs: theſe ſubſtances muſt be either coloured to the tinge of the ſhell, or elſe a pencil dipped in water-colours muſt finiſh them up to the reſemblance of the reſt; and then the whole ſhell being rubbed over with gum-water, or with the white of an egg, ſcarcely any eye can perceive the artifice: the ſame ſubſtances may alſo be uſed to repair the battered edges of a ſhell, provided the pieces chipped off be not too large. And when the excreſcences of a ſhell are faulty, they are to be taken down with a fine file. If the lip of a ſhell be ſo battered that it will not admit of repairing by any cement, the whole muſt be filed down, or ground on the wheel till it becomes even.

It is important alſo to thoſe who ſtudy conchology, to know in what countries the fineſt ſhells are produced. The ſhores of Aſia furniſh us with the pearl-oyſter and eſcallops, in the greateſt perfection. About Amboyna are found ſome beautiful ſpecimens of the Venus ſhell, the ducal mantle, and the coral oyſters. Here alſo are found a great variety of extremely beautiful muſcles, tellinæ, and volutæ; many fine buccina, and the Ethiopian crown. The dolia, or tuns, the murices, and the caſſides, are likewiſe found on this coaſt in great beauty. Many elegant cochleæ and ſcrew-ſhells are alſo brought from thence, and among them the wentletrap and ſpider ſhells. The Maldive and Philippine Iſlands, Bengal, and the coaſt of Malabar, abound with the moſt elegant of all the ſpecies of ſnails, and furniſh many other kinds of ſhells in great abundance and perfection. China abounds in the fineſt ſpecies of porcelain ſhells, and has alſo a great variety of beautiful ſnails. Japan furniſhes all the thicker and larger bivalves; and the iſle of Cyprus is famous above all other parts of the world for the beauty and variety of the patella or limpets.

America affords many very elegant ſhells, but neither in ſo great abundance nor beauty as the ſhores of Aſia. Panama is famous for the cylinders or rhombi, and we have beſide, from the ſame place, ſome good porcelains, and a very fine ſpecies of dolium, or *concha globoſa*, called from this place the *Panama purple ſhell*. One of the moſt beautiful of the cylinders is alſo known among our naturaliſts under the name of the *Panama camp*. About Braſil, and in the gulf of Mexico, there are found murices and Venus ſhells of extreme beauty; and alſo a great variety of porcelains, purpuræ, pectens, neritæ, bucardiæ or heart-ſhaped ſhells, and elegant limpets. The iſle of Cayenne affords one of the moſt beautiful of the buccinum kind, and the Midas ear is found principally about this place. Jamaica and the iſland of Barbadoes have their ſhores covered with porcelains, chamæ, and buccina; and at St. Domingo there are found almoſt all the ſame ſpecies of ſhells that we have from the Eaſt Indies; only they are leſs beautiful, and the colours more pale and dull. The pearl-oyſter is found alſo on this coaſt, but ſmaller than in the Perſian gulf. At Martinico there are found in general the ſame ſhells as at St. Domingo, but yet leſs beautiful. About Canada are found the violet chamæ, and the lakes of that country abound with muſcles of a very elegant pale blue and pale red or pink colour. Some ſpecies of theſe are remarkably light and thin, others are very thick and heavy. The great bank of Newfoundland is barren in ſhells: the principal kind found there are muſcles of ſeveral ſpecies, ſome of which are of conſiderable beauty. About Carthagena there are many mother-of-pearl ſhells, but they are not of ſo brilliant colours as thoſe of the Perſian gulf. The iſland of Magellan, at the ſouthern point of America, furniſhes us with a very remarkable ſpecies of muſcle called by its name; and ſeveral very elegant ſpecies of limpets are found there, particularly the pyramidal.

In Africa, on the coaſt of Guinea, there is a prodigious quantity of that ſmall ſpecies of porcelain or cowry which is uſed there as money; and there is another ſpecies of porcelain on the ſame coaſt which is all over white; the women make bracelets of theſe, and the people of the Levant adorn their hair with them. The coaſt of Zanguebar is very rich in ſhells: we find there a vaſt variety of the large porcelains, many of them of great beauty; and the nux maris, or ſea-nut, is very frequent there. Beſides theſe, and many other ſhells, there are found on this coaſt all the ſpecies of nautili, many of which are very elegant. The Canary iſles abound with a vaſt variety of the murices, and ſome other good ſhells; and we have from Madeira great variety of the echini, or ſea-eggs, different from thoſe of the European ſeas. Several ſpecies of muſcles are alſo common there; and the auris marina is nowhere more abundant. The Red Sea is beyond all other parts of the world abundant in ſhells, ſcarcely any kind is wanting there; but what we principally have from thence are the purpuræ, porcelains, and echini marini.

The Mediterranean and Northern Ocean contain a great variety of ſhells, and many of very remarkable elegance and beauty; they are upon the whole, however, inferior to thoſe of the Eaſt Indies. The Mediterranean abounds much more in ſhells than the Ocean. The gulf of Tarentum affords great variety of purpuræ, of porcelains, nautili, and elegant oyſters; the coaſt of Naples and Sardinia afford alſo the ſame, and with them a vaſt number of the ſolens of all the known ſpecies. The iſland of Sicily is famous for a very elegant kind of oyſter, which is white all over; pinnæ marinæ and porcelains are alſo found in great plenty there, with tellinæ and chamæ of many ſpecies, and a great variety of other beautiful ſhells. Corſica is famous, beyond all other places, for vaſt quantities of the pinnæ marinæ; and many other very beautiful ſhells are found there. About Syracuſe are found the gondola ſhell

or

or argonaut, the alated murex, and a great variety of elegant ſnails, with ſome of the dolia or tuns, and neritæ. The Adriatic ſea, or gulf of Venice, is leſs furniſhed with ſhells than almoſt any of the ſeas thereabout. Muſcles and oyſters of ſeveral ſpecies are however found there, and ſome of the cordiform ſhells; there are alſo ſome tellinæ. About Ancona there are found vaſt numbers of the pholades buried in ſtone; and the aures marinæ are particularly frequent about Puzzoli. The ports of Marſeilles, Toulon, and Antibes, are full of pinnæ marinæ, muſcles, tellinæ, and chamæ. The coaſts of Bretagne afford great numbers of the conchæ anatiferæ and acorns; they are found on old rotten boards, on ſea ſubſtances, and among cluſters of ſponges. The other ports of France, as Rochelle, Dunkirk, Breſt, St. Maloes, and others, furniſh oyſters excellent for the table, but of the common kind, and of no beauty in their ſhells; great numbers of muſcles are alſo found there; and the common tellinæ, the onion-peel oyſters, the ſolens, and conchæ anatiferæ, are alſo frequent there. At Granville there are found very beautiful pectens, and ſome of the heart-ſhaped ſhells called *ſtrawberries*.

Our own Engliſh coaſts are not the leaſt fruitful in ſhells, though they do not produce ſuch elegantly painted ones as the Indies. About Plymouth are found oyſters, muſcles, and ſolens, in great abundance; and there, and on moſt of our other ſhores, are numbers of the aures marinæ and dentalia, with pectens, which are excellent food; and many elegant ſpecies of the chamæ and tellinæ are fiſhed up in the ſea about Scarborough and other places. Ireland affords us great numbers of muſcles, and ſome very elegant eſcallop ſhells in great abundance, and the pholades are frequent on moſt of our ſhores. We have alſo great variety of the buccina and cochleæ, ſome volutæ, and, on the Guernſey coaſt, a peculiarly beautiful ſnail, called thence the *Guernſey-ſnail*. The coaſts of Spain and Portugal afford much the ſame ſpecies of ſhells with the Eaſt Indies, but they are of much fainter colours, and greatly inferior in beauty. There are, according to Tavernier and others, ſome rivers in Bavaria in which there are found pearls of a fine water. About Cadiz there are found very large pinnæ marinæ, and ſome fine buccina. The iſles of Majorca and Minorca afford a great variety of extremely elegant ſhells. The pinnæ marinæ are alſo very numerous there, and their ſilk or beards is wrought into gloves, ſtockings, and other things. The Baltic affords a great many beautiful ſpecies, but particularly an orange-coloured pecten, or eſcallop-ſhell, which is not found in any other part of the world.

The freſh-water ſhells are alſo found in great plenty; there is ſcarcely a pond, a ditch, or a river of freſh water, in any part of the world, in which there are not found vaſt numbers of ſhells, with the fiſh living in them. All theſe ſhells are ſmall, and they are of very little beauty, being uſually of a plain greyiſh or browniſh colour. Our ditches afford us chamæ, buccina, neritæ, and ſome patellæ; but the Nile, and ſome other rivers, furniſhed the ancients with a ſpecies of tellina which was large and eatable, and ſo much ſuperior to the common ſea tellina in flavour, that it is commonly known by the name of *tellina regia*, "the royal tellina." We have a ſmall ſpecies of buccinum common in our freſh waters, which is very elegant, and always has its operculum in the manner of the larger buccina; a ſmall kind of muſcle is alſo very common, which is ſo extremely thin and tender, that it can hardly be handled without breaking to pieces. The large freſh-water muſcle, commonly called in England the *horſe-muſcle*, is too well known to need a deſcription; and the ſize ſufficiently diſtinguiſhes it from all other freſh-water ſhells.

## Of FOSSIL SHELLS.

Foſſil ſhells are found buried at great depths in the earth. Of theſe ſome are found remaining almoſt entirely in their native ſtate, but others are variouſly altered by being impregnated with particles of ſtone and of other foſſils; in the place of others there is found mere ſtone or ſpar, or ſome other native mineral body, expreſſing all their lineaments in the moſt exact manner, as having been formed wholly from them, the ſhell having been firſt depoſited in ſome ſolid matrix, and thence diſſolved by very ſlow degrees, and this matter left in its place, on the cavities of ſtone and other ſolid ſubſtances, out of which ſhells had been diſſolved and waſhed away, being afterwards filled up leſs ſlowly with theſe different ſubſtances, whether ſpar or whatever elſe; theſe ſubſtances, ſo filling the cavities, can neceſſarily be of no other form than that of the ſhell, to the abſence of which the cavity was owing, though all the nicer lineaments may not be ſo exactly expreſſed. Beſides theſe, we have alſo in many places maſſes of ſtone formed within various ſhells; and theſe having been received into the cavities of the ſhells while they were perfectly fluid, and having therefore nicely filled all their cavities, muſt retain the perfect figures of the internal part of the ſhell, when the ſhell itſelf ſhould be worn away or periſhed from their outſide. The various ſpecies we find of theſe are, in many genera, as numerous as the known recent ones; and as we have in our own iſland not only the ſhells of our own ſhores, but thoſe of many other very diſtant ones, ſo we have alſo many ſpecies, and thoſe in great numbers, which are in their recent ſtate, the inhabitants of other yet unknown or unſearched ſeas and ſhores. The cockles, muſcles, oyſters, and the other common bivalves of our own ſeas, are very abundant: but we have alſo an amazing number of the nautilus kind, particularly of the nautilus græcorum, which though a ſhell not found living in our own or any neighbouring ſeas, yet is found buried in all our clay-pits about London and elſewhere; and the moſt frequent of all foſſil ſhells in ſome of our counties are the conchæ anomiæ, which yet we know not of in any part of the world in their recent ſtate. Of this ſort alſo are the cornua ammonis and the gryphitæ, with ſeveral of the echinitæ and others.

The exact ſimilitude of the known ſhells, recent and foſſil, in their ſeveral kinds, will by no means ſuffer us to believe that theſe, though not yet known to us in their living ſtate, are, as ſome have idly thought, a ſort of *luſus naturæ*. It is certain, that of the many known ſhores, very few, not even thoſe of our own iſland, have been yet carefully ſearched for the ſhell-fiſh that inhabit them; and as we ſee in the nautilus græcorum an inſtance of ſhells being brought from very diſtant parts of the world to be buried here, we cannot wonder that yet unknown ſhores, or the unknown bottoms of deep ſeas, ſhould have furniſhed us with many unknown ſhell fiſh, which may have been brought with the reſt; whether they were at the time of the general deluge, or the effect of any other cataſtrophe of a like kind, or by whatever other means, to be left in the yet unhardened matter of our ſtoney and clayey ſtrata.

Of all the foſſil ſhells, the cornua ammonis, vulgarly called *ſerpent-ſtones*, or *ſnake ſtones*, is decidedly the moſt elegant and curious. They are found of all ſizes, as noticed in p. 22; ſome of them rounded, others greatly compreſſed, and lodged in different ſtrata of ſtones and clays, even in the moſt elevated ſituations. Some of theſe ſhells are ſmooth, and others ridged in different directions; their ſtriæ and ridges being either ſtraight, irregularly crooked, or undulated. So few of this family having been yet found in their recent or living ſtate, makes it ſeem wonderful whence ſo vaſt a number and variety of them ſhould be brought into our ſubterranean regions. They ſeem indeed diſperſed in great plenty throughout the world, but no where found in greater numbers, beauty, and variety, than in our iſland. Mr. Harenberg found prodigious numbers of them on the banks of a river in Germany. He traced this river through its ſeveral windings for many miles; and among a great variety of belemnitæ, cochlitæ, &c. he found more than

thirty different ſpecies of the cornua ammonis. They lie immerſed in a bluiſh foſſil ſtone, of a ſoft texture and fatty appearance, in prodigious numbers, and of a great variety of ſizes, from the larger ſorts down to ſuch as could not be ſeen without very accurate inſpection. Such as lie in the ſofteſt of theſe ſtones are ſoft like their matrix, and eaſily crumble to pieces; others are harder. In a piece of this ſtone, of the bigneſs of a finger, it is common to find thirty or more of theſe foſſils; and often they are ſeen only in form of white ſpecks, ſo minute that their figure cannot be diſtinguiſhed till examined by the microſcope. They all conſiſt of ſeveral ſpirals, which are different in number in the different ſpecies, and their ſtriæ alſo are extremely various; ſome very deep with high ridges between them, others very ſlight; ſome ſtraight, others crooked; others undulated, and ſome terminating in dots, tubercles, or cavities, towards the back, and others having tubercles in two or three places. They are all compoſed of a great number of chambers or cells, in the manner of the nautilus pompilius, each having a communication with the others, by means of a pipe or ſiphunculus. A few of the ſmall ſpecies have been fiſhed up alive; but the large and beautifully marked ones are found only foſſil. They are compoſed of various foſſil bodies, often of quarry ſtone, ſometimes of the matter of the common pyrites, and of a great variety of other ſubſtances; and though they appear uſually mere ſtones, yet in ſome the pearly part of the original ſhell is preſerved in all its beauty. Sometimes alſo, while the outer ſubſtance is of the matter of the pyrites, or other coarſe, ſtony, or mineral, matter, the inner cavity is filled with a pure white ſpar of the common plated texture. This gives a great beauty to the ſpecimens, many of which are dug out of the alum rocks in Yorkſhire.

M. de Lamanon, a French naturaliſt, who accompanied La Perouſe in his late voyages of diſcovery, ſeems to agree with moſt conchologiſts, that the larger cornua ammonis may ſtill exiſt in the ſea; but he thinks they are in very ſmall number, and materially different from the greater part of the foſſil ſhells above deſcribed. He contends that thoſe ought to be conſidered as a race, formerly the moſt numerous of all, of which, either there are no deſcendants, or thoſe deſcendants are reduced to a very few degenerate individuals. That there are no living animals with ſhells of the *very ſame* kind with ſome of the foſſil cornua ammonis, the following obſervations he conſiders as a ſufficient demonſtration:—"The foſſil ſhells are very light and thin, whereas the ſhells of thoſe animals that live in very deep water are always thick and ponderous; beſides, the form of the foſſil cornua ammonis points out to us, in ſome meaſure, the organization of the animal which inhabited it. The celebrated Juſſieu proved, in 1721, that there exiſted a very cloſe analogy between the ammonite and nautilus. It is well known that the nautilus, by filling or emptying a part of its ſhell, has the power of remaining ſtationary in any depth it pleaſes: the ſame was doubtleſs the caſe with the ammonite; and if this ſpecies ſtill abounds in the ſea, it would ſurely be occaſionally diſcovered by ſailors. The waves alſo would throw fragments of it on the ſhore; fiſhermen might ſometimes entangle it in their nets; or, at leaſt, there would be fragments ſticking to the lead of the ſounding-line when aſcertaining great depths. It may alſo be added, that if the ammonites never quitted the abyſs of the ſea, thoſe which are found petrified would not be conſtantly met with on the ſame level, and in the ſame bed, as thoſe ſhell-fiſh that only inhabit the ſhallows. Yet there are found, in a multitude of places, ammonites mixed with turbines, buccina, and other littoral ſhells. They are found, beſides, at every degree of elevation from below the level of the ſea to the ſummits of the higheſt mountains. Analogy alſo leads us to ſuppoſe, that nature, who has given eyes to the nautilus, has not refuſed them to the ammonite: now what uſe could theſe be of if they remained confined to thoſe depths which the light is unable to penetrate. The extinction of the ancient race of ammonites is therefore a fact, which no rational ſuppoſition can deſtroy; and this fact is undoubtedly the moſt ſurpriſing of any that is preſented to us in the hiſtory of aquatic animals. The diſcovery of a few living ſpecies of cornua ammonis does not deſtroy the truth of this, for theſe ammonites are very different from thoſe which are found petrified. They are extremely rare, and cannot be looked up to as the repreſentatives of the old ammonites, ſo varied in their ſpecies, and the number of which in the ancient ocean was probably far more conſiderable than that of all the other ſhells beſides."

To every univalve ſhell, rolled in a ſpiral, ſo as that a horizontal plane will divide it into two equal parts, formed of united ſpirals, and bearing a certain proportion to each other, this author gives the name of an ammonite. "I thought it abſolutely neceſſary," ſays he, "to aſcertain the preciſe meaning of the term *ammonite*, previous to deſcribing that which I found during our voyage round the world. The form of this is almoſt orbicular, the long diameter being to the ſhort one as three lines to two lines and three quarters. A line is the twelfth part of an inch. The firſt ſpire is by far the largeſt, occupying nearly half of the longitudinal diameter. The ſummit is placed at the diſtance of about two-thirds of this diameter; it is terminated on the right ſide by a very ſmall knob, viſible only through a magnifier, thus differing from the ammonite of Rimini, (mentioned in p. 22,) which beſides is microſcopical and celled, the inſide of this which we are now ſpeaking of being entirely plain. The number of ſpiral circumvolutions is four and a half; they are equally convex on both ſides, and are fixed on a plane, dividing the ſhell into two equal parts; there is on each ſide a kind of boſs formed by the increaſe of the perpendicular diameter of the ſpires, in proportion as they recede from the center. The ſurface is ſmooth; the back is armed with a flat, even, brittle creſt, as thin as paper, ſurrounding it on every ſide like a ruff: it is about half a line broad, extends over the ſummit of the ſpires, and ſerves to join them together. The mouth of the ſhell is nearly triangular; its edges project in the form of lips, and are rounded at the border. I have often found this ammonite encloſed in the ſtomach of the ſcomber pelamis, or bonetta, caught in the South Sea, between the tropics, where no bottom was found with a line of more than two hundred fathoms. Theſe ſhells were covered with a black clayey mud. Their ſize varies from one to four lines acroſs; they are conſequently the largeſt living ammonites that have yet been diſcovered."

The above reaſoning, however, in ſupport of the extinction of the foſſil ammonia, ſeems far from concluſive, and by no means eſtabliſhes the fact in queſtion. How many ſpecies of teſtaceous animals have been lately diſcovered, that have eluded the reſearches of mankind for thouſands of years before? and how many may yet remain in the depths of the ocean, totally unknown to man, dwelling perhaps in a tranquil ſtate, with the maturer cornua ammonis? That no fragments of theſe ſhells in a recent ſtate are now ever found upon the ſea-coaſts of any country, is no good argument to prove their non-exiſtence; becauſe nothing leſs than a convulſion of the globe, ſufficiently powerful to overturn the bottom of the ſea, can caſt on ſhore theſe pelagian ſhells; for the ſame parity of reaſon that no convulſion of nature, leſs univerſal than the general deluge, could have heaped up, promiſcuouſly together, the foſſil ſhells we now find on the moſt elevated ſummits, and in ſituations far removed from the places of their natural and primeval abode. M. de Lamanon ſeems anxious to prove, that the ancient ammonites did not inhabit great depths of the ſea; and that Linnæus was deceived when he ſuppoſed that in great depths they may ſtill be found. But this naturaliſt contradicts himſelf, and entirely does away his own argument, when he tells us, that he could never find the recent ammonites but in the South Sea, where no bottom was to be found with

with a line of more than two hundred fathoms; and to put it beyond a doubt that the animals had been at that bottom, he informs us, that their ſhells were covered with a black clayey mud. It is true theſe ammonites were but ſmall; while of three hundred varieties of foſſil ammonites which he mentions, ſome, he ſays, have been found ten feet in circumference!

In treating of this ſubject we have been the more elaborate in our explanations and extenſive in our engravings, not only becauſe it forms an intereſting and elegant department of natural hiſtory, but becauſe the article CONCHOLOGY has never before appeared in any Cyclopædia, Encyclopædia, or other Dictionary, in the Engliſh language.

CONCHU'COS, a juriſdiction in the empire of Peru, in South America, under the archbiſhop of Lima; it begins forty leagues north-north-eaſt of the metropolis, and runs along the center of the Cordilleras. It produces fruits, grain, &c. and affords extenſive paſture for cattle of all kinds. Several branches of the woollen manufactory are carried on here, which conſtitute its greateſt commerce with the other provinces.

CONCHY'LIA, *ſ.* A general name for all ſorts of petrified ſhells.

CONCI'LIAR, *adj.* [*concilium*, Lat.] Relating to a council.—Having been framed by men of primitive ſimplicity, in free and *conciliar* debates, without any ambitious regards. *Baker.*

*To* CONCI'LIATE, *v. a.* [*concilio*, Lat.] To gain; to procure good will; to reconcile.—It was accounted a philtre, or plants that *conciliate* affection. *Brown.*

CONCILIA'TION, *ſ.* The act of gaining or reconciling.

CONCILIA'TOR, *ſ.* One that makes peace between others.

CONCI'LIATORY, *adj.* Relating to reconciliation.

CONCI'NI, better known by the name of the marſhal d'Ancre, was born at Florence, where his father was raiſed from a notary, to be ſecretary of ſtate. He came into France at the beginning of the ſeventeenth century with Mary de Medicis, wife of Henry the Great, and was then only gentleman in ordinary to that princeſs; but he was afterwards made her maſter of the horſe, bought the marquiſate of Ancre, enjoyed many conſiderable poſts, and was firſt gentleman of the bed-chamber, and marſhal of France, by the influence his wife, Eleonora Galigay, had over the queen: but he abuſed all this confidence; he diſpoſed of the finances and employments, filled the army and cities with his creatures, and endeavoured to make himſelf maſter of the government. This created great troubles in the ſtate. De Luines perſuaded Louis XIII. that the only method to ſtop his ambition, and put a period to the diſorders, was to finiſh his exiſtence. Accordingly a commiſſion was given to Vitry, one of the captains of the life-guard, who executed it on the draw-bridge of the Louvre, April 24, 1617, with ſeveral piſtol-ſhots. His body was afterwards abuſed by the populace; the parliament declared him guilty of treaſon, ſentenced his wife to loſe her head, and declared their ſon ignoble, and incapable of holding any office in France.

CONCIN'NITY, *ſ.* [from *concinnitas*, Lat.] Decency, fitneſs; a jingling of words.—The *concinnity*, I ſuppoſe, muſt have conſiſted in the rime. *Tyrwhitt on Chaucer.*

CONCIN'NOUS, *adj.* [*concinnus*, Lat.] Becoming; pleaſant; agreeable.

CONCIONATORY, *adj.* [*concionatorius*, *concio*, Lat.] Uſed at preachings or public aſſemblies.—Their comelineſs unbeguiled the vulgar of the old opinion the loyaliſts had formerly infuſed into them by their *concionatory* invectives. *Howell.*

CONCI'SE, *adj.* [*conciſus*, cut, Lat.] Brief; ſhort; broken into ſhort periods.—The *conciſe* ſtile, which expreſſeth not enough, but leaves ſomewhat to be underſtood. *Ben Jonſon.*—Where the author is obſcure, enlighten him; where he is too brief and *conciſe*, amplify a little, and ſet his notions in a fairer view. *Watts.*

CONCI'SELY, *adv.* Briefly; ſhortly; in few words; in ſhort ſentences.—Ulyſſes here ſpeaks very *conciſely*, and he may ſeem to break abruptly into the ſubject. *Broome.*

CONCI'SENESS, *ſ.* Brevity; ſhortneſs.—Giving more ſcope to Mezentius and Lauſus, that verſion, which has more of the majeſty of Virgil, has leſs of his *conciſeneſs*. *Dryden.*

CONCI'SION, *ſ.* [*conciſura*, Lat.] Cutting off; excision; deſtruction.

CONCITA'TION, *ſ.* [*concitatio*, Lat.] The act of ſtirring up, or putting in motion.—The revelations of heaven are conceived by immediate illuminations of the ſoul; whereas the deceiving ſpirit, by *concitation* of humours, produces conceited phantaſmes. *Brown.*

CONCLAMA'TION, *ſ.* [*conclamatio*, Lat.] An outcry or ſhout of many together.

CON'CLAVE, *ſ.* [*conclave*, Lat.] A private apartment. The room in which the cardinals meet; or, the aſſembly of the cardinals at Rome, ſimilar to the convocation of archbiſhops and biſhops in England.—It was ſaid of a cardinal, by reaſon of his apparent likelihood to ſtep into St. Peter's chair, that in two *conclaves* he went in pope, and came out again cardinal. *South.*—A cloſe aſſembly:

Forthwith a *conclave* of the godhead meets,
Where Juno in the ſhining ſenate ſits. *Garth.*

*To* CONCLU'DE, *v. a.* [*concludo*, Lat.] To ſhut.—The very perſon of Chriſt, therefore, for ever and the ſelf-ſame, was only, touching bodily ſubſtance, *concluded* within the grave. *Hooker.*—To include; to comprehend.—God hath *concluded* them all in unbelief, that he might have mercy upon all. *Romans*, xi. 32.—To collect by ratiocination.—The providences of God are promiſcuouſly adminiſtered in this world; ſo that no man can *conclude* God's love or hatred to any perſon, by any thing that befals him. *Tillotſon.*—To decide; to determine: that is, to *ſhut* or *cloſe* the diſpute:

Youth, ere it ſees the world, here ſtudies reſt;
And age, returning thence, *concludes* it beſt. *Dryden.*

To end; to finiſh.—I will *conclude* this part with the ſpeech of a counſellor of ſtate. *Bacon.*

Theſe are my theme, and how the war began,
And how *concluded* by the godlike man. *Dryden.*

To oblige, as by the final determination.—If therefore they will appeal to revelation for their creation, they muſt be *concluded* by it. *Hale.*

*To* CONCLU'DE, *v. n.* To perform the laſt act of ratiocination; to collect the conſequence; to determine:

For why ſhould we the buſy ſoul believe,
When boldly ſhe *concludes* of that and this;
When of herſelf ſhe can no judgment give,
Nor how, nor whence, nor where, nor what ſhe is? *Davies.*

To ſettle opinion.—I queſtion not but your tranſlation will do honour to our country; for I *conclude* of it already from thoſe performances. *Addiſon.*—Finally, to determine:

They humbly ſue unto your excellence,
To have a goodly peace *concluded* of
Between the realms of England and of France. *Shakeſp.*

To end:

We'll tell when 'tis enough;
Or if it wants the nice *concluding* bout. *King.*

CONCLU'DENCY, *ſ.* Conſequence; regular proof; logical deduction of reaſon.—Judgment concerning things to be known, or the neglect and *concludency* of them, ends in deciſion. *Hale.*

CONCLU'DENT, *adj.* Deciſive; ending in juſt and undeniable conſequences.—Though theſe kind of arguments may ſeem more obſcure, yet, upon a due conſideration of them, they are highly conſequential and *concludent* to my purpoſe. *Hale.*

CONCLU'DINGLY, *adv.* With uncontrovertible evidence.

dence.—Examine whether the opinion you meet with, repugnant to what you were formerly embued with, be *concludingly* demonſtrated or not. *Digby.*

CONCLU'SIBLE, *adj.* Determinable; certain by regular proof.—'Tis as certainly *concluſible* from God's preſcience, that they will voluntarily do this, as that they will do it at all. *Hammond.*

CONCLU'SION, *ſ.* Determination; final deciſion.—Ways of peaceable *concluſion* there are but theſe two certain; the one a ſentence of judicial deciſion, given by authority thereto appointed within ourſelves; the other, the like kind of ſentence given by a more univerſal authority. *Hooker.*—The collection from propoſitions premiſed; the conſequence.—The *concluſion* of experience, from the time paſt to the time preſent, will not be found and perfect. *War with Spain.*

Then doth the wit
Build fond *concluſions* on thoſe idle grounds;
Then doth it fly the good, and ill purſue. *Davies.*

The cloſe; the laſt reſult of argumentative deduction.—Let us hear the *concluſion* of the whole matter: Fear God, and keep his commandments; for this is the whole duty of man. *Eccleſ.* xii. 13.—The event of experiments; experiment.—We practiſe likewiſe all concluſions of graſting and inoculating, as well of wild trees as fruit trees. *Bacon.*—The end; the laſt part.—I can ſpeak no longer; yet I will ſtrain myſelf to breathe out this one invocation, which ſhall be my *concluſion*. *Howel.*—In Shakeſpeare it ſeems to ſignify ſilence; confinement of the thoughts:

Your wife Octavia, with her modeſt eyes
And ſtill *concluſion*, ſhall acquire no honour,
Demurring upon me. *Shakeſpeare.*

CONCLU'SIVE, *adj.* Deciſive; giving the laſt determination to the opinion.—The agreeing votes of both houſes were not by any law or reaſon *concluſive* to my judgment. *K. Charles.*—Regularly conſequential.—Thoſe that are not men of art, not knowing the true forms of ſyllogiſm, cannot know whether they are made in right and *concluſive* modes and figures. *Locke.*

CONCLU'SIVELY, *adv.* Deciſively; with final determination.—This I ſpeak only to deſire Eupolis not to ſpeak peremptorily, or *concluſively*, touching the point of poſſibility, till they have heard me deduce the means of the execution. *Bacon.*

CONCLU'SIVENESS, *ſ.* Power of determining the opinion; regular conſequence.—Conſideration of things to be known, of their ſeveral weights, *concluſiveneſs*, or evidence. *Hale.*

*To* CONCOA'GULATE, *v. a.* To curdle or congeal one thing with another.—The ſaline parts of thoſe, upon their ſolution by the rain, may work upon thoſe other ſubſtances, formerly *concoagulated* with them. *Boyle.*

CONCOAGULA'TION, *ſ.* A coagulation by which different bodies are joined in one maſs.

*To* CONCO'CT, *v. a.* [*concoquo*, Lat.] To digeſt by the ſtomach, ſo as to turn food to nutriment.—The vital functions are performed by general and conſtant laws; the food is *concocted*, the heart beats, the blood circulates, the lungs play. *Cheyne.*—To purify or ſublime by heat; to heighten to perfection:

The ſmall cloſe-lurking miniſter of fate,
Whoſe high *concocted* venom through the veins
A rapid lightning darts. *Thomſon.*

To ripen.—The root which continueth ever in the earth, is ſtill *concocted* by the earth; and fruits and grains are half a year in *concocting*, whereas leaves are out and perfect in a month. *Bacon.*

CONCOC'TION, *ſ.* Digeſtion in the ſtomach; maturation by heat; the acceleration of any thing towards purity and perfection.—The conſtanteſt notion of *concoction* is, that it ſhould ſignify the degrees of alteration of one body into another, from crudity to perfect *concoction*, which is the ultimity of that action or proceſs. *Bacon.*—Thus concoction is uſed for the ſame as digeſtion, though digeſtion is more generally confined to what paſſes in the ſtomach; whereas concoction is applied to what alterations are made in the blood veſſels, which may be called the ſecond concoction; and that in the nerves, fibres, and minuteſt veſſels, the third and laſt concoction.

CON'COLIN, a town of France, in the department of the Iſere: four leagues and a half north-eaſt of Grenoble.

CONCO'LOUR, *adj.* [*concolor*, Lat.] Of one colour; without variety.—In *concolour* animals, and ſuch as are confined unto the ſame colour, we meaſure not their beauty thereby; for if a crow or blackbird grow white, we account it more pretty. *Brown.*

CONCO'MITANCE, or CONCOMITANCY, *ſ.* [from *concomitor*, Lat.] Subſiſtence together with another thing.—The ſecondary action ſubſiſteth not alone, but in *concomitancy* with the other; ſo the noſtrils are uſeful for reſpiration and ſmelling, but the principal uſe is ſmelling. *Brown.*

CONCO'MITANT, *adj.* [*concomitans*, Lat.] Con'oined with; concurrent with; coming and going with, as collateral, not cauſative or conſequential.—The ſpirit that furthereth the extenſion or dilatation of bodies, and is ever *concomitant* with poroſity and dryneſs. *Bacon.*—It has pleaſed our wiſe Creator to annex to ſeveral objects, as alſo to ſeveral of our thoughts, a *concomitant* pleaſure; and that in ſeveral objects, to ſeveral degrees. *Locke.*

CONCO'MITANT, *ſ.* Companion; perſon or thing collaterally connected.—In conſumptions, the preternatural *concomitants*, an univerſal heat of the body, a torminous diarrhœa, and hot diſtillations, have all a corroſive quality. *Harvey.*—The other *concomitant* of ingratitude is hard-heartedneſs, or want of compaſſion. *South.*

Horror ſtalks around,
Wild ſtaring, and his ſad *concomitant*
Deſpair, of abject look. *Philips.*

And for tobacco, who could bear it?
Filthy *concomitant* of claret! *Prior.*

CONCO'MITANTLY, *adv.* In company with others.

*To* CONCO'MITATE, *v. a.* [*concomitatus*, Lat.] To be collaterally connected with any thing; to come and go with another.—This ſimple bloody ſpectation of the lungs, is differenced from that which *concomitates* a pleuriſy. *Harvey.*

CON'CORD, *ſ.* [*concordia*, Lat.] Agreement between perſons or things; ſuitableneſs of one to another; peace; union; mutual kindneſs:

Kind *concord*, heavenly born! whoſe bliſsful reign
Holds this vaſt globe in one ſurrounding chain;
Soul of the world! *Tickle.*

A compact.—It appeareth by the *concord* made between Henry and Roderick the Iriſh king. *Davies.*—Harmony; conſent of ſounds:

The man who hath not muſic in himſelf,
Nor is not mov'd with *concord* of ſweet ſounds,
Is fit for treaſons, ſtratagems, and ſpoils! *Shakeſpeare.*

Principal grammatical relation of one word to another, diſtinct from regimen.—Have thoſe who have writ about declenſions, *concords*, and ſyntaxes, loſt their labour? *Locke.*

CON'CORD, in law, an agreement made between two or more, upon a treſpaſs committed; and is divided into concord executory, and concord executed. *Howd.* 5, 6. Theſe concords and agreements are by way of ſatisfaction for treſpaſs, &c. Concord is alſo an agreement between parties, who intend the levying of a fine of lands one to the other, how and in what manner the lands ſhall paſs: it is the foundation and ſubſtance of the fine, taken and acknowledged by the party before one of the judges of the court of common pleas, or by commiſſioners in the country.