M. de Koninck
from Richard Griffith

A SYNOPSIS

OF THE

CHARACTERS

OF THE

CARBONIFEROUS LIMESTONE FOSSILS

OF IRELAND.

DUBLIN:
PRINTED AT THE UNIVERSITY PRESS,
BY M. H. GILL.
1844.

NOTICE.

The descriptions contained in the following Synopsis have been prepared under my direction by Mr. Frederick M'Coy, F.G.S., Dublin.

In addition to the Fossils previously known, the Synopsis contains upwards of four hundred and fifty new species, which have been named and described by Mr. M'Coy, the whole of which are contained in my Cabinet, and have been collected by myself and friends from the Carboniferous Limestone System of Ireland.

RICHARD GRIFFITH.

Fitzwilliam-place, Dublin,
August 28*th*, 1844.

ADVERTISEMENT.

In drawing up the following characters of those Fossils of the Irish Carboniferous Series which I have myself seen, I have endeavoured to express, first, all those characters which seemed permanent, or of specific value, in each species; second, the principal varieties to which they are liable; and finally, to point out, when necessary, the distinctions between the nearly allied species. The Genera have been placed in accordance with their affinities, commencing with the most highly organized; the Species have been arranged in alphabetical order under each generic head, to facilitate reference.

I have not noticed either the geological or geographical localities of the species, as from having examined and named the Collections made by Mr. Griffith, from nearly every carboniferous district in Ireland, the lists are so extensive that it has been thought better to keep them distinct.

The Collections of Fishes and Plants, although large and interesting, have not, as yet, been sufficiently examined for publication.

With regard to the drawings, I have spared no pains to make them as accurate as possible; a large number are entirely from my own pencil, and the others have been most carefully corrected, both as to outline, measurements, and effect, by my own hand.

Since the following Synopsis was sent to Press, and a large portion of it printed off, I received Koninck's "Descriptions des Animaux Fossiles," &c., Parts I. to XII., and although from the relative positions of the carboniferous deposits of Ireland and Belgium, an almost perfect similarity might be expected in their organic remains, yet of the large number of new fossils here put forward, the following only seem identical with M. de Koninck's species:—The *Nautilus hexagonus*, De Kon., is the *Nautilus* (*Discites*) *planotergatus* of this work, but as there is already a *Nautilus hexagonus* in the middle Oolite, the name I have proposed may perhaps be adopted. One of the varieties of the *Solarium fallax*, De Kon., is my *Platyschisma zonites*; as there are, however, two distinct forms confounded by that author, my specific name may, perhaps, be retained for this species, and thus the term *fallax* be limited

to the second shell figured by Koninck; the fossil seems to me congeneric with those ecarinate *Pleurotomariæ*, for which I have proposed the name *Platyschisma;* its affinity to *Solarium* is certainly more remote. *Pleurotomaria Hainesii* of this work should be changed to *Pleurotomaria naticoides*, De Kon., the species being identical. And finally, the *Producta tortilis* of this Synopsis is figured by Koninck as the *Productus undatus*, Defrance.

In drawing attention to those corrections which have arisen from the almost simultaneous discovery by M. de Koninck and myself, of a few species, I must express a hope, that I have not similarly erred with regard to any other authors, either by overlooking or misunderstanding their descriptions; no one, at least, can be more anxious to avoid such errors, or to correct them, when in my power.

FREDERICK M'COY.

TABLE OF THE GENERA.

SYNOPSIS,

&c. &c.

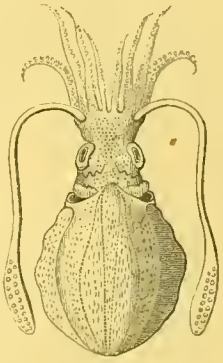
MOLLUSCA.

The *Mollusca*, or as anatomists more correctly call them, the *Heterogangliata*, include all the shell-fish, together with several naked groups of little interest to the geologist. The principal divisions of the class are, 1st. The *Cephalopoda*, which are the most highly organized, active, and rapacious of the entire group, having a distinct head, furnished with powerful horny mandibles, large, perfectly-formed eyes, a rudimentary skull and brain, powerful fins for swimming, and several other peculiarities of structure only found in the *Vertebrata*, to which they lead by means of the Fishes; the sexes are distinct. 2nd. The *Gasteropoda*, including all the spiral univalve shells, together with some naked groups, but all characterized by having the foot expanded into a disc for walking; they have also a head, and two eyes, and usually two or four tentacula; sexes distinct. 3rd. The *Dithyra*, or bivalves; those are much less highly organized than either the *Cephalopoda*, or *Gasteropoda*, having no head, tentacula, or eyes, and scarcely any powers of locomotion, having no fins for swimming, or disc-like foot for walking; many of the genera are permanently attached to foreign bodies, either by a byssus, or by the substance of the shell; they are all females. 4th. *Brachiopoda*, or arm-footed bivalves, of which we shall speak more when we come to them. There are, also, the *Pteropoda* and *Tunicata*.

CEPHALOPODA.

The *Cephalopoda* possess the power of swimming in greater perfection than any other Molluscous animals, and are purely carnivorous in their habits; they are provided with large arms or feet, which surround the head, and with which they can walk, seize their prey, and swim. There are several distinct groups. 1st. We have the *Dibranchiata* (fig. 1) or naked cuttle fishes, with two gills and three hearts; they possess the power of grasping, in a very remarkable degree, most of the species having two long fleshy arms, furnished with numerous suckers for the purpose; they are most highly organized, and approach nearest to the *Vertebrata* in size, structure, appearance, and habits; they can swim with tolerable velocity by means of fleshy fins, are very rapacious, and have the senses of hearing, seeing, and smelling, in higher perfection than any others of the class; besides the cranial cartilage, or skull, they have a large dorsal internal support, which though really analogous to the internal shell of a *Limax*, and having no organic connexion with the soft parts of the animal, still forcibly reminds the observer of the dorsal spine of the skeleton of the *Vertebrata*, to which, in their organs of nutrition, prehension, respiration, circulation, and the brain and nervous system, and organs of sense, they approach more nearly than any other of the molluscous group. 2nd. We have the *Siphonifera*, or *Tetrabranchiata*, including all the polythalamous shells which have their chambers connected by a siphuncle. Those appear to have been of the highest importance in the earlier periods of the earth's history, the immense multitudes of *Ammonites*, *Baculites*, *Scaphites*, *Hamites*, *Orbulites*, and *Nautili*, which crowd the

Fig. 1.



strata from the chalk to the lias inclusive, and the *Goniatites*, and gigantic *Orthoceratites* of the older rocks, seeming to have been among the chief carnivorous animals of those periods. They have all nearly disappeared from our seas, *Nautilus* and *Spirula* alone remaining to show us the nature of the animals which inhabited the many chambered shells familiar to the geologist. The *Siphonifera* are in their internal anatomy most nearly allied to the *Gasteropoda ;* they differ remarkably from the *Dibranchiata* in having four gills, and only one heart, and most particularly in wanting the internal dorsal lamina, and being covered by an external polythalamous shell, the chambers of which are connected by a siphuncle differing in structure according to the family. The subdivisions of this tribe are so numerous, and would lead us so far away from our subject, that it is better not to notice them.

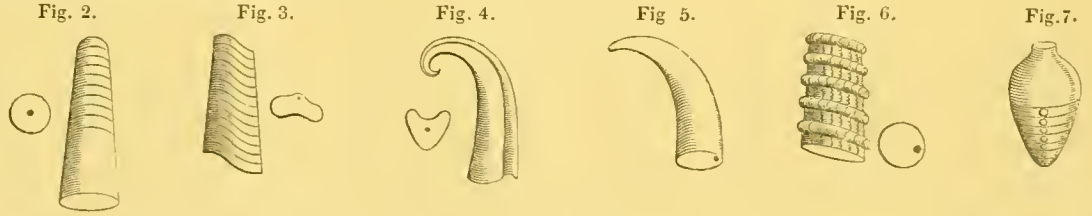
Family ORTHOCERATIDÆ.

Genus Orthoceras.

Gen. Ch.—Shell gradually tapering; smooth; siphuncle central.

There appear to be several subgeneric types even of the genus as here restricted, the first of those is *Orthoceras* proper (fig. 2), in which the form is straight conic, the section is circular or nearly so, the siphuncle central or nearly so, and the septa simple and placed at right angles to the long axis of the shell. The econd is *Loxoceras*[a], M'Coy (fig. 3), in which the section is oval, the septa waved and placed obliquely with respect to the axis of the shell, and the siphuncle is excentric. The third is *Trigonoceras*[b], M'Coy (fig. 4), in which the section is heart-shaped, the shell curved, with a concave back bounded on either side by a distinct ridge or keel, surface smooth, and the siphuncle central. The fourth is *Campyloceras*[c], M'Coy (fig. 5), in which the section is circular, the septa simple, and the surface smooth, but the shell is curved and the siphuncle dorsal. Fifth, *Cycloceras*[d], M'Coy (fig. 6), or those conical species marked with prominent concentric rings, and having the surface frequently sculptured with transverse scaly laminæ, and often decussated; siphuncle dorsal.

Fig. 2. Fig. 3. Fig. 4. Fig 5. Fig. 6. Fig.7.



This family also contains the genera *Poterioceras*[e], M'Coy (fig. 7), or the short fusiform orthoceratites, with contracted mouths, and *Actinoceras*, Stokes : the latter a doubtful genus.

Orthoceras attenuatum. *Flem.* (Not of *Sow.*)

Orthocera attenuata. *Flem.* An. Phil.

Sp. Ch.—Slender, subcylindrical, very gradually tapering ; septa distant; surface very finely striated transversely.

This species is allied to the *O. Steinhaueri*, but is smaller and more slender, and the transverse striæ very much finer; it is seldom more than the eighth of an inch in diameter. This is a more slender shell than the *O. elongato-cinctum* of Captain Portlock's Geological Report, which it otherwise very much resembles.

[a] Λοξος, oblique, and κερας, a horn.

[b] Τρεῖς, three; γωνία, an angle; and κερας, a horn.

[c] Καμπύλος, incurved, and κερας, a horn.

[d] Κυκλός, a ring, and κερας.

[e] Ποτήριον, a vase, and κερας.

Orthoceras cinctum. *Sow.* (not of *Phil.*)

Orthoceras cinctum. *Sow.* Min. Con.

Sp. Ch.—Shell very gradually tapering, section circular; siphuncle central; septa simple, distant; surface with fine, close, sharp, transverse striæ.

A few cylindrical fragments of this species have occurred.

Orthoceras cylindraceum. *Flem.* (Not of *Sow.*)

Orthocera cylindracea. *Flem.* An. Phil.

Sp. Ch.—Very gradually tapering, septa slightly waved, numerous; one and a-half lines apart; siphuncle very small, central.

This species is not nearly so cylindrical as some others, a specimen four inches in length, tapering about four lines. The *O. inequiseptum* (Phil.) is very closely allied to this species, but has the septa closer together. The *O. cylindraceum* of Sowerby is quite distinct, and should have the specific name changed.

Orthoceras filiferum. *Phil.*

Orthoceras filiferum. *Phil.* Geol. York.

Ch. Sp.—Very gradually tapering; siphuncle central; septa simple; surface with simple transverse striæ or ridges.

The specimens I have referred to this species have the annular ridges larger and more obtuse than in the *O. cinctum.*

Orthoceras mucronatum. *M'Coy.* (Pl. I. fig. 1.)

Sp. Ch.—Shell rapidly tapering, smooth; tip mucronate; section oval; siphuncle slightly excentric.

This very curious *Orthoceras* reminds us by its form of the *Belemnites mucronatus* of the chalk. The mucronate tip is a character I have not observed in any other *Orthoceras*[a]. Tapers more rapidly than *O. orale.* Length of specimen two inches; breadth at base six lines, tapers three lines.

Orthoceras ovale. *Phil.*

Orthoceras ovale. *Phil.* Geol. York.

Sp. Ch.—Shell very gradually tapering; section broad oval, septa simple; siphuncle nearly central.

This abundant species tapers very slowly; a specimen three inches long and nine lines in diameter at the base, diminishes three lines; the septa are one and a half lines apart; surface smooth.

Orthoceras pyramidale. *Flem.*

Orthocera pyramidalis. *Flem.* An. Phil.

Sp. Ch.—Shell rapidly tapering; septa slightly waved, distant; siphuncle small, central.

This species tapers rather rapidly, a specimen, four and a half inches long, measuring an inch in diameter

[a] Captain Portlock has figured some mucronate species since the above was written. See Geol. Report, &c.

at the larger end, and only four lines at the smaller; the septa are about two lines distant from each other, rather more at the large end, and about half a line less at the small end.

Orthoceras steinhaueri. *Sow.*

Orthocera Steinhaueri. *Sow.* Min. Con.—Orthoceras Steinhaueri. *Phil.* Geol. York.

Sp. Ch.—Shell very gradually tapering; section circular; septa about one and a half lines distant; very convex, simple; siphon lateral; surface strongly striated transversely.

This species is principally distinguished by the distance and great convexity of its septa. Usually about quarter of an inch in diameter; tapers one line in an inch.

Orthoceras striatum. *Sow.*

Orthocera striata. *Sow.* Min. Con.

The *O. striatum* described by Sowerby, in the Mineral Conchology from the Cork limestone, is stated to be striated *longitudinally*. Professor Fleming, in copying Mr. Sowerby's characters into his work on British Animals, alters it to *transverse* striæ, specimens agreeing with this latter description are common in the Cork limestone, and I at first thought, with Professor Fleming, that they might be the true *O. striatum*. Mr. Sowerby, however, mentions, in the Sil. System, that the *O. striatum* differs from the *O. filosum* (which has sharp, longitudinal ridges), in the fineness of its striæ. I have, however, seen no specimen corresponding with the original description in this particular, nor does Mr. Sowerby's figure afford any information.

Orthoceras sulcatulum. *M'Coy.* (Pl. I. fig. 4.)

Sp. Ch.—Gradually tapering, conic; section slightly elliptical; septa one-fifth the diameter, distant from each other; surface with coarse, waving, unequal transverse striæ.

This species closely resembles Professor Phillips' figure of the *O. cinctum*, Sow., but differs from his description in the coarseness of the transverse sulci (which also distinguishes the surface from *O. subflexuosum*, Münst.) From Sowerby's original figure and description of his *O. cinctum* it differs entirely, that species being nearly cylindrical, and with very fine, direct, transverse striæ, while the present shell has very coarse, waving, unequal ridges, and tapers more rapidly in form; specimens of the true *O. cinctum*, with those characters, are not uncommon; the present species is very rare. A specimen, two inches long, and one inch six lines in diameter at the base; tapers five lines.

Orthoceras (Loxoceras) Breynii. *Mart.* sp.

Orthoceratites Breynii. *Mart.* Pet. Derb.—Orthocera Breynii. *Sow.* Min. Con.

Sp. Ch.—Shell tapering; section elliptical; siphuncle in one focus, at the raised edge of the septa; septa very oblique, numerous; very slightly concave.

This species has the septa remarkably oblique, and what is very unusual, they are nearly flat; a specimen two inches and eight lines long, and one inch three lines at base, tapers four lines; the septa are from one and a half to two lines apart.

Othoceras (Loxoceras) distans. *M'Coy.* (Pl. IV. fig. 1.)

Sp. Ch.—Tapering five lines in two inches; section elliptical; septa concave, one-half their lesser diameter distant from each other, oblique in the direction of the shorter diameter of the shell, with a broad, shallow wave in the side; siphuncle nearly central.

This species differs from the *O. laterale*, Phil. *O. imbricatum*, Wal. and *O. undulatum*, Sow., in its very distant chambers, and from the last species by its nearly central siphuncle; it also tapers more rapidly than any of those species. Length of specimen, imperfect at both ends, two inches, three lines, long diameter at base, one inch one line, short diameter nine lines.

Orthoceras (Loxoceras) incomitatum. *M'Coy.* (Pl. I. fig. 6).

Sp. Ch.—Conical, very rapidly tapering towards the apex; section broad oval; septa slightly oblique, without wave, or with a very slight one, slightly convex, varying from a fifth to a sixth of their longest diameter in distance from each other; siphuncle slightly excentric.

In the great approximation of the septa, this species resembles the *O. imbricatum*, Wahl., but differs in its short, conical form towards the apex, and the septa wanting the strong lateral wave of that species; it is perhaps most nearly allied to the *O. cylindraceum*, Flem., but differs in its proportion, section, and siphuncle. One specimen of the last, chamber ten lines long, and seven lines in diameter at the base, tapers two lines; a specimen, near the apex one inch two lines long, and five lines in diameter at the base, tapered four lines; the septa vary from one-half, to one and a half lines apart. Very common in the black slate of Cove of Cork, but has not occurred elsewhere, and it is unaccompanied by any other fossil.

Orthoceras (Loxoceras) laterale. *Phil.* sp.

Orthocera undulatum. *Sow.* Min. Con.—Orthoceras undulatum and Orthoceras laterale. *Phil.* Geol. York.—Orthoceras laterale. *Phil.* Pal. Foss. Orthoceras subimbricatum. *Portk.* Geol. Rep.

Sp. Ch.—Shell tapering, thin, smooth; septa numerous, oblique, their edges rising with a wave on each side; about one and a half lines distant from each other; siphuncle excentric; section oval.

This species is very remarkable for the two lobes in the edge of the septa; a specimen two inches long and one inch in diameter at the base, tapers four lines.

Orthoceras (Trigonoceras) paradoxicum. *Sow.* sp.

Orthocera paradoxica. *Sow.* Min. Con.

Sp. Ch.—Shell rapidly tapering, abruptly curved towards the apex; back flat, bounded by two prominent rounded keels; front angular, rounded; sides convex in the middle, equal in width to the back; surface smooth; siphuncle nearly central.

The only perfect specimen I have seen, of this curious shell, is in the Collection of the Rev. Dr. Sirr, from the lower limestone of Kildare.

Orthoceras (Campyloceras) arcuatum. *Phil.* sp.

Orthoceras arcuatum. *Phil.* Geol. York.

Sp. Ch.—Obliquely conical, short, very rapidly enlarging, arched towards the apex; septa very numerous; siphuncle dorsal.

This is the shortest species of the genus with which I am acquainted, and is easily distinguished by its curved form and smooth surface.

Orthoceras (Campyloceras) unguis. *Phil.* sp.

Orthoceras unguis. *Phil.* Geol. York.

Sp. Ch.—Elongate, tapering, smooth, curved towards the apex; septa simple, approximate, from one and a half to two lines apart; siphuncle nearly dorsal.

This species is larger, and tapers much more gradually than the *O. arcuatum*, to which it is otherwise similar.

Cycloceras annulare. *Flem.* sp.

Orthocera annularis. *Flem.* An. Phil.

Sp. Ch.—Cylindrical, girt with numerous, distant, even transverse rings or ridges, surface smooth.

This beautiful little species is usually found in fragments about an inch in length, and quarter of an inch in diameter; there are usually about two chambers between two of the external rings.

Cycloceras lævigatum. *M'Coy.* (Pl. I. fig. 3).

Sp. Ch.—Very gradually tapering, regularly girt with equal rounded rings very slightly oblique, rather more than their own thickness apart, surface smooth.

This species belongs to the very interesting but difficult division of the *Orthoceratites*, to which, from the prominent ring-like elevations on the surface, I have given the name of *Cycloceras;* the present species is closely allied to the *O. Ibex* (of Sow. not of Phil.), and to the *O. annulatus* of Heisinger (not of the Min. Conch.) It is most likely to be confounded with the *O. lineolatum*, Phil. (*O. annulatum* of the Geol. York) from which it is distinguished by its perfectly smooth surface. A specimen one inch three lines in length, and nine lines in diameter, does not taper more than half a line.

Cycloceras lineolatum. *Phil.* sp.

Orthoceras lineolatum.—*Phil.* Pal. Fos.—Orthoceras annulatum.—*Phil.* Geol. York. (Not of the Min. Con.)

Sp. Ch.—Very gradually tapering; surface with numerous rounded oblique rings, the intervening spaces with fine, obtuse, slightly waving transverse striæ.

I have only seen one flattened fragment of this rare species.

Poterioceras. *M'Coy.*

Gen. Ch.—Shell fusiforme, short; mouth contracted; siphuncle dilated between the chambers, excentric.

Distinguished from the true *Orthoceratites* by its short, fusiform contour, and contracted mouth.

Mr. Sowerby proposed the name *Gomphoceras* for a fusiform species of the Silurian rocks, but that is a well known genus of Insects.

Poterioceras fusiforme. *Sow.* sp.

Orthocera fusiformis. *Sow.* Min. Con. Orthoceras fusiforme. *Phil.* Geol. York.

Sp. Ch.—Elongate, fusiform; length three times the width; siphuncle excentric towards the dorsal side.

This elegant species is distinguished from all others of the genus by its more elongate form, a specimen six inches long only measuring one inch seven lines in the widest part. In the same specimen the mouth only measured nine lines in diameter, the smaller end was six lines in diameter.

Poterioceras ventricosum. *M'Coy.* (Pl. I. fig. 2).

Sp. Ch.—Fusiform, width nearly half the length.

This fine species is one of the largest of the fusiform group of *Orthoceratites*, to which I have given the generic name of *Poterioceras*. It most nearly resembles the common *P. fusiforme*, but is easily distinguished by its great proportional width; the section is a very broad oval, siphuncle large, inflated, and slightly excentric. Length of chambered portion figured three and a half inches, diameter of last chamber four and a half inches, diameter of thirteenth chamber from the last one inch four lines, septa three lines apart.

Actinoceras. *Stokes.*

Gen. Ch.—Siphuncle containing an internal tube connected with the walls of the siphuncle by radiating lamellæ.

Actinoceras giganteum. *Sow.* sp.

Orthocera gigantea.—*Sow.* Min. Con.—Actinoceras Simmsii.—*Stokes*, Geol. Trans.

Sp. Ch.—Elongate conic, smooth, or faintly striated across; siphuncle excentric, moniliform, internally compound as in *Ormoceras*, radii about four (?), septa numerous, concave, composed of several thick lamellæ.

I have ascertained that this fossil has precisely the same structure of siphuncle, both in external form and internal complexity, as we see in the *Ormoceras Bayfieldii:* in fact, from the sections I have made, I do not find a single character to distinguish the genera *Actinoceras* and *Ormoceras* from each other. The *Orthoceras giganteum* of Sowerby presents all the characters, both of size and external and internal conformation, of the *Actinoceras Simmsii* of Stokes. I have, therefore, restored the old specific name, but retained Mr. Stokes' generic name. Common in the red limestone of Castle Espic Comber, where it sometimes attains a length of four feet, imperfect at each end. Sowerby, in the Min. Con., when describing the *O. giganteum*, notices its occurrence in this locality.

Actinoceras pyramidatum. *M'Coy.* (Pl. I. fig. 5).

Sp. Ch.—Rapidly tapering; siphuncle moniliform, contracted between the septa, longitudinally wrinkled, internal tube small, radiating lamellæ, three or four; septa double, having a considerable space between the layers on one side.

This species is easily distinguished from the *A. giganteum* (*Simmsii* of Stokes) by the rapidity with which it tapers and the simplicity of the siphuncle.

Cyrtoceras. *Gold.*

Gen. Ch.—Involute, slightly depressed; whorls disjoined; septa simple, siphuncle dorsal.

Cyrtoceras tuberculatum. *M'Coy.* (Pl. IV. fig. 2).

Sp. Ch.—Elongate, tapering, slightly curved; section very broad, oval; surface with about twenty-six narrow, equal, longitudinal ridges, strongly and regularly tuberculated; intervening spaces rather broader than the ridges, shallow, concave, smooth.

In proportions, curvature, and number of ridges, this closely resembles the *O. Gesneri*, Mart., but differs in the tuberculation of the ridges. The smooth intervening spaces, and nodular (not scale-like) tuberculation of the ridges, separates it from the *C. quindecimale* and *C. obliquatum;* the form of the latter is also perfectly distinct. A specimen, imperfect at both ends, one inch and seven lines in length, and eight lines in width at the base, tapers to five lines.

Phragmoceras. *Brod.*

Gen. Ch.—Involute compressed, conical; septa simple, crossed by the lines of growth; siphuncle usually ventral; mouth contracted, outer extremity produced.

Phragmoceras flexistria. (Pl. I. fig. 7). *M'Coy.*

Sp. Ch.—Discoid, compressed, involute, surface marked with numerous coarse, waving, longitudinal striæ, crossed by fine sigmoidal wrinkles of growth.

If this be a species of *Phragmoceras*, it must have been nearly as involute as *P. nautilium;* on the other hand, in the absence of chambers, the portion preserved bears some resemblance to certain of the silurian *Euomphali*, as *E. lincatus*, but from all those it is distinguished by the small size of the inner or ventral curve, and in either case the species is easily known by its close, *flexuous*, thread-like striæ.

Family NAUTILIDÆ.

1st. The genus *Nautilus* may be viewed as the type of the whole; the species it contains are large, simply formed shells, having a very wide geological range; they are involute, the last chamber usually enveloping all the rest, and being large enough to contain the animal; the septa are simple, or entire at their edges, and concave outwardly; the siphuncle is discontinuous, and usually central. I have separated two groups, *Temnocheilus* and *Discites*, the characters of which will be given under those heads. 2nd. Seems to be the genus *Goniatites*, De Haan, which has the edges of the septa bent angularly, so as to assume a complexity little short of what we see in the true *Ammonites*. 3rd. *Bellerophon*, although strongly allied to *Argonauta*, may, perhaps, be left in this family for the present, on account of the greater thickness of the shell, and its larger and more perfectly formed spire. The genus *Phragmoceras* of Brodrip, appears to belong to the present family, rather than to the *Orthoceratidæ*, to which, however, it obviously approaches; the compressed, curved form of these shells is very different from that of *Orthoceras*, but approaches closely to what might be considered as a partially unrolled *Nautilus*, from which it differs in no very important point of structure; some of the species are almost perfectly involute, as the *P. nautilium*.

Goniatites. *De Haan.*

Gen. Ch.—Shell discoid, involute; edges of the septa bent into distinct angles; siphuncle dorsal.

This remarkable genus appears to be characteristic of the carboniferous series (including the carb. slate or upper Devonian). It is found in every marine member of this group, and in some of them it is the most abundant fossil, while neither above nor below do we find any shells possessing the peculiar structure of the genus.

Goniatites Browni. *M'Coy.* (Pl. IV. fig. 17).

Sp. Ch.—Discoid, subglobose, sides flattened; umbilicus large, acute-edged, exceeding one-third the diameter of the shell; surface smooth; septa, dorsal lobe small, bifid; dorsal sinus acute; first lateral lobe slightly exceeding the dorsal in length, very wide, rounded; lateral sinus twice as long as the dorsal, acute, linguiform; second lateral lobe very wide, obtusely rounded.

From the *G. striatus*, Sow., which the species most resembles, it is distinguished internally by its much shorter and wider first lateral lobe; the same character distinguishes it from the *G. sphæricus*, Sow., and from both it is distinguished externally by its smooth surface, and from all the species of the same form, by the large size of the umbilicus. Diameter two inches two lines, thickness one inch one line.

Goniatites crenistria. *Phil.*

Goniatites crenistria.—*Phil.* Geol. York.

Sp. Ch.—Spheroidal, umbilicus very small; surface with delicate, slightly waving, transverse striæ, which are crenulated by very fine spiral lines.

This beautiful shell is completely reticulated by the crossing of the most delicate spiral and transverse striæ; it varies considerably in shape, being sometimes almost spherical, and at other times compressed; the markings of the surface will, however, at all times distinguish it; the septa are exactly similar to those of the *G. striatus;* diameter one and a half inches, thickness ten lines.

Goniatites discus. *M'Coy.* (Pl. II. fig. 6).

Sp. Ch.—Discoid, compressed, smooth; sides flattened, back rounded; volutions six; entirely exposed; septa, dorsal sinus single, acute; dorsal lobe short, rounded; first lateral sinus bifid; first lateral lobe twice as long as the dorsal lobe, rounded, sides parallel; second lateral sinus narrow, pointed, mucronate, equal in length to first lateral sinus; second lateral lobe short, rounded; marginal sinus very short, acute.

This *Goniatite* belongs to the remarkable little group including the *G. Henslowi*, *G. cyclolobus*, *G. mixolobus*, &c. and which, from the peculiarities both of septa, and external form, might make a very natural genus. Diameter one inch seven lines; length of mouth five lines; width four lines.

Goniatites excavatus. *Phil.*

Goniatites excavatus. *Phil.* Geol. York, and Pal. Fos.

Sp. Ch.—Discoid, depressed; back rounded; umbilicus large, margin acute; surface with fine, branching, curved, transverse striæ; septa, dorsal lobe short, bifid; first lateral sinus acute, angular; first lateral lobe very large, obtusely rounded; inner margins parallel; lateral sinus acute.

This species is liable to be confounded with the *G. reticulatus*, but is distinct both by its septa (having the lateral sinus angular, pointed, instead of being wide and obtuse, or with a small mucronate point, as in that species) and in wanting the spiral striation: the form too is not so depressed, and the back is more rounded than in that shell.

Goniatites fasciculatus. *M'Coy.* (Pl. II. fig. 8).

Sp. Ch.—Discoid; umbilicus very large; inner whorls partly exposed; back very convex, broad, crossed by numerous unequal bundles of fine transverse ridges, having a deep retral wave on the back; the bundles of transverse ridges about their own diameter apart, the intervening spaces being concave and smooth.

This beautifully marked species is distinguished from the *G. Listeri*, to which it is nearly allied, by the transverse ribs, instead of being simply rounded, as in that species, being formed each of a bundle of thin, unequal ridges; the umbilicus is also smaller, and with a rounded edge; the margin is plicated by the passage over it of the ridges; this part bears large tubercles in the *G. Listeri*, which is a much more common species. Diameter one inch six lines, thickness of last whorl eleven lines.

Goniatites Gibsoni. *Phil.*

Goniatites Gibsoni. *Phil.* Geol. York.

Sp. Ch.—Discoid, whorls, five or six, one-third exposed; back rounded; mouth broad, oval, a little wider than long; whorls crossed by sharp, forked ribs, most prominent at the edge of the umbilicus.

I am not acquainted with the septa of this remarkable little shell, which in general form, and in the marking of its surface, more closely resembles an *Ammonite* than the present genus. There are about five or six turns in the spire; the volutions are convex; the back broad and rounded; the radiating ribs rise boldly from the edge of the umbilicus, and, bending slightly forward, branch about the middle of the side into two smaller ones, which pass over the back; the surface between the ribs is perfectly smooth. Diameter four lines, thickness one line.

Goniatites intercostalis. *Phil.*

Goniatites intercostalis. *Phil.* Geol. York.

Sp. Ch.—Discoid depressed; whorls two-thirds exposed; back broad, obtusely angular in the middle; sides with radiating ribs, which form distinct tubercles at the dorsal angle; between these there are coarse spiral striæ.

I have not as yet seen the septa of this very rare shell; the back is broad, bounded by an obtuse angle, from whence the sides are concave, exposing rather more than one half of each whorl; the whorls are about four in number, spirally striated, with rather distant, strong, radiating ribs, forming tubercles when they reach the ridge which bounds the back, where they cease. Diameter one inch, thickness seven lines.

Goniatites latus. *M'Coy.* (Pl. II. fig. 7).

Sp. Ch.—Globose, back very broad, rounded; mouth transversely elliptical, twice and half as wide as long; umbilicus rounded, angular, very deep, exposing the edges of the preceding whorls; surface smooth, with a few distant, bent constrictions; septa, dorsal lobe simple, twice as long as wide, rounded; dorsal sinus very wide, rounded; lateral lobe half the length of the dorsal, width equal to the length, acute; lateral sinus wide, shallow; surface smooth.

This is one of the very few *Goniatites* of the mountain limestone, in which the dorsal lobe is simple, as in those of the inferior rocks, it resembles the *G. Nœggerathii*, but is much more globose, and has fewer whorls. Diameter one inch three lines, width of mouth ten lines, length of mouth four lines.

Goniatites Listeri. *Mart.* sp.

Ammonites Listeri. *Mart.* Pet. Derb.—Ammonites Listeri. *Sow.* Min. Con.—Goniatites Listeri. *Phil.* Geol. York.

Sp. Ch.—Spheroidal depressed; mouth twice as wide as long; umbilicus very deep, conical, exposing the angle of the internal whorls; edge of the umbilicus tuberculate; surface with distinct transverse striæ, or ridges, having a shallow, retral wave as they pass over the broad back; septa, dorsal lobe bifid, dorsal sinus long, acute; first lateral lobe very large, rounded; lateral sinus little deeper than the dorsal sinus; wide, mucronate, or suddenly pointed.

In this species the umbilicus is so large that all the whorls are half exposed, so that the toothed or plaited edge of the umbilicus can be seen all the way; the back is broad, slightly convex, and transversely striated. Diameter one and a half inches, thickness one inch.

Goniatites micronotus. *Phil.*

Goniatites micronotus. *Phil.* Geol. York.

Sp. Ch.—Discoid, depressed, back rounded; umbilicus very small, rounded; surface with delicate, transverse, curved striæ; septa, dorsal lobe very small, acute, first lateral lobe very large, rounded at the extremity, with their inner edges nearly parallel, dorsal and lateral sinus small and rounded.

This obscure species is known from the young of *G. obtusus* and *G. striolatus* by the small size of the umbilicus, the form of the septa distinguishes it from all the allied species. Diameter one inch, thickness six lines.

Goniatites mutabilis. *Phil.*

Goniatites mutabilis. *Phil.* Geol. York.

Sp. Ch.—Globose, smooth; umbilicus wide, acute-edged; mouth more than twice as wide as long; back broad, rounded; constrictions direct.

One or two specimens of this simply formed shell have occurred; the septa have not been seen as yet, neither have I seen any specimens corresponding to Professor Phillips's figure of the adult. Diameter four lines, thickness three lines.

Goniatites obtusus. *Phil.*

Goniatites obtusus. *Phil.* Geol. York.

Sp. Ch.—Discoid, gibbous, somewhat compressed, with nearly parallel sides, and broad, obtusely-rounded back; umbilicus very small; surface, when well preserved, very finely striated transversely; striæ waved; septa, dorsal lobe small, obscurely bifid, dorsal sinus angular, acute; first lateral lobe three times the length of the dorsal, oblong, rounded; lateral sinus wide, mucronate.

This species bears some resemblance to the *Goniatites striatus* and *G. crenistria* in general appearance, but is distinguished from the first by its transverse striæ, smaller umbilicus, and by its rounded lateral lobes, and from the latter by the surface not being reticulated; the back is broad and rounded, but the sides are but slightly convex; diameter one inch six lines, thickness ten lines.

Goniatites reticulatus. *Phil.*

Goniatites reticulatus. *Phil.* Geol. York.

Sp. Ch.—Discoid, depressed, back angulated; umbilicus conical, smooth, with an angular margin; surface with acute transverse branching, curved striæ, crenulated by fine spiral lines; septa, dorsal lobe short, obscurely bifid, dorsal sinus small, rounded; first lateral lobe narrow, rounded; lateral sinus large, mucronate.

It sometimes happens that casts only of the smooth conical umbilicus remain, but more frequently it occurs crushed or flattened, with the surface perfect, shewing distinctly the beautifully curved dichotomous striæ, which, under the lens, are seen to be crossed by delicate spiral striæ. The young shells are more globose, and have a rounded umbilicus. Diameter from one to two inches.

Goniatites sphæricus. *Mart.* sp.

Goniatites sphæricus. *Mart.* Pet. Derb.—Ammonites sphæricus. *Sow.* Min. Con.—Goniatites sphæricus. *Phil.* Geol. York.

Sp. Ch.—Globular, umbilicus small, acute-edged; surface spirally striated; septa, dorsal lobe bifid, dorsal sinus short, acute, first lateral lobe obtuse, four times the length of the dorsal lobe; second lateral lobe very obtuse, nearly as long as the first.

This species is almost perfectly spherical in general form; the umbilicus is small, rounded, and with a sharp edge; when finely preserved the surface is spirally striated, but it is more commonly found without the external shell. Diameter one inch ten lines, thickness one inch five lines.

Goniatites spilæroidalis. *M'Coy.* (Pl. IV. fig. 18).

Sp. Ch.—Spheroidal, sides slightly flattened, thickness equal to two-thirds the diameter; umbilicus rathe large, acute-edged; shell marked with very fine transverse striæ, and having faint, internal, sigmoidal ridges; septa, dorsal lobe bifid; lateral lobe very short, scarcely exceeding the dorsal lobe in length, broad, rounded, with parallel sides; dorsal sinus acute; lateral sinus very large, mucronate.

This species is much thicker, or more nearly spherical, than either the *G. crenistria*, *G. obtusus*, or *G. striolatus;* from the first and second it differs, besides its thickness, in the greater size of the umbilicus, and width of the lateral lobes of the septa, and from the latter, by its large size, very long lateral sinus, short lateral lobe, and spherical form; from the *G. sphæricus* it differs in the short, wide, lateral lobes, longer lateral sinus, and the absence of spiral striæ. Diameter one inch six lines, thickness one inch, diameter of umbilicus six lines.

Goniatites spiralis. *Phil.*

Goniatites spiralis. *Phil.* Pal. Fos.—Goniatites granosus. *Portk.* Geol. Rep.

Sp. Ch.—Discoid (compressed?) umbilicus very small, rounded; surface, with numerous close, equal, finely granulated, spiral striæ, the spaces between which are transversely striated.

All the specimens of this shell which I have seen were quite flat from compression, and I am not aware of the true proportion which the thickness should bear to the diameter, nor have I seen the septa. Diameter usually about two inches.

Goniatites striatus. *Sow.* sp.

Ammonites striatus. *Sow.* Min. Con.—Goniatites striatus. *Phil.* Geol. York.

Sp. Ch.—Spheroidal, slightly depressed, finely striated longitudinally; umbilicus small, rounded, with an obtuse margin; septa, dorsal lobe bifid; dorsal sinus angular, acute; first lateral lobe angular, acute, rather more than twice the length of the dorsal lobe; second lateral lobe blunt, shorter than the first lateral lobe; lateral sinus angular, acute, not longer than the dorsal sinus.

This species is known at once from the *G. sphæricus*, by its more compressed form, and acutely angular first lateral lobe. Both these species exhibit variable internal ridges on the cast. Diameter two inches, thickness one inch.

Goniatites striolatus. *Phil.*

Goniatites striolatus. *Phil.* Geol. York.

Sp. Ch.—Subglobose; sides slightly convex, gently sloping towards the back, which is narrow, rounded; umbilicus large, acute-edged; surface with fine, rather distant, straight, transverse striæ; septa, dorsal lobe very short, bifid; dorsal sinuses wide, pointed; lateral lobes large, obtusely rounded; lateral sinus moderate, mucronate.

This pretty species differs from the young of *G. obtusus*, by having the back narrower, and the sides sloping towards it, not parallel, its larger umbilicus, and more obtusely rounded first lateral lobe. Diameter about one inch, thickness five lines.

Goniatites truncatus. *Phil.*

Goniatites truncatus. *Phil.* Geol. York.

Sp. Ch.—Discoid, compressed; sides flattened; back flat, or slightly convex, meeting the sides nearly at right angles; umbilicus very small; surface with very fine transverse striæ.

Resembles the *G. obtusus*, but easily distinguished by its more compressed form, flatter sides, and flat, truncate back. Diameter one inch and a half, thickness six lines.

Goniatites vittiger. *Phil.*

Goniatites vittiger. *Phil.* Geol. York.

Sp. Ch.—Discoid, compressed, smooth; sides convex, concave towards the keel; back with a large, square keel; umbilicus wide, shallow, exposing the edges of the whorls; whorls five or six.

I have not yet seen the septa of this curious shell; it resembles a *Spirorbis* when one side only is seen.

Clymenia. *Münst.*

Endosiphonites. Ansted.

Gen. Ch.—Discoid involute; septa with one forward bend on the back; siphuncle ventral.

This genus is very distinct from *Goniatites*, by its ventral instead of dorsal siphuncle, and the comparative simplicity of the septa. There is an undetermined species common in the limestone of Cregg Nobber, resembling the *C. lævigata*, but with fewer, and more compressed whorls, and rounded back, without keel.

Clymenia plurisepta. *Phil.*

Clymenia plurisepta. *Phil.* Pal. Fos.

Sp. Ch.—Discoid (smooth ?) umbilicus large, edge rounded; sides very slightly convex; thickness rapidly diminishing from the edge of the umbilicus to the back, which is narrow, rounded; septa about one line apart. Diameter one inch, thickness half an inch.

Clymenia sagittalis. *Phil.*

Clymenia sagittalis. *Phil.* Pal. Fos.

This species differs from the last principally in being more compressed, and having a much smaller umbilicus.

Discites. *M'Coy.*

Fig. 8.

Gen. Ch.—Shell discoid, whorls exposed, quadrangular; back flat or concave; septa concave outwardly, with an acute sinus at each of the latero-dorsal angles, and a deep, rounded, dorsal sinus on the back, the concavity towards the mouth; siphuncle towards the dorsal margin.

This genus is distinguished from all others of the family by the quadrangular form of the whorls, these are all exposed, and are more numerous and more nearly equal in size than in any of the other genera; the angle formed by the meeting of the flat side with the flat or concave back, produces a long, acute, lateral sinus in the edge of the septa, reminding us of *Clymenia*, the point directed towards the mouth; between these on the back, there is a large obtuse sinus, the concavity of which is towards the mouth (fig. 8). The siphuncle is dorsal, or nearly so.

Nautilus (Discites) costellatus. *M'Coy.* (Pl. II. fig. 4).

Sp. Ch.—Discoid, inner whorls exposed; volutions very convex; back rounded; umbilical edge steep, smooth, whorls ornamented with about nineteen narrow, equal, prominent longitudinal ridges, separated by a space rather greater than twice their own diameter; septa very convex; siphuncle central.

This species is easily distinguished by the width of its volutions, broad, rounded back, and few distant longitudinal ridges; the number of whorls is about four; the width of the mouth from side to side is rather greater than the length from before backwards; the volutions are almost wholly exposed in a steep, smooth, umbilicus, the spaces between the ridges on the surface appear nearly smooth to the naked eye, but under the lens are seen to be marked with very fine transverse retroflexed striæ. Diameter one inch four lines; width of mouth eight lines, length six lines.

Nautilus (Discites) discors. *M'Coy.* (Pl. III. fig. 5).

Sp. Ch.—Discoid, compressed, whorls five, entirely exposed, quadrate, back convex, equal in width to the sides exclusive of the umbilical slope, sides slightly flattened, evenly convex; surface of the young shell

(and inner whorls of the old) marked with strong longitudinal (spiral) sulci, crossed by very fine striæ; last volution of adult specimens marked with coarse transverse sigmoidal striæ only.

I have named this species from the remarkable difference in striation between the young and old volutions, which is so great they might be taken for different species; it resembles the *N. subsulcatus*, Phil., most nearly, but is distinguished by the character of the striation, and by not having, at any period of growth, either the two keels on the back, the keel on the sides, or any concavity on those latter, the sides being regularly convex, and the back broader in proportion to the width of the sides. Diameter, three inches one line; length of mouth, one inch one line; width, eleven lines. It grows much larger.

Nautilus (Discites) latidorsatus. *M'Coy.* (Pl. IV. fig. 16).

Sp. Ch.—Discoid compressed, smooth; volutions entirely exposed in a very wide, shallow, undefined umbilicus; whorls cordate, triangular; sides margined exteriorly by a prominent rim or keel, within which is a shallow sulcus, from whence into the umbilicus the sides are evenly convex; back very broad, flat, nearly equalling the side in width.

This species differs, from all of the genus that I know, in the cordate or triangular section of the whorls, and in the prominent margin to the sides, formed, as it were, by the projection of the flat back. There are very faint traces of spiral striæ on the inner, or young volutions; septa simple, concave outwardly. Diameter, one inch seven lines; length of mouth, six lines; width of back, five lines.

Nautilus (Discites) mutabilis. *M'Coy.* (Pl. III. fig. 7).

Sp. Ch.—Discoid, very much compressed; whorls five or six, entirely exposed, quadrangular, aperture sagitate; back very concave, less than one-fourth the width of the side, umbilical slope as broad as the back, steep, concave, with an angular margin; two outer whorls in adult specimens perfectly smooth, inner ones marked with strong equal spiral sulci.

The change of character of the surface from the inner to the outer whorls is even greater than in the *Nautilus* (*Discites*) *discors*, M'Coy, the inner volutions being spirally striated as in that species, but the outer turns being perfectly smooth; it differs from that species, besides the smoothness of the outer whorls, in the much more compressed form; long, narrow mouth, and the narrow and very concave back; from the *N.* (*Discites*) *trochlea*, M'Coy, it differs in the striation of the inner whorls. Diameter four inches four lines; width of side, exclusive of marginal slope, one inch two lines; width of back three lines, greatest width of mouth at the umbilical angles seven lines.

Nautilus (Discites) oxystomus. *Phil.* sp.

Nautilus oxystomus. *Phil.* Geol. York.

Sp. Ch.—Discoid, compressed, smooth, back acute; volutions half exposed; sides of the inner whorls with two sharp spiral ridges.

Several fragments of this remarkable species have occurred to me, but none of them shewed more of the septa than has been already indicated by Professor Phillips; the length of the aperture is equal to half the diameter of the shell.

Nautilus (Discites) planotergatus. *M'Coy.* (Pl. II. fig. 2).

Sp. Ch.—Discoid, compressed, whorls quadrangular; sides flat, smooth; back flat, smooth, three-fourths the width of the sides; inner whorls exposed, about five in number; septa simple, about half an inch apart.

This fine species often reaches to ten inches in diameter; it is distinguished from the *N. complanatus*,

Sow., by its very broad, flat back, and simple septa; from the *N. discus*, Sow., by the broad, flat back, and the greater spaces between the chambers; the *N. quadratus*, Flem. is distinguished by its striated surface. Diameter, four inches; width of last whorl, one and a-half inches; breadth of back, one inch three lines.

Nautilus (Discites) subsulcatus. *Phil.* sp.

Nautilus subsulcatus. *Phil.* Geol. York.—Nautilus subsulcatus. *Sow.* Geol. Trans.

Sp. Ch.—Whorls about five, entirely exposed; back narrow, mesial portion concave in the young, flatter in adult specimens, separated from the lateral portion of the back by a ridge on each side; lateral portions of the back flat, oblique, narrower than the mesial portion; sides divided nearly in the middle by a spiral ridge; the outer portion of each side being concave, the inner slightly convex; surface sigmoidally striated; siphuncle dorsal. Diameter three and a half inches, thickness eleven lines.

Nautilus (Discites) sulcatus. *Sow.* sp.

Nautilus sulcatus. *Sow.* Min. Con.—Nautilus sulcatus. *Phil.* Geol. York.

Sp. Ch.—Whorls oblong; greatest thickness at the edge of the umbilicus; three keels on each side, exclusive of the raised edge of the umbilicus, or of the latero-dorsal angle, including between them four grooves, two large next the back, and two small next the umbilicus; siphuncle nearly dorsal; surface with sharp, sigmoidal striæ.

The great number of longitudinal grooves which furrow the back and sides of this species, give it a very strongly marked character; there are five keels on each side, one forming the angle which bounds the back; at a little distance from this, on the side, there is another larger, the two being separated by a shallow, concave space; there is then a concave space exceeding in width the last two keels; from this to the edge of the umbilicus there are three small keels separated by two small furrows; the back is concave; the whorls are nearly all exposed; the surface has fine sigmoidal striæ. Diameter one inch seven lines; thickness seven lines; length of mouth eight lines.

Nautilus (Discites) tetragonus. *Phil.* sp.

Nautilus tetragonus. *Phil.* Geol. York.

Sp. Ch.—Discoid, compressed; whorls quadrangular, back flat or slightly concave, with a small longitudinal ridge on each side; umbilicus very large, circular, sides with sharp curved striæ, forming thin, prominent plaits at the edges.

This shell is very local in its distribution; it varies considerably in its character, according to the age and state of conservation of the specimen. Diameter about one inch.

Nautilus (Discites) trochlea. *M'Coy.* (Pl. III. fig. 4).

Sp. Ch.—Discoid, compressed, smooth, volutions exposed, sides broad, slightly convex; back very concave, narrower than the inner edge of the volution, considerably less than one-half the width of the sides; margin of the septa very concave outwardly on the sides and back, produced into a very acute angle on the latero-dorsal ridges.

This species may be distinguished from the *N. planotergatus*, M'Coy, by the deep concavity of the back, which is also much narrower than in that species, the umbilicus is also smaller. The large size of the umbilicus distinguishes it from the *N. planidorsatus*, Portk. Thickness of last whorl (breadth of side) two inches four lines, width of back eleven lines.

Temnocheilus[a]. *M'Coy.*

Gen. Ch.—Shell discoid, involute, umbilicate; a deep sinus in the middle of the outer lip; septa simple, siphuncle central.

This subgenus will comprehend the greater number of the *Nautili* of the carboniferous series. From the true genus *Nautilus* it is externally distinguished by its discoid, flattened form, and the greater number of its volutions, all of which are exposed in a wide, conical umbilicus; one of the most important structural differences is, the deep notch, or sinus, to be found in the outer lip of the present group, from which it derives its name.

Nautilus (Temnocheilus) biangulatus. *Sow.* sp.

Nautilus biangulatus. *Sow.* Min. Con.—Nautilus biangulatus. *Phil.* Geol. York.

Sp. Ch.—Discoid; volutions half exposed by a large, conical umbilicus, bounded by a raised margin or keel; back evenly convex; septa very convex; siphuncle central.

This species is remarkable for the sharp, prominent keel which surrounds the umbilicus; between the prominent angle on each side, the back is slightly convex, but without any other keels or furrows; this forms the chief external difference between this species and the *T. cariniferus*. The mouth is about twice as wide as long; the septa very concave outwardly; siphuncle central, or nearly so; surface smooth. Diameter four inches, thickness two and a half inches.

Nautilus (Temnocheilus) bistrialis. *Phil.* sp.

Nautilus bistrialis. *Phil.* Geol. York.

Sp. Ch.—Orbicular, compressed, smooth; back broad, rounded; umbilicus very large, circular, with two strong spiral grooves within the edge.

This species occurs very rarely, and generally without the external shell; the sculptured edge of the umbilicus is a very curious peculiarity.

Nautilus (Temnocheilus) cariniferus. *Sow.* sp.

Nautilus cariniferus. *Sow.* Min. Con.—Nautilus carinatus et cariniferus. *Phil.* Geol. York.

Sp. Ch.—Discoid, volutions subpentagonal, half exposed by a wide conical umbilicus, which is margined by an acute keel or ridge, between which and the back there is on each side an obtuse ridge; siphuncle marginal.

This species differs from the *T. biangulatus* principally in having on each side an obtuse keel on the back; the space between the obtuse keel and the edge of the umbilicus is concave, while that between the one keel and the other is convex; the general form is that of the *N. biangulatus*, which it resembles in many respects; the two keels on the back are sharp and distinct in the young shells, but become more obtuse as they advance in age, and in very old specimens they are sometimes quite effaced, and are then scarcely distinguishable from the *N. biangulatus;* the mouth is twice as wide as long; the siphuncle is nearly dorsal. Diameter three and a half inches; thickness two inches two lines.

Nautilus (Temnocheilus) coronatus. *M'Coy.* (Pl. IV. fig. 15).

Sp. Ch.—Discoid, subglobose; inner whorls half exposed in a large, steep umbilicus, the acute edge of which is crowned with large, compressed, blunt tubercles; back flattened; surface smooth; septa simple; siphuncle nearly central.

[a] Τέμνω, seco; and χεῖλος, labrum.

This beautiful species has the exact form of the *N. cariniferus*, Sow., or with the back slightly more flattened, but differs from it in the row of close, blunt, compressed tubercles, which ornaments the edge of the umbilicus on each side. Diameter two inches six lines; length of mouth ten lines; width of mouth two inches.

The specimen figured was kindly lent by Dr. Haines, of Cork.

Nautilus (Temnocheilus) costalis. *Phil.* sp.

Nautilus costalis. *Phil.* Geol. York.

Sp. Ch.—Spheroidal, depressed; umbilicus small, deep; whorls crossed by sharp, direct, transverse ridges, and fine striæ; a few deep, direct constrictions on the cast.

This species is at once distinguished by the curious transverse plaiting of the whorls; these plaits are few and obtuse near the umbilicus, but become thinner, sharper, and more numerous as they pass over the broad, rounded back, between these are finer striæ; the sides are gently convex, the back rounded, and the mouth lunate by the deep insertion of the preceding whorl. Diameter three and a half inches. The *N. funatus* has thicker and fewer transverse ridges.

Nautilus (Temnocheilus) crenatus. *M'Coy.* (Pl. II. fig. 9).

Sp. Ch.—Discoid; inner whorls exposed by a large umbilicus; two strongly toothed, or serrated, keels, within the umbilicus, and one obtuse keel outside it; sinus in the lip shallow.

I have only seen a fragment of the last chamber of this shell, but its characters are so strongly marked that I have no hesitation in proposing it as a distinct species; the two notched or crenated ridges within the umbilicus give a very striking appearance to the shell; the back is flattened, with an obscure keel on each side; the mouth is hexagonal, and very much depressed, being three times as wide as long. I am not aware how many whorls there were, but suppose they were fewer than in the *N. biangluatus;* neither do I know the diameter of the shell when perfect, but suppose it to be about the size of the *N. cariniferus;* the fragment figured measures one and a half inches across the back.

Nautilus (Temnocheilus) furcatus. *M'Coy.* (Pl. IV. fig. 13).

Sp. Ch.—Discoid, compressed; sides gently curved; back rather narrow, rounded; umbilicus small, slightly exposing the whorls; surface marked with large, strong, rounded ribs, each of which, a short distance from the umbilicus, regularly branches into two of equal thickness, which, making a rather acute, forward bend, in passing over the back, unite again on the opposite side, before reaching the umbilicus; intervening spaces wider than the ribs, concave, smooth.

This species can only be confounded with the *N. funatus*, compared with which the following differences are observable: in specimens of the same size, the ridges are nearly three times more numerous, in a given space, in the *N. funatus*, than in the present species. In the former, all the ridges are simple, equal, and proceed directly across the shell; while in the latter each rib branches boldly and regularly into two strong ridges, before passing over the back; the umbilicus, also, is smaller in the *N. furcatus* than in the *N. funatus*, and exposes less of the whorls. The specimens are generally elliptical. Diameter two inches seven lines; diameter of last whorl thirteen lines; thickness eleven lines. The specimen figured was obligingly contributed by Dr. Haines of Cork.

Nautilus (Temnocheilus) globatus. *Sow.* sp.

Nautilus globatus. *Sow.* Min. Con.

Sp. Ch.—Subglobose, discoid; back very broad, slightly flattened; a deep sinus in the edge of the outer lip; umbilicus moderate, deep, with an angular edge; whorls increasing very rapidly; the last whorl slightly produced, flattened below.

This species has but few whorls, the inner ones being partly concealed by those which follow; they increase very rapidly in size, so that in old individuals the spire does not indent the mouth; the back is flattened, and, in young individuals, the sides are also somewhat flattened; when very young, there are some spiral grooves on the back, and in that state has perhaps been described as a distinct species; the mouth is very large and semicircular, with a deep sinus in the outer lip. Professor Phillips' shell seems distinct.

Nautilus (Temnocheilus) multicarinatus. *Sow.* sp.

Nautilus multicarinatus. *Sow.* Min. Con.

Sp. Ch.—Discoid; inner whorls half exposed in a deep, conical umbilicus; back flattened, with three or four keels on each side; one keel within the edge of the umbilicus.

This species much resembles the *N. cariniferus* in form, but it is distinguished by the number of keels with which it is marked; there are four on each side in young, well-marked individuals, but by age the keels on the back become more or less effaced; the keel within the umbilicus is more constant than any of the others, in fact, I do not remember an instance in which it was not present. Diameter four inches, thickness two inches and a half.

Nautilus (Temnocheilus) pinguis. *M'Coy.* (Pl. IV. fig. 12).

Sp. Ch.—Discoid, smooth; umbilicus rather small, conical, half exposing the inner volutions; whorls about four, gradually increasing, ventricose, carinated on the sides; keel vanishing towards the mouth; back broad, rounded; umbilical slope convex; mouth broad, oval, about one-third wider than long.

This species most nearly resembles the *Nautilus* (*Temnocheilus*) *cariniferus* but differs in having its volutions less broad and more ventricose, the umbilicus smaller, and its sides convex, and in the much greater convexity of the back. The deep sinus in the outer lip, found in all the species of *Temnocheilus*, is visible in the specimen figured. Diameter two inches one line; length of mouth nine lines; width of mouth one inch two lines.

The specimen figured is one of several rarities from the cabinet of Mr. Newenham of Cork.

Nautilus (Temnocheilus) porcatus. *M'Coy.* (Pl. III. fig. 6).

Sp. Ch.—Discoid; back very broad, flattened, having a slight mesial sulcus, and marked by ten spiral ridges, the two mesial ones being smallest; umbilicus very large, with an angular edge; one spiral keel similar to the dorsal ones within the edge of the umbilicus; surface smooth.

This species resembles the *N. multicarinatus*, Sow., but is distinguished by its smaller size, the greater number and equality of the spiral ridges, and the mesial hollow.

Nautilus (Temnocheilus) sulciferus. *Phil.* sp.

Nautilus sulciferus. *Phil.* Geol. York.

Sp. Ch.—Globose; umbilicus large, with a prominent angular margin; back convex, flattened and sulcated in the middle.

Only a very few imperfect specimens have occurred of this species.

Nautilus (Temnocheilus) tuberculatus. *Sow.* sp.

Nautilus tuberculatus. *Sow.* Min. Con.—Nautilus tuberculatus. *Phil.* Geol. York.

I have not seen in any of the Irish rocks, specimens which would exactly agree with the true *N. Tuberculatus*, Sow., which has the general form of the *Nautilus* (*Temnocheilus*) *coronatus*, M'Coy, but has the whorls thicker, the umbilical slopes tumid, and the tubercles of the edge of the umbilicus fewer, larger, rounder, and more nodulous than in that species.

Genus Nautilus.

Gen. Ch.—Shell convolute, discoid; septa simple at their edges, concave outwardly; siphuncle discontinuous, usually central; aperture large, sinuate at the dorsal margin.

There are several subgeneric types in even the genus as here restricted, but of these we shall take for the present no notice; most of the Palæozoic species have the spire exposed in all its turns by a large umbilicus, while there are others in which the whorls are completely concealed by the last volution, such, for instance, as the *N. dorsalis*.

Nautilus cyclostomus. *Phil.*

Nautilus cyclostomus. *Phil.* Geol. York.

Sp. Ch.—Apex spirally incurved, last chamber disjoined; nearly straight conic; mouth and section of the whorls circular; septa with a slight retral wave on the back; siphuncle nearly dorsal; surface smooth, or marked with faint transverse sigmoidal striæ.

This curious fossil approaches the genus *Hortolus* in structure, having the last whorl disjoined from the rest, and produced nearly in a straight line; it is rather a rare species.

Nautilus dorsalis. *Phil.*

Nautilus dorsalis (var. γ.) *Phil.* Geol. York.

Sp. Ch.—Shell rapidly enlarging; last chamber very large; mouth nearly circular, receiving the preceding whorl at its ventral margin; umbilicus very small, rounded; septa about twelve in each turn; siphuncle dorsal; surface rugose.

There are three varieties of this magnificent shell mentioned by Professor Phillips, but as yet I have only seen the one above mentioned; the surface is perfectly smooth in the most ordinary state of preservation, or when a portion of the outer shell is deficient. A specimen in the Collection of the Royal Dublin Society has a portion of the shell perfect, shewing it to be marked with small, rough, irregular, transverse wrinkles. The back is rounded, and the whole outline much resembles that of the recent *Nautilus pompilius*. Greatest diameter five and a half inches, thickness of whorls three and a half inches. (Small specimen).

Nautilus goniolobus. *Phil.*

Nautilus goniolobus. *Phil.* Geol. York.

Sp. Ch.—Subglobose, smooth, whorls concealed; umbilicus very small, rounded; septa with a deep retral wave on the back, and an angular lobe on each side.

I have only seen a very imperfect specimen of this species. It is evidently not a true *Nautilus*, but I hesitate to place it elsewhere, not having seen perfect specimens.

Bellerophon. *Montfort.*

Gen. Ch.—Globose, involute, monothalamous; last whorl embracing the others; a deep sinus in the middle of the outer lip, from which a band passes round the whorl, forming a kind of keel; surface transversely striated.

The present genus differs remarkably from the other testaceous *Cephalopoda*, with the exception of *Argonauta*, in having no chambers, and in the deep sinus which exists in the lip; from *Argonauta* it differs in the greater thickness of the shell, and more involute form, and the distinctly marked inner lip found in most of the species; these characters are also quite incompatible with the station assigned to it among the *Heteropoda*, by modern writers; I am not aware on what grounds it has been associated with the *Gasteropoda* by Professor Fleming. The genus occurs in the upper and lower Palæozoic rocks.

Bellerophon apertus. *Sow.*

Bellerophon apertus. *Sow.* Min. Con.—Bellerophon apertus. *Phil.* Geol. York.

Casts of the *Bellerophon apertus*, Sow., such as that figured in the Min. Con., are very common at Carlingford; they are spherical, with the whorls slightly exposed in an umbilicus, which closed when the shell is perfect; the back is depressed.

Bellerophon cornu arietis. *Sow.*

Bellerophon cornu arietis. *Sow.* Min. Con.—Bellerophon cornu arietis. *Phil.* Geol. York.

Sp. Ch.—Involute, slightly compressed, carinate; whorls widely separated, entirely exposed; aperture expanded; an acute sinus in the middle of the outer lip.

I have only seen imperfect specimens of this species; the shell is very thick, and the whorls are disjoined, even when perfect.

Bellerophon costatus. *Sow.*

Bellerophon costatus. *Sow.* Min. Con.—Bellerophon costatus. *Phil.* Geol. York.

Sp. Ch.—Central band convex, undefined; surface with sharp, slender, transverse arched ridges; umbilicus small, rounded.

This species is much narrower than the *B. hiulcus*, having, in fact, a subcarinated appearance; the dorsal band is convex, and not defined on the sides by ridges or furrows; the transverse striæ are fewer or farther apart than in the *B. hiulcus*, which is also wider, and has a much broader, defined band.

Bellerophon hiulcus. *Mart.* sp.

Nautilites hiulcus. *Martin*, Pet. Derb.—Bellerophon hiulcus. *Sow.* Min. Con.—Bellerophon hiulcus. *Phil.* Geol. York.

Sp. Ch.—Width of the mouth exceeding the diameter of the shell, central band broad, flat, and defined by a sharp elevated line on each side; surface sharply striated transversely; umbilicus very small.

This is wider in proportion than any of the other species of *Bellerophon;* it is also distinguished by the flat, defined, and very broad keel; the transverse striæ are sharp, prominent, and arched, as is usual in this genus. Diameter two inches, thickness two and a half inches.

Bellerophon lævis. *M'Coy.* (Pl. II. fig. 1).

Sp. Ch.—Globose, very wide, smooth, band narrow, flat, not prominent, defined on each side by an impressed line.

This species bears some resemblance to the *B. hiulcus* in general form, but is at once distinguished by its smooth surface and narrower band; the aperture is greatly expanded at the sides, its width being two and a half times its length; the umbilicus is so shallow that it can hardly deserve the name; it is, however, defined on the last whorls by an obtuse keel. Diameter one inch six lines, width of the mouth one inch six lines.

Bellerophon obsoletus. *M'Coy.* (Pl. II. fig. 3).

Sp. Ch.—Globose, slightly compressed towards the back; keel convex, but undefined; surface almost smooth, with crowded, nearly obsolete, arched, transverse striæ.

In general form, and in the obtuse, undefined, dorsal band, this species closely resembles the *B. costatus* Sow., with which I at first confounded it; the present shell is, however, distinguished by the absence of the distant, prominent, sharp, concentric ridges of that species, the surface being nearly smooth, marked only by very faint, obsolete, transverse striæ. Diameter eleven lines, thickness ten lines.

Bellerophon reticulatus. *M'Coy.* (Pl. II. fig. 2).

Sp. Ch.—Orbicular, compressed, umbilicus deep, rounded at the edges; keel obtuse, rounded; surface reticulated by equal spiral and curved transverse striæ, forming small tubercles at the intersections.

I have taken Professor Phillips' authority (Geol. York) for the axis of the *B. decussatus* of Fleming being solid, which, therefore, differs from the present species, which is distinctly umbilicate; the transverse striæ are also more obtuse in the present shell, and are equal in thickness to the spiral ridges. By this latter character fragments of the two species may be distinguished. Diameter three lines, thickness two and a half lines.

Bellerophon tangentialis. *Phil.*

Bellerophon tangentialis. *Phil.* Geol. York.

Sp. Ch.—Central band sharp, narrow, prominent; surface with transverse striæ, which form tangents to the umbilicus, and are perpendicular to the keel.

The band of this species forms a compressed, prominent keel, and is distinguished from the other species by the transverse striæ being perpendicular to it (in the others they meet it at a more or less acute angle), and by their forming tangents to the edge of the umbilicus, which is large and rounded. Diameter one inch two lines, thickness one inch.

Bellerophon tenuifascia. *Sow.*

Conch. naut. hiulcus, var. c. *Martin*, Pet. Derb.—Bellerophon tenuifascia. *Sow.* Min. Con.—Bellerophon tenuifascia. *Phil.* Geol. York.

Sp. Ch.—Band very narrow, elevated, threadlike; transverse striæ very fine; umbilicus moderate.

The fineness of the transverse striæ, and the very small, threadlike band, distinguish this from any other of the genus; the umbilicus is rather large and rounded. Diameter one inch seven lines, thickness two inches.

Bellerophon Wenlockensis. *Sow.* (*?*)

Bellerophon Wenlockensis. *Phil.* Pal. Fos.

A single cast of a small specimen, apparently of this species, has occurred. It is almost impossible, however, to identify internal casts of this genus with specimens in a perfect state. I have given this reference for the Irish specimen, rather because it agrees perfectly with the small Devonian cast which Professor Phillips provisionally placed with this species, than from a conviction that it is identical with the Silurian shell.

Euphemus. *M'Coy*[a].

Gen. Ch.—Globose, involute, monothalamous; surface spirally striated; no dorsal band.

Under this name I have separated those beautiful little shells hitherto ranked with *Bellerophon*, but destitute of the dorsal band or keel characteristic of that genus; the sculpturing of the surface of the two genera is so distinct, that even fragments of them can in general be discriminated; the striæ or furrows on the surface of *Bellerophon* are invariably transverse or parallel with the edge of the lip, while in *Euphemus* they are always spiral, following the direction of the whorls; a few reticulated species seem to unite the groups, which, taken on the whole, are distinct.

They are all of much smaller size than the true *Bellerophons*.

[a] One of the *Argonauts*.

Bellerophon (Euphemus?) globatus. *Sow.* sp.

Bellerophon globatus. *Sow.* Sil. Syst. ? and Geol. Trans.—Bellerophon globatus. *Phil.* Pal. Fos.

A few very obscure casts of a minute globular Bellerophon, with a pervious umbilicus, have been provisionally referred to this species; they are identical with those of N. Devon, which Professor Phillips has also provisionally ranked with this Silurian species.

Bellerophon (Euphemus) intersectus. *M'Coy.* (Pl. III. fig. 10).

Sp. Ch.—Globose, umbilicate, aperture expanded, outer lip very slightly bilobed; back rounded, spirally marked with distinct rounded ridges, intervening spaces flat, crossed by delicate transverse striæ, slightly retroflexed on the middle of the back.

This beautiful little shell is easily distinguished from the *Bellerophon decussatus*, or rather, perhaps, *B. striatus* of Fleming, which it most resembles, by the want of a band; the reticulation is also coarser. Diameter one and a half lines.

Bellerophon (Euphemus) orbiculus. *M'Coy.*

Sp. Ch.—(From the casts) globose diameter one fifth less than the width; smooth; spire of three whorls, which are exposed in a very narrow, rounded umbilicus, whorls increasing rapidly in size; back broad, rounded; mouth arched, twice as wide as long, sides rounded; shell very thin.

This species differs from the casts of the *B. urii*, and *B. globatus*, in the shortness and width of the mouth, and in the more broadly rounded back, its form being almost identical with that of the *B. D'Orbignii* (Portk.), from which it differs in its very thin shell, and smooth surface, even the casts of that species being distinctly sulcated. Diameter of large specimens five lines.

Bellerophon (Euphemus) Urii. *Flem.* sp.

Bellerophon Urii. *Flem.* Brit. Anim.—Bellerophon Urii. *Phil.* Geol. York.—Bellerophon Urii. *Portk.* Geol. Rep.—Bellerophon D'Orbignii? *Portk.* Geol. Rep.

Sp. Ch.—Globose; mouth expanded; umbilicus imperforate; surface with numerous, spiral, narrow, rounded ridges, separated by smooth, concave furrows.

This species, so common in the Glasgow coal fields, occurs occasionally in the Irish carb. limestone; the regular spiral ridges are very characteristic of the species; the furrows are somewhat wider than the ribs they separate. Diameter half an inch, thickness half an inch.

PTEROPODA.

Conularia quadrisulcata. *Sow.*

Conularia quadrisulcata. *Sow.* Min. Con.

I have seen one imperfect large specimen from the Kildare limestone, which seemed to be of this species, although larger, and tapering more gradually than the Coal Brook Dale specimens. This specimen has very strong longitudinal furrows at the four angles, but the furrow down the middle of each of the faces is very slight. Although the surface is obviously marked with strong transverse ridges, which meet at an obtuse angle in the centre of each of the sides, yet the specimen is too imperfect to determine any thing farther.

GASTEROPODA.

The modern tribe *Pectinibranchiata* includes all those molluscs whose body is covered by a spiral univalve shell; they have the head distinctly marked and provided with eyes and tentacula, and the under surface of the body formed into a disc-like foot for walking. The tribe is divisible into the following groups:

First, the *Zoophaga* of Lamarck, or the carnivorous shell-fish: these are among the most highly organized of the *Gasteropoda;* they have a distinct head, furnished with two tentacula, and perfectly formed eyes. Their shells are distinguished from the other univalves by having a deep notch or canal at the base of the aperture, which serves as a protection to the respiratory siphon of those animals. Of this group there are very few examples to be found in the mountain limestone; and these, I think, chiefly belong to the family *Fusinæ;* the numerous shells, called *Buccinum* by geologists, not belonging to that group, inasmuch as their base is never truncated; they would rather approximate to the genus *Chrysodomus* or *Macrocheilus*, in which the general form is buccinoid, and the basal channel is always shorter than the spire. To this group also belong those shells formerly described as *Melania* (but now separated from that fresh-water genus by Professor Phillips, under the generic name of *Loxonema*); they are analogous in the present group to the *Turritellæ* among the *Phytophaga*.

The next group is the *Phytophaga*. These are less constant in their characters than the last, but the greater number live upon vegetables, and have the aperture of the shell entire, or wanting the notch of the carnivorous group.

The *Phytophaga*, or plant-eating *Gasteropods*, include nearly all the univalve shells of the Palæozoic rocks; all those belonging to the genera *Pleurotomaria*, *Turbo*, *Turritella*, and *Euomphalus*, being clearly of this tribe; a satisfactory proof of the abundance of fuci or sea-weeds at these periods, although their remains are not found in the fossil state. As the animals of this division have no respiratory siphon, the shells are easily distinguished from those of the carnivorous *Gasteropods* by the latter having the base deeply notched to allow the exit of the respiratory tube, while those of the present tribe, being destitute of that organ, have the aperture round and entire; they are all spiral, turbinated shells, which at once distinguishes them from the *Scutibranchia*, or the limpets (*Cyclobranchia*) with which many authors confound them. One anatomical fact of importance to the fossilist seems to have been entirely overlooked, namely, that the sexes are distinct and in different individuals, the female shells having the body whorl invariably more ventricose than in the male specimens, so that if unacquainted with the structure of the animals, one might be led to describe the sexes as distinct species. The majority of the mountain limestone shells belonging to this group appear to enter into the family *Turbidæ*, or that family which connects the *Phytophagous* with the *Zoophagous Gasteropods*, these animals exhibiting much of the structure of the carnivorous type, while their shells are strictly those of the *Phytophaga*, another instance of the importance of attending to the anatomy of the creatures, as the mere conchologist might lead to error, by denying the existence of carnivorous shells, at periods when they might have been abundant, the popular idea being that every carnivorous shell must have a notch for the respiratory tube; it is, however, well known that a number of recent shells of this group have the base of the shell entire, although the animal is carnivorous.

After the *Pectinibranchiata* we have the *Scutibranchia*, which are known at once from the last by their funnel-shaped shells, which are scarcely ever spiral.

The next group is the *Cyclobranchia*, or limpets and chitons, the first having a simple cup-shaped shell, and the other one formed of eight transverse, imbricating, shelly plates, scarcely ever found in the fossil state.

Next we have the *Tectibranchia*, or Bullas, whose mantle forms two fin-shaped lobes, by which they can swim with facility: they form the passage to the *Cephalopoda*.

The remaining groups are not interesting to the Palæontologist.

Macrocheilus. *Phil.*

This name has been proposed by Professor Phillips for those shells of the carboniferous limestone previously called *Buccinum*. To that genus of course they do not belong, as their base is not notched. Such species as the *M. sigmilineus*, *M. elongatus*, &c., seem referrible to the recent genus *Chrysodomus*, of which the *Fusus antiquus* of our coasts is the type; and including those bucciniform shells, which have the base produced into a channel shorter than the spire; the whorls ventricose; the outer lip thin, and the inner lip obsolete; those fossils were, therefore, most probably carnivorous, like the *Fusinæ* just mentioned, although the aperture is entire.

Macrocheilus acutus. *Sow.* sp.

Buccinum acutum. *Sow.* Min. Con.—Buccinum acutum. *Phil.* Geol. York. (?)

Sp. Ch.—Acutely conical, smooth; volutions numerous; spire longer than the aperture.

This is a very elegant species; the spire is composed of five or six convex whorls, the body whorl small and contracted at the base, surface smooth. Length one inch eight lines. Diameter of body whorl nine lines.

Macrocheilus canaliculatus. *M'Coy.* (Pl. V. fig. 1.

Sp. Ch.—Ovate; spire acute, turriculated, composed of five flat whorls, channeled at the sutures; body whorl as long as the spire, convex; surface smooth.

This pretty species is remarkable for the flatness of the whorls of the spire, and the channeled sutures. Length five lines, width of basal whorl three lines.

Macrocheilus curvilineus. *Phil.* sp.

Buccinum curvilineum. *Phil.* Geol. York.

Sp. Ch.—Very elongate; volutions broad, slightly convex, obscurely striated; spire twice the length of the aperture.

This species has the body whorl very little larger than that which precedes it; the spire is very long, although of comparatively few turns, the width of each volution equalling the diameter of the shell at that part; the transverse striæ on the volutions are very oblique, and somewhat curved, whence the name. Length one inch five lines; diameter seven lines.

Macrocheilus imbricatus. *Sow.* sp.

Buccinum imbricatum. *Sow.* Min. Con.—Buccinum imbricatum. *Phil.* Geol. York.

Sp. Ch.—Ovate; spire shorter than the aperture; volutions convex, with very fine, transverse striæ.

Very nearly related to the *M. acutus*, but less elongate, and having the body whorl larger in proportion to the spire. Length one inch seven lines; diameter of body whorl ten lines.

Macrocheilus fimbriatus. *M'Coy.* (Pl. V. fig. 2).

Sp. Ch.—Ovate, ventricose; spire equal in length to the last volution, of three or four rounded whorls; all the sutures strongly fringed or crenated; whorls crossed by fine, sigmoidal striæ.

This minute species has the sutures very strongly crenated. Length one line; width half a line.

Macrocheilus ovalis. *M'Coy.* (Pl. V. fig. 3).

Sp. Ch.—Oval; spire short, of three convex whorls; pillar lip flattened; base attenuated; surface smooth.

This species is allied to the *Buccinum imbricatum* (Sow.), but is distinguished from it by the shorter spire, the broad, distinctly flattened pillar, and the lengthened, slender base; the outer lip is entire, thin, and without a notch at the base; the volutions are all convex, with simple sutures. The flattened pillar approximates this curious species to the genus *Littorina*, but the prolongation of the base of the shell induces me to place it rather in this group; it is interesting, however, as indicating the passage from one genus to the other. Length ten lines; width seven lines; length of the mouth six lines.

Macrocheilus parallelus. *Phil.* sp.

Buccinum parallele. *Phil.* Geol. York.

Sp. Ch.—Elongate, turreted; volutions convex; upper third of each whorl flattened, and finely striated spirally; lower portion with very coarse, spiral sulci.

This well marked species occurs but very rarely; the smallest fragments are easily recognized by the dissimilarity of the upper and lower parts of each whorl.

Macrocheilus rectilineus. *Phil.* sp.

Buccinum rectilineum. *Phil.* Geol. York.

The specimens I have seen of this shell only differ from the *M. imbricatus*, in having the turns of the spire slightly more tumid, and in the lines of growth being less oblique, and not sinuous.

Macrocheilus sigmilineus. *Phil.* sp.

Buccinum sigmilineum. *Phil.* Geol. York.

Sp. Ch.—Elongate, hemifusoid; whorls ventricose; mouth and spire equal in length; outer lip and lines of growth thin, oblique, slightly sigmoid.

This fine species seems congeneric with the *Fusus antiquus* of our coasts, which forms the type of the modern genus *Chrysodomus*. I have only seen a few imperfect specimens.

Macrocheilus tricinctus. *M'Coy.* (Pl. V. fig. 4).

Sp. Ch.—Globose; spire very short, acute, of three smooth, convex whorls; body whorl large, tumid, upper half smooth, lower half girt with three strong, spiral sulci.

This little species is remarkable for the spiral ridges being placed so low down on the basal whorl, that they are concealed on the spire by the suture, leaving that part of the shell smooth. Length one line; diameter one line and a quarter.

Loxonema. *Phil.*

Gen. Ch.—Shell spiral, elongate; mouth elongate, effuse below, right lip thin, waved; inner lip obsolete; no umbilicus; surface with arched, prominent striæ.

A provisional genus established by Professor Phillips for the reception of those elegant Palæozoic fossils formerly described as *Melania*, *Turritella*, &c. Although the characters of the genus are rather indefinite, yet by its adoption we avoid the serious error of including so many recent genera in the older rocks. It is here considered as a sub-genus of *Macrocheilus*.

Loxonema brevis. *M'Coy.* (Pl. III. fig. 2).

Sp. Ch.—Elongate, ovate; spire obtuse, of five, gradually increasing volutions; whorls slightly convex, with rather distant, strong, slightly arched, longitudinal ridges, thickest and most prominent below, originating in a small tubercle above; basal whorl very little larger than the preceding one.

Differs from the *L. rugifera* in the short form and less number of whorls, and from the Devonian var. of *L. tumida* in the flatness of the whorls, and stronger sulci. Length three and a half lines, width one and a half lines.

Loxonema constricta. *Mart.* sp.

Melania constricta. *Sow.* Min. Con.—Melania constricta. *Phil.* Geol. York.—Loxonema tenuistriata. *Portk.* Geol. Rep.

Sp. Ch.—Smooth, whorls tumid below, constricted above, sutures crenulated.

The constricted form of the upper part of each whorl, and the strongly plaited sutures, distinguish this species from its congeners; the latter character, however, is rarely well seen. Captain Portlock's *L. tenuistriata* does not seem to differ from the ordinary state in which specimens of this species are found. Length two inches six lines, diameter of last whorl nine lines.

Loxonema impendens. *M'Coy.* (Pl. III. fig. 3).

Sp. Ch.—Turreted, elongate, smooth; spire of about nine or ten, gradually increasing whorls; volutions flat above, very tumid, and obtusely rounded below; sutures plain, very slightly imbricating; surface smooth.

This fine shell differs from the *L. constricta*, in its plain (not crenated) sutures, the sutures not being constricted, and the greater prominence of the whorls below; from the *L. sulculosa*, Phil., in the smooth surface, and from the *L. suturalis*, Phil., in the sutures not being prominent. Length about two inches five lines, diameter of basal whorl one inch.

The specimen figured was obligingly communicated by Mr. Newenham, of Cork.

Loxonema polygyra. *M'Coy.* (Pl. III. fig. 1).

Sp. Ch.—Very elongate, slender; spire of eleven, very convex, gradually increasing whorls, each marked by five strong spiral ridges.

This beautiful little shell is remarkable for its small size and very attenuate form; the volutions are more numerous than in the other species. From the *L. acicula*, Phil., it is known by the greater number of the spiral ridges. Length three lines, diameter half a line.

Loxonema pulcherrima. *M'Coy.* (Pl. VII. fig. 7).

Sp. Ch.—Very much elongate, volutions numerous, flattened, crossed by sharp sigmoidal sulci, deepest at the upper edge; mouth twice as long as wide.

This beautiful species is distinguished from the *L. nexilis* by the greater curvature and sharpness of the striæ; the volutions are flattened, numerous, their length and breadth about equal. The mouth in the specimen figured is very perfect.

Loxonema sulcatula. *M'Coy.* (Pl. V. fig. 6).

Sp. Ch.—Elongate; spire acutely conic, of seven convex whorls, each girt with about ten equal, spiral sulci.

This shell is distinguished by the great number of its spiral sulci. Length five lines and a half; diameter of basal whorl two lines and a half; height of basal whorl two lines.

Loxonema sulculosa. *Phil.* sp.

Melania sulculosa. *Phil.* Geol. York.

Sp. Ch.—Elongate; whorls convex, crossed by arched striæ, more strongly marked towards the basal suture.

This is one of the largest known species, frequently attaining six inches in length; it is more elongate than the rest, and is moreover remarkable for the strong, waved sulci on the volutions, which very nearly resemble those of the *L. nexilis* of the Devonian rocks. Length three inches; diameter of basal whorl one inch three lines.

Loxonema tumida. *Phil.*

Melania tumida. *Phil.* Geol. York.—Loxonema tumida. *Phil.* Pal. Fos.

Sp. Ch.—Pyramidal, short; volutions narrow, very convex, crossed by direct, simple striæ.

This species is distinguished by its rapidly tapering form, and narrow, very convex volutions, which are about eight in number; each whorl is about twice as wide as long. Length one inch six lines; diameter of basal whorl ten lines.

Loxonema turrita. *M'Coy.* (Pl. V. fig. 7).

Sp. Ch.—Obliquely conical, turreted; spire composed of four or five rapidly increasing whorls; whorls cylindrical, or flat on the sides, and broadly tabulated above, the two portions separated by a sharp angle; whorls longitudinally costated with broad, close, rounded ridges, crossed by very fine, sharp, spiral striæ.

This beautiful species does not particularly resemble any *Gasteropod* of this or the allied genera. Length two lines.

Turritella. *Lam.*

Gen. Ch.—Shell elongate, subulate; whorls very numerous, in general spirally grooved; mouth round, lips thin; united anteriorly.

Turritella megaspira. *M'Coy.* (Pl. V. fig. 5).

Sp. Ch.—Subulate, very elongate; whorls about sixteen or seventeen, flat, smooth, slightly rounded at the sutures; tip of the spire obtuse.

This species is chiefly remarkable for its length, and the great number of its whorls. The dotted restoration in the plate is considerably too long, as I find from perfect specimens that the spire does not come to a point, but, though composed of an extraordinary number of whorls, it is blunt, and obtusely rounded, resembling that beautiful Brazilian land shell, the *Megaspira Ruschenbergiana*. The whorls are flat, or very slightly convex, slightly impressed at the sutures; surface perfectly smooth. Diameter of basal whorl six lines; length of an imperfect specimen of nine whorls one inch ten lines.

Turritella suturalis. *Phil.*

Turritella suturalis. *Phil.* Geol. York.

Sp. Ch.—Conical, smooth; whorls flat, or slightly concave; sutural, and lower edges rounded, prominent.

This species is rendered very remarkable by the prominent, rounded edges of the whorls. Diameter of last whorl seven lines; length one inch two lines.

Turritella tenuistria. *Phil.*

Turritella tenuistria. *Phil.* Geol. York.

Sp. Ch.—Acutely conical; whorls flat, slightly angulated below; surface with very fine, oblique, and spiral striæ.

This abundant species is easily recognized by its conical, tapering form, and plain, slightly striated volutions. Length one inch six lines; diameter at base seven and a half lines.

Turbo. *Linn.*

Gen. Ch.—Turbinate, ventricose; spire pointed; aperture round, entire; base convex.

Turbo spirata. *M'Coy.* (Pl. V. fig. 29).

Sp. Ch.—Ovate; spire lengthened; acute, conic of about five slightly convex whorls; basal turn, small, ventricose, rounded, imperforate; aperture ovate, rounded anteally; pointed retrally, rather more than half the length of the shell.

Only casts have as yet occurred of this species, which differs from the *Buccinum imbricatum*, Sow., in the small size of the basal whorl, and greater length of the spire, and number of the volutions. Length one inch and, probably, seven lines; diameter of last whorl one inch three lines; length of the mouth eleven lines.

Littorina. *Fer.*

Gen. Ch.—Turbinate; spire small, accuminated; aperture large, rounded anteally; outer lip sharp; pillar lip flattened.

The recent *Littorinæ*, as their name implies, are found chiefly on the shores, or in shallow water, where they feed on the sea-weeds.

Littorina pusilla. *M'Coy.* (Pl. V. fig. 26).

Sp. Ch.—Ovate, short; spire small, sharp, of three convex whorls; surface smooth; mouth rounded anteally, narrowed retrally.

This is one of the smallest species of the genus found in the Carb. limestone; the spire forms rather less than a third of the length of the body whorl; all the whorls are convex, and the surface quite smooth. Length three lines, width two lines and a quarter.

Lacuna. *Turt.*

Gen. Ch.—Shell globose, thin; body whorl large, ventricose; spire very small, pointed, of few, rapidly increasing whorls; aperture semicircular; columella oblique, the upper part reflected over the umbilicus, which forms a lengthened groove behind the columella.

Lacuna antiqua. *M'Coy.* (Pl. V. fig. 24).

Sp. Ch.—Depressed; volutions rounded; spire very small, acute, of three rapidly enlarging whorls; umbilicus very large, sharply defined; inner lip slightly reflected over it above, oblique; aperture large, semicircular; surface very finely striated across the volutions.

This curious little shell seems to be the first instance of the genus *Lacuna* occurring in the older deposits. The drawing has been injured in the lithographing. Length two lines, diameter three lines.

Naticopsis. *M'Coy.*

Gen. Ch.—Shell globose; inner lip smooth, flattened, slightly thickened; spire very small; umbilicus none.

In this genus are included several fossils of the carboniferous limestone, provisionally placed by the late Mr. Sowerby, Professor Phillips, and others, in the genera *Ampullaria*, *Natica* and *Nerita*. From *Natica* and *Ampullaria* it is distinguished by the want of an umbilicus, and the flattened pillar; from the latter genus it also differs, in being a marine shell; the smooth inner lip distinguishes it from *Nerita*. The operculum which I have seen two or three times, is quite distinct from that of *Natica* or *Nerita*, as will be seen by a glance at the figure, Pl. III. fig. 9, which is from a specimen presented by Mr. Newenham, of Cork.

Naticopsis canaliculata. *M'Coy.* (Pl. VII. fig. 3).

Sp. Ch.—Globose; body whorl large; spire depressed of three inflated whorls; sutures deeply channeled; mouth slightly dilated; shell very thin; volutions delicately striated across.

The thin shell, and channeled sutures of the spire, in this species, remind us strongly of *Ampullaria*. The spire is rather larger than is usual in this genus, and though depressed, the whorls are remarkably convex; the deeply canaliculated suture distinguishes it from all others of the genus.

Naticopsis dubia. *M'Coy.* (Pl. VII. figs. 2 and 2*a*).

Sp. Ch.—Transversely ovate, very much depressed; spire of three rather convex whorls; mouth transversely ovate; surface smooth; base convex.

I have seen only one specimen of this curious species; it is more depressed than any other of the genus; length ten lines, width two and a quarter inches.

Naticopsis elongata. *Phil.* sp.

Natica elongata. *Phil.* Geol. York.

Sp. Ch.—Elongate, very obliquely oval; spire prominent, mammillary, of two imperfect volutions; surface with very delicate, oblique striæ.

This species is remarkably elongate in form; the spire is almost wholly exserted; the surface is smooth, with the exception of some very fine lines of growth. Length two inches, diameter one inch three lines.

Naticopsis neritoides. *M'Coy.* (Pl. V. fig. 25).

Sp. Ch.—Globose, smooth; length one-fourth less than the width; spire very small, flat, of two whorls; aperture large, semicircular; outer lip thin; inner lip perfectly straight, thickened, convex.

This little shell, by its general form, minute spire, straightness of the inner lip, and large, semicircular aperture, approaches the true *Nerita*, Linn., so closely, that we might include it in that genus, were it not for the absence of any teeth on the pillar, which, besides, is slightly convex and thickened, as in *Naticopsis*, M'Coy; it is, therefore, better to include it in the fossil genus I have already established for shells having this peculiar character of columella, while the specific name will indicate the analogy I have pointed out. Length two and a half lines, width three lines.

Naticopsis Phillipsii. *M'Coy.* (Pl. III. fig. 9, and Pl. VI. figs. 4*a* and 4*b*).

Natica elliptica? *Phil.* Geol. York.

Sp. Ch.—Body whorl large, obliquely oval; spire very small, depressed, of four convex turns; surface perfectly smooth, except at the sutures, which are elegantly marked with sharp, short striæ; inner lip very much thickened; convex above, flattened or concave below.

Naticopsis plicistria. *Phil.* sp.

Natica plicistria. *Phil.* Geol. York.

Sp. Ch.—Ovate; spire prominent, of three volutions, slightly concave at the sutures, where they are strongly striated; surface with fine, oblique striæ.

This is easily distinguished from the *N. Phillipsii*, by its prominent spire and ovate form; it is a much scarcer species; the plication of the sutures appears to be the remains of delicate membranaceous plaits, such as we see in many of the *Haliotidæ*.

Naticopsis spirata. *Sow.* sp.

Nerita spirata. *Sow.* Min. Con.

Sp. Ch.—Globose, obliquely compressed; spire flattened, of three turns; volutions sharply striated across; striæ rising into a sharp plication at the sutures.

This pretty little species was originally described by Mr. Sowerby as a *Nerita;* but from the flattened, smooth, arched, inner lip, it must belong rather to the present genus. The Silurian fossil of this name seems a perfectly distinct species. Diameter ten lines; length eight lines.

Euomphalus. *Sow.*

Gen. Ch.—Discoid; spire depressed, or elevated, of many slowly increasing whorls; dextral; whorls entirely exposed by the very large umbilicus; surface generally smooth, or destitute of spinous processes.

The genus *Skenea* of Fleming does not appear to me to differ materially from the previously proposed genus *Euomphalus*, especially if extended, as Professor Fleming has done, to those fossils; it would be a more definite and better genus if restricted to the recent shells of which the *Serpula cornea*, Adams, is the type. *Cirrus* differs in nothing except that its spire is more or less produced, a character so vague and variable as to be of no use as a generic distinction, and I have therefore rejected *Skenea* as applied to the fossil species, and merged *Cirrus* into *Euomphalus*, knowing of no character by which to distinguish them; at the same time I am perfectly aware that *Euomphalus*, as it now stands, requires division; thus those species with rounded whorls, and a circular entire mouth, should obviously be separated from those in which the whorls are angulated, and in which there is a slit in the outer lip, as in *Schizostoma*. They resemble Lamarck's *Delphinula* in the depression of the spire, its obtuse tip, and the great size of the umbilicus, as well as in the absence of the pillar; differing principally in the smoothness of the surface.

Euomphalus acutus. *Sow.* sp.

Cirrus acutus. *Sow.* Min. Con.—Cirrus acutus. *Phil.* Geol. York.

Sp. Ch.—Acutely conical; volutions very convex, with a flat space on the upper part of the lower ones; body whorl much larger than the preceding ones.

The lower basal turn is almost discoid, closely resembling an *Euomphalus pentangulatus* in form; but the whorls from thence to the tip form an acutely conical spire. Diameter one inch six lines; height one inch three lines; thickness of last whorl six lines. Some specimens from Little Island, Cork, measure three inches in diameter.

Euomphalus æqualis. *Sow.* sp.

Planorbis æqualis. *Sow.* Min. Con.—Skenea æqualis. *Flem.* Brit. Anim.

Sp. Ch.—Discoid; equally concave on both sides; whorls fully exposed; an obtuse keel on the right side; left side bicarinate; mouth circular.

This species might, perhaps, be retained under the genus *Skenea*, as it appears more nearly allied than any of the other fossil species to the recent *Serpula cornea*, Adams, and *Helix serpuloides*, Mont., forming the type of that genus; it is very local. Diameter six lines.

Euomphalus anguis. *M'Coy.* (Pl. III. fig. 11).

Sp. Ch.—Discoid; depresso-conical; height of the spire equal to half the diameter, composed of five or six rounded whorls, very gradually increasing, the last whorl very slightly exceeding the preceding one in diameter; mouth round; umbilicus very wide, exposing all the whorls; surface smooth, with fine, irregular lines of growth, which bend forward in passing over the circumference.

The whorls of this species increase much less rapidly in size than in the *E. rotundatus*, or *E. acutus*, the last turn being very little larger than the preceding one, it is also much less elevated than either of those species; from the former, in particular, it differs in the small size of the basal whorls, and a slight flatness on their upper part, which, at the same time that it makes them more nearly circular in the section, produces a very obtuse keel, or convexity, on the upper part of the circumference, which is also marked by a slight retroflexion of the lines of growth, as in *Schizostoma*, the striæ of *E. rotundatus* are directly across. From the *E. acutus* it differs in the small size of the last whorl, obsolete keel, and depressed form. Diameter one inch eight lines; height of spire ten lines; height of mouth five lines.

Euomphalus bifrons. *Phil.*

Euomphalus bifrons. *Phil.* Geol. York.

Sp. Ch.—Spire depressed, whorls very convex, obtusely carinated beneath, and bearing one spiral row of large, nodular tubercles above.

The spire of this species is composed of about five turns, very convex both above and below; beneath they are obscurely carinated, as in the *E. pentangulatus*, but above they are ornamented with a row of large, obtusely rounded tubercles, about sixteen in a turn; they are about their own diameter apart. Diameter one inch seven lines, thickness six lines.

Euomphalus calyx. *Phil.*

Euomphalus calyx. *Phil.* Geol. York.

Sp. Ch.—Spire flat above; back very broad, flat; umbilicus deep, conical, margined by a sharp keel.

This curious species has the back very broad and flat, so that, although the spire is not raised, the umbilicus is very deep; the flat, steep sides of the umbilicus meet the back at an acute angle, so as to form a sharp keel round the base of the shell; the upper surface resembles that of the *E. catillus*. Diameter one inch, thickness five lines. It grows much larger.

Euomphalus catillus. *Mart.* sp.

Helix catillus. *Mart.* Pet. Derb.—Euomphalus catillus. *Sow.* Min. Con.—Euomphalus catillus. *Phil.* Geol. York.

Sp. Ch.—Spire concave, above; whorls with a very sharp keel both above and below, near the outer edge, back broad, but slightly convex.

This species is much rarer than the *E. pentangulatus*, from which it differs chiefly in having the keel on the under side of the volutions, at least as sharp as that on the upper; both keels are nearer to the outer edge than in that species, and the back is consequently broader and flatter; there are about the same number of volutions in each. Diameter one inch three lines, thickness of last whorl six lines.

Euomphalus (Phanerotinus) cristatus. *Phil.* sp.

Euomphalus cristatus. *Phil.* Geol. York.—Phanerotinus cristatus. *Sow.* Min. Con.

An imperfect fragment of this singular shell has been obtained. It is easily known by its disjoined whorls, and large, dentated, compressed, dorsal crest. The specimen in Mr. Griffith's Collection must have been about six inches in diameter.

Euomphalus crotalostomus. *M'Coy.* (Pl. VII. fig. 4).

Sp. Ch.—Discoid, depressed; spire slightly raised, of five whorls; a depressed or flattened space on the top of each whorl, bounded by an obscure keel; back flattened, convex; base flattened; umbilicus very large; mouth dilated; surface with transverse irregular lines of growth.

This species occasionally reaches a foot in diameter; the spire is very slightly raised; the mouth, in old individuals, is dilated, bell-shaped (whence the specific name), the remains of the expanded margins giving a peculiarly rugged aspect to the last whorl.

Euomphalus elongatus. *M'Coy.* (Pl. III. fig. 12).

Sp. Ch.—Elongate, conic, spire acute, nearly equalling in height the diameter of the base; of five gradually increasing whorls; upper half of the volutions plane, lower half convex; the two portions separated by an obtusely rounded keel; surface smooth.

This species is distinguished from the *E. acutus* by its gradually increasing whorls, and from the *E. pentagonalis* and *Natica tabulata*, as well as *E. acutus*, by the greater length and acuteness of the spire; it is also a much smaller species than any of them. Length about three and a half lines, width of basal whorl two and a half lines.

Euomphalus marginatus. *M'Coy.* (Pl. V. fig. 21).

Sp. Ch.—Discoid, spire depressed; whorls convex below, flat or slightly concave above; upper surface of the whorls bounded exteriorly or dorsally by an obtuse keel, which separates it from the back, and interiorly or ventrally by a narrow tumid border.

The volutions are four or five in number, of the same form as the *E. pentangulatus*, from which the tumid, prominent, inner margin of the whorls distinguishes it; it is also more strongly striated across. Diameter two inches three lines, thickness of last whorl seven lines.

Euomphalus neglectus. *M'Coy.* (Pl. V. fig. 23).

Sp. Ch.—Spire very much depressed, formed of three rounded volutions; umbilicus wide, rounded, surface smooth.

This shell has been figured by Professor Phillips, in Pl. XV. fig. 31, of the Geology of Yorkshire, where, however, it is not described, being passed over in the explanation of the plates as a probable variety of the *C. rotundatus;* from that species, however, it is at once distinguised by the very small number of whorls, and the flatness of the spire, which hardly rises above the last volution; I have seen a considerable number of specimens from different localities in Ireland, and in all I have seen, the characters were constant. Diameter three lines, thickness of last volution one line.

Euomphalus pentangulatus. *Sow.*

Euomphalus pentangulatus. *Sow.* Min. Con.—Euomphalus pentangulatus. *Phil.* Geol. York.—Euomphalus Bronnii. *Portk.* Geol. Rep.

Sp. Ch.—Spire flat above; whorls convex, very obtusely carinated beneath; back very convex; upper portion of each whorl divided near the centre by a distinct, but not sharp, keel; that portion of the surface on the outside of the keel is convex, that on the inside flat.

This very common shell has about five turns in the spire; the umbilicus is very wide, but shallow, the spire being very slightly raised; the under portion of the whorls is very convex, and obtusely angulated in the middle; the back is slightly compressed; diameter two inches, height of spire nine lines, thickness of the last whorl eight lines.

Euomphalus pileopsideus. *Phil.* sp.

Cirrus pileopsideus. *Phil.* Geol. York.

Sp. Ch.—Discoid, depressed; spire scarcely elevated above the level of the basal whorl, composed of four obtusely rounded, slightly imbricating whorls, rather coarsely striated across.

A few imperfect specimens have occurred of this species. Diameter seven lines, thickness of last volution three lines.

Euomphalus quadratus. *M'Coy.* (Pl. V. fig. 22).

Sp. Ch.—Discoid; spire flat, of three or four whorls; umbilicus very large, rounded; whorls square, finely striated across.

This little species is remarkable for the square form of its volutions; the spire is perfectly flat, as if truncated; the back broad, and bounded by two distinct keels, between which it is flat, or very slightly convex. Diameter six lines, length of mouth two lines, height of mouth two lines.

Euomphalus rotundatus. *Sow.* sp.

Helicites Dionysii. *Schlot.*—Euomphalus Dionysii. *Gold.* and *Bronn.*—Cirrus rotundatus. *Sow.* Min. Con.—Cirrus rotundatus. *Phil.* Geol. York.

Sp. Ch.—Obtusely conical; volutions five or six, rounded, tip obtuse; height of the spire rather more than two-thirds the diameter of last whorl; surface with faint, direct lines of growth.

This species is distinguished from the *E. acutus* by the volutions being uniformly convex, without the flattened space on the upper part of each whorl, which is found in that species; the volutions are about five in number. Diameter one inch six lines, height of the spire one inch.

Euomphalus serpens. *Phil.*

Euomphalus serpens. *Phil.* Pal. Fos.

Sp. Ch.—Discoid, spire convex, of four rounded, smooth whorls; umbilicus very wide, extending to the tip of the spire.

The Irish specimens are referrible to the *smaller variety* of this species found in N. Devon, and figured by Professor Phillips in Pl. XXXVI. fig. 172, c. d. e. Diameter six lines, height of spire two and a half lines.

Euomphalus tabulatus. *Phil.* sp.

Cirrus tabulatus. *Phil.* Geol. York.

Sp. Ch.—Obtusely conical, depressed; summit of the spire flattened; whorls with a nearly rectangular keel in the middle, separating the upper half, which is flat or concave, from the lower, which is flattened, and slightly oblique; mouth wider than long.

This species is remarkable for the square form of its whorls, which are plain or tabulate above, rounded beneath, and widely umbilicate; they are usually about five in number; the upper portion of the spire seems as if truncated. Diameter two inches, height ten lines, thickness of last whorl five lines.

Platyschisma. *M'Coy*[a].

Gen. Ch.—Obtusely conical, ventricose; shell very thin; spire short, obtuse, of few whorls; aperture large, lunate, rounded anteally, narrow retrally, with a very wide, shallow sinus in the outer lip, not forming a defined band; surface smooth, or only marked by lines of growth; umbilicus small, rounded.

This very distinct group of *Pleurotomariæ* differs from all the Oolitic, and the other Palæozoic forms, in several important characters, of which, the want of a definite mesial band is one of the most striking: they are also recognized by their obtuse form; smooth surface, without keels of any kind; the great width and shallowness of the sinus, as indicated by the lines of growth; and the thinness of their shells. They resemble the recent *Janthinæ* strongly, but differ from them in having the mouth rounded anteally instead of being angulated, and not having the pillar lengthened, as in that genus. The species appear confined to the carboniferous limestone.

Platyschisma cirroides. *M'Coy.* (Pl. VI. fig. 2).

Sp. Ch.—Shell discoid, depressed, umbilicate; base flattened, or slightly concave; whorls five, very gradually increasing, the last turn being but little larger than that which precedes it; slightly convex; body whorl obtusely carinated on its lower edge, spire very obtuse.

A very fine species, resembling the *P. helicoides* in some particulars; it is, however, a much rarer shell, and easily to be distinguished by the characters above mentioned. Diameter two inches three lines; height of spire one inch three lines.

Platyschisma helicoides. *Sow.* sp.

Ampullaria helicoides. *Sow.*—Pleurotomaria helicoides. *Phil.*

Sp. Ch.—Ovate, depressed; spire obtusely pointed, of four slightly convex whorls; base tumid; aperture lunate, with an obtuse sinus in the middle of the outer lip, which is followed by the lines of growth; umbilicus small, deep, rounded, spirally striated within.

This fine species is not uncommon; the shell is excessively thin; and from the wide, shallow, rounded sinus, it seems more nearly allied to *Janthina* than either *Ampullaria* or *Pleurotomaria*.

Platyschisma Jamesii. *M'Coy.* (Pl. V. fig. 20).

Sp. Ch.—Depressed, conical; spire obtusely pointed, of four or five flat, imbricating whorls; slightly tumid at the sutures; base flattened, rounded at the circumference; umbilicus small, surface marked with sharp, oblique striæ, having a broad, rounded, backward wave on the rounded circumference of the last whorl, and a little above the suture on the turns of the spire.

This is one of those ambiguous little shells, most allied to *Trochus*, and having much of the general cha-

[a] Πλατὺς, wide; and σχισμὴ, a slit.

racter of *Pleurotomaria*, but without the band, or the deep slit in the lip of that genus; the lines of growth indicate a shallow, rounded sinus in the right lip, as in *Janthina*, but the great thickness of the shell in the present species removes it very far from such delicate shells, and, together with the form, might approximate it to *Rotella*; but instead of the thick pad of enamel at the base of shells of that genus, the fossil is umbilicate. Diameter six lines; height of spire three lines and a half.

Platyschisma zonites. *M'Coy.* (Pl. V. fig. 17).

Sp. Ch.—Discoid; spire very depressed, obtuse, of five slightly convex whorls; circumference rounded; base flattened; umbilicus deep, rounded; surface nearly smooth, marked by obsolete lines of growth, having a wide, backward bend in the middle of the whorls.

This little shell so closely resembles a recent *Zonites*, as to have suggested the specific name; it is more depressed than any other species of *Platyschisma*, although the number of whorls is greater than is usual in that genus. Diameter seven lines and a half; height of spire three lines.

Pleurotomaria. *De Fran.*

Gen. Ch.—Trochiform, generally imperforate; whorls frequently carinated; a deep linear sinus in the middle of the right lip.

Pleurotomaria altavittata. *M'Coy.* (Pl. V. fig. 11).

Sp. Ch.—Obtusely conical; spire of three or four volutions; whorls plane above, rounded below; band prominent, flattened, situated above the centre of the volutions; surface smooth.

This much resembles the *P. abdita*, Phil., in shape, but is distinguished by the upper portion of the whorls being tabulated, and the band, instead of being subsutural, as in that shell, is placed unusually high on the volutions; the surface is quite smooth. Length six and a half lines, width eight lines.

Pleurotomaria canaliculata. *M'Coy.* (Pl. VI. fig. 3, *a*, *b*).

Sp. Ch.—Shell conical, turreted, umbilicate; upper third of the whorls flattened or concave at top; a deep, smooth channel runs along the angle which separates the upper flat portion from the descending portion of the whorls; spire acute, of five or six turns; mouth nearly round; all the whorls regularly and sharply striated spirally. Height one inch two lines, width one inch three lines.

This beautiful shell is very distinctly marked by the sulcus which runs along the upper edge of the whorls. Height of spire one inch two lines, width at base one inch four lines.

Pleurotomaria carinata. *Phil.*

Helix carinata. *Sow.* Min. Con.—Pleurotomaria carinata. *Phil.* Geol. York.

Sp. Ch.—Obtusely conical, volutions gently convex; band broad, simple, smooth; oblique striæ of the surface very fine. Diameter one inch seven lines, height of the spire one inch one line.

Pleurotomaria clathrata. *M'Coy.* (Pl. V. fig. 12).

Sp. Ch.—Obliquely ovate; spire acute, of four very convex whorls; mouth circular; umbilicus very minute; surface reticulated with sharp, prominent, transverse and concentric spiral ridges; keel small, sharp, with a broad, smooth groove on each side of it.

This beautiful little shell is distinguished from the others of its genus by the great convexity of the whorls of the spire, circular mouth, which, with the small umbilicus, regularly latticed surface, and smooth space above and below the keel, renders the present one of the most distinctly marked and elegant of the genus. Length two and a half lines, diameter of last whorl two lines.

Pleurotomaria concentrica. *Phil.*

Pleurotomaria concentrica. *Phil.* Geol. York.

Sp. Ch.—Conical; whorls quadrate, plain above ; surface spirally sulcated ; basal sulci largest. No umbilicus.

There are about five turns in the spire; the quadrate form of the whorls, and spirally sulcated surface, distinguish this from all the species except *P. canaliculata*, M'Coy, from which it is distinguished by having a distinct angle separating the flat upper part of each whorl from the lower, instead of a concave smooth groove, as in that species. Diameter eleven lines, height of spire ten lines.

Pleurotomaria conica. *Phil.*

Pleurotomaria conica. *Phil.* Geol. York.

Sp. Ch.—Acutely conical; height of spire nearly equal to the diameter of the base, umbilicate, band formed of two or three keels, surface with sharp, oblique striæ.

This shell has the spire higher, in proportion to its width, than most of the other species; there are usually three keels on the band, but sometimes there are only two; the oblique striæ of the surface are beautifully sharp and distinct. Diameter one inch four lines, height of the spire one inch three lines.

Pleurotomaria decussata. *M'Coy.* (Pl. V. fig. 13).

Sp. Ch.—Conical, acute, spire of about five or six whorls; volutions flattened; band broad, flat, defined, placed low down on the basal whorl, and close to the suture on those of the spire; surface decussated by rough, spiral, and oblique striæ; umbilicus very small.

This species has the size and form of the *P. conica*, Phil., but has only one simple, broad, flattened keel, instead of the two or three narrow ones of that species; besides which the surface of the present shell is marked by strong spiral as well as oblique striæ. Length one inch two lines, diameter of basal whorl one inch two lines.

Pleurotomaria lenticula. *M'Coy.* (Pl. VII. fig. 5).

Sp. Ch.—Discoid, very much depressed, smooth; spire of five or six slightly convex whorls, nearly flat, tip mammillary, base flattened; umbilicus very small, rounded; a narrow, sharp keel surrounding the last whorl; surface perfectly smooth.

This species is remarkable for its very depressed form, the height of the spire being little more than a third of the diameter; the whorls are all very smooth, and but little convex; the keel is only visible on the last whorl; it is very narrow and sharp. Diameter one inch nine lines, height of spire nine lines, thickness of last whorl six lines.

Pleurotomaria filosa. *M'Coy.* (Pl. V. fig. 14).

Sp. Ch.—Whorls very convex both above and below the keel, which is very large, prominent, rounded; surface with close, spiral, thread-like striæ both above and below the keel.

This species is distinguished by its numerous fine, spiral, striæ and large keel; there are about twenty spiral striæ between the keel and the suture above, alternately larger and smaller. Diameter of basal whorl fourteen lines.

Pleurotomaria Griffithii. *M'Coy.* (Pl. VI. fig. 1).

Sp. Ch.—Acutely conical; whorls flat, base convex; a single, very prominent, square keel, in the middle of the body whorl, but continued along the base of the spiral whorls, close to the suture; umbilicus large, open, conical.

This magnificent fossil is rarely of a less size than that figured in the plate, and frequently reaches six inches in diameter; the surface is almost perfectly smooth; the keel, which is very large and square, is much nearer to the base than the centre of each turn; and the portion of each whorl below the keel is so convex, as to give a channeled appearance to the sutures; the spire consists of six whorls, the keel extending to all of them; the upper whorls appear rounded, as in the plate, only when the outer shell is absent, as was the case with the specimen figured; umbilicus deep, conical, smooth. Length three inches, width four inches three lines.

Pleurotomaria Hainesii. *M'Coy.* (Pl. III. fig. 8).

Sp. Ch.—Conical, depressed; spire small, of three rounded volutions, having the band part above and part below the suture, basal whorl lenticular, depressed above and below, rounded at the circumference, where there is a narrow, prominent, square band; surface above marked with strong, equal sulci, slightly curved where they set off from the spire, and extending obliquely backwards to meet the band at a very acute angle; surface below the band smooth, or faintly striated across.

This beautiful species is dedicated to Dr. Haines, of Cork, who obligingly lent the specimen figured. Length five lines, width eight lines.

Pleurotomaria helicinoides. *M'Coy.* (Pl. VII. fig. 6).

Sp. Ch.—Obtusely conical, lenticular, smooth; last whorl carinate; whorls convex beneath; concave towards the outer edge, convex towards the suture above; umbilicus small, rounded.

This shell closely resembles the *Euomphalus Qualterianus*, but is known from it by the very small size of the umbilicus, which, in the latter species, is so large as to expose the whorls. Diameter four lines; height of spire two lines.

Pleurotomaria lævis. *M'Coy.* (Pl. V. fig. 15).

Sp. Ch.—Very depressed, discoid; whorls narrow, obtusely rounded at the circumference; spire obtuse, of three small whorls; mesial band narrow, flat, subsutural; surface smooth; umbilicus large, rounded.

This shell has its band concealed on the spiral whorls by the sutures, as in the *P. abdita*, Phil., from which it differs in being umbilicate, and much more depressed. Diameter three lines; height of spire one line and a half.

Pleurotomaria multicarinata. *M'Coy.* (Pl. V. fig. 16).

Sp. Ch.—Acutely conical; height and width about equal; body whorl small; spire of five or six rounded or subquadrangular whorls; each whorl with three or four large prominent keels on the middle, above which are four smaller ones, and beneath which, on the flattened base of the body whorl, are numerous small, spiral keels, or sulci, all crossed by very fine, transverse striæ; umbilicus moderate.

This species in size and shape exactly resembles the *P. conica*, Phil., but is easily distinguished by its greater number of keels; the body whorl is very little larger than that which precedes it; the mouth is round, or slightly angulated, base rather flattened. Diameter one inch three lines; height one inch four lines.

Pleurotomaria tornatilis. *Phil.* Geol. York.

A few very imperfect fragments, probably of this species, but unfit for description, have occurred.

Murchisonia. *D'Archiac* and *De Verneuil.*

Gen. Ch.—Elongate, turreted; spire very long, of numerous whorls; keeled; generally striated obliquely; umbilicus very small, or none; a deep, narrow slit in middle of right lip; mouth nearly round; base short.

Murchisonia elongata. *Portk.*

Murchisonia elongata. *Portk.* Geol. Rep.

Sp. Ch.—Very elongate; spire acute, of eleven angular, gradually increasing whorls; two keels bounding the band on the angle, with two keels above, and two below, at equal distances.

This shell is intermediate in character between the *M. angulata*, Phil., and *M. quadricarinata*, M'Coy, but perfectly distinct from both. Length nine lines, diameter of last whorl four lines.

Murchisonia Larcomi. *M'Coy.* (Pl. V. fig. 8).

Sp. Ch.—Spire of ten rounded volutions, each having slightly above the centre a flat mesial band, bounded by two rounded keels, above which are two smaller keels, and below which are two similar keels, on all but the basal whorl, which has three.

This pretty species is one of the most elongate of its genus; with the exception of the keels, the surface is smooth. Length one inch, diameter of basal whorl five lines.

Murchisonia quadricarinata. *M'Coy.* (Pl. V. fig. 9).

Sp. Ch.—Elongate, conic; whorls numerous, gradually diminishing in size, angular, the principal angle or keel being rather below the centre of each whorl; there are two smaller keels below the principal keel, and one above it, on each whorl; sutures prominent; surface nearly smooth, with slight traces of oblique striæ.

This species is allied to the *M. angulata*, Phil., but the number of its keels, and slender form, distinguish it from all of the genus. Length four and a half lines, diameter of last whorl one and a half lines.

Murchisonia sulcata. *M'Coy.* (Pl. V. fig. 10).

Sp. Ch.—Acutely conical; spire of four gradually increasing, very convex whorls; the whorls of the spire have four, and the basal whorl five broad, rounded, smooth, spiral, nearly equal grooves, separated by sharp ridges; umbilicus very small.

This species is remarkable for the great convexity of the whorls, and their very gradual increase, the basal turn being very little larger than the one preceding it; two of the spiral ridges on the most prominent part of each whorl seem to include the band between them. Length three and a half lines; diameter of last whorl three lines; thickness of last turn one and a half lines.

Elenchus. *Hum.*

Gen. Ch.—Trochiform, spire lengthened; body whorl small, smooth; imperforate; base of the pillar with a prominent angle or tooth.

Elenchus antiquus. *M'Coy.* (Pl. V. fig. 18).

Sp. Ch.—Ovate, smooth, spire pointed, of four slightly convex whorls; mouth half the length of the shell; pillar slightly thickened, obsoletely notched at the base; outer lip thin, straight; body whorl inflated; base very short.

This interesting shell may be distinguished from all the species of *Macrocheilus*, by the minute notch at the base, and the short, slightly thickened, and twisted pillar. The general form is buccinoid or gibbous ovate; the surface is smooth, with very fine, direct, transverse striæ. Length seven lines, width four lines.

Elenchus subulatus. *M'Coy.* (Pl. V. fig. 19).

Sp. Ch.—Elongate, subulate, spire of about six or seven flat, smooth whorls; mouth ovate, rounded antea-ally, narrow retrally; a small strong tooth on the pillar lip; right lip simple.

This species belongs apparently to that splendid little group of New Zealand shells, long ago distinguished

by Humphreys under the above generic title, and distinguished from the true *Monodontæ*, principally by their more elongate form, brilliant colouring, and the want of an umbilicus. The surface is perfectly smooth. Length about six lines; length of mouth two lines; diameter of last whorl two and a half lines.

SCUTIBRANCHIA AND CYCLOBRANCHIA.

Those are remarkably well defined, not only from a consideration of their anatomy, but also in their testaceous covering; their shells are all simply cup-shaped, never spiral, or very slightly so in a few aberrant forms, in which they differ from the *Pectinibranchiate Gasteropoda*, or ordinary spiral univalves. The genera *Acroculia* and *Patella*, are found in the carboniferous limestone; the first is scarcely distinguishable from the recent *Capulus*, or the Tertiary genus *Brocchia*, while the latter is a well-known recent genus; although, I must confess, that it appears to me that the shells we now call *Patella* in those rocks, do not really belong to the present tribe, but are more nearly related to *Umbrella* of Lamarck; it would require, however, more perfect specimens than I have seen to settle the question, meanwhile I cannot do better than leave them in their present position.

Trochella. *Sw.*

Infundibulum. *Mont.*

Gen. Ch.—Conical, patelliform; apex central; spire internal, of two or three whorls; umbilicus very small, or none.

Trochella prisca. *M'Coy.* (Pl. VII. fig. 1).

Sp. Ch.—Conical, smooth; height rather greater than half the diameter; spire of four flat whorls; sutures only indicated, on the outside, by an obscure depression; apex mammillary; mouth transversely elliptical; umbilicus smooth, roundish; circumference acute.

This fossil, although rather common, appears to have passed hitherto unnoticed, or, as I have frequently known it, mistaken for a cast of the umbilicus of a *Nautilus biangulatus*, or some such shell. The discovery of several fine specimens, shewing the under side, with the mouth and umbilicus, first enabled me to point out its true nature, and to characterize it as a distinct species. When the outer shell is removed, the internal spire can be distinctly seen; but when perfect, it is only indicated by the very slight convexity of the whorls, the suture being completely covered by the external shell. Diameter one inch seven lines, height of spire eleven lines.

Fissurella. *Brug.*

Gen. Ch.—Patelliform, apex perforated.

Fissurella elongata. *M'Coy.* (Pl. V. fig. 27).

Sp. Ch.—Length about twice the width, conical; sides parallel; extremities rounded; apex one-fourth the length of the shell, from the anterior end; surface decussated by equal, radiating, and concentric ridges.

Although the perforation in the apex of this remarkable fossil is obscured by a breaking of the shell, I have no hesitation in placing it in the present genus. It is very much elongated and compressed; the extremities are rounded, the anterior being slightly the broadest; the anterior end is only one-fourth the length of the shell, very convex; the posterior end is slightly depressed, the sides rather concave; the surface is marked with regular, rounded, radiating ribs, which are decussated by concentric sulci, placed at equal distances with the radiating ones, so as to give a regularly chequered appearance to the surface. Length nine lines, width four lines.

Dirinus. *M'Coy*[a].

Gen. Ch.—Patelliform; apex perforated by two oval foramina, symmetrically placed, one on the right side, the other on the left.

This most extraordinary genus is nearly related to the recent *Fissurella* of Lamarck; but instead of the single dorsal, branchial opening of that genus, we have here *two* distinct, oval foramina, laterally placed with respect to the apex, they are separated by a distinct, narrow, flattened septum. In some of the recent species of *Fissurella*, the opening is contracted in the middle, so as to indicate an approach to the structure here noticed. Only one species is as yet known to me.

Dirinus Bucklandi. *M'Coy*. (Pl. V. fig. 28).

Sp. Ch.—Obovate, conical, depressed; apex prominent, obtuse, inclining forward one third the length from the anterior margin; surface slightly irregular; smooth, or with a few lines of growth near the margin.

This very curious little shell is obtusely trigonal in its outline, the front being obtusely rounded; the posterior margin truncated; lateral angles rounded; the posterior and lateral margins are about equal in length. Length five lines; width five lines; height one line and a half; foramina three-fourths of a line in length, half their length distant from each other.

Acroculia. *Phil.*[b]

Gen. Ch.—Shell obliquely spiral; spire dextral; mouth large; no columella; a deep, wide notch in the right lip.

Acroculia angustata. *Phil.* sp.

Pileopsis angustus. *Phil.* Geol. York.

Sp. Ch.—Apex spirally involute, narrow; mouth expanded; delicately striated across.

The transverse striæ are exceedingly fine, the surface appearing smooth to the naked eye; the spire is more perfectly formed than in any of the other species, and the mouth is dilated, the whole form approaching to that of the *Natica ampliata*, Phil., which Goldfuss places in the present genus. Length nine lines, width of the mouth six lines.

Acroculia canaliculata. *M'Coy*. (Pl. III. fig. 13).

Sp. Ch.—Subconical, compressed; apex oblique, incurved; aperture deeply sinuated, trilobate; from each of the projecting lobes a deep channel extends to the beak, one passing up the back, and one in the middle of each side; there are a few irregular minor sulci parallel to the principal channels.

The trilobate aperture approximates this species to the *A. triloba, Phil.*, but the apex is more oblique, and the deeply channeled surface distinguish it equally from that, and from the other described species; the right lateral furrow is deeper than the left. Length nine lines, width five lines.

Acroculia carinata. *M'Coy*.

Pileopsis cassideus. *D'Archiac* and *De Verneuil*.

Sp. Ch.—Obliquely conical; apex free, incurved; very much compressed; back sharply keeled; surface smooth.

[a] Etym. δις, double, and ῥινες, the nostrils, in allusion to its double breathing holes.

[b] Although the name *Platyceras* of Conrad has the priority over the term *Acroculia*, yet the former seems so singularly inappropriate, that I have retained Professor Phillips's name, which has been already extensively adopted by European writers.

In July, 1841, I published a description of this species in a catalogue which I wrote of my friend, the late Major Sirr's fossils, who had collected the specimens from the Kildare limestone. The following year Viscount D'Archiac and M. de Verneuil published a description of a fossil from the greywacke of Kemmenau, which seems identical, although much less compressed.

Acroculia sigmoidalis. *Phil.*

Acroculia sigmoidalis. *Phil.* Pal. Fos.

A small fragment of this species, unfit for description, has occurred.

Acroculia triloba. *Phil.* sp.

Pileopsis triloba. *Phil.* Geol. York.

Sp. Ch.—Compressed, conical, arched; apex free, deflected, obtusely pointed; aperture distinctly trilobate, surface marked with lines of growth parallel to the margin, otherwise smooth.

This remarkable species is known from the *A. vetusta* by its more compressed form and free apex.

Acroculia tubifer. *Sow.* sp.

Pileopsis tubifer. *Sow.* Min. Con.—Pileopsis tubifer. *Phil.* Geol. York.

Sp. Ch.—Conical, acute, apex obtuse, not incurved; three obscure, longitudinal undulations in the front; each bearing a row of long tubular spines.

This species is much more lengthened and narrow than any of the others; the apex is arched, but not distinctly incurve at any stage of growth; the three rows of tubular spines are very remarkable. Length eleven lines, diameter of the mouth six lines.

Acroculia vetusta. *Phil.*

Pileopsis vetusta. *Sow.* Min. Con.—Pileopsis vetusta. *Phil.* Geol. York.—Aeroculia vetusta. *Phil.* Pal. Fos.

Sp. Ch.—Shell obliquely conical, gibbous; spire enrolled; mouth nearly circular in young, but lengthened in old individuals.

Much doubt has arisen as to what shell was intended by Sowerby for his *Pileopsis vetusta*, every subsequent writer quoting his figure with a mark of doubt, the shells which most usually occur not presenting the compressed form, lengthened aperture, or longitudinally undulated surface of Mr. Sowerby's larger figure, but agreeing perfectly with his smaller one; hence the question has arisen, whether Mr. Sowerby has confounded two species of *Pileopsis*, and which of them has the best right to the specific name *vĕtusta*. It appears that young specimens have the mouth almost circular; the surface smooth or obscurely wrinkled *transversely*, and the whole shell having a gibbose or inflated appearance; the beak delicate, acute, and incurved, in this state agreeing perfectly with Sowerby's 2 and 3 in the Mineral Conchology, Professor Phillips's figures in the Geology of Yorkshire, Palæozoic Fossils, &c.; by age, however, the sides become compressed; the back narrow, flattened, and bounded on each side by an irregularly rounded ridge or undulation, the beak becomes blunt, the mouth lengthened, and the lip undulating. Length of an old individual two inches four lines; length of the aperture one inch nine lines; width one inch three lines.

Patella. *Linn.*

Gen. Ch.—Conical, depressed; apex inclined to the anterior side; aperture oval; muscular impression interrupted at the head of the animal; surface radiatingly striated.

Patella mucronata. *Phil.*

Patella mucronata. *Phil.* Geol. York.

Sp. Ch.—Orbicular, depressed, smooth; vertex mucronate, central.

Professor Phillips mentions that the base is not plane in this species, but my specimens are too imperfect to ascertain this fact; yet from the mucronate apex, and general form, I have no doubt that they are the same. Diameter eleven lines, height five lines.

Patella scutiformis. *Phil.*

Patella scutiformis. *Phil.* Geol. York.

Sp. Ch.—Shell oval, depressed, smooth; apex acute, inflexed, nearly marginal.

I have, as yet, seen but very bad specimens of this species, which, nevertheless, seems distinct, by its regular elliptical form, and nearly marginal apex. Professor Phillips mentions fine, radiating striæ on his specimen, but they are not visible in the examples I have examined.

Patella sinuosa. *Phil.*

Patella sinuosa. *Phil.* Geol. York.

Sp. Ch.—Ovate; anterior end narrower, with a wave or sinus on each side; vertex prominent, one fourth the length of the shell from the anterior end.

This fine species is chiefly remarkable for the sinuosity on each side, at the anterior end. Length one inch nine lines, width one inch.

Siphonaria. *Sow.*

Gen. Ch.—Patelliform; a siphon, or canal, from the apex to the margin, at one side of the head.

The lateral siphon of this genus, which distinguishes it from *Patella*, is not only visible internally, leaving a scar, which interrupts the muscular impression; but is frequently visible externally, and slightly affects the margin.

Siphonaria Koninckı. *M'Coy.* (Pl. III. fig. 14).

Sp. Ch.—Longitudinally oval; width rather more than three-fourths the length, slightly irregular, apex prominent, obtuse, slightly nearer the anterior than the posterior end, and nearer to the left than the right side; an obtusely rounded furrow extends from the beak obliquely to the left side of the anterior end; surface smooth.

Most nearly allied to the *Patella lateralis*, Phil., which is possibly also of this genus; it differs, however, from that species, in its more lengthened form, obtuse apex, and entirely wanting the posterior radiations. From the *Umbrella lævigata*, M'Coy, it is distinguished by its large, lateral apex, greater convexity, and anterior, oblique furrow. Length seven lines, width six lines and a half.

Umbrella. *Lam.*

Gen. Ch.—Suborbicular, patelliform, depressed; apex nearly central, margin acute; muscular impression continuous.

Umbrella lævigata. *M'Coy.* (Pl. V. fig. 31).

Sp. Ch.—Ovate, margin sharp, slightly sinuous on each side at the anterior end, apex nearly central; surface smooth, with one or two very obscure concentric undulations.

From the sharpness of the edge and smoothness of the surface, I think there can be little doubt of this shell being more nearly related to *Umbrella* than to *Patella*. The only fossil this runs any risk of being con-

founded with is the *Patella sinuosa* of Phillips, from which it is readily distinguished by its nearly central apex. Length one inch five lines, width one inch two lines, height two lines.

Dentalium. *Linn.*

Gen. Ch.—Shell conical, tubular, slender, arched; open at both ends.

Dentalium inornatum. *M'Coy.* (Pl. V. fig. 30).

Sp. Ch.—Tube slightly arched, very gradually tapering, mouth circular; surface plain, smooth.

This is the first example I have seen of the genus *Dentalium* in the Irish palæozoic rocks; it is not unlike the recent *D. entalis*, and like it, is smooth, and entirely without the longitudinal ridges which ornament so many of the species; but it is considerably smaller, seldom attaining, I should think, a greater length than one inch; the imperfect specimens usually found are little more than half that, and have a diameter of about three-fourths of a line.

DITHYRA.

Teredo (?) antiqua. *M'Coy.* (Pl. VIII. fig. 1).

Sp. Ch.—Tube irregular, flexuous, nearly cylindrical, about three-fourths of a line in diameter; irregularly wrinkled transversely; anterior end flattened, and terminating in two short tubuli.

This curious shelly tube occurs occasionally in considerable abundance; the specimens are usually about three-fourths of an inch in length, and from one-half to three-fourths of a line in diameter, twisted in every direction. The tube terminates distinctly in two smaller tubuli, whence I have placed it as a *Teredo*, although with some doubt.

Genus Solenopsis. *M'Coy.*

Gen. Ch.—Transversely elongate, equivalve, inequilateral, beaks prominent, close to the anterior end; anterior end short, rounded, closed; posterior end elongate, truncated, slightly gaping.

I have instituted the present genus for the reception of a few fossils of the carboniferous series, hitherto ranked by Goldfuss and others with the genus *Solen;* from this genus they are distinguished by their prominent beaks, which are never terminal, and their rounded and closed anterior end. From *Solenocurtus* they differ in being inequilateral; from *Nucula* and *Solenella* they differ in the want of lateral teeth, and in their gaping, posterior end. The few species I know are all from the Palæozoic rocks, and scarcely differ except in size.

Solenopsis minor. *M'Coy.* (Pl. VIII. fig 2).

Solen pelagicus. *Portk.* (Not of *Gold.*)

Sp. Ch.—Width three times the length; anterior end short, rounded; surface with irregular, concentric striæ.

This species differs from the *Solen pelagicus*, Gold., in its being less elongate transversely, having a broader anterior end, and being entirely without the sinus, which extends from the beak to the ventral margin in that species; from the *Solen vetustus* of the same author, which it more nearly resembles, it differs in not being radiated, and in its strong, diagonal, posterior ridge. Length four lines, width eleven lines.

Sanguinolites. *M'Coy.*

Gen. Ch.—Transversely oblong, convex, equivalve, very inequilateral; dorsal and ventral margins parallel, or nearly so; anterior side short, rounded; posterior side lengthened, obliquely truncated, gaping; an oblique ridge usually extends from the beak to the anal angle, but no flexure; ligament external.

This genus has been formed to include a number of fossil shells of the older rocks, hitherto classed with *Sanguinolaria*. The latter shells have the dorsal and ventral margins curving towards each other posteriorly; forming a submucronate, beak-like termination, to the posterior end, while, on the contrary, the dorsal and ventral margins of the present shells are nearly parallel, so that the posterior end is as wide, or wider than the other parts of the shell; they are also much more gibbose, and have no posterior fold.

Sanguinolites angustatus. *Phil.* sp.

Sanguinolaria angustata. *Phil.* Geol. York.

Sp. Ch.—Nearly four times as wide as long; posterior end subtruncate, separated from the body of the shell by a distinct diagonal ridge from the beak; anterior end short, rounded; surface with coarse, transverse sulci; the posterior triangular space nearly smooth.

This shell is nearly flat, very much elongated transversely; the hinge-line and front margin are nearly parallel; length seven lines, width one inch eleven lines.

Sanguinolites arcuatus. *Phil.* sp.

Sanguinolites arcuatus. *Phil.* Geol. York.

Sp. Ch.—Transversely elongate, gibbous; posterior, dorsal margin convex; ventral margin nearly parallel to the dorsal, concave; surface smooth, with irregular lines of growth.

This remarkable shell seems more closely allied to some of the terebrating *Modiolæ* or *Lithodomi*, than to *Sanguinolaria*. I have not seen specimens perfect enough to give the proportional measurements.

Sanguinolites contortus. *M'Coy.* (Pl. XIX. fig. 3).

Sp. Ch.—Transversely oblong, twice and a half as wide as long; beaks very large, tumid; from whence to the posterior part of the front margin, the shell is obliquely gibbous, but without a distinct ridge; middle of the shell and posterior side flattened, so as to give rather a twisted appearance to the shell; anterior side narrow, pointed, rounded, having a lengthened, ovate lunule beneath the beak; posterior end obliquely truncated; surface smooth.

This species is wider than the *Unio Austicei*, and most nearly resembles the common *S. tumida*, from which it differs in having the posterior end broader, and instead of the sharp, straight, diagonal ridge of that species, there is a very obtuse, rounded, undefined convexity, so curved as to give a twisted appearance to the whole shell; the posterior side is never flattened in that species; in that shell also there are three rounded ridges, from the beak to the posterior end, which do not exist in the present shell, which is further distinguished by its more pointed, lengthened, and compressed anterior side. Length of a small specimen eleven lines, width two inches four lines. The specimen figured was presented by Mr. Newenham of Cork.

Sanguinolites costellatus. *M'Coy.* (Pl. VIII. fig. 5).

Sp. Ch.—Transversely oblong, depressed; anterior side short, rounded, marked towards the margin with four or five short, flat, radiating ribs.

This rare species is distinguished from all others by the radiating ridges on the anterior side; the specimen, although imperfect at the posterior end, is very much elongated transversely, probably three times as wide at long. Length six lines.

Sanguinolites curtus. *M'Coy.* (Pl. XI. fig. 1).

Sp. Ch.—Transversely oval, convex; width rather less than twice the length; anterior and posterior ends nearly equally rounded; abdominal margin rounded; no posterior diagonal ridge; surface of the anterior end, and body of the shell, strongly plicated transversely; one-half of the ridges disappear on reaching the posterior slope, every alternate one suddenly dilating, so as to form very obtuse, smooth ridges, as they pass over the posterior area.

This species resembles the *S. rugosa*, Phil., in the arrangement of the transverse ridges, but differs in being much less wide in proportion to the length. Length eight lines, width one inch two lines.

Sanguinolites discors. *M'Coy.* (Pl. VIII. fig. 4).

Sp. Ch.—Transversely oblong, convex, three times as wide as long; beaks prominent, small; anterior side short, rounded; front margin slightly convex; posterior end obliquely truncated, posterior slope separated from the body of the shell by a strong ridge from the beak to the posterior inferior angle; body of the shell marked by strong, transverse, equal ridges, which stop suddenly at the oblique posterior ridge, leaving the posterior slope smooth.

This shell derives its most prominent character from the discordance which exists between the posterior slope and the body of the shell, the former being perfectly smooth, while the whole of the latter is strongly sulcated transversely; it is rather more depressed than the allied species. Length four lines, width one inch.

Sanguinolites Iridinoides. *M'Coy.* (Pl. XII. fig 1).

Sp. Ch.—Shell flat, nearly four times wider than long; anterior side short, angular at the hinge; anterior side and body of the shell marked with fine, crowded wrinkles, which change into broad, obsolete undulations, in passing over the obscurely marked, diagonal ridge which runs from the beak to the inferior posterior angle; posterior end broader than the anterior, obliquely subtruncate; hinge-line three-fourths the width of the shell.

This shell resembles an *Iridina* in form. There is a slight depression parallel to, and a little below the hinge-line; the oblique, posterior ridge is much better marked in some specimens than in others; above it the undulations of the surface are broad, and slightly convex, but, immediately below it, suddenly diminish in size and increase in number, and, becoming more prominent, continue so to the anterior end; the depth of the shell gradually increases from the anterior to the posterior extremity. From the beak to the ventral margin, measured at right angles with the hinge-line, one inch three lines; from the anterior to the posterior end five inches. This shell is distinguished from the *S. undata*, Portk., by that species having numerous, strong, prominent ridges, continued without any sensible increase in number or diminution in size across the body of the shell, the anterior side is also much narrower and rounded. The differences from the *S. transversa*, Portk., are pointed out under that head.

Sanguinolites liratus. *Phil.* sp.

Sanguinolaria lirata. *Phil.* Pal. Foss.

Only very imperfect specimens of this species have occurred. The form resembles that of *S. plicatus*, M'Coy, but the surface is regularly marked with strong, nearly equal, elevated ridges, parallel with the margin.

Sanguinolites plicatus. *M'Coy.* (Pl. X. fig. 3, *a*, *b*).

Sanguinolaria plicata. *Portk.* Geol. Rep.

Sp. Ch.—Twice and a half as wide as long, convex; posterior end subtruncate; anterior end rounded; surface with close, irregular, transverse sulci, parallel to the margin.

This species, when in shale, is usually depressed, and the transverse sulci assume the appearance of plaits, or folds; when in limestone, however, it is more convex, and the transverse markings appear finer and more regular; there is some indication of a diagonal keel near the beak, but it becomes obsolete before reaching half-way to the posterior end; there often appears, particularly in shale specimens, a concave space from the beak to the opposite part of the front margin. Length seven lines, width one inch four lines. The plate containing the figure of this species, under the name *Sanguinolaria plicata*, was presented to the Geological Society of Dublin, some years ago, at an evening meeting, at which Captain Portlock was present. As he has figured the same fossil, under the same name, in his Geological Report, I am uncertain whether he intended to attribute the species to himself or to me.

Sanguinolites radiatus. *M'Coy.* (Pl. XIII. fig. 4).

Sp. Ch.—Transversely oblong, nearly three times as wide as long, evenly convex; dorsal and ventral margins parallel, ends equal, rounded; surface radiated with about twelve unequal, broad, convex ribs, from the beak to the ventral margin; anterior and posterior extremities smooth; no posterior oblique ridges.

Length four lines, width ten lines.

Sanguinolites sulcatus. *Phil.* sp.

Sanguinolaria sulcata. *Phil.* Geol. York.

Sp. Ch.—Transversely oblong, twice and half as wide as long, convex; posterior end subtruncate, rounded, gaping; anterior end small, rounded; surface with large wrinkles on the posterior slope, which divide each into two or three sharp, narrow sulci, on the body and anterior end of the shell.

This species is almost always found with the two valves together; the large, posterior wrinkles dividing each into a number of small ones, as they cross over the body of the shell, give a curious character to the surface. Length one inch, width two inches five lines.

Sanguinolites transversus. *Portk.* sp.

Sanguinolaria transversa. *Portk.* Geol. Rep.

Sp. Ch.—Transversely elongate, lanceolate; width three and a half times the length; beaks very small, close to the anterior end; anterior end short, rounded; ventral margin convex; posterior end narrow, obliquely truncated; hinge-line nearly as long as the width of the shell; surface marked with small, faint lines and waves of growth.

From the drawing given in Captain Portlock's Report, this species has been thought to resemble the *S. vetusta*, M'Coy; but when specimens are compared, the species seem quite distinct; the striæ and concentric waves of the former species are fine, and so faint as to be nearly obsolete, while in the latter they form large, rounded, prominent ridges; and one unvarying character, observable even in a cast, would distinguish them, independent of surface, namely, that in the *S. transversa* the posterior end is considerably narrower than the length from the beak to the opposite ventral margin, while in the *S. vetusta* it is considerably broader. Length one inch one line, width three inches nine lines.

Sanguinolites tricostatus. *Portk.* sp.

Sanguinolaria tricostata. *Portk.* Geol. Rep.

Sp. Ch.—Transversely oblong, nearly three times as wide as long; diagonally gibbous; beaks large, prominent; anterior side very short, rounded; front margin slightly convex, with a shallow sinus opposite the beak; posterior side lengthened, obliquely rounded; a strong ridge extends from the beak to the posterior inferior angle; between this keel and the hinge-line, are two other strong, rounded, radiating ridges, dividing the posterior slope into three equal, concave spaces; surface marked with close, fine, transverse striæ.

This handsome species, in general form, resembles the *S. tumidus*, but the posterior ridges are more distinct, and the regularly striated surface at once distinguishes it. Length nine lines, width two inches one line.

Sanguinolites tumidus. *Phil.* sp.

Sanguinolaria tumida. *Phil.* Geol. York.

Sp. Ch.—Three times as wide as long, very gibbous; beaks large, tumid; a distinct keel runs from the beak to the posterior angle, separating the posterior slope from the body of the shell; surface smooth; three obscure, radiating ridges on the posterior side.

This large species has the beaks remarkably prominent; the surface is smooth, with the exception of a few imbricating lines of growth. Length one inch ten lines, width three inches eight lines.

Sanguinolites undatus. *Portk.* sp.

Sanguinolaria undata. *Portk.* Geol. Rep.

Sp. Ch.—Transversely elongate, width about three and a half times the length; depressed; posterior end obliquely truncated, broad; anterior end very narrow, rather lengthened, rounded; surface regularly marked with strong, equal, subangular, concentric ridges, continuing strongly defined across the whole shell; intermediate spaces broad, concave, smooth.

This species differs from the *Sanguinolites Iridinoides*, M'Coy, in the strong, prominent ridges being continued equally from the posterior end, across the entire body of the shell to the anterior end, with a very trifling diminution in size, and without increasing perceptibly in number; the ridges are narrower, more equal, and the intervening species broader and smoother, than in that shell; they are also bent more angularly at the posterior end; the anterior end is much narrower in the present species.

Anatina. *Lam.*

Gen. Ch.—Shell very thin, inequivalve, inequilateral, transverse; hinge, with a spoon-shaped process, containing the cartilage, and a small, lengthened, testaceous appendage.

Anatina attenuata. *M'Coy.* (Pl. VIII. fig. 6).

Sp. Ch.—Transversely ovate, attenuated posteriorly; gibbous, smooth; beaks prominent, anterior end rounded; front margin very convex.

This curious fossil and the next are referrible, with tolerable certainty, to the genus *Anatina*, not only from the excessive thinness of the shell and external form, but from the characteristic testaceous appendage to the hinge, which is very frequently preserved in both species.—(It has been unfortunately obliterated from the Plate during the preparation of the stone for printing.) The form of the present species is clavate, being rounded, and very gibbous anteriorly, attenuated, narrow, and compressed posteriorly, where it is also rounded, but is slightly oblique; the beaks are very large, but somewhat flattened at the tip; the testaceous appendage of the hinge is about two lines long, flat, very narrow, and dilated at the tip; muscular impressions are distinct, the anterior being rounded, oval; the posterior one crescent-shaped, palleal impression sinuous. Length seven lines, width ten lines.

Anatina deltoidea. *M'Coy.* (Pl. VIII. fig. 7).

Sp. Ch.—Subtrigonal, gibbous; anterior side large, rounded; front margin very convex; posterior side compressed, broad, obliquely truncated, separated from the body of the shell by an obtuse ridge, extending from the beak to the posterior-inferior angle; surface smooth.

This species is easily distinguished from the *A. attenuata*, M'Coy, by the shortness and breadth of the posterior side, and also by its greater convexity; the shell is excessively thin; the appendage to the hinge is about a line and a half in length, and one-fourth of a line in width, the sides are nearly parallel, truncated at the tip; muscular impressions large, crescent-shaped; palleal impression sinuous. Length seven and a half lines, width ten lines.

Pandora clavata. *M'Coy.* (Pl. XI. fig. 2).

Sp. Ch.—Transversely elongate, clavate, width twice and one-third the length; beaks small, close to the anterior end; anterior end short, rounded; posterior attenuated, slightly recurved, truncated at the extremity; one valve very convex, the other flat; surface of both valves strongly striated transversely.

This interesting little shell has a slightly marked posterior ridge. Length three lines, width seven lines.

Edmondia (?) compressa. *M'Coy.* (Pl. XIII. fig. 10).

Sp. Ch.—Transversely oval, evenly convex, no posterior ridge or diagonal gibbosity; beaks small, close to the anterior end; anterior end short, rounded; ventral margin convex, posterior end obtusely rounded; surface marked with fine, irregular, concentric wrinkles of growth.

I have placed this handsome fossil provisionally in the genus *Edmondia* of Koninck, it resembles the *Lutraria primæva*, Portk., but is smoother, and wants the large, prominent beaks, diagonal gibbosity, and twisted appearance of the posterior side, found both in that species, and in the *U. Urii*, to which it is allied. Length one inch, three lines, width two inches one line.

Lutraria elongata. *M'Coy.* (Pl. VIII. fig. 3).

Sp. Ch.—Twice as wide as long, convex; beaks large, prominent, slightly flattened; anterior end short, rounded; posterior side very much elongated transversely, recurved, truncated at the extremity; dorsal and ventral margins nearly parallel; surface marked transversely with wrinkles parallel with the front margin, and truncated posterior end.

This curious little species is very rare, only one specimen having as yet occurred. Length four lines and a half, width ten lines.

Lutraria prisca. *M'Coy.* (Pl. XII. fig. 4).

Sp. Ch.—Shell transversely elongate, oval, convex, smooth, or slightly striated concentrically; posterior end narrowed, rounded, subtruncate, ventral margin very convex; beaks prominent, large.

This shell is much less transverse than the *L. primæva*, Portk., that species being much wider in proportion to the length, it also has the ventral margin nearly straight, while it is nearly semicircular in the present species. Length two inches five lines, width three inches nine lines.

Mactra incrassata. *M'Coy.* (Pl. XIX. fig. 8).

Sp. Ch.—Obtusely trigonal, width about one-sixth greater than the length; convex; beaks central, large; anterior and posterior ends equal, obtusely rounded; surface marked with several strong, distant, irregular, thickened marks of growth; between which, especially towards the margin, are finer, transverse lines of growth.

This fine species resembles the recent *M. solida* in most of its characters, but is considerably larger. Length two inches seven lines, width two inches eleven lines.

Mactra ovata. *M'Coy.* (Pl. XI. fig. 3).

Sp. Ch.—Transversely ovate, convex, smooth; beaks small, subcentral, nearest the anterior side; anterior side rounded; posterior side obtusely pointed; posterior area compressed.

When examined with a lens, there appear some faint, transverse striæ. Length seven lines, width nine lines.

Kellia gregaria. *M'Coy.* (Pl. XI. fig. 5)

Sp. Ch.—Transversely oval, length three-fourths the width, compressed; beaks close to the anterior end; very slightly convex; anterior and posterior ends equal, very obtusely rounded; surface smooth, with a few delicate wrinkles of growth near the margin.

In this interesting little shell the transverse wrinkles are inconstant and irregular, having precisely the membranous character of those of *Cyclas* or *Pisidium*; it seems, however, most allied to *Kellia suborbicularis*. Length two lines, width nearly three lines.

Psammobia decussata. *M'Coy.* (Pl. X. fig. 2).

Sp. Ch.—Transversely rhomboidal, gibbous; beak near the anterior end, which is short, rounded; posterior end obliquely truncated; surface with irregular, transverse sulci, decussated by close, fine, longitudinal striæ.

There is an obtuse ridge separating the posterior side from the body of the shell, the transverse sulci are at unequal distances, but the longitudinal striæ are very regular, close, and rounded. Length eight lines, width one inch two lines.

Lucina antiqua. *M'Coy.* (Pl. VIII. fig. 9).

Sp. Ch.—Orbicular, slightly convex; beaks pointed; lunule very small; surface marked with delicate, sharp, concentric striæ.

This handsome species is almost perfectly orbicular, the posterior margin being very slightly angulated; the lunule is small, but deep, ovate; concentric striæ very fine; it is less convex than most species of the genus. Length one inch three lines, width one inch four lines.

Ungulina antiqua. *M'Coy.* (Pl. VIII. fig. 8).

Sp. Ch.—Longitudinally ovate; length one-sixth greater than the width, evenly convex; beaks small, rounded from the posterior side; a depression in front of the beaks, where the anterior margin is slightly flattened; surface nearly smooth, with an irregular, concentric plication, strongest on the posterior side.

This singular shell appears so closely allied to the recent *Ungulina transversa*, that I have included it in the same genus. Length one inch three lines, width one inch one line.

Amphidesma subtruncata. *M'Coy.* (Pl. X. fig. 10).

Sp. Ch.—Subquadrate, rhomboidal, depressed, smooth; anterior side rounded; posterior side subtruncate, very obscurely flexuous; beaks small, pointed, subcentral; surface smooth.

This species has a very thin, smooth shell; the beaks are small but prominent; the posterior end is slightly beaked and flexuous. Length one inch one line, width one inch three lines.

Corbis cancellata. *M'Coy.* (Pl. VIII. fig. 14).

Sp. Ch.—Transversely obovate, one-third wider than long, compressed; shell thick, regularly cancellated by equal, radiating, and transverse, thin, prominent ridges; beaks large, prominent; anterior side small; posterior side somewhat attenuated, subtruncate, rounded.

The thick, regularly cancellated shell induces me to include this fossil in the genus *Corbis*, for the present, although it is much more compressed, and inequilateral, than the other species. The general form is obovate, the posterior portion of the shell being perceptibly narrower than the anterior; the beaks project considerably, but are compressed; they are about two-thirds the length from the posterior extremity. Length one inch three lines, width one inch nine lines.

Venus centralis. *M'Coy.* (Pl. XI. fig. 6).

Sp. Ch.—Transversely oval, convex; anterior and posterior sides equal or nearly so, rounded; beaks small, central; surface marked transversely with close, unequal, rounded ridges.

This is distinguished from the *V. elliptica*, Phil., by the almost perfectly central position of the beaks, the transverse wrinkles are also finer and more numerous in the present shell; they are sharpest at the anterior side. Length two lines, width three lines. The beaks are rather more central than in the figure.

Venus tenuistriata. *M'Coy.* (Pl. VIII. fig. 10).

Sp. Ch.—Suborbicular, slightly transverse, convex; anterior side and front margin rounded; posterior end subtruncate, rounded, beaks prominent; surface roughened by very close, fine, concentric striæ; a deep sinus in the palleal impression.

This rare species is but slightly convex; the beaks are large, the anterior side short and rounded, the dorsal margin is slightly convex, the transverse striæ are very fine and closely placed; the sinus in the impression of the mantle is very deep, with parallel sides, rounded at the end. Length one inch three and a half lines, width one inch seven lines.

Pullastra antiqua. *Sow.*

Pullastra antiqua. *Sow.* Geol. Trans.

The specimens which have occurred of this species are too imperfect for description.

Pullastra bistriata. *Portl.*

Pullastra bistriata. *Portl.* Geol. Rep.

Sp. Ch.—Transversely elliptical, oblique, slightly convex, flattened in the middle; beaks small, close to the anterior end; anterior side very short, rounded, posterior end obliquely subtruncate; hinge-line straight, three-fourths the length of the shell; shell girt with about ten concentric step-like ridges, rounded on their ventral edge, flattened above, each beautifully sculptured with close, rounded, prominent zig-zag lines.

This beautiful shell is exceedingly common in the carb. slate of several districts in Ireland; it is distinguished by the peculiar sculpturing of the surface from any other fossil. Length three lines, width seven lines.

Pullastra crassistria. *M'Coy.* (Pl. XI. fig. 7).

Sp. Ch.—Transversely oval, very gibbous; dorsal and ventral margins equally convex; anterior and posterior ends nearly equal, rounded, subtruncate; surface closely marked with unequal, obtuse, concentric ridges.

This little species is remarkable for its equal convexity, thick, regular, transverse striæ. Length five lines, width nine lines.

Pullastra elegans. *M'Coy.* (Pl. VIII. fig. 16).

Sp. Ch.—Transversely oblong, gibbous; length two-thirds the width; front margin and hinge-line straight and nearly parallel; anterior side very short, rounded; posterior end truncated; posterior slope separated from the body of the shell by a large, obtuse, diagonal, rounded ridge from the beak; surface marked with fine, regular, transverse striæ, having between them broad, flat, regular, smooth spaces, parallel with the margin.

There is a peculiar squareness of contour in this shell, resulting from the abrupt truncation of the posterior end, and the straight and nearly parallel dorsal and ventral margins; although very gibbous, the front is flattened, as is also the posterior slope, the separating ridge being obtusely rounded, the beaks large and tumid; the form is strongly allied to some of the tertiary species of *Petricola*. Length ten lines, width one inch one line.

Pullastra elliptica. *Phil.* sp.

Venus elliptica. *Phil.* Geol. York.

Sp. Ch.—Transversely elliptical, convex; surface with broad, concentric undulations.

Length six lines, width nine lines.

Pullastra ovalis. *M'Coy.* (Pl. VIII. fig. 20).

Sp. Ch.—Transversely oblong, convex, twice as wide as long; ventral and dorsal margins parallel; beaks small, close to the anterior end; anterior end very short, rounded; posterior end subtruncate; surface with numerous, rather distant, sharp, concentric striæ.

This fine species partakes of the general similarity of habit of all the other *Pullastræ;* it is, however, easily distinguishable from all the Palæozoic species by its great size and peculiar outline: the concentric striæ are sharp, fine, and placed rather distant from each other, so as to form numerous, regular, flat spaces between them (these spaces are usually elevated in the recent species, but the delicate intermediate striæ are usually elevated in the fossil ones); the posterior end is slightly truncated; the beaks tumid, but not very prominent; anterior side very short. Length one inch two lines, width two inches four lines.

Pullastra parallela. *Phil.* sp.

Venus parallela. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, flattened; beaks subcentral; dorsal and ventral margins nearly parallel; anterior side narrow, rounded; posterior subtruncate; lunule large, deep; surface with delicate, sharp, concentric striæ.

This beautiful little shell appears to belong to the recent genus *Pullastra*, it is slightly quadrate in form, the posterior end being subtruncate, the surface is beautifully striated. Length four lines, width six lines.

Astarte gibbosa. *M'Coy.* (Pl. VIII. fig. 11).

Sp. Ch.—Orbicular, length five-sixths of the width, gibbous, with regular concentric ridges; posterior side subtruncate, rounded; anterior side small, rounded; beak small, tumid.

This handsome shell is nearly allied to the *A. compressa* of the Indian Oolite, but is much more convex; the beaks are small, but tumid, placed close to the anterior end; the posterior margin is convex. Length one inch two lines, width one inch four lines.

Astarte quadrata. *M'Coy.* (Pl. XI. fig. 4).

Sp. Ch.—Subquadrate, gibbous; shell thick, marked with strong, concentric, slightly irregular grooves, and a few strong, distant wrinkles of growth; anterior end small, rounded; posterior end subtruncate, very obtusely rounded; beaks obtuse close to the anterior end.

This shell has a thick and somewhat rugged appearance from the prominence of the few large wrinkles of growth (as distinguished from the transverse sulci), which does not exactly accord with the usual appearance of the *Astartæ;* the form too is more quadrate than is usual in that genus, which is, nevertheless, the most approximate group in which to place it. Length one inch one line, width one inch six lines.

Cyprina Egertoni. *M'Coy.* (Pl. X. fig. 9).

Sp. Ch.—Orbicular, convex; shell very thick; edge obtuse; surface covered with close, rounded, concentric ridges.

This shell is so closely allied to some of the recent species, and to others found in the tertiary beds of Italy, that, were it not for its geological locality, it would be difficult to distinguish it as a species; from all fossils of the Palæozoic rocks, it is distinguished at a glance. The general form is nearly orbicular, and marked concentrically with close, cord-like striæ, as in most of the genus, these striæ are slightly irregular in size. Length three inches three lines, width three inches eight lines.

Donax primigenius. *M'Coy.* (Pl. X. fig. 7).

Sp. Ch.—Transversely trigonal, gibbous; anterior end short, obliquely truncated, beaked; posterior side elongate, rounded; a deep, angular sinus in the palleal impression.

This curious fossil is a perfectly formed *Donax;* the anterior end is truncated near the beak, but produced into a short pointed beak inferiorly; there is a very deep, angular sinus in the palleal impression, which, in the specimen figured, is well preserved. Length four lines, width seven lines.

Cardium orbiculare. *M'Coy.* (Pl. XII. fig. 7).

Sp. Ch.—Shell depressed, orbicular; posterior side a little longer than the anterior; anterior and posterior ends subtruncate, rounded, equal; beaks prominent, subcentral; surface smooth, with a few concentric striæ.

To most of the species of *Cardium* this species is extremely dissimilar, from the thinness of the substance of the shell, the concentric markings, and general form. I think, however, it bears a closer resemblance to the *Cardium Grœnlandicum*, forming the genus *Aphrodita* and *Acardo* of different authors, than any other shell with which I am acquainted, nor do I see any thing to discountenance the idea of their generic affinity. Length two inches four lines, breadth two inches six lines.

Cardiomorpha axiniformis. *Phil.* sp.

Isocardia axiniformis. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, depressed, smooth; beaks prominent, incurved; anterior side very short, rounded; front margin much curved, sharp; posterior side compressed, obliquely truncated, defined by a ridge from the beak.

This species much resembles an *Axinus* in its depressed, hatchet-like form, and obliquely truncated, compressed, posterior side; the large, incurved beaks, however, approximate it more to *Isocardia* or *Cardiomorpha*. Length one inch, width one inch six lines.

Cardiomorpha corrugata. *M'Coy.* (Pl. VIII. fig. 15).

Sp. Ch.—Transversely oblong, outline ovate in the adult, orbicular in the young shell; anterior side very small; posterior side lengthened, rounded; anterior and posterior sides deeply corrugated; rugæ obsolete in the middle.

This handsome shell is a much larger species than the *I. oblonga*, Sow., frequently attaining a size of six or seven inches in its greatest diameter. The deep, concentric rugæ distinguish it from the other species: there are about twelve on a moderate sized specimen, but only four or five on a young orbicular one. Length two and a half inches, width three inches eleven lines. (Small specimen).

Cardiomorpha oblonga. *Sow.* sp.

Isocardia oblonga. *Sow.* Min. Con.—Isocardia oblonga. *Phil.* Geol. York.—Cardiomorpha oblonga. *Koninck.* Fos. Bel.

Sp. Ch.—Transversely ovate, diagonally gibbous, smooth; beaks large, prominent, incurved; anterior end very small, rounded; posterior side large, subquadrate, hinge-line straight. Length one inch eight lines, width two inches eight lines.

Cardiomorpha ventricosa. *M'Coy.* (Pl. XIII. fig. 3).

Sp. Ch.—Transversely oblong, subquadrangular, diagonally gibbous, very ventricose, the depth being equal to the length; anterior side small, the beaks curved into it; posterior end subtruncate; dorsal and ventral margins parallel; surface smooth.

At first I imagined this to be only a monstrous variety of the *Cardiomorpha oblonga*, but I have since seen other specimens, perfectly similar, and I am assured they are not uncommon in the Cork limestone. It is much more gibbous than that species, and most so in young individuals, the margin being abruptly deflected in specimens of one inch in width, so that in large specimens the marks of growth are very prominent, that nearest the beak being raised nearly half an inch above the surface; nearer the margin, the second mark is less prominent, the third still less, and so to the edge; the surface is quite smooth, except towards the margin, where it is striated concentrically. Length one inch; width one inch five lines; depth one inch six lines.

Pleurorynchus. *Phil.*

Gen. Ch.—Shell fusiform; posterior side produced, rounded, gaping; anterior side truncated, often protected by an extension of the shell at the keel which bounds it, produced near the beaks into a long, slender tube.

No generic characters having been originally given for the genus *Pleurorynchus*, must surely have been the reason why this excellent genus has not been more generally adopted. As both Goldfuss and Mr. Sowerby continue to place these shells in the genus *Cardium*, I may be pardoned for furnishing generic characters of my own, and also a few details as to the structure of the perfect shells, which, I believe, have not come under the notice of preceding writers. All the species of *Pleurorynchus* are more or less fusiform shells, subtruncate at the anterior end; the body of the shell is large and gibbous; the posterior side is rather suddenly attenuated, rounded at the end, and gaping widely, resembling, in fact, the corresponding part of a *Pholas dactylus;* the anterior side is truncated, bordered by a shelly margin, varying in depth according to the species; near the beak, a long slender tube extends to a length often exceeding the length of the shell. The substance of these curious shells is exceedingly thick, finely striated on the outside, but strengthened internally by strong, radiating ribs, and presenting internally a cellular structure. The wide gaping of the posterior end shews, that like the *Mya truncata*, or the *Pholas* alluded to, it must have lived habitually buried in the sand, with its long siphons reaching to the surface. The resemblance to *Cardium* (or rather *Hemicardium*), seems to be one merely of general resemblance, and entirely at variance with the true structure of the genus, as seen in the figure of *P. fusiformis*, M'Coy. Professor Agassiz' reference of the genus to the *Brachiopoda* is, I confess, quite unintelligible, the *Brachiopoda* being essentially equilateral, from their structure, and the *Pleurorynchi* remarkably inequilateral; neither does its reference to the *Rudistes*, from the microscopic structure of the shell, seem more tenable, the structure alluded to being present in several other shells. Its true station seems to be between *Mya* and *Pholas*.

Pleurorynchus aliformis. *Sow.* sp.

Cardium aliforme. *Sow.* Min. Con. and Geol. Tr.—Pleurorynchus aliformis. *Phil.* Geol. York.—Cardium aliforme. *Gold.* Pet.

Sp. Ch.—Heart-shaped, gibbous; anterior side convex from the keel, which borders it, gradually rising to form the conical, anterior tube; posterior side rather short, conoid; surface, with radiating ribs, nearly equal on all parts of the shell.

This species is readily known from the *P. minax*, by its anterior side rising at once into a conical umbo, not exhibiting the central concave space of that species; the radiating ribs also are of nearly the same size on the anterior end as on the body of the shell in this species, in which it also differs from the *P. minax*. This species is very rare in the carboniferous limestone, where the other is abundant, this being, on the other hand, common in the inferior slates. Length five lines, width ten lines.

Pleurorynchus armatus. *Phil.*

Pleurorynchus armatus. *Phil.* Geol. York.

Sp. Ch.—Aliform, anteriorly subtruncate, produced into a slender tube, equalling or exceeding the posterior side in length; posterior side one-third longer than the length of the shell, compressed; surface regularly striated from the beaks.

This species is very closely allied to the young of *P. aliformis*, but is apparently distinguished by the great length of the anterior tube.

Pleurorynchus fusiformis. *M'Coy.* (Pl. IX. fig. 3).

Sp. Ch.—Transversely fusiform; posterior extremity narrow gaping; anterior extremity gibbous; the margin much prolonged, pointed ventrally, with an inflexed edge, forming a very deep, anterior chamber round the truncated, anterior face, from which the slender, conical tube rises abruptly; surface finely striated concentrically; lips rugose; internal longitudinal ribs large, strong, and sharp.

This splendid species vies with the *Pleurorynchus giganteus*, M'Coy, in size; it is distinguished from it, and, indeed, all others, by its fusiform contour, produced by the contraction of the anterior margin, the edge of which is suddenly inflexed to about half an inch in width; the substance of the shell is amazingly thick, half an inch being the usual thickness of adult specimens; the surface is concentrically striated from the beak; these striæ become very large and rugose near the edge, owing to the thickening of the lips in old specimens; internally the surface is strengthened by large ribs from the beak; the posterior half of the shell is narrow, compressed, round at the end, and gapes very considerably. Length three inches and a half, width from the ventral edge of the keel to the posterior extremity, five inches five lines.

Pleurorynchus giganteus. *M'Coy.* (Pl. IX. fig. 1).

Sp. Ch.—Cordate, obtusely pointed in front, very much depressed, posterior side suddenly contracted, very short, rounded, gaping; marginal keel of the anterior side long, thin, simple at the edge; anterior face conoid, nearly smooth, rising regularly from the margin to the base of the anterior tube, which rises abruptly at a considerable elevation from the beaks; surface nearly smooth, obsoletely striated transversely; the contracted posterior end marked with strong ridges from the beak.

This is one of the largest known species of *Pleurorynchus*. Length from the posterior extremity to the beaks about one inch four lines, from the same point to the extremity of the front margin four and a quarter inches, width of the keel three and a half inches.

Pleurorynchus Hibernicus. *Phil.*

Cardium Hibernicum. *Sow.* Min. Con.—Pleurorynchus Hibernicus. *Phil.* Geol. York.

Sp. Ch.—Horseshoof-shaped, anterior end truncated, nearly flat, rising abruptly into a slender, lengthened tube near the hinge; the edge which bounds the anterior face is produced, parallel to the body of the shell, so as to form a deep shelly border to the anterior end; body of the shell conical; posterior end cylindrical, produced.

This species, from its resemblance to a horse's hoof, is well known to our quarry men by the name of "foal's foot," and is much prized from the ready sale they get for them.

The tube which issues from the anterior side is as thick as a crowquill, and about four inches long; the posterior end forms a much thicker tube about two inches long, and gaping at the end like a *Pholas*, the portion of the shell which projects all round, beyond the margin of the truncated anterior face, is about as deep as from the same point to the base of the posterior tube; it is usually broken off; the surface is delicately striated; the anterior face is nearly smooth, except in the centre, where there are about a dozen concentric ribs. Length two inches three lines.

Pleurorynchus inflatus. *M'Coy.* (Pl. IX. fig. 2).

Sp. Ch.—Body of the shell very gibbous, regularly ribbed from the beak; anterior face convex, inflated, smooth, or marked only by lines of growth, separated from the body of the shell by a short, obtuse keel; anterior tube very long, cylindrical, smooth.

This species is allied to the *P. minax*, Phil., but is distinguished by its more gibbous, and smooth, convex, anterior end. The anterior keel of this shell is interesting from its small size. Length from the beak to the opposite margin seven lines.

Pleurorynchus minax. *Phil.*

Pleurorynchus minax. *Phil.* Geol. York.—Pleurorynchus minax. *Phil.* Pal. Fos.—Cardium aliforme. *Var.* Gold. Pet.

Sp. Ch.—Heart-shaped, gibbous; anterior side with a large, concave, central space; posterior side rather short, rounded; shell marked with nearly equal ribs, radiating from the beak, those within the concave anterior space much finer than the rest.

There appears to be much objection on the part of both British and foreign authors to admitting this as a species distinct from the *Cardium aliforme* of Sowerby; it is, however, easily distinguishable by the concave space in the anterior side, with its enclosed ribs, which are not more than half the thickness of those on any other part of the shell. Length nine lines, width one inch nine lines.

Pleurorynchus nodulosus. *M'Coy.* (Pl. IX. fig. 4).

Sp. Ch.—Conoidal; anterior face subtruncate, cordate; posterior side elongated; anterior keel obtuse, nodulous; surface with obsolete, longitudinal, and transverse, obtusely rounded ridges.

This small species is easily recognized by the keel which bounds the anterior face, being obtusely tuberculated or nodulous. Length three and a half lines, width (not including the anterior tube) about three lines.

Pleurorynchus trigonalis. *Phil.*

Pleurorynchus trigonalis. *Phil.* Geol. York.

This species differs almost solely from the *P. Hibernicus* in having the posterior side much shorter, or, if placed resting on its anterior face, it would be said to be more depressed. Length one inch four lines.

Cypricardia alata. *M'Coy.* (Pl. X. fig. 4).

Sp. Ch.—Transversely trigonal, diagonally gibbous, beaks small, curved, prominent; anterior side narrow, rounded; a slight sinus in front; posterior side dilated into a flat, rectangular wing; hinge-line as long as the shell is wide.

This species is unlike any other of the genus with which I am acquainted: it forms a passage to *Avicula*. Length five lines, width eight lines.

Cypricardia concinna. *M'Coy.* (Pl. VIII. fig. 24).

Sp. Ch.—Transversely oblong, twice and a half as wide as long, diagonally gibbous; beaks moderate, close to the anterior end; anterior end very short, rounded, tumid; posterior side lengthened, equally broad throughout, abruptly truncated at the end; a strong, rounded ridge extends from the beak to the posterior-inferior angle; surface sharply striated, parallel to the margin.

This little shell is remarkable for its great transverse length, and the abrupt or rectangular termination of the posterior end, the points of the angles being rounded. Length one and a half lines, width four lines.

Cypricardia cuneata. *M'Coy.* (Pl. VIII. fig. 25).

Sp. Ch.—Transversely oblong, rather more than twice as wide as long; very gibbous, especially towards the anterior side and beaks, which are very large and tumid; anterior side very short, rounded; posterior side

produced, flattened, abruptly truncated at the end, which is rectangular; hinge-line equal to the width of the shell; surface transversely striated; posterior slope striated parallel to the truncated margin, and with several *waving striæ parallel to the hinge-line.*

This curious little shell bears much resemblance to one of Professor Phillips' figures of the *Sanguinolaria sulcata*, Münst. (not of the Geol. of York.), from which it is distinguished by the length of the hinge-line, close, regular striation, great convexity, and the shortness of the anterior side. The striæ parallel to the hinge-line, very great convexity of the anterior side, and the compressed, wedge-like form of the posterior extremity, are remarkable in the present species. Length three and a half lines, width seven lines.

Cypricardia cylindrica. *M'Coy.* (Pl. VIII. fig. 23).

Sp. Ch.—Transversely elongated, three times as wide as long, cylindrical, very convex; anterior end short, rounded; posterior end obliquely truncated, obtuse; front margin entire, without sinus, parallel with the dorsal margin.

The hinge-line is about three-fourths the length of the shell, and parallel with the front margin, which is entire. Length four lines, width eleven lines.

Cypricardia modiolaris. *M'Coy.* (Pl. VIII. fig. 27).

Sp. Ch.—Transversely oblong, diagonally gibbous; beaks very small; anterior end tumid, rounded; hinge-line rather more than two-thirds the width of the shell; posterior end angulated, oblique, very obtusely rounded; posterior slope very obtusely rounded; abdominal margin slightly concave; surface with nearly obsolete concentric wrinkles of growth.

This species has much of the general form of the *C. impressa*, Sow., but the beaks are smaller, the anterior end rounded instead of being truncated, as in that species; the hinge-margin more elevated, and the posterior slope and extremity more obtusely rounded; it also resembles some specimens of the *Pullastra complanata*, Sow., but has not the narrow, beaked posterior extremity, has a much smaller anterior side, and is otherwise different. Length five and a half lines, width one inch one line.

Cypricardia oblonga. *M'Coy.* (Pl. VIII. fig. 21).

Sp. Ch.—Transversely oblong, three and a half times wider than long, obtusely keeled; anterior end short, rounded, a shallow sinus in the front margin, hinge-line about half the width of the shell; surface smooth, with a few obscure undulations at the posterior end. The hinge-line of this species in shorter than is usual in this genus, which, with the very elongate figure, will distinguish the species; from the shortness of the hinge-line the posterior end is very obliquely truncated, this portion of the shell is marked by a few broad, obscure undulations. Length six lines, width one inch seven lines.

Cypricardia quadrata. *M'Coy.* (Pl. VIII. fig. 22).

Sp. Ch.—Subquadrate, gibbous, obtusely keeled, anterior side very short; subtruncate, rounded, posterior side square; hinge-line straight, as long as the shell is wide, front with a short sinus, from which a concave space extends half way to the beak; surface with faint, rather distant, concentric striæ.

This species bears a slight resemblance to the *Cypricardia retusa* of the Silurian rocks, but is easily distinguished by the form of the anterior side; its quadrate, gibbous form distinguishes it from most others. Length six lines, width eleven lines.

Cypricardia rhombea. *Phil.*

Cypricardia rhombea. *Phil.* Geol. York.

I have only seen imperfect fragments of this shell; it is transversely oblong, with a very strong, diagonal keel; the dorsal and ventral margins parallel; posterior extremity truncated nearly at right angles with the hinge-line, which latter is nearly as long as the shell is wide.

Cypricardia sinuata. *M'Coy.* (Pl. VIII. fig. 26).

Sp. Ch.—Transversely ovate, obtusely keeled, anterior end very small, rounded, a distinct sinus in the ventral margin, surface smooth; width less than three times the length; hinge line two-thirds the width of the shell.

This species is allied to the *Cypricardia oblonga*, but is much less transverse, has a longer hinge, larger abdominal sinus, and more obtuse posterior end; there are a few obscure concentric undulations visible towards the posterior end. Length five lines, width one inch three lines.

Cypricardia socialis. *M'Coy.* (Pl. VIII. fig. 12).

Sp. Ch.—Twice and a half as wide as long, gibbous; dorsal and ventral margins parallel; beaks prominent, close to the anterior end; anterior side short, rounded, separated from the body of the shell by a deep sinus in the front margin, from which a broad, shallow sulcus extends obliquely to the beak; posterior end obliquely subtruncate, rounded; surface marked with strong, irregular, transverse striæ. Length four lines, width nine lines.

Cypricardia tumida. *M'Coy.* (Pl. VIII. fig. 13).

Sp. Ch.—Transversely ovate, gibbous, length two-thirds the width, smooth; beaks very large, tumid, close to the anterior end; anterior side short, rounded; posterior end rounded, not distinguished from the body of the shell.

This little species has much the aspect of the *C. semiculcata*, but is less wide, the posterior end much broader, and the surface is entirely devoid of transverse sulci, neither is there any furrow from the beak to the front margin. Its great convexity, shortness, and smooth surface, distinguish it from any of the allied species. Length four lines, width five lines and a half.

Sedgwickia. *M'Coy.*

Gen. Ch.—Equivalved, or nearly so, inequilateral; shell very thin, inflated; dorsal and ventral margins subparallel; anterior half of each valve marked with strong, transverse ridges; posterior half smooth; beaks moderate; anterior side very short, round; posterior side broad, lengthened, subtruncate.

The genus *Sedgwickia* (M'Coy) is composed of a very elegant little group of shells, having analogies which place them, as it were, between the so-called *Cypricardiæ* of the older strata, the *Axini* (Sow.), and the *Leptodomi* (M'Coy). The passage to *Cypricardia* is marked by such shells as the *Sedgwickia minima*, M'Coy, and *S. corrugata*, M'Coy, while an approach to the same form is indicated by such species of *Axinus* as the *A. obovata* (M'Coy), and the *A. obliqua* (M'Coy), which, however, still retain the oblique, acutely angular posterior side, and very short, oblique, hinge-line of *Axinus*, and which distinguishes them at a glance from the true *Sedgwickia's*, all of which have a broad, subtruncate, posterior end, and a hinge-line nearly as long as the shell. They are entirely without hinge teeth, their hinge resembling that of *Thracia*.

These beautiful shells are remarkable for having the anterior half of their valves marked with strong, transverse ridges, and the posterior half perfectly smooth; besides this circumstance they are distinguished from *Cypricardia*, with which I formerly arranged them, by the thinness of their shells. They seem to have much the habit of *Saxicava*, Lam., or more properly, perhaps, of *Leptodomus*, M'Coy. I have dedicated this genus to Professor Sedgwick.

Sedgwickia attenuata. *M'Coy.* (Pl. XI. fig. 39).

Sp. Ch.—Transversely ovate, convex; beaks large, compressed; anterior side very short, rounded; posterior side narrow, lengthened, subtruncate, rounded; hinge-line as long as the shell is wide; anterior side and middle of the shell marked with about fifteen strong, transverse ridges, remainder of the surface smooth.

This shell resembles the *S. bullata*, M'Coy, but is less convex, larger, and has a longer hinge-line, in consequence of which the truncation of the posterior end is not at all oblique; it also resembles the *S. gigas*, M'Coy, but is much smaller, has much fewer transverse ribs, and is more elongated transversely. Length seven lines, width eleven lines.

Sedgwickia bullata. *M'Coy.* (Pl. VIII. fig. 19).

Sp. Ch.—Transversely oblong, very gibbous, length about two-thirds the width; anterior side short, rounded; hinge-line nearly as long as the shell is wide; posterior end slightly oblique, subtruncate; beaks very large, tumid; an obtusely rounded ridge, from the beak to the posterior angle; anterior side with strong, rounded, distant ridges; middle of the shell and posterior side smooth.

The substance of the shell of this handsome species is remarkably thin. Length four and a half lines, width six and a half lines.

Sedgwickia corrugata. *M'Coy.* (Pl. VIII. fig. 18).

Sp. Ch.—Transversely elongate, twice as wide as long, gibbous; a strong, diagonal, rounded ridge, from the beak to the posterior angle; surface smooth, with the exception of four or five strong, transverse wrinkles on the body of the shell. Length one and one-third lines, width three lines.

Sedgwickia gigantea. *M'Coy.* (Pl. XI. fig. 40).

Sp. Ch.—Rhomboidal, ovate, convex, depressed; beaks very large, subcentral, nearest to the anterior end; anterior side rounded, abdominal margin very convex; posterior side obtusely rounded, subtruncate; anterior end marked with about forty sharp, transverse ridges, remainder of the surface smooth.

This fine shell is very much the largest of the group, and is distinguished besides by the great number of the anterior sulci. Length one inch nine lines, width two inches nine lines.

Sedgwickia globosa. *M'Coy.* (Pl. XI. fig. 38).

Sp. Ch.—Orbicular, globose, beaks nearly central; surface smooth, except on the anterior side, which is marked with short, delicate, transverse ridges.

This small species is remarkable for its orbicular form and great convexity. Length three lines, width three and a half lines.

Sedgwickia minima. *M'Coy.* (Pl. VIII. fig. 17).

Sp. Ch.—Transversely elongated, subtrigonal, very gibbous; beaks large, prominent; anterior side small, obtusely pointed; posterior end very broad, subtruncate, rounded; the greatest gibbosity is obliquely from the beak to the anal angle, but there is no distinct ridge; posterior end smooth, anterior end marked with short, strong, transverse striæ.

This is by a great deal the smallest species of the genus, scarcely equalling in size the numerous *Entomostraca* of the shales in which it occurs, and which it much resembles to the naked eye. Length about one-twentieth of an inch.

Axinus. *Sow.*

Gen. Ch.—Axiniform; posterior side short, rounded, with a long ligament placed in a furrow along the entire edge; posterior side produced, angulated with a small lunule under the beak; surface smooth.

Axinus axiniformis. *Portk.* sp.

Amphidesma axiniformis. *Portk.* Geol. Rep. (Without references).

Sp. Ch.—Rhomboidal, slightly oblique, depressed; length and width nearly equal; beaks prominent, acute, nearly central; anterior side subtruncate, rounded; posterior side very slightly oblique, convex; an oblique ridge from the beak to the posterior angle; surface smooth.

This species has frequently a glossy membranous expansion round the margin of the valves, visible on the shale in which it occurs. Length nine lines, width ten lines.

Axinus carbonarius. *Portk.* sp.

Amphidesma carbonaria. *Portk.* (Without references).

Sp. Ch.—Orbicular, compressed, smooth, or very finely striated transversely; length five-sixths of the width; beaks small, central; anterior and posterior sides equal, the latter slightly truncated. Length ten lines, width one inch.

Axinus centralis. *M'Coy.* (Pl. XI. fig. 8).

Sp. Ch.—Trigonal, depressed, smooth; beaks central, or nearly so; posterior slope truncated; posterior end obtusely pointed; anterior side narrow, rounded.

This is distinguished from every other *Axinus* I know, by its triangular outline, and nearly central beaks; the body of the shell is flattened, the ventral margin nearly straight, and the surface perfectly smooth. Length four lines, width five lines and a half.

Axinus deltoideus. *Phil.* sp.

Cypricardia deltoidea. *Phil.* Pal. Fos.

Sp. Ch.—Ovate, deltoidal, depressed, smooth; posterior side obliquely truncated, defined by a sharp angle or keel, extending from the beak to the posterior angle; anterior margin convex.

This species is described by Professor Phillips as a *Cypricardia*; he, however, notices the resemblance it bears to the *Axinus obscurus* of the magnesian limestone; the examination of some good specimens leaves no doubt on my mind that they are of the same genus: the two valves of the present species are usually found together, and are perfectly alike. Length nine lines, width eleven lines.

Axinus nuculoides. *M'Coy.* (Pl. XI. fig. 9).

Sp. Ch.—Transversely ovate, length two-thirds the width, convex; beaks small, one-third the width from the anterior end, broad, rounded; posterior side attenuated, pointed, extremity rounded; ventral margin

nearly straight; surface nearly smooth, marked towards the margin with fine, transverse lines of growth. Length four lines, width six lines.

Axinus obliquus. *M'Coy.* (Pl. VIII. fig. 29).

Sp. Ch.—Obliquely ovate, convex; beaks large, prominent, close to the anterior end; anterior side very short, rounded, front margin convex; posterior side lengthened, very obliquely truncated; a strong ridge from the beak to the posterior angle; surface smooth, except on the short, anterior side, which is marked with fine, rather distant, transverse striæ; epidermis produced into long fringes beyond the margin.

This species occurs in company with the *A. depressa. A. axiniformis*, and *A. carbonaria*, Portk., from all of which it is distinguished by its great obliquity, and the inequality of its sides; the transverse striæ also appear limited to the anterior side in the present shell. Length seven lines, width eight lines.

Axinus obovatus. *M'Coy.* (Pl. VIII. fig. 30).

Sp. Ch.—Transversely obovate, depressed; beaks large, not prominent, close to the anterior end, which is broadly rounded; abdominal margin convex, posterior end pointed, equally rounded towards the dorsal and ventral margins; surface smooth, or with a few irregular, concentric striæ.

The principal feature in this regularly obovate shell, is the great and *equal* convexity of the dorsal and ventral margins as they approach the posterior end, which is thus regularly pointed; the ridge separating the posterior slope from the body of the shell is very slightly defined. This shell is almost identical in form with the *Lyrodon ovatum* of the muschelkalk. Length nine lines, width one inch five lines.

Axinus orbicularis. *M'Coy.* (Pl. VIII. fig. 28).

Sp. Ch.—Orbicular, length and width equal, depressed, smooth; beaks small, nearly central; a slightly marked, rounded, oblique ridge on each side of the beak, that on the posterior side strongest; anterior and posterior margins almost equally convex.

This little shell is distinguished from all the allied species by its nearly central beaks and orbicular outline, and from the *A. carbonaria*, Port., by the height of the sides and their more perfectly rounded form.

Length three and a half lines, width four lines.

Dolabra. *M'Coy.*

Gen. Ch.—Subrhomboidal, gibbous, slightly inequivalve, inequilateral, anterior side rounded, posterior side subtruncate, generally oblique; shell thick, beaks large, prominent; in the left valve two long, diverging, cardinal teeth, anterior one longest, and two lengthened, posterior, lateral teeth.

I have found it necessary to frame this genus for the reception of a considerable number of shells of the Palæozoic rocks, hitherto classed with *Lyrodon*, *Cucullæa*, *Cypricardia*, &c. Some few shells of this group are placed by Goldfuss in the genus *Lyrodon*, although it is obvious, even from their external form, that they can have no affinity with the *Trigoniæ* of the Oolites; besides which, those last are equivalved, and have strongly sulcated, cardinal teeth, while the *Dolabræ* are inequivalve, and have simple cardinal teeth: from the *Cypricardiæ* they differ in general form, being inequivalve, and in their long diverging cardinal teeth. All the Devonian *Cucullæa's* of Marwood belong to this group, the long, anterior, cardinal teeth having been taken for the prominent edge of the muscular impression, although, as Professor Phillips has observed, it is on the wrong side of the beak for *Cucullæa;* the lateral teeth of *Cucullæa, angusta* as figured by Mr. Sowerby, or as I have observed them myself in Irish specimens, do not seem to correspond to those of *Cucullæa.*

Dolabra angusta. *Sow.* sp.

Cucullæa angusta. *Sow.* Geol. Trans.—Cucullæa angusta. *Phil.* Pal. Fos.

Sp. Ch.—Square, length and breadth equal, very gibbous; beaks large, tumid, central; sides nearly equal; anterior side rounded; posterior side truncated, straight, at right angles with the hinge.

Dolabra complanata. *Sow.* sp.

Cucullæa complanata. *Sow.* Geol. Trans.—Cucullæa complanata. *Phil.* Pal. Fos.

The specimens of this species which have occurred, although numerous and easily identified, are too imperfect for description.

Dolabra corrugata. *M'Coy.* (Pl. XI. fig. 12).

Sp. Ch.—Transversely trigonal, gibbous, a broad, longitudinal, shallow depression in the middle of each valve; anterior end short, rounded; posterior side lengthened, narrow, rounded; surface smooth; ridges strongly wrinkled concentrically; middle of the shell smooth.

This species is easily known from its congeners by its trigonal form, and the few strong wrinkles which mark the sides. Length one and a half lines, width two and a half lines.

Dolabra equilateralis. *M'Coy.* (Pl. XI. fig. 14).

Sp. Ch.—Square, length and width equal, equilateral, gibbous; beaks large, prominent, central; posterior ridge rounded; posterior margin narrowed, slightly oblique; surface smooth.

In general form this shell bears a strong resemblance to some of the large casts of the *L. lævigatum* of the Dürrheim Keuper beds. The remoteness of their geological localities will, however, prevent the possibility of their being confounded; besides which, the present shell is almost perfectly equilateral, the other very inequilateral; and the Keuper species has the posterior side very obliquely truncated, while it is very slightly so in the present species; it differs from the *Cucullæa angusta*, Sow., in its larger beaks, narrow posterior end, and more depressed form; and from the *C. trapezium*, in its shorter posterior side. Length one inch five lines, width one inch five and a half lines.

Dolabra gregaria. *M'Coy.* (Pl. XI. fig. 11).

Sp. Ch.—Rhomboidal, gibbous; beaks prominent close to the anterior end; anterior side small, rounded, angulated at the hinge; posterior side dilated into a broad, flattened wing, obliquely subtruncate, rounded; body of the shell obliquely gibbous, divided in the middle by a broad, flattened depression, from the beak to the front margin, bounded on each side by an obtusely rounded keel; surface marked with a few irregular, transverse striæ.

Length two lines, width two and a half lines.

Dolabra Hardingii. *Sow.* sp.

Cucullæa Hardingii. *Sow.* Geol. Trans.—Cucullæa Hardingii. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oblong, very gibbous; length two-thirds the width; beaks large, tumid, close to the anterior end; anterior side very short, rounded; posterior side slightly oblique, subtruncate; a diagonal ridge from the beak to the posterior angle, and one or two others on the posterior slope; surface with obscure, concentric lines of growth.

None of the ridges on the posterior side are strongly marked. Length about one inch.

Dolabra orbicularis. *M'Coy.* (Pl. XI. fig. 13).

Sp. Ch.—Orbicular, depressed, smooth; length and width equal; beaks central; posterior slope compressed, posterior ridge obtuse.

This species is remarkable for its nearly orbicular form. In some of the casts the impressions of the cardinal teeth are visible. Length five and a half lines, width the same.

Dolabra rectangularis. *M'Coy.* (Pl. XI. fig. 10).

Sp. Ch.—Subquadrate, length and width nearly equal, convex; beaks nearly central, very large, prominent; anterior side obtusely rounded, front margin convex; posterior side short, flat, rectangular, abruptly truncated, separated from the body of the shell by a very prominent diagonal ridge from the beak; surface smooth.

This shell much resembles the *Cucullæa angusta*, Sow., in general form, but is much more depressed, and is moreover distinguished by its greatly larger beaks, and prominent posterior diagonal ridge; the straight rectangular posterior side distinguishes it from every species of *Cypricardia* with which I am acquainted. Length six lines, width seven lines.

Dolabra securiformis. *M'Coy.* (Pl. XI. fig. 15).

Sp. Ch.—Rhomboidal, convex, securiform; anterior side very short, broad, rounded, front margin convex; a slight sinus at the posterior angle; posterior side produced, flattened, obliquely truncated, narrow at the end, separated from the body of the shell by an obtusely rounded ridge; hinge-line three-fourths the width of the shell; surface very finely striated transversely. Length ten lines, width one inch two lines.

Dolabra trapezium. *Sow.* sp.

Cucullæa trapezium. *Sow.* Geol. Trans.—Cucullæa trapezium. *Phil.* Pal. Fos.

The few specimens which have occurred of this shell are too imperfect for description; the species resembles the *D. Hardingii*, but is much longer in proportion to the width, and has the posterior end broader and more truncate.

Dolabra unilateralis. *Sow.* sp.

Cucullæa unilateralis. *Sow.* Geol. Trans.

Sp. Ch.—Obliquely trigonal; beaks large, tumid, nearer to the anterior than the posterior side; hinge-line short; margin one regular curve from the anterior end to the posterior angle, which is much lengthened, and having a strong ridge from the beak; posterior end very obliquely truncated.

Leptodomus. *M'Coy.*

Gen. Ch.—Transversely oblong, equivalve, inequilateral; shell very thin, inflated, transversely sulcated; beaks large, tumid, obliquely incurved; hinge-line moderate, nearly the length of the shell; anterior side short, rounded; posterior side subtruncate; muscular impressions two, distant, lunate.

This genus is proposed to include a number of fossil shells hitherto placed with *Corbula*, although differing from that genus in almost every essential point; in the first place, all the *Corbulæ* have one valve much smaller than the other, particularly at the beaks, while both the valves and beaks of the present shells are perfectly equal; the beaks of *Corbula* are nearly central and straight, they are close to the anterior end, and

obliquely incurved in the present genus: these fossils resemble the *Saxicavæ*, but as a genus they are at once distinguished by being regular, while the irregularity of form in the species of *Saxicava*, is so essentially connected with their habits that it becomes of importance; on the whole, the nearest approach among recent shells to our fossil genus, is perhaps Dr. Leach's genus *Thracia*.

Leptodomus fragilis. *M'Coy.* (Pl. X. fig. 11).

Sp. Ch.—Transversely oval, gibbous; shell very thin; surface with regular, sharp, elevated, concentric striæ; five-sixths of the width; anterior side large, rounded; posterior side slightly narrowed, subtruncate; beaks large.

This shell is so obviously related to the *Corbula gigantea* of the Greensand, that I have no hesitation in placing it in the same genus, at the same time that I do not think either of those shells congeneric with the *Corbula* of our coasts, and that they should rather form a distinct genus which would be found only in the fossil state. The present species is very convex; the beaks large, tumid; the shell is exceedingly delicate; the concentric striæ are extremely regular, small, but sharp and distinct, they are distant and smooth. Length one inch eight lines, width two inches two lines.

Leptodomus senilis. *Phil.* sp.

Corbula senilis. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, gibbous; surface with very irregular, transverse wrinkles.

This is easily distinguished from the *L. fragilis*, M'Coy, by the thick, rugged, irregular ridges which cross the surface, instead of the delicate, sharp, regular striation of the latter species; the beaks are very large and gibbous. Length one inch three lines, width two inches.

Venerupis cingulatus. *M'Coy.* (Pl. X. fig. 1).

Sp. Ch.—Transversely elongate, oval, cylindrical, very convex; beaks close to the anterior side, which is very small, rounded; posterior side elongated, obliquely truncated, rounded; surface with about ten or eleven large, angular, concentric ribs, which are sometimes crossed by fine, longitudinal striæ.

In this species the concentric ribs are very regular; they are large, angular, and sharp above. Length four lines, width seven lines.

Venerupis obsoletus. *M'Coy.* (Pl. XI. fig. 16).

Sp. Ch.—Transversely ovate, convex; surface with about ten obtuse, concentric ribs on the sides, becoming obsolete on the middle of the shell.

From its strong, general resemblance to the *V. scalaris*, I have placed this shell in the present genus, rather than in *Pullastra*, to which it seems closely allied; the surface is uniformly but slightly convex; the beaks rounded, but prominent; sides concentrically marked, with slightly convex wrinkles, which disappear before they reach the middle of the shell; the surface is otherwise perfectly smooth; the form is remarkably rounded in all its parts. Length seven lines, width eleven lines.

Venerupis scalaris. *M'Coy.* (Pl. X. fig. 6).

Sp. Ch.—Transversely ovate, short, very gibbous; beaks large, prominent, close to the anterior end, which is small; surface with about ten large, angular, concentric ridges.

This is one of the most strongly-marked fossils of the carb. limestone, and its large, smooth, angular, con-

centric ridges serve to distinguish it from the others of its genus; the beaks are large, prominent, tumid; anterior side obtusely pointed; posterior end rounded; body of the shell very convex. Length six lines, width ten lines.

ATRACHIA.

The *Atrachia* form the second tribe of the *Dithyra*. They are distinguished anatomically from the typical group by the mantle being free, and entirely wanting those long siphons, so characteristic of the *Macrotrachia*. Most of those shells which possess the power of affixing themselves by a byssus, belong to this tribe, as *Byssoarca*, *Modiola*, *Pinna*, *Pecten*, &c.

Nucula. *Lam.*

Gen. Ch.—Equivalve, inequilateral, transverse, hinge linear, with a row of sharp angular teeth on each side the umbones, and a central ligamentary pit.

Nucula attenuata. *Flem.*

Nucula attenuata. *Flem.* Brit. Anim.—Nucula claviformis. *Phil.* Geol. York. (Not of the Min. Con.)

Sp. Ch.—Transversely elongated, pear-shaped, gibbous, anterior end rounded, tumid; posterior end compressed, attenuated, rounded at the tip; nearly as deep as long, twice and a half as wide as long; the surface finely striated transversely. Depth three and a half lines, width ten lines.

Nucula birostrata. *M'Coy.* (Pl. XI. fig. 23).

Sp. Ch.—Transversely ovate, evenly convex, beaks small, pointed, rather more than a third of the width from the anterior end; posterior end rounded, slightly constricted; anterior end rounded, narrow, subrostrate; surface with fine, deep, equidistant, concentric striæ, with smooth, flat spaces between them.

This species at first sight seems closely allied to one of the figures of the *Sanguinolaria elliptica*, Phil., but is more inequilateral, more finely and regularly striated, the anterior side of the present shell is shorter and narrower than in that, and finally the posterior side, which is broad and obtusely rounded in the *S. elliptica*, is narrowed or subrostrate, like the anterior end, in this, and the hinge-line which is long and straight in the former, is curved and confounded with the margin of the shell, as in the *Nuculæ* in the present species; the posterior mucronation separates it from the *N. brevirostris*, Phil. Length five lines, width eight lines.

Nucula brevirostris. *Phil.*

Nucula brevirostris. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, anterior side produced, contracted, rounded; surface with fine, concentric striæ.

The produced and contracted anterior side, although a very common character among the *Nuculæ* of the newer rocks, is very uncommon in those of the carboniferous era, and, together with the short ovate form, will distinguish this species. Length three lines, width five lines.

Nucula carinata. *M'Coy.* (Pl. XI. fig. 21).

Sp. Ch.—Rhomboidal, nearly twice as wide as long; a strong rounded ridge from the beak to the front margin, from which the sides slope gradually; anterior side pointed, forming with the mesial ridge a nearly

equilateral triangle; posterior side one-half longer, tapering, rounded at the point; margin sinuous; surface finely striated transversely, with a few deeper lines of growth.

This curious little shell is not unlike that of a *Teredo;* it is exceedingly rare, only one specimen having as yet occurred. Length two lines, width three and a half lines.

Nucula clavata. *M'Coy.* (Pl. XI. fig. 25).

Sp. Ch.—Transversely ovate, gibbous; twice as wide as long; anterior side obtusely rounded; posterior end produced one-third longer than the anterior; subtruncate, obtusely rounded; an obtuse ridge extends from the beak to the posterior-inferior angle; surface marked with somewhat irregular, transverse striæ, and broad, flat, intermediate spaces; a few of the striæ deeper than the rest, particularly near the margin.

This species is easily distinguishable from the *Nucula attenuata*, Flem., and *N. acuta*, Sow., by the *very obtusely* rounded posterior end: in general appearance it comes nearest to the *N. claviformis*, Sow. (*N. rostralis*, Lam.), but that is a *Lias* species, and has a much narrower posterior ridge, and the extremity is abruptly truncated; the striæ are of a peculiar form in the present shell, appearing as if imbricated with the fine edge towards the beak. Length four lines, width eight lines.

Nucula cylindrica. *M'Coy.* (Pl. XI. fig. 26).

Sp. Ch.—Transversely elongate, twice as wide as long, very convex, cylindrical, rounded at both extremities; beaks very small, close to the anterior end; dorsal and ventral margins slightly convex; two long, curved, diverging, subrostral plates; surface smooth, or with traces of oblique striæ towards the margin.

This is one of those very interesting species in which there are well developed internal plates beneath the beak; the external form is allied to that of the *Lithodomi*. Length three lines, width six lines.

Nucula delta. *M'Coy.* (Pl. XI. fig. 22).

Sp. Ch.—Trigonal, compressed; anterior side abruptly truncated; posterior end obtusely pointed; dorsal and ventral margins slightly convex; surface smooth, with a few transverse wrinkles of growth.

The triangular, flattened form of this *Nucula* distinguishes it easily from every other Palæozoic species; the surface seems to have been smooth, or with one or two faint, distant waves of growth. Length five and a half lines, width six and a half lines.

Nucula gibbosa. *Flem.*

Nucula gibbosa. *Flem.* Brit. Anim.—Nucula tumida. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, gibbous; beaks large, tumid; length two-thirds the width, depth of the two valves equal to the length; surface smooth, with few concentric striæ.

This species has been described under the name of *N. gibbosa* by Dr. Fleming, from the Glasgow coal field, where it is very common. Professor Phillips subsequently described it under the name of *N. tumida*, without allusion to Fleming, whence I conclude that author's description must have escaped notice; I have, therefore, restored the original name above. This greatly resembles the recent *N. margaritacea* of our coasts. Length four lines, width seven lines.

Nucula leiorynchus. *M'Coy.* (Pl. XI. fig. 27).

Sp. Ch.—Transversely ovate, width rather more than twice the length, convex; posterior end rounded, gibbous; anterior end produced into a long, narrow beak, rounded at the point; surface marked with strong, regular, equal, transverse striæ, which disappear as they reach the anterior end, leaving the long, beak-like, anterior extremity smooth.

This elegant little species resembles the *N. acuta*, Sow. (not of Portk.), and *N. attenuata*, Flem. (*N. claviformis* of Phil.) in general form and striation, but differs in the smoothness of the rounded anterior rostrum; it is also analogous to the *N. rostralis*, Lamk. (*N. claviformis*, Sow.) of the *Lias*, but it is distinguished, besides their geological localities, by the present shell having the anterior extremity pointed, as well as smooth, while it is distinctly truncated in the former shell. Length one line and a half, width four lines.

Nucula linearis.

Nucula lineata. *Phil.* Pal. Fos.

Sp. Ch.—Transversely trigonal, convex; anterior side subtruncate, rounded; posterior end produced, pointed, extremity rounded; surface regularly marked with strong, concentric striæ; between each pair are three or four finer lines.

This small species is very rare; the two varieties are met with, the one with the larger striæ crenulated, and the other with all the striæ plain; both states of surface are occasionally found on the one specimen. The name *lineata* having being previously used for another species by Mr. Sowerby, I have modified it as above. Length four lines, width five lines.

Nucula longirostris. *M'Coy.* (Pl. XI. fig. 19).

Sp. Ch.—Transversely clavate; width two and a half times the length; anterior side produced into a very long, narrow beak, abruptly truncated at the end; posterior side moderate, rounded; surface very finely striated transversely.

This beautiful little shell is easily distinguished from the *N. acuta*, and other claviform species of the Palæozoic period, by its distinctly truncated anterior extremity, in which it approaches the *N. claviformis*, Sow., *N. rostralis*, Lam.), this latter shell, however, belongs to a different formation, and is, besides, distinguished by its coarse striæ, and is less elongated transversely. Length two lines and a half, width five lines and a half.

Nucula oblonga. *M'Coy.* (Pl. XI. fig. 24).

Sp. Ch.—Transversely oblong; width twice and a half the length, convex; dorsal and ventral margins parallel, straight; beaks inconspicuous, close to the anterior end; anterior end small, rounded; posterior end subtruncate, abruptly rounded; surface smooth.

This shell is distinguished by its great transverse diameter, subtruncate, posterior end, and the parallelism of the hinge-line and abdominal margin; the posterior end being as wide as any other part of the shell. There are traces of a subrostral plate, as in the *N. cylindrica*, M'Coy, and *N. solenoides*, Goldf. Length three lines, width eight lines.

Nucula Phillipsii.

Nucula undulata. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, depressed, width nearly twice the length; beaks small, subcentral; anterior end rounded; posterior end narrowed, compressed, subtruncate, rounded, defined only by an obtuse ridge from the beak; surface concentrically striated.

This is a large, depressed species, chiefly remarkable for the obtuse diagonal ridge, which runs from the beak to the front posterior angle, and its blunt, subtruncated, posterior end; the beaks are more nearly central than is usual in this genus. As there is already a *Nucula undulata* in the superior strata, I venture to make the above alteration in the specific name. Length six lines, width eleven lines.

Nucula rectangularis. *M'Coy.* (Pl. XI. fig. 20).

Sp. Ch.—Subquadrate, very convex, beaks tumid; anterior side very small, rounded; posterior side compressed, rectangular, abruptly truncated; posterior slope undefined, convex; surface finely and regularly striated concentrically.

I have seen indications of the hinge-teeth in this species, as in *Nucula;* at the same time the elevated hinge-margin is very unlike the usual appearance of that genus. It is allied to the *N. plicata* and *N. lucinaeformis*, Phil., both of which exhibit an angulated posterior side. Every fourth or fifth one of the concentric striæ are deeper than the intermediate ones. Length two lines, width nearly three lines.

Nucula stilla. *M'Coy.* (Pl. XI. fig. 18).

Sp. Ch.—Transversely elavate, gibbous; beak nearly central; posterior side obtusely rounded; anterior side suddenly contracted, forming a short, mucronate beak, rounded at the extremity; surface very finely striated concentrically.

This, although perfectly distinct from all the Palæozoic species, bears a remarkable similitude to the *N. gutta*, Münster, (*N. mucronata*, Sow.): that is, however, a well known *Lias* species. The beak-like anterior side is very abruptly narrowed from the body of the shell; the transverse striæ are very fine. Length three lines, width five lines.

Nucula unilateralis. *M'Coy.* (Pl. XI. fig. 17).

Sp. Ch.—Transversely ovate, convex; beaks large, rounded, terminal; anterior side forming a very small subrostral lobe; ventral margin very convex; hinge-line straight, two-thirds the width of the shell; posterior side broad, oval, obliquely subtruncate; surface smooth, with a few concentric lines of growth.

This singular shell is rendered curious by having, in fact, no anterior side, the beaks being large, anterior, and terminal, as in *Modiola*, the anterior side forming a small lobe beneath. It resembles the *Pullastra antiqua*, Sow., in form, but wants the elegant striation of that species, and has also a more tumid, prominent beak. Length four lines, width eight lines.

Arca cancellata. *Mart.* sp.

Arcites cancellatus. *Mart.* Pet. Derb.—Arca cancellata. *Sow.* Min. Con.

Sp. Ch.—Nearly twice as wide as long, gibbous; posterior diagonal ridge rounded; surface equally cancellated by coarse, radiating, and transverse sulci; abdominal sinus deep, rounded.

This species is very rare in the Irish limestone; the beaks are large, tumid, approximate; the abdominal sinus very distinct, and producing a shallow depression down the middle of the shell; the reticulations on the posterior slope are similar to those on the body of the shell.

Arca fimbriata. *M'Coy.* (Pl. XII. fig. 8).

Sp. Ch.—Shell small, very convex, rather more than twice as wide as long; hinge-line equal to the width of the shell; dorsal and ventral margins parallel; surface transversely imbricated, longitudinally fimbriated; posterior margin concave; posterior side defined by a strong ridge from the beak.

This is a very beautiful little species; the laminæ of growth are very thick, giving almost a rugged character to the shell; each one, to the naked eye, appears delicately fringed; under the lens this is found to be produced by a number of little, short, thick ribs, each having a rounded termination at the ventral edge. The ridge which separates the anterior side is strongly marked, and the whole shell is very convex; from a slight projection of the hinge-line, the posterior end appears concave. Length two lines, width five lines. The fossil appears to be rare, the only specimen I have as yet seen being the one figured.

Cucullæa arguta. *Phil.*

Cucullæa arguta. *Phil.* Geol. York.

Sp. Ch.—Rhomboidal, gibbous, twice as wide as long; anterior end short, rounded; posterior end obliquely truncate, inferior angle acute; a steep ridge separates the posterior slope from the body of the shell; beaks prominent; surface with regular, transverse, imbricating sulci.

This shell is so oblique, its posterior ridge so steep, and its angles so acute, that, when seen in the masses it sometimes forms, it resembles an *Avicula*, and the great regularity of the sulci, which are parallel to the margin, increases the resemblance; the posterior end is more obliquely truncated than is usual in this genus, and the ridge and angles sharper and more acute; the beaks are small but prominent. Length five lines, width ten lines.

Cucullæa tenuistria. *M'Coy.* (Pl. XII. fig. 10).

Sp. Ch.—Subcylindrical, transversely oblong, rather more than twice as wide as long; evenly convex, finely striated, obliquely from the beaks to the ventral margin; beaks approximate, small, close to the anterior end; anterior side small, compressed, posterior slope not defined, compressed; dorsal and ventral margins parallel.

Nearly twice and a half as wide as long; valves evenly convex, with numerous fine, oblique, anterior striæ; anterior side very short; no ridge defining the posterior slope, which passes gradually into the body of the shell. Length one inch, width two inches five lines.

Byssoarca. *Sw.*

Gen. Ch.—Shell transversely oblong, angulated, hinge-line straight, often eared, teeth small; valves gaping at the basal margin, leaving a sinus when the valves are closed for the passage of the byssus.

Byssoarca clathrata. *M'Coy.* (Pl. XI. fig. 34).

Sp. Ch.—Three times as wide as long, convex, cylindrical, anterior end obtuse, rectangular at the hinge-line, posterior end rectangular, posterior slope separated from the body of the shell by an obscure ridge; entire surface reticulated with equal, round, radiating striæ, which are about their own diameter asunder, and transverse striæ, which are equal to the longitudinal in size and distance from each other.

The peculiar character of this singular species consists in the longitudinal and transverse striæ being exactly equal in size and relative distance, the spaces produced by the crossing of those striæ are square, at each intersection a small tubercle is produced. Length three lines, width nine lines.

Byssoarca costellata. *M'Coy.* (Pl. XI. fig. 36).

Sp. Ch.—Width twice and a half the length, very convex, beaks rather large, prominent, anterior end short, pointed; posterior end rectangular; posterior slope separated from the body of the shell by a very steep ridge; entire surface ornamented with equal, rounded, radiating ribs.

This well-marked species is remarkable for the regular equality of its radiating ribs, which, together with its great width, will distinguish it from all other Palæozoic species; the sinus in the front is very small. Length four lines, width eleven lines.

Byssoarca Lanceolata. *M'Coy.* (Pl. XI. fig. 33).

Sp. Ch.—Transversely trigonal; width four and a half times the length; hinge-line rather less than two-thirds the length; anterior end very broad, obliquely truncated, smooth, concave, separated from the body of the shell by a strong, curved ridge from the beak; posterior end very narrow, the extremity obliquely trun-

cated; body of the shell with narrow, obtuse, radiating ribs, closely ornamented with compressed, transverse tubercles.

This is one of the most singularly shaped shells with which I am acquainted, all the usual proportions of the genus being reversed; it resembles the blade of a razor in form, the anterior side resembling the broad, truncated end; the hinge-line at the posterior side is about one-third longer than that of the anterior side of the beak; the posterior side is, however, very narrow, and almost pointed; the posterior slope is small, strongly striated across, and separated from the body of the shell by a slight ridge; the anterior space, contrary to the usual rule, is of great size, concave, and nearly smooth; it is very obliquely truncated, so as to form an acute angle with the ventral margin; it is separated from the body of the shell by a strong, curved ridge, the body of the shell is convex, having about thirty-three radiating ribs, closely covered with transverse, compressed tubercles, giving a reticulated appearance to the surface. Length five lines, width two inches.

Byssoarca obtusa. *Phil.* sp.

Cucullæa obtusa. *Phil.* Geol. York.

Sp. Ch.—Transversely oblong, gibbous, twice as wide as long; beaks large, tumid; anterior end obtusely rounded; posterior end oblique, very obtusely rounded; hinge-line three-fourths the length of the shell; surface smooth, with a few obtuse, transverse undulations on the body of the shell, and an obscure reticulation on the posterior slope; a shallow sinus in the front margin.

This species has a peculiarly blunt aspect from the obtuse rounding of all the angles: even that at the extremity of the posterior end, which is acute in almost every species of this and the neighbouring genera, is here very obtusely rounded; the beak is also large, tumid, and bluntly formed: the front is slightly inflexed, which produces a few transverse wrinkles on the otherwise smooth body of the shell; from this evidence of an attaching byssus, I have removed the shell to the genus *Byssoarca*. Length ten lines, width one inch ten lines.

Byssoarca reticulata. *M'Coy.* (Pl. XII. fig. 9).

Sp. Ch.—Transversely oblong, gibbous; dorsal and ventral margins parallel; beaks moderate, close to the anterior end; anterior end very short, rounded; posterior end obliquely truncated; posterior slope concave, separated from the body of the shell by a strong diagonal ridge; entire surface striated longitudinally; transversely decussated by the imbricating lines of growth, of which those nearest the margin are deep and rugose, those near the beak nearly obliterated; abdominal sinus large, deep.

This species may be known from the *Arca cancellata* by the greater transverse diameter, and the fineness of the longitudinal striæ: usually larger than the specimen figured, which was the first obtained. Length ten lines, width one inch eight lines.

Byssoarca semicostata. *M'Coy.* (Pl. XI. fig. 35).

Sp. Ch.—Width rather more than twice the length, gibbous; anterior end rectangular; posterior end nearly rectangular, concave; posterior slope with seven or eight coarse, rounded, radiating ribs separated by an obtuse, oblique keel from the body of the shell, which is decussated by very minute, transverse, and longitudinal striæ.

This beautiful shell is rendered conspicuous by the large radiating ribs which are on the posterior slope, while the body of the shell appears nearly smooth, being, however, reticulated by microscopic striæ. The valves are distinctly unequal. Differs from the *Nucula radiata*, Portk., of the Pomeroy schist, in its rectangular ends and reticulated body. Length four lines, width nine lines.

Crenella acutirostris. *M'Coy.* (Pl. XI. fig. 37).

Sp. Ch.—Subrhomboidal, oblique, length and width equal, slightly convex, smooth; beaks large, prominent, acutely pointed; anterior side rounded, posterior side obliquely truncated, compressed, posterior ridge strong, rounded.

This little species bears a resemblance to some of the varieties of *Cucullæa unilateralis*, Sow., but is much smaller, more compressed, and is, moreover, distinguished from this and all the other Devonian *Cucullæa's* by its narrow, pointed beak. Length four lines, width four lines.

Modiola. *Lam.*

Gen. Ch.—Transversely oblong; beaks small, not terminal; anterior side small, gaping, to allow the passage of the byssus; no hinge-teeth. Some of our fossil species, as for instance, the *M. microcephala*, have the thin, inflated, rugged shell, and elevated diverging ridges of *Lanistes*, but retaining the angulated hinge-line of *Modiola*, forming a passage from one genus to the other: others shew clearly the teeth of the genus *Brachydontes*, Sw., indicating a passage towards *Nucula*, Lam.

Modiola amygdalina. *Phil.*

Modiola amygdalina. *Phil.* Pal. Fos.

Sp. Ch.—Transversely ovate; rather more than twice as wide as long; very gibbous; beaks large, incurved, terminal; anterior side forming a very small lobe under the beaks; posterior side obtusely rounded; surface marked with sharp, rather distant, concentric striæ.

This curious little species has a small lunette beneath the beaks: the concentric striæ vary slightly in their distance from each other. Length three lines, width eight lines.

Modiola angusta. *Portk.*

Modiola Macadami var. angusta. *Portk.* Geol. Rep.

Sp. Ch.—Transversely elongate; three times as wide as long; very gibbous, cylindrical; extremities rounded; dorsal and ventral margins slightly convex; surface marked with fine, sharp, concentric striæ.

Modiola concinna. *M'Coy.* (Pl. XI. fig. 28).

Sp. Ch.—Transversely oblong, twice and a half as wide as long; gibbous; dorsal and ventral margins nearly parallel; beaks tumid, close to the anterior end; anterior end very short, rounded; posterior end obliquely subtruncated; surface with about nine or ten flat, imbricating lamellæ, each fringed by strong, sharp, longitudinal striæ, finest toward the anterior end.

This beautiful shell is obviously related to that section of the recent *Modiolæ*, with small, tender, yet rugged shells, destitute of byssus, and living habitually in various species of *Alcyonium*, and nearly allied animals, of whose existence at the period of the carboniferous limestone, we have no other proof. Length four and a half lines, width ten lines.

Modiola divisa. *M'Coy.* (Pl. XI. fig. 30).

Sp. Ch.—Transversely ovate, twice as wide as long, gibbous, beaks tumid, close to the anterior end; hinge-margin elevated, rectangular, as long as the shell is wide; anterior end short, rounded; posterior end subtruncate, rounded; a small notch, or sinus in the abdominal margin, from whence a deep sulcus extends entirely to the beak; surface very finely wrinkled transversely.

The deep, narrow sulcus, extending from the beak to the opposite margin, and dividing the anterior from the posterior portion of the shell, distinguishes this little species from any other of the genus. Length one and a half lines, width three lines.

Modiola lingualis. *Phil.*

Modiola lingualis. *Phil.* Geol. York.

Some obscure specimens of this shell have occurred. They are transversely elongate, about four times as wide as long; dorsal and ventral margins convex; hinge-line very short, scarcely angulated; anterior end narrow,

rounded; beaks very small, not prominent; posterior end rounded; the transverse striæ are scarcely visible on the sandstone casts which I have seen, but seem to have been distant, and strongest on the posterior slope.

Modiola Macadami. *Portk.*

Modiola Macadami. *Portk.* Geol. Rep.

Transversely ovate, gibbous; shell thin, inflated, marked with rather distant, irregular, deep, concentric striæ; hinge-margin angulated.

This is a very variable shell, length six lines, width one inch two lines.

Modiola megaloba. *M'Coy.* (Pl. XI. fig. 31).

Sp. Ch.—Transversely ovate, gibbous; beaks small, subterminal; anterior lobe exceeding half the length of the shell, defined by a strong sulcus from the beak; hinge-line two-thirds the length of the shell, angulated.

This is one of the very few instances in which the true, anteriorly lobed, recent, and Oolitic form of *Modiola* has been found in the older rocks. It differs from the *M. antiqua*, Gold., in being very much narrower towards the beaks, and in its angulated hinge-margin. From the beak to the posterior extremity five lines; from the cardinal angle to the opposite ventral sinus three lines.

Modiola patula. *M'Coy.* (Pl. XIII. fig. 13).

Sp. Ch.—Lengthened, spatulate, gibbous, smooth; marked towards the margin with numerous, fine, imbricating lines of growth; dorsal margin evenly convex, without posterior angle; posterior end obtusely rounded; anterior end forming an obtuse lobe before the beak; ventral margin inflexed, slightly sinuate.

The broad, spatulate form, want of posterior angle, and even convexity of the surface, distinguish this from every other Palæozoic species. From the beak to the posterior end, two inches two lines, greatest length from the dorsal to the ventral margin one inch one line. Communicated by Dr. Haines of Cork.

Modiola scalaris. *Phil.*

Modiola scalaris. *Phil.* Geol. York.

Sp. Ch.—Transversely oblong, twice as wide as long, slightly convex; beaks close to the anterior end, which is very short and rounded; posterior end obliquely subtruncate, rounded; dorsal and ventral margins parallel; surface marked with distinct, narrow, regularly elevated ridges, separated by broad, flat, smooth spaces. Width about half an inch.

Modiola subparallela. *Portk.*

Modiola subparallela. *Portk.* Geol. Rep.

Sp. Ch.—Transversely oblong, diagonally gibbous; dorsal and ventral margins nearly parallel; a slight sinus in the middle of the ventral margin; anterior and posterior ends rounded, nearly equal; hinge-line three-fourths the length of the shell; surface coarsely striated concentrically. Length six lines, width one inch.

Lithodomus dactyloides. *M'Coy.* (Pl. XI. fig. 41).

Sp. Ch.—Width three times the greatest depth, cylindrical; extremities obtusely rounded; beaks inconspicuous close to the anterior end; surface marked by concentric lines of growth, which, near the beak, are decussated by very fine, oblique, longitudinal striæ.

This is one of the most remarkable instances I know of a strong analogy existing between a fossil shell of the older rocks, and a species at present living in our seas. So strong is the resemblance which the present

fossil bears to the *Lithodomus dactylus*, Cuv., which perforates the coral reefs of the Indian ocean, that were it not that the fossil is a little more angulated posteriorly, it would be difficult to distinguish them even as varieties; the length is rather greater than the depth of the two valves in the fossil species; the shell is very thin, and the concentric lines of growth obtuse and irregular; the oblique striæ from the beak to the ventral margin sharp, fine. From the cardinal angle to the opposite margin eight lines; width one inch eleven lines.

Lanistes. *Humph.*

Gen. Ch.—Shell oval, transversely cordiform, ventricose; umbones prominent, with diverging elevated striæ; hinge-margin not elevated or angular; teeth none.

The few mountain limestone shells I have referred to this genus, differ from the recent species in having the hinge-margin a little more elevated as in *Modiola;* they have, however, the rugged, thin, inflated shell and peculiar aspect of this genus.

Lanistes obtusus. *M'Coy.* (Pl. XIII. fig. 9).

Sp. Ch.—Transversely ovate, obtusely rounded; anterior end narrow, separated from the body of the shell by a deep sinus in the ventral margin, from whence an oblique, shallow groove extends to the beak, behind which the body of the shell becomes suddenly more gibbous; hinge-line short; posterior end broad, rounded; surface radiated with very numerous, fine, sharp, rough, slightly flexuous striæ, frequently interrupted by irregular wrinkles of growth; the striæ are alternately larger and smaller towards the margin of large individuals, but are equal in size in small specimens.

Distinguished from the *L. rugosus*, M'Coy, by its more obtuse form, distinctly lobed, anterior side, shorter hinge-line, and very much sharper, finer, and more numerous radiating ridges. Length of most perfect specimen two lines and a half, width four lines. Imperfect specimens are not uncommon, ten lines in length.

Lanistes rugosus. *M'Coy.* (Pl. X. fig. 8).

Sp. Ch.—Transversely ovate, shell thin, rugged; anterior end very short, rounded; umbones prominent; posterior side dilated, angulated; surface with numerous, coarse, flexuous ridges, from the beak to the posterior margin. Greatest length from the cardinal angle to the opposite margin three lines, width six lines.

Mytilus. *Linn.*

Gen. Ch.—Equivalve, cuneiform, oblique; smooth; beaks terminal, pointed.

Mytilus comptus. *M'Coy.* (Pl. XIII. fig. 12).

Sp. Ch.—Acutely ovate, depressed; beaks terminal, acute, slightly incurved; dorsal margin convex, posterior angle very obtuse; front margin oblique, rounded; anterior face truncate, concave towards the beak; surface smooth, with a few lines of growth.

This little species differs from the *M. priscus* of the Silurian rocks, in its more acute and curved beaks, the greater strength of the ridge bounding the anterior face, its more convex and shorter dorsal margin, and more oblique front margin. Length eleven lines, greatest width six and a half lines.

Mytilus Flemingi. *M'Coy.* (Pl. XI. fig. 29).

Sp. Ch.—Trigonal, length twice the width; hinge-line half the length of the shell, depressed, smooth; anterior face truncated, bounded by a slightly sigmoidal ridge; beaks acute, terminal, curved towards the anterior side; posterior margin convex.

This species, like the *Dressina polymorpha*, has the truncated anterior face and ridge flexuous or sigmoidal. Length one inch four lines; greatest width seven lines; depth of anterior face three lines.

Inoceramus. *Sow.*

Gen. Ch.—Shell thick, inequivalve, triangular, deep; umbones incurved, lateral; hinge short, formed of a series of transverse grooves.

Inoceramus auriculatus. *M'Coy.* (Pl. XIX. fig. 5).

Sp. Ch.—Longitudinally oval, gibbous; beaks nearly central; posterior side expanded, compressed, slightly oblique; anterior side with a large, square ear, deeply divided from the body of the shell; surface smooth at the sides, marked with broad, obtusely rounded, concentric wrinkles in the middle.

This species is distinguished from the *I. vetustus* by the large ear on the anterior side, and nearly direct hinge-line; it is also less oblique. Length eleven lines, width nine lines, length of hinge-line five lines. The specimen figured was kindly lent by Dr. Haines of Cork.

Inoceramus lævissimus. *M'Coy.* (Pl. XIX. fig. 6).

Sp. Ch.—Longitudinally oval, compressed, gibbous in the middle; anterior side compressed, produced above the beaks into a short, angular wing; beaks small; a lengthened oblique lunette on the posterior side of the beaks; surface perfectly smooth.

This elegant shell most nearly resembles Count Münster's *I. inversus* of the Eifel, from which it differs in being much more compressed, the middle alone being convex; in its greater length, very small beaks, and perfectly smooth surface. Length two inches eight lines, width one inch ten lines. The specimen was presented by Mr. Jennings of Cork.

Inoceramus orbicularis. *M'Coy.* (Pl. XIII. fig. 11).

Sp. Ch.—Orbicular, convex, hinge-line oblique; surface with about fifteen broad, smooth, concentric ribs; length and width equal.

The almost perfectly orbicular form, and regular, concentric, flattened ribs, distinguish this from any species of the genus with which I am acquainted; the hinge-line is rather long, oblique; beak one-third the length from the anterior end; the convexity is much less than in most others of the genus. Length eleven lines, width twelve lines.

Inoceramus vetustus. *Sow.*

Inoceramus vetustus. *Sow.* Min. Con.—Inoceramus vetustus. *Phil.* Geol. York.—Posidonia vetusta. *Koninck.* Fos. Bel.

Sp. Ch.—Ovate, convex; beaks short, pointed, curved; hinge-line short; surface smooth, with about fourteen large, prominent, concentric undulations.

This species appears to belong to the chalk genus *Inoceramus*, rather than to the *Posidoniæ*. Length one inch nine lines, width one inch four lines.

Posidonia. *Gold.*

Posidonomya. *Bronn.*

Gen. Ch.—Obliquely ovate, thin, compressed, concentrically ridged; hinge-line oblique, subauriculated on each side; beaks subcentral.

It seems exceedingly probable, as M. Deshayes has already suggested, that *Posidonia* may be the internal plate of an animal allied to *Aplysia*. I was particularly struck with the resemblance while dissecting some large specimens of the *Aplysia depilans* of our coast this summer: the gill covers of those animals, when observed in the recent state, or before being dried, are precisely similar to a *Posidonia* in shape, and with somewhat similar concentric wrinkles, but more faintly marked; their consistence is intermediate between that

of thin horn and membrane, bending readily, and without injury in any direction, and capable of receiving very slight impressions, but with sufficient elasticity to regain its original shape on the pressure being removed. This seems to have been also the state of the *Posidoniæ*, as they impress each other in all directions in the shales without injury. The fine shales in which they occur must have been deposited in deep water, which is also the habitation of the recent *Aplysiæ*. The large, proportionate size of the soft portion of the animal, when compared with the small shell, would account for the general dark colour of the *Posidonia* shales. If the above view were correct, the *Posidoniæ* should be removed to the *Gasteropoda*.

Posidonia Becheri. *Gold.*

Posidonia Becheri. *Gold.* Pet.—Posidonia Becheri. *Sow.* Geol. Trans.—Posidonia Becheri. *Phil.* Pal. Foss.

Sp. Ch.—Obovate, oblique, compressed; numerous, angular, sharp, concentric ridges; posterior ear twice the width of the anterior.

This species varies considerably in its characters; the number of the concentric ribs, and the outline, being inconstant; some specimens exhibit delicate striæ parallel with the concentric ribs. Length two inches four lines, width two inches three lines.

Posidonia complanata. *Portk.*

Posidonia complanata. *Portk.* Geol. Rep.

Sp. Ch.—Transversely elliptical, compressed; beaks small, close to the anterior end, which is small, rounded; posterior end broader, rounded, ventral margin very convex; surface striated concentrically. Length from the beak to the posterior extremity one line.

This little shell belongs very probably to the genus *Isaura*, and, if so, it should be removed to the *Crustacea*.

Posidonia costata. *M'Coy.* (Pl. XIII. fig. 15).

Sp. Ch.—Ovate, oblique, compressed, four strong, rounded, radiating ribs occupy the middle of this shell; no concentric wrinkles.

This beautiful shell is the only *Posidonia* I know of without concentric wrinkles, it is rendered very striking by its four longitudinal, distant, well-defined mesial ridges. Most of the specimens shew a minute oblique plication of the surface, but as this is not constant in its direction, it is probably due to the folding of the epidermis, if it had one, or may be due to mechanical causes. Length ten lines, width eight lines.

Posidonia lateralis. *Sow.*

Posidonia lateralis. *Sow.* Geol. Trans.—Posidonia lateralis. *Phil.* Pal. Fos.

Sp. Ch.—Transversely ovate, twice and a half as wide as long; beaks close to the anterior end; surface with numerous, large, concentric wrinkles.

Portions of this species have occurred in company with the *P. Becheri*, and *P. tuberculata;* its great transverse diameter is the principal character.

Posidonia membranacea. *M'Coy.* (Pl. XIII. fig. 14).

Sp. Ch.—Compressed, membranaceous, transversely elongate, recurved; dorsal and ventral margins nearly parallel; width three times the length; surface with numerous minute, concentric, and longitudinal membranaceous wrinkles; hinge-line short, beaks in the centre of it.

This little species is exceedingly distinct from all others of the genus, the *P. lateralis* is the only one to which it bears the slightest resemblance, and from it, it is distinguished by being proportionably wider, by its numerous longitudinal striæ, and the minuteness of the concentric wrinkles; it is also much smaller.

The hinge-line is very short and oblique, the beak is placed nearly in the centre of it. From the beak to the posterior extremity one inch six lines, length six lines. Specimens frequently occur nearly three inches in their longest diameter; the figure is from a shorter specimen than usual.

Posidonia similis. *M'Coy.* (Pl. XII. fig. 2).

Sp. Ch.—Obliquely ovate, with numerous, irregular, small, rounded, concentric ridges; beak nearest the anterior extremity. Length two inches, breadth about one-fourth less.

This species is well distinguished from the *P. Becheri*, by its small, rounded, cord-like undulations, instead of the regular, sharp, concentric ribs which mark that species.

Posidonia tuberculata. *Sow.*

Posidonia tuberculata. *Sow.* Geol. Trans.—Posidonia tuberculata. *Phil.* Pal. Foss.

Sp. Ch.—Obovate, oblique, compressed; numerous concentric, angular ridges; decussated and tuberculated by four or five longitudinal, radiating ribs from the beak.

This species is scarcely distinguishable from the *P. Becheri;* the principal character is the existence of a few longitudinal ribs in the present shell which decussate the concentric ridges, forming tubercles at each of the crossings; but these ribs are so variable in number and position, and are often so obscure, that it is doubtful whether they form a good specific character; in some specimens, however, they are very remarkable; the concentric ribs are usually fewer and farther apart than in the *P. Becheri*, but this is a still more variable character. Length two inches two lines, width two inches one line.

Posidonia ——— ? (Pl. XII. fig. 3).

This little species was found in company with the *P. similis*, M'Coy. It resembles the *Posidonia Becheri* in the sharpness of its concentric ribs, but differs from it in having them larger and wider apart, and in having the beak in the centre of the hinge-line.

Meleagrina. *Lam.*

Margarita. *Leach.*

Gen. Ch.—Shell rounded, auricles small; umbones sublateral; hinge-line straight, but not lengthened or oblique; teeth small, tuberculated, obsolete.

I have found it convenient to extend this genus to all those *Aviculæ* whose hinge-line is rectangular, and the general form rounded, thus leaving the true *Aviculæ* a very well defined group.

Meleagrina alternata. *M'Coy.* (Pl. XIII. fig. 17).

Sp. Ch.—Truncato-orbicular, convex; ears large, nearly equal, marked with very strong, concentric striæ; body of the shell radiated with about eighteen strong, slender, distant ridges, alternately longer and shorter, the intermediate spaces being marked with rather distant, regular, concentric wrinkles.

In this minute but beautiful shell, the ears are nearly equal in size, one being rounded, the other pointed; they are without radiating ridges, but are very strongly marked with rounded, coarse striæ, parallel with the outer margin. Length one line, width one line.

Meleagrina echinata. *M'Coy.* (Pl. XIII. fig. 18).

Sp. Ch.—Orbicular, compressed, thin; hinge-line rather less than the width of the shell; anterior ear equal to the posterior ear in length, narrow, rounded, deeply divided from the body of the shell; posterior ear undefined, rectangular; surface marked by rather distant, narrow, radiating ridges, strongest towards the mar-

gin, which, being interrupted by the scaly laminæ of growth, form minute, adpressed spines at the intersections.

This is one of the thinnest and most delicate of our fossil square *Aviculæ*, the concentric laminæ of growth are rather irregular, shewing the fragile nature of the shell at all ages; the narrow threadlike striæ being frequently interrupted by the laminæ of growth, give an echinated character to the surface, there is a flat space behind the hinge, about one line in breadth. Length one inch one line, width one inch one and a half lines.

Meleagrina lævigata. *M'Coy.* (Pl. XII. fig. 5).

Sp. Ch.—Orbicular, oblique, convex, smooth; posterior ear undefined, rectangular; anterior ear very small, deeply divided from the body of the shell.

The smoothness of the surface will at once distinguish this species of *Margarita* from all its congeners; the surface is slightly but uniformly convex; the hinge-line is half the width of the shell, its extremities rectangular; anterior ear half the length of the posterior; the anterior side is dilated, so as to give a slight obliquity to the outline. Length one inch six lines, width one inch nine lines.

Meleagrina pulchella. *M'Coy.* (Pl. XII. fig. 6).

Sp. Ch.—Longitudinally ovate; hinge short, slightly oblique; ears obtuse; radiating ridges in pairs, plain on the sides, decussated by concentric undulations, and nodulous in the middle.

This pretty little shell may be known from the other mountain limestone species by its large ribs running in pairs from the beak to the margin; they are nodulous only on the convex middle part of the shell, where also they are crossed by obtuse concentric furrows, becoming obsolete on the sides; the number of longitudinal radii about twenty. Length five lines, width five lines.

This is a scarce fossil. The specimen figured is the only one I have seen.

Meleagrina quadrata. *M'Coy.* (Pl. X. fig. 5).

Sp. Ch.—Subquadrate, slightly oblique; hinge-line straight; posterior ear twice the length of the anterior ear, scarcely defined from the body of the shell; surface smooth, with obscure, concentric wrinkles.

This species may be distinguished from the others of the genus by its quadrate form, rectangular ears, and smooth, obsoletely wrinkled surface. Length five lines, width five lines.

Meleagrina radiata. *Phil.* sp.

Avicula radiata. *Phil.* Geol. York.

Sp. Ch.—Semicircular, hinge-line straight, ears acute; posterior ear undefined, twice the length of the anterior ear; surface with about twenty-five narrow, radiating ribs.

This species differs from the *M. tessellata*, chiefly in its smaller size, and the greater number of the radiating ridge, the posterior ear is also somewhat larger. Length four lines, width five lines.

Meleagrina rigida. *M'Coy.* (Pl. XIII. fig. 16).

Sp. Ch.—Longitudinally obovate, convex; anterior ear large, square; posterior ear about a third longer than the anterior, pointed; surface with about sixty-five rather distant, narrow, rough, radiating ridges, crossed by a few large, irregular, concentric wrinkles.

This fine shell runs no risk of being confounded with any others of its genus. The specimens obtained were of a brilliant, silvery white. The radiating ribs are narrow, rough, and separated by broad flat spaces. Length one inch nine lines, width one inch ten lines.

Meleagrina tessellata. *Phil.* sp.

Avicula tessellata. *Phil.* Geol. York.

Sp. Ch.—Semicircular, hinge-line straight, ears acute; posterior ear undefined, once and a half the length of the anterior ear; surface with fourteen or fifteen distant, rounded, radiating ridges.

This is a very boldly-formed species; the few large, distant, radiating ribs giving it a strongly-marked character; the spaces between the radiating ribs are smooth, and slightly concave; they are crossed by distant, imbricating lines of growth; the posterior ear is not distinctly defined from the body of the shell. Length eight lines, width nine lines.

Pteronites. *M'Coy.*

Gen. Ch.—Equivalve, transversely elongate, very much compressed; beaks small, nearly terminal; anterior side very small; a sinus in the front margin, under the beak; posterior side very wide, subtruncate; hinge-line exactly equal to the width of the shell; no hinge teeth.

This genus contains a number of very similar little shells, intermediate in character between *Avicula* and *Modiola;* they resemble *Avicula* in their very oblique form, large posterior side, and compressed contour; but they differ from them in the hinge-line never being extended into a lengthened wing, and in being equivalve, while their want of cardinal teeth distinguish them at once from the genus *Pterinea* of Goldfuss; the length of the hinge, and compressed, flattened form, distinguish them from the *Modiolæ.* The following species are the only ones I have seen of the genus:

Pteronites angustatus. *M'Coy.* (Pl. XIII. fig. 6).

Sp. Ch.—Width three and a half times the length; surface with very obscure wrinkles, parallel with the posterior margin; anterior end very small, pointed; posterior end obliquely pointed.

This shell is distinguished from the others of its genus by its more slender form; the front margin and hinge-line form an acute angle, the anterior end being bluntly pointed; the posterior end is also pointed, the margin rounding directly from the extremity of the hinge-line; the surface has some small, obscure wrinkles parallel to the posterior edge. Length six lines, width one inch eight lines.

Pteronites latus. *M'Coy.* (Pl. XIII. fig. 7).

Sp. Ch.—Transversely triangular, width rather more than twice the length; beaks convex, prominent; anterior end small; a distinct sinus in the front margin below the beak; posterior end broad, subtruncate, slightly emarginate.

This species is well distinguished from the *P. angustatus,* M'Coy, by its great length in proportion to its width: there is an obsolete sulcus running from the beak to the posterior extremity, and obscure indications of distant striæ, parallel to the posterior margin. Length eight lines, width one inch five lines.

Pteronites semisulcatus. *M'Coy.* (Pl. XI. fig. 32).

Sp. Ch.—Transversely trigonal, gibbous; beaks small, tumid, nearly terminal; hinge-line equal to the width of the shell; much elevated, rectangular; anterior and posterior sides of the shell smooth; about seven or eight obtuse, rounded ribs extend obliquely from near the beak to the inferior posterior end.

This species is remarkable for having only a few radiating ribs on the middle of the shell, having the sides perfectly smooth, with the exception of a few delicate lines of growth; the hinge-line considerably elevated and compressed; the beaks prominent; anterior side very small, tumid; sinus in the front margin moderate. Width ten lines.

Pteronites sulcatus. *M'Coy.* (Pl. XIII. fig. 5).

Sp. Ch.—Transversely trigonal; anterior end pointed; posterior end broad, subtruncate; a triangular space extending from the hinge-line to about the middle of the posterior end, smooth; from thence to the front margin, roughened by about thirteen or fourteen rugged, obtuse ribs.

The strongly ribbed or radiated surface distinguishes this species from the nearly allied *Pteronites latus;* the form is almost exactly that of the *P. latus*, the anterior end being, however, more pointed; the beaks are exceedingly small. Length six lines, width one inch.

Pteronites ventricosus. *M'Coy.* (Pl. XIII. fig. 8).

Sp. Ch.—Transversely elongate, width twice the length, falciform, very gibbous; beaks large, tumid, close to the small anterior end; hinge-line equal to the width of the shell; abdominal margin very convex; surface smooth, or with a few large wrinkles of growth.

This species is so exceedingly ventricose, that the depth of one of the valves nearly equals its length. Length two lines and a half, width five lines.

Pterinea. *Gold.*

Gen. Ch.—Transversely elongate, oblique, very inequilateral (equivalve?), hinge-line long, forming a short wing on the anterior side, and a large, falciform one on the posterior side; cardinal teeth from two to five, just under the beak, linear, nearly parallel; lateral teeth strong, lengthened, double.

The shells of this genus are much stronger than those of *Avieula*, and are, moreover, distinguished by their strong lateral and cardinal teeth; they are said to be equivalve, but such as I have seen were not so.

Pterinea desquamata. *M'Coy.* (Pl. XIII. fig. 2).

Sp. Ch.—Obliquely ovate, convex; anterior side small, rounded; posterior slope straight, abruptly marked; posterior wing small, falcate, marked with about seven distant, radiating ridges, the spaces between which are flat and smooth; there is an intermediate finer rib between each of the two upper pair; body of the shell radiated with about forty-six smooth, equal, narrow ridges, the spaces between which are equal to their own diameter; between each pair there is one fine, sharp rib.

This approximates to the *P. lineata*, Gold., but has much finer, radiating ridges, particularly on the posterior wing; there are no concentric scales or striæ in the present species. Length nine lines and a half, width seven lines. Collected by Dr. Haines of Cork.

Pterinea intermedia. *M'Coy.* (Pl. XIII. fig. 1).

Sp. Ch.—Ovato-orbicular, oblique, convex; anterior ear very small, rounded; posterior ear two-thirds the length of the shell, pointed; surface entirely radiated with numerous, close, obtuse ridges, alternately larger and smaller, crossed by rather distant, sharp, imbricating striæ.

This interesting species is closely allied both to the *P. lineata*, and *P. decussata*, but differs from the former in being much less oblique, and having a shorter wing, or posterior ear; and from the latter, in having the striæ much finer, more numerous, and unequal in size. Length seven lines and a half, width seven lines. I have seen fragments of individuals half an inch longer than the above.

Avicula. *Lam.*

Gen. Ch.—Shell obliquely oval, inequivalve; hinge margin very much lengthened, and forming narrow, unequal ears; teeth nearly obsolete.

Avicula angusta. *M'Coy.* (Pl. XIII. fig. 20).

Sp. Ch.—Obliquely elongate, depressed, nearly three times as wide as long; posterior slope and ventral margin straight and parallel; posterior slope very slightly marked; a slight sinus in the ventral margin, opposite the beak; posterior end obtusely rounded; posterior wing small, falciform, smooth; body of the shell marked with very delicate, concentric, imbricating striæ.

This resembles the *Gervillia inconspicua*, Phil., but is narrower, and the wing is much smaller, and different in form. Length four lines, width ten lines.

Avicula bicostata. *M'Coy.* (Pl. XIII. fig. 26).

Sp. Ch.—Transversely oblong, twice as wide as long, very gibbous; beaks large, tumid; anterior side short, rounded; posterior side lengthened, rounded; hinge-margin pointed, slightly shorter than the shell; a deep sinus extends from the beak to the opposite ventral margin, bounded on each side by a broad, distinct flattened rib; entire surface sharply and regularly striated concentrically.

This very beautiful shell is distinguished from all the allied fossils, by the large ribs bounding the abdominal sinus, and the elegant striation of the surface. Length two lines, width four lines.

Avicula flabellula. *M'Coy.* (Pl. XIII. fig. 27).

Sp. Ch.—Obliquely ovate, convex; ears small, without radiating striæ; surface finely striated from the beaks; ridges flat, each divided by a fine line in the centre, and separated by a narrow, concave sulcus.

This species is remarkable for the very great width of the front, which is fully double that of the hinge-line; the beaks are small and prominent; the ears are small, nearly smooth, or with a slight, irregular plication, parallel to the margin; the surface is very regularly radiated from the beak, with fine, smooth, flattened, elevated striæ, most of which are divided by a fine line about the middle. Length seven and a half lines, width nine lines.

Avicula gibbosa. *M'Coy.* (Pl. XIII. fig. 25).

Sp. Ch.—Obliquely oval, short, very gibbous; beaks large, prominent, incurved; posterior wing small, acute, falcate; anterior side moderate, rounded; posterior side semielliptical, abdominal sinus deep; surface with a few, irregular, obtuse lines of growth.

This little species is chiefly remarkable for the great convexity of its valves; the posterior slope is gradually rounded; it is less elongated transversely than most of the genus; the posterior, wing-like termination of the hinge-line has a few coarse striæ parallel with the outer margin; the smoothness of the surface is interrupted by irregular, prominent lines of growth. Length three lines, width five lines.

Avicula informis. *M'Coy.* (Pl. XIII. fig. 21).

Sp. Ch.—Transversely trigonal, beaks obtuse, nearly terminal; anterior end very small; posterior end obtusely rounded; hinge-line as long as the shell, forming a rectangular, compressed wing; body of the shell very gibbous; surface smooth, with two or three large, obtusely rounded, concentric wrinkles, most distinct over the posterior slope.

This little species is not uncommon; its few obtuse wrinkles and general bluntness of form approximate it to the *A. quadrata*, M'Coy, but it is much more transverse, and smaller. Length one line, width two lines. A very large specimen measures two lines in length, and four in width.

Avicula laminosa. *Phil.* sp.

Gervillia laminosa. *Phil.* Geol. York.

Sp. Ch.—Very oblique; ears long, anterior obtusely triangular, posterior twice and a half as long as the anterior, forming a lengthened, narrow wing; posterior side straight, convex; surface with scale-like lines of growth.

This species has the anterior and posterior ears much larger than the *A. lunulata;* the flat, perpendicular space which separates the posterior ear from the body of the shell in that species does not exist in this, the corresponding part being simply convex. Length one inch two lines, width eleven lines, length of hinge-line one inch seven lines.

Avicula lævigata. *M'Coy.* (Pl. XIII. fig. 23).

Sp. Ch.—Depressed, posterior wing about half the length of the shell; posterior side slightly curved, convex; anterior side very short, rounded; an obtuse sinus in the anterior edge; beak large, prominent, surface smooth.

This fine shell bears some resemblance to the *Gervillia lunulata*, Phil., it is easily distinguished by its greater size, smooth surface, and the total absence of the steep, posterior ridge which in that species separates the ear from the body of the shell; the posterior side is also straighter, and the posterior wing shorter than in that species; the surface is evenly convex, and quite smooth; the shell is most convex near the beaks, becoming flatter towards the ventral margin; the sinus in the anterior side is very wide, but not deep; there are a few indistinct lines of growth near the edge. Length two and a half inches, width of hinge-line one and a half inches.

Avicula lunulata. *Phil.* sp.

Gervillia lunulata. *Phil.* Geol. York.

Sp. Ch.—Very obliqne, transversely elongate; posterior side arched, defined from the posterior ear by a perpendicular, smooth, flat space; posterior ear four times as long as the anterior ear; surface with regular, imbricating lines of growth.

This species is rendered very remarkable by the upward curve of the posterior side, which is bounded by a steeply-inclined, narrow space, separating it from the posterior ear, which latter, when well preserved, forms a very long, narrow wing; the anterior ear is short and rounded; the surface is marked with regular, imbricated striæ. Length one inch seven lines, width seven lines.

Avicula recta. *M'Coy.* (Pl. XIII. fig. 24).

Sp. Ch.—Convex, obliquely elongate; posterior side straight, obtusely pointed, separated from the posterior wing by a broad, steep, longitudinally striated space, nearly at right angles with both the wing and body of the shell; posterior wing half the length of the shell, pointed; anterior wing very short, obtusely pointed; posterior wing and body of the shell girt with sharp, close, regular ridges, parallel to the margin.

This beautiful species is distinguished from the *Gervillia lunulata*, Phil., by the sharpness and regularity of the transverse ridges, and the *straightness* of the posterior side; the steeply ridged posterior side distinguishes it from the others. Length nine lines, width of hinge-line seven lines.

Avicula squamosa. *Phil.* sp.

Gervillia squamosa. *Phil.* Geol. York.

Fragments of this species have occurred very rarely; they are distinguished by the broad, regular, scale-like striation of the surface.

Avicula Thompsoni. *Portk.* sp.

Pterinea Thompsoni. *Portk.* Geol. Rep.

Sp. Ch.—Transversely elongate, diagonally gibbous; beaks small; anterior wing pointed, separated from the body of the shell by a small sinus in the front margin, opposite the beak, from whence a furrow extends to the beak; posterior wing falcate, terminating in a long slender spine; surface with concentric, imbricating lines of growth.

This is a very distinct and beautiful species, the long, spiniform extremity of the posterior wing is a curious peculiarity. Length of hinge-line ten lines, from the beak to the posterior extremity five lines.

Avicula Verneuilii. *M'Coy.* (Pl. XIII. fig. 19).

Sp. Ch.—Transversely subtrigonal; beaks very narrow, small, terminal; posterior side broad, flattened, forming an obtuse angle at the hinge-line, which is less than two-thirds the length of the shell, and obtusely rounded at the posterior end; an obtuse, slightly sigmoidal keel extends from the beak to the posterior extremity; surface marked with fine, irregular lines of growth.

This shell is allied to the *Avicula Goldfussi*, De Ver., and to the *A. Saturni*, Gold., but is distinguished from both by its more slender form, shorter hinge-line, and by the posterior end being oval or rounded, instead of being subtruncate, as in those species; the ridge from the beak to the posterior end is also straighter and more obtuse in the present shell. Length from the beak to the posterior end two inches two lines, from the posterior cardinal angle to the opposite abdominal margin one inch.

Pinna. *Linn.*

Gen. Ch.—Equivalve, triangular; umbones terminal; extremity widely gaping; hinge-margin straight, teeth none; anterior margin slightly gaping.

Pinna flabelliformis. *Mart.* sp.

Conch. Pinnites flabelliformis. *Mart.* Pet. Derb. (*C. P. nudus* in the Syst. Arrangement).—Pinna costata. *Phil.* Geol. York.

Sp. Ch.—Lanceolate, trigonal, narrow, convex; beak and sides of the shell smooth; surface with regular, narrow, straight ribs, separated by concave, smooth spaces.

This elegant species occurs but sparingly; the nearly parallel, regular, mesial ribs, and the wide, smooth, intervening spaces, easily distinguish it from the others. As only fragments have come before me, I cannot give the correct measurements. Professor Phillips' figure represents the beaked portion, which is deficient in Martin's figure, in which latter there is no smooth part shewn.

Pinna flexicostata. *M'Coy.* (Pl. XIX. fig. 1).

Sp. Ch.—Elongate, triangular, very gibbous; ventral margin smooth or marked with few oblique wrinkles; rest of the surface marked with narrow, equal, flexuous sulci, having between them smooth, rounded, slightly flexuous ridges of unequal width.

From the *P. flabelliformis*, Mart., this species is distinguished by having the ventral third of the surface destitute of radiating ribs, and in the longitudinal ridges being irregularly unequal in width, and in their being flexuous; it differs from the *P. inæquicostata*, Port., in having the two sides similarly marked; from all three it differs in the longitudinal ridges being flexuous. Length about four inches, width about one and a half inches.

Pinna inæquicostata. *Portk.*

Pinna inæquicostata. *Portk.* Geol. Rep.

A few fragments, probably referrible to this species, have occurred. It is described as having the radiating ribs broader on one side than on the other, and the sides smooth.

Pinna mutica. *M'Coy.* (Pl. XIX. fig. 11).

Sp. Ch.—Cuneiform, four-sided; valves gibbous, obscurely keeled in the middle; surface smooth, with obscure, irregular, oblique indentations near the margin of the valves.

This species has the ordinary wedge-shaped, four-sided figure of most of the genus, the two dorsal planes are the narrowest, the mesial ridge of the valves is very obtuse; this scarce species is easily known from the other *Pinnæ* of the Palæozoic rocks, by the plainness of its surface. Length, when perfect, probably about three inches.

Lingula.

Gen. Ch.—Longitudinally oblong, equivalve, equilateral; beaks terminal, pointed, gaping; front margin subtruncate, gaping; attached by a fleshy pedicle, passing out between the beaks.

Lingula marginata. *Phil.*

Lingula marginata. *Phil.* Geol. York.

Sp. Ch.—Oblong, twice as wide as long, sides straight, parallel, convex; front margin subtruncate; posterior end obtusely rounded; slightly mucronate in the centre; surface marked with lines of growth parallel with the margin.

Distinguished from the *L. parallela*, Phil., by its truncated front, and straight sides. Length half an inch. Some of the specimens shew traces of the pedicle of attachment.

Lingula parallela. *Phil.*

Lingula parallela. *Phil.* Geol. York.—Lingula parallela. *Portk.* Geol. Rep.

Sp. Ch.—Oblong, convex, twice as long as wide; sides nearly parallel, slightly convex; front convex; posterior end elliptical, pointed.

Several specimens have occurred, apparently referrible to this species, but the various fossil species of *Lingula* are so ill defined, and resemble each other so closely, that without very perfect specimens it is difficult to identify them.

Lingula squamiformis. *Phil.?*

Lingula squamiformis. *Phil.* Geol. York. (?)—Lingula squamiformis. *Portk.* Geol. Rep.

Sp. Ch.—Oblong, width rather more than half the length; sides straight, parallel; front subtruncate; posterior end obtusely rounded; slightly acuminate in the middle; convex; depressed towards the front margin; surface with irregular, concentric lines of growth.

The specimens corresponding to these described by Captain Portlock are exceedingly abundant in certain localities. I have never seen a specimen so wide in proportion to the length as that figured by Professor Phillips; there may, however, be varieties. Length, ten lines, width six lines.

Anomia. *Linn.*

Gen. Ch.—Shell very thin, irregular, inequivalve, perlaceous, attached by a calcareous mass passing through a foramen near the beak of the lower valve, which is flat or concave, the other convex.

Anomia antiqua. *M'Coy.* (Pl. XIX. fig. 7).

Sp. Ch.—Hemispherical, irregular, convex; margin deflexed; surface of both valves minutely but irregularly wrinkled concentrically; foramen in the lower valve large, circular.

This interesting shell occurs not unfrequently; but as the specimens most usually shew only the dorsal valve, they might be easily taken for a mass of *Stromatopora;* the irregular shape, and delicate, concentric plication, heightening the resemblance: the discovery, however, of the perforated, attached valve, which I have figured, points out its true nature. The shell is very thin. Length one inch, width the same.

Malleus orbicularis. *M'Coy.* (Pl. XIX. fig. 2).

Sp. Ch.—Shell orbicular, slightly oblique, thick, irregular, foliaceous; anterior wing small, rounded at the extremity, having a deep, angular sinus beneath it for the byssus; posterior wing, with nearly parallel margins, subtruncate at the extremity; surface irregularly marked by the imbricating, concentric laminæ of growth.

Some of the species of *Avicula* and *Malleus* are so nearly allied, that in the fossil state it is sometimes difficult to distinguish between their genera; in the present instance, however, the great thickness of the foliaceous shell, and its *irregularity*, obviously approximate it to the Linnæan *Ostreæ*, of which *Malleus* is a portion: from all the other species of *Malleus* it is distinguished by the nearly orbicular form of the body of the shell. Length three inches, width three inches eight lines; length of hinge-line three inches three lines.

Lima. *Linn.*

Gen. Ch.—Longitudinally oval, oblique; auriculated valves gaping on one side, near the umbones; with a triangular disc between the beaks, divided in the centre by a triangular, ligamentary pit; without teeth.

Lima alternata. *M'Coy.* (Pl. XV. fig. 4).

Sp. Ch.—Oblong, convex; hinge rectangular, ears slightly rounded, separated from the body of the shell by a wide, shallow sinus in the margin, and a hollow from thence to the beak; surface entirely covered with very fine, sharp, undulating striæ, alternately larger and smaller.

This species is allied to the *Lima prisca*, M'Coy, but is larger, less convex, and much more finely striated. In the present species the striæ are alternately larger and smaller, but perfectly equal, and farther apart in the *L. prisca*. Length about eleven lines, width ten lines.

Lima concinna. *M'Coy.* (Pl. XV. fig. 6).

Sp. Ch.—Obliquely ovate; hinge-line oblique; ears very small, without radiating striæ, equal, surface radiated with very numerous, close, fine, flexuous striæ, alternately thicker and thinner; the intervening spaces being less than half the width of the ridges.

This little shell has no very tangible characters, but is, nevertheless, quite distinct from any other mountain limestone form. The ears are very small, and either smooth or slightly striated parallel with the outer margin; the valves are nearly convex, and very closely striated, the striæ being more nearly equal on one valve than on the other; the general outline is broadly ovate and oblique. Length five lines, width five lines.

Lima decussata. *M'Coy.* (Pl. XV. fig. 3).

Sp. Ch.—Obliquely ovate, lengthened, slightly convex; ears very small, equal; hinge-line oblique; surface radiated, with numerous unequal, obtuse, smooth ridges, the spaces between which are strongly striated transversely.

This rare and beautiful species is easily distinguished from the Devonian *Pecten granulosus*, Phil., with which it is alone likely to be confounded, by its very short hinge-line, and by the thickness and inequality of the longitudinal striæ. Length seven and a half lines, width six lines.

Lima lævigata. *M'Coy.* (Pl. XIV. fig. 3).

Sp. Ch.—Obliquely oval, convex; ears very small, undefined; surface smooth, with regular, obsolete, concentric undulations.

This is a very scarce species, it is regularly oval in form, the ears being so small as scarcely to interrupt the regularity of the outline; the hinge-line is oblique, short; the body of the shell concentrically marked with broad, rounded wrinkles or waves, which are very slightly raised above the surface; to the naked eye, the surface appears smooth, but under a lens is found to be marked with very delicate, waving, longitudinal striæ. Length one inch four lines, width one inch.

Lima obliqua. *M'Coy.* (Pl. XV. fig. 7).

Sp. Ch.—Obliquely oval, slightly convex, smooth, marked with few strong, distant lines of growth; hinge-line very oblique.

The oblique, regularly oval outline, together with its smooth surface, distinguishes this from the other species of *Lima;* the lines of growth are distant, regular, and very strong. Length ten lines, width eight lines.

Lima planicostata. *M'Coy.* (Pl. XV. fig. 5).

Sp. Ch.—Obliquely ovate, compressed, hinge-line equal to the width of the shell, ears equal, distinct, smooth; surface radiated with numerous flat, unequal ribs, separated by very narrow, deep, concave sulci.

This delicate little species is distinguishable by its broad, flat, unequal ribs, they increase in number towards the margin, and are smooth; the ears are large, the hinge-line oblique; the beaks very small; the body is evenly, but slightly convex. Length six lines, width five lines.

Lima prisca. *M'Coy.* (Pl. XVIII. fig. 6).

Sp. Ch.—Oblong, oval; hinge nearly straight; ears large, rectangular, anterior smallest; surface with numerous, fine, slightly undulating, longitudinal, thread-like ridges.

This remarkable fossil bears a strong resemblance to the recent *L. fragilis* of our coasts. The shell is thin, and somewhat inflated; surface rugged transversely; from the lines of growth the beaks are small but prominent, and the ears large; the longitudinal striæ sharp and distinct. Length ten lines, width seven lines.

Lima semisulcata. *M'Coy.* (Pl. XV. fig. 2).

Sp. Ch.—Elongate, oval, depressed; hinge-line short, oblique; posterior ear twice the length of the anterior; surface smooth, with five or six sharp, longitudinal striæ in the middle of each valve.

This beautiful little species is easily known by its fine, sharp, mesial ridges, all the remainder of the surface being perfectly smooth, with the exception of a few, obscure, concentric wrinkles of growth. The general form is rather depressed, the beak is small but prominent, the ears very short. Length seven lines, width five lines.

Pecten. *Linn.*

Gen. Ch.—Shell regular, depressed, nearly orbicular, auriculated; umbones central; ligament small, internal; hinge-margin short.

Pecten æqualis. *M'Coy.* (Pl. XV. fig. 13).

Sp. Ch.—Orbicular, subtriangular, wider than long; gibbous; ears unequal, anterior rounded, posterior pointed, marked with about eight strong ridges, parallel with the outer margin; body of the shell radiated with about seventeen strong, rough, distant ribs, equal in thickness but alternately longer and shorter, roughened by numerous strong, irregular, concentric wrinkles.

This little species is not remarkable for any very striking character, excepting, perhaps, the equality of thickness in the radiating ridges, although of unequal length; the only species it approaches is the *P. cancellatulus*, M'Coy, (Pl. XIV. fig, 9.), from which it differs in the radiating ridges being alternately longer and shorter, and in the irregularity of the concentric wrinkles. Length two lines, width two and a half lines.

Pecten asperulus. *M'Coy.* (Pl. XVI. fig. 5).

Sp. Ch.—Orbicular, slightly convex; ears moderate, unequal, anterior rounded, marked with numerous, radiating ridges, crossed by striæ parallel with the margin; posterior pointed and similarly marked; surface of the shell regularly radiated with numerous sharp, tuberculated striæ, alternating with which are an equal number of much finer spinose striæ, the spaces between them strongly plicated transversely.

This species approaches the *P. rugulosus*, M'Coy, in general appearance, but is distinguished by the transverse striation of the ears, the distinctly tuberculated, radiating ridges, and the intervening spaces, which are smooth in *P. rugulosus*, having a distinct concentric plication in the present shell. Length about seven lines, width seven lines.

Pecten arachnoideus. *Phil.*

Pecten arachnoideus. *Phil.* Pal. Fos.

Sp. Ch.—Obliquely ovate, slightly convex; ears small, nearly equal, acute, smooth, or marked with a few lines of growth; surface with few distant, sharp, radiating sulci, forming between them broad, flat, unequal ribs, crossed by close, fine, concentric striæ.

This species occurs of considerable size, but I have not been able to satisfy myself as to whether the obliquity be real or accidental. Length one inch nine lines, width one inch ten lines.

Pecten arenosus. *Phil.*

Pecten arenosus. *Phil.* Geol. York.

Sp. Ch.—Shell subtriangular, convex; ears large, square, distinct; surface with very numerous, sharp, radiating ridges, alternately larger and smaller, decussated by very fine, concentric striæ.

This species has the radiating ribs very numerous and close together, alternately longer and shorter; under the lens they appear regularly reticulated by sharp, transverse lines; the ears are large, rectangular, unequal, radiatingly striated. Length one inch, width one inch two lines.

Pecten bellis. *M'Coy.* (Pl. XV. fig. 15).

Sp. Ch.—Ovate, convex; ears moderate, nearly equal, radiated with few, distant, rounded ridges, the intervening spaces being sharply striated parallel to the external margin; body of the shell marked with about thirty-two sharp, radiating ridges, alternately larger and smaller; interspaces nearly smooth, or faintly marked by irregular lines of growth.

This little shell approaches the *P. gentilis*, Sow., very much in general appearance, but has more than twice the number of radiating ridges, and is shorter in proportion to the width. Length three lines, width three lines.

Pecten cancellatulus. *M'Coy.* (Pl. XIV. fig. 9).

Sp. Ch.—Orbicular, convex; ears large, square; surface with about fifteen thick, radiating ribs, which are cancellated and tuberculated by thinner, transverse ones.

This singular shell is remarkable for the great size and regularity of the radiating ribs; these are slightly nodulous where they pass over the concentric ribs, which are about half their thickness; the spaces resulting from the crossing of these two sets of ribs are nearly square; the ears are rather large and rectangular, with sharp, sigmoidal striæ parallel with the margin. Length three lines, width three and a half lines.

Pecten cingendus. *M'Coy.* (Pl. XVII. fig. 11).

Sp. Ch.—Truncato-orbicular, slightly convex; ears unequal, posterior very large, rectangular, undefined; anterior one small, narrow, smooth; surface with about twelve concentric, angular, smooth ridges, becoming obsolete on the large posterior ear.

This strongly marked species at first sight bears a resemblance to the *P. Sedgewickii*, M'Coy, but it is smaller, less convex, and has much smaller and more numerous concentric ridges, the ears also are entirely different. Length six lines, width seven lines.

Pecten clathratus. *M'Coy.* (Pl. XIV. fig. 12).

Sp. Ch.—Nearly orbicular, convex; surface with about fifteen strong, radiating ribs, between each pair of which are three smaller ones, which are cancellated by transverse ribs equalling them in thickness.

This beautiful shell has between each of the fifteen large ribs, three smaller ribs, the centre one of which is slightly the largest; it is these three smaller ribs only that are crossed by the transverse ridges; those are placed at such a distance, that the spaces resulting are nearly square: at each crossing of a longitudinal and transverse rib, there is a swelling or tubercle produced.

Pecten cœlatus. *M'Coy.* (Pl. XVIII. fig. 2).

Sp. Ch.—Shell convex, rounded; length and width equal; about sixty-six close, round, equal, scaly ridges.

A handsome shell, with numerous, close, rounded, radiating ribs, each closely set with small, arched, imbricated scales, not distinctly visible without the aid of a lens, surface evenly convex; outline nearly circular. I have not seen the ears of this species. Length one inch three lines, breadth one inch four lines.

Pecten cognatus. *M'Coy.* (Pl. XIX. fig. 4).

Sp. Ch.—Truncato-orbicular, depressed; posterior ear pointed, undefined from the body of the shell; surface radiated with about thirty-eight sharp, slender ridges, nearly equal in length and thickness, and separated by flat spaces twice the width of the ribs, crossed by fine, sharp, concentric striæ, about the same distance from each other as the radiating ribs.

This species resembles the *P. megalotis*, M'Coy, but is distinguished by the ears being *radiated;* the posterior ear is also shorter and less acute, and the entire shell wider and more depressed in the present species. Length six lines, width six lines.

Pecten comptus. *M'Coy.* (Pl. XV. fig. 14).

Sp. Ch.—Longitudinally ovate; ears equal, anterior rounded, with a deep sinus, posterior pointed, marked with three radiating ridges, crossed by very fine, sharp striæ; body of the shell radiated with about forty-six distinct, rounded irregular ridges, intervening spaces flat, smooth.

This pretty little shell occurs in great abundance, in company with the *P. irregularis*, M'Coy, which it resembles in general size and shape, and in the irregular thickness of the radiating ribs, but has nearly twice the number of radiating ridges, making it, of course, appear much more finely striated, even to the naked eye. Length three lines and a half, width three lines and a half.

Pecten concavus. *M'Coy.* (Pl. XV. fig. 10).

Sp. Ch.—Orbicular, wider than long; ears nearly equal; left valve concave outwardly; covered by about one hundred and fifty rough, radiating ridges, alternately larger and smaller.

This large species, like the *P. Jacobæus*, has the left valve *concave outwardly*, in which it differs from all the other Palæozoic species. Length three inches three lines, width three inches eight lines.

Pecten concentrico-striatus. *M'Coy.* (Pl. XIV. fig. 5).

Sp. Ch.—Transversely obovate, or nearly orbicular, convex; ears very large, unequal, radiatingly striated; anterior narrow, subtruncate at the extremity, deeply divided from the body of the shell; posterior angular, pointed; surface with delicate, rather distant, concentric striæ.

This is a wide species; the ears are large, unequal, and marked with radiating ribs, decussated by the lines of growth; the surface is marked with rather distant, rounded, concentric striæ, the spaces between which are smooth; the hinge-line in well-preserved specimens is dentated. Length ten lines, width eleven lines.

Pecten conoideus. *M'Coy.* (Pl. XVII. fig. 2).

Sp. Ch.—Longitudinally ovate, subtriangular, convex valve very gibbous; ears large, equal, slightly pointed; radiating striæ numerous, smooth, equal, rounded, about their own diameter apart, spaces between them flat, smooth.

This species is very inequivalve; the convex valve is very gibbous; the beak large and inflated; the ears are nearly equal, and without radiating striæ. Length one inch, width eleven lines.

Pecten consimilis. *M'Coy.* (Pl. XV. fig. 16).

Sp. Ch.—Elongate, oval, convex, smooth; ears very small, unequal; posterior ear largest, rounded at the extremity, deeply divided from the body of the shell, and reticulated with strong, radiating, and concentric ridges, anterior ear very small, rectangular, with transverse striæ.

This species closely resembles the large *P. elongatus*, M'Coy, and *P. depilis*, M'Coy, in form, and in the small size of the ears; it is distinguished from both, however, by the reticulation of the larger ear. In the present instance the character is of much importance, as from its general size and form it might readily be confounded with the *P. depilis*. Length three lines, width two lines.

Pecten deornatus. *Phil.*

Pecten deornatus. *Phil.* Geol. York.

Sp. Ch.—Nearly orbicular, flattened; ears small, acute, equal; surface smooth, with irregular, concentric wrinkles.

This species has very little to attract the attention of the Palæontologist, being neither characteristic of any particular stratum, or remarkable for its beauty, scarcely even affording a specific character. Length seven lines, width six lines.

Pecten depilis. *M'Coy.* (Pl. XVI. fig. 11).

Sp. Ch.—Lengthened, ovate, convex, smooth; ears small, unequal, striated parallel with the outer margin, posterior ear rounded, anterior ear half the length of the posterior, rectangular; hinge-line less than the width of the shell.

This is one of the very few smooth species of *Pecten* found in the mountain limestone. Length three lines, width two and a half lines.

Pecten dissimilis. *Flem.*

Pecten dissimilis. *Flem.* Brit. Anim. (Not of *Phil.*)

Sp. Ch.—Nearly orbicular; right valve slightly convex, with obtuse, alternately larger and smaller, radiating ribs; the other valve flat, or slightly concave, with sharp, imbricating, concentric striæ.

The difference between this species and the *P. fallax*, M'Coy, is very obvious, both valves being radiatingly striated in the latter, while only one is in the present species. The space intervening between the ribs is smooth; the ears small.

Pecten duplicicosta. *M'Coy.* (Pl. XV. fig. 9).

Sp. Ch.—Longitudinally ovate, depressed; ears nearly equal, pointed, marked with numerous, close, rough, radiating ridges; surface radiated with very numerous, close, fine ridges, disposed in pairs.

This species is unlike any other *Pecten* with which I am acquainted, in the disposition of its striæ: when slightly worn or rubbed, each of the fine, flat, radiating ridges seems doubled, or divided by a fine mesial line. Length seven and a half lines, width seven lines.

Pecten ellipticus. *Phil.*

Pecten ellipticus. *Phil.* Geol. York.

Sp. Ch.—Elongate, ovate, convex, smooth; ears small, equal, square.

This species is distinguished from the *P. Sowerbii*, M'Coy, by its smooth surface, and having ears of the usual form, not raised above the beak of the shell; traces of the colouring frequently remain in this shell; it seems to have been dark zigzag markings, on a light ground. Length one inch two lines, width eleven lines.

Pecten elongatus. *M'Coy.* (Pl. XVI. fig. 9).

Sp. Ch.—Longitudinally oval, length one-sixth greater than the width, convex; surface minutely striated concentrically; ears nearly equal, one square, slightly defined, the other rounded, deeply separated from the body of the shell.

This fine species appears smooth to the naked eye, but in finely preserved specimens, or with the aid of a lens, very minute, regular, concentric striæ are visible; from the *P. Sowerbii*, M'Coy, which has somewhat similar striæ, it is distinguished by its greater size, and the form of its ears, while from the *P. flatus*, M'Coy, which to the eye appears nearly as smooth, and has the same general form, it is distinguished by having the minute striation concentric, instead of longitudinal, as in that species. Length one inch seven lines, width one inch six lines.

Pecten exiguus. *M'Coy.* (Pl. XV. fig. 11).

Sp. Ch.—Longitudinally ovate, slightly convex; ears large, distinctly marked, nearly equal in length, posterior one pointed, anterior one narrow, rounded at the end, deeply divided from the body of the shell; both ears marked with radiating ridges, crossed by sharp, concentric striæ; body of the shell marked with exceedingly fine, close, radiating striæ.

This is the smallest species of *Pecten* with which I am acquainted; the striæ on the body of the shell are so fine that most specimens appear smooth to the naked eye. It is very common in some localities. Length one and a half lines, width slightly less.

Pecten fallax. *M'Coy.* (Pl. XIV. fig. 2).

Sp. Ch.—Nearly orbicular, convex; hinge-line exceeding the width of the shell; ears unequal; surface of one valve with numerous rounded, nodulous ribs, alternating irregularly with very thin, smooth ones; intervening spaces striated transversely; the other valve with numerous, radiating, smooth, equal ribs, the spaces between which are also smooth.

This species is remarkable for the difference it exhibits between the right and left valves, the one being covered with thick, nodulous, radiating ridges, which even cover the ears; between each pair of those there is usually a very fine, smooth rib, the intervening spaces being sharply striated across; the opposite valve, on the contrary, has much more numerous equal ribs, which, with the intervening spaces, are quite smooth. It

appears to me that Professor Phillips's figure 19, which he refers with a doubt to the *P. dissimilis* of Fleming, belongs rather to this shell; the two species are very distinct. Length one inch two lines, width one inch four lines.

Pecten filatus. *M'Coy.* (Pl. XIV. fig. 10).

Sp. Ch.—Elongate, ovate, convex; ears distinct, square, unequal; surface nearly smooth, with very fine, longitudinal, thread-like striæ.

This species is remarkable for its nearly parallel, wire-like striæ, which are scarcely visible to the naked eye; the form is regularly ovate; the ears deeply divided from the body of the shell, large, unequal, rectangular. Length ten lines, width nine lines.

Pecten flabellulum. *M'Coy.* (Pl. XV. fig. 17).

Sp. Ch.—Orbicular, flattened; surface gently undulated by faint, irregular, radiating, rounded plaits, obsoletely striated longitudinally; a few distant, sharp, radiating ridges extend from the beak about half way to the margin.

This beautiful shell is in no danger of being confounded with any other; it resembles an expanded fan, the surface being marked with broad, nearly obsolete, longitudinal folds, and about eight or nine slender, radiating ridges extending half way from the beak; under the lens the surface appears very finely and obscurely striated. Length one inch, width about two lines more.

Pecten flexuosus. *M'Coy.* (Pl. XVIII. fig. 1).

Sp. Ch.—Shell ovate, nearly orbicular, with about forty-five irregular, rounded, flexuous, radiating ribs; ears small, falcate, pointed, sharply striated, parallel with the outer margin.

The only specimen I have seen of this species is but indifferently preserved; the surface is slightly convex; the ribs unarmed, radiating in a waved or slightly irregular manner; only one ear remains, small, and somewhat falcate. Length two inches, width two inches two lines.

Pecten Forbesii. *M'Coy.* (Pl. XV. fig. 20).

Sp. Ch.—Orbicular, convex; surface marked with strong, close, radiating ribs, alternately larger and smaller, cancellated by sharp, concentric ridges; ears small, unequal, one square, undefined from the body of the shell, the other small, narrow, rounded, marked with a few radiating ridges, and strong striæ parallel to the margin.

This little species is allied to the *P. arenosus*, Phil., but is more orbicular, and the concentric striæ are coarser and farther apart; the ears also are entirely different in form. Length five and a half lines, width six lines.

Pecten gibbosus. *M'Coy.* (Pl. XVIII. fig. 5).

Pecten gibbosus. *M'Coy.* In Catalogue Geol. Soc. Dublin.

Sp. Ch.—Shell orbicular, very convex, smooth, marked by a few concentric lines of growth; ears nearly equal in length, posterior ear undefined, rectangular, anterior ear narrow, deeply divided from the body of the shell, truncate at the extremity.

This little species is almost globular; the small, lengthened ear is perfectly flat and distinctly separated from the body of the shell. Length seven lines, width the same.

Pecten granosus. *Sow.*

Pecten granosus. *Sow.* Min. Con.—Pecten granosus. *Phil.* Geol. York.

Sp. Ch.—Nearly orbicular, wider than long, convex; ears small, unequal, surface with about thirty tuberculated ribs, between each of which is a smaller, nearly smooth one.

This fine species is one of the largest of the genus found in the carboniferous limestone; the ears extend nearly the width of the shell, but are narrow. Length one inch ten lines, width two inches (frequently three inches in length).

Pecten granulosus. *Phil.*

Pecten granulosus. *Phil.* Pal. Fos.

Sp. Ch.—Obliquely ovate, lengthened, slightly convex; ears large, distinct, nearly equal; surface reticulated with fine, equidistant, radiating and concentric striæ.

This little species resembles a *Lima* in general form. It is easily distinguished from the other species by the minute, equal reticulation of the surface. Length six lines, width four lines.

Pecten Hardingii. *M'Coy.* (Pl. XV. fig. 18).

Sp. Ch.—Ovato-orbicular, depressed; ears equal, square, radiated with about five or six equal ridges, crossed by others of equal size, parallel with the outer margin; surface radiated with twenty-two strong, equal, spinulose ridges, alternating with which are an equal number of much finer striæ, also spinulose; intervening spaces flat, smooth.

This species is distinguished from the *P. interstitialis*, Phil., and *P. intercostatus*, M'Coy, by having only one fine rib between each pair of large ones. Length six lines, width seven lines.

Dedicated to Major Harding, who has so materially advanced the knowledge of the fossils of the Devonian series.

Pecten hians. *M'Coy.* (Pl. XVI. fig. 6).

Sp. Ch.—Longitudinally ovate, depressed; ears small, unequal, a very large fold beneath the posterior ear, forming a hiatus in the margin; surface with very numerous, rounded, radiating ridges, alternately larger and smaller, crossed by regular, concentric, imbricating striæ.

This shell is rendered very remarkable by the large fold on the posterior side, which, probably, served to allow the byssus attaching the shell to pass through; the byssus, however, according to this view, must have far exceeded the size usual in this genus; the ears are very small for the size of the shell. Length two inches, width two inches two lines.

Pecten incrassatus. *M'Coy.* (Pl. XVI. fig. 1).

Sp. Ch.—Orbicular, convex; ears nearly equal, acute; about twenty-five thick, rounded, radiating ribs; surface with fine, irregular, concentric wrinkles.

This boldly marked shell is easily recognized by its numerous, large, rounded ribs, most of which are continued distinctly to the beak; they are separated by concave spaces, wider than themselves: the ears are sharply striated parallel to the margin; the body of the shell has very delicate, short, discontinuous, membranous, concentric markings, which become larger towards the margin, where they give the ribs a slightly nodulous character. Length one inch two lines, width one inch four lines.

Pecten inornatus. *Phil.*

Pecten inornatus. *Phil.* Geol. York.

Sp. Ch.—Ovate, slightly convex; ears small, equal, nearly square; surface concentrically waved, with obtusely rounded, smooth wrinkles.

This species is usually somewhat less than the *P. ellipticus*, Phil., from which it is distinguished by the large, concentric wrinkles on the body of the shell. Length seven lines, width six lines.

Pecten intercostatus. *M'Coy.* (Pl. XVIII. fig. 4).

Sp. Ch.—Shell oblique; surface with about nine or ten strong, radiating ribs; between these are from three to nine smaller, the middle one of which is usually larger than the rest; all the ribs have fine, compressed, hooked spines at regular intervals, which, when broken, give them a tubercular aspect; ears very large, square, with radiating ridges, and strong spines on the dorsal margin.

This beautiful little shell appears very closely allied to the *P. interstitialis*, Phil., but the number of small ribs between every two large ones, instead of being regularly three, is seldom less than five, and as frequently nine, on the one specimen; the ears also differ materially. It is very seldom that any of the delicate spines are preserved, the ribs more frequently presenting a roughened or tuberculated aspect. Length six and a half lines, width seven and a half lines.

Pecten interstitialis. *Phil.*

Pecten interstitialis. *Phil.* Geol. York.

Sp. Ch.—Obliquely ovate; ears small, acute; about eighteen sharp, radiating, spinose ribs, in the spaces between which are three smaller ribs, or striæ.

This species has nearly equal, acute ears, which are striated both radiatingly and across; the three elevated striæ between each pair of large, spinous ribs are very regular. Length seven lines, width six and a half lines.

Pecten irregularis. *M'Coy.* (Pl. XV. fig. 8).

Sp. Ch.—Longitudinally ovate, or nearly orbicular, convex; ears moderate, nearly equal, marked with about five radiating ridges, crossed by fine striæ, parallel with the outer margin; body of the shell radiated with about twenty-six flattened ridges, very irregular in thickness and length, intervening spaces smooth.

This little species occurs in company with the *P. bellis*, M'Coy, which it much resembles; it is distinguished, however, constantly, by the flatness and irregularity of the radiating ridges, which also gives them the appearance of being more crowded, although really less numerous, than in that shell. Length two lines, width two lines.

Pecten Jonesii. *M'Coy.* (Pl. XVI. fig. 10).

Sp. Ch.—Obliquely obovate, convex; ears unequal, finely striated, parallel to the margin, anterior largest, connected with the body of the shell by a flat space, posterior ear slightly pointed; body of the shell with about twenty-eight narrow, rounded, radiating ribs, three or four times their diameter apart, intervening spaces smooth, slightly and irregularly wrinkled concentrically.

This species is remarkable for the distinctness of its striation, the slender, radiating ridges being widely separated, and each continuing distinctly up to the beak; there are no radiating striæ on the ears. Length six lines, width seven lines.

Pecten Knockonniensis. *M'Coy.* (Pl. XVII. fig. 4).

Sp. Ch.—Longitudinally ovate, convex; valves dissimilar, the one marked with close, fine, smooth, radiating striæ, slightly flexuous, and nearly equal in size, the other radiated with about twelve large, rounded ribs, each having a very fine, sharp, ridge on each side, each set of three ribs being separated from the next by a narrow, flat space, all the radiating ridges on this valve are closely set with small, imbricating, scale-like laminæ of growth; ears unequal, marked with radiating ridges crossed by fine lines of growth.

This very beautiful species closely resembles the *P. transversus* of Devonshire, but is distinguished by its smaller size, and the length considerably exceeding the width, the reverse of the proportions in the Devo-

nian species; the ears are also different; some of the finer striæ are frequently flexuous. Length eight lines, width seven and a half lines.

Pecten leiotis. *M'Coy.* (Pl. XV. fig. 21).

Sp. Ch.—Longitudinally obovate, subtrigonal, flat; ears small, nearly equal, pointed, smooth; body of the shell radiated with about thirty-five smooth, sharp, slender, equal ridges; intervening spaces flat, about five times the width of the ridges; slightly wrinkled transversely.

This beautiful shell resembles most closely the *P. micropterus*, M'Coy, from which it is distinguished, as from most others of the radiated species, by its smooth ears. Length ten lines, width nine and a half lines.

Pecten macrotis. *M'Coy.* (Pl. XVI. fig. 13).

Sp. Ch.—Orbicular, depressed; slightly convex; ears unequal; anterior ear pointed, with strong, scaly striæ parallel to the margin; posterior ear very long, acute, with fine, radiating ridges, crossed by delicate lines parallel to the margin, separated from the body of the shell by a steeply inclined space; surface of the shell, with about forty-nine fine, radiating, flattened ribs, rather irregular in some parts of the shell.

This pretty species closely resembles the *Pecten tabulatus*, M'Coy, but is distinguished by its more orbicular form, longer, and longitudinally striated posterior ear, the more convex body of the shell, and, finally, by the much greater number of its radiating ribs. Length five lines, width six lines.

Pecten megalotis. *M'Coy.* (Pl. XIV. fig. 7).

Sp. Ch.—Lengthened, ovate; ears unequal, right ear very large, falcate; surface with about twenty-three narrow, radiating ribs, intervening spaces striated across; large ear with very sharp, prominent, curved striæ.

In this species the radiating ribs are small, rounded, and rather distant, one-half only reach the beak, the other half terminate at about a fourth the length of the shell from the beak; the transverse striæ are faint, and rather irregular, strongest near the beak; the large ear is marked with numerous, sharp, scale-like striæ.

Pecten meleagrinoides. *M'Coy.* (Pl. XVI. fig. 3).

Sp. Ch.—Truncato-orbicular, convex; ears nearly equal, flattened, slightly pointed, not distinctly separated from the body of the shell; surface radiated with strong, rounded ridges, alternately larger and smaller; the interstitial spaces are about equal to the ridges in breadth, concave; surface marked with obsolete, concentric, wrinkles.

This resembles the tuberculated valve of *P. fallax*, M'Coy, in shape, but is distinguished by its smoother ribs, and much wider and smoother interstitial spaces; the ears also are very different in form, resembling those of a *Meleagrina*. Length ten lines, width eleven lines.

Pecten micropterus. *M'Coy.* (Pl. XV. fig. 12).

Sp. Ch.—Longitudinally ovate, slightly oblique, depressed; ears very small, anterior one rectangular, posterior one-third longer, acute, having a straight, flat space between it and the body of the shell; with the exception of the straight portion between the body of the shell and the posterior ear, the entire surface is radiated with fine sharp ridges, distant about four times their diameter apart, intervening spaces smooth, with obsolete, irregular, transverse wrinkles.

This species is remarkable for the small size and singular form of its ears, besides which, it is easily known from the other ancient species, by its very distant, sharp, slender, radiating ridges. Length nine lines, width ten lines.

Pecten mundus. *M'Coy.* (Pl. XVII. fig. 5).

Sp. Ch.—Ovate, convex; ears large, slightly pointed, equal, without radiating ridges, closely striated, parallel to the margin; surface with distant, very fine, radiating ridges, alternately larger and smaller, decussated by numerous, fine, concentric wrinkles.

In this species the radiating striæ are remarkably slender, and three or four times their diameter apart; the ears are perfectly equal in size and shape, transversely striated; the concentric striæ of the body of the shell are fine, sharp, and about the same distance apart as the longitudinal ones, but rather irregular. Length four and a half lines, width four lines.

Pecten Murchisoni. *M'Coy.* (Pl. XVIII. fig. 3).

Sp. Ch.—Shell longitudinally ovate; surface radiated with about twenty thick, nodular, ribs, alternating with an equal number of smaller ones, the intervening spaces flat, smooth; ears large, equal, square, with three or four ribs.

This elegant species is marked by about eighteen or twenty large, distant, radiating ridges, which, in some lights, appear slightly tubercular; between these are an equal number of small ribs, the spaces between which are perfectly even and smooth; the ears large and square, equal, smooth, with a few radiating, round ribs, four on one side, and two on the other; crossed on one ear by two ridges equalling the others in thickness, but running parallel with the lateral margin; at each intersection of the ribs a large tubercle is formed. Length one inch and a half, breadth one inch and a quarter.

Pecten orbiculatus. *M'Coy.* (Pl. XIV. fig. 8).

Sp. Ch.—Orbicular, very convex, smooth; ears acute, nearly equal, marked with radiating ribs.

This curious species is closely allied to the *P. gibbosus*, M'Coy, but is at once distinguished by the form of the ears, and their being marked with radiating striæ. Length five lines, width six lines.

Pecten ovatus. *M'Coy.* (Pl. XIV. fig. 11).

Sp. Ch.—Ovate, flat, ears large, square; surface with about seventeen equal, distant, tuberculated ribs, the spaces between which are sharply striated transversely.

This species has a more regular ovate form than any other with which I am acquainted; the ears extend very nearly the width of the shell, and are radiatingly ribbed; the radiating ribs on the surface are regularly tuberculated, and of equal size, although I have occasionally seen, as in the magnified figure, a very slender, irregular rib, tuberculated like the rest, extending up a short way from the margin; the intervening spaces are delicately, but sharply striated across. Length eight lines, width seven lines.

Pecten pera. *M'Coy.* (Pl. XV. fig. 19).

Sp. Ch.—Ovate, slightly convex, front broad; ears large, unequal, anterior one rectangular, posterior larger, pointed; surface radiated with very numerous, close, fine striæ, alternately larger and smaller, crossed near the margin by sharp, concentric lines; ears with about ten or twelve sharp, radiating striæ, similar to those of the body, and crossed by very delicate striæ.

From the width, and slight convexity of the front, the outline resembles a bag or satchel. I am not sure whether the radiating striæ are spinose; in some lights they seem to be so, but the character is doubtful. Length ten lines, width one inch.

Pecten planicostatus. *M'Coy.* (Pl. XIV. fig. 6).

Sp. Ch.—Obliquely obovate, slightly convex; ears short, square, unequal, smooth; surface with very broad, irregular, smooth, flattened, radiating ribs, from the beak.

I have much doubt whether this shell really belongs to the genus *Pecten*—it is at least an aberrant type, and if placed in this genus it leads to *Lima*, and if placed in *Lima*, it leads back to the present genus. The hinge-line is oblique, the ears short, smooth, and slightly unequal; the surface of the shell is marked with very broad, smooth ribs, much flattened, and dividing irregularly as they approach the margin, where they are about twenty in number. Length one inch three lines, width one inch four lines.

Pecten planoclathratus. *M'Coy.* (Pl. XVI. fig. 2).

Sp. Ch.—Longitudinally ovate, convex, reticulated with numerous, equal, longitudinal, and concentric, broad, flattened ridges.

This species appears to be exceedingly rare, only one specimen being as yet known, and even that one is imperfect as to the ears; the species is, however, easily known from any other by the flatness of the ridges. Length ten lines, width nine lines.

Pecten plicatus. *Sow.*

Pecten plicatus. *Sow.* Min. Con.

Sp. Ch.—Nearly orbicular, oblique, depressed; ears large, unequal, surface covered with fine, smooth, flattened, irregular, radiating striæ.

This species is closely allied to the *P. papyraceus*, but has much smaller ears, and coarser striæ.

Pecten polytrichus. *Phil.*

Pecten polytrichus. *Phil.* Pal. Foss.

Sp. Ch.—Transversely elliptical, twice as wide as long; surface radiated with deep, sharp sulci, between which are from six to nine finer radiating striæ.

The character of the striation of this species resembles that of the *Orthis interstrialis*. I have never seen specimens shewing the ears.

Pecten quinquelineatus. *M'Coy.* (Pl. XVII. fig. 6).

Sp. Ch.—Longitudinally oval, nearly flat; surface slightly irregular, marked with about thirty-five narrow, uneven, radiating ridges, each pair having usually between them five smaller, radiating striæ, the middle one of which is largest, interstitial spaces flat; (ears unknown).

This fine shell at once strikes the eye, from its great size and regularly oval contour; the principal radiating ridges are strong and direct, but narrow; the intervening striæ are almost invariably five, but in one or two instances near the sides there are only three; of these the middle or odd one is always larger than the others. I have not seen the ears of this species. Length four inches two lines, width four inches.

Pecten rugulosus. *M'Coy.* (Pl. XVII. fig. 7).

Sp. Ch.—Orbicular, slightly convex; ears distinct, nearly equal, anterior rounded, deeply divided from the body of the shell, marked with four distant, radiating ridges; posterior slightly pointed, marked with three or four rounded, radiating ribs; body of the shell with numerous close-set, radiating striæ, alternately larger and smaller, slightly nodular or roughened.

This species, has little to attract attention, either in its form or markings, the distinct, radiating ridges on

the ears, however, seem to fix it on the memory; the radiating ridges of the body are but slightly roughened by an obscure nodulation, the spaces between them are slightly concave and smooth. Length ten lines, width eleven lines.

Pecten sclerotis. *M'Coy.* (Pl. XVI. fig. 4).

Sp. Ch.—Longitudinally ovate, depressed, ears unequal; surface with numerous longitudinal, rough ribs, alternately larger and smaller; pointed ear, with obtuse striæ parallel to the margin, and irregularly tuberculated.

Although the only specimen I know of this shell is imperfect, yet it is not likely to be confounded with any other of the genus; it comes nearer to the *P. Murchisoni*, M'Coy, than perhaps any other species, but has nearly three times the number of ribs, and differently formed ears. The radiating ribs are narrow, rounded, and closely set with small, erect scales; the spaces between them are deep, concave, and smooth; there are about thirty of the principal ribs, and an equal number of intervening shorter and thinner ones; the pointed ear, which is the only one preserved in the specimen, has, near the base, numerous smooth, obtuse striæ, the remainer of it being covered with rough, irregular tubercles. The specimen is too imperfect to give the measurements correctly.

Pecten Sedgwickii. *M'Coy.* (Pl. XIV. fig. 4).

Sp. Ch.—Longitudinally ovate, convex; ears acute, surface smooth, with about ten broad, triangular concentric ridges; the ears are ridged parallel with the margin.

This singular species is concentrically marked with broad, triangular ribs, somewhat like those of *Posidonia Becheri;* the surface is otherwise perfectly smooth. I have dedicated this species to Professor Sedgwick, to whose zeal we are indebted for the unique specimen figured on the plate.

Pecten segregatus. *M'Coy.* (Pl. XVII. fig. 3).

Sp. Ch.—Longitudinally ovate, slightly convex; ears unequal, one falcate, the other rounded; surface radiated with very distant, narrow ridges, every fifth one twice the size of the others, alternately larger and smaller; ears also radiated with similar, very distant ribs; interstitial spaces broad, flat, smooth.

This singular species is easily recognized by the great distance which the narrow, radiating ridges are asunder, and the flat, smooth spaces between them; they are about a line apart in full-grown shells, and about the thickness of a fine thread. The specimens are all imperfect; one of them, however, is one and a half inches long.

Pecten semicircularis. *M'Coy.* (Pl. XVII. fig. 10).

Sp. Ch.—Shell nearly flat, wider than long, front margin semicircular; anterior ear small, square at the extremity, with three close, round, radiating ridges, crossed by sharp striæ, parallel to the margin; surface of the shell closely set with very fine, numerous, equal, radiating ridges, increasing in number towards the margin; intervening spaces flat, transversely striated.

This fine species is so much depressed as to appear nearly flat; the radiating ridges are smooth, very thin, and numerous, new ones being continually added towards the margin; they are more than their own diameter apart. Length two inches two lines, width three inches.

Pecten semistriatus. *M'Coy.* (Pl. XVII. fig. 9).

Sp. Ch.—Orbicular, convex, ears unequal; surface smooth, with the exception of a broad border round the margin, which is marked with radiating striæ, forming between them broad, unequal ribs, very slightly convex.

This curious little species resembles the recent *P. obsoletus* in having the margin only marked with radiating ribs or striæ, which disappearing at about half the length of the shell from the beak, leave all the middle of the shell and the region of the beaks perfectly smooth. Length eight lines, width three and a half lines.

Pecten serratus. *M'Coy.* (Pl. XVII. fig. 8).

Sp. Ch.—Longitudinally ovate, depressed; ears very large, unequal; surface with about thirty narrow, equal, radiating ribs, closely set with pointed scales; posterior ear pointed, with one or two longitudinal undulations of the shell; anterior ear rounded, deeply divided from the body of the shell, with four or five rounded, longitudinal ridges, crossed by erect, waving, scaly lines of growth.

This elegant species is perfectly unlike any other with which I am acquainted; the spaces between the numerous serrated ribs are smooth. Length six lines, width six lines.

Pecten simplex. *Phil.*

Pecten simplex. *Phil.* Geol. York.—Avicula simplex. *Koninck.* Fos. Bel.

Sp. Ch.—Obliquely ovate; width two-thirds the length; left valve gibbous, right valve nearly flat; posterior side steeply truncated; beaks prominent; hinge-line oblique, less than the width of the shell; ears very small, equal, nearly square; surface marked with strong, obtuse, radiating ridges; intervening spaces transversely striated.

This pretty little species cannot with propriety be included either in *Pecten* or *Avicula*, and a new group is much wanting to include it and a number of other fossils.

Pecten Sowerbii. *M'Coy.* (Pl. XIV. fig. 1).

Sp. Ch.—Elliptical, convex in the middle; ears small, equal, acute, conate; surface concentrically striated.

This very beautiful species is distinguished from all the others of the carboniferous limestone by the form of its ears, which are equal, acute, and conate, being considerably elevated above the beak of the shell, as we see in some Oolitic species; the surface is concentrically striated. Length one inch one line, width one inch.

Pecten spinulosus. *M'Coy.* (Pl. XVII. fig. 1).

Sp. Ch.—Longitudinally ovate, convex; ears large, nearly equal; anterior rounded, posterior pointed; body of the shell radiated with about twenty-six sharp, regularly spinose ridges, between each pair of which intervenes one much finer rib, also regularly set with spines at the same distances as those on the larger ridges; ears with close, radiating ridges, crossed by sharp, imbricating striæ.

The spines are placed at such regular distances on the ribs of this little species, that they seem to form concentric, as well as longitudinal rows; they are cylindrical, solid, and placed rather far apart; the ears are remarkably large, nearly equal, and square. Length three and a half lines, width three and a half lines.

Pecten tabulatus. *M'Coy.* (Pl. XVI. fig. 12).

Sp. Ch.—Lengthened, ovate, flat; ears nearly equal; posterior ear rounded, with two or three longitudinal folds, crossed by very strong, scaly striæ, parallel to the margin; anterior ear acute, falcate, with fine striæ parallel to the curved margin. This ear is deeply divided from the body of the shell by a steep space; surface of the shell with about fifteen flat ribs, separated by very narrow, deep sulci; each rib branches as it reaches the margin.

This little species is remarkable for the perfect flatness of the body of its shell, which is, nevertheless, of considerable depth, being much elevated above the plane of the ears, from which it is consequently separated by a very steep plane. Length about six lines, width six lines.

Pecten transversus. *Sow.*

Pecten transversus. *Sow.* Geol. Trans.—Pecten transversus. *Phil.* Pal. Foss.

Sp. Ch.—Transversely oval, slightly convex; ears moderate, nearly equal, acute; surface with strong radiating ridges, disposed in about twenty-six fasciculi of three each, each bundle being distinctly separated from the adjoining ones; entire surface marked with fine, sharp, concentric striæ.

This species resembles the *P. Knockonniensis*, M'Coy, which see: the specimens which have occurred are very imperfect.

Pecten tripartitus. *M'Coy.* (Pl. XVI. fig. 8)

Sp. Ch.—Longitudinately ovate, longer than wide, slightly convex; ears very unequal, one small, square, the other very large, rounded; sides finely and sharply striated longitudinally; middle of the shell smooth.

This species has its surface divided longitudinally into three portions, the two outer of which are delicately striated, and the middle one smooth; this is much more distinct in some specimens than in others, but is always perceptible; the ears are very unequal, the small one smooth, the larger with coarse, radiating striæ. Length four lines, width three lines.

Pecten undulatus. *M'Coy.* (Pl. XVII. fig. 12).

Sp. Ch.—Elongate, ovate; ears unequal, posterior one small, pointed, anterior large, rounded, deeply divided from the body of the shell; surface with numerous, equal, fine, concentric striæ, decussated by radiating striæ similar to the transverse ones in shape and size, but rather farther apart; three or four short, round plaits in the posterior side-margin.

This species is rendered very remarkable by the short, obtuse folds or plaits in the posterior margin, and I have found the character constant in six or seven specimens which came to hand of the species, they appear very characteristic; the whole surface is beautifully reticulated, with slightly flattened, delicate striæ. Length ten lines, width nine lines.

Pecten variabilis. *M'Coy.* (Pl. XVI. fig. 7).

Sp. Ch.—Shell smooth; ears unequal; anterior ear square at its extremity, narrow; posterior ear rectangular, undefined; form varying from longitudinally ovate to orbicular, and from slightly convex to globose.

The normal character of this very variable species appears to be a longitudinally ovate form, the length, however, but little exceeding the breadth, moderately convex, and perfectly smooth; but among the countless varieties some are nearly flat, others almost hemispherical; some shew a plication of the surface, longitudinal, oblique, or concentric, and some extreme varieties are even wrinkled or undulated concentrically; these are, however, obviously the abnormal conditions; the parts about the beak or the ears are not liable to variation. Lengh eleven lines, width nine lines.

Monotis. *Bronn.*

Gen. Ch.—Suborbicular, inequivalve; usually rounded anteriorly; auriculated posteriorly; ears undefined.

Those shells differ from *Pecten* in having their ears usually undefined, and very frequently no ear on the anterior side, whence their name.

Monotis æqualis. *M'Coy.* (Pl. XV. fig. 1).

Sp. Ch.—Suborbicular, length and width equal; hinge-line less than the width of the shell; right valve convex, posterior ear pointed, anterior ear small, rounded; left valve flattened; body of the shell radiated with

about twenty-six unequal, rounded ridges; ears radiated with three or four similar ridges; the ears, and sometimes the margin of the valves, are sharply striated concentrically.

This curious little shell resembles the *M. decussata* of the Oolite in shape, having a distinct, but small ear on the anterior side. It occurs in great abundance in company with the *P. simplex*, Phil., which it much resembles, but which is easily known from the present shell by its smooth, equal ears, finer striæ, and lengthened, oblique form. Length three lines, width three lines.

BRACHIOPODA.

Before entering on the *Brachiopoda* I shall give a brief outline of what has been done by the principal writers on the subject.

Cuvier included in his *Brachiopoda* only the genera *Lingula*, *Terebratula*, *Spirifer*, *Thecidea*, *Orbicula*, and *Crania*.

Lamarck removed *Crania* from the *Brachiopoda* to his family *Rudistes*, in which he also placed *Calceola* and *Discina;* he included only in the *Brachiopoda* the genera *Orbicula*, *Terebratula*, and *Lingula*.

De Blainville forms his order *Palliobranchiata* of the genera *Lingula*, *Terebratula*, *Strophomena*, *Dianchora*, *Thecidea*, *Plagiostoma*, *Podopsis*, *Orbicula*, and *Crania*. This author, it will be observed, admits the genus *Strophomena* (*Productus*), but also arranges with them *Dianchora*, *Podopsis*, and *Plagiostoma*, genera which almost every other author agrees to have little or no affinity with them.

Deshayes recommends the suppression of the genus *Spirifer*, considering, with many others, that the spiral appendages are the spiral arms of the animal, common to all the *Brachiopoda;* hence he believed that genus not to possess any peculiar generic character, and therefore places all the *Spirifers* either in the genus *Terebratula* or *Producta*, according to whether the foramen in the beak of the large valve be distinctly visible or otherwise. Leaving out of consideration what appears to be the primary error in this view, namely, the considering the spiral appendages of *Spirifer* as the spiral arms of the animal, a great source of inconvenience in this arrangement is, that nearly allied species, and sometimes even two specimens of the same species, must be separated into two distinct genera.

Von Buch, in his Memoir, "Uber die Terebrateln" (1834), produced the most remarkable and valuable arrangement of this tribe which we possess. His method is a dichotomous one, somewhat resembling Dr. Fleming's system. He first divides the *Brachiopoda* into those which are attached by the margin, and those attached by the lower side of the shell. The first group he then divides into those which have one valve perforated, and those having neither valve perforated. The former he afterwards subdivides into those which have the perforation separated by a deltideum from the hinge-line, including, under the name of *Terebratula*, the genera *Atrypa*, *Strigocephalus*, *Uncites*, *Pentamerus*, and *Megas*[a], and those which have a triangular foramen, the base of which rests on the hinge-line, including, under the name of *Delthyris*, the genera *Spirifer*, *Orthis*, *Cyrtia*, and *Gypidea*. Those having neither valve perforated, he separates into such as have a large cardinal area, including only *Calceola;* and such as have no cardinal area, being *Leptæna* (*Producta*, *Strophomena*). His second great division, those attached by the lower side, is divided into that having the lower valve pierced for attachment, containing *Orbicula*, and secondly that having the lower valve entire, and attached by its whole face, including *Crania*.

[a] Professor Phillips translating this table in his "Palæozoic Fossils," places *Orthis* in this division instead of the next.

Professor Phillips (Palæozoic Fossils of Devon) has proposed, I believe, the latest important classification of the group before us. His arrangement resembles that of Von Buch. I give it in his own words:

" Brachiopoda.

Valves free, attachment by exserted muscle.
Valves equal . . . . . *Lingula.*
Valves unequal, larger valve imperforate (*Athyridæ*).
No cardinal area . . . . . *Producta.*
A cardinal area . . . . . *Calceola.*
Larger valve perforated in or under the beak.
Perforation reaching to the hinge-line . . . . . (*Delthyridæ*).
Cardinal area more or less common to both valves, ... *Orthis.*
Cardinal area confined to the larger valve.
Internal plates of larger valve separate . . . . . *Spirifera.*
Internal plates of the larger valve united on the mesial line of the shell.
Plates narrow . . . . . *Strigocephalus.*
Plates very broad . . . . . *Pentamerus.*
Cardinal area obsolete; beak incurved over a minute perforation, which is often obtect, or merely serves to receive the beak of the smaller valve . . . . . *Cleiothyris.*
Perforation not reaching to the hinge-line . . . . . (*Cyclothyris*).
Beak truncate, perforate . . . . . *Epithyris.*
Beak acute, the perforation below it . . . . . *Hypothyris.*"

None of the *Brachiopoda* have a distinct head, eyes, tongue, or any other external organs of sense. They differ from all the other bivalves, in their shells being symmetrical, one side perfectly resembling the other, and each shell might almost be considered as containing two individuals, so completely does this symmetricity extend to the animal: thus, they have two hearts, one on each side; two circulatory systems, which only meet in the centre, where they supply the organs of nutrition; the stomach and intestinal canal occupy the centre of the shell, and are remarkably small; the muscles are disposed in an equally symmetrical manner; the foot of other bivalves is replaced in those animals by two long, spirally-rolled, tubular arms; the use of these singular organs has been very variously stated. Fischer, of Moscow, took them for the organs of digestion. Pallas and De Blainville considered the fringes with which those arms are provided to be the gills of the animal; Cuvier opposed this opinion, from having found the gills of the genus *Lingula* on the inner side of the mantle. Müller (Naturforschen), from an attentive observation of their habits was led to the conclusion that they served the animal for securing its prey; this is now known to be their true function. They are protruded from the shell by being inflated, or forcibly filled with fluid; when this is effected, they unroll themselves; the largest, or basal turn, by increasing in diameter, forces open the valves, which have no cartilage, or other contrivance, except this, to keep them open; and then the delicate extremities, being protruded beyond the edge of the shell, fall into the sea, where they hang until the agitation of the waters bring some little *Mollusc* within their grasp, when the cause which protruded them being removed, they coil themselves round their prey, and by rapidly retracting to their original position, bring the food to the mouth of the animal, which is situated in the centre between them; the arms retract, from the elasticity of the cartilaginous tubes of which they are formed, not by any muscular action. The primary divisions of the tribe appear to consist of the following families: 1. *Delthyridæ*, or Spirifers; 2. the *Athyridæ*, or Productas; 3. the *Orbiculidæ*, the Orbiculas; 4. the *Terebratulidæ*, or true Terebratulas; and 5. the *Pentameridæ*, or chambered Brachiopods.

It will be seen that I have differed from the preceding writers by excluding the genus *Lingula* from the true

Brachiopoda, to which, in my opinion, it has little immediate affinity, both the animal and the shell differing in the most important characters; thus the *Brachiopoda* have two hearts, *Lingula*, like the ordinary bivalves, has but one; all the *Brachiopoda* are inequivalve, *Lingula* equivalve: the *Brachiopoda* (when attached) have one valve perforated for the passage of the muscle of attachment, in *Lingula* the muscle of attachment passes *between* the valves, neither of them being perforated; in *Lingula*, the gills are attached to the mantle, nearly as in ordinary bivalves, while the true *Brachiopoda* have no gills at all, the surface of the mantle being covered with vibratile ciliæ which serve the same purpose; and many other points of structure, not only in the shell but in the animal, induced me to consider the relation of this genus to the *Brachiopoda* as less strong than it has been usually considered, and to view it rather as a connecting link between the *Brachiopoda* and the *Dithyra*.

Orbicula. *Lam.*

Gen. Ch.—Depresso-conical, suborbicular; ventral valve flat, perforated by an oblong fissure for the byssus of attachment; four muscular impressions in each valve.

Orbicula nitida. *Phil.*

Orbicula nitida. *Phil.* Geol. York.—Orbicula nitida. *Portk.* Geol. Rep.—Orbicula cincta. *Portk.* Geol. Rep.

Sp. Ch.—Longitudinally oval, slightly narrowed in front, apex about one-fifth the length from the anterior end; upper valve convex, lower valve flat, perforated; surface with concentric, imbricating striæ, and very fine, radiating lines.

I believe the *O. cincta*, Portk., may be considered a variety of this species; the radiating striæ are very minute. Length seven lines, width six lines.

Orbicula quadrata. *M'Coy.* (Pl. XX. fig. 1).

Sp. Ch.—Subquadrate, very much depressed, length and breadth equal; beak small, inflexed, one-third the length of the shell from the margin; surface rough, with concentric, scale-like lines of growth.

This species is at once distinguished from the *O. nitida*, Phil., by its greatly depressed, quadrate form, and its strongly imbricated surface; the specimen figured was found on a *Turbinolia*. Length five lines, width the same, height half a line.

Orbicula trigonalis. *M'Coy.* (Pl. XX. fig. 2).

Sp. Ch.—Conical, obovate, trigonal; anterior end narrow, rounded, posterior subtruncate; surface irregular, marked with close, rounded, radiating ridges from the beak, which is small, deflexed, and little more than one-fourth the length from the anterior margin.

This is the only species of *Orbicula* in the older rocks which is marked with radiating ridges; the form is somewhat irregularly conic, depressed, closely set with round, slightly irregular, radiating ridges. Length four and a half lines, width three lines.

Family ATHYRIDÆ.

The *Athyridæ* or *Productas* are distinguished as a family from all the other *Brachiopods*, by being defensively armed with large, strong spines.

That the *Athyridæ* immediately follow the *Delthyridæ* or *Spirifers* is, I think, evident, from the close connexion which exists between the genus *Orthis*, among the *Spirifers*, and *Leptagonia*, M'Coy, in the present family, so nearly resembling each other that it is sometimes difficult to determine to which of them a species may belong; while the union on the other side to the *Orbiculidæ* is evident from the similarity of their

internal structure. Among the earliest scientific notices of these shells were those by the celebrated Mr. Martin, whose admirable figures of the more abundant species are, perhaps, the best we have. He formed of them one of his divisions of *Anomites*, under which name most of the fossil *Brachiopoda* were then described. Mr. Sowerby subsequently gave this division the name *Productus;* this term is now usually laid aside in favour of Dalman's name *Leptæna*. I have, however, retained the former appellation for the typical genus in the following pages. I have also retained Dalman's name, but use it in a restricted sense, confining it to those flat, scale-like, species analogous to the *Leptæna lata*, and which abound in rocks of the Silurian range; while those very inequivalve, large, hemispherical species, to which I now[a] retain the generic name *Producta*, are quite unknown in the Silurian rocks, but abound in the carboniferous limestone, where the other form is comparatively rare. I have considered *Leptæna*, as here restricted, to form a sub-genus of *Orthis*, rather than as a part of the family *Athyridæ*. As the internal structure of the *Athyridæ* is even less known than that of the *Spirifers*, I shall, when treating of each genus, lay before the reader what I have been able to discover of it.

Crania. *Retz.*

Gen. Ch.—Subquadrate; upper valve conical; apex nearly central; lower valve thick, entire, attached by its whole inferior face; four muscular impressions in each valve.

Crania vesiculosa. *M'Coy.* (Pl. XX. fig. 3).

Sp. Ch.—Ovato-orbicular, wider than long; hinge-line slightly truncated; apex one-third the length of the shell from the hinge-line, before and on each side of it are placed two obscure tubercles, so situated that, with the beak, they form an equilateral triangle; surface obscurely undulated concentrically.

This is the only species of *Crania* which has come under my notice in the Irish mountain limestone. It is nearly orbicular, or a very little wider than long; the hinge-margin is obscurely truncated (distinguishing it at once from *Orbicula*), the surface is rather irregular, slightly imbricated concentrically. This species is allied to the *C. prisca*, Hen., but that species is longer than wide, while in this the proportion is reversed; they also differ in many minor points. Length eight lines, width ten lines, height six lines.

Calceola. *Lam.*

Gen. Ch.—Triangular, very inequivalve; cardinal area very broad, flat, triangular, reticulated; dorsal valve semiconic, beak pointed; ventral valve flat, semicircular; hinge-line plicated.

Calceola sandalina. *Lam.*

Sp. Ch.—Dorsal valve pyramidal, smooth; beak slightly, or not at all incurved; cardinal area flat, triangular, marked with decussating striæ; ventral valve flat, semicircular; hinge-line sulcated.

Producta. *Sow.* (Restricted).

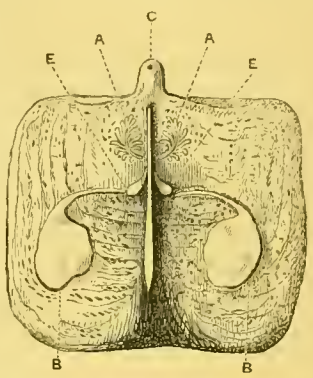
Gen. Ch.—Shell hemispherical, eared; dorsal valve very convex, ventral valve concave; hinge-line long, equalling or exceeding the width of the shell, compressed; no cardinal area or foramen.

The species of this old and extremely natural genus are all very inequivalve, the dorsal valve being very convex, usually with a mesial hollow, and striated longitudinally from the beaks. The ventral valve is concave, generally with a mesial elevation, corresponding to the depression in the dorsal valve. The position of the muscular impressions differs essentially from that of the *Spirifers;* they are also considerably larger than those of that genus. The two pair of principal adductors arise one pair on each side of the beak of the dorsal valve, forming a large square cicatrix; these form elevations in the cast. The principal pair of adductors of the ventral

[a] The above was written three years ago.

valve form two large, irregular, oval cicatrices in the ventral valve, situated one on each side, about midway between the central septum and the lateral margin of the shell, and about their own length distant from the anterior margin (see fig. 9, the ventral valve of the *Producta pustulosa*, B B); E E (fig. 9) shews the origin of the second pair of adductor muscles, forming small, pear-shaped cicatrices, close to the central septum, the lower, dilated portion curving outwards. The ventral valve is connected to the dorsal, by a kind of cardinal tooth, usually notched (see fig. 10, B), similar to that of *Thecidea*. There is in the centre of the ventral valve of all the species, a long, prominent, shelly, septum arising from the cardinal tooth, and extending to within a short distance of the anterior margin; it increases in prominence towards its anterior end, where it is abruptly truncated or rounded according to the species; it is in some measure analogous to the central septum, in the dorsal valve of the *Spirifers*. The beautiful markings, represented fig. A A, may be viewed as a modification of the spiral appendages of *Spirifer ;* they are in fact the support for the arms of the animal, but instead of their extremities being free, and projecting into the cavity of the shell, as in *Terebratula* or *Spirifer*, it is fixed along its whole length to the surface of the ventral valve, as we see in *Thecidea* and *Crania;* the reason of this difference appears to be that *Spirifer* and *Terebratula*, having convex ventral valves, and being attached so as to hang by the beak, their arms are so placed, that the bases of the cones which they form, when retracted, become parallel, and their extremities, when unrolled, extend in the direction of the anterior margin of the valves, the supports in that case extending themselves into the centre of the cavity of the shell; but in these *Brachiopods*, as *Crania*, *Thecidea*, *Orbicula*, &c., which have the ventral valve flat, the arms are coiled so that their bases rest on its surface, both on the same plane; the supports, therefore, are always fixed, in their entire length, to the internal face of the ventral valve, and project but slightly from it. That the arms of the *Productæ* were also placed in the same manner, appears evident from the accordance pointed out in the form and mode of attachment of the appendages; and if so, we would have an important anatomical fact to justify the allocation of the *Productæ* (*Athyridæ*), near *Orbicula*.

Fig. 9.



Producta aculeata. *Mart.* sp.

Anomites aculeatus. *Martin*, Pet. Derb.—Productus aculeatus. *Sow.* Min. Con.

Sp. Ch.—Rounded, very gibbous; beaks large, tumid; front slightly indented; smooth; dorsal valve with irregular, adpressed spines; ventral valve without spines.

This species is chiefly remarkable for the curious position of its spines, which have their points directed towards the beak, appearing, as it were, to force themselves up through the surface of the dorsal valve; their bases are large, few, and irregularly placed; the ventral valve is very concave, and has no spines; excepting the spines on the dorsal valve, the surface is perfectly smooth; the hinge-line is exceedingly short. Length five lines, width six lines.

Producta antiquata. *Sow.*

Anomites semireticulatus. *Martin*, Pet. Derb.—Productus antiquatus. *Sow.* Min. Con.—Productus lobatus. *Deshayes.*

Sp. Ch.—Subquadrate; surface with coarse, rough, longitudinal striæ; rostral portion of the shell triangular, entirely covered with concentric undulations, which become large and spinous towards the sides; front of old shells produced subcylindrical, with parallel sides, which are without striæ, but have numerous, very long, curved spines; mesial hollow wide; both valves nearly alike; width of the hinge-line equal to the length of the shell.

This is the most common species of the genus; Martin's figure, above referred to, obviously represents a young shell of this species, having a flattened, triangular figure, and the entire surface reticulated by the concentric wrinkles. The same portion has been figured by Sowerby, in the Mineral Conchology, under the name

Productus antiquatus, and by M. Deshayes, under that of *Producta lobata*, to which latter shell it only bears the most remote resemblance. As yet I am not acquainted with a figure of the adult shell, such as it usually occurs in our limestone. Professor Phillips' figure represents a curious variety, a specimen similar to which I have seen from the limestone of Cornacarrow, near Enniskillen, it is cylindrical, without mesial hollow, or large concentric wrinkles, and with a considerable smooth space between each of the radiating striæ; altogether it has a peculiar appearance, and may possibly be distinct. Length usually about three inches. Martin's name should, perhaps, be adopted for the species, as having the priority, but Mr. Sowerby's name is so well known, that I have thought it better to retain it.

Producta aurita. *Phil.*

Professor Phillips proposes this name for the *P. hemispherica* and *P. Scotica* of Sowerby, united. I have occasionally used the name for a few specimens which have occurred, resembling *P. Scotica*, but with very few spines, and having the ears unusually long.

Producta caperata. *Sow.* sp.

Leptæna caperata. *Sow.* Geol. Trans.—Leptæna caperata. *Phil.* Pal. Fos.

Sp. Ch.—Hemispherical, very convex, no mesial hollow; concentrically wrinkled; surface with small, very numerous, oblong, tubercles arranged in quincunx; ears transversely wrinkled.

This species differs from the *Producta scabricula* in being much more convex, and more nearly orbicular in its outline; it has no trace of mesial furrow, the concentric wrinkles are stronger, and the tubercles smaller and much more numerous than those of the *Producta scabricula;* when well preserved, there are long, slender spines on the hinge-line. Length one and a half inches, width two inches, depth ten lines.

Producta comoides. *Sow.*

Productus comoides. *Sow.* Min. Con.

Sp. Ch.—Semicircular, very gibbous, inflated; hinge-line equal to the width of the shell, cardinal area wide, with nearly parallel sides; shell very thick; surface with very fine, waved, radiating striæ.

I am not sure that I by any means understand this species: the very large shell which I have been in the habit of considering as *P. comoides*, I have recently been inclined to consider as the *adult state* of Professor Phillips' *O. papilionacea;* they agree perfectly, however, with Sowerby's figure and definition of his *P. comoides*, with the exception, perhaps, of the cardinal area not having such parallel sides: on the other hand, specimens of a shell given me by Lady Peschel present a cardinal area with truly parallel sides, a very thick shell, and similar form, but it is very coarsely sulcated, and possesses a hinge distinct from either *Producta* or *Orthis*. Professor Phillips and M. de Koninck have, I think, figured a distinct species under this name.

Producta concinna. *Sow.*

Productus concinnus. *Sow.* Min. Con.—Producta concinna. *Phil.* Geol. York.

Sp. Ch.—Subcylindrical, very short, rounded, front evenly convex; surface coarsely striated longitudinally, concentrically wrinkled near the beak. Length and width equal.

This little species bears a great resemblance to the top, or rostral portion of the *Producta Martini*, it is, however, much smaller, more rounded, and the surface more evenly formed; the top of the ventral valve frequently has a distinct, nearly smooth margin, as in that species. Length seven lines, width six lines.

Producta corrugata. *M'Coy.* (Pl. XX. fig. 13).

Sp. Ch.—Hemispherical, the concavity of the ventral valve nearly equalling the convexity of the dorsal; radiating striæ narrow, sharply defined, alternately larger and smaller; four or five large wrinkles on each side.

In general proportion this exactly resembles the *Producta hemispherica*, but the large, concentric wrinkles are peculiar and very constant; the ventral valve is less concave than in that species, and even fragments might be distinguished by the peculiar character of their striæ; these are thick, close together, and slightly rounded or flattened in the *Producta hemispherica*, but are very sharp and distinct, alternately larger and smaller, and having a small space between them, in the present species.

Producta costellata. *M'Coy.* (Pl. XX. fig. 15).

Sp. Ch.—Semicylindrical, short, front flattened, sides compressed; surface with strong, radiating ribs, muricated by long cylindrical spines; a semicircular row of large spines on each side of the shell.

This species bears some likeness to the *P. spinosa*, but the radiating ribs are greatly stronger, and the front is flattened; the present shell has also a semicircular row of large spines at each ear, and the spines of the whole surface are much larger, and more numerous, than in that shell. Its very short hinge-line, parallel sides, and coarse muricated ribs distinguish it from the *Producta setosa*, Phil. Length eight lines, width seven lines.

Fig. 10.

The internal structure (see fig. 10) is much more simple than of most of the *Productæ;* the supports (A A) form but two lobes on each side of the septum, instead of the numerous complex turns of the corresponding parts in the more typical species; the cardinal tooth of the ventral valve (B) is large, and distinctly notched; the muscular impressions (C C and D D) are similar in shape and position to those of the other *Productæ;* the central septum is particularly large.

Producta Edelburgensis. *Phil.*

Producta Edelburgensis. *Phil.* Geol. York.

Sp. Ch.—Semicircular, depressed; beak small; ears flattened; radiating striæ thick, branching frequently before they reach the margin.

This curious species is very like old individuals of *Producta latissima*, but is more depressed; the beak is also much smaller, and the ears, which in *Producta latissima* are almost fusiform, are quite flat in the present shell; the radiating striæ of the *Producta Edelburgensis* have a peculiar appearance, from being thick and entire, to a short distance from the beak, and then suddenly dividing into a great number of smaller ones, as they approach the margin; these ribs are finely striated across, but usually without spines. Length one inch five lines, width three inches six lines.

Producta elegans. *M'Coy.* (Pl. XVIII. fig. 13).

Sp. Ch.—Shell forming three-fourths of a circle, convex; nine or ten concentric sulci, the rostral edge of the broad furrows between them, with two or three concentric rows of short, deep, undulating scratches, the marginal edge with three or four concentric rows of punctures, set in quincunx; beak small; hinge-line straight.

This pretty little shell is related more to the young of *P. fimbriata*, Sow., than to any other of the genus; it is, however, much more depressed; the beak is large and prominent in that shell, but very small in this; and, finally, the ridges are greatly more numerous in the present species, and punctured on the marginal edge, instead of on the rostral, as in that fossil. The ears of the *P. elegans* are much flattened, the ventral valve similar, but flatter. Length five lines, breadth six lines.

Producta fimbriata. *Sow.*

Productus fimbriatus. *Sow.* Min. Con.—Producta fimbriata. *Phil.* Geol. York.

Sp. Ch.—Slightly elongate, rounded, very gibbous; about seven or eight broad, concentric ridges, each fringed on its rostral edge with a row of lengthened, spine bases; no mesial furrow.

This is an exceedingly variable shell, scarcely two specimens being found alike. I have taken as the type of the species, however, those specimens which agree most nearly with Sowerby's original figure and description. In these there are usually about eight transverse, smooth, ridges, about a line in width, the rostral margin being prominent, and bearing a row of narrow, lengthened, tubercles, which give the ridges an elegantly fringed appearance; the dorsal valve is very convex, and the beak large and tumid; the ventral valve is but slightly concave, it has flat, concentric ridges, and numerous spinulose puncta. The varieties differ in the irregularity of the spines, and the concentric ridges becoming almost obsolete. Length one inch one line, width one inch.

Producta flexistria. *M'Coy.* (Pl. XX. fig. 16).

Sp. Ch.—Semicylindrical, short; front flattened; beak globose, rather depressed; mesial furrow slight, or none; surface coarsely striated longitudinally; five or six large, smooth furrows on the sides, curved nearly three-fourths of a circle, encircling a small, concave, smooth space.

This shell is more nearly related to the *Producta sulcata*, than to any other of the genus; it is, however, more finely, and less regularly striated, in addition to which the remarkably curved ribs on the sides distinguish it from that, and every other species of the genus with which I am acquainted. The two valves are nearly similar, the beak of the ventral one, however, being less globose than that of the dorsal, the front is square, and the sides flattened, having, as before mentioned, a nearly circular, depressed, smooth space, near the extremity of the hinge-line. Length one inch one line, width one inch two lines.

Producta fragaria. *Sow.* sp.

Leptæna fragaria. *Sow.* Geol. Trans.—Leptæna fragaria. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oval, gibbous; numerous large, spiniform tubercles, arranged nearly in quincunx order, alternately connected by concentric wrinkles; no mesial furrow.

This species is by many authors considered to be a variety of the *P. rugata*, but differs constantly in being nearly one-third wider in proportion to its length, being more convex, and in having the spines much more numerous and more regularly placed; the concentric rugæ are also smaller, more numerous, and more regular than in that species. Length six lines, width eight lines; frequently twice this size.

Producta gigantea. *Sow.*

Anomites giganteus. *Martin*, Pet. Derb.—Productus giganteus. *Sow.* Min. Con.

Sp. Ch.—Transversely oblong; beak very gibbous; sides dilated into large, rounded ears; surface with large, slightly flexuous ribs, covered by coarse, waving striæ, with small, irregular spines. Length two-thirds the width.

This very large species is remarkable for having longitudinal ribs, as thick as a man's little finger, on the surface of the dorsal valve; they are somewhat undulating, and accompanied by numerous, irregular, rough, flexuous striæ. Width nine or ten inches.

Producta granulosa. *Phil.*

Producta granulosa. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, gibbous; hinge-line very short; sides rounded, flattened; ventral valve slightly concave; surface with numerous, crowded, minute tubercles; no mesial furrow.

This little shell is almost destitute of ears, the flattened sides of the shell hardly deserving that name; the dorsal valve is very gibbous, particularly towards the beak; the tubercles which crowd the surface have no particular order of position; they are very small and numerous; there is no mesial furrow in either valve. Length eight lines, width nine lines.

Producta hemispherica. *Sow.*

Producta aurita (pars.) *Phil.*

Sp. Ch.—Shell hemispherical; ventral valve very concave; radiating striæ close, obtuse, smooth, without spines; hinge-line equal to the width of the shell.

In this species the ventral valve is almost as concave as the dorsal is convex, so that there results between them an exceedingly small space for the animal; the ears are short, convex, rounded; the striæ are equal, close, and obtusely rounded; the *P. personata*, Sow., is probably the internal cast of this species. Size very variable, length from one and a half to three inches.

Producta intermedia. *M'Coy.* (Pl. XX. fig. 4).

Sp. Ch.—Transversely elliptical; no dorsal furrow; gibbous near the beak; with about twelve narrow, concentric sulci; the intermediate broad ridges are flattened, with three rows of small spines, in quincunx; deflexed, front broad, forming rectangular ears at the sides; very finely striated longitudinally.

This curious shell forms a connecting link between the genera *Producta*, Auct., and *Leptagonia*, M'Coy, the portion near the beak is a perfect *Producta*, and might be compared with the *P. punctata*, while the nearly smooth, deflected front reminds us at once of *Leptagonia*. Length one inch eleven lines, width one inch six lines; the flat, concentric ridges are about a line in width, but become narrower towards the beak.

Producta interrupta. *Sow.* sp.

Leptæna interrupta. *Sow.* Geol. Trans.

Sp. Ch.—Semicircular, gibbous; hinge-line equal to the width of the shell; surface with about twelve rounded, concentric wrinkles, crossed by strong, radiating striæ from the beak.

The most peculiar character of this little species is the interruption of the longitudinal striæ by the concentric wrinkles, giving them a fringed appearance. Length seven lines, width eight lines.

Producta laciniata. *M'Coy.* (Pl. XX. fig. 12).

Sp. Ch.—Nearly semicircular, length one-sixth less than the width; hinge-line rather less than the width of the shell; moderately convex; beak small, prominent; ten or twelve rounded, concentric wrinkles, fringed on their marginal declivity with close, regular, lengthened spine bases.

This rare species bears some resemblance to the *P. fimbriata*, Sow., but the convex valve of the present shell is nearly as flat as the small valve of the *P. fimbriata*; the general form is more transverse, depressed, and the beak is greatly smaller; the number of concentric ridges is greater, and they are more closely and regularly fringed, with smaller spines, which latter are also set on the marginal, instead of the rostral edge of the wrinkles. Length eleven lines; width one inch one line.

Producta latissima. *Sow.*

Productus latissimus. *Sow.* Min. Con.—Producta latissima. *Phil.* Geol. York.

Sp. Ch.—Hinge-line very wide; beak much curved, but not large or prominent; ears involute, not distinguished from the body of the shell; very coarsely striated from the beak; spines numerous, very small. Length one-third the width.

The margin curls inwards, so as to give a fusiform appearance to the whole shell, when young, but with age it becomes nearly hemispherical, the surface assumes a ridged appearance, and the striæ branch and become finer, the whole shell resembling the *P. gigantea*, which it sometimes nearly equals in size; it is distinguished, however, by its smaller, and much less prominent beak. The striæ are very thick and distinct for about three-fourths of an inch from the beak, when they suddenly divide into a great number of smaller, flexuous ones, as

in the *Producta Edelburgensis*. There are numerous small spines on the surface, but, when broken away, they leave so small a mark, that they are frequently overlooked. Length one inch, width two and a quarter inches. This is the usual size of specimens.

Producta laxispina. *Phil.*

Producta laxispina. *Phil.* Geol. York. and Pal. Fos.

Sp. Ch.—Hemispherical, hinge-line long, ears large; surface smooth, with greatly lengthened, obsolete, tubercles, irregularly placed.

This shell has much the appearance of the *Producta spinosa*, but the length of the hinge-line, and the great size of the ears, at once distinguish it; its comparatively smooth surface distinguishes it from the other allied species; the spines are very remarkable, they are so much elongated as almost to assume the appearance of ribs, they are not strongly marked. Length one inch, width one and a quarter inches.

Producta lirata. *Phil.*

Producta lirata. *Phil.* Geol. York.

Sp. Ch.—Small, subcylindrical, very gibbous; beak large; hinge-line equal to the width of the shell; ears small, flattened, rectangular; front semicircular: surface smooth, marked towards the margin with few, irregular, longitudiual ridges. Length six lines, width seven lines.

Producta lobata. *Sow.*

Productus lobatus. *Sow.* Min. Con.—Producta lobata. *Phil.* Geol. York.

Sp. Ch.—Subcylindrical, ears small, acute; dorsal valve divided into two lobes by a deep, mesial sulcus; radiating ridges thick, rounded, smooth, finer, and reticulated by concentric wrinkles on the rostral portion; a few small spines, irregularly placed.

This species closely resembles the *Prod. concinna*, differing chiefly in the greater coarseness of the longitudinal striæ, and its very deep, mesial depression. Length eight lines, width nine lines.

Producta longispina. *Sow.*

Productus longispinus and P. Flemingii. *Sow.* Min. Con.

Sp. Ch.—Eared, dorsal valve gibbous, with a mesial depression; obsoletely ribbed longitudinally, with several very long, cylindrical spines.

This little species is chiefly remarkable for the great length of the spines; it is very common in the Scotch millstone grit, but is rare with us. It resembles the *P. concinna*, but is much smaller, neater, more finely striated, and has a smaller portion of the beak reticulated. Length about five lines, width the same.

Producta margaritacea. *Phil.*

Producta margaritacea. *Phil.* Geol. York.

Sp. Ch.—Semicircular, depressed; gibbous towards the beak; radiating ribs coarse, rounded, smooth; a few large spines on the ears and sides of the shell.

This species bears a considerable general resemblance to the *P. pectinoides*, but is wider, greatly more depressed, and the radiating ribs are much smaller, more convex, and do not divide in the remarkable manner of that species; the present shell has also large lateral spines, of which the other has seldom any trace. Length one inch, width one inch three lines.

Producta Martini. *Sow.*

Anomites productus. *Martin*, Pet. Derb.—Productus Martini. *Sow.* Min. Con.

Sp. Ch.—Semicylindrical, very long, expanded at the margin; front flat; surface irregularly spinous, with smooth, flexuous, frequently branched striæ; ventral valve flat on the top; length nearly three times the width.

This shell has become celebrated from giving its name to the present genus; the front is produced to a length unusual even in this genus, whence Martin's name; the spines on the sides of the shell, at the base of the ears, are sometimes two and a half inches in length, and curved outwards. The flat, rostral portion of the ventral valve has generally a smooth margin, about a line in breadth. Length two and a quarter inches, width one inch.

Producta maxima. *M'Coy.* (Pl. XIX. fig. 12).

Sp. Ch.—Twice as wide as long; gibbous; front flattened; beak large, undefined; both valves coarsely striated; striæ slightly waving.

This gigantic shell is considerably the largest known species of the genus. The hinge-line is wide, the beak very gibbous, but the front is broad and flattened. Width frequently one foot.

Producta membranacea. *Phil.* sp.

Leptæna membranacea. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular, flat; substance of the shell very thin, with numerous close, concentric, undulating wrinkles; spines few, irregularly placed.

This delicate species occurs in great abundance in the carb. slate series of Ireland, but the characters are not very decisive, and it seems very nearly allied to the *P. fragaria*.

Producta mesoloba. *Phil.*

Producta mesoloba. *Phil.* Geol. York.

Sp. Ch.—Subquadrangular, gibbous; front concave, with a central, narrow, convex ridge; surface smooth, transversely wrinkled at the beak, with large, scattered, adpressed spines.

The specific name indicates one of the most remarkable characters of this species, namely the mesial lobe, which is situated in the centre of a wide hollow in the middle of the dorsal valve; the surface is smooth, except at the beak, where it is concentrically wrinkled; the spines are large, irregularly placed, and adpressed, so that their points are directed towards the beak. The ventral valve is concave, with a central sulcus, corresponding to the mesial ridge of the dorsal valve; the hinge-line is a little shorter than the width of the shell, so that the ears are obtuse, angled. Length one inch, width one and a quarter inches.

Producta muricata. *Phil.*

Producta muricata. *Phil.* Geol. York.

Sp. Ch.—Semicylindrical, short, very gibbous, front convex; regularly ribbed from the beak with large, rounded ribs, muricated by strong, regularly-placed spines.

This species is distinguished from every other by the extreme regularity of its strong, radiating ribs, which are ornamented from the beak to the margin by large, equi-distant, spiniform tubercles, the tubercles of one rib alternating with those of the next; the ears are short, square, depressed. Length one inch, width the same.

Producta ovalis. *Phil.*

Producta ovalis. *Phil.* Geol. York.

Sp. Ch.—Longitudinally ovate, very gibbous; mesial furrow slight; ventral valve nearly flat; surface with numerous, undulating, transverse ridges, having numerous, very small spines.

This rare species is at once distinguished by the length of the ventral valve rather exceeding the width, so as to give a regularly ovate outline; the number and small size of its spines, and fine, concentric wrinkles, distinguish it from the *P. pustulosa*, which it most resembles. Length nearly two inches, width one inch seven lines.

Producta pectinoides. *Phil.*

Producta pectinoides. *Phil.* Geol. York.

Sp. Ch.—Orbicular, very gibbous; without spines; radiating ribs broad, smooth, rounded, each divided into three or four, near the margin; ears short, square.

This species, and the *P. margaritacea*, should form a subgeneric group; the structure of their shell is very thin, foliaceous, differing entirely from that of the other *Productæ*. I have not seen the internal structure. The present species is nearly hemispherical, with short, square ears; the forking of the ribs near the margin is very remarkable. Length ten lines, width one inch three lines.

Producta prælonga. *Sow.* sp.

Leptæna prælonga. *Sow.* Geol. Trans.

Sp. Ch.—Subcylindrical, very gibbous; mesial furrow shallow; beak of the dorsal valve large, obtuse; ears very small; longitudinal striæ strong, unequal.

This species resembles the *P. setosa*, but is distinguished by the coarse, irregular striæ, and large, tumid beak: the front is also more produced than is usual with that species. Length eleven lines, width nine lines.

Producta pugilis. *Phil.*

Producta pugilis. *Phil.* Geol. York.

Sp. Ch.—Subcylindrical, quadrangular, front flattened; sides steep, flattened, parallel; ears small, cylindrical, acute; radiating ridges thick, smooth, equal; a few very large, scattered spines. Breadth of the front equalling its length.

In general form this resembles the *Producta sulcata*, but differs in the unusually large spines, which are very irregularly placed; the radiating ridges are equal in size, and the surface would be regular were it not that wherever one of the large spines occurs, three or four of the striæ become raised, forming a kind of rib from its base to the margin; this gives the shell an irregularly ribbed appearance, and frequently conveys the impression of the striæ being unequal in size; the ears are small and acute, appearing to project from the middle of the flat side; the mesial hollow is most distinct on the rostral portion of the shell; the sides of the beak are reticulated by a few concentric wrinkles. Length one inch six lines.

Producta punctata. *Sow.*

Productus punctatus. *Sow.* Min. Con.—Producta punctata. *Phil.* Geol. York.

Sp. Ch.—Shell rounded, wider than long, convex, with a slight mesial depression; transversely sulcated, the intermediate broad ridges spinulose.

In this species there are usually about fourteen or fifteen flat, concentric ridges, about a line and a half in depth; hispid, with small, cylindrical spines, when these are broken away, as is usually the case, the ridges appear as if punctured with a pin, whence the specific name. The ventral valve is but slightly concave, with a mesial ridge corresponding to the hollow in the dorsal valve. Length one inch seven lines, width two inches.

Producta pustulosa. *Phil.*

Producta pustulosa. *Phil.* Geol. York.

Sp. Ch.—Rotundato-quadrate, gibbous; beak pointed; a distinct mesial hollow; the entire shell girt with regular, broad, rounded wrinkles, on which the small, oval tubercles are regularly arranged in transverse rows, except on the ears, where the wrinkles are smooth.

This species has the same general shape as the *Producta scabricula*, but is considerably larger; it differs from it in having the entire surface covered by distinct, transverse undulations, which are quite smooth on the ears and sides of the shell, but on the other parts bear small, lengthened, close-set tubercles. Length two inches, width two inches and a quarter.

Producta quincuncialis. *Phil.*

Producta quincuncialis. *Phil.* Geol. York.

Sp. Ch.—Hemispherical; hinge-line exactly the width of the shell; front margin semicircular; usually without a mesial hollow; surface with coarse, longitudinal striæ, swelling alternately into lengthened tubercles.

This species is often confounded with the *Producta scabricula*, its nearest affininity is, however, perhaps to the *Producta antiquata;* the structure of the tubercles is curious, and will, at any time, distinguish this species from the *Producta scabricula;* in the present shell they are merely a thickening, at intervals, of the radiating ribs, while in the *Producta scabricula* they form distinct, unconnected tubercles, bearing at their lower extremity a small spine. Stress is sometimes laid on the distinguishing character of *Producta scabricula* having a deep mesial hollow, and the *Producta quincuncialis* being without one; although this is generally the case, yet specimens of *Producta scabricula* occasionally occur without a mesial hollow, and *Producta quincuncialis* as often has one. It never attains the same size as *Producta antiquata*, and may be distinguished by having its front wider, and more nearly semicircular, its sides striated, its beak much more gibbous, and by having the concentric wrinkles at the beak fewer, and never assuming the large, rugged, spinous character at the sides, which we see in the *Producta antiquata*. Length one and a half inches, width two inches.

Producta rugata. *Phil.*

Producta rugata. *Phil.* Geol. York.

Sp. Ch.—Orbicular, depressed; hinge-line short; surface with few, large, irregular, concentric wrinkles, and scattered spines; no mesial furrow.

This scarce species is very much depressed; the cardinal angles are flattened, so as to give something of an eared appearance to the shell; the concentric undulations are few in number, obtuse and irregular; seldom extending more than half way across the shell; the tubercles are large, scattered, and very few in number. The length seven lines, width six and a half lines, depth three lines.

Producta scabricula. *Sow.*

Productus scabriculus. *Sow.* Min. Con.—Producta scabricula. *Phil.* Geol. York.

Sp. Ch.—Semicircular, gibbous; mesial hollow wide; surface with numerous, oblong tubercles, arranged in quincunx, each having at its anterior end a small spine, directed towards the margin. Length two-thirds the width.

This species has in general a wide mesial hollow, but specimens sometimes occur in which it is not visible; there are irregular, faint, concentric undulations; the tubercles, when well preserved, are found to be the bases of exceedingly small spines, which are placed at the end, next the margin of the shell; the ears are rectangular and wrinkled. Length one inch nine lines, width two inches four lines, depth one inch.

Producta Scotica. *Sow.*

Productus Scoticus. *Sow.* Min. Con.—Producta aurita (pars.) *Phil.* Geol. York.

Sp. Ch.—Semicircular, twice as wide as long; ears large, flattened, gibbous towards the beak; radiating striæ fine, obtuse, flexuous; more or less wrinkled transversely; the bases of cylindrical spines irregularly scattered over the surface.

This species is frequently confounded with the *Producta hemispherica*, but is wider, and usually more depressed; the large spines completely distinguish it from that species.

Producta setosa. *Phil.*

Producta setosa. *Phil.* Geol. York.

Sp. Ch.—Subcylindrical, semicircular, very gibbous; ears flattened, distinct, rectangular; surface strongly striated from the beaks; irregularly spinous; length and breadth equal.

This species resembles the *Producta spinosa*, but is much more distinctly striated; the hinge-line is longer, and the ears larger, and more distinct. Length three quarters of an inch.

Producta spinosa. *Sow.*

Productus spinosus. *Sow.* Min. Con.

Sp. Ch.—Rounded, very gibbous; obsoletely ribbed, longitudinally; with very long, cylindrical spines; hinge-line very short; no mesial furrow.

This differs from all the nearly allied species in being marked by faint, rounded, smooth, radiating ribs; the spines, when well preserved, are perfectly cylindrical, and sometimes nearly two inches in length; the hinge-line is so short, that the back of the shell is much rounder than the front. Length nine lines, width eight lines.

Producta spinulosa. *Sow.*

Productus spinulosus. *Sow.* Min. Con.—Producta spinulosa. *Phil.* Geol. York.

Sp. Ch.—Semicircular, depressed, without mesial hollow; beak large, gibbous; surface smooth, with many small spines.

The ventral valve of this scarce little species is very concave; the hinge-line is long and straight, the ears square, flattened; the beak is very large, inflated. Length six lines, width nine lines.

Producta striata. *Fischer.* sp.

Mytilus striatus. *Fischer.* Oryctol. Mos.—Pinna inflata. *Phil.* Geol. York.—Producta limæformis. *De Buch.* Mon. Prod.—Producta anomala. *Sow.* Min. Con.

Sp. Ch.—Shell large, trigonal, very irregularly conic, depressed; surface with close, small, waving striæ, which are usually rounded, or slightly flattened.

This curious shell seems to me to be the type of a new and peculiar genus; in form and general habit it certainly resembles *Pinna* very closely, in which genus Professor Phillips has placed it, but is distinguished by one valve being concave and the other convex. Fischer originally referred it to *Mytilus*, from which it differed in having one valve concave, and in wanting a hinge-line. Von Buch and Mr. Sowerby have placed it in *Producta*, from which it seems to differ in not being eared, and, in fact, entirely wanting the straight hinge-line of that genus; the small, narrow, pointed beaks, and general form, are at variance with the usual characters of the genus.

The present species is very irregular in form, some specimens being almost cylindrical, while others are almost as broad as long, and flattened; the striation is not subject to so much variation; on most specimens the striæ are smooth and rounded, but irregular in size; they are all flexuous, but irregularly so. Length one foot, width five inches.

Producta subaculeata. *Murch.* and *De Ver.*

Leptæna subaculeata. *De Ver.* Bul. Geol. Soc. de Trans.

The specimens referred to this species only differ from the *L. aculeata*, in having the spines perpendicular to the surface, instead of being adpressed, as in that species. They are less wide, and have rather fewer spines than the *P. granulosus*.

Producta sulcata. *Sow.*

Productus sulcatus. *Sow.* Min. Con.—Producta sulcata. *Phil.* Geol. York.

Sp. Ch.—Semicylindrical, front flattened, with parallel sides; mesial hollow small, shallow; longitudinal ribs very thick, rounded, at intervals spinous, decussated near the beaks by slight, concentric wrinkles, a row of large spines on each ear.

This species is sometimes likely to be confounded with some varieties of the *P. antiquata*, but differs in its smaller size, greater proportion of length to width, more strictly parallel sides, and the top of the smaller valve being flat; the radiating ribs are also much larger and smoother. Professor Phillips unites the *Producta costata*, Sow., to this species; but the specimens I have been able to examine of this latter agreed strictly with Mr. Sowerby's figure and description in the Mineral Conchology; and even fragments may be distinguished by the shape of the longitudinal ridges in each, so that it may, perhaps, be as well to keep the species distinct. I have only seen the *Producta costata* from the original locality in which they were found by Mrs. Murchison, namely, the Glasgow coal shale, while the *Producta sulcata* is common in many limestone districts in Ireland. Length two inches, width one inch and a half.

Producta tortilis. *M'Coy.* (Pl. XX. fig. 14).

Sp. Ch.—Semicircular, convex; rostral portion rather depressed; front deflected, rounded; entire surface marked with close, fine, rounded, longitudinal striæ; and transverse, interrupted, irregular, waving wrinkles.

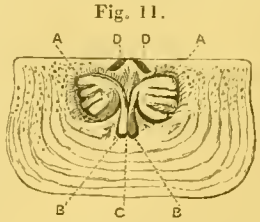
This remarkable species is, perhaps, most nearly allied to the *P. Scotica*, Sow., and it also bears some resemblance to the *P. fragaria*; but both those species are distinctly spinose, while the present shell is altogether without spines: from the *P. hemispherica*, Sow., and *P. corrugata*, M'Coy, it is distinguithed by the depression of the rostral portion, and by the irregular, transverse, wrinkling, or crumpled appearance of the whole surface. Length one inch, two lines, width one inch six lines.

Leptagonia. *M'Coy.*

Gen. Ch.—Shell transverse; rostral portion flat, concentrically wrinkled; front smooth, abruptly deflected at right angles to the flat, rostral portion; cardinal area flat, with a large (obtect) triangular foramen.

The remarkable fossils which I separate under this name have all a peculiar contour, from the distinct angle which separates the flat, wrinkled, rostral part of the shell, from the smooth, deflected front. Von Buch places the shells which enter into the present genus among the *Delthyridæ* or *Spirifers*, a position which almost every other author denies; most writers agreeing that they should be placed among the *Productæ*, with which they certainly agree in all their important characters, excepting the cardinal area and foramen. It is by this group that the *Athyridæ* or Productas pass into the *Delthyridæ* or Spirifers, uniting in itself the characters of the two groups. The generic characters above given are merely those external ones which can be easily found in the worst preserved specimens, and will distinguish even fragments from the other genera of the *Productas*. The internal structure differs very much from that of the other groups; the muscular impressions are four in each valve. In the dorsal valve the principal pair of adductor muscles (A A, fig. 11) arise each from a large, rounded, radiatingly sulcated cicatrix, placed about one-third their diameter from the beak, and divided by a slight, shelly septum (C); the cicatrices of the lesser adductors (B B) are much smaller than the others, pear-shaped, the anterior end being rounded, the posterior attenuated, smooth; they take their origin interiorly, and a little anterior to that of the great pair. In this valve we also observe two large cardinal teeth (D D), perfectly resembling those of *Orthis*. In the ventral valve the attach-

Fig. 11.



ments of the principal pair of adductor muscles, form two hemispherical smooth cicatrices (A A fig. 12), about half the size of those in the dorsal valve; they are nearly half their diameter distant from the hinge-line; considerably anterior to them are the two elongated, pear-shaped origins of the lesser pair of adductors (B B); they differ from those in the dorsal valve in being smaller, and having their attenuated extremities directed anteriorly instead of posteriorly; they are divided by a thin, shelly septum; figure 13, A A, shews the perfect form of the cardinal teeth in the next species.

Fig. 12.

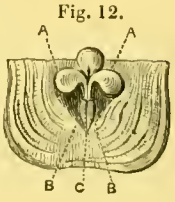
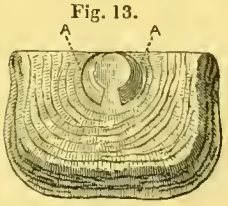


Fig. 13.



Leptagonia analoga. *Phil.* sp.

Producta analoga. *Phil.* Geol. York.—Leptæna analoga. *Sow.* Geol. Trans.

Sp. Ch.—Rostral portion flat, slightly convex in the middle; about fourteen irregular, concentric rugæ, crossed by rather coarse, straight striæ from the beak; front short, flattened in the middle. Length about one inch, width two inches.

This species has been well separated from the *Producta depressa*, Sow., by the accurate author of the Geology of Yorkshire, although many observers still confound the two. It differs from the *Producta depressa* in having the flat part of the valves much less depressed than in that species; the concentric rugæ are double the number, and the size nearly twice the usual dimensions of the *Producta depressa* of the Silurian rocks; the front, or deflected portion, is flattened, or even concave in the middle, and in well preserved specimens extends beyond the hinge-line, forming smooth, rounded ears; the concentric wrinkles are rounded, irregular; the two valves are alike; the cardinal area about a line in width, transversely striated; the triangular foramen is large.

Leptagonia depressa. *Sow.* sp.

Producta depressa. *Sow.* Min Con.—Leptæna depressa. *Sow.* Sil. Res.

Sp. Ch.—Subquadrate; flat part of the valves very much depressed; about ten irregular concentric wrinkles, crossed by straight, radiating striæ.

The specimen above described is the first I have known from the mountain limestone. Professor Phillips' specimen, to judge from the figure, looks more like the *L. rugosa*. The present species is smaller, and narrower in proportion than the foregoing; the flat portion of the valves is also much more depressed, so much so, that the angle which separates it from the descending front forms a prominent border to it all round; the front is flattened in the middle, and at the sides, thus giving a quadrangular contour to the shell. Length five lines, width seven lines.

Leptagona multirugata. *M'Coy.* (Pl. XVIII. fig. 12).

Sp. Ch.—Top of the upper valve flat; closely striated, with about twenty-two concentric rugæ, which frequently unite in pairs as they approach the hinge-line; hinge-line straight, equal to the breadth of the shell; length, three-fifths the breadth.

This shell, as well as the *Producta analoga* of Professor Phillips, has been frequently confounded by geologists, with the *L. depressa* of the Silurian rocks; this latter, however, I have seen very rarely in undoubted mountain limestone, nor do I know that either of the former have been found in any of the Silurian range. The present shell is distinguished from the nearly allied species, *L. depressa*, *L. analoga*, and *L. tenuistriata*, by having the top of the upper valve perfectly flat, neither sensibly convex nor concave, as in those species. The concentric furrows are greatly more numerous in the present shell; these in *Leptæna analoga* are about thirteen or fourteen, in *Leptæna tenuistriata* twelve, and in *L. depressa* much less. Breadth of the shell about an inch.

Leptagonia nodulosa. *Phil.* sp.

Leptæna nodulosa. *Phil.* Pal. Fos.

Sp. Ch.—Shell semicircular; concentric rugæ disconnected, very irregular, crossed by extremely fine, flexuous striæ; deflected front, undulated, so as to make the angle which separates it from the rostral portion somewhat nodular; the front is not flattened in the middle.

This is a larger, wider, and more irregular species than the *L. analoga;* the concentric wrinkles on the flat, rostral portion are very short and irregular, and do not extend the whole width of the shell; in the *L. analoga* they are decussated by rather coarse, straight, radiating striæ, while in the present species the radiating striæ are remarkably fine and waving. The deflected front is so much undulated, that it appears almost nodular, whence the specific name; it wants also the mesial depression of that species. It is difficult to say whether this is really distinct from the common *L. analoga*, for instance, it is usually found much larger than that species, but that might only shew it to be an adult individual; then, again, the irregularity of the deflected margin and concentric rugæ are just the characters we would expect to arise from extreme age; the radiating striæ I have found to vary very much in thickness, &c., according to the preservation of the specimens; yet there appears to be a peculiarity of contour, which, together with its being most abundant in the Devonian rocks, renders it desirable to retain Professor Phillips' specific name. Length one inch three lines, width two inches nine lines.

Leptagonia plicatilis. *Sow.* sp.

Productus plicatilis. *Sow.* Min. Con.—Producta plicatilis. *Phil.* Geol. York.

Sp. Ch.—Rostral portion convex, with a deep, narrow, mesial hollow, and sixteen or seventeen small, rounded, concentric wrinkles, irregularly spinose; a row of three or four large spines on each side the beak; deflected front smooth.

This is obviously an aberrant species, leading to the ordinary *Productas* by its convex, rostral portion, and also by its having a mesial hollow and large spines. In well preserved specimens the front is perfectly smooth, even the fine, radiating striæ being there obsolete. Length seven lines, width eleven lines.

Leptagonia rugosa. *Dal.* sp.

Leptæna rugosa. *Dal.*

Sp. Ch.—Subrhomboidal, front straight, deflexed margin short; flat portion of the valves with fine, regular, rounded, concentric undulations, crossed by coarse, direct, equal, radiating striæ.

This species is very rare in the mountain limestone, and, when it does occur, is often confounded with the *P. analoga*, Phil., from which it differs entirely in its striation, and in the great regularity of the transverse wrinkles.

Leptæna. *Dal.* (Restricted).

Gen. Ch.—Semicircular, thin, scale-like; finely striated longitudinally; dorsal valve convex, ventral valve nearly equally concave; hinge-line as long as the shell is wide, usually armed with spines; cardinal area distinct, flat, *with parallel sides*, having a central, triangular, nearly closed foramen.

The genus, as here restricted, includes all those elegant, nearly flat, striated, scale-like shells, so abundant in the Silurian rocks, but rare in the carboniferous series. They are distinguished from *Orthis* by their narrow, cardinal area, with parallel sides, the area of *Orthis* being triangular, or rhomboidal, when distinctly common to the two valves; the hinge-line is never less than the width of the shell, and frequently armed with comparatively large spines, in which they differ from the true *Orthidæ*, which are never spinose.

Leptæna convoluta. *Phil.*

Leptæna convoluta. *Phil.* Pal. Fos.

Sp. Ch.—Transversely fusiform, gibbous, convoluted; ears conical; surface with coarse, longitudinal, rounded striæ.

A rare species, easily distinguished from the *L. volva*, M'Coy, by the coarse, *direct* striæ of the surface. I am not aware whether spines have been detected on the hinge-line; the Irish specimens do not shew any.

Leptæna crassistria. *M'Coy.* (Pl. XX. fig. 10).

Sp. Ch.—Semicircular, convex; length two-thirds the width; beak large, gibbous; surface with about twenty-eight coarse, rounded, radiating ridges; ears smooth, flattened; hinge-line spinous.

This well-marked species is very abundant in certain localities. The radiating ribs are sharp, equal, rounded, and about equal in width to the spaces between them; the ears are smooth, and much flattened; there are about twelve short, slender, curved spines on the hinge-line. Length five and a half lines, width seven and a half lines.

Leptæna Dalmaniana. *Kon.*

Sp. Ch.—Semicircular, flat, nearly twice as wide as long; surface covered with very fine, flexuous striæ; ten or twelve slender spines on the hinge-line.

The striæ on this beautiful species are so fine, as to be indistinctly seen with the naked eye; they are flexuous; the substance of the shell is very thin, and both valves are perfectly flat; the spines on the hinge-line are short and slender. Length eight lines, width thirteen lines. Before receiving De Koninck's work I had figured this species, Pl. XX. fig. 7.

Leptæna gibberula. *M'Coy.* (Pl. XX. fig. 11).

Sp. Ch.—Semicircular, length two-thirds the width, very gibbous in the middle; ears acute, flattened; surface very finely and regularly striated longitudinally.

This curious little species is not uncommon in the carb. slate series of Ireland, the shales of which abound with small species of *Orthis* and *Leptæna*, from all of which the present is distinguished by the great gibbosity of the middle portion, or body of the shell, the flattened, acute ears, and the nearly smooth surface, the longitudinal striæ being so fine as to require the lens to render them distinctly visible; they are close, rounded, and perfectly equal, in which they differ from the Silurian *L. sericea*, Sow., with one of the varieties of which it is likely to be confounded. Length one and a half lines, width three lines.

Leptæna Hardrensis. *Phil.* sp.

Orthis Hardrensis. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular, one valve convex, the other slightly concave; hinge-line equal to the width of the shell, armed with ten short, cylindrical spines; surface strongly striated from the beak; striæ crossed by minute, transverse lines; internal surface rough, with small, depressed spines; impressions large, reniform.

It closely resembles the *L. lata* of the Silurian rocks. The *L. sarcinulata* of continental authors seems to include them both.

Leptæna lata. *De Buch.* (?)

Leptæna lata. (?) *Sow.* Sil. Syst.

A few fragments of a *Leptæna*, possibly of this species, have occurred very rarely, but it is possible they might be referred to some of the varieties of the preceding species.

Leptæna multidentata. *M'Coy.* (Pl. XX. fig. 8).

Sp. Ch.—Semicircular; dorsal valve convex; ventral valve slightly concave; hinge-line straight, furnished with about twenty-six short, toothed spines; cardial area triangular, narrow, smooth; both valves coarsely striated longitudinally; striæ often dichotomizing; the intervening sulci regularly punctured.

This fine species is distinguished from every *Leptæna* I know, by the great number of short, strong spines on the hinge-line; the dorsal valve is convex towards the beak, flattened towards the cardinal angles; the longitudinal striæ are coarse, rounded, and frequently branching as they approach the margin; they are separated by very narrow sulci regularly punctured. Length eleven lines, width one inch five lines; height of cardinal area one line.

Leptæna papyracea. *M'Coy.* (Pl. XXII. fig. 2).

Sp. Ch.—Truncato-orbicular, length two-thirds the width, flat; hinge-line less than the width of the shell, spinous; cardinal angles obtuse; surface radiated with sharp, filiform, unequally-branched striæ, divergingly arched at the sides; sides of the shell concentrically wrinkled.

This singular species is common in one or two localities. It is distinguished from all others of the genus by the corrugated sides; it is perfectly flat, and as thin as paper; the hinge-line is considerably less than the width of the shell, and is closely set with long, hooked, slender spines. Length ten lines, width eleven lines.

Leptæna perlata. *M'Coy.* (Pl. XX. fig. 9).

Sp. Ch.—Semicircular; nearly twice as wide as long, convex; front margin nearly straight; surface marked with very fine, longitudinal, slightly flexuous striæ; hinge-line with about eight long, slender spines, set nearly at right angles.

This species is very closely allied to the *L. lata* of the Silurian strata; but on comparison of specimens the present shell is found to have the radiating striæ very much finer than either the Silurian species, or the *O. Hardrensis* of Phillips, and that they are slightly flexuous, nor is there any mesial depression in the present shell. Length three lines, width five and a half lines.

Leptæna plicata. *Phil.* sp.

Orthis plicata. *Phil.* Pal. Fos.—Orthis plicata. *Sow.* Geol. Trans.

Sp. Ch.—Transversely elliptical; width more than twice the length, extremities rounded, depressed; surface with about thirty coarse, sharp, radiating ridges, which become doubled in number as they approach the margin.

This species seems closely allied to that which I have figured under the name of *Leptæna serrata*, but is distinguished by its angular plaits, and rounded extremities; the radiating ridges are striated transversely. Length three lines, width seven lines.

Leptæna sericea. *Sow.* (?)

Leptæna sericea. *Sow.* Sil. Syst. ?—Leptæna interstrialis. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular, gibbous; very finely striated every fifth or sixth line, forming a sharp sulcus.

The few specimens of this shell which have occurred to me are obviously identical with the *Leptæna interstrialis* of Phillips. That author states, that on comparison with specimens of the *L. sericea*, his shell seemed distinct. I do not, however, see any very clear distinction in the Irish specimens, and they are referred to that species for the present, until more perfect specimens may occur. Length about seven lines.

Leptæna serrata. *M'Coy.* (Pl. XVIII. fig. 10).

Sp. Ch.—Semicircular, convex; surface covered with numerous, rather coarse, branched ridges; hinge-line equal to twice the length, straight, furnished with twenty small, hooked spines.

This species has been confounded with the *L. lata* of the Silurian rocks. It has, however, twenty short, hooked spines on the hinge-line, while that has but eight, or ten at most, long and slender ones. The thick, dichotomous striæ are likewise so characteristic, as to enable the geologist to distinguish even small fragments of the two species. Breadth ten lines, length five lines. One of the rarest fossils we have.

Leptæna sordida. *Sow.*

Leptæna sordida. *Sow.* Geol. Trans.—Orthis sordida. *Phil.* Pal. Fos.

Sp. Ch.—Outline from subquadrate to nearly semicircular; slightly convex; finely striated longitudinally; striæ granulated near the margin.

This pretty species is nearly allied to the *O. Hardrensis*, Phil., but is distinguished by its greater length in proportion to the width, and the striæ being granulated near the margin; the internal structure is also very different. Length four lines, width six and a half lines.

Leptæna tuberculata. *M'Coy.* (Pl. XX. fig. 5).

Sp. Ch.—Semicircular, convex; length two-thirds the width; surface with about forty-eight thick, rounded, dichotomous, smooth ribs, each bearing towards the margin a row of from five to eight round tubercles.

This curious little species is nearly semicircular, the hinge-line being much shorter than the width of the shell; moderately convex; the radiating ribs are thick, smooth, and distinctly separated, branching as they approach the margin, where they bear a row of six or eight little round tubercles. Length five lines, width eight lines.

Leptæna volva. *M'Coy.* (Pl. XVIII. fig. 14.)

Sp. Ch.—Semicircular, gibbous; ears involute, separated from the body of the shell by a shallow depression; hinge-line twice the length of the shell, furnished with twenty-four slender, hooked spines; surface covered with very fine, flexuous striæ.

This pretty species resembles the *L. convoluta* in general form, but is distinguished by the exceedingly fine, flexuous striæ; the two valves are almost in contact, the ventral valve being nearly as concave as the dorsal is convex; the cardinal area is very narrow, concave, and with parallel sides. Length eight lines, width one inch four lines.

Orthis. *Dalman.*

Gen. Ch.—Shell semicircular; dorsal valve convex in the middle; ventral valve nearly flat, slightly convex or concave; cardinal area triangular, common to both valves, that of the dorsal valve reticulated by muscular striæ, a large triangular foramen in the centre, nearly closed by arched scales; no spiral appendages; dental lamellæ semicircular, curving towards each other at their extremities.

Orthis arachnoidea. *Phil.*

Spirifer arachnoidea. *Phil.* Geol. York.—Orthis arachnoidea. *Phil.* Pal. Fos.

Sp. Ch.—Semielliptical, flat; hinge-line equal to the width of the shell; length exceeding the width; surface with numerous sharp, fine, close, divaricating striæ, increasing very much in number towards the margin, a few equidistant sulci deeper than the rest.

This elegant species is very rare in the Irish limestone series, where it has been occasionally confounded with the *O. pecten*, which it much resembles. Length one inch nine lines, width one inch eight lines.

Orthis arcuata. *Phil.*

Orthis arcuata. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oval; twice as wide as long, flattened; beaks small, prominent; ventral valve with a slight mesial hollow; surface with fine, divaricating striæ, much curved at the sides.

This species is rare; it is wider, and the striæ are more curved than in *O. interlineata*. Length six lines, width eleven lines.

Orthis Bechei. *M'Coy.* Pl. XXII. fig. 3).

Sp. Ch.—Semicircular, depressed; nearly twice as wide as long; front straight, slightly convex; sides abruptly rounded, nearly straight, forming rectangular cardinal angles; hinge-line equal to the width of the shell; cardinal area wide, triangular; surface closely radiated with fine, very much branched, equal striæ (about twenty-six in half an inch of the margin); intervening spaces narrow, concave, sharply striated across.

This fine species differs from the *O. crenistria*, in being so much more finely striated, and the striæ being equal in thickness, although, of course, very unequal in length, from their increasing so much in number towards the margin, and from the *O. arachnoidea*, Phil., in its great width, transverse striation, cardinal area, &c. From the nature of the striation, fragments are liable to be confounded with the *Atrypa desquamata*. From the *O. comata*, M'Coy, it is easily distinguished by its sharp, straight, frequently branching striæ, and their greater distance; the striæ in that species being remarkably obtuse, close, and flexuous, very seldom branched, and much finer, there being about eleven striæ in a quarter of an inch at the margin of the *O. Bechei*, and twenty-one in the same space of margin of the *O. comata*. Length one inch three lines, width two inches. Dedicated to Sir Henry T. De la Beche.

Orthis caduca. *M'Coy.* (Pl. XXII. fig. 6).

Sp. Ch.—Orbicular; perfectly flat, thin, width slightly exceeding the length; hinge-line shorter than the width of the shell; surface radiated with very numerous, fine, dichotomous striæ, of unequal length and fineness, slightly arched at the sides; intervening spaces flat, finely striated transversely.

This beautiful shell is distinguished from Captain Portlock's *O. cancellata*, by its short hinge-line, more numerous and finer striæ; the transverse striæ being much more delicate in the present shell. Length eight lines, width ten lines.

Orthis circularis. *M'Coy.* (Pl. XX. fig. 19).

Sp. Ch.—Outline circular; hinge-line less than one-third the width of the shell; valves nearly equal; very slightly convex, radiated with thick rounded ridges, which are decussated by delicate, transverse striæ, and numerous, strong, scale-like lines of growth; besides these there are a few scattered erect scales on the ridges.

This little species is remarkable for its almost perfect circularity of outline; the valves are but slightly convex, coarsely ribbed; the beaks are very small, but prominent; a few irregular, erect scales on some of the ribs give an irregularly tuberculated appearance to some specimens. Length five lines, width the same.

Orthis comata. *M'Coy.* (Pl. XXII. fig. 5).

Sp. Ch.—Truncato-orbicular; hinge-line as wide as the shell, extremities rectangular; cardinal area large, triangular; beaks large, prominent; surface marked with very numerous, fine, longitudinal ridges, or striæ, obtusely rounded, close, equal, and slightly waving, very finely striated across.

In form this resembles the *O. crenistria*, but is easily distinguished by its very numerous, flexuous, rounded striæ, which, instead of being unequal in length and thickness, and separated by broad, flat, spaces, as in that species, are in the present shell equal, and perfectly close together, resembling coarse, flowing hair; the obtuse, flexuous, and very numerous striæ distinguish it from the *O. Bechei*, M'Coy (see *O. Bechei*). Length one inch six lines, width two inches seven lines.

Orthis compressa. *Sow.* (?)

Orthis compressa. *Sow.* (?) Sil. Syst.—Orthis compressa. *Phil.* Pal. Fos.

Sp. Ch.—Truncato-orbicular, depressed; length and width nearly equal; surface with very fine, radiating striæ, having between them rows of impressed puncta.

A few imperfect specimens, apparently of this species, have occurred.

Orthis connivens. *Phil.* sp.

Spirifera connivens. *Phil.* Geol. York.

Sp. Ch.—Globose; front margin much raised and sinuated; a mesial hollow, bounded by two obtuse ridges, in each valve; surface with coarse, radiating striæ.

Orthis crenistria. *Phil.*

Spirifera crenistria. *Phil.* Geol. York.—Orthis crenistria. *Sow.* Geol. Trans.—Orthis crenistria. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular; cardinal area large, strongly striated; foramen nearly closed by vaulted scales; greatest depth of convex valve about one-third from the beak; radiating striæ strong, sharp, unequal in thickness, increasing in number towards the margin; spaces between the radiating striæ flat, sharply striated across.

In old individuals the front becomes as much deflected as in the *Leptæna euglypha*.

Orthis cylindrica. *M'Coy.* (Pl. XXII. fig. 1).

Sp. Ch.—Ventral valve semicircular, evenly convex, very gibbous towards the beak; deflected front very long, convex, cylindrical; surface marked with fine, longitudinal ridges, every fourth or fifth larger than the others; the intervening spaces slightly wrinkled transversely, with very fine longitudinal striæ.

The striation of this beautiful shell is similar in character to that of the *O. crenistria*, *O. Kellii*, *L. euglypha*, &c., but the form at once distinguishes it from every other known species; it approaches somewhat to the *L. euglypha*, but is much longer, more cylindrical, and convex; even young shells may be distinguished by all the space near the beaks being flattened, or slightly concave in the one, but very gibbous in the other. Length of rostral portion eight lines; length of the deflected front one inch two lines; width one inch two lines.

Orthis divaricata. *M'Coy.* (Pl. XX. fig. 17).

Sp. Ch.—Transversely oval; ventral valve evenly convex; dorsal valve plano-concave in the middle; hinge-line very short; surface finely and regularly striated; striæ at the sides much curved.

This species is much larger, and more convex than the *O. arcuata*, Phil., which, in some respects, it much resembles; it is likewise more finely striated, and much less transverse, the width exceeding the length by rather less than one-fifth, while the *O. arcuata* is nearly twice as wide as long; it has, also, a larger cardinal area. Length twelve lines, width fourteen lines.

Orthis filiaria. *Phil.* sp.

Spirifera filiaria. *Phil.* Geol. York.

Sp. Ch.—Longitudinally obovate, depressed; beaks prominent; hinge-margin very short, widest towards the front; smaller valves concave in the middle; a shallow sinus in the front margin; surface coarsely striated longitudinally.

The obovate outline of this species distinguishes it from every other with which I am acquainted Length one inch, width eleven lines.

Orthis gibbera. *Portk.* sp.

Atrypa gibbera. *Portk.* Geol. Rep.

Sp. Ch.—(Young) semicircular, convex, front margin slightly raised; (adult) semicylindrical, depth exceeding the width; sides subparallel, rostral portion of the shell flattened; front of both valves deflected, much produced, rounded; margin of the dorsal valve deeply lobed at the sides, raised to a narrow, rounded sinus in front; cardinal area narrow; surface very finely striated longitudinally, every fifth or sixth line thicker than the intermediate ones.

This curious species was figured on our plate nearly three years ago (previous to the publication of Captain Portlock's Report) under the specific name *alta*, in allusion to the great height of the valves. I have, however, of course adopted Captain Portlock's specific name, as first published. The dorsal valve resembles a *Bellerophon bilobatus* in shape; the striation resembles that of some varieties of the *O. resupinata*. Depth of both valves one inch five lines, width one inch one line, length the same.

Orthis granulosa. *Phil.*

Orthis granulosa. *Phil.* Pal. Fos.

Sp. Ch.—Orbicular, flat; hinge-line two-thirds the width of the shell; beaks very small, pointed; surface strongly radiated, with angular, granulose ridges, which become doubled in number as they approach the margin.

A rare species, easily distinguished by its numerous, dichotomous, tuberculated striæ. It resembles the *O. testudinaria* and *O. canalis* of the Silurian rocks. Length three lines, width four lines.

Orthis interlineata. *Sow.*

Orthis interlineata. *Sow.* Geol. Trans. (pars.)—Orthis interlineata. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oval, depressed; beaks small, prominent; surface with strong, radiating striæ, increasing in number towards the margin; cardinal teeth diverging, enclosing a large, cordiform space.

This species is distinguished from the *O. parallela* by its greater width and large cordiform impressions; from *O. arcuata*, by the directness and lesser width of its striæ. Length nine lines, width one inch three lines.

Orthis Kellii. *M'Coy.* (Pl. XXII. fig. 4).

Sp. Ch.—Truncato-orbicular, hinge-line slightly less than the width of the shell; cardinal angles obtuse; ventral valve very convex, with a wide, rounded, mesial furrow; dorsal valve shallow, slightly concave; surface of both valves radiated with very fine, close, unequal ridges and striæ.

I am indebted to Mr. John Kelly for directing my attention to this species; it seems to be constantly distinguished from the *O. crenistria*, Phil., by its deep, rounded mesial furrow, which also indents the front margin, so that it closely resembles in shape the *O. bilobata*, Sow.; it is also much more convex, and is particularly gibbous near the beak, from which the surface is regularly arched to the margin, while the *O. crenistria* is flattened, or slightly concave near the beak, and is either nearly flat, or in old specimens suddenly rounded to a short, deflected margin, as in the *L. cuglypha;* the cardinal angles of the *O. crenistria*, Phil., are acute, so that the width is nearly double the length; while, on the other hand, in the *O. Kellii*, M'Coy, the cardinal angles are obtuse, the hinge-line being rather less than the width of the shell. and the length is three-fourths

the width. I have never seen the *O. Kellii* more than two inches in length, while the *O. crenistria* is frequently double that size, and is almost always larger than the former species. The striation is so variable in those shells, according to the state of preservation of the surface, that it is of little use in specific distinctions; the striæ, however, of the *O. Kellii*, M'Coy, although resembling in character those of the *O. crenistria*, Phil., are usually much finer, closer, and more nearly equal, than in that species. Length one inch four lines, width one inch eight lines.

Orthis latissima. *M'Coy.* (Pl. XX. fig. 20).

Sp. Ch.—Twice and a half wider than long, depressed, convex near the beak; margin slightly inflexed; cardinal angles rounded; surface regularly and closely marked with fine, rounded striæ; internal impression large, formed of two lobes on each side, the anterior of which is dilated, and spatulate at the tip, that nearer the beak suddenly pointed; central septum extending only as far as the lateral impressions.

This is the widest species of *Orthis* with which I am acquainted; it is convex only near the beak, and the long ears are rounded and slightly turned up as in the *Leptæna latissima;* there is a narrow, inflexion of the margin; the radiating striæ are exceedingly fine, close, equal, rounded, and smooth; the internal supports are very large, forming a double lobe on each side. Length eleven lines, width two inches two lines.

Orthis longisulcata. *Phil.*

Orthis longisulcata. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oval, rather more than twice as wide as long, depressed; surface radiated with very fine, divaricating striæ, increasing in number towards the margin, and in old specimens decussated by imbricating laminæ of growth; cardinal teeth very long, straight, diverging.

This species is allied to the *O. interlineata*, but is more finely striated; the long, straight teeth distinguish it from any of the other species. Length nine lines, width one inch seven lines.

Orthis orbicularis. *Sow.*

Orthis orbicularis. *Sow.* Sil. Syst.

Sp. Ch.—Orbicular, depressed; beak small; hinge-line nearly equal to the width of the shell; dorsal valve convex, the other flattened, with a wide mesial hollow; both valves finely striated.

I have not seen the internal structure of this species, which is almost necessary for its recognition.

Orthis papilionacea. *Phil.* sp.

Spirifer papilionacea. *Phil.* Geol. York.

Sp. Ch.—Width rather more than twice and a half the length; front deflected in old specimens; surface covered with exceedingly fine, undulating, equal striæ; cardinal area narrow, rhomboidal, transversely striated.

This beautiful species with age acquires nearly the size of the *Productea gigantea*, and nearly the same form, in which state it has, perhaps, been ranked with the *P. comoides*. When young, however, it is flat, transversely elliptical, very wide, and with very acute cardinal angles.

Orthis parallela. *Phil.*

Orthis interlineata. *Sow.* (pars).—Orthis parallela. *Phil.* Pal. Fos.

Sp. Ch.—Longitudinally ovate, depressed; surface with strong, alternately larger and smaller, divaricating, angular striæ, doubling in number as they approach the margin; cardinal teeth lengthened, slightly curved, approximate at their tips, enclosing two long, tongue-shaped impressions.

This species is very distinct from the *O. interlineata*, both in form and internal structure; it approaches

much nearer to the *O. filiaria* of the superior beds, but has much coarser striæ, and a larger hinge-line. Length nine lines, width eight lines.

Orthis (?) quadrata. *M'Coy.* (Pl. XX. fig. 18).

Sp. Ch.—Shell quadrate, pyramidal; front straight, slightly emarginate; sides slightly concave; cardinal angles pointed; cardinal area very large, flat, triangular; surface with about forty strong, radiating ridges, alternately larger and smaller.

This pretty little shell resembles the *Leptæna minima* of the Wenlock shale in outline and size, but the striæ are coarser, and the cardinal area larger; the present species is almost pyramidal, the height at the beak being rather more than one-half the length. Only a single specimen has occurred. Length one line and a half, width two lines.

Orthis radialis. *Phil.* sp.

Spirifera radialis. *Phil.* Geol. York.

Sp. Ch.—Semicircular, twice as wide as long; convex; surface with large, irregular, rounded, radiating ridges, with numerous, intermediate, smaller ones, all crossed by numerous, prominent, imbricating laminæ of growth.

This magnificent shell is in no danger of being confounded with any other, its characters are so bold and striking. It is very rare.

Orthis resupinata. *Mart.* sp.

Con. Anom. resupinatus. *Mart.* Pet. Derb.—Terebratula resupinata. *Sow.* Min. Con.—Spirifera resupinata. *Phil.* Geol. York.—Orthis resupinata. *Phil.* Pal. Fos.

Sp. Ch.—Transversely oval, length one-third less than the width; dorsal valve concave; ventral valve evenly convex, with a mesial depression; surface with fine, radiating striæ, which form lengthened, alternating spines at irregular intervals.

This species is liable to considerable variation, the striæ are often nearly plain, some are more convex than others, and finally some adult specimens are scarcely an inch long, while others, apparently not full grown, are nearly three times that size, just as we see in some living species of *Cypræa*. Length one inch five lines, width one inch ten lines, depth ten lines.

Orthis semicircularis. *Sow.*

Orthis semicircularis? *Sow.* Sil. Syst.—Orthis semicircularis. *Sow.* Geol. Trans.—Orthis semicircularis. *Phil.* Pal. Fos.

Sp. Ch.—Truncato-orbicular, gibbous; radiating striæ, fine, direct, increasing in number towards the margin; cardinal teeth very short, thick, and very much diverging.

I have followed Professor Phillips and Mr. Sowerby in calling this Devonian shell *O. semicircularis*, although the Caradoc sandstone species appears to me to differ constantly in being wider, more convex, and more coarsely striated.

Orthis sulcata. *M'Coy.* (Pl. XX. fig 6).

Sp. Ch.—Semicircular, gibbous; ears flattened; surface with very coarse, rounded, frequently branched striæ; hinge-line exceeding the width of the shell, furnished with ten strong, conical spines.

This species is easily distinguished from the *Leptæna volva*, M'Coy, by its flattened ears, and coarser striæ, and from *O. multidentata*, M'Coy, by its greater gibbosity, coarser striæ, and less number of cardinal spines. Length nine lines, width fourteen lines.

Orthis (?) tenuistriata. *Sow.*

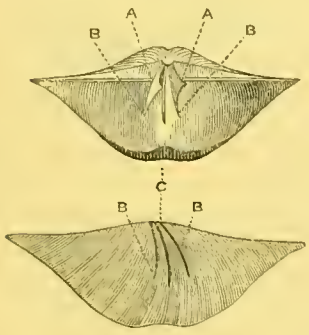
Orthis tenuistriata. *Sow.* Geol. Trans.

I have referred to this species some imperfect fragments of a shell most nearly related to the *Leptæna Hardrensis*, Phil., but with the striæ somewhat finer. The specimens to which I allude are certainly not the young of the *O. crenistria*, which has much wider and more unequal striæ.

DELTHYRIDÆ.

The *Delthyridæ* or Spirifers (with the exception of *Orthis*, not then known) were originally formed into the genus *Spirifer* by the late Mr. Sowerby, who named them from the spiral appendages which he was the first to figure and describe. This he did on the supposition that they were "two spirally-rolled cones," and as such he has figured them, both in the Linnæan Transactions and Mineral Conchology, without, however, indicating the manner of their attachment to the shell, or their uses. The turns are so coated with little crystals of calcareous spar in those figures, that they appear much thicker than they really are, and touching each other; the consequence of which has been, that nearly all the continental geologists have described them as two hollow cones floating free in the body of the animal. M. Deshayes considered them as the arms of the animal, and mistaking the crystallization represented in Mr. Sowerby's figure for joints, he describes them as articulated (which the arms of Brachiopods never are). Almost every author[a] of the present day considers these appendages as the arms of the animal. As I have been led to hold an entirely opposite view, it may be necessary to enter into some details of the internal structure of the Spirifers, which I have arrived at by making a great number of sections of the shells, and from the examination of several silicious casts, the calcareous matrix of which I succeeded in removing, by the action of dilute hydrochloric acid, so as to display the parts with great delicacy.

Fig. 14.



In the dorsal, or large valve, we find two short, strong, cardinal, teeth (see fig. 14), A A, one at each side of the base of the triangular foramen; in order to give the requisite strength to these teeth, we find them, in all the species, supported by two thin, shelly plates, which extend from their bases to the beak of the shell, and rest against the dorsal valve (B B). These I propose to call the *dental lamellæ;* it is their bases which form the two diverging lines we so constantly find on grinding down or polishing the beak of the large valve of the Spirifers (see fig. 14, lower figure), they form the sides of the triangular foramen. In the centre and invariably longer than these is a smaller septum (c).

In the ventral or smaller valve we find no septum, but the cardinal teeth, like those of the *Terebratulæ*, are exceedingly complex, they arise one on each side the beak, by a broad, flattened base, from which they diverge as in the annexed cut (fig. 15) approximating again at about the middle of the shell, where they give off a short, blunt process, directed backwards; they then diverge until they reach the anterior margin of the shell, when they turn backwards, and towards the beak forming a number of spiral turns, diminishing in size towards the cardinal angles. These are the bodies considered by most authors as the *arms of the animal*, but which I hope to be able to shew, are merely a modification of that delicate, shelly support, which we find in the true *Terebratulæ* (see fig. 16), for the body of the animal. In the first place the *arms* of Brachiopods are analogous to the foot of other bivalves, and therefore take their origin from the body of the animal, not from the shell. I have been able to demonstrate that the present organs arise from *the shell*, in precisely the same position as the internal support of the living *Terebratulæ*. Mr. Sowerby describes the appendages of the *Spiriferæ*, as "hollow, cartilaginous tubes;" in this it is possible that he mistook the outer coating of minute crystals for the tube itself, and the

Fig. 15.

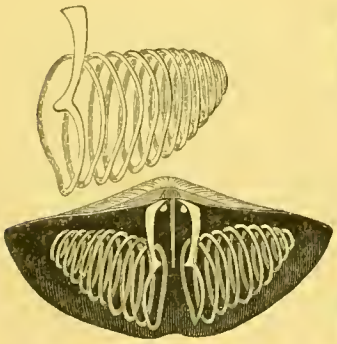
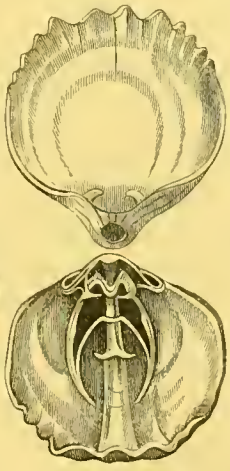


Fig. 16.

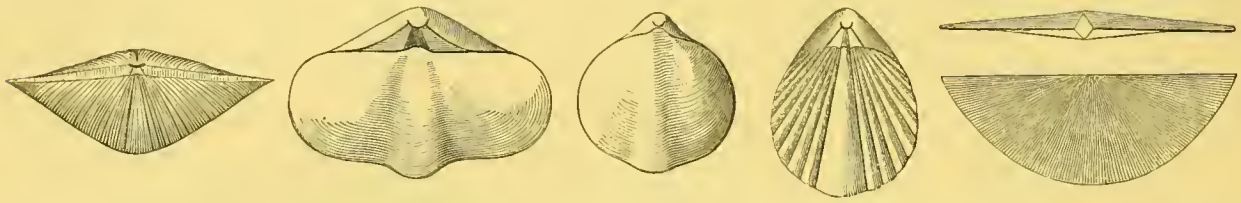


[a] This was written nearly three years ago; some of the views have been since adopted by others.

true shelly support in the middle as the hollow; I am led to this conclusion from having myself succeeded in removing this crystalline coating in many species, among others those figured by Mr. Sowerby, and in every instance I have found the true spiral process to be perfectly flat, and not as thick as the thinnest writing paper, perfectly resembling, in fact, the (in my mind) analogous processes in the living *Terebratulæ*. The negative argument against their being the arms, properly so-called, is, that in no single instance have these organs been found in any of the *Brachiopoda* of the newer rocks; even where the impressions of the fleshy arms of *Cephalopoda* have been preserved, none of the *Terebratulidæ* (which we know had those arms) shew them in the fossil state, but they all exhibit the variously modified, shelly support, preserved in exactly the same manner as the external shell. It is only in this group that they assume a spiral form.

The family *Delthyridæ* appear to be divided into the five following natural genera: 1. *Spirifera*, Sow., (fig. 17), composed of those longitudinally-ribbed species, in which the hinge-line is equal to, or exceeds the width of the shell, the cardinal area with parallel sides, the cardinal teeth of the ventral valve large, spirally rolled, and having a triangular foramen beneath the beak of the dorsal valve. 2. *Martinia*, M'Coy (fig. 18),

Fig. 17. Fig. 18. Fig. 19. Fig. 20. Fig. 21.



or the smooth Spirifers in which the hinge-line is less than the width of the shell, and the cardinal area triangular. 3. *Athyris*, M'Coy (fig. 19), in which there is no vestige of either foramen, cardinal area, or hinge-line. This remarkable genus is frequently confounded with those shells usually named *Terebratula*, in the older rocks, but is distinguished by the large, spiral appendages, which are wanting in the other group. 4. *Brachythyris*, M'Coy (fig. 20), in which we find the longitudinally-ribbed surface of *Spirifera*, united with the short hinge-line of *Martinia*. 5. *Orthis*, Dal. (fig. 21), in which there are no spiral appendages, the hinge-line and striæ frequently spinose (as in *Leptæna*), and the cardinal area common to both valves, and its sides inclined towards each other at its angles; dorsal valve smallest.

Spirifera. *Sow.*

Gen. Ch.—Shell transversely elongate; hinge equalling or exceeding the width of the shell; surface ribbed longitudinally; cardinal area with the sides parallel, or nearly so; a triangular foramen beneath the beak of the dorsal valve; dental lamellæ short, diverging; cardinal teeth of the ventral valve very long, spirally rolled.

This well known genus appears to have three minor or subgeneric types of form; one of them is *Spirifera* proper, as above defined; 2. *Cyrtia*, of Dalman, in which the cardinal area is exceedingly wide, triangular, and the beak of the dorsal valve not incurved; 3. *Fusella*, M'Coy, including those little shells allied to the *Spirifera fusiformis* and *rhomboidea* of Phillips, Geol. Yorkshire, having a regular fusiform outline, with a very wide and hollow cardinal area, the sides of which are parallel.

Spirifera aperturata. *Schlot.* sp.

Terebratula aperturata. *Schlot.* ?—Spirifer aperturata. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular, gibbous; mesial fold large, rounded, sides rounded, cardinal angles mucronate; sides with coarse, rounded, equal ridges, mesial ridge, and hollow, with fine, sharp, longitudinal ridges, half as thick as those on the sides.

The Eifel specimens of this shell have more numerous radiating ridges than the Devonian or Irish examples (which are identical), and have a more marked difference in thickness between the mesial and lateral ribs.

Spirifera attenuata. *Sow.*

Spirifer attenuatus. *Sow.* Min. Con.—Spirifera attenuata. *Phil.* Geol. York.

Sp. Ch.—Convex, width exceeding twice the length, cardinal angles attenuated; mesial fold rounded, defined, cardinal area flat, with parallel sides; beaks incurved, but not close; radiating ribs numerous, sometimes simple, sometimes branched.

This is, perhaps, one of the most difficult species to characterize, so numerous are its varieties; the type of the species is about three times as wide as long, the depth equal to about the length of the smaller valve; the mesial ridge and corresponding hollow rounded; the ridge defined on each side by a sulcus deeper than the rest; the surface covered with exceedingly numerous, thin, branched ribs. But the greater number of specimens differ in some particular or other. Thus, many specimens have no mesial elevation, in others the width is little more than twice the length; the depth varies greatly, and as to the radiating ribs we have every variety, between those specimens having seventy very thin, branched, ribs, and those possessing but half the number of thick, rounded, simple, or undivided ribs. With respect to these latter varieties, I should remark, that some authors have lately separated those with branched, and those with simple ribs, into two distinct species, but it is not by any means unfrequent to find the ribs on the dorsal valve branched, and those on the ventral valve simple, in the same specimen; and where a large number of specimens can be compared, the passage from one extreme to the other may in general be traced in the most perfect manner. In all these varieties the cardinal angles, when perfect, are extended into long, smooth spines. Length one and a quarter inches, width three inches, depth one inch.

Spirifera bicarinata. *M'Coy.* (Pl. XXII. fig. 10).

Sp. Ch.—Rhomboidal, width more than twice the length, very gibbous; sides cylindrical; mesial fold wide, smooth, concave on both valves, bounded on both valves by two large, rounded keels; about twelve rounded, entire ribs on each side; cardinal area with parallel sides, very wide and hollow.

This curious species is easily recognized by the mesial fold being concave, and bounded by large keels *on both* valves. Length eight lines, width one inch six lines.

Spirifera bisulcata. *Sow.*

Spirifer bisulcatus. *Sow.* Min. Con.

Sp. Ch.—Semicircular, gibbous; about ten or twelve strong, rounded, entire ribs on each side of the mesial furrow, which is strongly defined, round, and prominent, with slightly smaller, dichotomous ribs; cardinal area narrow, beaks almost in contact; width very little greater than the length.

Although this is found in almost every list of mountain limestone fossils, I have found it exceedingly scarce in every locality in Ireland, the fossils of which I have had an opportunity of examining, except the limestone of Blacklion near Enniskillen; the specimens most usually seen in Irish collections under this name, being imperfect individuals of *Spirifera attenuata*, having their cardinal angles broken off, so that the length and width may be about equal. Besides having its length and breadth nearly alike, the present species may be distinguished from the *Spirifera attenuata* by the small number of its simple, lateral ribs. Von Buch, and most continental Oryctologists, consider this species as identical with the *Spirifer aperturatus* of Schlottheim; but as Mr. Londsdale has already remarked, the beaks of the *Spirifera aperturata* are widely separated by an obtusely triangular, cardinal area, while the present shell has the beaks in contact, and a cardinal area with parallel sides. Professor Phillips's figure does not appear to belong to this species, it bears a closer analogy to the *Spirifera disjuncta*, and to the next species. Length one inch, width fourteen lines, depth nine lines.

Spirifera calcarata. *Sow.*

Spirifer calcaratus. *Sow.* Geol. Trans.—Spirifera calcarata. *Phil.* Pal. Fos.

Sp. Ch.—Nearly three times as wide as long, convex; cardinal angles attenuated, smooth; mesial furrow strongly defined; surface round, with numerous sharp, equal, radiating ridges, rarely branched; those on the mesial furrow smaller, and less prominent.

This species is very common in the carboniferous slate of nearly every district in Ireland. It resembles the *S. attenuata* of the limestone in many points; but is more depressed, has the mesial fold more strongly defined, and has the ridges more equal and sharply marked. Length seven lines, width one inch seven lines.

Spirifera choristites. *Von Buch.*

Choristites mosquensis Sowerbii. *Fisher.* Oryct. Mos.

Sp. Ch.—Subquadrangular, gibbous; cardinal area wide, flat; beaks incurved, remote; mesial fold shallow, rounded; ribs numerous, depressed, branched, about nineteen on each side the mesial fold, which has about ten of the same size and structure as those on the sides. Length slightly exceeding the width.

This species is distinguished from the *Spirifera bisulcata* by the beaks being so far apart, and by the great number of its lateral radiations; from the *Spirifera attenuata* it is distinguished by its length being about equal to the width. I do not know that this shell has been before detected in Britain, unless, indeed, Mr. Sowerby's *Spirifera disjuncta* may be looked upon as a variety of it. Professor Phillips' *Spirifera bisulcata* is, perhaps, also nearly allied to it. *Spirifera disjuncta* of the Devonian rocks is a wider shell. The specimens which I have referred provisionally to this species have the mesial fold more strongly marked than in the foreign examples. Length one and a half inches, width two lines less, depth one inch.

Spirifera clathrata. *M'Coy.* (Pl. XIX. fig. 9).

Sp. Ch.—Semicircular, gibbous; sides slightly cuspidate, twice as wide as long; mesial lobe narrow, rounded, prominent; ribs numerous, branched, three or four on the mesial fold, and about sixteen on each side; whole surface reticulated with very minute, longitudinal, and transverse striæ.

This interesting shell might be mistaken for one of the shorter varieties of the *S. attenuata*, were it not for the minute reticulation of the surface. Length seven lines, width one inch two lines. Grows very much larger than the specimen figured, equalling the *Spirifera gigantea* in size, to which species it is closely allied; the reticulation of the surface, however, seems peculiar.

Spirifera convoluta. *Phil.*

Spirifera convoluta. *Phil.* Geol. York.

Sp. Ch.—Fusiform, depressed, width about four times the length; cardinal area concave, striated across; surface radiated with numerous, obtuse, rounded, smooth ribs, three of which are elevated to form the mesial fold.

This species is easily known from all others by its excessive width. Length eleven lines, width four inches.

Spirifera costata. *Sow.*

Spirifer costatus. *Sow.* Geol. Trans.

See *S. speciosus*. Mr. Sowerby's shell, and some of the Irish carb. slate specimens, have the ribs narrower, and the intervening spaces wider, than in the Eifel specimens.

Spirifera Crispa. *Sow.*

Spirifer crispus. *Sow.* Sil. Syst.—Delthyris crispus. *Dal.* Act. Holm.

Sp. Ch.—Semicircular, gibbous; hinge-line equal to the width of the shell; cardinal area large; three or four large plaits on each side of the mesial ridge; surface crossed by concentric, imbricating laminæ of growth.

This beautiful shell is allied to the *C. insculpta*, Phil., and *S. octoplicata*, Sow. Length six lines, width nine lines.

Spirifera decemcostata. *M'Coy.* (Pl. XXII. fig. 9).

Sp. Ch.—Semicircular, gibbous, smooth, twice as wide as long; front rounded; sides suddenly attenuate, cuspidate; mesial lobe large, round, projecting, with five large, rounded ribs on each side, leaving a broad space at the cardinal angles smooth, or only striated transversely.

This species is so very distinct from every other *Spirifera* with which I am acquainted, that it would be unnecessary to point out any particular difference; the whole surface is smooth, except the cuspidate sides, which are marked with strong lines of growth.

Spirifera disjuncta. *Sow.*

Spirifer disjunctus. *Sow.* Geol. Trans.—Spirifer disjuncta. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular; twice, or twice and a half as wide as long, gibbous; cardinal area broad, flat, beaks remote; mesial furrow strong; surface with numerous, narrow, radiating ridges.

This species is more gibbous and less transverse than the *S. attenuata*, and has a much wider cardinal area. Length one inch, width two inches three lines.

Spirifera extensa. *Sow.*

Spirifer extensus. *Sow.* Geol. Trans.

Sp. Ch.—Width five times the length, convex; cardinal area narrow, with parallel sides; cardinal angles very acute; mesial fold prominent, defined; surface radiated with narrow, rounded, equal ribs.

A few imperfect specimens of this species have occurred; it is allied to the *S. convoluta*, Phil., but is distinguished by its more numerous and slender radiating ridges. Length six lines, width two inches six lines.

Spirifera furcata. *M'Coy.* (Pl. XXII. fig. 12).

Sp. Ch.—Semicircular, gibbous; length three-fourths the width; sides rectangular; mesial fold defined, prominent, rounded, with about six thick, rounded ribs, two of which reach the beak; sides with about five strong, radiating ridges on each side, near the beak, each of which branches into two or three strong, rounded ribs, as they approach the margin.

Distinguished from *Sp.* (*Brachythyris*) *duplicicosta*, Phil., by the long hinge-line and cardinal area, which place it in the present genus as strictly defined, and by the greater thickness and less number of radiating ribs; and from the *S. laxa*, Portk., by the strongly ridged mesial fold. Length eleven lines, width fourteen lines, depth six lines.

Spirifera fusiformis. *Sow.*

Spirifera fusiformis. *Phil.* Geol. York.

Sp. Ch.—Transversely elongate; width nearly four times the length; sides rapidly tapering, conical; mesial hollow wide, smooth; mesial ridge with three ribs; eight round, smooth ribs on each side the mesial fold; it has a wide and greatly hollowed cardinal area, the beaks are much incurved and approximate; the sides

diminish rapidly in size from the mesial fold, and are almost perfectly round. Length four lines, width one inch three lines, depth four lines.

This little species might be regarded as the type of a subgenus, (*Fusella*, M'Coy) which might be thus characterized.

Gen. Ch.—Shell elongate transversely, fusiform; cardinal area wide, much curved; beaks incurved.

This group would embrace these little *Spirifers* of the mountain limestone, which have a perfectly fusiform outline, the depth being equal to the length, and the sides cylindrical; the cardinal area is extremely wide in proportion to their size, and is always hollowed, or much curved, thus contrasting with the narrow, flat area of the typical Spirifers, while the strongly incurved beaks distinguish them from the *Cyrtiæ*. It would include the *S. bicarinata*, *S. rhomboides*, &c. &c.

Spirifera gigantea *Sow.*

Spirifer giganteus. *Sow.* Geol. Trans.—Spirifera gigantea. *Phil.* Pal. Fos.

Sp. Ch.—Transversely elongate; sides cuspidate, mesial fold defined; about twenty-five narrow entire ribs on each side, crossed by numerous lines of growth.

This large species is not uncommon in some localities in Ireland; it has been confounded by some of the English geologists with the *S. princeps*, from which it differs in its slender and more numerous radiating ridges.

Spirifera grandæva. *Phil.*

Spirifera grandæva. *Phil.* Pal. Fos.

Sp. Ch.—Truncato-orbicular, front narrow, sides nearly straight, gibbous; cardinal angles acute, mesial fold broad, rounded, well defined; about nine or ten large, rounded ribs on each side the mesial fold, on which there are about five ridges equal in size to those of the sides.

A single specimen of this very rare species has occurred; it is distinguished from the *S. aperturata* by the greater size of the ribs on the mesial fold.

Spirifera inornata. *Sow.*

Spirifer inornatus. *Sow.* Geol. Trans.

Sp. Ch.—Nearly four times as wide as long, convex; surface irregular, smooth, with a few unequal, transverse waves of growth.

A few imperfect fragments of this species have been found.

Spirifera megaloba. *Phil.*

Spirifera megaloba. *Phil.* Pal. Fos.

Two or three large, rounded, transversely imbricated ribs belonging to this species have occurred.

Spirifera mesomala. *Phil.*

Spirifera mesomala. *Phil.* Pal. Fos.

Sp. Ch.—Semicircular, depressed; mesial fold broad, flat, smooth, and sharply defined, about ten narrow, rounded, equal ribs on each side.

Spirifera minima. *Sow.*

Anomites acutus. *Mart.* Pet. Derb.—Spirifer acutus. *Flem.*—Spirifer minimus. *Sow.* Min. Con.

Sp. Ch.—Semicircular, convex, length two-thirds the width; ribs deep, equal; mesial ridge and furrow angular; cardinal area small; cardinal angles obtuse; beak of dorsal valve prominent, incurved.

This is one of the smallest species of *Spirifera;* it is very rare; it appears to be the *Anomites acutus* of Martin; so that, following Fleming, we ought, perhaps, to place *acutus* as the specific name. Length about half an inch.

Spirifera octoplicata. *Sow.*

Spirifer octoplicatus. *Sow.* Min. Con.

Sp. Ch.—Trigonal; hinge-line equal to the width of the shell; four large angular plaits on each side the mesial ridge; surface smooth.

The nearly smooth surface is the principal distinction between this species and some of the varieties of the *S. crispus*. Length six lines, width nine lines.

Spirifera Ornithorhyncha. *M'Coy.* (Pl. XXI. fig. 2).

Sp. Ch.—Cruciform, a very large, compressed, smooth, mesial *ridge on both* valves, greatly produced into a beak in font; sides narrow, cylindrical, with five or six obtuse radiating ridges; cardinal area large hollow.

When seen in front, the long, central beak, at right angles to the cylindrical sides, gives this shell the appearance of the Roman letter T., and when viewed laterally, the resemblance to the beak of the little Auk *Alca Alle*, has suggested the specific name. Length of central beaked portion, one inch two lines.

Spirifera ostiolata. *Schlot.*

Spirifer ostiolatus. *Schlottheim.* Nachträge.

Sp. Ch.—Suborbicular, gibbous; length three-fourths the width; cardinal angles obtuse, beaks approximate; cardinal area narrow, with parallel sides; about twelve broad, rounded, entire ridges on each side; mesial ridge and hollow broad, shallow, smooth.

In this fine species the surface is minutely granulated in most of the specimens, as noticed by Mr. Lonsdale, I am not quite sure whether it be due to the mode of preservation. Length one inch three lines, width one inch six lines.

Spirifera princeps. *M'Coy.* (Pl. XXI. fig. 1).

Spirifera Princeps. *M'Coy.* In Cat. Geol. Soc. Dub.

Sp. Ch.—Semicircular, twice as wide as long, gibbous; numerous furrows from the beak, which increase in number towards the margin, including between them broad, flattened, branched ribs; front elevated in the middle, with about five ribs on the rounded mesial elevation, of the same size as those on the sides; hinge-line equal to the width of the shell, cardinal angles slightly acute, flattened; beaks approximate.

This species agrees with the shorter varieties of *Spirifera attenuata* in the proportion of length to breadth, but differs in having but half the number of radiating, branched ribs; while it is distinguished from the *Spirifera bisulcata* by its greater width, and by having a greater number of ribs, which are simple in *Spirifera bisulcata*, but much branched in the present species, which is also much larger than either. With the *Spirifera striata* it has little affinity, being much more tumid, and the mesial fold being round instead of triangular, as in that species, the character of the ribs also differs entirely. Length three and a-half inches, width six inches.

Spirifera pulchella. *Sow.*

Spirifer pulchellus. *Sow.* Geol. Trans.

Sp. Ch.—Transversely oval, gibbous; beak of the dorsal valve large, incurved; cardinal area triangular; cardinal angles rounded; two large rounded ribs on each side the mesial furrow, which is narrow and rounded; surface smooth, or with a few concentric lines of growth.

This little species is not uncommon, in company with the *S. crispa*, *S. speciosa*, &c. Length three lines, width five lines.

Spirifera quinqueloba. *M'Coy.* (Pl. XXII. fig. 7).

Sp. Ch.—Ventral valve semicircular, twice as wide as long, with five nearly equal, rounded, distant, radiating ribs, crossed by sharp, regular, concentric lines of growth.

This species is distinguished from the *S. ptychodes*, Dal., which has also five lobes, by its greater width and transverse striæ; from the *S. crispa* of the Silurian rocks (allied to the *S. amblyptera*, Phil.), by its greater width and acute cardinal angles; from the *S. crispa* of the Eifel and Irish carboniferous slate, by the small number and roundness of its distant, radiating ribs. Length three lines, width six lines.

Spirifera rhomboidea. *Phil.*

Spirifera rhomboidea. *Phil.* Geol. York.

Sp. Ch.—Fusiform, rhomboidal; width exceeding twice the length; depth exceeding the length of the small valve; mesial fold defined, rounded, bearing six round, smooth, radiating ribs; about twelve rather larger ribs on each side.

This is not an uncommon species; the long, cylindrical sides render it very striking. Length seven lines, depth six lines, width one and a quarter inches.

Spirifer rotundata. *Sow.*

Spirifer rotundatus. *Sow.* Min. Con.—Spirifera rotundata. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, depressed; cardinal area narrow; beaks approximate; about twelve, broad, flattened (occasionally branched) ribs, on each side the mesial elevation, which is large, rounded, and smooth.

The width of this species is about once and a half the length, the depth half the width; the lateral radiations are broad, and much flattened, usually branched; the mesial ridge smooth, rounded, usually with a sulcus down the middle; the corresponding hollow has obscure ribs, somewhat smaller than those of the sides (I have seen a few specimens in which both the mesial hollow and ridges had obscure ribs). This very common species is united by Von Buch to the *Spirifera ostiolata*, from which, however, it differs very widely. Most of our English authors have confounded it with the *Spirifer pinguis* of Sowerby (see *Brachythyris pinguis*). It is not the *Anomites rotundatus* of Martin. Length two inches three lines, width three inches.

Spirifera rudis. *Phil.*

Spirifera rudis. *Phil.* Pal. Fos.

A few obscure fragments, resembling Professor Phillips' figure more than any other species I am acquainted with, have occurred, but they are too imperfect to furnish a description, nor is any definition of the species published.

Spirifera speciosa. *Bronn.*

Spirifer speciosus alatus. *Bronn.* Leth. Geog.

Sp. Ch.—Transversely elongated, fusiform, gibbous; sides conical, pointed; cardinal area narrow, with parallel sides; mesial fold broad, rounded; about ten narrow, rounded, prominent ribs on each side; entire surface crossed by regular, imbricated, erect, scale-like laminæ of growth.

This beautiful shell is abundant in the Eifel, and certain districts in Ireland, I can see nothing to distinguish the *S. costata* of Sowerby from this species.

Spirifera striata. *Sow.*

Anomites striatus. *Mart.* Pet. Derb.—Spirifer striatus. *Sow.* Min. Con.

Sp. Ch.—Semicircular, depressed; cardinal angles acute; mesial fold angular, produced in front; cardinal area large, hollow, with parallel sides; about fourteen sharp, unequal sulci on the mesial fold, and thirty-seven on each side.

Next to *Spirifera princeps*, M'Coy, and *S. giganteus*, Sow., this is the largest of the known Spirifers, frequently attaining the width of four inches, or even more. The surface is much depressed; the mesial fold strongly defined, angular, and forming a triangular projection in front; the sides are acutely angular; cardinal area large, and much curved; the beak incurved, but small; the striæ are exceedingly numerous, sharply defined, narrow, and rather unequal. This shell is very well known on the Continent, as the species in which Mr. Sowerby first discovered the spiral appendages, a part of which he figured, rather larger than nature, in the twelfth volume of the Transactions of the Linnæan Society. Length three inches, width four inches and a half, depth one inch and a half.

Spirifera transiens. *M'Coy.* (Pl. XIX. fig. 14).

Sp. Ch.—Triangular, or rhomboidal, including the beak, twice as wide as long, gibbous; mesial fold very large, prominent, rounded, undefined, producing a very deep sinus in the front margin; sides radiated with about ten or twelve large, thick, rounded ribs, equal, or irregularly duplicate; mesial fold with about six or seven ribs, equal in size to those of the sides; cardinal angles acute; cardinal area low, triangular.

This species is most nearly allied to the *S. grandæva* of the Devonian rocks, but is distinguished by its very large, undefined mesial fold, and more tumid sides; from *S. biscalcata* and *S. attenuata* it differs in its very large, undefined, mesial fold, and the smaller number and greater size of its radiating ribs, and most importantly by the triangular cardinal area, as in *Cyrtia*. Length one inch seven lines, width two inches six lines. Young specimens are not so wide in proportion to the length.

Spirifera trigonalis. *Sow.*

Anomites trigonalis. *Martin*, Pet. Derb.—Spirifer trigonalis. *Sow.* Min. Con.

Sp. Ch.—Gibbous; margin semicircular; cardinal angles acute; hinge-line broad, flat; from twenty to thirty strong, radiating ribs, three of which are elevated to form the mesial ridge; the ribs of the mesial fold usually divide into two or three as they approach the margin, those of the sides always entire.

They are, perhaps, two species confounded under the name of *Spirifera trigonalis*, the one is usually about one inch and a half long, and two inches and a half wide; tumid, and with a semicircular outline, the mesial fold forming a square sinus in the margin, a deep hollow in the dorsal valve, but from being flattened on the top, is scarcely raised above the surface of the ventral valve; about twelve or fourteen strong, rounded ribs on each side the mesial fold, and three on the mesial fold; the centre one of which usually divides obscurely into three, the others into two; the cardinal area very broad, slightly curved. This is the shell figured and described in the Mineral Conchology. The other comes nearer to the shell figured by Martin, it is much smaller, rarely exceeding three-quarters of an inch in length, and one inch and a quarter in width; only seven angular ribs on each side the mesial fold; the mesial elevation, instead of being flattened on the top, forming a small, square sinus in the margin, and being confounded with the surface of the ventral valve is acutely angular, forms an exceedingly deep, triangular sinus in the margin, and rises very prominently from the ventral valve; the plaits on the mesial elevation of the first shell are of an equal size with those on the sides; but in the other they are much smaller and more obscure. Both varieties are common in certain localities.

Spirifera Urii. *Flem.*

Spirifera Urii. *Flem.* Brit. Anim.—Atrypa unguiculus. *Sow.* Geol. Trans.—Spirifera unguiculus. *Phil.* Pal. Fos.

Sp. Ch.—Hemispherical; dorsal valve very gibbous; beak large, pointed; ventral valve nearly flat; surface smooth; both valves with a narrow, linear, mesial sulcus.

This curious little shell is subject to much variation in its characters, but is at all times easily recognized by its peculiar form, and the deep, narrow sulcus in both valves.

Cyrtia. *Dalman.*

Gen. Ch.—Cardinal area very wide, triangular; beak of the dorsal valve pointed, not incurved; mesial fold usually smooth.

This group is admissible only as a subgenus of *Spirifera*, from which it is distinguished by its cardinal area being triangular, and the beak of the dorsal valve very slightly incurved, characters, however, which vary very much even in the same species.

Cyrtia cuspidata. *Mart.* sp.

Anomites cuspidatus. *Martin*, Pet. Derb.—Spirifer cuspidatus. *Sow.* Min. Con.—Spirifera cuspidata. *Phil.* Geol. York.

Sp. Ch.—Pyramidal; cardinal area very large, flat, triangular, forming, in old specimens, an acute angle at the beak of the dorsal valve; mesial ridge and hollow broad, rounded, smooth; fourteen rounded, entire ribs on each side the mesial fold.

This very well known shell was first noticed by Mr. Martin (in the Linnæan Transactions, vol. iv. p. 4), who considered it to form a distinct division of the group now called Spirifers. It is placed by Professor Phillips at the head of his division *Cuspidatæ*, which is nearly equivalent to Dalman's genus, *Cyrtia*, which I have adopted, considering it, however, as only a subgenus of *Spirifera*, its characters being obviously subordinate to those of that genus, and of less importance than any of generic distinction in this family. The cardinal area of the present shell varies with the age of the animal: in young individuals its height is less than the width of the hinge-line; in old it considerably exceeds it. The mesial fold is usually broad, rounded, and smooth, but specimens are not rare in which the mesial elevation is flattened, and divided in the centre by a sulcus, as in *Cyrtia distans;* and I have also seen specimens in which the mesial hollow was obscurely ribbed, as in that species. Length two inches, width the same.

Cyrtia distans. *Sow.* sp.

Spirifer distans. *Sow.* Min. Con.

Sp. Ch.—Rhomboidal, length two-thirds the width, depth equal to the length of the smaller valve; about fourteen rounded, entire ribs on each side the mesial ridge, which is wide, smooth, and divided by a sulcus in the middle; the corresponding hollow on the dorsal valve contains about eight longitudinal ribs.

The ribs in the mesial hollow of this species are somewhat smaller than those on the sides; the mesial elevation is without plaits; the cardinal area very wide, curved; foramen small. Von Buch considers this species as identical with the *Spirifer speciosus micropterus* of Goldfuss. It differs, however, in having ribs in the mesial hollow, its more numerous plaits, and the greater space between the beaks. Length one and a quarter inches.

Cyrtia dorsata. *M'Coy.* (Pl. XXII. fig. 14).

Sp. Ch.—Subrhomboidal, nearly twice as wide as long; dorsal and ventral valves evenly convex; beak of dorsal valve large, straight; cardinal area very large, triangular, slightly concave; mesial fold indistinct, or none; surface coarsely and regularly striated longitudinally.

This remarkable species has nearly the form of the *Strigocephalus dorsatus*, Gold., but is a true *Cyrtia;*

like the *C. senilis*, Phil., the mesial fold is obsolete; the dorsal and ventral valves are evenly convex; cardinal angles acute in the young, rounded in the old shells; the striæ are coarse, round, and equal. Length two inches four lines, width two inches ten lines; height of cardinal area one inch three lines.

Cyrtia laminosa. *M'Coy.* (Pl. XXI. fig. 4).

Sp. Ch.—Semicircular, about twice as wide as long; cardinal area wide, triangular; surface with about seven, prominent, angular, radiating ribs on each side the mesial fold; mesial fold deep, wide; entire shell crossed by close, waving, erect laminæ.

This most beautiful Spirifer is distinguished from the other species by the singular, scale-like sculpturing of the surface, from which it derives its name. Length seven lines, width one inch three lines.

Cyrtia linguifera. *M'Coy.*

Spirifera ostiolata. *Phil.* Pal. Fos. (omit Synonymes).

Sp. Ch.—Subrhomboidal, gibbous; cardinal area large, triangular, concave; mesial fold wide, rounded, well defined, in old shells produced in front into a tongue-shaped process, without ribs on either valve; ten rounded, smooth ribs on each side the mesial fold.

The shell to which I have given this name appears to me identical with that figured by Professor Phillips, from the Devonian rocks, considered by him as the *Spirifera ostiolata* of Bronn and Schlottheim; that shell has, however, a narrow cardinal area, with parallel sides, and the beaks incurved, approximate; the present species has, on the contrary, a very wide triangular area, and the beak of the dorsal valve is not incurved; there are also several minute distinctions between the species; I have given, however, the most striking points. The lateral ribs are rounded and smooth, about ten or twelve or each side the mesial fold. I have a very singular specimen from the Kildare limestone, which has twelve ribs on one side the mesial ridge, and but six on the other; the mesial fold is very prominent, and rounded, the surface, particularly in old shells, is marked by irregular, transverse lines of equal growth. Length one inch, width one and a quarter inches.

Cyrtia mesogonia. *M'Coy.* (Pl. XXII. fig. 13).

Sp. Ch.—Semicircular, gibbous; surface smooth; cardinal area wide, concave, triangular; cardinal angles acute; mesial ridge very prominent, angular, both it and the angular mesial furrow without ribs; eight or nine strong, rounded, equal ribs on each side the mesial fold.

This species is allied to the *Spirifer distans*, Sow., and the *S. ostiolata*, Phil., but is distinguished from both by the very prominent, angular, mesial fold; *S. distans* has also the mesial hollow ribbed, while it is smooth in the present species. Length one inch, width one inch five lines.

Cyrtia nuda. *Sow.* sp.

Spirifer nudus. *Sow.* Geol. Trans.—Spirifera nuda. *Phil.* Pal. Foss.

Sp. Ch.—Subrhomboidal, gibbous; ventral valve semicircular, width twice its length; cardinal angles obtusely rounded; cardinal area wide, curved, triangular; mesial fold wide, rounded; one or two obtusely rounded ridges on each side; surface with obsolete lines of growth.

This obscurely marked species is in length seven lines, width ten lines.

Cyrtia Semicircularis. *Phil.* sp.

Spirifera semicircularis. *Phil.* Geol. York.

Sp. Ch.—Front semicircular, width double the length; cardinal area variable in width; about four smooth, radiated ribs are raised with the mesial fold, and there are about fourteen on each side of it.

This shell is allied to the *S. distans*, but is at once distinguished by the ribs on the mesial elevation. This

is one of those very interesting forms which, from being aberrant in their characters, form the passage from one group to another, being, in fact, a connecting link between the two. The existence of those links in nature has been frequently urged by short-sighted observers as a reason for *uniting* the *groups* so *connected.* We should always, however, bear in mind that no group can be considered natural or perfect *which does not exhibit* forms, partaking in some measure of the characters of the allied groups, and thus shading, as it were, the one into the other. When such links are wanting, we may rest assured that they are either extinct or as yet undiscovered; for, wherever our knowledge of species is extensive, we invariably find them forming a continuous and unbroken chain of affinity, harmoniously blending one into the other by the most insensible gradations, yet, nevertheless, presenting at certain points such remarkable types of form or structure as to deserve a generic or sectional name, although each point or type may be shewn to pass insensibly into the next, so much so, that those species which connect the two groups are frequently of such an intermediate character that it may be difficult to say to which of them it really belongs[a].

The present species possesses the triangular cardinal area of the genus *Cyrtia*, but the beak of the dorsal valve is slightly incurved, the mesial fold is sulcated, and altogether the characters of the species shew a decided tendency to return again to the more ordinary form of the typical Spirifers, which it enters by means of those small fusiform shells forming the subgenus *Fusella*, M'Coy, in which the cardinal area, though wide and curved, has parallel edges; this latter group passes into the true Spirifers by means of the *Fusella fusiformis* on the one hand, and *Spirifera speciosa*, and such like shells, on the other. Length one inch, width one inch eight lines.

Cyrtia senilis. *Phil.* sp.

Spirifera senilis. *Phil.* Geol. York.

Sp. Ch.—Semicircular, irregular, gibbous; ventral valve convex; cardinal area triangular, curved, three times as wide as high, strongly striated transversely; surface with radiating striæ, and large, obtuse, irregular, concentric wrinkles.

This very curious shell is among the rarest *Brachiopoda* of the carb. series; the shell is very thin, as in *Anomia*, and the irregular surface also gives it a very peculiar aspect. Length two inches, width two inches nine lines.

Cyrtia simplex. *Phil.* sp.

Spirifera simplex. *Phil.* Pal. Fos.

Sp. Ch.—Dorsal valve pyramidal, acute; cardinal area very large, triangular, marked with decussating striæ; ventral valve convex; mesial ridge and hollow rounded, obtuse; surface entirely smooth, without ribs.

This shell is closely allied to the *C. cuspidata*, but is well distinguished by the want of lateral, radiating ribs. Length one inch six lines; width one inch eight lines.

Cyrtia subconica. *Mart.* sp.

C. Anomites subconicus. *Mart.* Pet. Derb.—Spirifer subconicus. *Sow.* Geol. Trans.—Spirifera subconica. *Phil.* Pal. Fos.

A few fragments, possibly of this species, have occurred; it resembles the *C. cuspidata* in miniature, but with only five ribs on each side of the mesial fold.

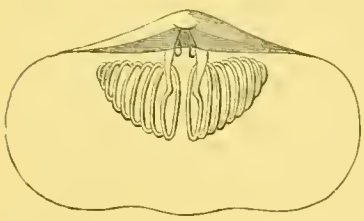
[a] A remarkable instance of the mischief produced by considering all naturally-connected groups as one, may be seen in the family Unionidæ, or fresh water mussels; in this family the species are exceedingly numerous, and consequently the affinities very perfect; some of the best American and European naturalists, who have devoted years to the study of these shells alone, considered it to be divided into upwards of twenty genera, all of them distinguished by marked peculiarities, either in the animals or the shells, but, of course, connected by aberrant species; this perfection,

Martinia. *M'Coy.*

Gen. Ch.—Hinge-line shorter than the width of the shell; dorsal edges of the cardinal area obtusely rounded; surface smooth; spiral appendages small.

The short-hinged, smooth Spirifers, were distinguished long ago by that excellent artist and friend of Mineral Conchology, Mr. William Martin, and placed by him in a separate division from the long-hinged, ribbed species; they were afterwards confounded together by the late Mr. Sowerby, under the general name of *Spirifer*, in the Mineral Conchology; they were then separated again by Professor Phillips, in his admirable Geology of Yorkshire, and form the fourth division of his genus *Spirifera*; and more recently Von Buch, in his memoir on the genus *Delthyris*, forms of them his second division of the *Spiriferæ*, but hitherto no author has named, or fully characterized, this most natural genus. The spiral appendages, instead of filling nearly the whole shell, as in the true Spirifers, are so small as only to occupy the upper or rostral half of it (fig. 22). Thus furnished with internal as well as external characters, I have no hesitation in keeping those as a distinct genus of the great family of Spirifers, and dedicating it to the author of the Petrificata Derbiensia, to whom we owe the first figures and descriptions of the more abundant species. Nearly all the species of this genus, and some of *Athyris*, are united by foreign Palæontologists under the name *Spirifer lævigatus*. I would not have noticed this were it not that some recent British writers have done the same. I agree perfectly with Professor Phillips, who has described most of them, in thinking them distinct.

Fig. 22.



Martinia decora. *Phil.* sp.

Spirifera decora. *Phil.* Geol. York.

Sp. Ch.—Orbicular, convex, smooth; beak of the dorsal valve prominent; cardinal area short, triangular; mesial ridge obscure, divided by a longitudinal sulcus.

This is a rare species, approaching very closely in its character to some varieties of the *M. symmetrica*. Length one inch six lines, width one inch five lines.

Martinia elliptica. *Phil.* sp.

Spirifera elliptica. *Phil.* Geol. York.

Sp. Ch.—Transversely elliptical; mesial fold wide, flattened, scarcely perceptible, except at the margin; surface with very fine radiating striæ, decussated near the beak by fine, concentric wrinkles; width nearly double the length.

This is a very pretty shell, but not common any where; the radiating striæ, though constant, are scarcely perceptible; the concentric markings vanish towards the margin, and become nearly obsolete in old shells. The beak and cardinal area rather large. Length one inch five lines, width two inches three lines.

Martinia glabra. *Mart.* sp.

Anomites glaber. *Martin*, Pet. Derb.—Spirifer glaber. *Sow.* Min. Con.—Spirifera glabra. *Phil.* Geol. York (pars).

Sp. Ch.—Transversely oval; much wider than long, depressed, sharp edged; mesial fold very wide and prominent; cardinal area variable; surface smooth.

This species is liable to much variation in the proportion of length to breadth; the depth and cardinal area also vary occasionally, but it is never so rounded in outline, so deep, or with so large a cardinal area, as

however, inclined a distinguished writer to include them all in one genus, and a recent author has gone so far as to consider them all as varieties of one species.

either the *Spirifera oblata* or *Spirifera obtusa*, with both of which authors have confounded it. Mr. Sowerby lays stress on the mesial elevation being flattened in the middle; it is, however, very frequently rounded, but is always very wide and undefined, in which it differs from the next species. Length one inch six lines, width two inches six lines.

Martinia mesoloba. *Phil.* sp.

Spirifera mesoloba. *Phil.* Geol. York.

Sp. Ch.—Orbicular, depressed; mesial fold round, prominent, sharply defined on both valves; surface smooth, slightly imbricated; cardinal area very short, triangular.

This species is nearly allied to the preceding, but when once seen will run no risk of being confonnded with it, or indeed with any other fossil I know. In outline it is nearly circular; the valves are smooth, depressed, and sharp-edged; the beaks and cardinal area small; the mesial fold is very peculiar, it is narrow, rounded abruptly from the depressed surface of the ventral, or smaller valve; it is bonnded on either side by an impressed line, which renders it distinct up to the beak. Professor Phillips' figure is a very good one, and shews the character of the mesial fold extremely well. The slightly imbricated lines of growth scarcely diminish the smoothness of the surface. Length one inch, width one inch two lines.

Martinia oblata. *Sow.* sp.

Spirifer oblatus. *Sow.* Min. Con.—Spirifera glabra. *Phil.* Geol. York. (pars).

Sp. Ch.—Gibbous, obovate, smooth; mesial elevation square; seldom distinct more than half way to the beak.

The depth of this species exceeds half the width; in young individuals there is no mesial elevation, or it is but slightly marked on the edge of the shell, in old specimens it rarely extends within half the distance between the front and the beak; in finely-preserved specimens there are traces of very obscure, lateral radiations towards the margin. It is a local species in Ireland, but where it occurs it is usually very common. Length two inches, width two inches five lines.

Martinia obtusa. *Sow.* sp.

Spirifer obtusa. *Sow.* Min. Con.

Sp. Ch.—Transversely oval, very gibbous; depth half the width; sides tumid; mesial furrow narrow, rounded, forming a very deep sinus in front; beak of the dorsal valve, and cardinal area large, surface smooth.

This species is thought by many authors to be identical with the *Spirifer glaber* of the Mineral Conchology. It appears to me, however, to be distinguished, as Mr. Sowerby observes, by the greater size of the beak of the large valve, and by the greater depth of the sinus in the front, to which I might add, that the mesial ridge is much narrower than in the former species, that the width is never so great in proportion to the length, and the sides, which in *Spirifera glabra* are always more or less depressed, are in the present shell remarkably tumid, or gibbous. Length one inch five lines, width one inch nine lines.

Martinia phalæna. *Phil.* sp.

Spirifera phalæna. *Phil.* Pal. Fos.

Sp. Ch.—Twice as wide as long; beaks very prominent; mesial hollow very wide, rounded, bounded by two prominent ridges; surface marked with small, rounded, concentric ridges. Length six lines, width one inch five lines.

Martinia plebeia. *Sow.* sp.

Atrypa plebeia. *Sow.* Geol. Trans.—Spirifera plebeia. *Phil.* Pal. Fos.

Sp. Ch.—Orbicular, subrhomboidal, very gibbous; front produced into a tongue-shaped elevation; mesial ridge wide, indistinct on the ventral valve; beaks small, approximate; surface smooth.

This is a very small species, rarely attaining three-quarters of an inch in length; it has been taken for the young of *Martinia glabra*, but is distinguished by its produced front, the smallness of its beaks, and the want of the mesial sulcus in the larger valve. Mr. Sowerby's figure shews no cardinal area, but the shell, which I believe to be identical, as well as Professor Phillips's, has a distinct one resembling that of the *M. obtusa*. Length eight lines, width nine lines.

Martinia protensa. *Phil.* sp.

Spirifera protensa. *Phil.* Pal. Foss.

The few imperfect specimens which I have referred to this species, appear to me to differ from the *S. obtusa*, Sow., only in the stronger striation of the cardinal area, a character which depends very much on the state of preservation of the shell. I have not observed the radiated surface.

Martinia rhomboidalis. *M'Coy.* (Pl. XXII. fig. 11).

Sp. Ch.—Rhomboidal, gibbous, length and width equal; cardinal angles rounded; cardinal area very small, triangular; beaks small, incurved; mesial fold very prominent, narrow, rounded; mesial sulcus deep; sinus in the margin large, linguiform; surface radiated with numerous, obtusely-rounded, nearly obsolete ridges.

This species is allied to the *S. protensa*, Phil., from which it differs in the length being equal to the width, and in the very small size of the cardinal area; from the *A. plebeia*, Sow., it differs in the great size of the mesial fold, and in the radiated surface. Length eight lines, width seven and a half lines, depth six lines.

Martinia strigocephaloides. *M'Coy.* (Pl. XXII. fig. 8).

Sp. Ch.—Suborbicular, gibbous; dorsal valve produced into a lengthened, acute beak; cardinal area narrow, acute, angular; no mesial fold; surface marked with regular, concentric lines.

This remarkable shell seems to conduct to the *Pentameræ* by means of *Strigocephalus*, the external form of which it exactly assumes, the gradation being rendered perfect by the present shell, on the one hand, and by Professor Phillips's *Strigocephalus brevirostris* on the other, so like, indeed, are the two shells, that were it not that the Devonian shell has a smooth surface, and this a concentrically lined one, they might be taken for the same species. Professor Phillips's shell, however, has the same internal structure as the *Strig. Burtoni*, it, therefore, belongs to the same genus, while my species has the internal structure of the group in which I have placed it. As this species, from its external characters, appears to form the passage from the complex *Deltheridæ* or true Spirifers to the more simply formed *Pentameridæ* of the older rocks, it may be interesting to detail, as far as I know, its internal anatomy. The dorsal or beaked valve exhibits, at about one-third of its length from the beak, the cicatrices of the upper pair of adductor muscles; these are remarkably small, of a lengthened, narrow, oval figure, the depth of each equal to about its own diameter; they are separated from each other by a short, thin, shelly septum, which does not extend farther from the beak than the muscles which it separates. In the annexed cut (fig. 23) I have figured those parts of the natural size, together with the palleal impression, or attachment of the mantle of the animal. The ventral or smaller valve has its beak divided by a thin, shelly septum, which, extending a short way towards the margin, serves to separate the origin of the upper pair of adductor muscles; the cicatrices produced by the origin of those muscles in the ventral valve are much smaller, even than the origin of those in the dorsal valve; they are of the same lengthened shape, but each terminated at the end nearest the beak by a small, deep foramen, which serves for the insertion of the principal tendon; they form little, sharp tubercles on the cast. The spiral appendages arise each from a broad, flattened, triangular process, their bases being placed so as to diverge

Fig. 23.

from the beak. The appendage at the right side curves boldly forwards, outwards, and towards the right side, again curving inwards at about the middle of the shell, at which point it gives off a short, blunt process, directed backwards, or towards the cavity of the shell; this is, probably, the principal fulcrum for the base of the *true arms* of the animal; from this point it again assumes its former direction, until it reaches the front margin of the valve, where it turns inwards and backwards, following the curve of the dorsal valve for about two-thirds the length of the shell, where it again bends forwards, and a little to the right of the first turn, thus forming the first, or basal volution of the spire, which it forms by repeating those curves about eleven times, gradually becoming more attenuated as it approaches the apex, which is obtuse. The appendage of the left side is similar in all things, but takes, of course, an opposite direction. In the annexed cut (fig. 24) I have sketched one of those appendages free from the shell; A represents the broad, flattened process, by which it is attached to the beak of the ventral or smaller valve, B the short, obtuse process mentioned above; when in their natural situation in the shell, as indicated by the dotted lines (fig. 25), the internal surfaces of the broad bases of attachment embrace firmly the external surfaces of the cardinal teeth of the dorsal valve. From the peculiar curves just described at the origin of those appendages, it will be seen a considerable space results between them, beneath the beaks; this space affords room for the free action of the two upper pair of muscles for closing the valves. For the better understanding the relative position of those parts, I subjoin a profile view of the present species (fig. 25), in which A A represent the origin of the superior adductors; B B, the origin of the superior adductors in the ventral valve; C, one of the cardinal teeth of the dorsal valve; D, spiral appendage. Length one inch, width ten lines.

Fig. 24.

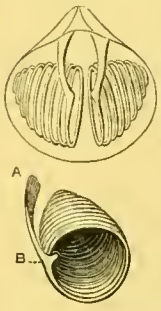
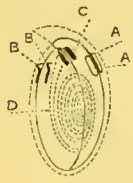


Fig. 25.



Martinia symmetrica. *Phil.* sp.

Spirifera symmetrica. *Phil.* Geol. York.

Sp. Ch.—Quadrate or subpentagonal, very gibbous, smooth; mesial ridge not defined on the small valve; divided by a sulcus in the middle.

This species is remarkable for its regular rhomboidal form, and divided mesial furrow, the furrow passes insensibly into the sides of the shell on the small or ventral valve, but is very well defined on the larger one. The surface is quite smooth, the beaks and cardinal area moderate; the length and width about equal; depth two-thirds the width. Length one inch nine lines.

Reticularia. *M'Coy.*

Gen. Ch.—Hinge-line shorter than the width of the shell; cardinal area triangular; cardinal angles very obtusely rounded; mesial fold very slightly raised, or none; surface ornamented with either fine longitudinal or transverse striæ, or most usually reticulated by both; dental lamellæ perfectly parallel.

This beautiful little group includes all those Spirifers analogous to the *S. imbricata*, *S. lineata*, *S. microgemma*, *S. reticulata*, *S. decussata*, &c., having a reticulated or striated surface combined with the general form and cardinal area of *Martinia*, M'Coy, in which genus I formerly placed them, although they obviously formed a very marked group, distinguished by its small size, reticulated or striated surface, and very remarkably by the entire absence of the mesial fold in most of the species (in the one or two species which possess a trace of the mesial fold, it is very slightly elevated). But the internal structure which I have recently seen in three of the species, presents a very distinct and important character; the dental lamellæ, instead of converging towards the beak, as in all the other forms of Spirifer, are in those perfectly parallel to each other and to the central septum, in their whole length, thus confirming by a very interesting internal peculiarity, the easily recognizable external characters. The genus is carboniferous and Devonian.

Reticularia imbricata. *Sow.* sp.

Terebratula imbricata. *Sow.* Min. Con.—Spirifera imbricata. *Phil.* Geol. York.

Sp. Ch.—Transversely oval; strong, obtuse, radiating striæ, interrupted by broad, thick, imbricating lamellæ; no mesial fold.

This is distinguished from the *M. lineata* by its thick, radiating striæ, and the distance between and small number of the transverse striæ, which, in the present shell, form between them about ten or eleven thick, imbricated, concentric laminæ, each about a line in breadth. Length one inch, width one inch four lines; usually found in company with the *Reticularia lineata.*

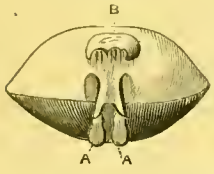
Reticularia lineata. *Mart.* sp.

Anomites lineatus. *Martin*, Pet. Derb.—Terebratula lineata. *Sow.* Min. Con.—Spirifera lineata. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, convex; no mesial fold; surface with close, imbricated, transverse lines.

This very elegant species abounds in the limestone of Little Island, Cork, but is not very common any where else. It has been figured and described by Sowerby as a *Terebratula*, not having found the spiral appendages in it. The beaks and cardinal area are very small; the concentric lines are very numerous and regular; the two cardinal teeth of the ventral valve are thin, narrow, their bases slightly converging towards the beak; those of the dorsal valve are broader and thicker; the cicatrices of the upper pair of muscles in the ventral valve form two small, deep, oval cavities (elevations in the cast); their long diameters parallel to each other, and directed towards the beak, from which they are about their own length distant; the cicatrices of the similar pair of muscles, in the dorsal valve, are confluent, forming one round, undivided cavity, distant twice its length from the hinge-line (see fig. 26; A A, origin of upper pair of muscles in ventral valve; B, origin of upper pair in dorsal valve). Length nine lines, width one inch.

Fig. 26.



Reticularia microgemma. *Phil.* sp.

Spirifera microgemma. *Phil.* Pal. Fos.

Sp. Ch.—Orbicular, gibbous; mesial fold rounded, prominent; beak of the dorsal valve large, tumid; very fine, radiating striæ, and numerous imbricating laminæ of growth, the edges of which, when crossed by the radiating striæ, are ornamented with minute, rounded tubercles.

This is known from the *Reticularia imbricata* by the prominent mesial fold; the greater number of the transverse lamellæ, the delicacy of the radiating striæ, and the little tubercles at the intersection of the lines; from *Reticularia reticulata* it is distinguished by its prominent, undefined, mesial elevation, its flattened laminæ of growth, and its tubercles. Length eight lines, width ten lines.

Reticularia reticulata. *M'Coy.* (Pl. XIX. fig. 15).

Sp. Ch.—Transversely oval; about thirty round, undulating, concentric wrinkles, decussated by exceedingly fine, close, radiating striæ; a faint, but defined mesial fold.

This beautiful little species is at once distinguished from the *R. imbricata*, Phil., by all its markings being infinitely smaller, and more delicate; the transverse laminæ, instead of being broad and flat as in that species, are very narrow, rounded, and flexuous, and are fully three times the number in the present shell; the radiating striæ are in proportion finer and more numerous. The mesial elevation, though nearly as flat as the rest of the shell, is defined on each side by a sharp, impressed line; the mesial hollow is deep and also defined by two obtuse ridges extending to the beak. Length eight lines, width eleven lines.

Reticularia striatella. *M'Coy.* (Pl. XIX. fig. 13).

Sp. Ch.—Transversely oval, or, including the beak, subrhomboidal, gibbous; front very slightly elevated; surface radiated with numerous, fine, close, rounded striæ.

The specimen figured of this pretty little shell shews the remarkable parallelism of the dental laminæ so characteristic of the subgenus *Reticularia*, M'Coy, it also has the same general form, small size, and absence of a distinct mesial fold, as in the other species of that very definite little group; the longitudinal striæ are very numerous, fine, and equal. Length six lines, width eight lines.

Brachythyris. *M'Coy.*

Gen. Ch.—Hinge-line shorter than the width of the shell; cardinal area small, curved, triangular; surface ribbed longitudinally.

The species which I bring together under this name, form a very remarkable little group, possessing the short hinge-line, and triangular area of the genus *Martinia*, M'Coy, with the ribbed surface of the true Spirifers. Holding characters which are essentially intermediate between the more positive distinctions of the more typical groups, it could scarcely be supposed, that the characters of the genus should be so constant as they appear to be. Professor Phillips has observed the strong affinity which exists among the species, by making of them his third division *Radiatæ*, of his great group *Spirifera*. Some of this genus, as *Spirifera exarata*, Fleming, and *Brachythyris planicostata*, M'Coy, possess the singular peculiarity of their large valve being found in great quantities separated from the smaller; from which I would infer, that the cardinal teeth of this genus must be either much smaller or weaker than any other of the family, but I have not ascertained the fact. With the exception of the two species just mentioned, they are all scarce shells, but found occasionally in all parts of the carboniferous series, from the millstone grit to the yellow sandstone, inclusive.

Brachythyris duplicicosta. *Phil.* sp.

Spirifera duplicicosta. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, depressed; mesial fold angular; about seven ribs on each side the mesial fold, each of which, at one-third its length from the beak, divides into three others.

This species is rendered remarkable by the regularity with which the ribs branch as they approach the margin; the mesial fold is angular, very prominent at the margin, usually bearing three ribs near the beak, which, by their subdivision, form nine as they reach the front. The width exceeds the length by about one-third, the depth is only equal to half the length of the small valve. Length one inch.

Brachythyris exarata. *Flem.* sp.

Spirifer exaratus. *Flem.* Brit. Anim.

Sp. Ch.—Transversely obovate, cardinal area exceedingly short; about six very broad, flat ribs on each side the mesial fold, which is flattened, but distinctly defined, and has usually three obscure ribs; length three-fourths the width.

I believe Dr. Fleming, the author of the highly useful History of British Animals, is the only writer who has noticed this remarkable fossil, and I am not aware that there is any figure of it in existence. It resembles *Spirifera rotundata* in general size and shape, but is distinguished by its very short cardinal area, which is, in fact, almost an equilateral triangle, its length very little exceeding its width. It is curious that this shell, in common with the *Brachythyris planicostata*, M'Coy, is usually found without its ventral valve. Length one and a half inches, width two inches.

Brachythyris hemispilærica. *M'Coy.* (Pl. XIX. fig. 10).

Sp. Ch.—Orbicular; dorsal valve hemispherical; ventral valve flat, slightly convex towards the beak; cardinal area an equilateral triangle; mesial fold broad, flat; about ten broad, flat, entire ribs on each side.

The only species this at all resembles is the *S. planata*, Phil., from which it is easily distinguished by the peculiar proportions of the cardinal area and dorsal valve. In some specimens the mesial fold is smooth, in others obscurely divided by two or three lines, but in all the specimens it is perfectly flat, and not raised above the surface. Length one inch, width the same.

Brachythyris integricosta. *Phil.* sp.

Spirifera integricosta. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, gibbous, mesial fold, defined on each side by a furrow deeper than the rest; ribs very prominent, rounded, entire; beaks closely approximate. There are about ten very prominent, round ribs on each side the mesial elevation, which latter is prominent, well defined, and formed by the elevation of three of the ribs, slightly flattened on their summits. The beaks are nearly in contact, the cardinal area consequently narrow, much curved. I have seen fragments of a species closely allied to this, but having only half the number of lateral radiations, the spaces between them equal to their breadth, and the cardinal area much shorter. The *B. integricosta* usually measures one and a-quarter inches in length, and one and a-half in breadth; depth three-fourths of an inch.

Brachythyris linguifera. *Phil.* sp.

Spirifera linguifera. *Phil.* Geol. York.

Sp. Ch.—Rotundato-quadrate, gibbous; mesial fold very prominent, rounded, smooth; about ten broad, faint ribs on each side near the margin; length nearly equal to, or slightly exceeding, the width; depth equal to the length of the ventral valve.

This is the most aberrant species of the genus, leading to *Martinia*, or the smooth Spirifers; we accordingly find the lateral ribs exceedingly obscure, even at the margin, and almost totally effaced near the beak; assuming much of the character of the true *Martinia*. The mesial elevation and corresponding hollow are, in general, free from sulci; the cardinal area is very short; the beaks tumid, much incurved, but not close. Length one inch four lines, width one inch three lines.

Brachythyris ovalis. *Phil.* sp.

Spirifera ovalis. *Phil.* Geol. York.

Sp. Ch.—Longitudinally oval, beaks approximate; cardinal area narrow, triangular; seven or eight obtusely rounded ribs on each side the mesial fold, which is prominent, rounded, smooth, and without plaits.

This is one of the very few Spirifers in which the length exceeds the breadth; in the present species the length exceeds the width by only one-twelfth, yet it nevertheless gives a remarkable outline to the shell, which is commemorated in Professor Phillips' specific name; it is, in fact, almost perfectly oval, the long axis being in the direction of the length of the shell; the mesial fold is broad, rounded, and perfectly smooth. Length one inch, width eleven lines, depth seven lines.

Brachythyris pinguis. *Sow.* sp.

Spirifer pinguis. *Sow.* Min. Con.

Sp. Ch.—Globose, beaks very approximate; mesial fold round, prominent, distinctly defined, and without plaits; length and width equal, depth exceeding the length of the ventral valve.

This is the only common species of the genus *Brachythyris*. It is, perhaps, sufficiently described in the above character: I may add, however, that Sowerby considered a sulcus down the middle of the mesial elevation, and the absence of sulci in the mesial hollow, to be important characters; the mesial ridge is, however, perhaps oftener found without a mesial sulcus than with, and the mesial hollow frequently exhibits obscure sulci, or traces of ribs. Bronn has confounded the present shell with the *Spirifera ostiolata* of the Eifel; it is, however, distinguished at a glance by its short hinge-line and approximate beaks. I have not quoted Professor Phillips' figure for this species, as that appears to me to be the young of *Spirifera rotundata*, as is indeed suggested by himself in the text. Many authors have considered this shell to be the young of *Spirifera rotundata*, but it may be distinguished from all ages of that species by its width never exceeding its length, its greater depth, and its consequently obtuse edge. From *Brachythyris integricosta* it is known by its want of plaits on the mesial fold. Length one inch.

Brachythyris planata. *Phil.* sp.

Anomites rotundata. *Martin*, Pet. Derb.—Spirifera planata. *Phil.* Geol. York.

Sp. Ch.—Orbicular; ventral valve plane; radiations numerous, obtuse.

The almost perfect flatness of the lesser valve of this species forms one of its most remarkable peculiarities. The longitudinal ribs are flattened; there are three on the mesial fold, and eleven or twelve on each side. It appears to me that this is the shell intended by Martin as his *Anomites rotundatus*, and not the *Spirifer rotundatus* of Sowerby; the small size, circular outline, flatness of the smaller valve, and want of the mesial elevation, agreeing much better with the present fossil, than with Mr. Sowerby's species. Professor Phillips' name is, however, so well established for this species, and the shell described in the Mineral Conchology, from being one of the most abundant mountain limestone fossils, is so well known by Mr. Sowerby's name, that to transpose their specific appellations would be productive of more inconvenience than the mere establishing the priority of Martin's name for the present species would perhaps warrant. Length one inch, width the same.

Brachythyris planicostata. *M'Coy.* (Pl. XXI. fig. 5)

Sp. Ch.—Shell transversely oval, gibbous, rounded; mesial elevation large, square, defined; entire surface radiated with numerous, narrow, smooth, flat ribs.

This species resembles the *Spirifer exaratus* of Fleming, in the singular character of the two valves being almost invariably found apart, and, I might add, in the great rarity of the smaller valve in most localities. From the dark limestone at Killymeal, Dungannon, I have seen many specimens of the large valve, which is very common there, while I have seen but one or two examples of the small valve; while, on the other hand, in the limestone of Mullaghfin, Duleek, the two valves are equally common, and almost always found in contact. The specimen figured is from this latter locality. Length two inches, width three inches.

Athyris. *M'Coy.*

Gen. Ch.—Nearly orbicular, small; no cardinal area or hinge-line; spiral appendages very large, filling the greater part of the shell.

This very interesting group possesses all the external characters of the *Terebratulidæ*, united to the internal structure of the Spirifers, to which latter family it truly belongs. Professor Phillips is the only author who has recognized the group; he forms of it his last division of the genus *Spirifera*, but gives no characters to distinguish it from *Terebratula;* the internal structure is, however, a sure guide.

Athyris concentrica. *Von Buch.* sp.

Terebratula concentrica. *Von Buch.*

Sp. Ch.—Orbicular, convex, an obtusely rounded, mesial fold; surface concentrically striated.

This species is not uncommon; it is figured in the Bul. de la Soc. Geol. de France, with a perforated beak, as in *Terebratula*. I have, however, seen numerous specimens with the beak entire and imperforate, as in the other Palæozoic species.

Athyris decussata. *Sow.* sp.

Atrypa decussata. *Sow.* Geol. Trans.—Spirifera decussata. *Phil.* Pal. Fos.

Sp. Ch.—Orbicular, length and width nearly equal, convex; surface marked with sharp, concentric, imbricating striæ, crenulated by very fine, radiating lines.

This pretty species is very abundant; it differs from the *S. concentrica*, Von Buch, in the absence of a mesial fold, and in the distinct, radiating striæ. Length eight lines, width nine lines.

Athyris depressa. *M'Coy.* (Pl. XVIII. fig. 7).

Sp. Ch.—Transversely oval, depressed; width exceeding the length by one-fifth; surface with equal, transverse, imbricated laminæ, having their margins minutely dentato-tubercular; mesial fold large, undefined, rounded, prominent.

This fossil occurs in abundance in certain localities; the specimens are generally more or less crushed, so as in some measure to conceal the characters of the species. The curious, tubercular, tooth-like fringe to the transverse laminæ will, however, serve to distinguish even fragments of the shell. Length one inch and a half, width one inch ten lines.

Athyris expansa. *Phil.* sp.

Spirifera expansa. *Phil.* Geol. York.

Sp. Ch.—Transversely elliptical; width very little exceeding the length; very depressed; edge obtuse; no mesial fold; obtuse, imbricating, concentric striæ, and very faint, radiating lines.

This species is very nearly allied to the *A. glabristria*, but wants the mesial fold, which in that species is very prominent; it is greatly more depressed, the depth being less than one-third of the width; the edge is obtuse in this, but sharp in the former species; the concentric striæ are always present, but never very prominent, as in the *Athyris squamosa*, they are obtusely rounded, not assuming the form of erect scale-like laminæ as in that species. The usual length is about one inch three lines; the width one inch and a half.

Athyris fimbriata. *Phil.* sp.

Spirifera fimbriata. *Phil.* (Not figured).

Sp. Ch.—Nearly orbicular; depth half the width; coarse, rounded, radiating striæ, decussated irregularly by thick, prominent, lines of growth; edge of the valves rounded, obtuse; no mesial fold.

I am not aware of any published figure of this species, which is very rare. The radiating striæ are uncommonly thick, smooth, rounded, but not very prominent; the concentric ridges are rather irregular in their distance one from the other; these, together with the blunt edge, give an unshapely appearance to the shell; it is a small species, rarely exceeding half an inch in length; the width is very little greater than the length.

Athyris glabristria. *Phil.* sp.

Spirifera glabristria. *Phil.* Geol. York.

Sp. Ch.—Transversely elliptical, depressed; mesial fold large, prominent, undefined, obtusely rounded; surface smooth or with faint radiating striæ.

This is one of the many smooth Spirifers which runs a risk of being confounded with the *Spirifera* (*Martinia*) *glabra*. That shell has, however, a large cardinal area, while this has no trace of one. The present shell is very constant in general outline, but varies in depth from one-half to one-third of its width; the beaks are very small; the surface is usually smooth, but, if finely preserved, shows delicate, radiating striæ. The lines of growth are only conspicuous near the margin, but do not affect the general smoothness of the surface. Length one inch three lines, breadth one inch ten lines.

Athyris globularis. *Phil.* sp.

Spirifera globularis. *Phil.* Geol. York.

Sp. Ch.—Orbicular, ovate, subglobose; mesial fold wide, obtuse; surface smooth, with fine lines of growth.

This species is rather longer than wide, very gibbous, the depth being equal to about two-thirds the width; the surface is smooth, with the exception of a few lines of growth; the mesial fold is wide, but not very prominent; both mesial ridge and furrow are frequently divided by a fine, impressed line.

The spiral appendages in this species are of great size, filling almost the entire shell; the apices of the cone, instead of being directed upwards towards the beak, as in the true Spirifers, are directed downwards towards the front margin. This fossil is of very local occurrence in Ireland; it rarely exceeds three-quarters of an inch in length.

Athyris hispida. *Sow.* sp.

Atrypa hispida. *Sow.* Geol. Trans.

Sp. Ch.—Transversely oval, convex; beaks small; surface concentrically imbricated by broad lamellæ; concentrically fringed, with strong, spine-like striæ.

When well preserved the *Athyris decussata* puts on precisely the surface of this species, the concentric striæ of that shell being the basis, or remains of concentric, broad lamellæ, such as we see in the *Actinoconchus paradoxus* and *Athyris squamosus*, and being, in both shells, decussated by similar strong striæ, which give a fringed appearance to the surface when irregularly worn. Length six lines, width seven lines.

Athyris planosulcata. *Phil.* sp.

Spirifera planosulcata. *Phil.* Geol. York.

Sp. Ch.—Pentahedral, depressed at the sides, tumid in the middle; centre of each valve with a broad, well-defined mesial sulcus.

The surface of this curious species is perfectly smooth, it is very much depressed at the sides, but somewhat tumid in the middle, the ventral valve having a mesial hollow, as well as the dorsal, forms a very peculiar character. About an inch in length, width very little greater than the length.

Athyris squamosa. *Phil.* sp.

Spirifera squamosa. *Phil.* Geol. York.—Spirifer lamellosus. *Lèvèillè*, Mém. Geol. Soc. de France.—Spirifer De Roissyi. *Lév.* Mém. Geol. Soc. de France.

Sp. Ch.—Transversely elliptical, or subrhomboidal; depth half the width; mesial fold narrow, prominent; frequently divided by a mesial sulcus; surface with distant, erect, concentric laminæ of growth.

This is one of the most elegant shells of its genus, and is rendered particularly striking by its erect laminæ of growth; these are usually about nine in number, perfectly continuous across the shell, and, when well preserved, stand a line or more in height[a], perpendicular to the surface of the valve, they are about a line and a half distant from each other, the spaces between them being perfectly flat and smooth. The mesial ridge, though narrow, is rounded and very prominent at the margin, but becomes obscure towards the beak of the ventral or smaller valve; the mesial sulcus on the dorsal or larger valve is, however, sharply defined, and continues distinct up to the beak. Length usually one inch, width about one-fourth greater than the length, depth one-half the width.

Athyris (?) triloba. *M'Coy.* (Pl. XX. fig. 21).

Sp. Ch.—Longitudinally ovate, subtrigonal; mesial fold very broad, prominent, slightly convex, divided by a faint mesial sulcus; sides rounded, narrower than the mesial fold; surface regularly marked by strong, transverse, imbricating laminæ of growth.

This shell is so distinct from the other *Brachiopoda* of the formation, that it is not likely to be confounded with any other species; the great width of the mesial fold is very remarkable; the surface is smooth, with the exception of the regular, thick laminæ of growth. Length five lines, width six lines.

Actinoconchus. *M'Coy.*

Gen. Ch.—Shell globose; the margin of both valves greatly extended, forming a flat, circular, striated disc; spiral appendages as in *Athyris*.

I founded this genus several years ago, in a paper read to the Geological Society of Dublin, for the reception of a very singular fossil, occasionally found in the lower members of the carboniferous series. Specimens such as are usually found, present the appearance of some globular, smooth species of *Atrypa* which had by accident fallen on a portion of an *Orthis Pecten*, or some such fossil; the discrepancy between the smooth, globose shell, and its flat, striated margin, being so great, that few would imagine they were parts of the same species. The discovery of the specimen figured, Pl. XXI. fig. 6, *a*, first led me to consider them as parts of the one shell, by exposing the upper valve perfect, the beak of the lower valve, and the flat, striated laminæ appearing from between them; but it was not until I received the specimens, fig. 6, *b*, that the structure of the shell was at all clear.

The central globular portion resembles a smooth *Terebratula*, or *Atrypa*, with a few concentric lines of growth, but the dorsal valve, as far as I can judge from the specimens I have examined, is quite imperforate; the few concentric lines of growth I imagine to be the remains of disciform margins to the valves of the young shell, such as are now seen in the old; and as the shell advances in growth, the two flat margins, instead of being in contact, and affording each other mutual support, become erect, insulated, scale-like laminæ, liable to be broken off by the slightest accident; so that each line of growth, or former margin of the shell, might have been dilated, as in the example figured, *as long as it was the margin;* but when a new edge was formed between the two old discs, they fell off as superfluous, like the tip of *Bulimus decollatus*, merely leaving a concentric line of growth to mark their places. The same thing can be seen in such shells as the *Tridacna squamosa*, where those scales near the beak are always effaced, and thus it is that we only find the two last formed discs on the present shell; occasionally, however, we find portions of the old margins, which, having been supplanted, are in a state of decay; a specimen of this kind is figured, Pl. XXI. fig. 6, *a*, in which two discs are visible on each valve, the one broken and in a state of decay, the other projecting far beyond it.

[a] Since writing the above I have seen a specimen from the Cork limestone, in which the laminæ nearest the edge were prolonged nearly an inch from the surface of the shell, and radiatingly furrowed, as in the *Actinoconchus paradoxus*, M'Coy; this latter may therefore be an *Athyris*.

Actinoconchus paradoxus. *M'Coy.* (Pl. XXI. fig. 6).

Terebratula Roissyi. *Verneuil.* Bul. Soc. Geol. Fran.

The depth of the smooth, central portion is equal to two-thirds its length, measured from the beak to the commencement of the striated portion. The disc has, at its origin, a narrow space, quite smooth, and free from striæ; the disc itself has numerous fine, radiating sulci, at equal distances, the spaces between them flat. In general, the central portion is dull, while the disc possesses a slightly lustrous, or shining appearance; length of central portion eight lines, breadth seven lines; disc projects about three-fourths of an inch beyond the shell on every side, excepting a space at the beak. Since I read the paper above referred to, M. de Verneuil published a description of this fossil in the Bul. Geol. Soc. de France, under the name of *Terebratula Roissyi*, stating the beak to be perforated, as in the recent *Terebratulæ*, and referring it to the *Spirifer Roissyi* of L'Eveille; as I have taken different views on both those points, and had described it so long before, I have retained my old name.

Family TEREBRATULIDÆ.

The *Terebratulidæ* may be divided into the following genera: 1. *Delthyridæa*, M'Coy (Fig. 27), or those species which have a long hinge-line, and a distinct, cardinal area (as in the *Delthyridæ* or Spirifers), the deltidium fissured in the middle; all the species of this genus are largely plaited; 2. *Terebratula* (Fig. 28) (as here restricted), composed of those species which have the beak truncated so as to form a large circular perforation; the deltidium only reaches to the anterior margin of the foramen, not extending round it; all the smooth, perforated species belong to this genus; 3. *Cyelothyris*, M'Coy (Fig. 29), formed of those curious

Fig. 27. Fig. 28. Fig. 29. Fig. 30. Fig. 31.

species in which the deltidium completely encircles the foramen; 4. *Atrypa*, Dal. (Fig. 30) (as here restricted), composed of those species which are destitute of a foramen and deltidium at all periods of their life; and, 5. *Seminula*, M'Coy (Fig. 31), a genus formed for the reception of those little species which have a minute perforation, but want the deltidium. The two last genera are the only ones found in the Palæozoic rocks, and include all the so-called *Terebratulæ* of these formations.

Atrypa. *Dal.* (Restricted).

Gen. Ch.—Equilateral, inequivalve; dorsal valve imperforate, and without deltidium; no hinge-line, brachial supports simple, flat, triangular.

The term *Atrypa* has, of late, been used in so wide a sense, that its restriction, as in the present instance, to the imperforate Terebratulæ of the older rocks may be convenient[a]. The species of this genus, as now

[a] Mr. Sowerby makes it include some of the present shells, and also the smooth Spirifers, with a short hinge-line and wide cardinal area (*Martinia*, M'Coy); the imperforate Spirifers, without hinge-line, cardinal area or foramen, but possessing the spiral appendages (*Athyris*, M'Coy); and some others.

restricted, are very numerous and extremely various in their form, some being transverse, others elongate; some having a smooth surface, and a still greater number plaited longitudinally.

The genus *Atrypa*, according to our view, includes all those species of Terebratuliform shells which are without a distinct perforation in the dorsal valve; and of course as wanting the perforation, they also want the deltidium; they were, therefore, probably, free shells, another very interesting peculiarity, in which they differ from the *Terebratulæ*.

I have been enabled to discover the internal structure in many of the species, and find it to be much more simple than that of the more typical groups; the supports of the arms assume the form of two broad, flat, triangular processes, narrow at their origin near the beak of the ventral valve, and increasing in breadth towards their free extremities, where they are obliquely truncated; they are not recurved in any of the species, nor is there any connecting process between them. The arms were probably free, and capable of being protruded for the greater part of their length. This group is generally confounded with the imperforate Spirifers, forming the genus *Athyris*, M'Coy, but is at once distinguished by the simplicity of its internal supports, these parts being very long, and spirally coiled in the latter genus. Professor Phillips' genus *Cleiothyris* appears to include them both.

The genus *Atrypa* is exclusively confined to the Palæozoic rocks.

Atrypa acuminata. *Mart.* sp.

Anomites acuminatus. *Martin*, Pet. Derb.—Terebratula acuminata. *Sow.* Min. Con.—Terebratula acuminata. *Phil.* Geol. York.

Sp. Ch.—Tetrahedral, ventral valve very much elevated, obtusely keeled in the middle; dorsal valve small, concave; margin sharp, forming a very acute sinus in the front.

This species is subject to an extraordinary degree of variation in its form. The most usual and typical form is that described in the above specific character, but others occur in which the sinus in the front is obtuse and plaited, and others with lateral plaits are not uncommon. Some specimens are depressed, as the *T. platyloba*, Sow.; all the varieties have the surface smooth to the naked eye, but minutely striated under the lens. The internal structure is similar to that of the *A. hastata*, but the supports are smaller in proportion to the size of the shell (see fig. 32). This is a local species in Ireland, but where it does occur it is usually very abundant. Length one inch three lines, width one inch five lines.

Fig 32.

Atrypa angularis. *Phil.* sp.

Atrypa primipilaris. *Sow.* Geol. Trans. (not of *Von Buch*).—Terebratula angularis. *Phil.* Pal. Fos.

Sp. Ch.—Pentagonal, wider than long; mesial fold large, prominent, sharply defined, flattened; surface radiated with numerous, irregular, branching striæ. Length three and a half lines, width four lines.

Atrypa anisodonta. *Phil.* sp.

Terebratula anisodonta. *Phil.* Pal. Fos.

I have considered as this species, those specimens agreeing with *T. pleurodon* in general form, but having the plaits rounded, and becoming obsolete towards the beak.

Atrypa aspera. *Dal.*

Terebratula aspera. *Schlot.*—Atrypa squamosa. *Sow.* Geol. Trans.

Sp. Ch.—Outline from transversely oval to longitudinally obovate, dorsal valve very convex; ventral valve less so, beaks prominent; surface radiated with from fourteen to eighteen strong, rounded ribs, with rather distant, concentric rows of large, scale-like laminæ of growth.

This handsome species is very rare; the Irish specimens are identical with those of the Eifel and Devonshire, but not with the Silurian ones.

Atrypa bifera. *Phil.* sp.

Terebratula bifera. *Phil.* Pal. Fos.

Sp. Ch.—Subrhomboidal, very much depressed; mesial fold very wide, shallow; beaks small, pointed; surface radiated with very numerous, rounded, much branched striæ.

This species is rather rare. I described it several years ago in a paper to the Geological Society of Dublin (previous to the publication of the Palæozoic fossils), under the name of *Atrypa dichotoma*, and subsequently published a short description of it in a catalogue which I wrote, of my friend the late Major Sirr's fossils. Length seven lines, width nine lines.

Atrypa canalis. (?) *Sow.* sp.

Terebratula canalis. *Sow.* Sil. Syst. (?)

A few obscure specimens, from the very bottom of the carboniferous series, have, with great doubt, been referred to this species; they resemble the *Atrypa sacculus*, but are rather narrower, and with a deep sulcus from the beak to the front margin.

Atrypa compta. *Phil.* sp.

Terebratula compta. *Phil.* Pal. Fos.

Sp. Ch.—Obscurely pentagonal, valves nearly equally convex, front truncated; surface with numerous equal, radiating ridges. Length five lines, width four and a half lines.

A few obscure and imperfect specimens only have been observed.

Atrypa cordiformis. *Sow.* sp.

Terebratula cordiformis. *Sow.* Min. Con.

Sp. Ch.—Cordiform, acuminated; front very much elevated, with about five acute plaits extending half way to the beak; sides tumid.

This species is chiefly distinguished from one of the varieties of the *A. acuminata*, by being more convex or tumid at the sides, and in the length and distinctness of the mesial plaits.

Atrypa desquamata. *Sow.*

Atrypa desquamata. *Sow.* Geol. Trans.—Terebratula (Atrypa) desquamata. *Phil.* Pal. Fos.

Sp. Ch.—Longitudinally obovate, convex; beak large, prominent; surface covered with deep, narrow, smooth striæ, very much branched as they approach the margin.

This species varies considerably in form, some specimens being nearly square and much flattened; they are more commonly however as above described; some specimens have the front slightly elevated, in others it is plane. Length about one inch and an half, width one inch five lines. I have not seen the perforation beneath the beak.

Atrypa excavata. *Phil.* sp.

Terebratula excavata. *Phil.* Geol. York.

Sp. Ch.—Rhomboidal, very gibbous, beak of dorsal valve large, prominent; sides concave; three very large, angular, mesial plaits, and two on each side.

This curious species is distinguished by the great size of its plaits, and the concave space on each side of the beak, which is large, prominent, and not much incurved; the mesial elevation is very high, the depth and width being about equal. Length nine lines, width eleven lines.

Atrypa fallax. *Sow.*

Terebratula pleurodon. *Phil.* (pars).—Atrypa fallax. *Sow.* Geol. Trans.

Sp. Ch.—Nearly orbicular, convex; beaks prominent, pointed; mesial elevation slight, undefined; surface radiated, with about sixteen or eighteen strong, angular plaits, continuing sharp and distinct to the beak.

This is one of the forms considered by Professor Phillips to be a variety of the *A. pleurodon;* it is at least a distinct variety, and even as such it is convenient to have a name. Length six lines, width eight lines.

Atrypa ferita. *Von Buch.* sp.

Terebratula ferita. *Von Buch.* Tereb.—Terebratula ferita. *Phil.* Pal. Fos.

Sp. Ch.—Longitudinally ovate, subpentagonal; beaks narrow, pointed; surface with about seven very large, angular ridges.

This species is too distinct in its plication, to be confounded with any other. Length three lines, width two and a half lines.

Atrypa flexistria. *Phil.* sp.

Terebratula flexistria. *Phil.* Geol. York.

Sp. Ch.—Transversely ovate, tumid; mesial elevation very large, rounded; about nine obtuse plaits raised with the front margin; the lateral plaits arched; beak small.

This species differs from the *A. ventilabrum* in the great curvature of the lateral plaits; also in the size of its rounded mesial lobe: all the plaits are obtusely rounded. Length eight lines, width ten lines.

Atrypa gregaria. *M'Coy.* (Pl. XXII. fig. 18).

Sp. Ch.—Trigonal; beak of the dorsal valve very large, produced, incurved; dorsal valve flattened; sides abruptly rounded; a very wide, but shallow, mesial depression, slightly produced in front; ventral valve an equilateral triangle; all the angles rounded, very convex; front margin raised to a broad sinus; surface smooth.

This curious species is very remarkable in form, wholly unlike any of the other Palæozoic species, approaching nearly in size and shape to the *Terebratula lineolata*, Phil., of the Speeton clay; it is the only true *Atrypa* I know of, resembling in this respect several of the attached *Terebratulæ* of the more recent formations. Length seven lines, width six lines, depth three lines and a half.

Atrypa hastata. *Sow.* sp.

Terebratula hastata. *Sow.* Min. Con.—Terebratula hastata. *Phil.* Geol. York.

Sp. Ch.—Ovato-pentagonal, depressed; front truncate, slightly emarginate, depressed; sides of the beak angulated; surface smooth; breadth two-thirds the length, which is usually one inch.

This fossil is very abundant. The valves are more nearly equal than is usual in species of this genus; the outline of the young shell is regularly ovate, but becomes pentagonal as it increases in size; the front, in young individuals, is rounded, but in old shells truncate, and somewhat wedge-shaped, from the depression of the middle of the valves; there is an obtuse keel on each side of the beak of the dorsal valve. The internal supports or cardinal teeth of the ventral valve, I have found to be composed of two flat, triangular laminæ, having the ventral edge convex, and the dorsal edge concave; they increase in breadth towards the anterior end, where they are obliquely truncated. They arise in the usual manner, one on each side of the beak of the ventral valve, diverging as they approach the front margin. They reach, in the present species, somewhat less than half the length of the shell (see fig. 33). Length one and three quarter inches, width one inch.

Fig. 33.

Atrypa indentata. *Sow.*

Atrypa indentata. *Sow.* Geol. Trans.

Sp. Ch.—Transversely oval, convex; front indented, beaks very small, prominent; abdominal edge of the lower valve elevated, surface smooth.

The surface of the upper valve is evenly convex, no mesial ridge being formed by the elevation of the front margin; the form is nearly orbicular, slightly wider than long. Length three lines, width three and a half lines.

Atrypa insperata. *Phil.*

Terebratula (Atrypa) insperata. *Phil.* Pal. Fos.

Sp. Ch.—Longitudinally oval, depressed; surface radiated with large, rounded, dichotomous ribs, about six of them in the middle of the dorsal valve slightly elevated.

A single very imperfect specimen of this species has occurred.

Atrypa isorhyncha. *M'Coy.* (Pl. XVIII. fig. 8).

Sp. Ch.—Shell subglobose, depth exceeding the width, rather square, strongly plaited; mesial elevation square, of four plaits; beaks obtuse, nearly equal, with a triangular flattened space on each side; plaits twenty, obtusely angular.

The flattened or very slightly concave spaces on each side of the beak closely ally this remarkable fossil with such species as the *T. plicatilis* and *T. serrata* of the Oolite, and the few other fossils which possess this curious character.

It may be known from the *T. excavata* of Phillips by the greater number of its plaits, which in that species rarely exceed seven. Length ten lines, width one inch, depth one inch one line.

Atrypa juvenis. *Sow.*

Atrypa juvenis. *Sow.* Geol. Trans.—Terebratula juvenis. *Phil.* Pal. Fos.

Sp. Ch.—Longitudinally ovate, narrow towards the front, depressed, smooth; beak of dorsal valve very small, much incurved, strongly angulated at the sides.

The outline of this species is very remarkable, from the greatest transverse diameter being near the beak. Very rare.

Atrypa lachryma. *Sow.*

Atrypa lachryma. *Sow.* Geol. Trans.

Sp. Ch.—Longitudinally ovate, valves nearly equal, very convex; beaks very small; front margin with a small, deep sinus; mesial sulcus of the dorsal valve broad, flat; surface smooth.

This little shell closely resembles the young of *T. sacculus*, but is obviously distinct, by its raised margin and small beaks. Length five lines, width four lines, depth three and a half lines.

Atrypa laticliva. *M'Coy.* (Pl. XXII. fig. 16).

Sp. Ch.—Transversely rhomboidal, length two-thirds the width, gibbous; middle of the shell elevated in front, with three obtuse ribs, reaching nearly to the beak; between the mesial elevation and the sides is a smooth space, equal in breadth to the mesial elevation; sides small, compressed, with three obtuse ridges, reaching half way to the beak.

This species is remarkable for the small number of its ribs, and the broad space between those of the mesial elevation and the sides. Length six lines, width nine lines.

Atrypa laticosta. *Phil.* sp.

Terebratula laticosta. *Phil.* Pal. Fos.

A few fragments of a large *Atrypa*, with broad, rounded, transversely striated ribs, have been referred to this species with doubt.

Atrypa nana. *M'Coy.* (Pl. XXII. fig. 19).

Sp. Ch.—Orbicular, or slightly ovate, compressed, beak pointed; surface radiated with about ten, straight, equal, obtusely angular ridges, none of which reach the beak.

This little species resembles the *T. radialis* in form, but is much flatter, and has considerably fewer, larger, and more angular ribs, all of which disappear before reaching the beak, as in the *A. subdentata* and *rotunda*, Sow., from both of which it is distinct, by its greater flatness, and more numerous radiating ridges; it is also much smaller than any of those shells. Length two lines, width two lines.

Atrypa ? oblonga. *Sow.*

Atrypa oblonga. *Sow.* Geol. Trans.

A few very obscure casts, resembling Mr. Sowerby's figure of this rather doubtful species, have occurred.

Atrypa ? obtusa. *M'Coy.* (Pl. XXII. fig. 20).

Sp. Ch.—Orbicular, convex; length and width equal, depth two-thirds the width, margin very obtusely rounded; surface marked with rather distant, smooth, concentric striæ.

The margin of this species is broadly rounded, and the edges being thickened, give, particularly to old individuals, a peculiarly rugged character to this portion of the shell, very unusual in the genus *Atrypa;* the concentric lines are very delicate and more distant than those of the *A. concentrica*, scarcely interrupting the smoothness of the surface; the thickened edges and obtusely rounded margin distinguish it from the *A. concentrica* and other allied species. It probably should be referred to *Athyris*. Length one inch two lines, width the same, depth ten lines.

Atrypa platyloba. *Sow.* sp.

Terebratula platyloba. *Sow.* Min. Con.

This very depressed variety of the *A. acuminata* is not uncommon in several localities.

Atrypa pleurodon. *Phil.* sp.

Terebratula pleurodon. *Phil.* Geol. York.

Sp. Ch.—Transversely oval; mesial elevation large, square, with several large, acutely angular plaits, which reach to the beak, forming deep notches or teeth in the margin.

This species is exceedingly variable in the number of the mesial and lateral plaits, but in all instances they are acute, and extend perfectly distinct to the beak, which characters serve to distinguish all the varieties; the lateral plaits are of unusually large size, and form deep notches in the side margin. The form also varies considerably, but the character of the ribs seems to distinguish the species under all its modifications. Length nine lines, width one inch.

Atrypa prisca. *Schlottheim.* sp.

Terebratulites priscus. *Schlottheim.* Petref.—Terebratula affinis. *Sow.* Min. Con.

Sp. Ch.—Longitudinally ovate or subtrigonal; front very narrow, rounded; sides nearly straight; beaks small; ventral valve most convex; surface covered with very numerous, rounded striæ, which frequently branch as they approach the margin, and are crossed by close, imbricating laminæ of growth.

This species in general form and striation is analogous to the *A. desquamata*, but that species is distinguished, as its name implies, by the absence of the concentric, scale-like striation of the present shell. Length one inch two lines, width one inch.

Atrypa proava. *Phil.* sp.

Terebratula proava. *Phil.* Geol. York.

Sp. Ch.—Longitudinally obovate; beak of the dorsal valve large, produced; front broad, rounded; mesial fold square; surface radiated with numerous, obtusely rounded ridges, which reach little more than half way to the beak, leaving the rostral portions smooth.

A few small, obscure specimens only have occurred of this curious species. Length six lines.

Atrypa pugnus. *Mart.* sp.

Anomites pugnus. *Martin*, Pet. Derb.—Terebratula pugnus. *Sow.* Min. Con.—Terebratula pugnus. *Phil.* Geol. York.

Fig. 34.

Sp. Ch.—Ovato-deltoidal, smooth; dorsal valve evenly convex; front much elevated, with four or five very short, obtuse plaits in the middle, and three or four on each side.

The most remarkable character of this species is the shortness of the marginal plaits, which from some fancied resemblance to the knuckles of a clenched fist, have suggested the specific name. The ventral valve is evenly convex and smooth. Length nine lines, width one inch. Fig. 34 exhibits the brachial appendages in this species, they are remarkably small, and similar in form to those of most of the plaited species.

Atrypa radialis. *Phil.* sp.

Terebratula radialis. *Phil.* Geol. York.

Sp. Ch.—Suborbicular, beaks pointed, small; valves almost equally convex; no mesial fold; surface radiated with fine, equal, rounded ridges.

This pretty little species is rather rare; length usually about three lines, width the same.

Atrypa reniformis. *Mart.* sp.

Anomites reniformis. *Mart.* Pet. Derb.—Terebratula reniformis. *Sow.* Min. Con.—Terebratula reniformis. *Phil.* Geol. York.

Sp. Ch.—Reniform; front margin raised so as to form a square sinus, from which about four obtusely rounded plaits reach nearly to the beak; sides smooth, tumid, without plaits.

This species is remarkable for the tumid or inflated appearance of the sides, and this in both the dorsal and ventral valves; so that at the sides, the dorsal valve presents the unusual appearance of hanging below the margin; this character will easily distinguish the present species from those nearly allied; the mesial plaits are obtusely rounded, but the notches they form in the margin are acute. Length one inch, width one inch five lines, depth seven lines.

Atrypa sacculus. *Mart.* sp.

Anomites sacculus. *Mart.* Pet. Derb.—Terebratula sacculus. *Sow.* Min. Con.—Terebratula sacculus. *Phil.* Geol. York.

Sp. Ch.—Obovate, very gibbous, edge rounded, obtuse; front indented, a deep, mesial furrow; surface smooth.

This little shell is very gibbous; it differs from all the varieties of the *A. hastata* in the great convexity of its valves, blunt, rounded edges, the form of the indentation in the front of the deep mesial hollow, and its small size, it rarely exceeding half an inch in length; the mesial hollow in the dorsal valve is narrow, but so

deep as almost to divide the shell into two lobes. Martin describes the beak of this species as perforated, but I think it must have been from accident, or perhaps wear, as some specimens now before me seem perfectly imperforate. Length six lines, breadth four lines.

Atrypa semisulcata. *M'Coy.* (Pl. XXII. fig. 15).

Sp. Ch.—Orbicular, depressed; beak small; mesial fold broad, flat, with about five, strong, rounded, radiating ridges, continued to the beak; sides smooth, or very finely striated longitudinally.

This species is very remarkable, from its coarsely ridged mesial fold, and nearly smooth sides. Length seven lines, width eight lines.

Atrypa striatula. *Sow.*

Atrypa striatula. *Sow.* Geol. Trans.

A few nearly hemispherical casts in decomposing slate are the only data we have for the occurrence of this species in Ireland, they shew a very fine striation on some parts of the surface; Mr. Sowerby's original description and figure appear to have been from equally imperfect specimens; before receiving his definition, I considered the Irish fossils to belong to the genus *Orthis*, although they are too imperfect to be certain of the fact.

Atrypa sublobata. *Portk.*

Atrypa sublobata. *Portk.* Geol. Rep.

I feel the definition of this very remarkable species so difficult, that I must refer to Captain Portlock's figures and description, from which the reader will gain a much clearer idea of the species than I could convey. I may, however, state, that in the same locality, namely, the red sandstone of Kildress, Cookstown, I have observed all the forms noticed by that author.

Atrypa sulcirostris. *Phil.* sp.

Terebratula sulcirostris. *Phil.* Geol. York.

Sp. Ch.—Transversely oval, tumid; front much elevated, with about five large, rounded, distinct plaits, which are continued to the beak; there are usually four broad, flattened plaits on each side, which do not reach the beak, but form large, acute notches in the margin.

This species receives its specific name from the prolongation of the mesial plaits to the beaks, giving them a sulcated appearance. The lateral plaits are broader than the mesial ones, greatly flattened, and disappear when they reach about half way to the beak. Length seven lines, width six lines.

Atrypa triangularis. *Sow.*

Atrypa triangularis. *Sow.* Geol. Trans.

A few very obscure specimens have occurred, resembling some of the smaller varieties of the *A. acuminata*, but I have referred them provisionally to Mr. Sowerby's species.

Atrypa triplex. *M'Coy.* (Pl. XXII. fig. 17).

Sp. Ch.—Transversely oval, gibbous; beaks very small, pointed; surface with nine short, angular ribs, which reach but half way to the beak; front elevated with three of the ridges; the three ridges on each side slightly larger than the mesial ones.

This pretty little shell is remarkable for its three equal lobes, of three ridges each, it is distinguished from

the *A. raricosta*, Phil., by the ridges extending only half way to the beaks on the ventral valve, and its very small size. Length two and a half lines, width three lines.

Atrypa ventilabrum. *Phil.* sp.

Terebratula ventilabrum. *Phil.* Geol. York.

Sp. Ch.—Deltoidal, gibbous; about five distinct, rounded plaits abruptly raised with the margin in front, about ten distinct, rounded, lateral plaits.

The great number and distinctness of the lateral plaits distinguishes this from *A. sulcirostris*, to which it is otherwise similar. The margin of the present shell is usually sharper, and the valves more depressed than in that species; the front is frequently much produced; the lateral plaits are smaller than the mesial ones, but are perfectly distinct, and continued nearly to the beak. Length nine lines, width one inch.

Atrypa virgoides. *M'Coy.* (Pl. XXII. fig. 21).

Sp. Ch.—Longitudinally oval; width two-thirds the length; evenly convex; front narrowed, straight; beak of the dorsal valve small, rounded, very slightly incurved; surface concentrically imbricated.

This is distinguished from the *A. virgo*, Phil., which it most nearly resembles by its imbricated surface, it is also considerably larger than the South Devon shell; it differs from the *A. hastata* in the rounded sides of the beak of the dorsal valve and its being very slightly incurved, as well as in its narrow front, and imbricated surface. Like many others of the smooth, or nearly smooth *Brachiopoda*, it appears strongly costated longitudinally when the external shell is removed. Length one inch four lines, width eleven lines.

Seminula. *M'Coy.*

Gen. Ch.—Shell small, subpentagonal; smooth, or slightly plaited at the margin; beak of the dorsal valve small, with a minute perforation; no deltidium.

The species of this genus are all small; nearly smooth shells; the margin frequently indented, but no distinct plaits on the surface; the outline is usually more or less pentagonal; the beak has a very minute foramen for the passage of the muscle of attachment, but there is no *deltidium* separating the foramen from the hinge. The genus is peculiar to the Palæozoic rocks.

Seminula pentahedra. *Phil.* sp.

Terebratula pentahedra. *Phil.* Geol. York.

Sp. Ch.—Pentagonal, depressed; front and sides indented, the angles forming broad undulations on the surface; length and breadth nearly equal, depth half the length.

This shell appears to have been gregarious, but was, at the same time, very local in its distribution, rarely occurring, but when it does occur it is usually found in great abundance; it is of a very regular, pentahedral figure, the spaces between the angles concave, with an indented margin. Length six lines, breadth six lines.

Seminula pisum. *M'Coy.*

Terebratula seminula. *Phil.* Geol. York.

Sp. Ch.—Globular; front margin elevated in the middle, with an indentation on each side. Length, depth, and breadth nearly equal.

This little species is almost spherical; the elevation of the front margin does not affect the surface of either valve; the two valves being evenly and nearly equally convex; the teeth or indentations in the front margin do not produce plaits on the surface. This species appears to have been gregarious, but very local in its distribution. Length one line and a half.

Seminula rhomboidea. *Phil.* sp.

Terebratula rhomboidea. *Phil.* Geol. York.—Terebratula rhomboidea. *Phil.* Pal. Fos.

Sp. Ch.—Shell small, globose, rhomboidal; marginal elevation very high, indented in the middle; length and breadth equal.

This small, well-marked species is extremely constant in its characters; the valves are perfectly smooth, with the exception of the lines of increase; the two valves are equally deep; the depth of the two valves equals half the breadth; the broad elevation of the front is not perceptible on the smaller valve, which is convex, but forms a very wide depression in the dorsal valve; the elevation of the margin has a notch or indentation in the middle, from which a small ridge runs through the centre of the mesial depression in the dorsal valve, and a small groove through the centre of the ventral valve towards the beak. Length six lines, width six lines.

CRUSTACEA.

Astacus ? Phillipsii. *M'Coy.* (Pl. XXIII. fig. 1).

The very interesting fossil to which I have given the above name is, I believe, the first instance in which any remains of the Macrourous Decapods have been found in the Irish Palæozoic strata; the specimen is from the thin beds of limestone, intercalated with the slate of Hook Head, Waterford, where it was collected by Mr. C. W. Hamilton, Secretary of the Geological Society, Dublin, in whose collection it is preserved. The specimen consists of a short portion of the leg, the carpus, and the penultimate, or immoveable joint of the didactyle hand or pincers, apparently of the right side; the existence of a thumb or mobile finger, and a powerful one, is proved by the marks of muscular attachment at the base of the penultimate joint, in the situation requisite for moving it; so far as preserved, the length of the penultimate joint is one inch seven lines. The carpus is quadrangular, wider than long, width five lines; length on the outside four lines, on the inside two lines. The structure of the laminated shell, and of the ginglymoid joints, is still preserved.

Calymene (?) granulata. *Münst.*

Calymene granulata. *Münst.* Beitrage.—Calymene granulata. *Phil.* Pal. Fos.

Sp. Ch.—Cephalothorax, semicircular; surface minutely tuberculated; glabella pear-shaped, very tumid; cheeks small, triangular, convex; eyes large, strongly reticulated; pygidium obtusely rounded, lobes tumid, nearly equal, each segment with a transverse row of granules.

The specimens which have occurred of this species are all imperfect, but seem identical with the Devonian ones. This is obviously not a true *Calymene*.

Calymene lævis. *Münst.*

Calymene lævis. *Münst.* Beitrage.—Calymene lævis. *Phil.* Pal. Fos.

The specimens referred to this species are very imperfectly preserved, they present, however, the same remarkable parallelism of the sides of the body and subtruncate tail. I have not seen the head.

Calymene Latreillii. *Stein.*

Calymene Latreillii. *Stein.* Mem. Geol. Soc. Fran.—Calymene Latreillii. *Phil.* Pal. Fos.

One or two fragments of the post-abdomen of a species resembling that figured by Professor Phillips, have occurred, but too imperfect for correct identification or description.

Griffithides. *Portk.*

The genera *Phillipsia* and *Griffithides*, so common in the carb. limestone, are very distinct in their characters. In *Phillipsia* the glabella is as wide at the base as in front, and marked on each side with three cephalo-thoracic furrows, which in *Griffithides* is gibbous in front, but contracted to a very narrow neck at the base, and there are no lateral furrows; the eyes in the former are usually larger and reticulated, while in the latter they seem smooth.

Griffithides calcaratus. *M'Coy.* (Pl. IV. fig. 3).

Sp. Ch.—Cephalo-thorax, semioval; glabella smooth, ovate, most convex in the middle of its length; cheeks small, triangular, flat, smooth; wings strongly striated, broad, prominent, rounded, terminating posteriorly in long, flattened spines; eyes moderate, lunate (smooth ?), connected with the glabella by a nucleus on each side; pygidium with a smooth margin, each segment with a row of very minute granules.

This beautiful species is most nearly allied to the *G. longispinus*, Portk., but is at once distinguished by its smooth cheeks; the eyes also, in the present species, are differently formed and placed, and the glabella is much smaller and less prominent in front. Length of glabella five lines, greatest width three lines; width at base one line, width of cephalo-thorax seven lines; length of eyes one and a half lines, width one line; length of posterior alar spine three lines. The Pygidium has a broad, smooth, margin or limb, in which it differs from that of the *G. longispinus*, in which the segments are extended to the margin; there is a single row of very minute granules on each segment. Width of pygidium five lines.

Griffithides globiceps. *Phil.* sp.

Asaphus globiceps. *Phil.* Geol. York.—Griffithides globiceps. *Portk.* Geol. Rep.

Sp. Ch.—Cephalo-thorax semioval; glabella pear-shaped, very gibbous, globose in front; cheeks triangular, convex; eyes small, lunate, smooth, connected by a nucleus with the base of the glabella; wings broad, convex, with strong, imbricating, longitudinal striæ; extremities acutely angular; axal and lateral lobes of the abdomen and pygidium nearly equal, very tumid; pygidium obtusely rounded; entire surface smooth.

Specimens, with the cephalo-thorax, abdomen and pygidium in contact, are not uncommon.

Griffithides granuliferus. *Phil.* sp.

Asaphus granuliferus. *Phil.* Geol. York.

Sp. Ch.—Pygidium obtusely rounded; length four-fifths the width; axal and lateral lobes nearly equal, tumid; surface covered with rather distant, very minute granulations.

I have never seen this species much more than half the size of the specimen figured in the Geology of Yorkshire: the minute, scattered granulations easily distinguish it.

Griffithides longiceps. *Portk.*

Griffithides longiceps. *Portk.* Geol. Rep.

Pygidium semi-oval, obtusely pointed; axal lobe large, with about ten or twelve rows of small tubercles; lateral lobe depressed, with about eight rows of tubercles.

I have only seen the tail of this species.

Griffithides longispinus. *Portk.*

Griffithides longispinus. *Portk.* Geol. Rep.

I have seen very imperfect fragments only of this species; the pygidium is wider and larger than in the *G. longiceps*, but similarly marked. I have not seen the head.

Griffithides obsoletus. *Phil.* sp.

Asaphus obsoletus. *Phil.* Geol. York.

This very curious species resembles the *G. globiceps* in general form, but has the head marked with transverse, waving striæ, unlike any other *Tribolite* I know). Its head is very rare, only one imperfect fragment having been seen; the pygidium figured by Prof. Phillips resembles that of the *G. globiceps*, and probably does not belong to the head.

Phillipsia cœlata. *M'Coy.* (Pl. IV. fig. 4).

Sp. Ch.—Glabella ovate, convex, rounded in front, attenuated behind, to a narrow neck; neck furrow very strong; first cephalo-thoracic furrow deep, enclosing a semicircular, convex space, above which are, on each side, three others shorter and more shallow; limb bordering the cephalothorax, broad, convex, when decorticated, marked with twelve or thirteen fine continuous striæ; surface of cephalo-thorax closely sculptured with a fine, scale-like granulation; neck tubercle distinct.

The only specimen which has occurred of this very interesting Trilobite is imperfect as to the cheeks, but there are so many excellent characters to distinguish it, that the smallest fragment could be recognized. In structure it presents some variations from the characters of the genus, as defined by Captain Portlock; the form of the glabella is rather that of *Griffithides* than *Phillipsia*, but it has the cephalo-thoracic furrows of the latter genus; these furrows are four in number, or three exclusive of the semicircular basal one; that is, one more on each side than accords with that author's view of the genus. I have observed, however, the same number in the *P. Jonesii*. Length of glabella three lines, greatest width of glabella one and a-half lines.

Phillipsia colei. *M'Coy.* (Pl. IV. fig. 6).

Sp. Ch.—Elongate, oval; length rather less than twice the width; sides parallel; cephalo-thorax smooth; glabella rounded in front, but not encroaching on the margin, slightly convex, constricted at the sides; cephalo-thoracic furrows distinct, cheeks large, flattened; wings narrow, ending posteriorly in short, triangular spines; eyes small, lunate. Thorax, axal lobe rather wider than the lateral ones; each segment having a row of minute, crowded, irregular granulations; pygidium rounded, margin broad, finely granulated, each segment having a row of numerous, crowded, very unequal granulations, larger than those of the thorax.

This species resembles the *P. Kellii*, Port., but is easily distinguished by the character of the granulation of the segments. Length eleven lines, width six lines; length of glabella four lines, width six lines. I have dedicated this elegant fossil to the Earl of Enniskillen.

Phillipsia (?) discors. *M'Coy.* (Pl. IV. fig. 7).

Sp. Ch.—Pygidium semielliptical; axal lobe reaching to the margin, one-third less in width than the lateral lobes, very convex, composed of seventeen narrow segments, the third and fourth unite in the middle of the lobe to form one large tubercle, and towards the apex there are four or five small tubercles, irregularly disposed; the lateral lobes have only six large, rounded segments, each terminating at the margin in a large, rounded tubercle, and having usually between the margin and the axal lobe, two other large, obtuse tubercles, one of these on the third and last, being largest, and probably spiniferous; besides these there are a few irregular granules, especially towards the apex, all the lateral segments seem forked from nearly their origin.

I have included this very remarkable trilobite in the genus *Phillipsia*, Portk., although I think there can

be little doubt, if better known, it would form a genus distinct from any of those already constituted; I have named it from the great difference in number of the segments of the axal and lateral lobes of the pygidium. Length of pygidium three lines, width four and a half lines, width of axal lobe one line.

Phillipsia gemmulifera. *Phil.* sp.

Asaphus gemmuliferus. *Phil.* Geol. York.

Sp. Ch.—Pygidium obtusely rounded, narrow; with three nearly equal, convex lobes, each lobe with six longitudinal rows of small tubercles.

This species strongly resembles the *P. truncatula*, but is constantly smaller and more convex. Length of pygidium five lines, width five lines.

Phillipsia Jonesii. *Portk.*

Phillipsia Jonesii. *Portk.* Geol. Rep.

Sp. Ch.—Longitudinally oval, twice as long as wide; glabella one-third the entire length, very broad, depressed, obtusely rounded in front, contracted in the middle; eyes very large, reniform, more than half the length of the glabella; cheeks small, narrow, slightly convex; surface covered with minute, rather distant, impressed puncta; abdomen and pygidium smooth.

This species is easily recognized by its very broad, depressed glabella, which is somewhat hour-glass shaped, being remarkably contracted in the middle; many specimens are found rolled up. Length of cephalothorax four lines, width five lines.

Phillipsia Kellii. *Portk.*

Phillipsia Kellii. *Portk.* Geol. Rep.

This pretty little species is intermediate between the *P. truncatula* and *P. Jonesii;* it is about the size of the latter species, but resembles the former in the tuberculation of the pygidium, which is also more obtuse at the extremity than in that species; there are six rows of granules on each lobe of the pygidium. The head resembles that of the *P. Jonesii*, but is longer in proportion to the width, has smaller eyes, and the glabella has more nearly parallel sides.

Phillipsia Macoyii. *Portk.*

Phillipsia Macoyii. *Portk.* Geol. Rep.

The only specimen which has occurred of this species I collected myself from the carboniferous limestone of Kildare; it was lent to Captain Portlock for his Monograph of Irish Trilobites, as I conceived it to be not only a new species, but the type of a new genus. I am still inclined to think it cannot be ranked with any known genus; the very small size of the glabella, and large size of the eyes, distinguish it from the most nearly allied, and from *Phillipsia*, with which Captain Portlock has ranked it, it is distinguished by the want of the cephalo-thoracic furrows. As I have, however, no means of examining the specimen now, I cannot characterize it. Length of cephalothorax two lines, width three lines.

Phillipsia mucronata. *M'Coy.* (Pl. IV. fig. 5).

Sp. Ch.—Pygidium semi-elliptical, terminating posteriorly in a short, mucronate, obtuse point; axal lobe nearly as wide as the lateral ones; about fifteen axal and nine lateral segments; surface smooth.

This is the only *Trilobite* I know of in the Mountain Limestone with a mucronate or pointed tail. Length of pygidium four lines, width five lines.

Phillipsia quadriserialis. *M'Coy.* (Pl. IV. fig. 8).

Sp. Ch.—Pygidium semi-oval, slightly wider than long; of fifteen axal and twelve lateral segments; each lobe bearing four rows of large tubercles; limb narrow, flattened, smooth.

This species is distinguished from the *P. truncatula*, by having but four instead of six rows of tubercles on each lobe; it is also very much smaller and rather more pointed posteriorly. The same character distinguishes it from the *P. gemmulifera*, *P. Kellii*, *P. longispina*, &c. Length of pygidium four lines, width five lines.

Phillipsia truncatula. *Phil.* sp.

Asaphus truncatulus. *Phil.* Geol. York.—Phillipsia ornata. *Portk.* Geol. Rep.

Sp. Ch.—Pygidium large, obtusely pointed, lateral lobes flattened; mesial lobe narrower, tumid; each lobe with six longitudinal rows of rounded tubercles.

I have not seen either the head or abdomen of this species. Length of pygidium nine lines, width eleven lines.

Dithyrocaris. *Scouler.*

As my friend Dr. Scouler has not as yet fully published his views concerning this very important and curious genus, I shall not offer any observations upon it.

Dithyrocaris Colei. *Portk.*

Dithyrocaris Colei. *Portk.* Geol. Rep.

Sp. Ch.—Longitudinally oval; anterior end narrow, having a shallow, rounded sinus in front, posterior end broader; margins sigmoidally curved, forming an acute sinus towards the centre; sides terminating in acute, angular, flattened spines; the mesial ridge strongly crenated; lateral ridges almost as large as the mesial one, and similarly crenated; short, sigmoidal, anterior ones also similar; margins of the valves obliquely striated; surface otherwise perfectly smooth.

This large species is very closely allied to the *Argas tricornis*, Scouler. Taking one half of the shield, or one valve, its length is about twice and a half the width. Length of single valves three inches seven lines, width one inch six lines.

Dithyrocaris orbicularis. *Portk.*

Dithyrocaris orbicularis. *Portk.* Geol. Rep.

I have only seen a few fragments, probably of this species; along with the last, it is distinguished by its nearly circular outline, and its tuberculated lateral and mesial ridges and margin.

Dithyrocaris Scouleri. *M'Coy.* (Pl. XXIII. fig. 2).

Sp. Ch.—Length of expanded pair of valves very slightly exceeding the width, surface smooth; central and lateral ridges transversely wrinkled; frontal notch nearly as deep as wide, rounded. Valves, when spread flat, forming a nearly orbicular shield, the length very slightly exceeding the width, and having a deep, rounded notch in front; central ridge or hinge strong, rounded, regularly marked with transverse wrinkles; lateral ridges marked with irregular, flat, scale-like undulations; intermediate short ridges nearly straight, slightly bent towards the central ridge above, and towards the lateral ridges below; surface smooth; margin of the valves narrow, fringed or obliquely striated, immediately within which, on the lateral margins, is a plain, rounded ridge, divided longitudinally by a nearly mesial sulcus; it is close to, and parallel with the outer margin for about the upper half of its length, then gradually turning in towards the lateral ridge, where it widens; tail exactly equalling the body in length, terminating as usual in three spines of nearly equal length, the central one triangular, marked with very fine, oblique striæ, meeting at an acute angle on the central ridge; two lateral spines rounded, coarsely sulcated longitudinally. Width of the expanded pair of valves one inch four lines, length to the tip of posterior spine one inch five lines, length of central spine of tail one inch.

Dithyrocaris tenuistriatus. *M'Coy.* (Pl. XXIII. fig. 3).

Sp. Ch.—Valves elongate, ovate, rounded anteally, obtusely pointed retrally, convex; mesial ridge large, running nearly the entire length of the valve; two smaller ridges close to, and parallel with the inner margin; about one-fifth of the length from the anterior end, and situate between the mesial and internal ridges, there is a short sigmoidal ridge, and a fifth one at the anterior end defines, for a short way, the line which separates the flat, external margin from the convex part of the valve; surface finely and regularly striated longitudinally.

This species differs from all others of the genus, in the want of the retral spine to the valve; it is also much more convex than any of its congeners; fragments may be discriminated by the regularity and fineness of the striæ. Length of the valve one inch, width five lines.

Entomoconchus. *M'Coy.*

Gen. Ch.—Shell bivalve, globose; depth from the dorsal to the ventral margin exceeding the length; abdominal margin most convex; hinge auriculated at each end, and with two small, beak-like folds nearly in the centre.

Entomoconchus Scouleri. *M'Coy.* (Pl. XXIII. fig. 4).

Entomoconchus Scouleri. *M'Coy*, Jour. Geol. Soc. Dub.—Cytherina Phillipsiana. *Koninck.* Crus. Bel.

Sp. Ch.—Globose; hinge in the direction of the shortest diameter of the shell, having at each end a short, square, or slightly rounded ear; one end more globose than the other, the straightest extremity having a slightly developed auriform process, resembling those of the hinge; surface very finely granular.

A description of this fossil has already been published in the Transactions of the Geological Society of Dublin; it was originally figured by Prof. Phillips in the Geol. York., but not named or described; subsequently to the period at which I described it, Koninck figured and described it under the name of *Cytherina Phillipsiana.* I have retained my own name, not so much from its priority, as because I do not think it can be well referred to *Cytherina;* each valve, besides the small, square ears, has two obtuse umbones close to the hinge-line; the general form reminds us of shells of the genus *Lima*, as the recently discovered genus, *Isaura*, puts on in the same family the appearance of a *Cyclas.* Those shell-like *Entomostraca* are of the greatest interest, many of the minute bivalves suffered to remain in genera of *Conchifera* belonging almost certainly to this class. Length eleven lines, width nine lines.

Daphnia primæva. *M'Coy.* (Pl. XXIII. fig. 5).

Daphnoides (?) *Hib.* Trans. Roy. Soc. Ed.

Sp. Ch.—Longitudinally oval, compressed; without tail; head forming a short, obtusely pointed beak, curved downwards.

I believe this is the first instance in which the genus *Daphnia* has been observed in the fossil state; the present species is not very uncommon in some localities; like one or two of the recent species, it is without the posterior mucronate point, possessed by the majority of the genus; the head forms a very distinct, but short beak; but I have as yet seen no traces of its eye, although the shell on that portion of the surface is well preserved; the sides are but slightly convex. Length one and one-third lines, depth three-fourths of a line.

Bairdia. *M'Coy.*

Gen. Ch.—Shell elongate, fusiform, suddenly tapering at both ends; a very short proportion of the valve overlaps the abdominal margin.

The fossils of this genus are readily distinguished by their lengthened, ovate form, and ends suddenly tapering to blunt, recurved points; they are all of a small size. I have named the genus in honour of Mr. Baird, the able investigator of the living British Entomostraca.

Bairdia curtus. *M'Coy.* (Pl. XXIII. fig. 6).

Sp. Ch.—Length twice and a half the depth; dorsal margin very convex; abdominal margin nearly straight.

This is a much shorter and more gibbous species than the next. Length one line.

Bairdia gracilis. *M'Coy.* (Pl. XXIII. fig. 7).

Sp. Ch.—Length three and a half times the depth; dorsal and abdominal margins parallel.

The diameter is about two-thirds the depth; the abdominal margin is convex at both ends, and concave in the middle; the dorsal margin is concave at both ends, and convex in the middle, they are consequently nearly parallel; both ends are alike. Length half a line.

Cythere amygdalina. *M'Coy.* (Pl. XXIII. fig. 8).

Sp. Ch.—Length rather more than twice the depth; one end small, rounded, submucronate; the other much larger, obtusely rounded; valves convex; surface smooth.

This species has much the shape of the *C. excavata*, M'Coy, but is more slender, has more unequal ends, and is entirely without marks or impressions of any kind. Length half a line. Common.

Cythere arcuata. *M'Coy.* (Pl. XXIII. fig. 9.)

Sp. Ch.—Slender, rounded, twice as long as deep, arcuate, convex, the dorsal margin very convex, ventral margin nearly equally concave; surface smooth, without markings.

This little species is very common in the carboniferous shales, and although rarely well preserved, is easily recognized by its lengthened, curved form; it differs from *Bairdia gracilis*, M'Coy, and the allied species, by its simple, obtusely rounded extremities. Length about half a line.

Cythere bituberculata. *M'Coy.* (Pl. XXIII. fig. 10).

Sp. Ch.—Twice and a half longer than deep; ventral edge long, straight; back but slightly convex; both ends nearly equally rounded; sides flattened; each valve with two very large, rounded tubercles, situated rather more than their own diameter, one from the anterior, the other from the posterior end.

This very distinct and beautiful species is common in one or two localities; it is easily known from the other species I have described, by the *two* large tubercles on each valve. Length one-third of a line.

Cythere costata. *M'Coy.* (Pl. XXIII. fig. 11).

Sp. Ch.—Ovate, rounded, gibbous; abdominal margin very convex; ends obtusely rounded; the anterior slightly narrower; a deep circular depression in the centre of each valve, and each side ornamented with four, longitudinal, slender ridges, and one following the curve of the abdominal margin and ends; three or four obtuse, rounded tubercles at the anterior end.

I have seen several specimens of this very distinct and beautiful species, which is, however, one of the rarest and *most solitary* of the genus. It is easily distinguished from all others by its beautifully costated sides; the number of tubercles at the anterior end is also remarkable. Length half a line.

Cythere cornuta. *M'Coy.* (Pl. XXIII. fig. 12).

Sp. Ch.—Shell sub-rhomboidal, gibbous; an obtuse spine near the centre of the abdominal margin of each valve.

This is distinguished at a glance from the *C. spinigera*, M'Coy, by having the spiniform tubercle in the middle or nearly so, of the abdominal margin; the posterior end is obtusely rounded, while the anterior end gives a slight obliquity to the contour of the shell; the dorsal outline is gradually curved, the abdominal somewhat undulated, but without a sinus. This shell is most inflated at the back, and gradually diminishes in diameter towards the abdominal edge; the sides are not, however, concave, one valve overlaps the other

for a small space beneath. This species bears a considerable resemblance to the *Cypris spinigera*, Sow., but that shell is an inhabitant of the Wealden rocks, and truly belongs to the fresh water genus, *Cypris*, while this is a marine shell, and consequently not of that genus. A comparison of the figures of the two species will exhibit numerous differences. Total length one line; the diameter is two-thirds the depth; depth a little more than half the length. Not common.

Cythere elongata. *M'Coy.* (Pl. XXIII. fig. 13).

Sp. Ch.—Three times as long as deep; dorsal and ventral margins nearly parallel, very slightly curved; ends equal, rounded; sides convex, smooth, one small tubercle near the anterior end.

The great length in proportion to the depth, is so remarkable in this species, that although very small, it is easily distinguished by the naked eye. It is very common in the shales of certain localities; but, from the want of a specific name, has not been heretofore noticed. Length half a line.

Cythere excavata. *M'Coy.* (Pl. XXIII. fig. 14).

Sp. Ch.—Ovate, convex; length nearly twice the depth; one end broadly rounded, the other rounded, but narrower; valves smooth, a deep circular hollow in the middle of each, nearest the narrow end; surface smooth.

At first sight this species resembles the *C. impressa*, M'Coy, but is distinguished by the larger size of the depression in the valves, their more uniform convexity, and the total absence of tubercles. Length about half a line.

Cythere gibberula. *M'Coy.* (Pl. XXIII. fig. 25).

Sp. Ch.—Gibbous; back semicircular; ventral margin short, straight; ends very obtusely rounded; each valve swelled in the middle into a large, undefined, rounded gibbosity.

This species occurs in great numbers in the shale of some localities, it is chiefly remarkable for the large hump or protuberance in the middle of each valve. Length half a line.

Cythere Hibbertii. *M'Coy.* (Pl. XXIII. fig. 15).

Sp. Ch.—Oblong; depth two-thirds the length; ventral margin nearly as long as the shell, prominent; ends equal, subtruncate, rounded; valves convex, compressed towards the ventral margin; surface smooth.

This is the largest species of *Cythere* I have met with in the Irish Palæozoic rocks, being frequently upwards of a line in length. It resembles the *C. inflata*, M'Coy, but is much less gibbous, has a longer and more prominent ventral margin, and less pointed ends; the dorsal margin is also less convex in the present species, giving it something of an oblong, square outline.

This I believe to be the species figured by Captain Portlock as the *Cypris Scotoburdigalensis* of Hibbert, but an examination of several Burdiehouse specimens induces me to give it, at least provisionally, a distinct name.

Cythere impressa. *M'Coy.* (Pl. XXIII. fig. 16).

Sp. Ch.—Twice as long as deep, gibbous; ends rounded, anterior slightly larger than the posterior; ventral margin nearly straight for about half its length, suddenly convex at the anterior end; sides of the valves smooth; a deep, narrow depression close below the dorsal margin, at equal distance from each end, with a small tubercle placed on its anterior edge.

This species is very common in the slates and shales of several districts; it is easily recognized by its unequal ends, and, where the surface is preserved, by the deep, impressed puncture in the middle of the dorsal margin, and its accompanying tubercle; the valves are most gibbous at the anterior side of the depression. Length about half a line.

Cythere inflata. *M'Coy.* (Pl. XXIII. fig. 17).

Sp. Ch.—Shell gibbous; anterior and posterior ends nearly alike, anterior a little larger; diameter from the most convex part of one valve to that of the other, five-sixths of the depth, measured from the centre of the dorsal to the centre of the abdominal margin; depth two-thirds of the length; abdominal margin of the left valve overlaps. Length from one to two lines.

This is the largest, as it is likewise the most abundant species of *Cythere* found in the mountain limestone of Ireland. Its most ordinary size is about a line and a half long, and one line from the dorsal to the abdominal margin; the back is much and regularly curved, greatly inflated, and marked along the centre by a groove or sulcus, which points out the situation of the hinge; towards the abdominal margin it suddenly becomes compressed, the abdominal margin itself is straight, without any sinus, and presenting a very small, obtuse, radicle-like projection; the abdominal portion of the left valve overlaps the other very distinctly.

This species abounds most in dark, fœtid limestones, but it is rare in the light-coloured limestones, where the following species supplies its place.

Cythere inornata. *M'Coy.* (Pl. XXIII. fig. 18).

Sp. Ch.—Compressed; diameter one-half the depth; sides slightly convex; shell plain.

This is a very small species; rarely exceeding half a line in length, it bears a great resemblance to the young of the *C. cornuta*, M'Coy, in general form, but wants the characteristic spines of that shell, and the sides, instead of being concave, are convex. It is also much more compressed than the *C. inflata*, M'Coy, which it resembles in the want of spines. In that shell the depth is less than the diameter, while it is double the diameter in this species. Very common in several localities.

Cythere oblonga. *M'Coy.* (Pl. XXIII. fig. 22).

Sp. Ch.—Oblong, very gibbous; length rather less than twice the depth; dorsal and ventral margins slightly curved, parallel; ends almost equal, very obtuse, rounded; surface smooth, without ornament.

This is rather a large species, having, to the naked eye, an oblong square form; the valves have their greatest convexity in the middle, while in the *C. Hibberti*, M'Coy, and *C. inflata*, M'Coy, which it most resembles, the greatest convexity is along the dorsal margin; from those species it is likewise distinguished by its greater length and the equal curvature or parallelism of the dorsal and ventral margins. Length about one line. Common.

Cythere orbicularis. *M'Coy.* (Pl. XXIII. fig. 19).

Sp. Ch.—Nearly orbicular, depressed, length very slightly exceeding the depth; valves flattened, gibbous in the middle, smooth.

This is comparatively a large species, nearly equalling the *C. inflata* and *C. Scotoburdigalensis* in size, from both of which it is easily known by its proportionate shortness, the flatness of the valves, and their central gibbosity; from the *C. gibberula*, which it resembles in the central gibbosity of the valves, it is distinguished, as in the other cases, by the remarkable shortness in proportion to the depth. Length one line.

Cythere pusilla. *M'Coy.* (Pl. XXIII. fig. 20).

Sp. Ch.—Oval, length but slightly exceeding the depth, very gibbous; ends rounded; ventral margin short; surface smooth.

This is the smallest species of *Cythere* which I have observed in the Palæozoic rocks; it has no very tangible characters, yet from its great abundance it becomes important; it is more nearly spherical than any of the

others; it most closely resembles the *C. inornata*, M'Coy, but is more gibbous, and has more nearly equal ends. Length about one-third of a line.

Cythere scutulum. (*M'Coy*. (Pl. XXIII. fig. 21).

Sp. Ch.—Orbicular, compressed, smooth; sides flat; ventral margin about one-third the length of the shell; the ends equal, projecting below the ventral margin.

This species approaches the *C. orbicularis*, M'Coy, in shape, but is well distinguished by the form of its ventral margin, and the perfect flatness of its sides, the sides of *C. orbicularis*, M'Coy, being very gibbous or obtusely conical. Length one line.

Cythere spinigera. *M'Coy*. (Pl. XXIII. fig. 23).

Sp. Ch.—Shell somewhat reniform, sides slightly concave; one spiniform tubercle close to the end on each valve; a slight abdominal sinus.

This species has both ends alike, and the sides a little concave; there is a very small abdominal sinus, while the back is much and regularly curved; the portion of the valve which overlaps is much thickened; in this species the two tubercles are entirely beyond this portion, while in *C. cornuta*, they are nearly in the centre. Length from one line to a line and a quarter; diameter two-thirds the depth; depth two-thirds the length.

Cythere trituberculata. *M'Coy*. (Pl. XXIII. fig. 24).

Sp. Ch.—Oblong, length rather more than twice the depth, convex; both ends equal, rounded; dorsal and ventral margins nearly parallel, each valve with three small, round, nearly equidistant tubercles, one of which is much closer to the ventral margin than the other two.

This species, in addition to its lengthened, regular form, is easily distinguished from its congeners by the *three* tubercles on each valve. Length half a line.

ANNELIDA.

The *Annelida*, or red-blooded worms, are the least highly organized group of the *Annulosa*, or articulated animals; the forms found in the carb. limestone belong to Cuvier's order *Tubicola*, or those sedentary species having the gills attached to the head, and inhabiting a tube, sometimes shelly, as in *Serpula*, sometimes nearly membranous, or formed of agglutinated grains of sand, as in *Terebella* or *Sabella*.

Serpula. *Linn.*

Gen. Ch.—Tubular, gradually widening towards the aperture; irregularly attached; aperture round; edge simple.

Serpula (?) compressa. *Sow.*

Serpula compressa. *Sow.* Min. Con.

Sp. Ch.—Tube thick, perlaceous (?) rapidly tapering, flexuous; section elliptical.

The examples I have seen of this species seem more allied to *Serpulites* than to *Serpula;* the pearly or glistening appearance of the surface more nearly resembling the former than the latter genus. Diameter four lines.

Serpula hexicarinata. *M'Coy.* (Pl. XXIII. fig. 28).

Sp. Ch.—Elongate, slightly flexuous, hexagonal; sides nearly equal, smooth, flat; a narrow, rounded, prominent keel on each of the angles.

This species is easily distinguished from any of the other Palæozoic *Serpulæ*, by the hexagonal form of the tube, and the six narrow, rounded keels on the angles. Length usually about two inches, width half a line.

Serpula parallela. *M'Coy.* (Pl. XXIII. fig. 30).

Serpula socialis. *Gold. Portk.* Geol. Rep.

Sp. Ch.—Tubes very slender, cylindrical, smooth, grouped parallel to each other in bundles; tubes one-fourth of a line in diameter.

This curious species differs from all the *Serpulæ* with which I am acquainted, in being perfectly smooth, and without the irregular flexuosity in any part of the tubes, which we commonly see in the other species of the genus; the tubes are parallel to each other, forming masses three or four inches long, and one inch in thickness. When preserved in shale they are usually yellowish and semi-transparent, probably owing to their mode of conservation; in limestone they are white and opaque. It is exceedingly constant in its characters; as it is certainly not identical with the *Serpula socialis*, Gold., of the cretaceous period, it seems best to give it a distinctive name.

Serpula scalaris. *M'Coy.* (Pl. XXIII. fig. 29).

Sp. Ch.—Cylindrical, very slowly tapering, tortuous; shell thick; surface with large imbricating, transverse rings.

This species is rendered remarkable by the large, regular, transverse rings on the surface of the tube, which is very tortuous. Diameter two lines.

Spirorbis. *Lam.*

Gen. Ch.—Discoid, spirally coiled, whorls round; attached by the under side.

Spirorbis caperatus. *M'Coy.* (Pl. XXIII. fig. 26).

Sp. Ch.—Discoid, whorls hardly two, very rapidly enlarging, round, strongly wrinkled concentrically.

I have only seen one specimen of this pretty little shell attached to a species of *Fenestella;* the strongly wrinkled surface will distinguish the species.

Spirorbis globosus. *M'Coy.* (Pl. IV. fig. 10).

Sp. Ch.—Subglobose, slightly compressed, smooth; volutions concealed by the last whorl; back broad, rounded; umbilicus very small.

This very gibbous species differs from the *S. omphalodes*, Gold., in the small size of the umbilicus, and the completely concealed volutions; it most nearly resembles the *S. valvata* of the Muschelkalk. Diameter one line, thickness half a line.

Spirorbis intermedius. *M'Coy.* (Pl. IV. fig. 9).

Sp. Ch.—Discoid, flattened; sinistral; whorls two and a half, round, nearly equal in thickness throughout; a few distant, irregular, ring-like thickenings.

This species is intermediate between the *S. ammonia* and the *S. omphalodes*, having the compressed form, very gradually increasing whorls, and obscurely annulated surface of the former, with a smaller number of whorls, besides which, it differs from both in being sinistral. Diameter one line, thickness one-fourth of a line.

Spirorbis minutus. *Portk.*

Spirorbis minutus. *Portk.* Geol. Rep.

I have not seen good specimens of this shell; those on the specimens of *Dithyrocaris Colei* which I have examined, being very indistinct; it seems, however, a very good species. I have not seen it except in this situation. There are only about two turns in the spire: diameter about one-fifth of a line.

Spirorbis omphalodes. *Gold.* ?

Serpula omphalodes. *Gold.* Pet. ?

On certain shale-plants are found abundance of a little shell referred by Captain Portlock to the above species. The Irish specimens are perfectly flat on the attached side, smooth, and having two and a half or three turns in the spire; the mouth semicircular. Goldfuss's characters do not exactly agree with those, I have therefore marked the reference with a doubt.

Spiroglyphus. *Lam.*

Gen. Ch.—Discoid; spirally coiled; parasitic; forming a deep groove for itself in the surface of shells.

Spiroglyphus marginatus. *M'Coy.* (Pl. XXIII. fig. 27).

Sp. Ch.—Discoid; volutions hardly two; upper side rounded; attached side flat; externally bordered by a broad, flat keel; surface smooth. Parasitic on various shells in one or two localities.

Serpulites carbonarius. *M'Coy.* (Pl. XXIII. fig. 32).

Sp. Ch.—Tube small, narrow, shelly; terminating posteriorly by two lengthened, cylindrical tubes, the prolongation of the lateral, thickened ridges.

This remarkable species is intermediate in the texture of its tube, between the *S. longissimus*, Sow., and *S. membranaceus*, M'Coy, being more delicate than the former, but much more testaceous than the latter; it is, however, greatly inferior to either of them in size, the most usual diameter of the compressed tube being one or one and a half lines, and the largest specimen which has, as yet, fallen under my observation was barely two lines in width; the forked, posterior termination is a new and important character, which, however, I believe to belong to the whole genus, rather than to characterize the present species. It is formed of two long testaceous tubes, bordered on the inside of their base by a membranous prolongation of the principal tube.

My friend, Dr. Scouler, has recently shewn me specimens of this species, collected by himself, from the Scotch carboniferous shale.

Serpulites membranaceus. *M'Coy.* (Pl. XXIII. fig. 31).

Sp. Ch.—Tube elongate, curved, membranaceous; abdominal and dorsal (?) margins thickened.

The extraordinary genus *Serpulites*, hitherto thought so characteristic of the Silurian rocks, as to distinguish the slates of that period from those of the carboniferous system, has recently occurred in some abundance in the shales of the carboniferous period; the species, however, appear to be distinct from those in the Silurian rocks. The present species is of great size, probably exceeding that of the *S. longissimus;* its substance, however, instead of being decidedly shelly as in that fossil, is excessively thin and membranous, so that the smallest fragments of the two species could be easily discriminated. A very interesting fact is shewn by our figure, namely, that two opposite points of the circumference of the tube were really thickened, forming two opposite, longitudinal ridges (or tubes ?) and that this appearance is not due to pressure. General width of the compressed tube seven lines.

Sabella antiqua. *M'Coy.* (Pl. IV. fig. 11).

Sp. Ch.—Tube composed of very fine grains, cylindrical for about one inch and a half, gradually tapering at one end; diameter of tube about one line.

This curious fossil occurs in considerable numbers in the shales of several districts in Ireland. When the specimens are well preserved, they shew the finely granular, arenaceous tube, with, in many instances, its smooth, glossy, membranous lining; the specimens are usually more or less curved, particularly towards the smaller end. They are usually about two or two and a half inches long.

ECHINODERMATA.

The *Echinodermata* are the most highly organized of the *Nematoneura*, and form an exceedingly well-defined group.

Some of them, as the *Sipunculidæ*, resemble worms in their external appearance, being cylindrical, soft, and without feet; their internal structure, however, is perfectly that of the *Echinodermata*. Next come the *Holothuriæ*, which, though still without a calcareous covering, approach very nearly in structure to the *Echinæ:* they are for the most part oval and smooth, with five rows of ambulacra, or rows of tubular suckers or feet (sometimes scattered over the body) the head is surrounded with beautifully pinnate, leaf-like gills. The *Echini* differ from those in having the entire body enclosed in a hard, calcareous, spheroidal case, having five narrow ambulacra, each composed of two rows of small, pentagonal plates, each plate perforated for the passage of two sets of tubular, foot-like suckers; between the ambulacra are five broader spaces, each composed of two rows of large, pentagonal, imperforate plates, closely set with sharp spines, which both serve as a defence and assist in locomotion; the mouth is furnished with a complex and powerful dental apparatus, which does not occur in any of the other Echinoderms. The respiration is principally effected by the admission of water to the interior, where it is made to pass in currents over the lining membrane of the shell and the surface of the intestines, by means of the cilia with which they are covered. Following them, we have the *Asteriadæ* or star fishes, in which the general form is depressed and divided into five or more rays, the under side of each of which is hollowed into an ambulacral groove, analogous to the ambulacra of the *Echinidæ*, and pierced for the passage of similar foot-like suckers; the tip of each ray exhibits a small red point, which is considered by Ehrenberg to be a true eye. The external integument is coriaceous and covered with hard, calcareous granules, plates, or spines; the mouth is central and without teeth. By means of the genus *Comatula* we pass at once from the *Asteriadæ* to the *Crinoidea*, which form the lowest group of the *Echinodermata*.

Palæchinus. *Scouler.* MSS.

Gen. Ch.—Spheroidal; ambulacra composed of two rows of pentagonal plates, each perforated by two rows of pores; anambulacra composed of two rows of pentagonal, and three or more rows of hexagonal plates; plates covered with spiniform tubercles, destitute of central ligament; anus dorsal, central; ovarian plates as in *Echinus;* mouth ventral, central.

The above name was provisionally given by Dr. Scouler to a specimen in the Collection of the Royal Dublin Society, and to another in the Collection of the Rev. Mr. Fox; they were exhibited at a meeting of the Geological Society of Dublin under those names; at that time the specimens were obscured by adhering matrix, and considered unique; a satisfactory examination was, therefore, impossible, and in consequence no characters could be given to separate them from the other recent or fossil genera; the accession of additional

specimens, and the discovery of two more new species from the shales of the north and south of Ireland, have enabled me to give the above generic characters. I have adopted the name proposed by Dr. Scouler. Most of the *Echinidæ* have the interambulacral spaces composed but of two rows of large, pentagonal plates; in the present genus, on the contrary, it is composed of from five to seven rows of plates; the spiniferous tubercles and ambulacra have the same character as in *Echinus*.

Palæchinus elegans. *M'Coy.* (Pl. XXIV. fig. 2).

Sp. Ch.—Ovate; dorsal end pointed; ventral end obtuse, rounded; ambulacra large, convex; interambulacra composed of two rows of pentagonal, and three rows of hexagonal plates; interambulacral plates mammillated, and covered with very minute spiniferous tubercles, width of the lateral interambulacral plates equal to five ambulacral ones.

This species is readily distinguished from the *P. ellipticus*, by its pointed, superior extremity, the mammillated surface of the plates, independent of the spiniferous tubercles, and the greater proportional size of the ambulacral plates. Length about two inches.

Palæchinus ellipticus. *Sc.* MSS. (Pl. XXIV. fig. 3).

Sp. Ch.—Elliptical; ventral and dorsal ends equal; ambulacra prominent, convex, and having two rows of pores on each side; interambulacra composed of two rows of pentagonal, and three rows of hexagonal plates; plates evenly convex, regularly marked with numerous minute tubercles, nearly in quincunx; the width of one pentagonal, lateral, interambulacral plate equal to seven ambulacral ones.

This species is distinguished by its regular elliptical form, and the small size of its ambulacral plates, seven of which are only equal in width to one of the interambulacral ones. Length two inches, width one inch eight lines.

Palæchinus gigas. *M'Coy.* (Pl. XXIV. fig. 4).

Sp. Ch.—Orbicular, depressed; interambulacra composed of six rows of plates; four rows of pores on each side the ambulacra; seven ambulacral plates equal to the width of one of the lateral anambulacral ones; tubercles large, equal, each surrounded by a ring.

This is by far the largest species of the genus I have met with. The above specific characters will distinguish it readily from its congeners; the spiniferous tubercles on the plates are nearly equal in size, and disposed regularly in quincunx; each tubercle is of considerable size, convex, imperforate, and surrounded by a narrow, elevated ring; the space between the tubercles is smooth; the ambulacral plates bear tubercles in this species, as well as the interambulacral, a character which may be useful in distinguishing fragments from the other species. Length of a hexagonal plate from the middle of the interambulacra four lines, width six lines.

Palæchinus (?) Konigii. *M'Coy.* (Pl. XXIV. fig. 19).

Sp. Ch.—Plates, with numerous, irregularly placed, large, compressed tubercles, between which are numerous, small, simple tubercles, very irregularly disposed.

This species is more nearly allied to *Echinus*, in the character of its tuberculation, than any other of the *Palæchini*; in the latter genus the tubercles are uniform, or nearly so, in size and structure, while the present species resembles *Echinus*, in having two distinct sets of tubercles, the smaller being greatly more numerous. The surface in the specimens I have examined was reticulated with very fine lines, apparently the traces of muscular action of the integument for moving the spines.

Palæchinus spilæricus. *Scouler.* MSS. (Pl. XXIV. fig. 5).

Sp. Ch.—Spherical; anal and oral ends equal; ambulacra prominent, convex, with two rows of pores on each side; interambulacra composed of two rows of pentagonal, and in some cases four, in others five rows of

hexagonal plates; one of these rows always becomes obsolete before reaching the anus, thus producing an irregularity in the shape of the adjoining plates; surface of the plates irregularly studded with minute tubercles.

This fine species is distinguished by its spherical form, and the number and irregularity of the interambulacral plates. I am not acquainted with any other Echinite in which the interambulacra are dissimilar; in the present species, however, some of the interambulacra have six rows of plates, while others have seven.

Echinocrinus. *Agass.*

Gen. Ch.—Interambulacra composed of *three or more* rows of plates, those on each side, next the ambulacra, pentagonal, those of the intermediate rows hexagonal, as in *Palæchinus;* each plate having in the centre one large, perforated tubercle, surrounded by an elevated ring, as in *Cidaris*, each of which tubercles bears a large, mobile, generally muricated spine.

It is a singular circumstance that, except Professor Agassiz, every author who has hitherto treated of the *Echinodermata* of the mountain limestone, should have referred the hexagonal plates with the above characters to the genus *Cidaris*, when a glance at the recent or Oolitic Cidarites, would be sufficient to shew that in their entire framework there is not one hexagonal plate, both the ambulacra and interambulacra being composed each of *two* rows of pentagonal plates only, while in the present genus, as in *Palæchinus*, their interambulacra must have been composed of more than two rows, as is obvious from their hexagonal form: the large, perforated tubercle, however, is precisely in accordance with that of the true *Cidaris*, as is also the mode of attachment and general character of the large spines with which both genera are armed. Thus, as we have seen, the Echini of the mountain limestone to differ remarkably as a group from the Cainozoic and Mesozoic genera, in the complexity of their interambulacra; so do we find the Cidarites of the Palæozoic rocks to differ in the same character, both from the recent and newer fossil forms: while the relation which the recent Cidarites bear to the recent Echini is precisely equivalent to that which *Echinocrinus* holds to *Palæchinus*. I had long ago distinguished this genus in my MSS. under the name of *Archæocidaris*, subsequently Professor Agassiz announced his intention of forming the genus *Echinocrinus* for the *Cidaris Nerii*, &c.

Echinocrinus Munsterianus ? *Koninck.* sp. (Pl. XXVII. fig. 2).

Sp. Ch.—Spines cylindrical, with about twenty-three longitudinal, oppositely muricated ribs.

This beautiful little spine is at once distinguishable from any other living or fossil species with which I am acquainted, by the great number of its minutely denticulated ribs; it is very rare. The fragment figured measures half an inch in length; breadth two lines. The figure I have given was lithographed nearly three years ago, previous to its description by M. de Koninck.

Echinocrinus glabrispina. *Phil.* sp.

Cidaris glabrispina. *Phil.* Geol. York.

I have seen two or three smooth spines of *Echinocrinus* about one inch in length, and tapering gradually to a point, which, I suppose, are referrible to this species.

Echinocrinus triserialis. *M'Coy.* (Pl. XXVI. fig. 1).

Sp. Ch.—Large mobile spines, triangular; each of the angular ridges armed with a row of strong, tooth-like spines; intervening spaces smooth.

The spines of this species differ from all I am acquainted with, in having but three longditudinal rows of spines, or denticulations, the other species of the limestone having four or five rows; the portions of the spine not muricated are smooth in this, but strongly striated longitudinally in the other species; it also differs in its triangular form, the sides being nearly flat and almost equal. Length of specimen figured, imperfect at each end, one inch eight lines, diameter one and a half lines.

Echinocrinus urii. *Flem.* sp. (Pl. XXVII. fig. 1).

Echinus. *Ure's* Hist. Ruth.—Cidaris Urii. *Flem.* Brit. Anim.—Cidaris Benburbiensis. *Portk.* Geol. Rep.

Sp. Ch.—Spines with their lower third finely striated longitudinally; upper two-thirds with about five or six longitudinal, alternating rows of short, strong spines. Plates having the central perforated tubercle surrounded by a single ring; margin with rounded radiating ridges.

This species differs from the *C. Urii* of Fleming, in having but one ring round the tubercles, and having the margins of the plates radiatingly ridged instead of granulated; both of these characters depend so much on the preservation of the specimen, that their presence or absence may in some measure be considered as accidental, a very slight disintegration causing the ridges to assume the appearance of tubercles; so that the present species is very probably the same as that of Fleming, the spines agreeing perfectly. Spines of this species frequently attain to three and a half inches in length; cylindrical, slightly broader in the middle of the muricated part; diameter at base two lines, length of plate figured seven lines, breadth four lines.

Echinocrinus vetustus. *Phil.* sp.

Cidaris vetusta. *Phil.* Geol. York.

It is very possible that the spines referred to this species may really belong to the upper part of *E. Urii*, being rather smaller but muricated in the same manner; the murication extends nearer to the base in the present species.

Adelocrinus histrix. *Phil.*

Adelocrinus histrix. *Phil.* Pal. Fos.

A single specimen of this curious fossil has occured; like Professor Phillips's specimen, it was a cast in soft shale; the specimen was about one inch in diameter, and half an inch long, conical, undivided, and covered with scattered, spine-like tubercles. The specimen was imperfect at each end, and irregularly crushed, so that I am unable to add any information to that already known, or even to say whether it truly belong to the *Crinoidea*. It seems very closely allied to the *Echinus Humboldtii* of Steininger.

Pentremites. *Say.*

Gen. Ch.—Pelvis of three unequal plates, two pentagonal, and one tetragonal, supporting five large scapulæ; ambulacra five, column round; surface of articulation radiated.

Pentremites Derbiensis. *Sow.*

Pentremites Derbiensis. *Sow.* Zool. Journal.—Pentremites Derbiensis. *Phil.* Geol. York.

Sp. Ch.—Spheroidal; length slightly exceeding the width; pelvis concave; sutures about one-third the length from the base; surface granulated.

This beautiful little species is easily distinguished from any of those described by Mr. Gilbertson, by its small size, and nearly basal sutures. Length four lines.

Pentremites ellipticus. *Sow.*

Pentremites ellipticus. *Sow.* Zool. Jour.

Sp. Ch.—Longitudinally ovate, length one-third greater than the width; base truncate, concave; sutures mesial; surface obscurely striated and granulated.

This species, in its lengthened, elliptical form, resembles the *P. oblongus*, but is at once distinguished by its mesial sutures.

Pentremites florealis. *Say.*

Pentremites florealis. *Say.* Jour. Acad. Nat. Sc. Phil.—Pentremites ovalis. *Phil.* Pal. Fos. (not of *Gold.*)

One or two obscure fragments of a Pentremite, have occurred, which, by their very broad ambulacra, and general form, seemed identical with Professor Phillips's species, but certainly not with Goldfuss's. Captain Portlock has also observed the *P. ovalis* in the carboniferous limestone of Sligo, but, from his observations, it would seem that his specimen too was more allied to that figured by Professor Phillips, than by Professor Goldfuss. The former seems to me identical with Say's *P. florealis.*

Platycrinus. *Miller.*

Gen. Ch.—Column elliptical, the joints of which articulate by a transverse ridge; pelvis of three, unequal pieces (one piece, according to Mr. Austin) supporting five large scapulæ.

Platycrinus contractus. *Phil.*

Platycrinus contractus. *Phil.* Geol. York.

Sp. Ch.—Pelvis acutely conical; scapulæ nearly twice as long as wide, narrower above than below; surface smooth.

This species is rendered remarkable by the contraction of the upper part of the cup, resulting from the narrowing of the scapulæ at their superior end; it is distinguished from the *P. similis*, M'Coy, which has the same character, by its lengthened pelvis.

Platycrinus elongatus. *Phil.*

Platycrinus elongatus. *Phil.* Geol. York.

Sp. Ch.—Pelvis elongate, conical; scapulæ of equal width, straight, one-third longer than wide; articulations small; surface smooth.

This species is rendered remarkable by the great elongation of the scapulæ and pelvis; from the *P. contractus*, which is almost equally elongate, it is distinguished by having its scapulæ of equal breadth above and below; the proboscis is very long.

Platycrinus expansus. *M'Coy.* (Pl. XXV. figs. 18, 19).

Sp. Ch.—Pelvis wide, flat, deeply divided; scapulæ very large, wider than long; articulations prominent, large; width of the body at scapular articulations twice the length.

This fine species is distinguished from all of the genus by the great width of the body in proportion to the length, owing to the scapulæ being short, and wider above than below; the markings are similar to those of the *P. ellipticus* of Phillips, from which, however, its form and proportions will at once distinguish it. Length ten lines, width one inch seven lines.

Platycrinus gigas. *Phil.*

Platycrinus gigas. *Phil.* Geol. York.

Very large specimens of a smooth *Platycrinus*, closely resembling the *Plat. lævis* of Miller, and *gigas* of Phil., but not shewing the interscapular plates, have occurred.

Platycrinus granulatus. *Mill.*

Platycrinus granulatus. *Mill.* Hist. Crin.—Platycrinus granulatus. *Phil.* Geol. York.

Sp. Ch.—Scapular articulation very small; scapular and pelvic plates having several irregular rows of small, rounded, tubercles.

This beautiful species is very rare; the few specimens which have occurred are easily recognized by the distinctly tuberculated plates, and minute articulation of the scapulæ.

Platycrinus interscapularis. *Phil.*

Platycrinus interscapularis. *Phil.* Pal. Fos.

Sp. Ch.—Globose; pelvis saucer-shaped, contracted and produced at the columnar articulation, supporting five scapulæ and one interscapular plate; surface smooth, with few irregularly scattered tubercles.

In this fine species the large interscapulary plate is very remarkable, resembling in this particular the *P. elongatus*. Length from scapular articulation to the columnar adherence one inch two lines, diameter one inch seven lines.

Platycrinus laciniatus. *Phil.*

Platycrinus laciniatus. *Phil.* Geol. York.

Sp. Ch.—Pelvis saucer-shaped, constricted and prominent at the columnar articulation; scapulæ square; articulation small; all the plates marked with sharp, very prominent, radiating ridges and tubercles.

This elegant crinoid is distinguished from the *P. ellipticus*, *P. tubereulatus*, and other nearly allied species, by the constricted, neck-like prominence of the base of the pelvis.

Platycrinus lævis. *Mill.*

Platycrinus lævis. *Mill.* Crin.

Sp. Ch.—Plates of the body smooth; scapulæ of equal width below and above; each supports an arm having two hands, each of which has two fingers.

This is not the species figured by Professor Phillips as the *P. lævis* of Miller, the figure in the Geol. of York. represents a species with a small pelvis, and the scapulæ much narrower below than above, giving a conical appearance to the body; in the present species, however, the scapulæ are equally wide above and below, and the pelvis equal in diameter to any part of the body of the animal. Length of body from scapular articulations four and a half lines, diameter eight lines.

Platycrinus ornatus. *M'Coy.* (Pl. XXV. fig. 1).

Sp. Ch.—Pelvis elongate, conical, attenuated, cylindrical at base; scapulæ long, narrow, of equal breadth above and below, each supporting one lengthened, cuneiform arm-joint, having each two hands of great length; surface of the pelvis and scapulæ sculptured with round, curving lines and points; column near the pelvis composed of numerous circular joints, a thicker and longer one alternating with a thinner and shorter one.

This very curious crinoid is apparently destitute of fingers, the hands being of great length, and tentaculated to their base; the scapular plates are beautifully carved in irregular curved lines; the pelvis has roughened, transverse lines, which follow the curves of the scapular articulations; the produced cylindrical base of the pelvis articulates with a cylindrical column, formed of alternately thicker and thinner joints. Length of body three lines, width two and a half lines.

Platycrinus punctatus. *M'Coy.* (Pl. XXV. figs. 15–17).

Sp. Ch.—Pelvis very thick, rugged, concave in the middle; scapulæ of equal length and breadth, very thick; all the plates ornamented with equal, close, minute, elevated puncta.

This species is chiefly distinguished from the *P. rugosus* by its beautifully granulated plates; from the *P. granulatus* it differs in the shortness of the scapulæ, the largeness of the scapular articulations, and the greater closeness and minuteness of the puncturing of the plates. The pelvis is small, but thick, rugged, and concave, except at the edges; the scapulæ are very massive, of about equal length and breadth; the articulation from the cuneiform armjoint very large; interscapulary plates large, pentagonal. Length eleven lines, width nine lines.

Platycrinus rugosus. *Mill.*

Platycrinites rugosus. *Mill.* Hist. Crin.—Platycrinus rugosus. *Phil.* Geol. York.—Platycrinus rugosus. *Portk.* Geol. Rep.

Sp. Ch.—Pelvis very flat; scapulæ square, very thick, rugged, surface smooth; three fingers to each hand; scapular articulation very large and low.

The pelvis and scapulæ are very thick, variously ornamented, according to the degree of muscular contraction; in some cases they are quite smooth, with steeply-bevelled edges, at other times they are rugged, with variously shaped protuberances, but in all, the surface, when examined with the lens, appears smooth.

Platycrinus similis. *M'Coy.* (Pl. XXVI. fig. 6).

Sp. Ch.—Pelvis truncated, flat; scapulæ narrower above than below; length of the scapulæ about two-thirds the width of the pelvis.

This species very closely resembles the *P. contractus*, but is distinguished by its perfectly flat pelvis, and the shortness of its scapulæ. Length five lines, width seven lines.

Platycrinus triacontadactylus. *M'Coy.* (Pl. XXV. figs. 2–7).

Sp. Ch.—Plates of body smooth; scapulæ of equal width throughout, each supporting an arm with two hands and three fingers each.

This species could scarcely be distinguished from the *P. lævis*, were it not for the addition of a third lateral finger to each hand. It occurs in company with that species at Hook Head in Waterford, in which remarkable locality, specimens of both those species and many others are found beautifully preserved, with their column, body, proboscis, hands, tentacula, &c. quite perfect and *in situ*. The proboscis is very large, composed of smooth, polygonal plates; it is obtuse at the apex, where the opening appears as a simple slit, bounded by four quadrangular plates; the fingers are beautifully tentaculated; the column is round near the pelvis, and formed of joints, alternating a longer and thicker with a shorter and thinner, every seventh one being a little larger; at this portion of the column the joints articulate by a radiatingly striated margin only; lower down, the joints become elliptical, and the transverse ridge characteristic of the genus appears. Length of body from the base of arm-joint to base of pelvis three lines and a half; width seven lines; length of proboscis one inch four lines. Since the plate of this species was printed, Mr. Austin has described (An. Nat. Hist., vol. xi.) a species under the name of *P. trigintidactylus*, which may be identical with this; as the description is not very full, and there is no figure, I am not certain of the fact.

Platycrinus tuberculatus. *Mill.*

Platycrinites tuberculatus. *Mill.* Hist. Crin.—Platycrinus tuberculatus. *Phil.* Geol. York.

Sp. Ch.—Cylindrical, pelvis abruptly truncated, nearly flat, scapulæ lengthened, equally wide above and below; marked with irregular rows of tubercles.

The specimens which have occurred are very imperfect, and difficultly recognizable; they approach nearer to the Devonian than to the mountain limestone specimens.

Poteriocrinus gracilis. *M'Coy.* (Pl. XXV. figs. 11 to 14).

Sp. Ch.—Body, measured from the pelvis to the scapulæ, nearly twice as long as wide; smooth, length of the arm-joint twice its thickness.

This is closely allied to the *P. tenuis*, Mill., but is much more slender, and the plates of the body proportionably longer; the arm-joint is also much shorter; the column is formed of round, equal, thin joints, with a broad surface of articulation radiatingly striated; the proboscis is very long, and from the strong, radiating, muscular ridges, assumes a beautifully stellated appearance. Length of body five lines, width three and a half lines.

Poteriocrinus impressus. *Phil.*

Poteriocrinus impressus. *Phil.* Geol. York.

Sp. Ch.—Conical, smooth, angles of the plates impressed; pelvis very small, supporting five pentagonal first costals, which are broader than long.

This large species is distinguished by having the angles of the second costals, scapular and interscapular plates deeply indented; the scapular articulation occupies about two-thirds the width of the plate.

Taxocrinus. *Phil.*

Isocrinus. *Phil.* (not *Von Meyer*).—Bladocrinus. *Aust.* (not *Agas*).

Gen. Ch.—Column enlarging towards the pelvis, pelvis of five very small plates; costals five; the joints are equal and similar, from those to the first cuneiform arm-joint; arms and hands very long.

Taxocrinus macrodactylus. *Phil.*

Cyathocrinus macrodactylus. *Phil.* Geol. York.—Isocrinus macrodactylus. *Phil.* Pal. Fos.

Sp. Ch.—Pelvis supporting five pentagonal, and five quadrangular, costal plates, bearing five quadrangular scapulæ, each supporting one cuneiform arm-joint, from each of which proceed two hands of five joints dividing into numerous fingers; surface smooth.

This species occurs of considerable size, but very imperfectly preserved; I have deviated a little from Professor Phillips in my view of the plates of the body, hands, and arms.

Taxocrinus polydactylus. *M'Coy.* (Pl. XXVI. fig. 7).

Sp. Ch.—Column of numerous round, unequal joints; about twenty of them at the summit suddenly increase in diameter, but become very thin, and are perfectly equal; those support five pentagonal, pelvic (first costal?) joints; these support five heptagonal scapulæ(?), each supporting a series of five or six equal, cylindrical joints, terminating in a cuneiform joint, bearing two hands divided into five or more fingers; surface smooth.

The complex genus, *Taxocrinus*, now contains a considerable number of well-marked species, of which that before us is not the least curious; the upper joints of the column are suddenly dilated, as we see in *Apiocrinus*, forming an enlarged alimentary cavity, and leaving us in doubt as to the true pelvis of the genus; the supra-columnar joints are five, pentagonal, and support five, large, heptagonal plates, which, perhaps, it is safer to call scapulæ than any thing else; from these to the first cuneiform joint, as we see in the other *Taxocrini*, the joints are equal and similar; this joint supports two hands, having each a great number of fingers. The surface is smooth; diameter of the body at supra-columnar joints six lines. Length from the supra-columnar joint to the tip of the fingers, as far as known, three inches and a half.

Cyathocrinus. *Mill.*

Gen. Ch.—Pelvis of five pentagonal plates; supporting five costals; column round or pentagonal; articulating surfaces radiated.

Cyathocrinus conicus. *Phil.*

Cyathocrinus conicus. *Phil.* Geol. York.

Sp. Ch.—Cup elongate, conic; pelvis deep, supporting five pentagonal costals, one-third longer than wide, bearing five scapulæ; surface granulated.

This narrow, lengthened species is found very rarely. The specimens are too imperfect to give the measurements.

Cyathocrinus ellipticus. *Phil.*

Cyathocrinus ellipticus. *Phil.* Pal. Fos.

The only characters for which the columns to which Professor Phillips has given this name are remarkable, is the very great thickness of the joints; the canal is pentagonal or pentaphylloidal; surfaces of articulation finely striated; section usually elliptical, sometimes round.

Cyathocrinus geometricus. *Gold.*

Cyathocrinus geometricus. *Gold.* Pet.—Cyathocrinus geometricus. *Phil.* Pal. Fos.

Only single costal plates of this species have been yet found in Ireland; they are easily recognized by their beautifully radiated surface.

Cyathocrinus inequidactylus. *M'Coy.* (Pl. XXVI. fig. 8).

The above name was provisionally given to a small species of *Cyathocrinus*, resembling the *C. planus*, but with fingers of very unequal length.

Cyathrocrinus macrocheirus. *M'Coy.* (Pl. XXV. fig. 8–10).

Sp. Ch.—Column pentagonal; from fourteen to seventeen joints in each hand.

This species is at first sight nearly allied to the *C. quinquangularis*, Mill., but it is readily distinguished from it and all others by the enormous length of the hands, those of the *C. quinquangularis* being composed of only two or three joints; the column of the present species is pentagonal, the joints alternately thicker and thinner, with every fifth one larger; the five plates of the pelvis are rather longer, and more pointed than those of the *C. quinquangularis*, but the costals are shorter, their length and width being about equal; the arms are formed each of two joints, broader than long, and a cuneiform one, longer than broad, from which two hands proceed, each having from fourteen to seventeen joints, and a cuneiform one, from which proceed two fingers, each composed of about twenty-seven joints, and a cuneiform one, from which others again proceed; the surfaces of all the plates are smooth.

Cyathocrinus megastylus. *Phil.*

Cyathocrinus megastylus. *Phil.* Pal. Fos.

This name is merely given to some very large stems of *Cyathocrini*, the characters of which have not been determined; the Irish specimens are identical with those figured by Professor Phillips.

Cyathocrinus ornatus. *Phil.*

Cyathocrinus ornatus. *Phil.* Geol. York.

A single plate only of this species has occurred; it is easily recognized by two sets of granulated striæ which meet at an acute angle in the centre of the plates.

Cyathocrinus pinnatus. *Goldf.* (?)

Cyathocrinus pinnatus. *Gold.* Pet. (?)—Cyathocrinus pinnatus. *Phil.* Pal. Fos.

Only columnar joints of this species have as yet been observed in the Irish carb. series; they are moniliform, elliptical, thin, alternately larger and smaller; the circumference prominent, with distinct striæ of articulation; centre concave, nearly smooth; canal pentagonal.

Cyathocrinus planus. *Mill.*

Cyathocrinus planus. *Mill.* Hist. Crin.

A few obscure, columnar joints, agreeing in general character with this species, have occurred; they are nearly equal, circular, smooth; circumference striated; alimentary canal small, round.

Cyathocrinus variabilis. *Phil.*

Cyathocrinus variabilis. *Phil.* Pal. Fos.

This, as a species, has scarcely any definite character; it is convenient, however, to refer to it all those indeterminate, small, circular, thin joints of *Cyathocrinus*, having strongly striated, articulating surfaces, and a small pentagonal, or pentaphylloidal alimentary canal; no stress, however, should be laid by the geologist on its occurrence in any particular stratum, for the above reason.

Rhodocrinus (Gilbertsocrinus) abnormis. *M'Coy.* (Pl. XXVI. fig. 3).

Sp. Ch.—Scapulæ heptagonal, two pentagonal and three hexagonal intercostals.

This fine species differs from all of the genus in having the scapulæ heptagonal, and three of the intercostal plates being hexagonal; differing thus in some manner from the characters of the genus, as laid down by Professor Phillips, and being itself a remarkably fine species, I shall give a somewhat detailed description of its structure. Like most of the genus its general form is hemispherical, with the pelvis concave outwardly; all the plates are very convex, so as to give a nodular appearance to the body; the pelvis is small, the suprabasal joints are five, hexagonal, and rather longer than wide; alternating with, and above these are five very convex, heptagonal, first costals, on each of which rests a hexagonal second costal; this plate is the most regular and constant in form of the whole animal; it is longer than wide in the present species; on its upper edge rests a large heptagonal scapula; this plate, in all the others of the genus, is small *and pentagonal*, on the superior lateral edges are placed two small, hexagonal first arm-joints, having above and between them a small pentagonal, clavicular plate, and laterally two horse-shoe shaped joints, from which the hands proceed; on the superior edge of three of the suprabasal joints rests a hexagonal, intercostal plate, having above them several rows of irregular intercostals, as in the genus *Rhodocrinus*. The proboscis is nearly central and elevated. Length of base one inch three lines, width one inch five lines.

Rhodocrinus verus. *Mill.*

Rhodocrinus verus. *Mill.* Hist. Crin.

Columns, possibly referrible to this species, occur rather rarely, they agree in general size, form, striæ of articulation, and pentaphylloidal canal, with the columns referred by Miller to the present animal, but the identification of columns of *Crinoidea*, and referring them to their appropriate bodies, is a task of such great difficulty, that, geologically speaking, it is, perhaps, better either to take no notice of unconnected stems, or, where they are very characteristic of any particular bed, to give them distinct provisional names for reference.

Actinocrinus. *Mill.*

Gen. Ch.—Plates of the pelvis, three, supporting six first costal plates, one pentagonal and five hexagonal; eleven second costal and intercostal plates bearing five scapulæ. Column and alimentary canal round.

Actinocrinus amphora. *Gilbertson.*

Melocrinites amphora. *Gold.*—Actinocrinus amphora. *Portk.* Geol. Rep.

Sp. Ch.—Spheroidal, very much depressed; pelvis small, of three pentagonal plates; first costals five hexagonal and one pentagonal; length two-thirds the width; second costals very shallow, twice as wide as long; intercostals hexagonal: arms very large, thick, having each near the base on the upper surface, a very prominent, tubercular plate; proboscis very large, lateral; with five very prominent, convex plates at its base; surface of all the plates carved with close irregular flexuous ridges, edges striated.

Actinocrinus constrictus. *M'Coy.* (Pl. XXVII. fig. 3).

Sp. Ch.—General figure lengthened, globose; constricted round the middle of the first costals, below which the lower portions expand again, forming with the pelvis a broad, tumid base; pelvis broad, hexagonal, of three plates; first costals, five hexagonal, and one pentagonal, very large, the length of the hexagonal ones equal to their greatest width, the pentagonal one is somewhat narrower; they all have the upper third flat, or slightly concave, and the lower two-thirds very convex outwardly; second costals, five, hexagonal, length one-fourth less than the width, and little more than one-half the length of the first costals; intercostals large, hexagonal, their length exceeding the width by about one-third, width equal to that of the second costals.

The great size of the first costals, the transverse constriction of the body, and the inflated form of the lower part of the cup and pelvis, distinguish this readily from the other described species of *Actinocrinus*. Length of body one inch seven lines, diameter at the base of the arms one inch four lines. Presented by Mr. Charles B. Newenham of Cork.

Actinocrinus costus. *M'Coy.* (Pl. XXVI. fig. 2).

Sp. Ch.—Scapulæ hexagonal; first costals longer than wide; costal and intercostal plates very large; a fourth pentagonal, interscapular plate adheres over a heptagonal intercostal, above the irregular first costal.

The hexagonal scapulæ distinguish this fine species from the *A. triacontadactylus*, Mill., and the *A. tessellatus*, Phil.; the disproportionally large costal and intercostal plates distinguish it from all others of the genus, even when too imperfect to shew the scapulæ. The general form is pear-shaped, rather narrower than *A. triacontadactylus*; the pelvis is large; the first costals are of the usual form, very large; the second costals hexagonal, and longer than wide; scapulæ hexagonal, also longer than wide; the intercostal plates are hexagonal, large; one of them over the irregular first costal is heptagonal, its superior angle being truncated to support a fourth interscapulary plate. The muscular markings of the plates are very well shewn in the specimen figured.

Actinocrinus Gilbertsoni. *Mill.* MSS.

Actinocrinus Gilbertsoni. *Phil.* Geol. York.

Sp. Ch.—Second costals twice as wide as long; all the plates minutely sculptured.

The specimens of this species which have occurred were very imperfect, but the great width of the costals and the peculiar sculpturing of the plates, will serve to distinguish the species from all, except the *A. amphora*, of which it may be a variety. The specimens I have seen were smaller than that species, and the sculpturing of the surface finer.

Actinocrinus globosus. *Phil.*

Actinocrinus globosus. *Phil.* Geol. York.

One or two very obscure casts have been, with doubt, referred to this species. The globular form and concave base are identical, but the plates of the body are not visible.

Actinocrinus lævis. *Mill.*

Actinocrinites lævis. *Mill.* Hist. Crin.

Several imperfect specimens, referrible to this species, have occurred; the smoothness of the plates are the principal distinction from the *A. triacontadactylus*.

Actinocrinus polydactylus. *Mill.*

Actinocrinites polydactylus. *Mill.* Crin.—Actinocrinus polydactylus. *Phil.* Geol. York.

Sp. Ch.—Five arms, each having two hands, terminating in four or five fingers.

This is a smaller species than the *A. triacontadactylus*, but closely resembles it in many of the details; the muscular ridges are much more distinct, however, and it is at once distinguished by the greater number of its fingers; the pectoral plates, when contracted, shew the remarkable character of being palmated, and divided into several points or branches; abundant in the limestone of Hook Head, some specimens exhibiting the column upwards of a foot in length (imperfect), the body, arms, hands, fingers, tentacula, proboscis, &c. in situ.

Actinocrinus pusillus. *M'Coy.* (Pl. XXVI. fig. 4).

Sp. Ch.—Body small, globose, surface of the plates ornamented with minute, curved lines and dots.

This Actinocrinite does not appear ever to attain the size of a large hazel nut; it differs from all of its genus in the beautifully ornamented plates of the body, which, under the lens, appear sculptured in the most delicate manner, with raised, twisted lines and isolated points, over which the strong muscular ridges pass. The pelvis is small, flattened at the base, supporting six large costals; the intercostals are hexagonal, and about equal to the second costals in size; the scapulæ are small, each supporting an arm, having two hands. Length six lines, width six lines. Occurs in great numbers in one locality.

Actinocrinus tenuistriatus. *Phil.*

Actinocrinus tenuistriatus. *Phil.* Pal. Fos.

I have observed several joints of *Actinocrinus* answering perfectly to Professor Phillips's figure and description of this species; they are chiefly remarkable for the fineness of their striæ of articulation, and the uniform thinness of the joints.

Actinocrinus tessellatus. *Phil.*

Actinocrinus tessellatus. *Phil.* Geol. York.

Sp. Ch.—First costals large, hexagonal; three upper sides nearly equal and shortest; second costals hexagonal; all the sides nearly equal; scapulæ heptagonal; surface of the plates nearly smooth, slightly marked at the edges with short, muscular ridges.

This species is very rare; the peculiar form of the scapulæ distinguish it from the allied species.

Actinocrinus triacontadactylus. *Mill.*

Actinocrinus triacontadactylus. *Mill.* Crin.—Actinocrinus triacontadactylus. *Phil.* Geol. York.

Sp. Ch.—Scapulæ hexagonal, supporting five arms, having each two hands provided with three fingers each.

The column of this abundant species is round, formed near the pelvis of thin joints, alternately a little longer and thicker, every third or fourth joint larger; nearer the base the joints become of an uniform thickness and size; when young they are contracted at the sutures, so as to be slightly moniliform; the articulating surface is regularly striated from the centre; round, auxiliary side-arms come off irregularly from the columns; the plates of the body generally exhibit very distinctly the marks of muscular contraction, in the form of strong, variable, radiating ridges. The fingers are formed, as usual, of two series of joints. Length of body from the scapulæ one inch, width one inch three lines.

Phillipsocrinus. *M'Coy.*

Gen. Ch.—Pelvis saucer-shaped, composed of one pentagonal and three hexagonal plates; supporting one pentagonal and six hexagonal first costal plates; five of which, having their superior margins truncated, support five scapulæ; the pentagonal costal and one of the hexagonal costals, having their upper margin angularly pointed, support no scapulæ; between each of the scapulæ is interposed a single hexagonal, interscapulary plate, but over the pentagonal costal, and over the hexagonal one with the pointed summit, two of them adhere laterally together.

This genus differs from all others of the tribe, in the great number of the costal plates; it approaches most nearly to the genus *Caryocrinites* of Say, from which it differs in the form of the plates of the pelvis; that genus has but six costals, this has seven; in *Caryocrinites*, four of the costals are pentagonal, and two hexagonal; in the present genus there are six hexagonal, and but one pentagonal; in *Phillipsocrinus*, there are seven interscapulary plates, and but five arms, while in *Caryocrinus* there are but two interscapulary plates, and there are six arms. Only one species is as yet known. I have dedicated the genus to Professor Phillips.

Phillipsocrinus caryocrinoides. *M'Coy.* (Pl. XXVI. fig. 5).

As but one species is known, the generic characters above given will identify it; it will be only necessary to add, that the plates exhibit the marks of strong, muscular contraction, as in *Actinocrinus*, between which the surface is minutely and irregularly, but beautifully sculptured. Length from scapulæ eight lines, width one inch.

Atocrinus[a]. *M'Coy.*

Gen. Ch.—Column composed of round joints, alternately thicker and thinner; pelvis and entire visceral cavity composed of one undivided piece, from which proceed five arms of one cuneiform joint, each supporting two hands, composed of one cylindrical, and one cuneiform joint, each; one hand of each arm having three fingers and the other but two, the fingers composed of a single row of joints.

The genus *Atocrinus* has been formed for the reception of a little Crinoid, having the remarkable character of an undivided cup, the plates of the pelvis, scapulæ, &c. being all anchylosed (in *Symbathocrinus*, Phil., it is the pelvic plates only which are anchylosed). The fingers are thick, tapering but slightly, and composed of but one series of joints, the hands are equal, one having two fingers and the other three.

Atocrinus Milleri. *M'Coy.* (Pl. XXV. fig. 20).

Having had an opportunity of examining only one specimen of the genus, the above character will, at the same time, indicate the only known species. Three of the joints nearest the pelvis are rather smaller than the rest, and uniform in size; the cup is hemispherical, a little dilated at the insertion of the cuneiform arm joint, surface smooth. Length from the pelvis to the tip of the finger seven lines.

[a] α, privative,—$\tau\acute{\epsilon}\mu\nu\omega$, seco, from its undivided cup.

ACRITA.

The *Acrita* form the lowest division of the animal kingdom; they have no appreciable nervous system, no brain, nor nervous filaments, consequently, no organs of sense, and, consequently also, no muscular system; they have no true circulation, in the highest of them only, has a movement been detected in their nutrient fluids; and, finally, their digestive system is composed of a few rude cavities in the general parenchyma of the body, but without distinct walls or abdominal cavity. Of those the *Zoophyta* are the most interesting to the geologist.

ZOOPHYTA.

The *Zoophyta*, or Polyps, exhibit great diversity of structure; the most perfect, or Ciliobrachiate polyps, are very complex, and differ very much from the rest; they form a separate group, under the name of *Bryozoa*; they inhabit tubular cells, and have the tentacula which surround the mouth covered with vibratile cilia, the currents produced by the action of which are sufficiently powerful to hurry the minute animals on which they live into their mouth; their muscles are fibrous; the intestinal mass floats in a distinct cavity, and is composed of a mouth, large œsophagus, gizzard, stomach, biliary glands, intestine, and anus; it is, in fact, as complex as that of a bird, yet some of the most ancient fossil corals we know, apparently belong to this group, as this *Flustræ* and *Escharæ*, as well as some others, resembling the ordinary tubular polyps. Of the unciliate polyps, the most highly organized are the tubular polyps, compound animals, whose common body is encased in a branched, tubular, horny sheath; the extremities of the branches are open, forming cells, each of which contains a hydra-like portion of the animal, having a mouth, surrounded by ten nodular tentacula, by which food is provided for the entire community. The *Actineæ*, or *Sea Anemonies*, although they could not be found in the fossil state, are interesting to the geologist, from their resemblance to the animal of *Turbinolia*, *Cyathophyllum*, and probably *Amplexus*. They are short, cylindrical animals, having their base formed into a sucker-like disc, by which they are attached; the opposite extremity is fringed with numerous, short, perforated tentacula, having the mouth in the centre, which communicates directly with a simple, closed, bag-like stomach; the space between the stomach and the external muscular walls of the animal, contains a great number of vertical, fibrous lamellæ; it is those lamellæ, strengthened by calcareous matter, which we see in the fossil *Turbinolia*, and *Cyathophyllum*; in *Amplexus*, in which the calcareous lamellæ are merely rudimentary, they were probably continued in a fibrous or membranous state towards the centre, as in the other species; the spaces between those lamellæ contain the ovaries. The *Tubiporidæ* inhabit tubular, calcareous corals; they live in society, but are not organically connected with each other; the little animal inhabiting each tube is provided with eight simple, flattened tentacula, each having a few rows of papillæ on the edge; alternating with these are eight slender ovaries, which hang within the tube; in the centre is a simple stomach, as in *Actinia*; the small portion near the mouth of the tube, which is inhabited by the animal, is lined by a membrane, which secretes at the bottom of the cell a transverse, calcareous diaphragm, such as we see in *Turbinolia*, and *Cyathophyllum*; those partitions, of course, increase in number with the age of the animal. Next to those we have the *Corallidæ*, which differ entirely from the last, the solid portion of the animal forming a variously branched horny, or calcareous stem, covered by a thick coating of living, soft, irritable matter, in which are seated at intervals the most beautiful and brilliantly coloured polypi, each furnished with eight fimbriated tentacula; those polypi provide nourishment for the entire community; they are capable of retraction within the cells of the living cortex, but have no immediate connexion with the central axis, in which there are no cells. Then come the *Madreporadæ*, in which there is still an external living crust, and scattered polypi; but those latter are lodged in cells in the stony, central portion of the animal. The *Alcyonidæ* scarcely

differ, except in the want of the calcareous support, the central portion being as soft as the external. The *Hydræ* resemble the separate or single polyps of the last group, but are single, unattached, and capable of locomotion; they are of no direct interest to the geologist. Finally, we have the *Fungiæ*, which, although the solid portion resembles that of the higher lamelliferous corals, is much less highly organized, being, in fact, a mere gelatinous investment to the lamellæ of the skeleton, which it thinly coats, without tentacula, mouth, stomach, ovaries, or any other organs.

Amplexus. *Sow.*

Gen. Ch.—Cylindrical, divided into chambers by numerous, transverse septa, which embrace each other with thin, reflexed, crenulated margins; outer surface striated longitudinally; inner surface ribbed with short, equal lamellæ, none of which reach the centre.

Amplexus nodulosus. *Phil.*

Amplexus nodulosus. *Phil.* Pal. Fos.

Sp. Ch.—Irregular, elongate, tortuous, unequally swollen or nodular; septa as in *A. Sowerbii;* surface concentrically wrinkled.

The irregular, nodular character of the tube, and strong, concentric wrinkles, are the principal characters which distinguish this species from the *A. Sowerbii.*

Amplexus Sowerbii. *Phil.*

Amplexus coralloides. *Sow.* Min. Con.—Amplexus Sowerbii. *Phil.* Geol. York.

Sp. Ch.—Cylindrical, regular, divided by plain, equidistant, transverse septa, with embracing, crenated margins; surface nearly smooth; longitudinally striated.

This remarkable coral, when young, is attached by a very slender, conical base, but as it increases in size it becomes cylindrical; the conical portion is less than one inch long, and is about half an inch in diameter, and from this upwards it is cylindrical. Now as we often find specimens upwards of a foot long, and an inch and three-quarters in diameter, perfectly cylindrical, it becomes difficult to imagine how so long and heavy a body could be supported on so slender a stem; so that hence the interesting question arises, was the adult *Amplexus* free? My friend, Dr. Scouler, is known to have paid much attention to this interesting animal, and we may ere long expect an able account of the species from his pen.

Amplexus tortuosus. *Phil.*

Amplexus tortuosus. *Phil.* Pal. Fos.

Sp. Ch.—Cylindrical, tortuous; septa simple; marginal plates about twenty-four; surface longitudinally striated and concentrically wrinkled.

The septa not being plaited at the edges forms the most important distinction of this species from the *A. Sowerbii*, it is likewise much smaller, more tortuous, and more equally cylindrical, than that species. Diameter of tube about seven lines.

Turbinolopsis. *Lamour.*

Gen. Ch.—Inversely conical, terminating in a deeply concave, stellular disc; lamellæ smooth, alternately longer and shorter, notched on the edges; no transverse septa.

I am not aware of any character of generic importance by which to separate the present genus from the old *Turbinoliæ* or rather *Cyathophyllum*, if we except the alleged want of transverse septa in *Turbinolopsis*,

but, owing to the state of preservation in which those fossils are usually found, it is almost impossible to decide whether they were present or not; some of the Irish specimens appear to have been attached.

Turbinolopsis bina. *Lons.* ?

Turbinolopsis bina. *Lons.* Sil. Syst. ?—Petraia bina. *Lonsd.* Geol. Trans.—Turbinolopsis bina. *Phil.* Pal. Fos.

Sp. Ch.—Conical; cup deep; lamellæ about thirty, strongly toothed on the edges, between each pair a very fine slightly elevated ridge, marked with regular, impressed puncta.

This little species is common in the carb. slate, as well as in the shales of S. Devon, but they appear to me to differ considerably from the Silurian coral of the same name. Length of cast about four lines, width five lines.

Turbinolopsis celtica. *Lamour.*

Turbinolopsis celtica. *Phil.* Pal. Foss.

Sp. Ch.—Elongate, conic; cup deep; lamellæ about forty; strongly toothed on the edges.

This species is common; it is rather more gradually tapering than the *T. bina*, and is constantly distinguished by the greater number of the lamellæ; these are usually forty in the Irish specimens, but forty-eight according to Phillips, in those from Torquay, while from twenty-four to thirty is the usual number in the *T. bina*. Length of cast seven lines, width six lines.

Turbinolopsis pauciradialis. *Phil.*

Turbinolopsis pauciradialis. *Phil.* Pal. Fos.

Sp. Ch.—Very rapidly expanding, short; lamellæ very thin, distant, finely serrated, about twenty in number; between each pair an obtusely rounded ridge.

The small number of the lamellæ distinguishes this at once from the others of the genus. Length of cast eight lines, width eleven lines.

Turbinolopsis pluriradialis. *Phil.*

Turbinolopsis pluriradialis. *Phil.* Pal. Fos.

Sp. Ch.—Obtuse; aperture expanded; cup deep; lamellæ about eighty; between each pair a row of impressed puncta.

The very great number of the lamellæ, and consequent narrowness of the intermediate spaces, distinguishes this species from the others of its genus. Length one inch two lines, width eleven lines.

Turbinolia.

Gen. Ch.—Turbinate, free, base attenuated; star single; internally composed of vertical lamellæ and distant, transverse septa.

Turbinolia expansa. *M'Coy.* (Pl. XXVIII. fig. 7).

Sp. Ch.—Inversely conical, breadth double the height; lamellæ about 120, twisted towards the centre.

A curious and rare species, easily known from the *T. fungites*, by the extreme expansion of the disc, which, measured across the star, is usually double the length; the ordinary length of the *T. fungites* is about four inches, measuring, at that length, about one inch across the star; the present species very rarely attains a length of one inch and a-half, measuring at that length two inches and three-quarters across the star. I have seen

young specimens three-quarters of an inch long; they do not expand so rapidly as the adult, but are, at that age, more widely different from the *T. fungites*.

Turbinolia fungites. *Flem.*

Turbinolia fungites. *Flem.* Brit. Anim.—Turbinolia fungites. *Phil.* Geol. York.

Sp. Ch.—Obliquely conical, curved; transversely wrinkled, star concave, lamellæ about 112.

This species is liable to great variation in its characters, when young and preserved in shale, exposed to the action of the atmosphere, it is impossible to distinguish them from *Turbinolopsis*, when old, the number of the lamellæ increases, and transverse septa appear; when very old, it becomes cylindrical, and then approaches very closely to *Siphonophyllia;* the characters of the species are best known when about two inches long, the star is then about one inch in diameter.

Siphonophyllia cylindrica. *Scouler.* MSS. (Pl. XXVII. fig. 5).

The beautiful coral to which my friend, Dr. Scouler, has given the above name, resembles, in some, degree a gigantic specimen of the *Turbinolia fungites*, it is, however cylindrical for the length of ten or eighteen inches; the middle of the coral exhibits a number of transverse plates, about a line or two distant from each other, and bearing crowded, erect laminæ. Down the side of each runs a distinct syphon, from which the genus derives its name; the interval between the plates and the exterior is occupied by a cellular substance similar to that of the *Cystiphyllum* of Lonsdale.

Astræa.

Gen. Ch.—Polypidom, composed of parallel, aggregated, polygonal prisms, terminating each in a stellular disc.

Astræa aranea. *M'Coy.* (Pl. XXVII. fig 6).

Sp. Ch.—Stars large, polygonal; very irregular in size and the number of angles; slightly convex, with a large, oval, central hollow or cup, having in the middle a flat, elliptical umbo; interstices very thin, smooth, straight; lamellæ about fifty, very delicate, equal (or nearly so), all seeming to reach the centre.

This beautiful species forms large masses in the limestone of certain localities; the stars are much larger, and less regular in shape, than those of the *A. crenularis*, or *A. hexagona*, most nearly resembling the *A. helianthoides* in those respects; from this latter species it is distinguished by the less number of its lamellæ, the oval form of its cup, and the large, compressed umbo.

Astræa crenularis. *Phil.* sp.

Cyathophyllum crenulare. *Phil.* Geol. York.

Sp. Ch.—Discoid; stars unequal, polygonal, their margins prominent, sharp, denticulated; central umbo twisted; conical cup deep; lamellæ about forty-six, alternately longer and shorter.

Astræa irregularis. *Portk.*

Astræa irregularis. *Portk.* Geol. Rep.

Sp. Ch.—Discoid, stars small; very irregular in size and shape; chiefly pentagonal, their margins thin, prominent, sometimes undulated; lamellæ about thirty-five, nearly equal in length.

This species resembles the *A. pentagona*, but is distinguished by its more numerous lamellæ, nearly all of which reach the centre, while they are alternately longer and shorter in that species.

Astræa pentagona. *Blain.*

Astræa pentagona. *Lonsd.* Geol. Trans.—Astræa pentagona. *Phil.* Pal. Fos.

This species differs from the last, principally in the fewer lamellæ, and the greater distance between them; and in the margin of the stars being bent or indented in a zigzag manner, by the extremities of the lamellæ on each side.

Lithostrotion. *Park.*

Columnaria. *Goldfuss.*

Gen. Ch.—Coral, composed of adhering, prismatic, parallel tubes; each having a single, terminal star.

Lithostrotion striatum. *Park.*

Lithostrotion striatum. *Park.* Organ. Rem.—Cyathophyllum basaltiforme. *Phil.* Geol. York.

Sp. Ch.—Tubes prismatic, irregular, polygonal, longitudinally or transversely striated; marginal lamellæ, about forty, commencing within a crenulated vertical dissepiment.

This beautiful fossil occurs occasionally in abundance; it varies considerably in the number and shape of its sides, these are usually plane, but sometimes specimens occur in which they are convex; the striation varies from longitudinal to transverse, and the diameter of the tubes, from three to six lines; but so irregularly are those characters distributed, sometimes in the same specimen, that it is obvious they all belong to one species.

Lithodendron. *Schweig.*

Gen. Ch.—Coral, cylindrical, branched, adhering by the base, each tube with a single, terminal, stellular disc.

Lithodendron affine. *Mart.* sp.

E. Madreporites affinis. *Martin*, Pet. Derb.—Lithodendron longiconicum. *Phil.* Geol. York.

Sp. Ch.—Tubes thick, loosely branched, exteriorly smooth; lamellæ sixty-four, alternately longer and shorter.

This large species occurs usually in thick beds or masses, often of great size; it is easily known from the other species by its smooth surface. Diameter of the tubes about five lines.

Lithodendron cæspitosum. *Mart.* sp.

E. Madreporites cæspitosa. *Mart.* Pet. Derb.—Lithodendron fasciculatum. *Phil.* Geol. York.

Sp. Ch.—Tube flexuous, irregular, slightly nodulous; longitudinally striated; lamellæ about twenty-five within, fifty without.

This species forms bundles or masses, often of extraordinary extent, in certain localities; the tubes are irregularly wrinkled concentrically, and marked with obtuse, smooth, longitudinal striæ. Diameter of tubes four lines.

Lithodendron coarctatum. *Portk.*

Lithodendron coarctatum. *Portk.* Geol. Rep.

I have only seen one bad specimen of this species; the tubes are smooth, crowded, little more than a line in diameter. I am not aware of the differences which are supposed to exist between this species and the *L. sexdecimale* of Phillips, Geol. York; the specimen I have seen is not good enough to determine the question.

Lithodendron pauciradialis. *M'Coy.* (Pl. XXVII. fig. 7).

Sp. Ch.—External tube smooth, one-sixth of an inch in diameter, slightly flexuous, parallel, often coalescing, branches few; lamellæ, ten or eleven within, twenty or twenty-two without; an internal tube uniting the lamellæ, within which a small crenulation, or radiating set of lamellæ appear, one between each of the large ones.

This differs from all the known species of *Lithodendron* in the small number of the principal lamellæ, or those which reach the centre; externally it differs from the *L. fasciculatum* in its smooth surface; from the *L. affine* (*longiconicum*) in the smaller diameter of the tube, and from all the species in its peculiar mode of branching and crowded, nearly parallel mode of growth.

Lithodendron sexdecimale. *Phil.*

Lithodendron sexdecimale. *Phil.* Geol. York.

Sp. Ch.—Tube small, slightly flexuous, loosely branched; surface generally smooth; mesial lamellæ sixteen, with curved, vertical dissepiments.

This pretty species is the smallest of its genus found in the Irish limestone, the tubes being rarely thicker than a crow-quill; the surface is sometimes finely striated, but generally smooth; it forms masses of considerable size, but is a much rarer and more local species than any of the foregoing. Diameter of tubes one line.

Lithodendron sociale. *Phil.*

E. Madreporites duplicata. *Mart.* Pet. Derb.?—Lithodendron sociale. *Phil.* Geol. York.

Sp. Ch.—Tubes thick, close, frequently adhering laterally to each other; surface with obtuse, waving longitudinal striæ, and concentric wrinkles; axis ovate; radiating lamellæ, about sixty-four, alternately longer and shorter.

This is the largest species of the genus, and from its curious habit of the tubes occasionally adhering laterally to each other, so as to give them an angular contour, it evinces an approximation to the genus *Lithostrotion;* the longitudinal striæ are thick and obtuse; diameters of tubes seven or eight lines.

Syringopora. *Goldfuss.*

Harmodytes. *Fisch.*

Gen. Ch.—Coral, formed of vertical, flexuous, cylindrical tubes, anastomosing by transverse tubuli.

Syringopora bifurcata. *Lonsd.*

Syringopora bifurcata. *Lonsd.* Sil. Syst.

Sp. Ch.—Dichotomous, branches short, occasionally anastomosing, connected by small, transverse tubuli; surface smooth; diameter of tubes one line.

This species is distinguished by its regular dichotomizing.

Syringopora catenata. *Mart.* sp.

Tubiporites catenata. *Mart.* Pet. Derb.—Harmodytes parallela. *Fisch.* Oyct. Mos.—Syringopora reticulata. *Gold.* Pet.—Harmodytes radians. *Bronn.* Leth. Geog.

Sp. Ch.—Tubes small, slightly flexuous; connecting tubuli placed at regular distances.

This delicate species is easily distinguished from the *S. geniculata* by its straighter, thinner, and more regular tubes, it is more nearly allied to the *S. ramulosa*, but from that it is distinguished by its more regularly placed, transverse tubuli, and much more slender tubes. Diameter of tubes half a line.

Syringopora geniculata. *Phil.*

Syringopora geniculata. *Phil.* Geol. York.

Sp. Ch.—Tubes round, branching, irregularly flexuous or geniculated, wrinkled across, united by very numerous, short, transverse tubuli.

This curious species is remarkable for the frequent short bendings of the tubes; the connecting tubuli are numerous, and at the origin of each the tube is angularly bent; this occurring so frequently, and at such short intervals, gives an irregularity to the tubes which is very characteristic. This species forms masses, frequently of great extent. The tubes are about one line in diameter.

Syringopora laxa. *Phil.*

Syringopora laxa. *Phil.* Geol. York.

Sp. Ch.—Tubes thick, straight, occasionally branched, adhering without connecting tubuli.

This singular species has not, I believe, been yet figured; it forms bundles of considerable size, but I have not seen the transverse tubuli in any specimens which have come under my examination; the tubes are nearly straight. Diameter of tubes one line and a half.

Syringopora ramulosa. *Gold.*

Syringopora ramulosa. *Gold.* Pet.—Syringopora ramulosa. *Phil.* Geol. York.

Sp. Ch.—Tubes slightly flexuous, nearly parallel; tubuli alternating at very unequal distances.

In this species the tubes are nearly smooth, rather distant, and connected by irregular, transverse tubuli. Diameter of the tubes one line.

Aulopora.

Gen. Ch.—Parasitic; cells tubular, cylindrical; united at the extremities, irregularly branching.

Aulopora campanulata. *M'Coy.* (Pl. XXVI. fig. 15).

Sp. Ch.—Incrusting; tubes short, conical, expanding to a very wide, bell-shaped mouth.

The singularly large, bell-shaped mouth of the tubes distinguishes this handsome species from any other with which I am acquainted; it is usually found parasitic on the *Orthis crenistria*. Diameter of tubes at mouth one line.

Aulopora gigas. *M'Coy.* (Pl. XXVII. fig. 14)

Sp. Ch.—Repent; tubes cylindrical, forming a very open, irregular net-work; ostiolæ distant, circular, erect; diameter of the tubes one line.

This coral greatly resembles the Silurian *A. serpens*, but is much larger and more loosely branched; the specimen figured is attached to a cylindrical *Turbinolia*.

Manon cribrosum. *Gold.* ?

Manon cribrosum. *Gold.* Pet. ?—Manon cribrosum. *Phil.* Pal. Fos. ?

One or two small and very obscure fragments of a coral have occurred allied to this species, but much smaller in its details than any of the published figures; if it varies as much in size as the *Porites pyriformis*, they may be of the same species. It is, however, a doubtful reference.

Astreopora antiqua. *M'Coy.* (Pl. XXVI. fig. 9).

Sp. Ch.—Discoid, convex; surface with large, circular cells, in quincunx, about one-third their diameter apart; sides of the cells radiatingly striated; intervening flat spaces, with minute, irregular, curving ridges.

This fossil closely resembles the *Hydnopora cyclostoma* of Phillips; the genus *Hydnopora* (or *Monticularia*) has the stars raised above the surface, a character which our fossil certainly does not possess, but which may, perhaps, be better placed in the genus *Astreopora*, in which the cells are cylindrical, with striated sides. If Professor Phillips's coral and mine were specifically the same, it would be necessary to change his generic name as above; and as all the *Astreoporæ* have circular cells, the specific name would be also objectionable, and might be changed as I have proposed. It is probable, however, that the two species are distinct. I have seen several specimens of the Irish species, and they are all free, while Professor Phillips's coral is parasitic on shells; the proportions also, or number of cells in a given space, is different in the two. Diameter of masses about one inch, diameter of cells one line.

Dictuophyllia. *De Blainville.*

Gen. Ch.—Incrusting, fixed; cells large, polygonal, irregular; whole surface strongly reticulated.

Dictuophyllia antiqua. *M'Coy.* (Pl. XXVI. fig. 10).

Sp. Ch.—Cells nearly equal, polygonal; their raised margins granulated.

This species may be distinguished from the *D. reticulata* of the chalk by its greater size, more regular cells, and the margin of the cells being irregularly granulated instead of being striated, as in that species. Diameter of stars about five lines.

Pleurodictyum problematicum. *Gold.*?

Pleurodictyum problematicum. *Gold.* Pet. ? Pleurodictyum problematicum. *Phil.* Pal. Fos. ?

Sp. Ch.—Oval, depressed; superior surface divided into numerous, large, irregular, pentagonal, or acutely rhomboidal cells, by thin septa, perforated by numerous, small foramina.

The specimens which have occurred in Ireland are extremely imperfect, and cannot be referred with accuracy to the Devonian species, not shewing more than one or two of the perforated septa; the cells are remarkable for their acutely rhomboidal section.

Favosites. *Lam.*

Calamopora. *Gold.*

Gen. Ch.—Massive, composed of vertical, diverging, prismatic tubes, connected by transverse tubuli or foramina.

Favosites capillaris. *Phil.*

Favosites capillaris. *Phil.* Geol. York.

Sp. Ch.—Spheroidal, composed of very fine, prismatic tubes; the transverse septa are arranged at equal distances and height in all the tubes.

This beautiful species usually forms spherical masses, the size of an orange, the tubes are literally hair-like, being scarcely visible in a section parallel to their length; on the surface, however, they form a delicate network of minute, polygonal cells. Diameter of specimens usually about three inches, six tubes measure one line across their openings.

Favosites fibrosa. *Gold.* sp.

Calamopora fibrosa. *Gold.* Var. a.—Favosites fibrosa. *Lonsd.* Sil. Syst.—Favosites fibrosa. *Phil.* Pal. Fos.

Sp. Ch.—Branching; formed of very fine, lengthened, polygonal tubes, not flexuous, connected by tubuli on the angles.

This species is very common; it is variously branched, the termination of the branches being obtusely rounded; the tubes are much longer and straighter than in the *F. spongites* or *F. septosus*, they are also finer.

Favosites Gothlandica. *Lam.*

Favosites Gothlandica. *Lam.* Anim. Sans. Vert.—Calamopora Gothlandica. *Gold.* Petref.—Favosites Gothlandica. *Lonsd.* Sil. Syst.

Sp. Ch.—Polymorphous, composed of pentagonal or hexagonal tubes, the sides of which have one or two rows of minute, connecting foramina, transverse septa at irregular distances.

The size of the tubes, number of angles, and number of pores vary considerably in this species, as also the form of the general mass; the usual diameter of the tubes is about one line.

Favosites (?) megastoma. *Phil.* sp.

Calamopora megastoma. *Phil.* Geol. York.

Sp. Ch.—Incrusting, discoid; cells very large, polygonal or rounded, with strong, radiating, internal striæ; numerous connecting foramina at their edges.

This species forms discoid, convex masses, often of considerable size; the cells are large, regular, and with rather thick walls; the lateral perforations generally very distinct. Cells usually five lines in diameter.

Favosites (?) parasitica. *Phil.* sp.

Calamopora parasitica. *Phil.* Geol. York.

Sp. Ch.—Incrusting; cells very irregular in shape and size; their sides irregularly perforated.

This species differs chiefly from the *C. megastoma*, Phil., in the small size and irregular shape of the cells; the lateral perforations are few, very minute and far apart; the tubes composing the cells are also longer in proportion, and the cells deeper than in that species. Cells usually about one line and a half in diameter.

Favosites polymorpha. *Gold.* sp.

Calamopora polymorpha. *Gold.* Pet.—Favosites polymorpha—*Lonsd.* Sil. Syst.—Favosites polymorpha. *Phil.* Pal. Fos.

Sp. Ch.—Branched, composed of numerous large tubes externally polygonal, internally cylindrical; connected by alternating tubuli; tubes about one-third of a line in diameter.

This is rather a rare coral, but casts of it occasionally occur, shewing the peculiar branched form, and the impressions of the large openings of the tubes. Diameter of the branches usually from half to two-thirds of an inch.

Favosites septosus. *Flem.*

Favosites septosus. *Flem.* Brit. Anim.

Sp. Ch.—Hemispherical, forming a thick, flattened crust, composed of rather coarse, slightly flexuous, polygonal tubes, in which the transverse septa are irregularly placed.

This species approaches very nearly to the *F. spongites* of the Silurian rocks, but it is, perhaps, safer to leave them distinct in the present state of our information on the species. The greater size of the tubes and

irregularity of the transverse septa, distinguish it from the *F. capillaris*. Thickness of the masses about one inch, there are three tubes in the space of one line.

Favosites spongites. *Gold.*

Calamopora spongites *Gold.* Petref. Germ.

The specimens referred to this species are closely allied to the *F. spongites*, but have the tubes slightly flexuous; they are probably, however, identical.

Favosites (Michelinia) tenuisepta. *Phil.*

Calamopora tenuisepta. *Phil.* Geol. York.—Michelinia tenuisepta. *Koninck*, Fos. Bel.

Sp. Ch.—Conical, proliferous; external surface of the tubes convex, wrinkled across; cells very unequal, rounded within, numerous, small, connecting foramina in the sides.

This remarkable coral occurs usually in company with the nearly allied species *C. megastoma* and *parasitica*. Length usually about two and a half inches, width one and a half inches, diameter of the cells varying from one to three lines.

Favosites tumida. *Phil.* sp.

Calamopora tumida. *Phil.* Geol. York.

Sp. Ch.—Subramose, irregular, formed of concentric layers of square tubes, the mouths of which are contracted to a smaller orifice at the surface, and whose angles bear numerous connecting foramina.

This species is exceedingly irregular in form, and it appears probable that different species, and even genera, may be confounded under the one name.

Caunopora placenta. *Phil.*

Coscinopora placenta. *Lonsd.* Geol. Trans.—Caunopora placenta. *Phil.* Pal. Fos.

Sp. Ch.—Form irregularly tumid; composed of concentric laminæ, pierced by two sets of tubes, one set numerous, very fine, and flexuous, the others larger, straight, cylindrical.

I have used Professor Phillips' name to distinguish the Irish coral as well as the Devonian, although I conceive it to be totally distinct as a species from the *Coscinopora placenta* of Goldfuss; as Professor Phillips has already shewn, it cannot enter into the genus *Coscinopora* of that author.

Stromatopora concentrica. *Lonsd.*

Stromatopora concentrica. *Lonsd.* Sil. Syst.—Stromatopora concentrica. *Phil.* Pal. Fos.

Sp. Ch.—Polymorphous, composed of numerous, thin, approximate, concentric laminæ, perforated by fine, straight tubes; horizontal section finely reticulated.

This is rather a doubtful species in the carboniferous series, the amorphous masses it usually forms having little the appearance of organized bodies; owing to the compactness of the limestone, it is often difficult to see any of the characters of the coral, which has, therefore, been frequently passed over.

Stromatopora polymorpha. *Gold.*

Stromatopora polymorpha. *Gold.* Pet.—Stromatopora polymorpha. *Lonsd.* Geol. Trans.—Stromatopora polymorpha. *Phil.* Pal. Fos.

Sp. Ch.—Polymorphous; concentric laminæ traversed by fine, vertical tubes; horizontal section irregularly radiated and reticulated round many unequal centres.

This irregular coral is not uncommon in some districts, but the characters are seldom well seen in a limestone specimen, unless accidentally weathered.

Stromatopora subtilis. *M'Coy.* (Pl. XXVII. fig. 9).

Sp. Ch.—Heteromorphous, composed of thin, concentric layers, pierced by fine, perpendicular tubes; structure scarcely visible to the naked eye.

In structure it resembles the *S. concentrica*, but is much finer and more delicate in all its parts. From the appearance of some of the specimens, a doubt might be entertained of its being organic.

Ceriopora. *Gold.*

Gen. Ch.—Polypidom, tuberose, composed of numerous, thin, concentric layers; pores round, unequally placed.

This genus was intended by Goldfuss to include several fossil forms, now referred to *Alveolites*, *Chrysaora*, &c.; the above definition is of the genus as now restricted.

Ceriopora distans. *M'Coy.* (Pl. XXVII. fig. 13).

Sp. Ch.—Subcylindrical, verrucose; pores small, equal, conspicuous.

A coral, which closely resembles the *C. verrucosa* of the Silurian rocks. The specimen figured is in the collection of the Geological Society of Dublin; it is more lengthened than usual. Length of specimen one inch five lines; diameter nine lines.

Verticillopora. *De Fran.*

Gen. Ch.—Polypidom, branched, cylindrical, composed of aggregated, polygonal tubes, divided by transverse septa; axes hollow or filled.

Verticillopora abnormis. *Lonsd.* (?)

Verticillopora abnormis. *Lons.* Sil. Syst. (?)

Specimens agreeing with the above in general character occur, but too imperfect to furnish a detailed description; they differ from the *V. dubia*, M'Coy, in the greater size and regularity of the ostiolæ, the reference is, however, made with much doubt.

Verticillopora dubia. *M'Coy.* (Pl. XXVII. fig. 12).

Sp. Ch.—Dichotomous, cylindrical, branches obtuse; axis hollow in adults, filled in young branches; composed of numerous, very unequal, polygonal tubes; ostiolæ forming an irregular network on the surface.

In this species the tubes are very irregular in size and shape, they are parallel to the axis for the greater part of their length, and then diverge towards the surface, where they form a very irregular net work; the hollow space of the axis is very large in proportion to the solid external part, except in the young branches, which are completely filled with the tubes. I have not seen the septa.

Flustra.

Gen. Ch.—Foliaceous, or incrusting, flexible; cells contiguous, arranged in regular series, forming a reticulated surface.

Flustra palmata. *M'Coy.* (Pl. XXVI. fig. 14).

Sp. Ch.—Foliaceous, divided into numerous, flattened, palmated branches; cells on both sides, with very numerous, minute, polygonal openings; their outer covering and opening unknown.

This species closely resembles in form our recent *Flustra foliacea*, the substance of the fossil species is, however, thicker than in any of the recent foliaceous *Flustræ* with which I am acquainted. If this be a true *Flustra* it belongs to that division of the genus having the cells on both sides; it is, however, very possibly a Favosite; the whole surface is beautifully reticulated with minute cells. Length of some branches two inches, thickness of the lobe about one line.

Berenicea. *Lamouroux.*

Gen. Ch.—Parasitic; cells united in a spot-like crust, radiating from a centre, adhering throughout, not circumscribed; mouth at the distal extremity of each cell; substance submembranaceous.

Berenicea megastoma. *M'Coy.* (Pl. XXVI. fig. 13).

Sp. Ch.—Mouth of the cells very large, prominent, semicircular, inclining from the centre.

The general form of this little coral is that of a small, nearly circular, flat scale; the openings of the cells are unusually large, and having a raised edge only to the superior half of the margin, their form appears nearly semicircular.

Orbiculites antiquus. *M'Coy.* (Pl. XXVI. fig. 16).

Sp. Ch.—Circular, flat; openings of the cells numerous, oval, nearly in quincunx order, their own diameter apart. Diameter of disc one-third of a line.

This very remarkable little coral occurs in abundance in the shales of some localities, but from its small size it is very likely to be overlooked; the intercellular spaces are flat and smooth.

Millepora.

Gen. Ch.—Polymorphous; pores very minute, perpendicular to the surface; cells without lamellæ.

Millepora gracilis. *Phil.*

Millepora gracilis. *Phil.* Pal. Fos.

Sp. Ch.—Slender, cylindrical; cells rhomboidal, in quincunx; interstices granular.

This very common species is known from the *M. rhombifera* by its coarsely granular interstices; the *M. interposa*, Phil., is distinguished by its single row of impressed pores between the cells. Length usually one inch, diameter three-fourths of a line.

Millepora interporosa. *Phil.*

Millepora interporosa. *Phil.* Geol. York.

Sp. Ch.—Slender, cylindrical, dichotomous; cells oval, interstices broad, smooth, with a row of minute, impressed pores.

This is the rarest species of the genus, and also the most beautiful; the rows of pores in the interstices are variable, both in number and position, in the different specimens; the cells are smaller and more oval than in the *M. rhombifera* or *M. gracilis*. Length usually from one to two inches, diameter three-fourths of a line.

Millepora (Pustulopora) oculata. *Phil.*

Millepora oculata. *Phil.* Geol. York.

Sp. Ch.—Compressed, dichotomous, branches at right angles to the stem; four rows of very large, prominent pores.

The great size of the cells, with their entire oval, prominent margins, distinguish this species from all except the *M. spicularis*, Phil., while in its rectangular manner of branching it differs from all the other Palæozoic species.

Millepora rhombifera. *Phil.*

Millepora rhombifera. *Phil.* Geol. York.

Sp. Ch.—Cylindrical; surface with equal, rhomboidal cells, arranged in quincunx.

This pretty species is not uncommon; it is easily known by its round section, and rather large, acute, rhomboidal cells. Length usually from one to two inches, diameter three-fourths of a line.

Millepora similis. *Phil.*

Millepora similis. *Phil.* Pal. Fos.

Sp. Ch.—Stem oval, elongate, flexuous, dichotomous; surface with numerous rows of close, rhomboidal pores in quincunx.

This species is very closely allied to the *M. rhombifera*, Phil.; from which, however, it is easily distinguished by its much superior size, and its flexuous, depressed, dichotomous stem.

Millepora (Pustulopora) spicularis. *Phil.*

Millepora Spicularis. *Phil.* Geol. York.

Sp. Ch.—Stem slender, round, branched; branches short, simple, terminating in fine points; surface with rows of prominent, oval, unequal cells.

This elegant little species is distinguished from its congeners by its numerous short, spicular branches. Its stem is much smaller than in any of the other mountain limestone species.

Tragos. *Schweig.*

Gen. Ch.—Halycondroid; skeleton simple, spicular; form capitate, attached by a root or bundle of fibres expanding to a disc, with distant, unequal ostiolæ.

Tragos semicirculare. *M'Coy.* (Pl. XXVII. fig. 8).

Sp. Ch.—Pedicle semicylindrical, surmounted by a semicircular, flattened head; ostiola on the upper surface large, scattered, with a channel from each to the convex margin; truncated margin furnished, with several short processes.

This fossil is so totally different in character from any other zoophyte which I know, that I am still uncertain to what exact group it should be referred; it appears, however, to belong to the family *Spongiadæ*, but not to any of those divisions having interlaced fibres; the genus *Tragos* is, in my mind, most nearly allied to it, although the pedicle being at the margin instead of in the centre, and the numerous root-like processes to the truncated margin, point out differences in habit worthy of generic distinction. Greatest diameter one inch, least diameter six lines. Only two specimens have occurred.

Gorgonia. *Linn.*

Gen. Ch.—Axis corneous, with osseous spiculæ; polypiferous basis cretaceous; polypi developed; cells sessile, with simple or spinose margins.

Gorgonia assimilis. *Lonsd.*

Gorgonia assimilis. *Lonsd.* Sil. Syst.

Some specimens referrible to this obscure species have occurred; the general size, form, and occasional anastomozing of the branches are the only characters visible.

Gorgonia Lonsdaleiana. *M'Coy.* (Pl. XXVIII. fig. 1).

Sp. Ch.—Stem irregularly rounded, curved, or straight, rarely dichotomizing; pores irregular, projecting, papillate.

This very curious coral is of rare occurrence; the cells for the polypi resemble warts, as in many of the living species, but their margin is indistinct; the external and internal portions of the branches are distinctly visible in some specimens.

Gorgonia zic-zac. *M'Coy.* (Pl. XXVIII. fig. 2).

Sp. Ch.—Flabelliform, very much branched, reticulated; fenestrules irregular in size and shape, most frequently nearly square, with rounded angles; interstices thick, rounded, irregularly flexuous, forming a zig-zag series of salient and re-entering angles; dissepiments short, about half the diameter of the interstices; axis coarsely striated; cortex finely granulated.

The separation of cortex and axis is clearly discernible in some portions of the specimen.

Jania. *Lamouroux.*

The few Corallines which I have noticed, as of this genus, should, probably, be removed to the vegetable kingdom, but not having any other plants to describe, I have left them, for the present, in their old place among the corals.

Jania antiqua. *M'Coy.* (Pl. XXVI. fig. 12).

Sp. Ch.—Trichotomously branched; branches slightly curved; of equal diameter throughout their entire length; cylindrical, external crust thin.

This curious coralline, in its trichotomous mode of branching, resembles the *Corallinæ*, but in general habit, and in the branches being equally thick at both ends, it is more nearly related to the *Amphiroæ*, but has not the disjoined branches of that genus. The cavity left by the shrinking of the internal, fleshy axis is very large, leaving but a thin, external, calcareous crust. Length of branches about half an inch, diameter half a line.

Jania bacillaria. *M'Coy.* (Pl. XXVI. fig. 11).

Sp. Ch.—Dichotomous; branches very slender, cylindrical; suddenly dilated at the summit to a short, conical figure, more than double the diameter of the stem.

The lengthened, slender stems of the branches, with their suddenly dilated tip, resemble in form the antique tobacco pipes so commonly found in our fields; it is one of the most remarkable corallines of the carb. series. Length of branches half an inch, diameter of stems one-third of a line, dilated summits one line.

Jania crassa. *M'Coy.* (Pl. XXVII. fig. 4).

Sp. Ch.—Irregularly dichotomous; branches thick, conical, short; slender at their origin, expanding rapidly; surface smooth.

This is by much the largest species of this group I have seen; it is common in the shales of several localities; it most nearly resembles the *J. bacillaria*, M'Coy, from which it differs in the great thickness and conical form of the branches. Length of specimens usually from one to two inches; length of branches about three lines, diameter of branches at base usually about one line, at extremity one line and a half.

Vincularia. *De Fran.*

I have used this name here for those simply formed species, without lateral branches, and having more than two rows of pores. I have not separated those specimens which have the pores all round, from those having

them on one side only, as it seemed impossible to separate generically such species as the *V. parallela* (*Flustra*, Phil.) from such as the *V. raricosta*, M'Coy.

Vincularia dichotoma. *M'Coy.* (Pl. XXVII. fig. 15).

Sp. Ch.—Dichotomous; obverse rounded, with about six equal, parallel, slender, longitudinal ridges, in the concave furrows, between which are five rows of oval, prominent cells, the marginal furrow on each side free of cells; reverse flat, with numerous, semicircular, scale-like wrinkles, and about six longitudinal striæ.

When seen with the flat side up this curious zoophite resembles Ellis and Solander's *Galaxaura marginata* of the Bahama Islands more than any other coral; the obverse, however, resembles that of the *V. parallela*, Phil. Common. Width of branches one line, length from one to three inches (imperfect).

Vincularia megastoma. *M'Coy.* (Pl. XXVII. fig. 10).

Sp. Ch.—Elongate, slender; section elliptical, obverse with about three rows of large, subrhomboidal cells arranged alternately, the rows slightly inosculating; the sharp spaces intervening between the cells form longitudinal, waving ridges, and marked with waving, longitudinal striæ; reverse without cells striated longitudinally.

This pretty little coral is about the size of the *Millepora gracilis*, Phil. from which it differs in the large size and small number of the cells, and by having the cells on one side only; from the *V. raricosta*, M'Coy, it is distinguished by wanting the straight parallel ridges, and by the great size, rhomboidal form, and small number of the cells, and the flexuous and striated character of the intercellular spaces; from the *Millepora rhombifera*, Phil., it also differs in the large size and small number of the cells. Length of specimens usually about three or four lines, diameter about one-fourth of a line.

Vincularia parallela. *Phil.* sp.

Flustra parallela. *Phil.* Geol. York.

Sp. Ch.—Linear, thin, flattened, membranous; about six or seven longitudinal ribs on each side; between each pair is a row of large, oval pores, with raised margins; sides smooth, without pores.

This coral presents most essential differences from the recent genus *Flustra*. It varies somewhat in size, thickness, and the number of the longitudinal furrows. Length from one to two inches, width half a line.

Vincularia raricosta. *M'Coy.* (Pl. XXVII. fig. 11).

Sp. Ch.—Elongate; sides parallel; section elliptical; most convex on the porous side; poriferous face convex, marked with fine, sharp, parallel keels, enclosing between them four rows of pores; pores round, or slightly oval, with prominent margins, placed twice their diameter apart, but irregularly with regard to each other; reverse flattened, faintly marked with exceedingly fine, numerous, waving striæ; sides indented each by a prominent row of pores.

This coral is distinguished from the *Flustra parallela*, Phil., by having pores in the lateral furrows, and the sides strongly indented by prominent rows of pores, and from the *V. multangularis*, Portk., by the larger size, and much less number of the longitudinal rows of pores, and by having them on one side only. Length of specimens usually about one inch, width rather more than half a line.

Glauconome. *Lonsd.* (not of *Gold.*)

Gen. Ch.—Stem elongate, oval, laterally branched; obverse bearing longitudinal rows of pores; reverse striated.

I have assigned this genus to Mr. Lonsdale, rather than to Professor Goldfuss, as the former author was the first to point out the true characters of those elegant corals.

Glauconome bipinnata. *Phil.*

Glauconome bipinnata. *Phil.* Pal. Fos.

Sp. Ch.—Bipinnate, secondary branches very short; obverse with two rows of approximate, oval pores; reverse with strong granulated striæ.

This species is nearly allied to the *G. pluma*, but differs in its bipinnate mode of branching, and in having the secondary branches much shorter, and as if truncated; the pores also differ.

Glauconome gracilis. *M'Coy.* (Pl. XXVIII. fig. 5).

Sp. Ch.—Very slender, elongate, simply pinnate: lateral branches opposite, short, slender; obverse of the stem strongly carinated; with, on each side, a row of very large, circular, prominent pores, which strongly indent the margin; one is placed at the origin of each lateral branch, and one in the intermediate space, about half their own diameter apart; lateral branches without keel; pores large, round, very prominent, and indenting the margin, arranged alternately in inosculating lines; reverse, convex, with about four strong, granulated, longitudinal ridges.

This elegant species is very common in some localities. It is distinguished from the *G. pluma*, Phil., *G. disticha*, Goldf., and *G. bipinnata*, Phil., by the large, circular, prominent pores of the stem; it is much smaller, or rather more slender than those species, in which also the margin is entire. The specimens are usually about one inch in length; stem about one-fifth of a line in diameter.

Glauconome grandis. *M'Coy.* (Pl. XXVIII. fig. 3).

Sp. Ch.—Stem less than twice the thickness of the lateral branches; lateral branches rather more than the width of the midrib apart, obscure; lateral branches carinate, and bearing two alternating rows of very small, round, prominent pores, which indent the margin slightly; the stem is obscurely carinate, and has usually two rows of small, round, prominent pores, which do not alternate, or reach the margin; one at the origin of each lateral branch, and three between one branch and the next.

The small size, and great number of the pores distinguish this from every other species of *Glauconome* I know. It is a very large species. Length of imperfect specimen one inch nine lines; length of lateral branches two lines; diameter of midrib about half a line. Collected by Mr. Charles B. Newenham of Cork, who kindly presented the specimen figured.

Glauconome pluma. *Phil.* sp.

Retepora pluma. *Phil.* Geol. York.

Sp. Ch.—Branches alternating at very regular distances; on the midrib two rows of very large, ovate pores, subalternate with prominent margins; pores on the branches small, round, regularly alternating; reverse longitudinally striated.

This little species has the pores on the midrib so large as to occupy the entire of the poriferous surface; the branches are numerous, close, and regularly alternate. Length about one and a half inches, diameter of midrib one-third of a line.

Glauconome pulcherrima. *M'Coy.* (Pl. XXVIII. fig. 4).

Sp. Ch.—Stem bipinnately branched, main stem and principal branches strongly keeled, branchlets both of the main stem and branches regularly attenuate, without keel; pores large, with prominent margins, one row on each side of the principal stem and branches, and one very minute row on the keel; pores on the branchlets as large as those of the branches, but approximate, almost inosculating, there being no keel to separate the two rows; reverse finely striated longitudinally.

This beautiful species is not likely to be confounded with any other of the genus; the specimens are often of considerable size, two inches being the usual length.

Ptylopora. *Sc.* MSS.

Gen. Ch.—Flabelliform, or infundibuliform, attached by roots, from which a strong midrib arises, giving origin on each side to thin, equidistant interstices, connected by regular dissepiments; external face of the interstices carinate, and bearing two rows of pores.

Ptylopora flustriformis. *Phil.* sp.

Retepora flustriformis. *Phil.* Geol. York., and *Phil.* Pal. Fos.

Sp. Ch.—Midrib square, coarsely striated; interstices thick, equidistant; fenestrules small, oval, equal; dissepiments as thick as the interstices, equidistant; pores small, round, five or six to the length of a fenestrule.

A very beautiful, feather-like coral.

Ptylopora pluma. *Sc.* MSS. (Pl. XXVIII. fig. 6).

Sp. Ch.—Midrib very thick; general form feather-shaped; interstices with a regularly poriferous keel; pores small, round, four to the length of an interstice.

The coral to which Dr. Scouler has given this name appears to differ from the *P. flustriformis*, in its narrow, feather-like outline, the length being three times the width; the midrib is also larger and more distinctly poriferous. I have not, however, examined good specimens.

Fenestella. *Miller.*

Gen. Ch.—Cup-shaped, conical, reticulated, formed of thin, carinated, radiating ribs (interstices), connected by transverse, nonporiferous bars (dissepiments), two rows of prominent pores on the external, carinated face of each interstice.

This excellent genus is easily distinguished from *Retepora* by its nonporiferous, transverse bars, and its poriferous face being external instead of internal, as in that genus. From my genus *Polypora* it is distinguished by its poriferous face being carinated, and having normally but two rows of pores (in most *Fenestellæ* I have observed a very irregular row of small pores on the central keel); from *Hemitrypa* it is known by the apparent want of the external (imperforate ?) sheath, which at present seems peculiar to that genus[a].

Fenestella antiqua. *Lons.*

Fenestella antiqua. *Lons.* Geol. Trans. (not Sil. Syst.)—Fenestella antiqua. *Phil.* Pal. Fos.

Sp. Ch.—Interstices thin, equidistant, irregularly branching; dissepiments very thin, equidistant; fenestrules nearly twice as long as wide, slightly rounded; pores large, prominent, five to the length of a fenestrule, the two rows apparently inosculating.

This species differs from the true *F. antiqua* of the Silurian rocks, as Mr. Lonsdale and Professor Phillips have already noticed, in the contiguity of the two lines of pores.

Fenestella carinata. *M'Coy.* (Pl. XXVIII. fig. 12).

Sp. Ch.—Interstices externally, close together, irregularly bifurcate; dissepiments and interstices flattened, of equal breadth, and on the same level; fenestrules circular; poriferous face of interstices angular, with a strong, longitudinal keel in the middle; dissepiments very thin, small, rounded; fenestrules elongate, oval. Two irregular rows of pores with projecting margins, and one irregular row on the central keel.

[a] I have recently observed this sheath in some of the true Fenestellæ; *Hemitrypa* is, therefore, possibly only the perfect state of *Fenestella*.

This coral to the naked eye has the appearance of a perfectly flat surface, with regular, round dots resembling pin holes.

Fenestella crassa. (*M'Coy.* (Pl. XXIX. fig. 1).

Sp. Ch.—Spreading; interstices thick, strongly keeled, irregularly branched; dissepiments very thin, distant; fenestrules large, very elongate, irregular; pores rather small, few, twice their diameter apart, without raised margins; a few irregular, small pores on the central keel; reverse striated.

This species is allied to the *Fenestella laxa*, Phil., but is rather more regular in its habit; it likewise differs in the dissepiments being much thinner, the interstices being strongly carinated, and the greater distance of the pores, which, so far from being tubular, have not even the raised margin found in nearly all of the genus. The reverse of the *F. laxa* is also granulated with great regularity, while in the present species it is regularly striated. The figure is taken from a portion of a specimen three inches long, and four and a half inches wide; the interstices are half a line thick.

Fenestella ejuncida. *M'Coy.* (Pl. XXVIII. fig. 11).

Sp. Ch.—Flabelliform, interstices nearly straight, equidistant, very thin; dissepiments nearly as thick as the interstices, placed at regular distances; fenestrules large, nearly equal in size and shape; oblong, slightly longer than wide, about three times as wide as the interstices; pores small, prominent, placed alternately, one at the origin of each dissepiment, and four in the intervening space; seven or eight interstices in the space of three lines.

Fenestella flabellata. *Phil.* sp.

Retepora flabellata. *Phil.* Geol. York.

Sp. Ch.—Slightly spreading, irregularly branched; interstices very thin, distinctly carinated; dissepiments scarcely half as thick as the interstices, equidistant; fenestrules equal, rectangular, twice as long as wide; width equal to that of an interstice; pores very prominent, deeply indenting the margin; three to the length of a fenestrule; reverse sharply striated longitudinally.

A pretty little species, easily distinguished from the *F. tenuifila*, by its smaller size, and the deep indentations produced by the pores on the margin of the fenestrules, the striæ of the obverse are also sharper and more direct.

Fenestella formosa. *M'Coy.* (Pl. XXIX. fig. 2).

Sp. Ch.—Flat, leaf-like; interstices thin, irregularly branching; fenestrules large, irregular in size and shape; dissepiments very thin; pores of the sides of the interstices large, numerous, their thickened edges indenting the margin, four or five to the length of a fenestrule; at each bifurcation, and at each setting off of a dissepiment, is one pore, nearly twice the size of the others; in the middle of each dissepiment is placed one oval pore, and on the strong keel of the interstices is a very regular row of small pores, all having raised margins.

Once seen with the lens this remarkable coral can never be forgotten; to the naked eye it has much of the habit of the common *Fenestella undulata*, Phil., but the extraordinary disposition of the pores separates them at once; it is very constant in its characters, several specimens from different localities presenting precisely the same structure; it forms the most beautiful object for the microscope that can be conceived. Length about one inch, width half an inch; there are about three interstices in one line.

Fenestella frutex. *M'Coy.* (Pl. XXVIII. fig. 10).

Sp. Ch.—Flabelliform; rising from a distinct root or trunk, and suddenly expanding to a nearly circular network; fenestrules broad, usually quadrangular, but rather irregular in size and shape; interstices thick, frequently branching, slightly flexuous, irregular; dissepiments thin, at regular distances; pores very prominent,

their own diameter apart, placed much on the sides, so as to indent the margins of the fenestrules deeply; they are placed alternately, usually two to each fenestrule, and one at the origin of each dissepiment; about five interstices in the space of one line; reverse with coarse, waving striæ.

This beautiful little species in its mode of growth resembles a little shrub, or tree, having a short, thick trunk, and suddenly expanding to a nearly circular head; it is not uncommon; the specimens being about one-fourth of an inch long, and very constant in form.

Fenestella hemispherica. *M'Coy.* (Pl. XXIX. fig. 4).

Sp. Ch.—Hemispherical, cup-shaped; interstices and dissepiments exceedingly minute; interstices thin, sharply carinated, reverse longitudinally striated; dissepiments one-fourth the thickness of the interstices; fenestrules rectangular, wider than the interstices, and somewhat longer than wide; pores small, twice their diameter apart, with raised margins which do not indent the edge; about three pores to the length of a fenestrule.

This beautiful coral forms a hemispherical cup, the root or base being slightly excentric, a few longitudinal folds or undulations disturb the regularity of the form; the substance of the coral itself is so exceedingly delicate, that it is only after a close examination with good lenses that it can be at all made out; the fenestrules are usually longer, and the pores consequently farther apart than in the drawing. Length one inch two lines, diameter one inch six lines; there are about seven interstices in one line.

Fenestella laxa. *Phil.*

Retepora laxa. *Phil.* Geol. York.—Fenestella laxa. *Phil.* Pal. Fos.

Sp. Ch.—Interstices thick, rounded, very irregularly branched, dissepiments round, nearly equal to the interstices in thickness; fenestrules very large and extremely irregular in size and shape; there is no keel on the poriferous face of the interstice; pores numerous, small, approximate, with raised margin, reverse regularly granulated in quincunx.

This species is distinguished by its great size, the looseness and irregularity of its branching, and its regularly granulated reverse. The interstices are half a line in thickness.

Fenestella membranacea. *Phil.* sp.

Retepora membranacea. *Phil.* Geol. York.

Sp. Ch.—Elongate, conical; interstices straight, equidistant, with a sharp, central keel; dissepiments nearly equal in thickness to the interstices; fenestrules elongate, rather wider than the interstices, nearly three times as long as wide; pores small, about three in the length of a fenestrule; nonporiferous face granulated.

This abundant species is remarkable for its very elongate, conical shape; it is fixed at the base by long, solid, nonporiferous roots, of considerable thickness; the lengthened form of the regular fenestrule, and the granulation of the nonporiferous face, are the most important specific characters. This species often grows to a length of nine or ten inches; five interstices occupy about one line. I have recently seen a specimen exhibiting traces of the external sheath of *Hemitrypa*.

Fenestella Morrisii. *M'Coy.* (Pl. XXVIII. fig. 14).

Sp. Ch.—Expanded, conical, cup-shaped; interstices thick, round, regularly branching; dissepiments very thin, at nearly equal distances; pores large, nearly their own diameter apart, with very prominent margins; about six to the length of a fenestrule; fenestrules slightly irregular, usually quadrangular, one-third longer than wide, reverse nearly smooth.

This species is somewhat cup-shaped; very much expanded, with the root excentric; usually one-fifth of the diameter from one of the sides; the dissepiments are unusually delicate, and have frequently disappeared, while the other parts of the coral are in good preservation. I have named this species in honour of my friend, Mr. J. Morris, the author of the elaborate and highly useful Catalogue of British Fossils.

Fenestella multiporata. *M'Coy.* (Pl. XXVIII. fig. 9.)

Sp. Ch.—Foliaceous; interstices thin; sharply keeled, irregularly branched; dissepiments thin, distant, fenestrules large, very elongate, irregular; pores very numerous, small, margins tumid, seven or eight to the length of a fenestrule; reverse regularly striated.

The great number of pores between each dissepiment is the most remarkable peculiarity of this species. It grows frequently to a length of two or three inches; there are about three interstices in one line.

Fenestella nodulosa. *Phil.* sp.

Retepora nodulosa. *Phil.* Geol. York.

Sp. Ch.—Flat, expanded, fan-shaped; interstices thick; dissepiments equidistant, regular, half as thick as the interstices; fenestrules quadrate, rounded at the extremities, constricted in the middle, length and breadth nearly equal; pores large, with very prominent margins, more than their own diameter apart, one at the origin of each dissepiment, and one in the middle, deeply indenting the margin.

This interesting coral is very closely allied to the *F. plebeia*, M'Coy, but is easily distinguished by the single, very prominent, mesial pores, constricting the sides of each fenestrule, giving them somewhat of an hour-glass form.

Fenestella oculata. *M'Coy.* (Pl. XXVIII. fig. 15).

Sp. Ch.—Interstices very broad, flattened, rarely branched, obscurely keeled; dissepiments less than one-fourth the thickness of the interstices, regularly placed; fenestrules half the width of the interstices, rectangular, three times as long as wide; pores placed close to the margin, very large, with a thickened margin, which deeply indents the sides of the fenestrule, three between each dissepiment; reverse smooth.

This species is remarkable for the great proportional size of the interstices, and the size and prominence of the pores; the keel on the interstice is nearly obsolete. Occurs usually in fragments, about one inch in length: there are about two interstices in one line.

Fenestella plebeia. *M'Coy.* (Pl. XXIX. fig. 3).

Sp. Ch.—Flat, expanded, fan-shaped; interstices thick; fenestrules equal, rectangular, from two to three times as long as wide; width equal to that of the interstices; dissepiments thin, regular; pores four or five to the length of a fenestrule; reverse minutely granulated, and very coarsely sulcated longitudinally.

This is a very abundant species.

Fenestella polyporata. *Phil.* sp.

Retepora polyporata. *Phil.* Geol. York.

Sp. Ch.—Interstices thick, rounded (not carinated ?), irregularly branched; dissepiments short, thin, placed at irregular distances; fenestrules large, very irregular in size and shape; pores very small, impressed, from five to seven to the length of a fenestrule.

This is a very interesting species, as exhibiting one of those aberrant types of form so important to the sys-

tematic zoologist; in its thick, uncarinated interstices, and small impressed pores, it makes an approach to the genus *Polypora*, M'Coy, but they are disposed in two rows only, as in the true *Fenestellæ*.

· Fenestella quadradecimalis. *M'Coy.* (Pl. XXVIII. fig. 13).

Sp. Ch.—Interstices slightly flexuous, thin, irregularly branching; dissepiments thin, distant; fenestrules very large, irregular in shape, pores very numerous, prominent, about fourteen to the length of a fenestrule; reverse finely striated longitudinally.

This species is remarkable for the immense number of pores between one dissepiment and the next, fourteen being the usual number; the interstices are very thin, but often dilated at the point of branching; the fenestrules are of great size but very irregular.

· Fenestella tenuifila. *Phil.* sp.

Retepora tenuifila. *Phil.* Geol. York.

Sp. Ch.—Slightly spreading, irregularly branched, interstices very thin, sharply carinated; fenestrules nearly square, little longer than wide; width equal to twice the thickness of the interstices; dissepiments half the thickness of the interstices; pores small, their prominent margins indenting the edge about three to the length of each fenestrule; reverse with waving, longitudinal striæ.

This delicate species is remarkable for the excessive thinness of the dissepiments and interstices, except at the branchings; the fenestrules are nearly square. There are about five interstices in one line.

Fenestella undulata. *Phil.* sp.

Retepora undulata. *Phil.* Geol. York.

Sp. Ch.—Interstices and dissepiments very thin; fenestrules large, irregular; pores very large; rather distant, prominent, indenting the margin, about four to the length of a fenestrule; reverse with undulating, longitudinal striæ.

This is a loosely branched but very delicate species, the substance of the coral itself being very slender; the fenestrules are four or five times the width of the interstices; the pores are only subalternate, and so large as to give a nodular aspect to the interstices. It grows to upwards of two inches in length; there are about two interstices in the space of one line.

· Fenestella varicosa. *M'Coy.* (Pl. XXVIII. fig. 8).

Sp. Ch.—Interstices unequal, those from which the branches originate being twice the thickness of the others; dissepiments thin, irregularly placed; fenestrules slightly irregular, usually quadrangular; pores moderate, unequal, from four to six to the length of a fenestrule; reverse nearly smooth.

This is one of the most extraordinary species with which I am acquainted, from the character of some of the interstices suddenly increasing to double their normal thickness, and, after giving out numerous thin branches, chiefly from one side, dwindling again to the original size, and continuing their course. Whenever, from the origin of the interstices, it becomes necessary for one of those thin branches to dichotomize, it suddenly doubles its thickness for a certain length, and, as long as it remains thick, it gives off branches as before; all the interstices are slightly flexuous; the reverse is very convex, and nearly smooth.

· Hemitrypa. *Phil.*

Gen. Ch.—Polypidom, a stony, cup-shaped net-work, keeled, and poriferous, as in *Fenestella*, covered with an external (imperforate ?) sheath.

Hemitrypa Hibernica. *Sc.* sp. (Pl. XXIX. fig. 7).

Fenestella Hibernica. *Scouler*, MSS.

Sp. Ch.—Polymorphous, irregularly conic; internal net-work having the interstices equidistant, straight fenestrules equal, oblong, rounded; length rather less than twice the width; dissepiments thinner than the interstices; internal non-poriferous face rounded, smooth; external poriferous face angular; pores small, oblong, (not prominent?) about three to the length of a fenestrule; external sheath nearly smooth, marked externally with faint, equidistant striæ, which coincide with the interstices of the internal net-work, and enclosing between them two alternating rows of large, rounded, or obscurely hexagonal depressions, coinciding with the openings of the internal net-work.

This curious coral throws much light on the structure of Professor Phillips's genus *Hemitrypa*. The internal net-work bears much resemblance to the *F. membranacea*, Phil., but from the difficulty of procuring well-preserved specimens of this latter, it is difficult to determine the question satisfactorily; in the present coral however, the fenestrules seem to be generally shorter in proportion to their length; the dissepiments thinner; and the obverse either smooth or (in some specimens from shale), with large, irregular, distant, spiniform tubercles, but never granulated in the minute and regular manner of the *F. membranacea*.

Hemitrypa oculata. *Phil.*

Hemitrypa oculata. *Phil.* Pal. Fos.

I have referred with hesitation to this species, some fragments, belonging evidently to the genus *Hemitrypa*, but distinct from the *H. Hibernica;* they are much smaller in their details than that species, and approach more nearly to Professor Phillips's figures of the *H. oculata;* the openings in the external sheath are small and round, as they are figured and described in that species, differing remarkably from the large, hexagonal ones in the *H. Hibernica;* the interstices also of the internal network are oval, as in the Devonian species, while in the former one they are square; the specimens, however, are not good enough to define the species properly.

Ichthyorachis. *M'Coy.*

Gen. Ch.—Coral plumose, composed of a straight, central stem or midrib, having on each side a row of short, simple branches or pinnæ, all in the same plane; obverse both of the midrib and lateral branches rounded, without keel, and each bearing several rows of small, prominent, oval pores, arranged in quincunx; reverse rounded, smooth, or finely striated.

The present genus stands nearly in the same relations to *Glauconome*, Lons., as *Polypora*, M'Coy, does to *Fenestella*, Miller. *Fenestella* and *Glauconome* are carinate on the obverse, and bear two rows of large, prominent pores, while *Polypora* and *Ichthyorachis* are rounded on the obverse, and bear several rows of small pores arranged in quincunx. It is probable that this is the fossil alluded to by Mr. Miller, when he quotes vertebræ of fishes in the Cork limestone, no bony fishes occurring in those formations, and the coral very strongly resembling the spine of a small fish; I have named the genus from this resemblance ἰχθύς a fish, and ῥάχις, a back-bone.

Ichthyorachis Newenhami. *M'Coy.* (Pl. XXIX. fig. 8).

Sp. Ch.—Stem and lateral branches with five rows of oval, prominent pores, closely arranged in quincunx; reverse flattened, slightly convex, divided by a deep groove along the middle; obsoletely striated longitudinally; lateral branches half the thickness of the midrib, space between them equal to the diameter of the midrib.

I have named this fine coral after Mr. Charles B. Newenham of Cork, a gentleman who has most assiduously collected the fossils of that neighbourhood, and whose Collection has furnished the only examples of the species which have been seen. Length of specimens, imperfect at both ends, one inch eleven lines; diameter of midrib, one line. Length of lateral branches, as far as known, about five lines; they are about one line apart.

Polypora. *M'Coy.*

Gen. Ch.—Expanding, interstices round, branching, having on one side from three to five rows of pores, the margin of which is never raised, interstices connected by thin, transverse, nonporiferous dissepiments.

This genus is very abundant in the carboniferous limestone, and as it appears to form a very natural group distinct both from *Retepora* and *Fenestella*, I have, after much hesitation, ventured to characterize it. From *Retepora* it is easily distinguished by its nonporiferous dissepiments, and general habit; from *Fenestella* it is well distinguished by the numerous rows of pores, and the absence of a keel on the interstices; the species of the present genus do not appear to assume an infundibuliform or cup-shaped figure, but are usually flat and fan-shaped.

Polypora dendroides. *M'Coy.* (Pl. XXIX. fig. 9).

Sp. Ch.—Flat, fan-shaped, interstices thick, regularly branched, divaricating; dissepiments very thin, frequently oblique, and placed at nearly equal distances; fenestrules large, rhomboidal, poriferous face, with five rows of small impressed pores arranged in quincunx, reverse longitudinally striated.

This beautiful species is chiefly remarkable for the degree of divergence with which the interstices branch, and the small number of rows of pores. Length one inch, width one and a half inches; the interstices are about one line apart and half a line thick.

Polypora marginata. *M'Coy.* (Pl. XXIX. fig. 5).

Sp. Ch.—Interstices thick, irregularly bifurcate; sides margined; dissepiments thin; fenestrules small, elongate, oval, or approaching to a square form; reverse with direct, deep, longitudinal striæ; poriferous surface, with five alternating rows of pores, and interjacent, waved striæ.

The broad, flat, margin of the branches distinguishes this rare species at a glance from any of the other corals likely to be confounded with it.

Polypora papillata. *M'Coy.* (Pl. XXIX. fig. 10).

Sp. Ch.—Interstices rarely bifurcating, very narrow, rounded; dissepiments thin, rounded; fenestrules circular or oval; poriferous surface smooth, with three alternating rows of pores; reverse smooth, with a small, papillated pore at the origins of most of the dissepiments.

This species is remarkable for its large and round fenestrules, which are of such a size that the interstices and dissepiments appear disproportionably thin. The prominent pores on the outer side have caused me to doubt the propriety of placing this coral in the same genus with the preceding species. It is very rare.

Polypora verrucosa. *M'Coy.* (Pl. XXIX. fig. 6).

Sp. Ch.—Interstices rarely bifurcating, regular, equal, rounded; dissepiments thin, distant; fenestrules rectangular, five times as long as wide, about one-third wider than the interstices, equal; obverse with four rows of prominent, wart-like pores, about ten in each row to the length of a fenestrule; between the pores are waving, longitudinal striæ; reverse nearly smooth.

This coral is very remarkable as being the only species of *Polypora* yet known with prominent pores; they are so prominent in the specimen figured as to resemble the wart-like pores of some of the *Gorgoniæ;* the spaces between them are marked with coarse, waving striæ; the fenestrules are very regular, long and narrow.

Retepora prisca. *Gold.* (Not Fenestella prisca. *Lonsd.*)

Very imperfect specimens, probably referrible to *Retepora prisca* of Goldfuss, have occurred; they belong, of course, to the genus *Fenestella*, but not to the Silurian *F. prisca*.

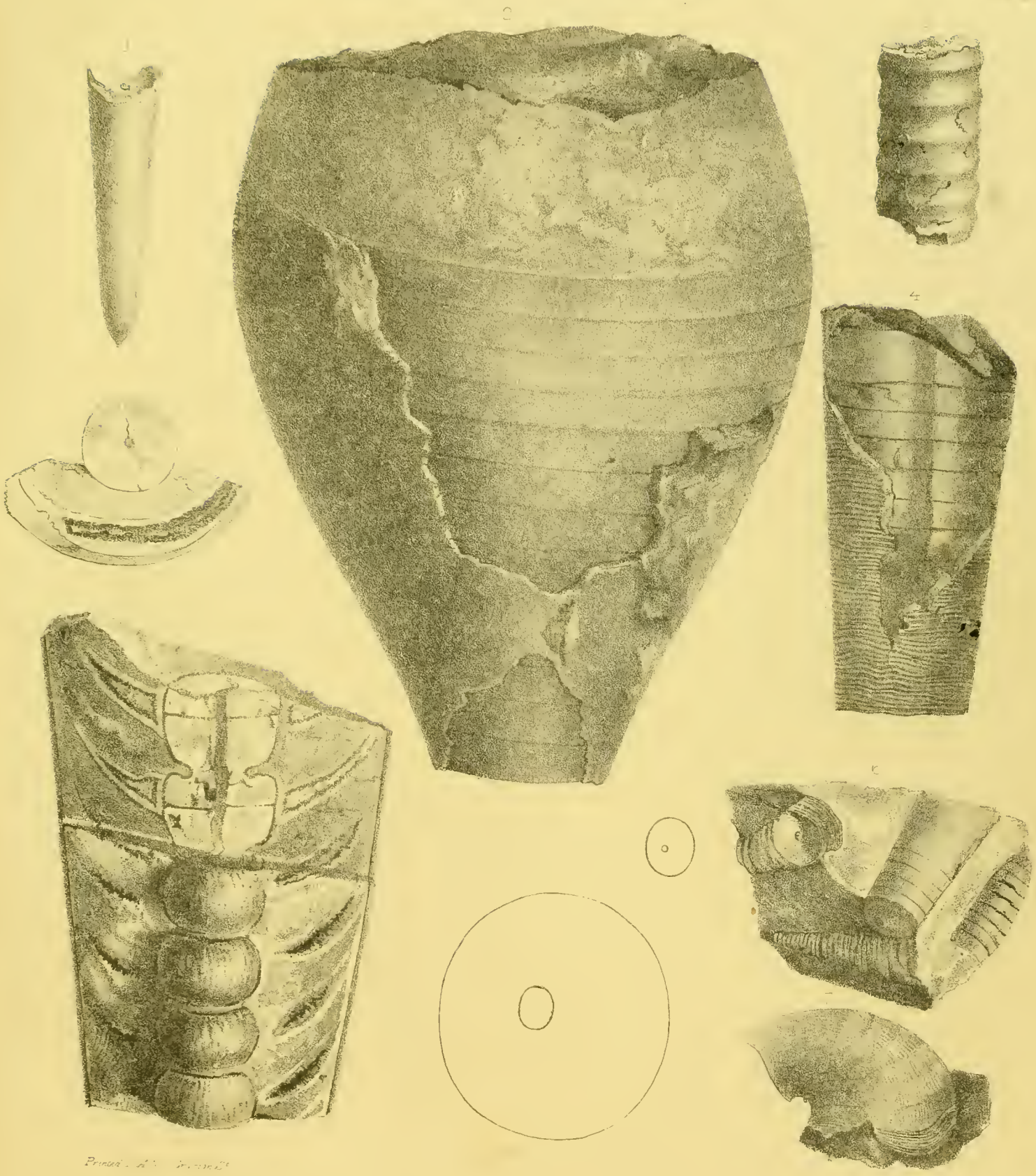
Retepora undata. *M'Coy.* (Pl. XXIX. fig. 11).

Sp. Ch.—Irregularly cup-shaped; interstices anastomosing, flattened; fenestrules ovate, pointed at one end; poriferous face with five or six rows of pores in quincunx; reverse with waved, or scale-like, semicircular ridges.

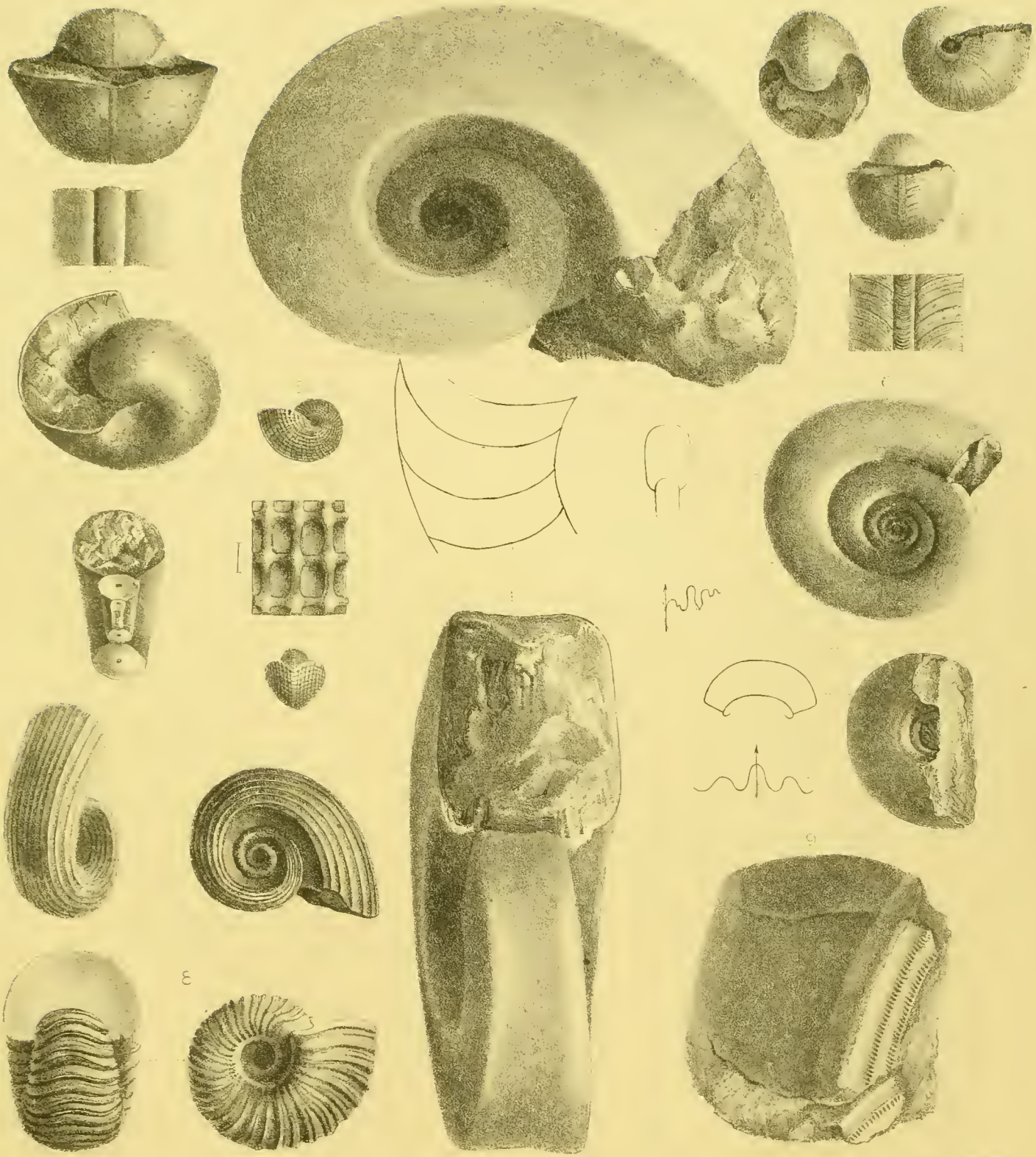
This fine species is not uncommon. The specimens figured exhibit the longitudinal central axis of attachment.

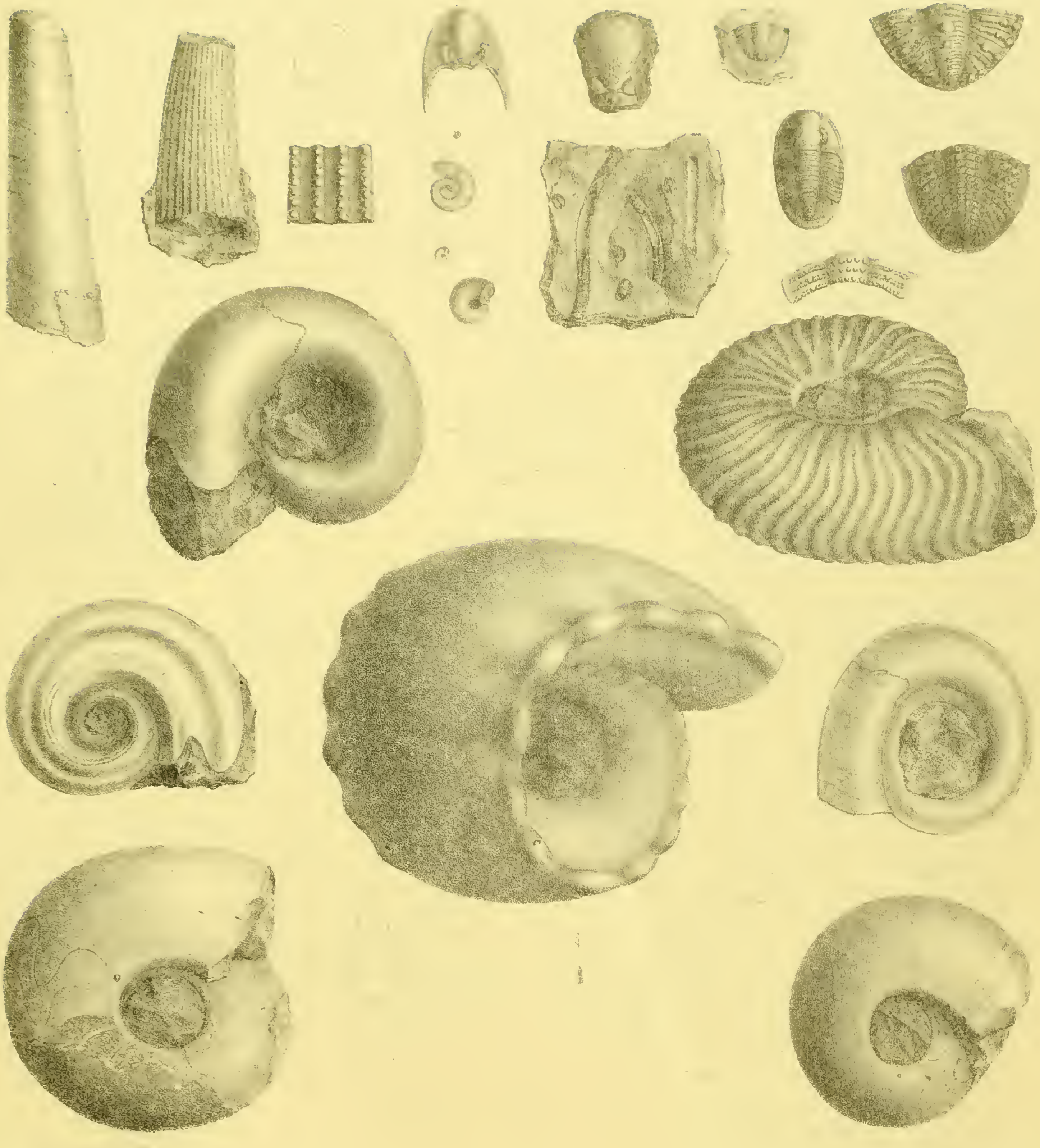
THE END.

CARBONIFEROUS LIMESTONE.

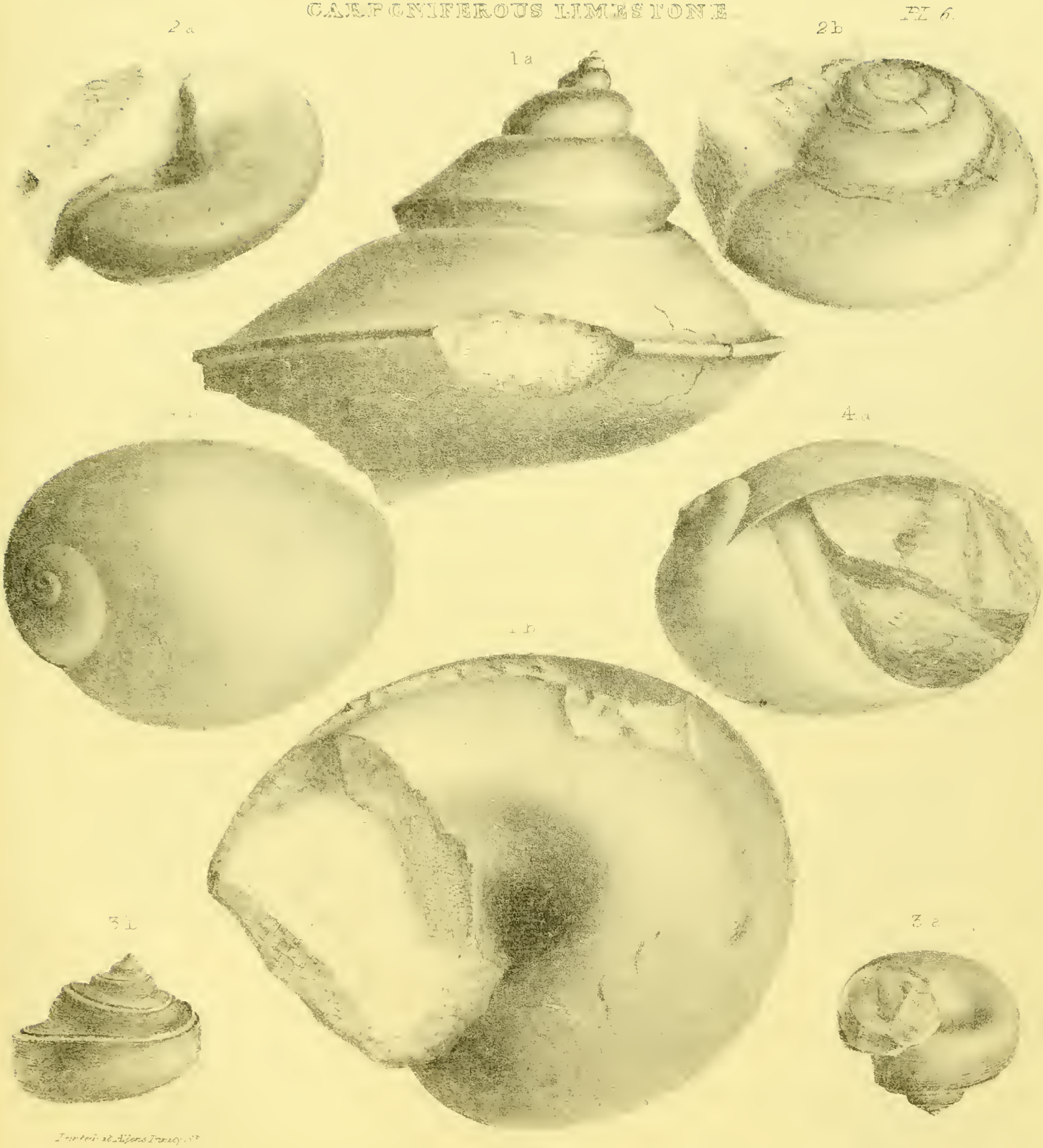


1 Orthoceras micronatum
2 Potenoceras ventricosum
3 Cyclocerus lævigatum
4 Orthoceras sulcatulum
5 Actinoceras pyramidatum
6 Lozoceras inconstans.
7 Phragmoceras flexistria

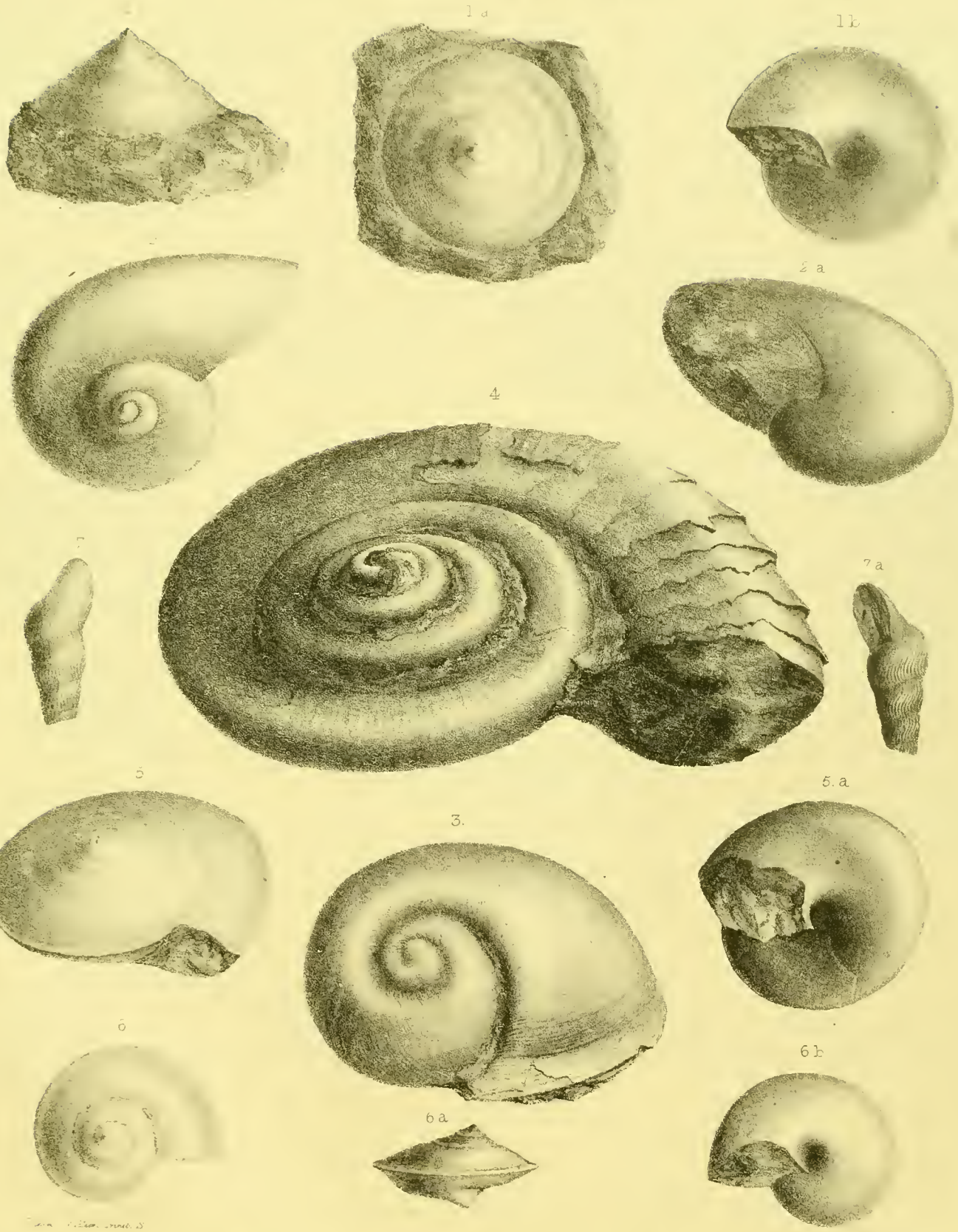




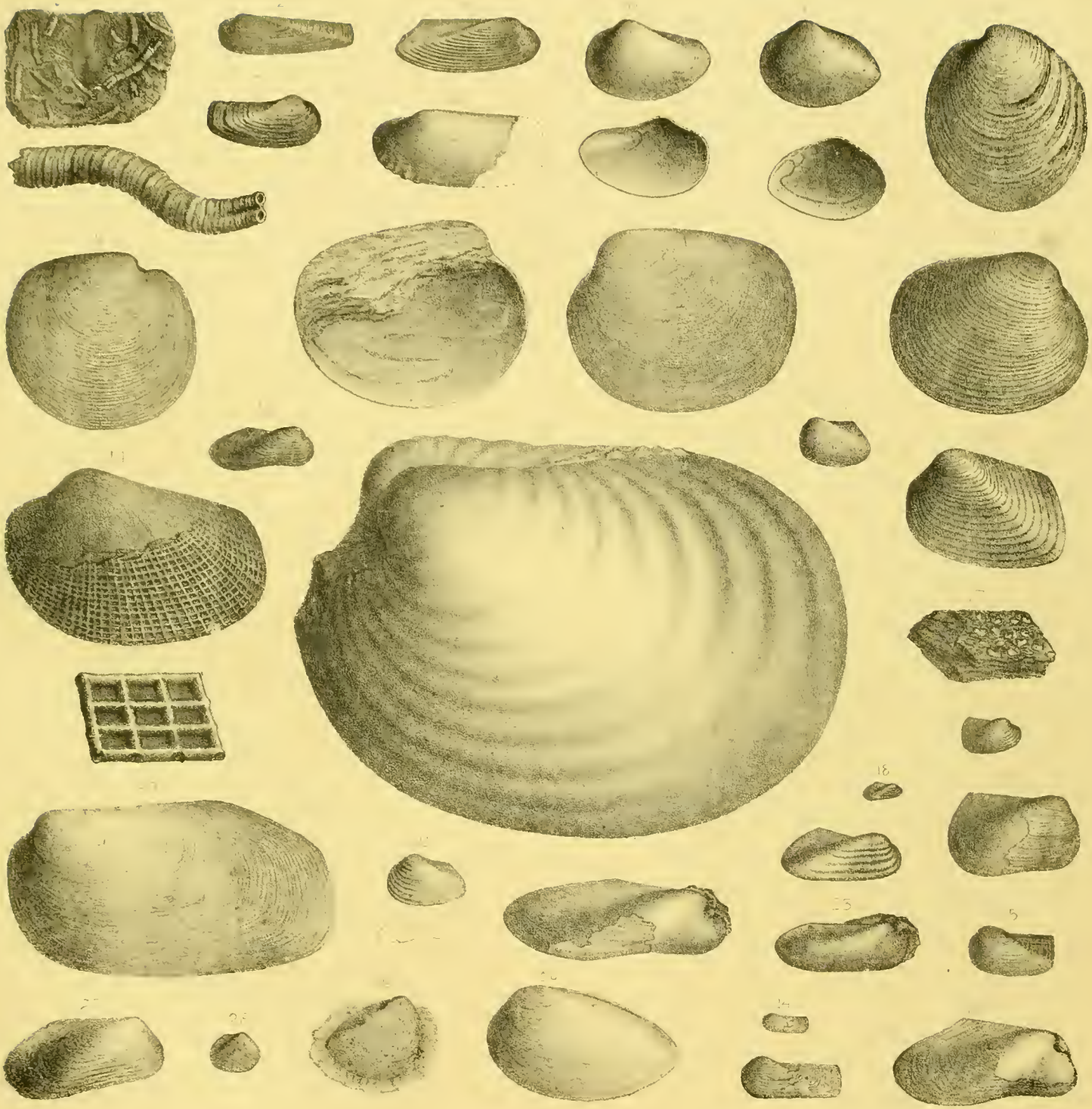
Platyschisma James



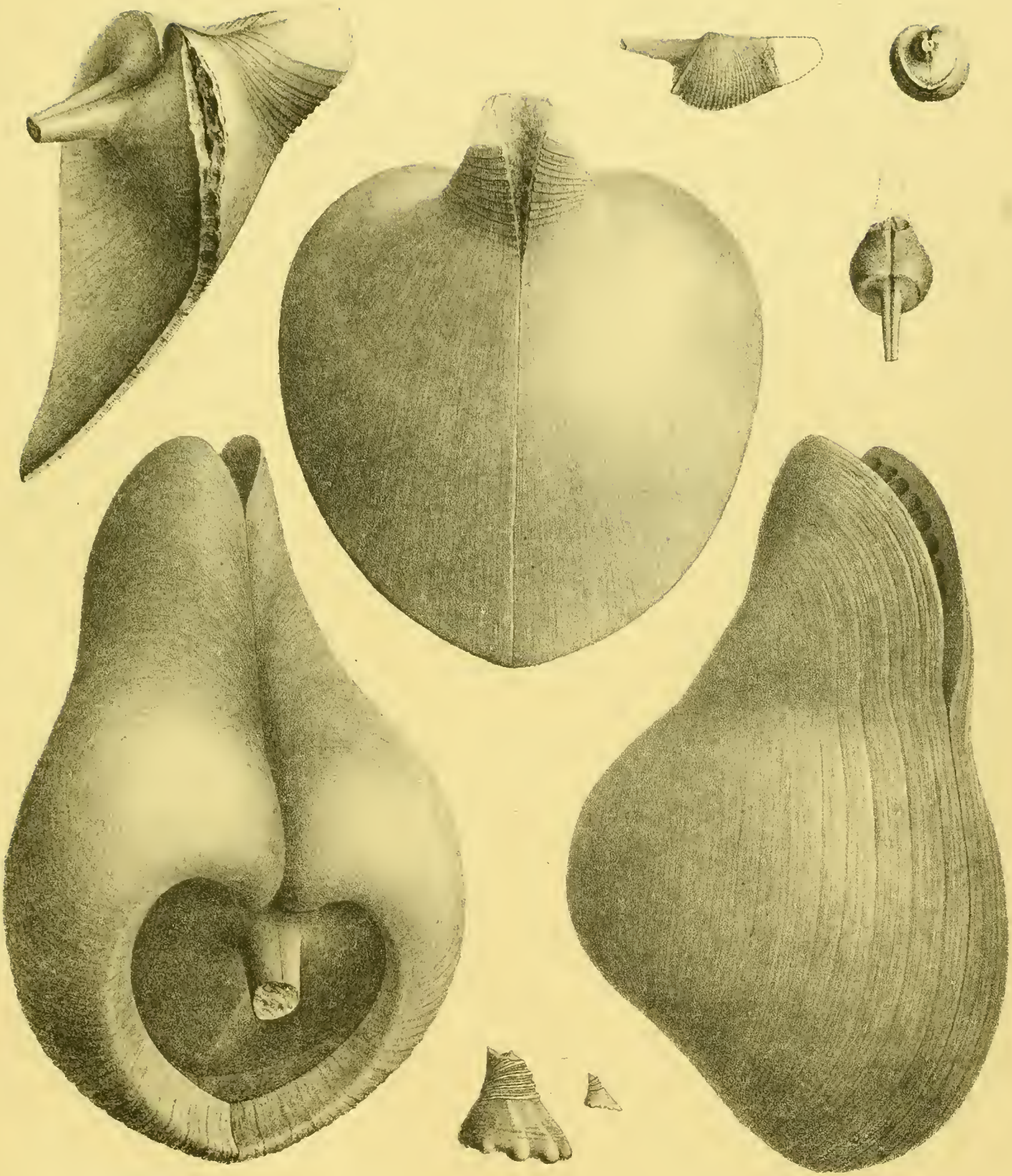
1 a, b Pleurotomaria [illegible]
2 a, b Platyschisma [illegible]
3. a, b Pleurotomaria canaliculata
4 a, b Natica nana Phillips

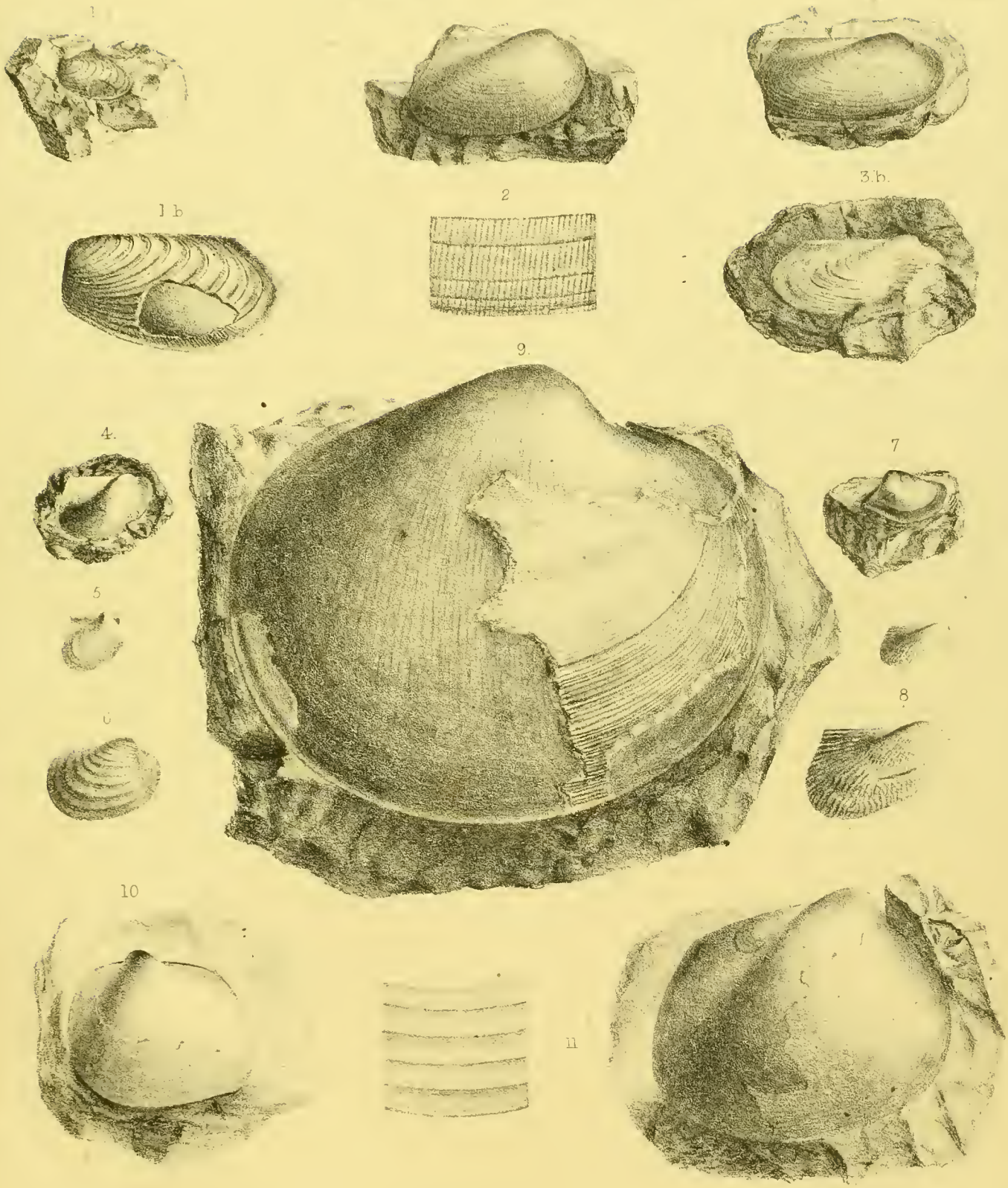


1 Trochelia prisca
2 Naticopsis ducta
3 Naticopsis canaliculata
4 Euomphalus Crotalostomus
5 Pleurotomaria lenticula
6 Pleurotomaria hemicardes
7 Loxonema pulcherrima

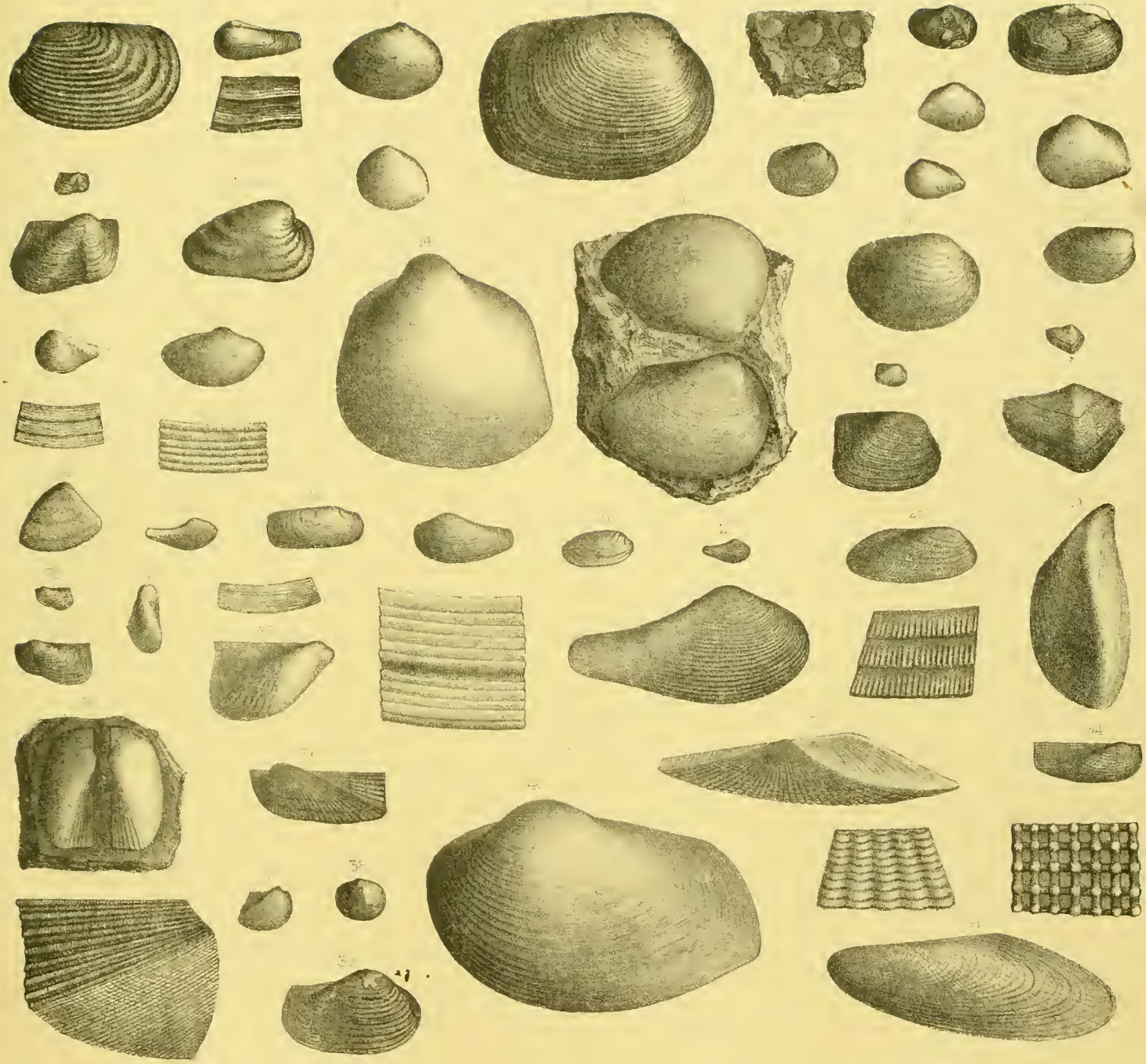


Cardiomorpha corrugata





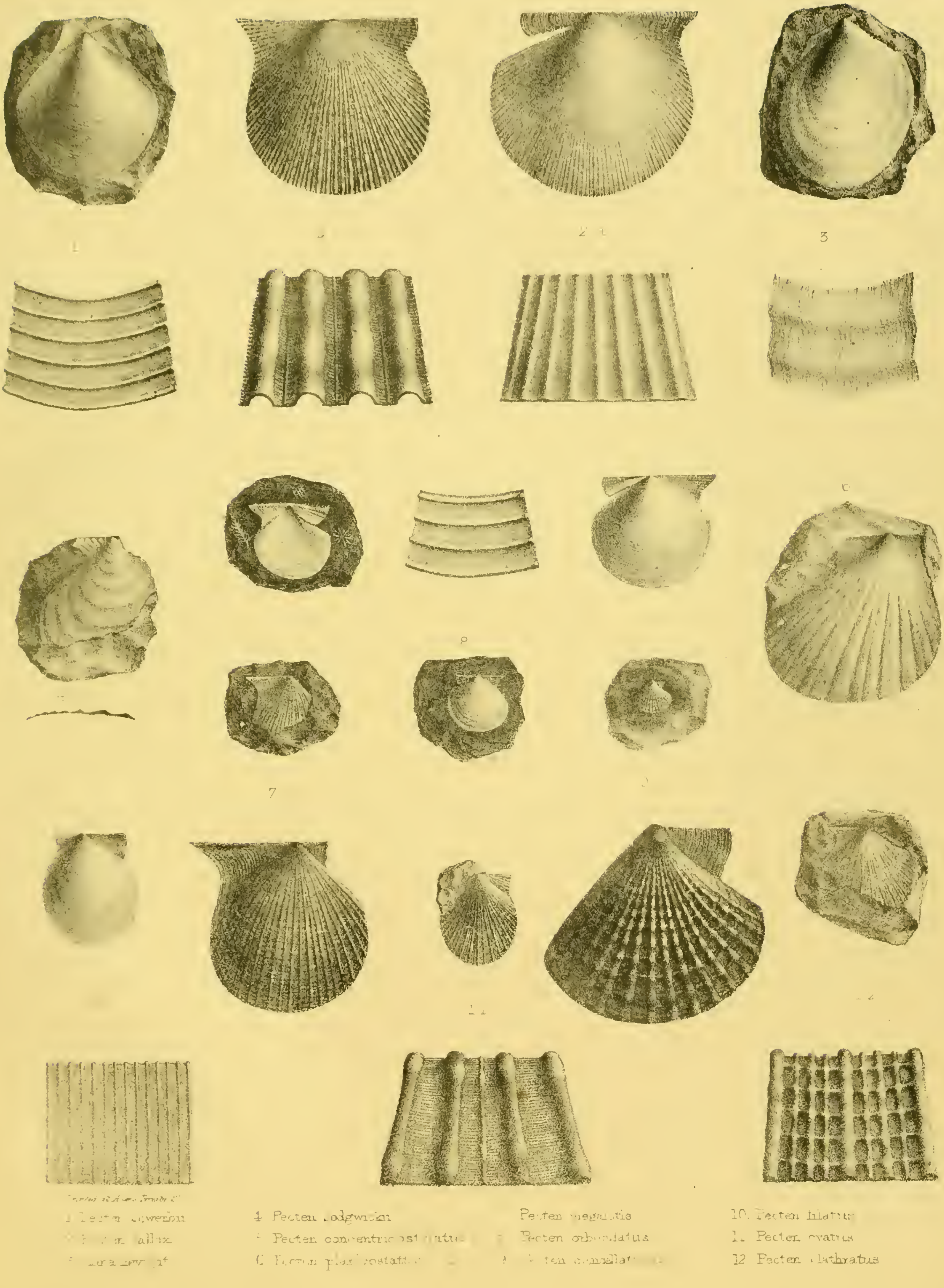
1 a b Venerupis cingulatus
2 Psammobia decussata
3 a b Sanguinolites plicatus
4 Cypricardia alata
5 Meleagrina quadrata
6 Venerupis scalaris
7 Donax primigenius
8 Lanistes rugosus
9. Cyprina Egertoni
10 Amphidesma subtruncata
11 Leptodomus fragilis.



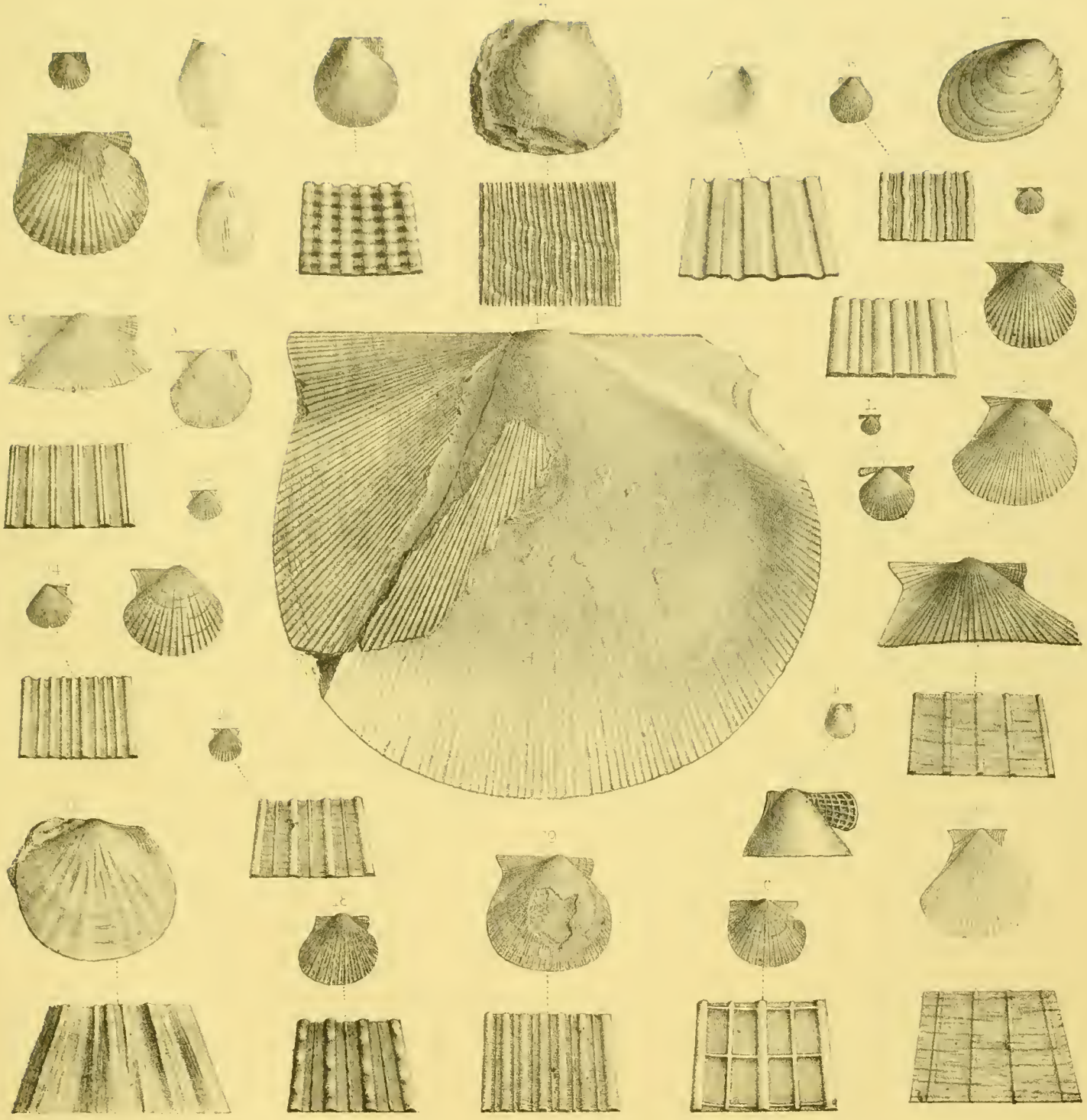
CARBONIFEROUS LIMESTONE.

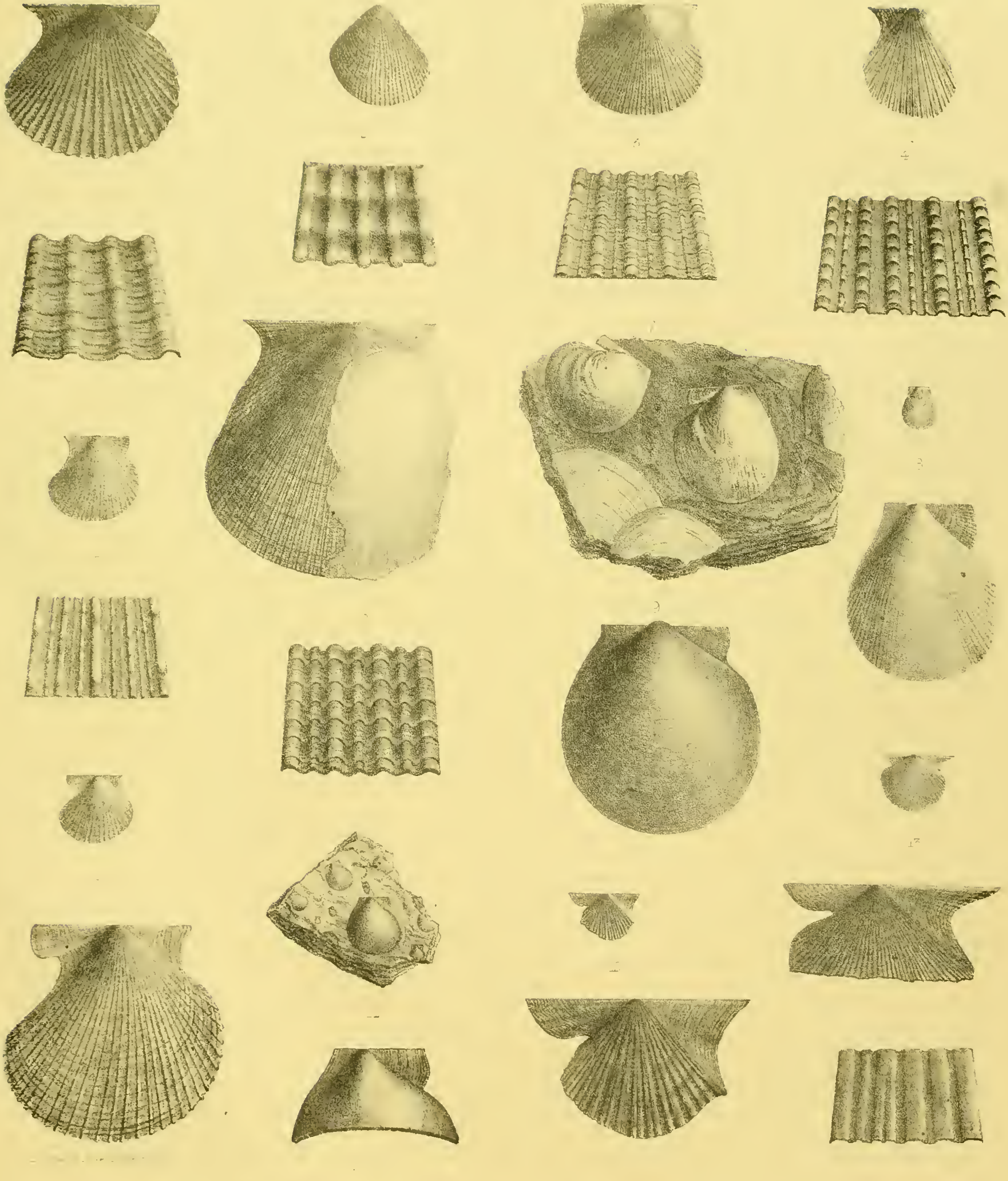
1. Sanguinolites iridinoides 3. Posidonia ? 5. Meleagrina laevigata 7. Cardium [illegible] 9. Byssoarca reticulata
2. [illegible] similis 4. Lutraria prisca 6. [illegible] pulchella 8. Arca [illegible] 10. [illegible]

CARBONIFEROUS LIMESTONE.



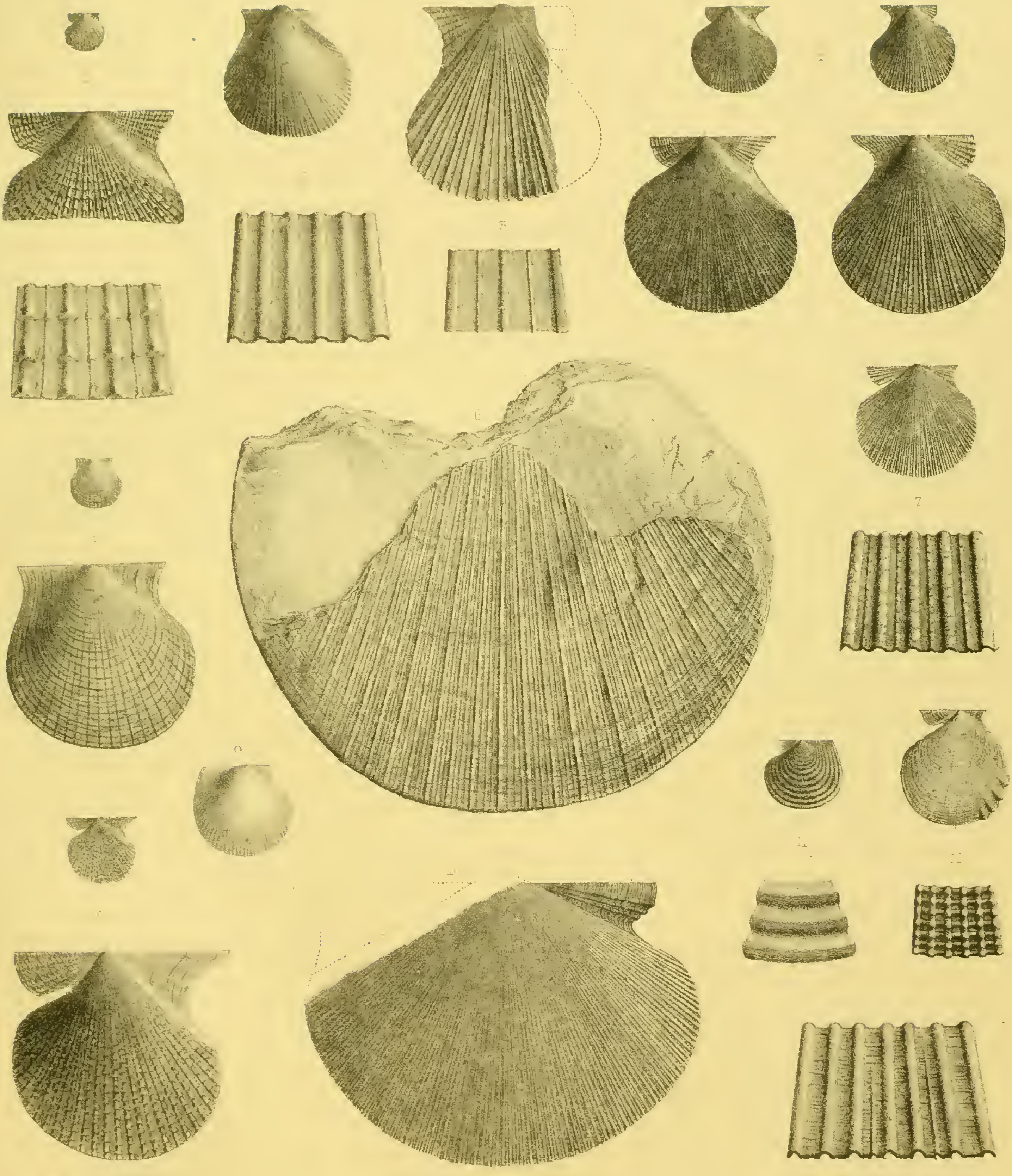
1. Pecten Sowerbii
2. Pecten fallax
3. [illegible]
4. Pecten Sedgwickii
5. Pecten concentrico-striatus
6. Pecten plani-costatus
7. Pecten megalotis
8. Pecten orbiculatus
9. Pecten cancellatus
10. Pecten hiatus
11. Pecten ovatus
12. Pecten clathratus





1 Pecten [illegible]
2 ——— [illegible]
3 ——— Meleagrinoides
4 ——— [illegible]
5 Pecten asperulus
6 ——— hians
7 ——— variabilis
8 ——— tripartitus
9 Pecten elongatus
10 ——— Jonesii
11 ——— depilis
12 ——— tabulatus
13 ——— macrotis

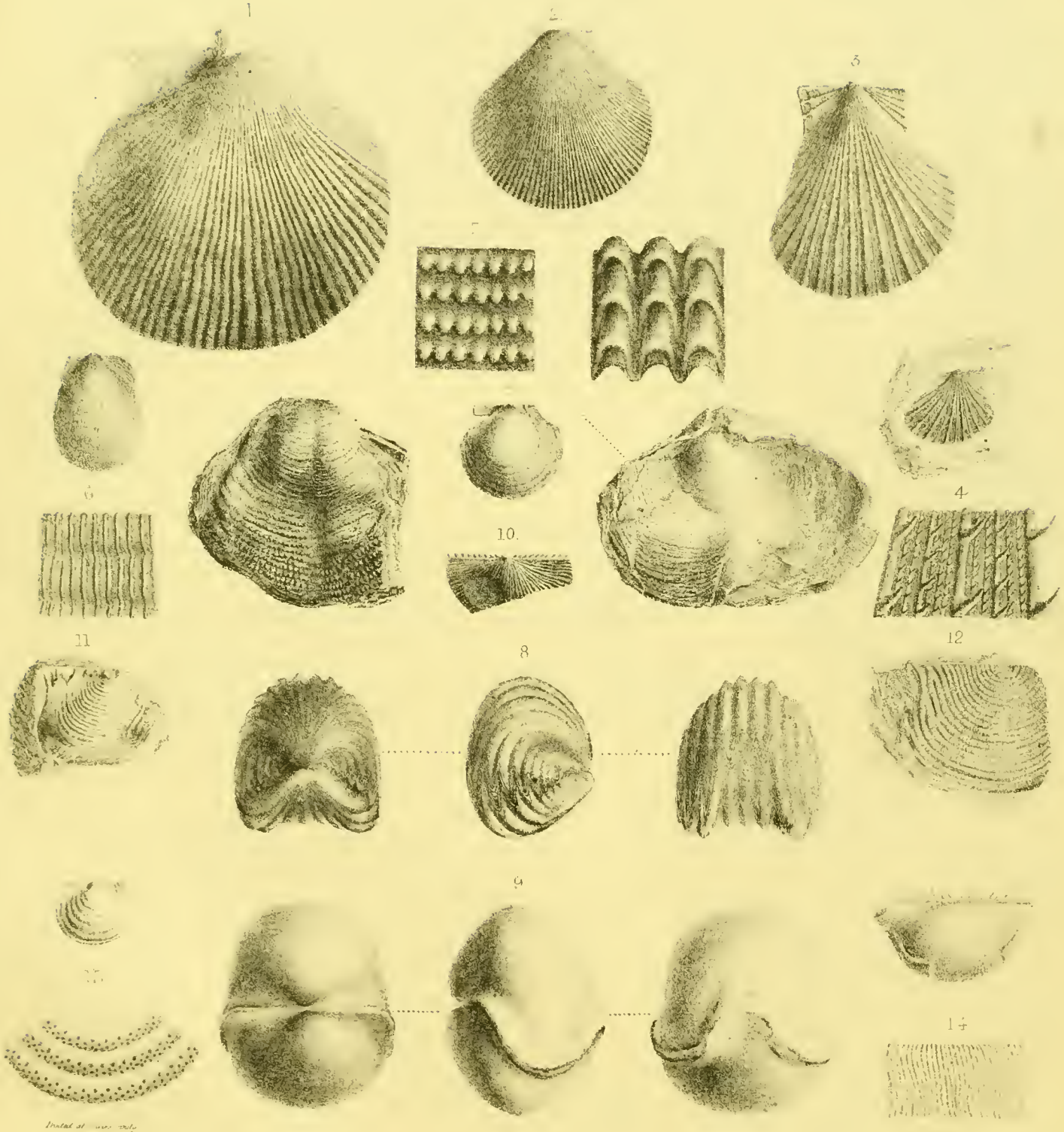
CARBONIFEROUS LIMESTONE



1 Pecten [illegible]
2 ——— [illegible]
3 ——— segregatus
4 ——— [illegible]

5 Pecten [illegible]
6 ——— quinquelineatus
7 ——— [illegible]
8 ——— [illegible]atus

9 Pecten [illegible]
10 ——— semicircularis
11 ——— [illegible]
12 ——— undulatus



1. *Pecten flexuosus*
2. *Pecten calvatus*
3. *Pecten Murchisoni*
4. *Pecten intercostatus*
5. *Pecten gibbosus*
6. *Inna prisca*
7. *Athyris depressa*
8. *Atrypa reticularis*
9. *Orthis gibbera*
10. *Leptæna sericea*
11. *Leptæna*
12. *Leptagonia multirugata*
13. *Producta elegans*
14. *Leptæna rhomboidalis*

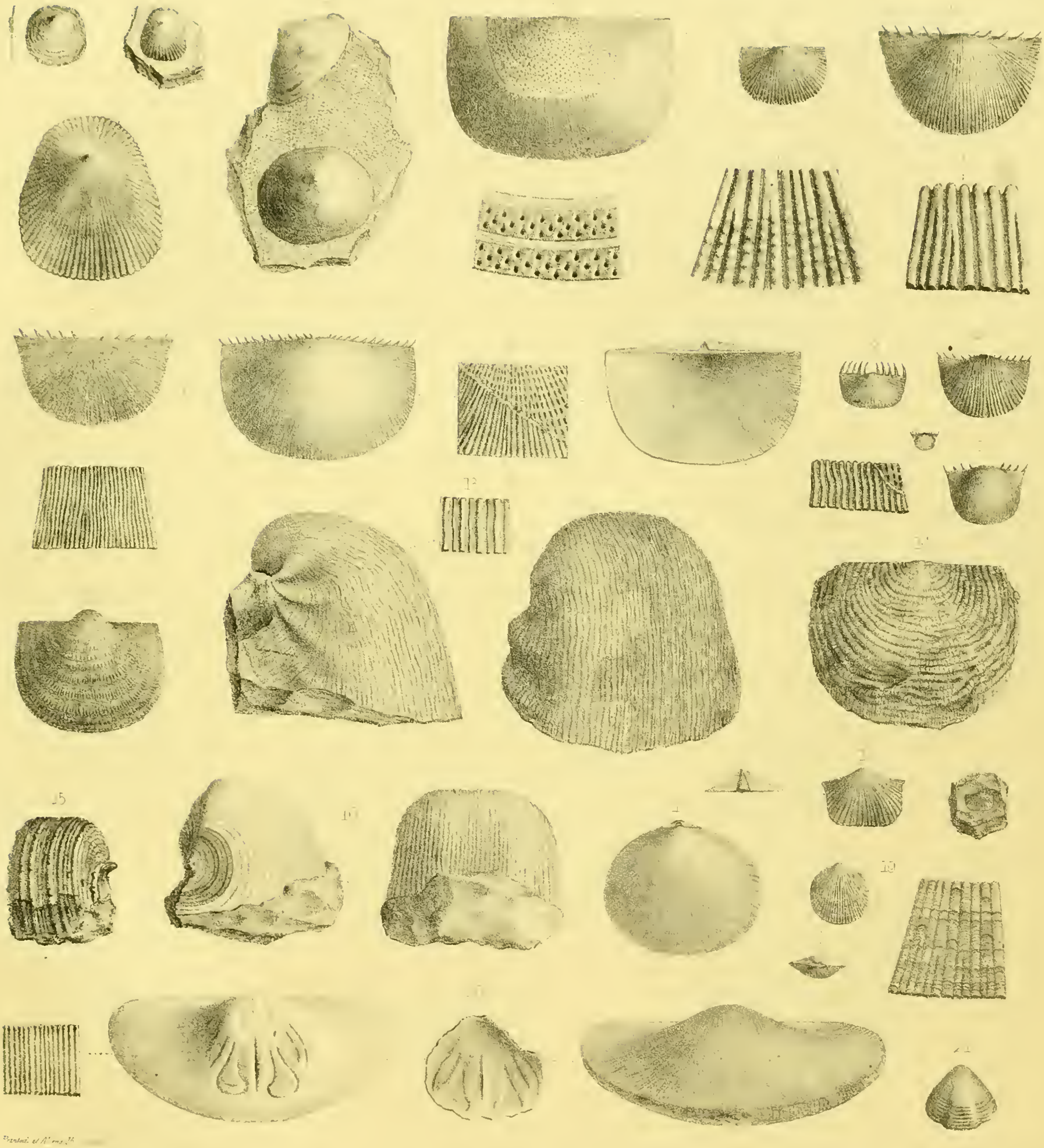
Reticularia striatella

Spirifera

Brachythyris hemispherica

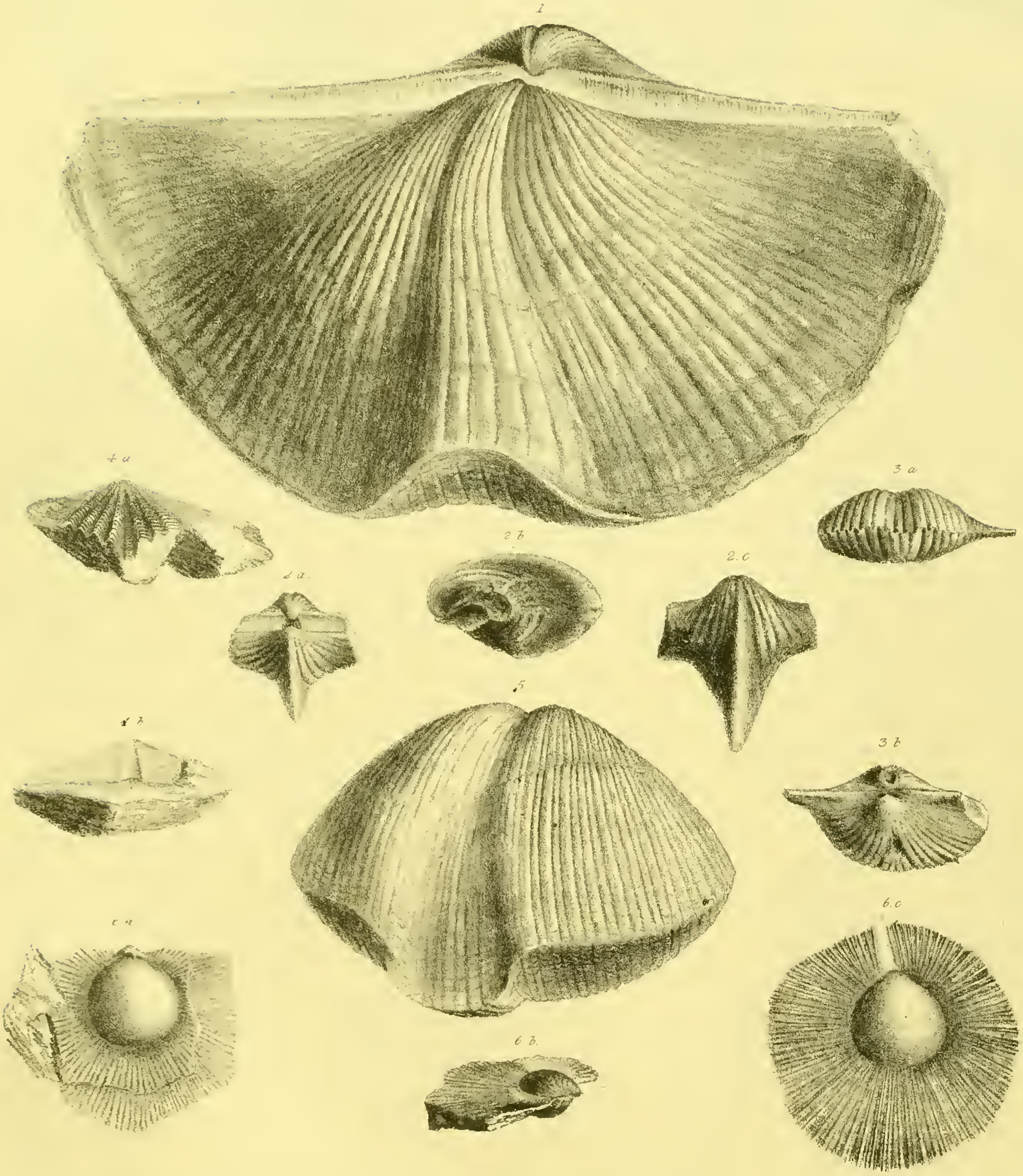
Reticularia reticulata

[illegible] No. XX



1	Orbicula [illegible]	6	Orthis [illegible]	11	[illegible]	[illegible]	[illegible]
2	trigonalis	7	Leptaena Dalmaniana	[illegible]	[illegible]	[illegible]	[illegible]
3	Crania [illegible]	8	multi[illegible]	13	[illegible]	[illegible]	[illegible]
4	Producta [illegible]	[illegible]	[illegible]	14	[illegible]	[illegible]	[illegible]
5	Orthis [illegible]	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
							[illegible]
		11	[illegible]				

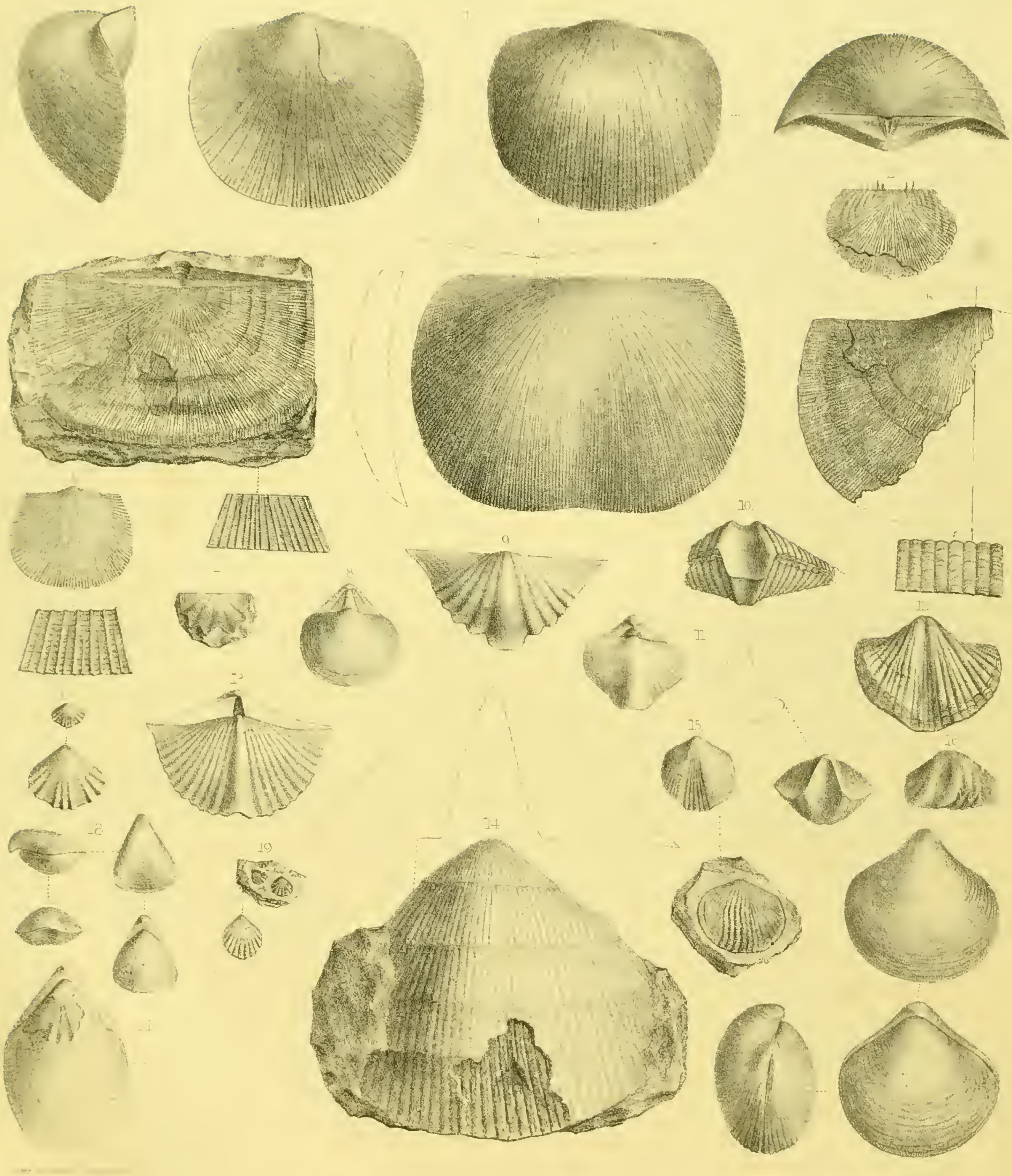
CARBONIFEROUS LIMESTONE. PLATE. XXI



1 Spirifera princeps
2 ornithorhyncha
3 calcarata

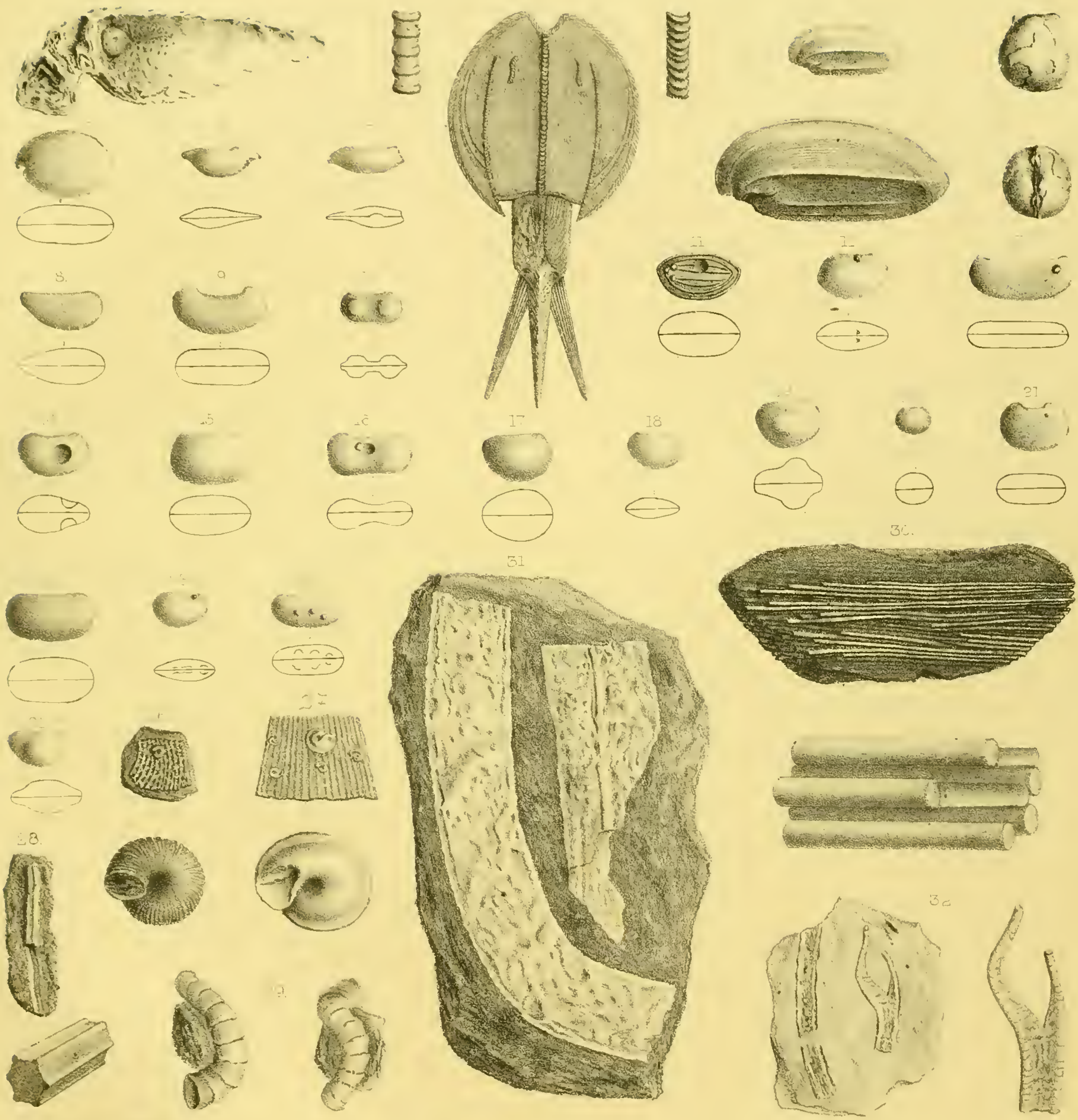
4 Cyrtia laminosa
5 Brachythyris planicostata
6 Actinoconchus paradoxus

Printed at Allens Tracing.

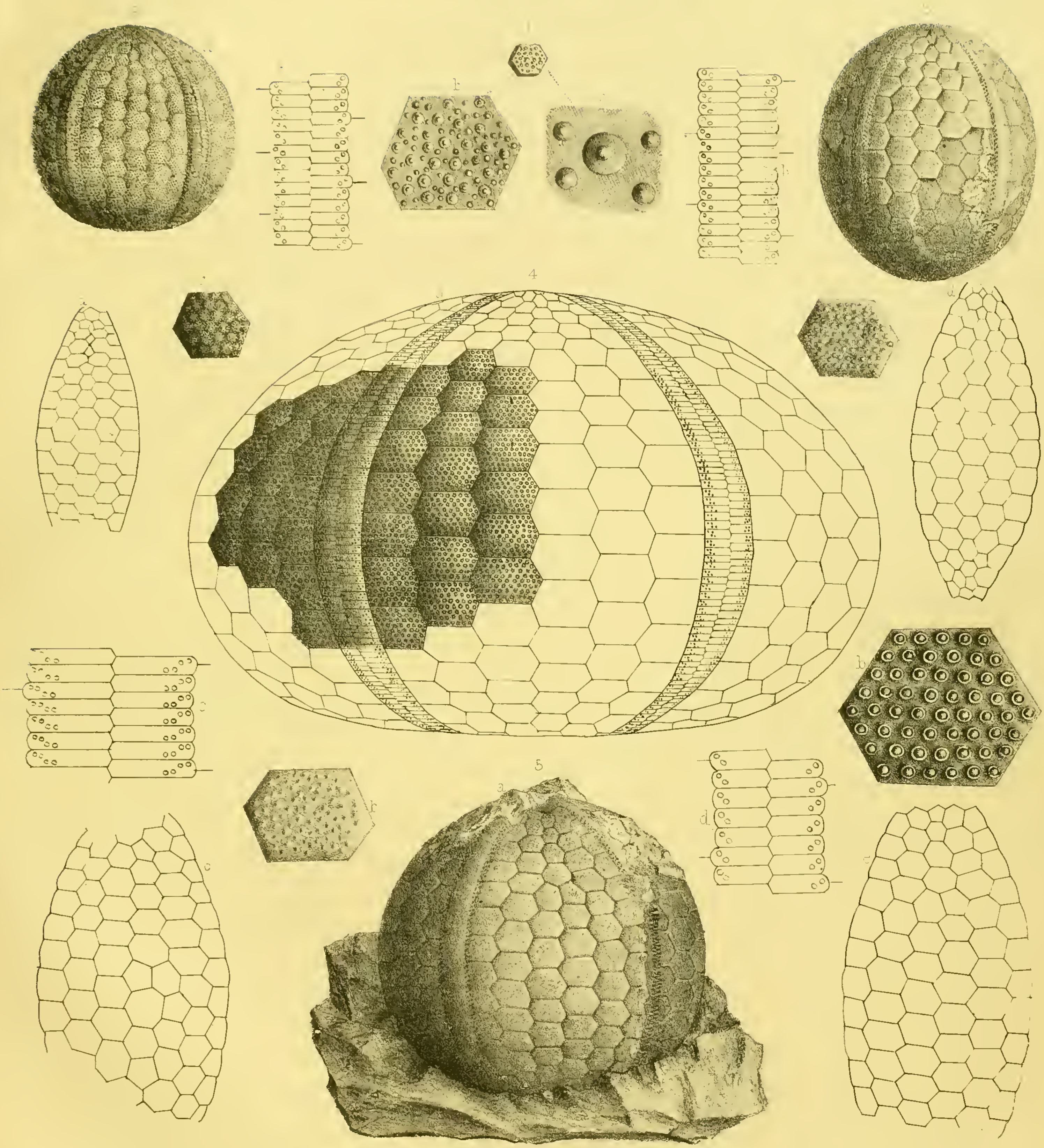


1 [illegible]
2 [illegible] papyracea
3 [illegible] Bechi
4 [illegible] Kelli
5 [illegible]
6 [illegible] radia[illegible]
7 [illegible]
8 [illegible] cephaloides
9 [illegible]
10 [illegible]
11 M[illegible] rhomboidalis
12 [illegible] furcata
13 [illegible] mesogona
14 [illegible]
15 Atrypa semisulcata
16 Atrypa [illegible]
17 [illegible] triplex
18 [illegible] gregaria
19 [illegible] nana
20 [illegible] obtusa
21 [illegible] virgoides

CARBONIFEROUS LIMESTONE



1	Astacus Phillipsii	9	Cythere [illegible]	17	Cythere [illegible]lata	25	Cythere gibberula
2	Dithyrocaris Scouleri	10	[illegible]	18	[illegible]	26	Spirorbis caperatus
3	[illegible]	11	[illegible]	19	[illegible]	27	Spiroglyphus marginatus
4	Entomoconchus Scouleri	12	cornuta	20	pusilla	28	Serpula hexicarinata
5	Dapsilia [illegible]	13	elongata	21	[illegible]	29	scalaris
6	Bairdia curtus	14	excavata	22	oblonga	30	parallela
7	gracilis	15	Hibberti	23	spinigera	31	Serpulites membranaceus
8	Cythere amygdalina	16	impressa	24	trituberculata	32	carbonarius



Printed at Allen's 15 Grafton St

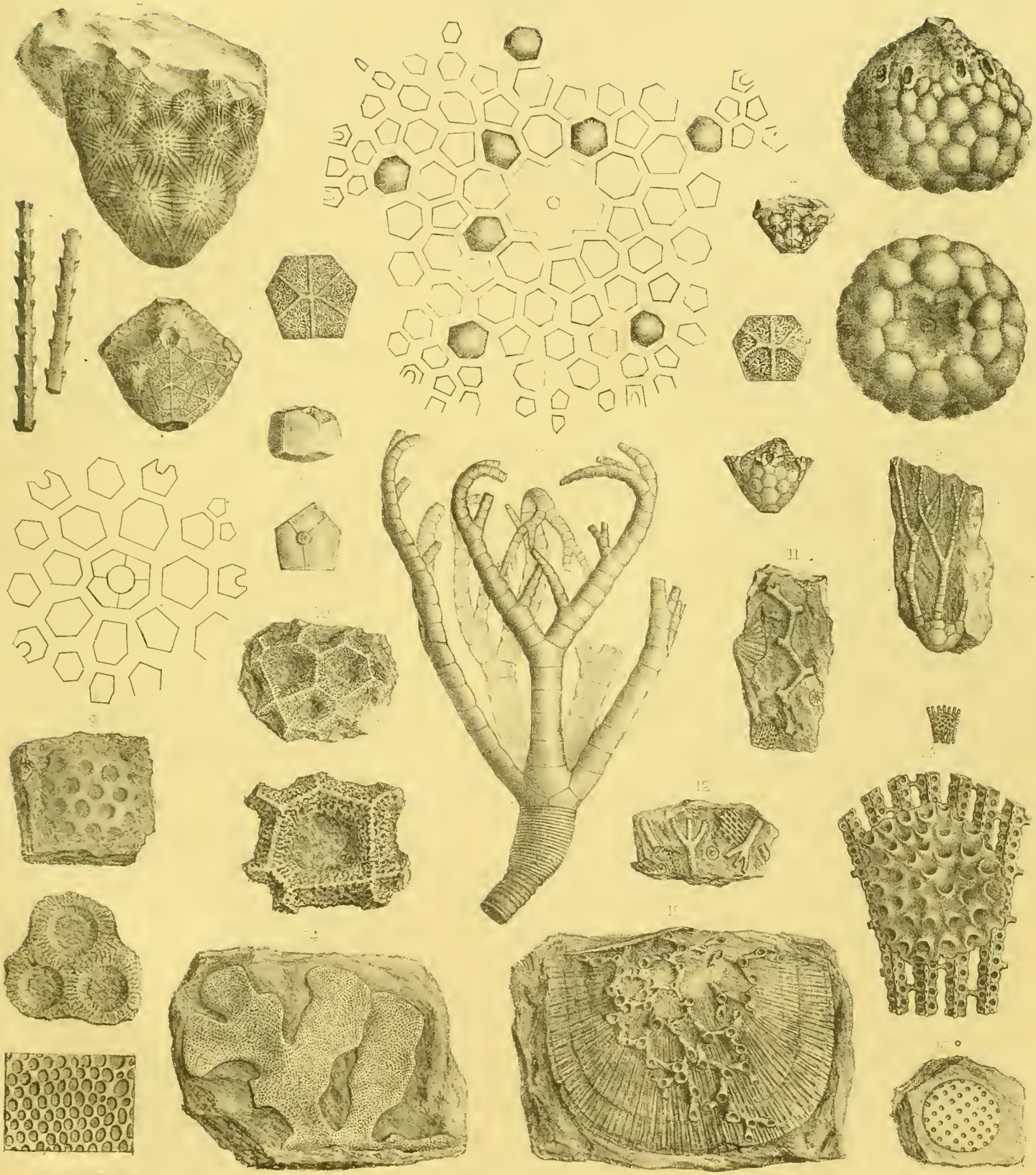
1 Palæchinus [illegible]

2 — elegans

3 — ellipticus

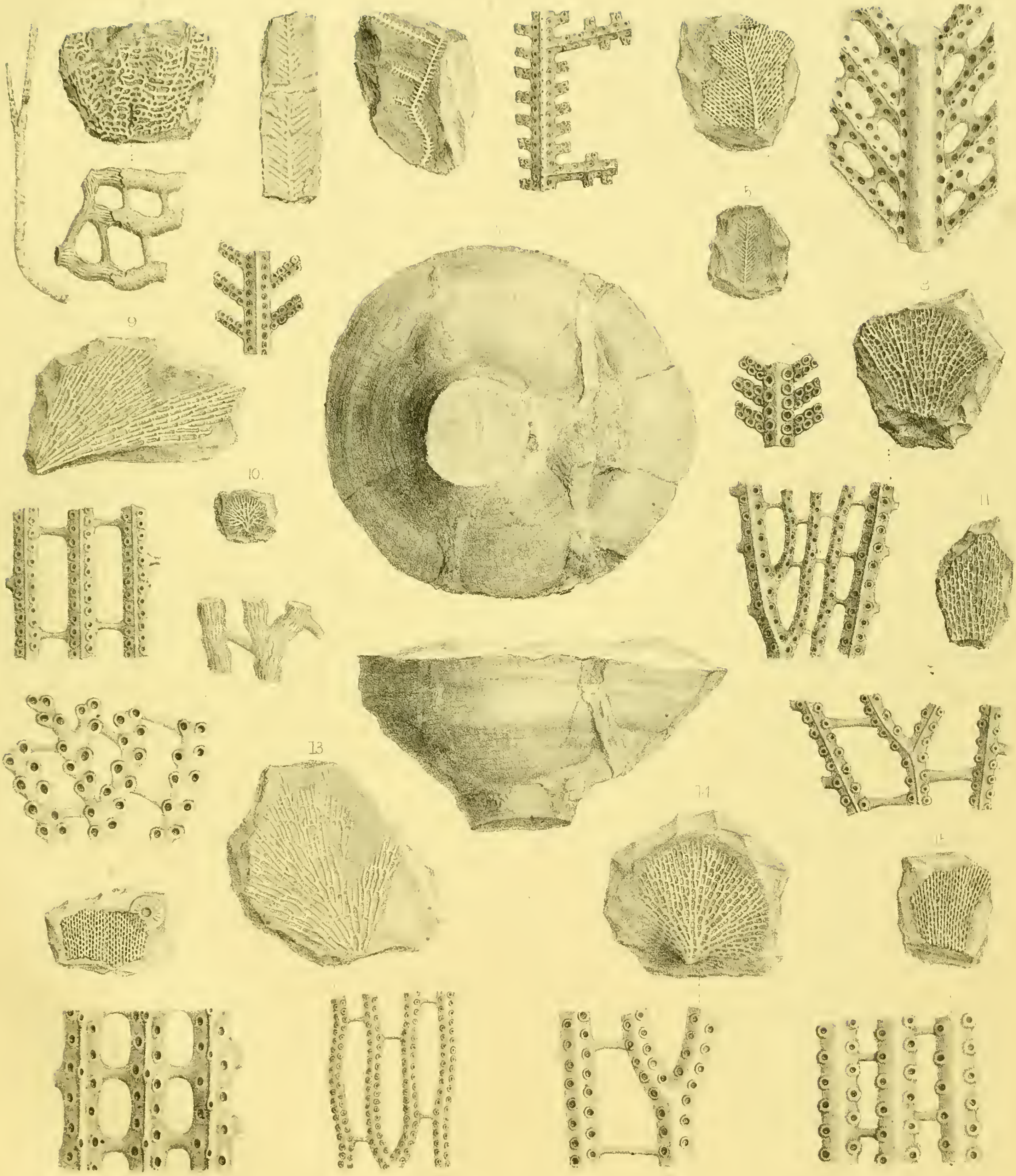
4 — gigas

5 — sphæricus



...anea

Vincularia ...



grandis	6 Ptylopora pluma	
pulcherrima	Turbinolia expansa	
gracilis	Fenestella	13
	9 multiporata	14. Morrisii
	10 frutex	15 oculata