

V.—*Report on the Fossil Invertebrata from Southern India, collected by Mr. Kaye and Mr. Cunliffe.*

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PART THE FIRST.—*Description of the Species.*

MOLLUSCA.

Cephalopoda.

GENUS NAUTILUS, Linnæus.

THERE are four well-marked species of this genus in the collection. Two of them appear to be identical with European species, and two are new. The former are cretaceous forms: of the latter, one is nearly allied to a cretaceous and the other to oolitic species. Not one of the specimens is in perfectly good condition, so that the certainty of the determinations may hereafter be questioned.

1. *Nautilus lævigatus*, D'Orbigny?

N. testâ subglobosâ, inflatâ, lævigatâ, subumbilicatâ; aperturâ orbiculari-lunatâ; septis obsolete undulatis; siphunculo subcentrali.

Median diameter, 6 inches. Breadth at base of aperture, 4 inches.

Shell subglobose, much-inflated, slightly umbilicated, externally smooth; the mouth suborbicular and lunate. The chambers have a slight tendency to show a sinuated outline. The siphon is a little nearer to the spire than to the back. The spaces between the chambers and the degree of inflation of the entire shell vary in different specimens. Young examples have a very smooth shell. I cannot distinguish it from the *Nautilus lævigatus*, except in that the chambers of the French species are usually wider. M. D'Orbigny describes his shell as from the "couches moyennes de la craie, à l'étage des craies tufau et au grès vert." (D'Orb. P. F. Terrains Crétacés, vol. i. p. 84. pl. 17.)

Locality, Pondicherry.

2. *Nautilus sphaericus*, sp. nov.

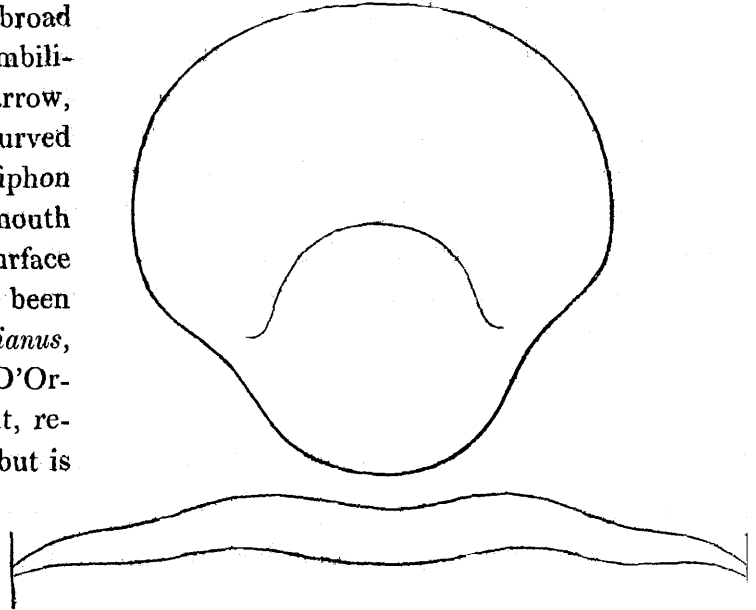
N. testâ globosâ, inflatissimâ (lævigatâ?), umbilicatâ; aperturâ latissimâ, lunatâ, angustatâ; septis arcuatis; siphunculo excentrico.

Median diameter, 4 inches.

Breadth at base of aperture, $4\frac{7}{10}$ inches.

A very globose shell, as broad as long. It is distinctly umbilicated. The chambers are narrow, and the septa are slightly curved towards the umbilicus. The siphon is ventrally excentric. The mouth is lunate and narrow. The surface of the shell appears to have been smooth. *Nautilus Bouchardianus*, described and figured by D'Orbigny from the French gault, resembles the Indian species, but is not so globose, and the siphon is differently placed.

Locality, Pondicherry.



3. *Nautilus clementinus*, D'Orbigny?

N. testâ subglobosâ, inflatâ, reticulatâ, umbilicatâ; aperturâ latè lunatâ; septis simplicibus.

Median diameter, $2\frac{4}{10}$ inches.

Breadth at base of aperture, $1\frac{7}{10}$ inch.

A subglobose inflated shell, distinctly umbilicated, having a wide lunate mouth and very simple chambers. The surface is transversely furrowed by numerous regular shallow sulcations, separated by acute ridges, and reticulated by less strongly marked longitudinal striations. The specimens are much injured, and the position of the siphon is not distinctly seen. I cannot distinguish between the Indian fossil and the young of *Nautilus clementinus* (D'Orb. Pal. Franc.; Ter. Crét. i. pl. 13 bis), as described and figured by D'Orbigny from the French gault.

Locality, Verdachellum.

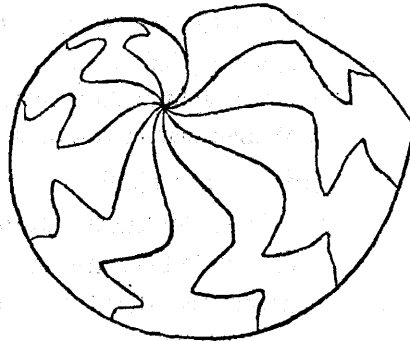
4. *Nautilus Delphinus*, sp. nov.

N. testâ compressâ, discoideâ (lævigatâ?), subumbilicatâ; dorso rotundato; aperturâ lanceolatâ; septis sinuatis, lateraliter in medio lobo triangulari subacuto ad basim superiorem angulato; siphunculo?

Median diameter, $3\frac{6}{10}$ inches.

Breadth at base of aperture, $2\frac{3}{10}$ inches.

This species is much-compressed, especially dorsally: the angles of the mouth project so as to give the aperture a hastate or triangular form. The surface of the only specimen is too much worn to be made out clearly. The septa are remarkably sinuous; laterally and nearly in the centre they make a bend, the sweep of which is abruptly curved and directed towards the umbilicus so as to form a sort of triangular lobe, resembling in form a porpoise's



fin, and angulated at its superior base, whence the line crosses the back in a slightly undulated curve. It belongs to a group of forms mostly oolitic. The *Nautilus sinuatus* of Sowerby and *Nautilus biangulatus* of D'Orbigny are its nearest allies.

Locality, Pondicherry.

GENUS AMMONITES, Auctorum.

There are twenty-three species in the Pondicherry collection. They belong to the following sections, as established by Von Buch and D'Orbigny:—

1st, *Fimbriati*, a group especially characteristic of the lowest part of the cretaceous system and extending into the oolites. To this division belong *Ammonites Vishnu* and *Ammonites Brahma*.

2nd, *Ligati*, a group of which all the known species are cretaceous, and the greater number from the lowest beds. The Pondicherry species of this division are no fewer than eight, most of them closely allied to fossils of the beds called in France "Lower Neocomian."

3rd, *Heterophylli*, a group almost entirely confined to the lowest portion of the cretaceous system. Seven Pondicherry Ammonites belong to this division, many of them extremely near French Neocomian species.

4th, *Flexuosi*, a lower cretaceous group of small extent. One Indian fossil, the *Ammonites Egertoni*, belongs to it.

5th, *Dentati*, an extensive group of lower cretaceous forms. Two of the Indian species belong to this division.

6th, *Clypeiformi*, lower cretaceous and oolitic. There is one Pondicherry species, *Ammonites Siva*.

7th, *Armati*, a group of upper oolitic forms. *Ammonites Menu* appears to belong to this section.

8th, A single Ammonite, *A. Rembda*, represents a type of forms as yet uncharacterized, and which I propose to call *Lævigati*.

*Fimbriati.*1. *Ammonites Vishnu*, nov. sp. Pl. VII. fig. 9.

A. testâ compressâ, lævigatâ, transversim costatâ, costis simplicibus, distantibus, prominentibus; dorso rotundato; aperturâ ovato-cordatâ.

Diameter, $4\frac{1}{4}$ inches.

Diameter of disc formed by the inner whorls, 2 inches.

Medium thickness of outer whorl, 1 inch.

Whorls five or six, rounded, forming a concave disc, which however is not deep in the centre. Each whorl is banded at intervals by strong rounded ribs, those towards the mouth on the outermost whorl becoming fewer and more distant, and presenting the character of oral varices. There are fifteen on the outer whorl. The surface of the shell appears to have been smooth. The mouth is broadly ovato-cordate. The sutures are plainly seen on the second volution. The young shell was probably ribless.

In the specimen figured, the sutures of the chambers are visible only on the exposed portion of the second whorl. The lateral lobes are pinnate and bifurcate, and appear to have been three or four in number. Their relative arrangement is not exposed.

The cast is deeply furrowed in the region of each varicose rib, and undulated beneath the intermediate ribs.

This species approaches very nearly the Neocomian *Ammonites honoratissimus* of M. D'Orbigny (Ter. Crét. i. plate 37). It differs in being less compressed; in having more numerous transverse ribs, especially on the second whorl; and in the form of the aperture, which in the French species is oblongo-ovate.

Locality, Pondicherry.

2. *Ammonites Brahma*, nov. sp. Pl. VIII. fig. 1.

A. testâ compressâ, lævigatâ, transversim sulcatâ costatâque; sulcis marginatis distantibus, costis numerosis lateraliter obsoletis; anfractibus sex, internis acutè tuberculatis; dorso rotundato; aperturâ reniformi.

Diameter 4 inches.

Diameter of inner whorls 2 inches.

Median breadth of outer whorl $1\frac{1}{4}$ inch.

Shell compressed; whorls six, smooth, convex, the outermost transversely sulcated and strongly ribbed at intervals; the strong ribs six or seven in number, the intermediate ones continuous over the rounded back, but obsolete at the sides: the inner whorls with fewer sulcations, but ornamented with acute tubercles; the umbilicus is rather deep; the aperture is transversely reniform. Young shells

have their backs smooth and all the whorls tubercled. [This character especially distinguishes *A. Brahma* from *A. Vishnu*.]

The sutures of the chambers resemble those of *A. Vishnu*. The dorsal lobe is very large and ramified, much exceeding the superior lateral, which is bifurcated. The saddles are in pairs, three or four in number, and much-branched. The line of lobes is very oblique.

Locality, Pondicherry.

Ligati.

3. *Ammonites Juilleti?* Pl. VII. fig. 2.

A. Juilleti, D'Orbigny, Pal. Fr. Ter. Cr. i. p. 156. pl. 50. f. 1-3?

A. testâ suborbiculari, lævigatâ, umbilicatâ; anfractibus 5 rotundatis; aperturâ circulari.

| | Dimensions of Pondicherry specimen. | Dimensions of a French specimen. |
|---|--|-------------------------------------|
| Breadth | $0\frac{7}{12}$ inch. | $0\frac{7}{12}$ inch. |
| Breadth of outer whorl at the mouth | $0\frac{3}{4}$ inch. | $0\frac{3}{4}$ inch. |
| Breadth of outer whorl at the com- mencement of the second | $0\frac{2}{3}$ inch. | $0\frac{2}{3}$ inch. |
| Breadth of umbilicus | $0\frac{2}{3}$ inch. | $0\frac{2}{3}$ inch. |

The above dimensions present the chief differences between an Indian specimen and one from Castellane (in Mr. Pratt's collection) nearly of the same size. The shell is suborbicular and rather tumid; the umbilicus deep; the whorls 5, rounded and apparently smooth. [M. D'Orbigny in a supplementary note on *A. Juilleti* speaks of striated specimens.] The aperture is circular.

The chambers are very much divided. The lateral lobes are two, deeply cleft and bifurcated, especially the superior one, which however is scarcely so long as the deeply divided and much-ramified dorsal. The saddles are deeply bilobed, the dorsal one, which is largest, most regularly. The divisions of the chambers in the Indian species very closely resemble those in the French species. For the present, I cannot safely separate the one from the other. The French *A. Jeannoti* is described by M. D'Orbigny from specimens collected near Gap, in Neocomian marls.

Locality, Pondicherry.

4. *Ammonites Kayei*, sp. nov. Pl. VIII. fig. 3.

A. testâ discoideâ, depressâ, latè umbilicatâ, transversim striatâ sulcatâque, striis minutissimis obliquis; sulcis distantibus paucis; anfractibus 8 planiusculis; aperturâ reniformi.

| | |
|------------------------------------|-------------------------|
| Diameter | $2\frac{3}{10}$ inches. |
| Diameter of umbilicus | $1\frac{2}{10}$ inch. |
| Thickness of outer whorl | $0\frac{7}{10}$ inch. |

Shell discoid and resembling a *Planorbis* in shape; remarkable for the wide con-

cave umbilicus exposing numerous depressed whorls, usually eight or nine in number. These whorls are furrowed at intervals by deep, oblique and slightly undulated furrows of growth, about four of which are seen on the cast of the outer whorl: when the shell is present the furrows are filled up. The surface of the true shell is very finely marked by regular oblique transverse striæ, the interstices of which rise into minute ridges like those seen on the epidermis of many *Helices*, as *H. pulchellus*. It appears to have been very thin. The back is rounded; the mouth is slightly reniform and very broad.

The chambers of this remarkable species are much divided, there being no fewer than five very narrow and gradually decreasing lobes, more or less trifurcated at their extremities. The intermediate saddles are also narrow and are bifurcated. The dorsal lobe is a little shorter than the superior lateral.

This curious Ammonite, one of the most interesting in the collection, appears to be an extreme form of the group of *Ligati*.

Locality, Pondicherry.

5. *Ammonites Garuda*, sp. nov. Pl. VII. fig. 1.

A. testâ discoideâ, lævigatâ, in umbilico radiatim striatâ; anfractibus 5, ultimo inflato; dorso rotundato, umbilico profundo; aperturâ rotundatâ, subinflatâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $0\frac{9}{10}$ inch. |
| Diameter of outer whorl | $0\frac{4}{10}$ inch. |
| Thickness | $0\frac{1}{20}$ inch. |

Whorls about five, gradually increasing, and the outer one somewhat inflated towards the aperture. The shell appears in some specimens to have been striated, and in others smooth: in the larger specimens radiating striæ are seen in the umbilicus proceeding from the suture of the whorls.

The chambers are very complicated in old specimens, comparatively simple in young (as figured). The lateral lobes are four, the superior ones bifurcated, their divisions trifurcated. The dorsal lobe, which is as long or longer than the superior lateral, is deeply cleft, the branches slender and trifurcating. The saddles are more or less three-branched, their lobules ovate and very regular.

Locality, Pondicherry.

6. *Ammonites Soma*, sp. nov. Pl. VII. fig. 7.

A. testâ discoideâ, lævigatâ, subcompressâ, sulcatâ, sulcis distantibus, anfractibus 4-5, ultimo lato; umbilico parvo, profundo; dorso rotundato; aperturâ suborbiculari, subcompressâ.

| | |
|-----------------------------------|------------------------|
| Diameter | $0\frac{10}{12}$ inch. |
| Diameter of outer whorl | $0\frac{4}{12}$ inch. |
| Median thickness | $0\frac{3}{12}$ inch. |

Whorls about five, suddenly increasing, but somewhat compressed, though thick. Surface apparently smooth, becoming interrupted at distant intervals by oval furrows of growth. Umbilicus very narrow but deep, especially within the second whorl. [In its ally, *A. Garuda*, the outer whorl rises much above the second.] Mouth not dilated, and hence presenting a suborbicular form, somewhat oblong from the compression of sides, so as to be longer than wide. [The mouth of *A. Garuda* is wider than long.]

Chambers very complicated. Lateral lobes 3 or 4, the superior lateral largest, much-divided, trifurcated, and exceeding in length the dorsal. Dorsal lobe deeply cleft, each division branching into antler-like ramifications. Siphonal saddle oblong. Dorsal and lateral saddles bifurcated, much-ramified, divisions narrow. The ramifications of the sutures of the chambers in this Ammonite are much more complicated than in *A. Garuda* of the same size.

Locality, Pondicherry.

7. *Ammonites Chrishna*, sp. nov. Pl. IX. fig. 2.

A. testâ compressâ, discoideâ, lævigatâ; anfractibus depressis, 4-5, ultimo radiatim costato, costis dorsaliter obsoletis; dorso transversè crebrisulcato, sulcis lateraliter obsoletis; aperturâ lunatâ.

| | |
|---|-----------------------|
| Diameter | 4 inches. |
| Median diameter of last whorl | $1\frac{1}{10}$ inch. |
| Thickness | $1\frac{2}{10}$ inch. |

Shell much-depressed, the last whorl gently increasing and leaving the inner whorls exposed, ornamented with ten or eleven radiating curved ribs, which commence above the inner margin, and become obsolete before they reach the back. The back is crossed by numerous sulcations, which however are not continued down the sides, but cease suddenly: there are about thirty-one of these on a specimen of the above dimensions. The umbilicus is shallow, and narrow when compared with the breadth of the shell. The mouth appears to have been ovate.

The lobes of the chambers are about three on each side, and more or less regularly trifurcated. The superior lateral is largest, and greatly exceeds the dorsal, which is wide, and terminates in two not very long spreading branches. The saddles are narrow and bifurcated. The lateral is as large as, or exceeds the dorsal. The auxiliary lobes and saddles suddenly decrease.

This species is related to *Ammonites Carteroni*, a French Neocomian species.

Locality, Pondicherry.

8. *Ammonites Ganesa*, sp. nov. Pl. VII. fig. 8.

A. testâ discoideâ, lævigatâ, dorso rotundato, umbilico profundo, anfractibus 5; anfractu ultimo internè costato-tuberculato; costis 7-8; aperturâ reniformi-subtrigonâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $1\frac{6}{10}$ inch. |
| Diameter of outer whorl | $0\frac{7}{10}$ inch. |
| Breadth | $0\frac{5}{10}$ inch. |

Shell discoid, the whorls ornamented with obsolete ribs on their inner sides, forming elongated tubercles immediately over the deep and steep-sided umbilicus. The whorls are five in all, the outermost broader than all the rest together. The aperture is kidney-shaped and inclined to triangular.

The chambers are complicated. The lateral lobes are three or four in number, much-divided, and more or less trifurcated. The dorsal lobe is nearly as long as the superior lateral, deeply divided, and sends out two narrow trifurcated branches which are separated by a quadrangular, oblong, siphonal saddle. The saddles are bifurcated, their branches narrow, deeply separated and much-ramified.

Locality, Pondicherry.

An abnormal form of the section *Ligati*, approaching nearest a group of gault and upper greensand forms of which the *Ammonites peramplus* of Mantell is an example.

9. *Ammonites Cala*, sp. nov. Pl. VIII. fig. 4.

A. testâ discoideâ, lævigatâ, anfractibus $6\frac{1}{2}$ rotundatis; umbilico lato; dorso rotundato; aperturâ reniformi.

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| Diameter | $1\frac{1}{10}$ inch. |
| Diameter of outer whorl | $0\frac{4}{10}$ inch. |
| Thickness | $0\frac{4}{10}$ inch. |

Shell resembling in shape *Planorbis corneus*. The whorls are six, and exposed in the wide and shallow umbilicus. The mouth is wide in consequence of the dilatation of the outer whorl.

Chambers with many-lobed partitions. Lobes five or six, more or less trifurcated, rather short, rapidly decreasing towards the umbilicus, and placed in an oblique line. Dorsal lobe large, much pinnate and bifurcate, exceeding the superior lateral. Saddles bifurcated and more or less phylliform in their extreme divisions, equalling the lobes in dimensions, and gradually decreasing towards the umbilicus.

This species is nearly allied to the French Neocomian form, *Ammonites Emerici*. It differs however in the absence of distant sulcations, a character which would separate it from the group *Ligati* were it not so very near in all other respects several species of that section, and in the size of the dorsal lobe and number of the lateral ones; the former being much larger in proportion to the superior lateral, and the number of the latter being fewer than in *A. Emerici*.

10. *Ammonites Durga*, sp. nov. Pl. VII. fig. 11.

A. testâ discoideâ, lævigatâ, compressâ, anfractibus 4, planis, suturis profundis, dorso rotundato, compresso; aperturâ lanceolato-ovatâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $0\frac{8}{10}$ inch. |
| Diameter of outer whorl | $0\frac{3}{10}$ inch. |
| Thickness | $0\frac{4}{10}$ inch. |

Shell resembling a flattened species of *Planorbis*, the outer whorl dorsally compressed so as to exhibit a slight tendency to carination; the inner whorls exposed, 4 or $4\frac{1}{2}$, their inner margin sudden and steep. Umbilicus shallow. Chambers apparently rather simple; lobes about four, the dorsal nearly equalling the superior lateral, which appears to be trifurcated, and not so broad as the former.

Locality, Pondicherry.

Heterophylli.

11. *Ammonites Indra*, sp. nov. Pl. XI. fig. 7.

A. testâ inflatâ, umbilicatâ, striatâ, lævigatâ, anfractibus amplexantibus, dorso rotundato aperturâ dilatâ, ovatâ.

| | |
|-----------------------------------|-------------------------|
| Median diameter | $3\frac{4}{10}$ inches. |
| Oral diameter | $4\frac{3}{10}$ inches. |
| Diameter of outer whorl | $1\frac{4}{10}$ inch. |
| Thickness | $1\frac{4}{10}$ inch. |

Shell resembling an umbilicated *Nautilus*, much-dilated at the mouth, where the outer whorl becomes also somewhat elongated. Surface minutely striated, though at first glance appearing smooth and polished. The umbilicus is small; in the specimens examined it was hidden by rock. The umbilical side of the outer whorl is rounded and sloping. The sutures are beautifully complicated. The lateral lobes are four or five, gradually diminishing: they are trifurcated and much-divided, springing from very narrow bases. The superior lateral is much the largest, and slightly exceeds the very large, much-ramified and deeply bifurcated dorsal. The saddles are bifurcated, their extreme divisions more or less phylliform: the superior lateral saddle is largest. The partitions are arranged obliquely, and their sutures encroach nearly on each other.

A very distinct and beautiful species, one of the finest in its section.

Locality, Pondicherry.

12. *Ammonites diphyloides*, sp. nov. Pl. VIII. fig. 8.

A. testâ compressâ, lævigatâ; umbilico leviter impresso; anfractibus amplexantibus latera-liter depressis; dorso rotundato; aperturâ ovato-lunatâ.

| | |
|----------------------------------|-----------------------|
| Diameter | $0\frac{8}{10}$ inch. |
| Diameter of body-whorl | $0\frac{4}{10}$ inch. |
| Thickness | $0\frac{3}{10}$ inch. |

Resembling *A. Rowyanus* in form, but compressed and not dilated at the mouth.

The surface appears to have been quite smooth. The umbilicus is very small, and not so deep as in the last species. The mouth is ovate and lunate, through the projection of the returning whorl.

The divisions of the partitions are numerous and short. The lateral lobes are seven or eight in number, trifurcated, though but slightly divided, much-dentated and separated by secondary lobes. The dorsal lobe is nearly as long as the superior lateral and broader, bifurcated, each furcation trifurcated and widely spreading. The saddles are bifurcated and their divisions are phylliform.

This Ammonite is very nearly allied to *A. diphyllus*, a French Neocomian species from Senes, and also to *A. picturatus* from the same locality, but I cannot safely identify it with either. I have compared it with specimens of *A. diphyllus* in the collection of Mr. Pratt.

Locality, Pondicherry.

13. *Ammonites Surya*, sp. nov. Pl. VII. fig. 10.

A. testâ compressâ, undulatâ, transversim regulariter sulcato-striatâ; striis ad umbilicum obsoletis; umbilico angustissimo; dorso rotundato; aperturâ elongatâ, compressâ.

| | |
|--|---------------------------------|
| Diameter | $2\frac{3}{4}$ inches. |
| Diameter of outer whorl (largest specimen) | $1\frac{1}{2}$ inch. |
| Median thickness | $0\frac{1}{2}\frac{3}{0}$ inch. |

Shell discoid, much-compressed, so that in young specimens the back has an approach to carination, the outer whorl embracing all the others so as to leave but a very small umbilicus, from which proceed strong undulating ribs, which become obsolete just before they reach the back. The back itself (rounded in adult examples) is crossed by deep regular striæ, which run down the sides on and between the ribs, and become obsolete just before they reach the umbilicus. The mouth is oblong and compressed. The chambers (as seen through the shell of the largest specimen) are very complicated. The lateral lobes are five or six in number, long, slender, ramifying, and trifurcated; the superior lateral much exceeds the dorsal. The saddles are two-branched, the branches much-ramified, the ramifications terminating in ovate phylliform lobules.

A species of the same group with the last, but very distinct from any European forms. *Ammonites difficilis*, a French Neocomian species, figured by D'Orbigny from the Basses Alpes, is perhaps its nearest known ally.

Locality, Pondicherry.

14. *Ammonites Nera*, sp. nov. Pl. VIII. fig. 7.

A. testâ valdè compressâ, umbilicatâ, anfractibus amplexantibus planis, ultimo transversè striatâ, striis tenuissimis, regularibus, continuis, simplicibus, ad umbilicum obsoletis; dorso rotundato; aperturâ oblongâ, compressâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $0\frac{8}{10}$ inch. |
| Diameter of outer whorl | $0\frac{3}{10}$ inch. |
| Thickness | $0\frac{2}{10}$ inch. |

Shell discoid and extremely compressed, the whorls rapidly increasing in breadth; the outer one embracing all the others and leaving a small umbilicus. The back is rounded and crossed by exquisitely fine regular and continuous striæ, which run along the sides towards the umbilicus, but become obsolete before they reach it. At the umbilicus are indications of a few short radiating furrows. Mouth oblong, and most dilated superiorly. Very young shells appear to have been smooth and much thicker in their proportions.

Chambers very complicated and elegant in their pattern. The lateral lobes four or five, very narrow and long, much-divided, and more or less irregularly trifurcated at their extremities. The superior lateral extends much beyond the dorsal, and is much wider than the next lateral. The saddles are bifurcated, narrow, and beautifully crenated. The partitions of contiguous chambers encroach upon one another.

Very near *Ammonites semistriatus*, D'Orbigny, and some allied species from the Neocomian beds of Castellane.

Locality, Pondicherry, apparently rare.

15. *Ammonites Yama*, sp. nov. Pl. VII. fig. 4.

A. testâ compressâ, lævigatâ?, anfractibus planatis, umbilico angustissimo, dorso compresso, rotundato; aperturâ compressâ, oblongâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $0\frac{8}{12}$ inch. |
| Diameter of outer whorl | $0\frac{3}{12}$ inch. |
| Median thickness | $0\frac{2}{12}$ inch. |

Shell very much worn in the only specimen in the collection, much-compressed, the sides of the whorls being almost flat, very gently increasing towards the mouth, which consequently has an oblong compressed form, distinguishing it from all the species in the collection. The outer whorl embraces all the others so as to leave but a narrow umbilicus. The chambers are not visible. This species is nearly allied to *Ammonites Varuna*, but easily distinguished by the peculiar form of the aperture and the equality of the whorls.

Locality, Pondicherry.

16. *Ammonites Varuna*, sp. nov. Pl. VIII. fig. 5.

A. testâ discoideâ, depressâ, lævigatâ, anfractibus 4 depressis, umbilico angustissimo, profundo; dorso rotundato; aperturâ dilatâtâ, rotundatâ, subtrigonâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $0\frac{5}{10}$ inch. |
| Diameter of outer whorl | $0\frac{2}{10}$ inch. |
| Thickness | $0\frac{3}{20}$ inch. |

Shell discoid, compressed, the outer whorl embracing the others, so as to leave a very narrow and deep umbilicus, in which the inner whorls are seen separated by a deep suture. The surface appears to have been smooth. The aperture is oblong and inclined to become triangular; the angles are rounded off.

The chambers present four lateral lobes and as many saddles. The superior lateral is very much larger and more divided than any of the others, and extends beyond the dorsal: it is deeply trifurcated and much-denticulated. The dorsal lobe is broad and square, bifurcated at the end, the furcations tridentated and separated by a short square siphonal saddle. The saddles terminate in equal divisions, the lobules being more or less phylliform.

Locality, Pondicherry. A connecting link between the *Ligati* and *Heterophylli*.

17. *Ammonites Rouyanus*, D'Orbigny. Pl. VIII. fig. 6.

A. Rouyanus, D'Orb. P. F. Ter. Crét. i. p. 362. pl. 110. fig. 3-5.

A. testâ inflatâ, lævigatâ (sub lente striatâ), umbilicò impresso; anfractibus amplexantibus, convexis; dorso rotundato, demum striato; aperturâ dilatâtâ, rotundatâ.

Diameter $1\frac{1}{10}$ inch.

Diameter of outer whorl $0\frac{1}{2}\frac{1}{10}$ inch.

Median thickness of outer whorl $0\frac{1}{2}\frac{1}{10}$ inch.

Fragments show that it grows to twice this size.

Shell resembling a *Nautilus* in form, smooth to the naked eye, but when examined with a lens seen to be minutely striated; shining. The umbilicus is imperforate and impressed. The outer whorl embraces all the others, and gradually increases so as to form a wide, round, trumpet-like mouth. The back is beautifully rounded, and in old specimens is finely striated across.

Lobes of the sutures very numerous (seven or more), gradually diminishing towards the umbilicus. The lateral ones trifurcated and acutely pinnate. Dorsal lobe as large as the superior lateral, bifurcated, the furcations trifurcated. Intermediate pinnated but unbranched auxiliary lobes between the primary ones. Saddles bifurcated, parts nearly equal and terminating in phylliform lobules. Dorsal saddle as large as the superior lateral lobe. Siphonal inter-saddle small, linguiform.

Except in the returning whorls of the Indian species being narrower than they are in M. D'Orbigny's figure of *A. Rouyanus*, I cannot distinguish between them: so prefer identifying the Indian with the French species. The latter is from Castellane.

Locality, Pondicherry.

Flecuosi.

18. *Ammonites Egertoni*, sp. nov. Pl. IX. fig. 1.

A. testâ subcompressâ, lævigatâ, transversim radiato-sulcatâ; sulcis lateraliter obscuris, ad

umbilicum et juxta dorsum prominentibus, in dorso interruptis; dorso rotundato, in medio lævigato; aperturâ ovato-trigonâ, angulis obtusis.

| | |
|-------------------------------------|------------------------|
| Diameter | $3\frac{3}{4}$ inches. |
| Length of mouth | $1\frac{3}{4}$ inch. |
| Thickness at mouth | $1\frac{1}{2}$ inch. |
| Thickness at second whorl | $1\frac{1}{4}$ inch. |

A subcompressed shell of several rounded whorls, the outermost much the largest, and ornamented with ribs which, rising strongly from the umbilicus, become almost obsolete on the centre of the whorl, and reappear in the shape of oblong tubercles on the region of the back; these tubercles are however altogether absent in the last chamber on the adult shell. The back itself is rounded and smooth. The mouth is broadly ovate and subtrigonal.

The chambers are rather complicated. There are three lateral lobes, the superior one largest and trifurcated, as are also the others, but in a less degree. The superior lateral greatly exceeds the dorsal, which is short and two-branched, the branches slender and spreading. The saddles are two-branched, the lateral one being larger than the dorsal.

Locality, Pondicherry. A form connecting such Ammonites as *A. Renaussianus* and *A. radiatus* with the group of which *A. Carteroni*, *A. fascicularis*, and the Indian *A. Chrishna* are examples.

Dentati.

19. *Ammonites Cunliffei*, sp. nov. Pl. VIII. fig. 2.

A. testâ compressâ, undulatâ; dorso compresso, lævigato, lateraliter tuberculato, tuberculis distantibus; umbilico angusto, marginato, margine tuberculato; aperturâ compressâ, supernè truncatâ.

| | |
|-----------------------------------|-----------------------|
| Diameter | $1\frac{1}{10}$ inch. |
| Diameter of outer whorl | $0\frac{9}{10}$ inch. |
| Median thickness | $0\frac{4}{10}$ inch. |

Shell laterally compressed, the back much depressed and bordered on each side by a row of distant, very prominent tubercles, seven on each side of the outer whorl. The foremost of these is at some distance from the mouth, and in front of it the undulations on the shell are strongest and inclined to bifurcate. There is another row of smaller and closer tubercles on the inner margin of the whorls, which forms a steep and sudden wall round the narrow umbilicus. Consequently the base of the mouth is broad, and the latter assumes an ovato-quadrate form.

The lateral lobes of the chambers are three, much divided and spreading, and more or less trifurcated. The dorsal lobe is oblong and not deeply divided, but branched at its extremity into two short trifurcating arms. It is fully as long or longer than the superior lateral. The saddles are more or less regularly bifur-

cated and much divided though broad (broader than the lobes). Their extreme divisions are rounded, but not foliaceous.

Locality, Pondicherry.

This very distinct Ammonite appears to be rare. It approaches some gault species, and in the form of its back resembles some French Neocomian Ammonites, but is very distinct from all.

20. *Ammonites Pavana*, sp. nov. Pl. VII. fig. 5.

A. testâ compressâ, undulatâ; dorso depresso, lateraliter obsoletè tuberculato; tuberculis distantibus; umbilico angusto, marginibus crenatis; aperturâ compressâ, supernè truncatâ.

Diameter $0\frac{5}{12}$ inch.

Median diameter of outer whorl . . . $0\frac{2}{12}$ inch.

Median thickness $0\frac{2}{12}$ inch.

Shell laterally compressed, the last whorl very large and suddenly increasing to the mouth, ornamented with undulated slightly raised ridges, some of which, at regular intervals, are rather larger than the rest, and rise into tubercles at the margin of the slightly depressed back. The umbilicus is deep and very narrow, and exposes four or five whorls. The chambers are not seen in the only specimen in the collection. It approaches very nearly to the last species (*A. Cunliffei*), but differs from specimens of the same size in having no strong tubercles on the whorls, especially near the umbilicus; the general aspect is also different. It is evidently a young shell, and probably when full-grown exhibits a much squarer back, which, near the mouth, in the specimen before me, is nearly round.

Locality, Pondicherry.

Clypeiformi.

21. *Ammonites Siva*, sp. nov. Pl. VII. fig. 6.

A. testâ compressissimâ, lævigatâ, angustissimè umbilicatâ, anfractibus complanatis, amplexantibus; dorso acutissimè cultrato, integerrimo; aperturâ sagittatâ.

Diameter $3\frac{1}{2}$ inches.

Diameter of outer whorl $1\frac{7}{10}$ inch.

Thickness $0\frac{7}{10}$ inch.

Shell quoit-shaped, the inner whorls concealed, the umbilicus very small. The surface is smooth; a few fine radiating striæ appearing only on the umbilicus. Back compressed and very sharp. Mouth lanceolate.

The divisions of the septa are numerous but short. The lobes gradually decrease towards the umbilicus. The dorsal lobe is largest. They are more or less irregularly bifurcated. The saddles terminate in large phylliform lobules, which are more or less symmetrically arranged, but the terminal lobule is always in advance

of all the others. As the contiguous chambers encroach on each other at the sutures, great complexity is given to the pattern they describe.

The oolitic *Ammonites discus* (Sowerby), the Neocomian *A. clypeiformis* (D'Orbigny), and the *A. Requierianus* (D'Orbigny) of the French 'craie chloritée' are all very near allies of this fine species from Pondicherry.

Armati.

22. *Ammonites Menu*, sp. nov. Pl. X. fig. 1.

A. testâ discoideâ, inflatâ, obsoletè undulatâ, striatâ sulcatâque, sulcis transversis distantibus, marginatis; dorso lato, subquadrato, lateraliter tuberculato; umbilico impresso; aperturâ latâ (lunato-quadratâ?).

| | |
|-----------------------------------|-------------------------|
| Diameter | $2\frac{7}{10}$ inches. |
| Diameter of outer whorl | $1\frac{1}{10}$ inch. |
| Median thickness | $1\frac{4}{10}$ inch. |

Shell suborbicular, much inflated, smooth or minutely striated, the outer whorls with two series of tubercles, those most dorsal larger than the inner, which have a tendency to be prolonged superiorly into ribs. The back is slightly rounded and free from ribs, but rendered somewhat quadrate by the bordering tubercles. Anteriorly there are two deep sulcations with raised borders, crossing the shell and continuous round the outer whorl. The mouth, which is broken away, appears from the section to have been broad, lunate and somewhat quadrangular, owing to the projecting tubercles. In the young shell the dorsal series of tubercles appears to be wanting.

The chambers are extremely complicated. The lateral lobes are three, of which the superior lateral is much the largest; they are trifurcated and much pinnate. The dorsal lobe is not quite so long as the superior lateral; it is much divided at the sides and separated at the extremity by a short, square, dentated, siphonal saddle. The saddles are as much divided as the lobes and are unequally bifurcated, the furcations deeply crenate and much divided. The nearest allies of this species are oolitic, to which formation all the European species of the division belong.

Locality, Pondicherry.

Lævigati.

I propose to establish a distinct section, under the above name, for *Ammonites* which have smooth, ribless, compressed sides, and the back encircled by a siphoniferous keel.

23. *Ammonites Rembda*, sp. nov. Pl. VII. fig. 3.

A. testâ compressâ, lævigatâ; latè umbilicatâ; dorso carinato; carinâ simplici, filiformi,

lateribus sulcatis; anfractibus complanatis, ad umbilicum abruptis (apertura oblongâ, compressâ).

Diameter?

Diameter of outer whorl $0\frac{1}{2}$ inch.

Diameter of exposed part of second volution $0\frac{2}{1\frac{1}{2}}$ inch.

A second but imperfect specimen in Mr. Cunliffe's collection measures about three inches in diameter. The best-preserved specimen of this very remarkable Ammonite is a small one, unfortunately broken, but what remains is very perfect. The whorls are smooth, extremely compressed; the outer one sloping off to the keel; abruptly and perpendicularly depressed at its umbilical margin, which is also the case with the perfectly flat second whorl. The keel which encircles the back is strongest towards the mouth, and almost obsolete on the inner whorls. It is of a pentagonal form, its sides being hollowed out by two grooves. These grooves are obliquely striated, and the striæ are finely punctate. On the cast the keel is rounded and the grooves are punctate only. The mouth was probably oblong and compressed. There are oblique distant sulcations on the cast indicating temporary mouths.

The chambers, so far as seen, present two large but narrow lateral lobes, which are regularly and deeply trifurcated at their extremities. The superior lateral is much the largest, and extends beyond the deeply bifurcated and wide dorsal. The saddles are narrow and bilobed at their extremities; they do not expand so widely as the lobes.

Locality, Pondicherry.

In the Verdachellum collection are four species of Ammonites; of these, two (*A. Buddha* and *A. Sugata*) belong to the section Heterophylli, or perhaps to the section of which I have made *A. Rembda* the type, and two to the Ligati (*A. Gaudama* and *A. Sacya*); the sections to which all belong indicate a cretaceous age for the beds in which they are found. I have named the Verdachellum Ammonites after Buddhist deities, and the greater number of the Pondicherry species after Brahminical gods. In so large a genus as Ammonites mere descriptive names become inappropriate, since no epithet of that kind can be used which may not apply to many species. Hence such an artificial nomenclature as that I have here adopted becomes not only excusable but convenient, since it indicates, without too strongly insisting on, the geographical region in which the species are found.

24. *Ammonites Buddha*, sp. nov. Pl. XIV. fig. 9.

A. testâ depressâ, politâ, lævigatâ, anfractibus amplexantibus; radiato-sulcatâ, costis intermediis regularibus, latis, rotundatis, supra dorsum continuis, dorso rotundato.

Breadth of last whorl 2 inches.

Thickness $1\frac{1}{2}$ inch.

A fragment of a very beautiful finely-polished Ammonite, the whorls of which appear to have been ornamented with radiating, rather undulating sulcations, separating broad, smooth, rounded ribs which run over the rounded back. The surface is very smooth, but bears traces of minute striæ. It is closely allied to the Columbian *Ammonites Dumasianus*, described and figured by M. D'Orbigny in his 'Geology of South America.'

Locality, Verdachellum.

25. *Ammonites Sugata*, sp. nov. Pl. X. fig. 2.

A. testâ subcompressâ, umbilicatâ, lævigatâ; anfractibus amplexantibus; dorso rotundato, carinato, carinâ elevatâ obtusâ; aperturâ compresso-lunatâ.

Diameter $1\frac{2}{12}$ inch.

Thickness $0\frac{1}{2}$ inch.

A Nautilus-like shell, compressed at the sides, rounded at the back, but bearing an obtuse narrow siphoniferous keel. The surface is smooth; the centre is umbilicated; the mouth is oblong and lunate.

It is allied to the *Ammonites alpinus* of the French gault.

Locality, Verdachellum.

26. *Ammonites Sacya*, sp. nov. Pl. XIV. fig. 10.

A. testâ discoideâ, concavâ, lævigatâ, anfractibus 5, rotundatis, minutissimè transversè striatis; costis obscuris distantibus interruptis; dorso rotundato (aperturâ rotundatâ).

Diameter $1\frac{5}{12}$ inch.

Diameter of last whorl $0\frac{5}{12}$ inch.

Thickness $0\frac{5}{12}$ inch.

A Planorbis-like species, with thick round-backed whorls, so coiled as to exhibit a broad and concave umbilicus. The surface of the shell is minutely striated across. The last whorl is crossed at distant intervals by obscure ribs marking periods of growth. The chambers are not visible.

Locality, Verdachellum.

27. *Ammonites Gaudama*, sp. nov. Pl. X. fig. 3.

A. testâ compressâ, anfractibus planatis ad suturam, abruptè rotundatis; ad dorsum, flexuoso-sulcatis; varicibus continuis, in ultimo anfractu distantibus; dorso rotundato (aperturâ —).

Semi-diameter $1\frac{1}{12}$ inch.

Thickness $0\frac{1}{12}$ inch.

A fragment of a very distinct Ammonite, allied to *A. Mayorianus* of D'Orbigny, having flat coiled whorls, which are semi-sulcated; the furrows run across the rounded back. Several varices of growth cross the outer whorl at irregular distances.

Locality, Verdachellum.

28. Besides the above-described Ammonites from Pondicherry, there is a fragment (represented in Pl. VII. fig. 9) which at first sight seemed to be a portion of some Scaphite, but which I now believe to be a part of the outer whorl of an Ammonite allied to some characteristic oolitic forms (*A. Gowerianus* for example). The whorl is very narrow, and has a back much wider than its breadth. The sides are ornamented with fine deep simple ribs, narrower than the furrows between them. Some of these ribs proceed without increasing over the back and round to the other side; others, in the example before us, meet in threes at short but prominent tubercles which are placed at considerable distances from each other along the side of the back. From the dorsal side of each of these tubercles, three or four similar fine ribs spring and run across the back to the opposite tubercle.

This fragment measures 1 inch across the back and $\frac{6}{10}$ ths of an inch across the whorl. I have named it provisionally *Ammonites? indicus*.

There is a fragment of a very large Ammonite, but undeterminable, among the specimens from Trichinopoly.

Genus BACULITES, Lamarck.

Of this characteristic cretaceous genus, there are two species in the Pondicherry collection, both distinct from all forms hitherto described.

1. *Baculites vagina*, sp. nov. Pl. X. fig. 4.

B. testâ compressâ, angulatâ, lævigatâ, undulatâ; dorso compresso, angusto, plano, marginato; ventre lato, plano; lateribus in medio undulato-tuberculatis; aperturâ obliquâ, sinuatâ.

| | |
|--|-------------------------|
| Length of the most entire specimen | $6\frac{1}{10}$ inches. |
| Breadth at mouth | $1\frac{3}{10}$ inch. |
| Breadth of back | $0\frac{2}{10}$ inch. |
| Breadth of belly | $0\frac{6}{10}$ inch. |
| Thickness at mouth | $0\frac{9}{10}$ inch. |
| Breadth at mouth of largest fragment | 2 inches. |

Shell a long scabbard-like sheath, broad at the mouth and gradually tapering; compressed at the sides, especially dorsally. The back is very narrow and flat, margined along two-thirds of the shell by two very slightly-undulated, obtuse, narrow ridges; from these, for about a third of the breadth, the sides are smooth, or marked only by oblique lines of growth, but in the centre they are undulated by oblique tubercles, which become less numerous and obsolete as the shell becomes narrower. These tubercles are continued slightly to the margin of the broad flat ventral surface. The mouth is very oblique, being produced dorsally into a linguiform process. The upper surface of each of the lateral tubercles is often marked by a little group of groove-like striæ. The cast is very smooth and its angles very obtuse.

The chambers are beautifully marked. There are five lobes and five saddles, all symmetrical. The dorsal lobe is very wide, and its two crenated branches are separated far apart by a wide siphonal saddle. The superior lateral lobe is longer than the dorsal, but not so broad; the inferior laterals are wider than the superior, but not so long. The lateral saddle is longer and broader than the dorsal; the saddles are elegantly, though not deeply, crenate, and the lobes similarly dentate. The ventral lobule is very short, ovate, crenate and unsymmetrical at its extremity.

Locality, Pondicherry. Apparently abundant. Nearly allied to *Baculites incurvatus* of Dujardin, and to the *Baculites anceps* of Lamarck. The form and the more transverse tubercles distinguish it from the former; the tubercles and the conformation of the chambers from the latter.

2. *Baculites teres*, sp. nov. Pl. X. fig. 5.

B. testâ tereti, undique rotundatâ; lævigatâ, leviter undulatâ, striis longitudinalibus obsoletis, aperturâ obliquâ, sinuatâ.

Length (of largest fragment) 2 inches.

Maximum breadth $0\frac{1}{4}$ inch.

Shell completely cylindrical, gently tapering, marked with obsolete regular longitudinal striæ, which are not always clearly visible, and obscure undulating oblique transverse folds. The chambers are not visible in the specimens examined. This remarkable and very distinct Baculite appears to be the analogue of the *B. neocomiensis* of D'Orbigny.

Locality, Pondicherry.

Genus TURRILITES, Lamarck.

To this genus probably belongs a Planorbis-like cast of four contiguous whorls, which are convex, rounded, and obscurely undulated: the aperture is round. I have named it provisionally *Turrilites planorbis*. It measures $\frac{5}{12}$ ths of an inch across, and the last whorl is $\frac{2}{12}$ ths of an inch thick. Pl. IX. fig. 5.

Genus HAMITES, Parkinson.

The Hamites in this collection appear all to belong to a group having widely-apart spiral terminal volutions, a character of the genus *Ancyloceras* of D'Orbigny. But all M. D'Orbigny's species of *Ancyloceras* have the lobes of their chamber-partitions divided into "parties impaires," whereas all the Pondicherry species have their lobes as in *Hamites*, divided into "parties paires," *i. e.* bifurcated instead of trifurcated. I regard *Ancyloceras*, however, as only a section, and scarcely even that of *Hamites*, to which *Cribceras*, or at least a part of that genus*

* See Morris on the genus *Ancyloceras* in Annals of Nat. Hist. vol. xv. p. 30.

may as well be united, and it will be seen that among the following species we have some which assuredly commence life in the form on which M. D'Orbigny has founded his genus *Helicoceras*.

1. *Hamites subcompressus*, sp. nov. Pl. XI. fig. 6.

H. testâ elongatâ, compressâ, crebricostatâ, costis subdistantibus, continuis, simplicibus, obtusis, regularibus, sulcis oralibus interruptis.

Circumference of largest specimen, $1\frac{7}{10}$ inch.

Shell presenting an elliptical section, compressed at the sides, ornamented with encircling ribs which are very regular, and separated by shallow furrows, each of which is about three times the breadth of a rib. At intervals they are interrupted by deep and broad sulcations, indicating stages of growth. The sutures show that the chambers were of no great dimensions, though separated by complicated partitions. Both lobes and saddles are bifurcated and even. The pinnations of the lobes are not deep, hence their margins are but slightly denticulated and the interspaces broad.

Locality, Pondicherry.

2. *Hamites tenuisulcatus*, sp. nov. Pl. XI. fig. 3.

H. testâ elongatâ, rotundatâ, crebricostatâ; costis numerosissimis, filiformibus, continuis, obliquis, regularibus, simplicibus.

Circumference of largest specimen, $2\frac{1}{10}$ inches.

Shell ornamented with very fine and closely-ranged thread-like ribs, which run obliquely though regularly, and are slightly rounded at their summits. In some of the specimens they are interrupted at distant intervals by varices and furrows, indicating arrests of growth. The interstices are narrow, shallow and smooth. All the specimens are more or less curved, some very slightly, others suddenly. The posterior extremity terminates in an obliquely-coiled helicoid spire. The sutures of the chambers are well seen in one of the most curved examples. From it we know the chambers to have been distant, and the partitions divided into evenly furcated lobes and saddles. The largest saddle is the superior lateral; the pinnations of the lobes are not deep, but the larger divisions are wide-spreading. On the whole, the sutures are more complex than in the last species.

Locality, Pondicherry: frequent.

3. *Hamites indicus*, sp. nov. Pl. XI. fig. 4.

H. testâ elongatâ, rotundatâ seu subcompressâ, crebricostatâ; costis continuis, regularibus, simplicibus, subacutis, approximatis (nucleo obtusis).

Circumference of largest specimen, 2 inches.

This Hamite differs from *large-sulcatus* in having much more frequent ribs,

which are in other respects similar to those of the first-described species. The sutures of the chambers are very similar, but the saddles are much more unequal and the lobes more deeply divided. It terminates like the next species in a loose oblique spiral of several whorls.

Locality, Pondicherry.

4. *Hamites large-sulcatus*, sp. nov. Pl. XI. fig. 1.

H. testâ elongatâ, rotundatâ, transversim crebricostatâ, costis continuis, prominentibus, subobliquis, simplicibus, regularibus, distantibus, acutis (in nucleo obtusiusculis).

The surface of this Hamite is barred by very regular sharp ribs, which in some specimens are arranged more or less obliquely. The sulcations between the ribs are quite smooth and rounded. The section of the shell is round, or very slightly compressed. Most of the fragments are straight, but a few are segments of a considerable curve, which shows that the termination posteriorly was spiral. The largest and most curved specimen bears two oral varices. The sutures are seen on some small fragments; they are composed of six lobes and six saddles, both lobes and saddles bifurcated, and not very deeply pinnate. The superior lateral lobe is larger than the dorsal.

There are specimens in the collection of various sizes; the largest measures $2\frac{6}{10}$ inches in circumference.

This species appears to be common at Pondicherry.

5. *Hamites rugatus*, sp. nov. Pl. XI. fig. 2.

H. testâ elongatâ, subcompressâ, transversim crebricostatâ, costis continuis, prominentibus, subobliquis, simplicibus, regularibus, obtusiusculis (in nucleo rotundatis).

Diameter of largest specimen $5\frac{2}{10}$ inches.

This species, which grows to a great size, is encircled by very numerous, prominent and closely-placed ribs. The posterior extremity becomes suddenly spiral, so as to form, when young, a species of the genus *Helicoceras* of M. D'Orbigny. The spire is of three oblique turns, placed quite apart from each other. The partitions of the chambers are very complicated, the lobes and saddles being narrow and much pinnated. They are doubly bifurcated and even.

Locality, Pondicherry.

6. *Hamites nereis*, sp. nov. Pl. X. fig. 7.

H. testâ elongatâ, arcuatâ, compressâ, transversè costatâ, costis frequentibus, interstitiis angustioribus, in dorso subinterruptis; dorso canaliculato.

Circumference of largest specimen $0\frac{9}{10}$ of an inch.

Shell compressed, especially at the back, which is channeled so as to interrupt

the ribs, sometimes entirely and sometimes only imperfectly. Sulcations of the sides twice as broad as the simple and prominent ribs.

Locality, Pondicherry.

7. *Hamites undulatus*, sp. nov. Pl. X. fig. 6.

H. testâ tereti, elongatâ, arcuatâ, transversè costis obscuris undulatâ.

Circumference of largest specimen $0\frac{6}{10}$ inch.

A very slender pipe-like species, distinguished from all the others by its round, smooth, undulated surface.

Locality, Pondicherry.

Genus PTYCHOCERAS, D'Orbigny.

Of a species of this interesting and curious genus, established by M. A. D'Orbigny, there are numerous fragments, beautifully preserved, in the Pondicherry collections. The known European species of *Ptychoceras* are from the lowest beds of the Cretaceous system.

Ptychoceras siphon, sp. nov. Pl. XI. fig. 5.

P. testâ elongatâ, lævigatâ, undulato-plicatâ; plicis prope aperturam frequentioribus.

Length of longest specimen 4 inches.

Median circumference $1\frac{1}{2}$ inch.

The shell is round, straight for the greater part of its length, and tapers posteriorly; at its widest part it makes a sudden crook-like curve to form the aperture. This portion is more frequently plicated, and the plications stronger than at the straight portion; posteriorly it seems to have made a similar sudden curve; in the younger specimens, indeed, so sudden, that the two parts of the crook are touching. The bend below is striated transversely. The nature of the final termination has not been seen.

The chambers present six lobes and six saddles comparatively (with *Hamites*) very simple, and not differing very greatly in size. The dorsal and ventral lobes are largest. The dorsal, as well as the laterals (which are equal), are bifurcated, each furcation slightly bidentate; the ventral is trifurcate. The saddles are broader than the lobes, and composed of two nearly equal, broad, emarginate (bi-lobuled) branches.

Locality, Pondicherry.

Genus BELEMNITES, Lamarck.

Of this genus there are in the Pondicherry collection,—

1. The chambers and part of the sheath of a middle-sized conical species, but indeterminate. The nucleus is represented in Pl. IX. fig. 4.

2. Semi-compressed pipe-like fragments, equal in dimensions throughout, evidently closely allied to the *Belemnites ? ambiguus* of Morton. I have provisionally named them *Belemnites ? fibula*. The figure (Pl. IX. fig. 3) represents the form of the specimen of the natural size.

Gasteropoda.

In the following descriptions of the fossil gasteropodous mollusca of Southern India, I have described under each genus all the species of cretaceous age belonging to it in the collection, whether from Pondicherry, Trinchinopoly, or Verda-chellum. It will be seen that all the species are new, as might indeed have been expected in this group. The allies of many are to be found among European cretaceous fossils, but others are, if anything, more nearly allied to tertiary and recent forms. Several belong to genera hitherto considered of very recent creation. The interpretation of these very remarkable peculiarities will be found in the second part of this report.

The genera are arranged in what I consider the sequence of their alliance. The arrangement differs considerably from that which is usually adopted. I commence with *Trochus* and its allies (*Pleurotomaria ? Nerita* and *Phasianella*), because, among all the genera to be passed in review, these are, in many respects, most highly organized. In them we find indications of a higher organisation, exhibited in the characters of the eyes, tentacula, and appendages of head and body. *Natica* will be found far removed from its usual but incorrect association with *Nerita*; its true position, as is evident to any one who studies and understands the animal, being close to *Bulla*, where also *Tornatella* must be placed, its animal being still more similar to that of the last-mentioned genus.

Genus TROCHUS, Linnæus.

1. *Trochus arcotensis*, sp. nov. Pl. XIII. fig. 9.

T. testâ latè conicâ (umbilicatâ), anfractibus 5 complanatis, æqualiter (5) striatis, transversè obliquè-striatis, ad suturas depressis, ultimo anfractu margine basali acuto, basi planâ, concentricè crenato-striatâ; aperturâ quadrangulari.

Height $0\frac{4}{12}$ inch. Breadth $0\frac{5}{12}$ inch.

A conical flat-whorled shell, resembling some varieties of *Trochus cinereus* in shape. The whorls are five, and are ornamented by a few spiral thread-like ribs with obliquely striated interstices. The striæ run over them, and slightly crenulate the ribs. The base is flat, spirally grooved and ornamented like the upper portion of the basal whorl. There appears to have been an umbilicus, possibly

with a crenated margin like a *Solarium*. The mouth is oblique and quadrangular. The cast is smooth.

Locality, Pondicherry. This species approaches more nearly certain recent *Trochi* than any fossil ones with which I am acquainted.

2. *Trochus radiatulus*, sp. nov. Pl. XIII. fig. 11.

T. testâ conoideâ, anfractibus (6) tumidis, ad suturam depressis; obliquè striatisque (striis subdistantibus), in medio lævigato; ultimo anfractu margine subangulato; umbilico margine subcrenulato; basi convexiusculâ, radiato-striato; aperturâ subangulatâ.

Height $0\frac{3}{12}$ inch. Breadth $0\frac{3}{12}$ inch.

A very pretty little species, resembling the recent *Trochus Adansoni* in general aspect. The whorls are tumid and slightly flattened at their summits, where they are ornamented by rather distant, oblique, deep radiating striæ; these are continuous with fine lines of growth, which run across the apparently smooth sides, and on the basal whorl meet and again become deep around the umbilicus. The aperture is slightly angulated.

Locality, Pondicherry.

3. *Trochus Rajah*, sp. nov. Pl. XIII. fig. 12.

T. testâ conoideâ, anfractibus (6) tumidis, subangulatis, supernè depressis, obliquè-plicatis, plicis distantibus (in anfractibus superioribus incompletis) longitudinaliter sulcato-striatis; basi convexâ; aperturâ quadrangulâ.

Height 1 inch. Breadth $0\frac{1}{2}$ inch.

A conical Cirrus-like species, presenting very distinct characters. The whorls are ventricose and slightly angulated. The shell is ornamented with oblique distant folds crossed by spiral sulcations. The base appears to have been slightly perforated; the aperture is quadrangular. The crest is quite smooth and slightly undulated beneath the folds. In the specimen preserved very little of the shell remains.

Locality, Pondicherry.

4. *Trochus rotelloides*, sp. nov. Pl. XIII. fig. 10.

T. testâ depressissimâ, spiraliter striatâ, anfractibus superioribus planis, ultimo compresso rotundato; basi umbilicatâ, spiraliter striatâ.

Height $0\frac{8}{12}$ inch. Breadth $1\frac{2}{12}$ inch.

A much-depressed Rotella-like shell, but having a deep and well-marked umbilicus. Above it is lenticular, and the suture very shallow: beneath it is slightly convex. The entire shell appears to have been spirally grooved. The only specimen is not in good state. It is, however, easily distinguished from any of its allies.

Locality, Pondicherry.

GENUS PLEUROTOMARIA, DeFrance.

1. *Pleurotomaria indica*, sp. nov. Pl. XIII. fig. 13.

P. testâ conicâ, elevatâ, anfractibus 7, complanatis, in medio vix convexiusculis, spiraliter sulcato-striatis; basi planâ, angulatâ, striatâ; aperturâ angulatâ.

Height $1\frac{9}{12}$ inch. Breadth $1\frac{3}{4}$ inch.

A pyramidal shell, with nearly flat whorls, spirally striated. The spiral sulcations are usually arranged in pairs between two broader thread-like ridges, of which there are about four on each side of the median furrow. The ridges on the summits of the whorls near the suture are strongest. The base appears to have been umbilicated, but the umbilicus is obscured by rock in the only specimen brought home.

In general form and details of sculpture this species approaches the *Pleurotomaria gigantea* of the English lower greensand, and still more nearly the *Pleurotomaria Pailletiana* of the neocomian beds of France.

Locality, Pondicherry.

2. *Pleurotomaria verdachellensis*, sp. nov. Pl. XIV. fig. 8.

P. testâ conicâ, latâ, anfractibus 7-8, convexis, subcarinatis, spiraliter striatis, transversè obliquè-sulcatis; basi marginato, margine incrassato.

Height $2\frac{2}{12}$ inches. Breadth 3 inches.

A conical but slightly depressed shell, with convex whorls, which are almost carinated in the centre. They are spirally striated with rather distant striæ on each side of the narrow mesial furrow. The base is bounded by a thickened margin. Transverse oblique wrinkles run across the whorls from either edge, and meet, forming an angle at the mesial furrow.

It is allied to several French species from the Craie chloritée.

Locality, Verdachellum.

GENUS NERITA, Linnæus.

1. *Nerita ornata*, sp. nov. Pl. XIII. fig. 5.

N. testâ subgloboâ, ovatâ; spirâ parvâ, depressissimâ, anfractibus tribus, ultimo supernè obliquè undulato-sulcato, in medio granulato, infernè obsoletè spiraliter sulcato; aperturâ semilunari, labro lato, lævi.

Diameter $1\frac{1}{2}$ inch. Height $1\frac{3}{10}$ inch. Maximum breadth of aperture $1\frac{2}{10}$ inch.

Shell thick, subglobose, transversely ovate, with three volutions, those of the spire minute. The last whorl sculptured in a remarkable manner, its uppermost part being ornamented with deep-waved sulcations, which are succeeded in the centre of the whorl by obscure granulations, whilst the lower portion is spirally grooved, the grooves becoming obscure. The granulations of the middle part are

doubtless produced by the spiral grooves crossing the extremities of the oblique sulcations and their intermediate ridges. The pillar-lip is broad and smooth. In most of the specimens it is concealed by rock, so that the shell presents the aspect of a *Neritopsis*.

Locality, Pondicherry, where it appears to be common.

2. *Nerita munita*, sp. nov. Pl. XII. fig. 15.

N. testâ late ovatâ, depressâ, spirâ parvâ exsertiusculâ: anfractibus 4 lævibus, ad suturam latè sulcatis, sulco plano, fortè marginato; aperturâ semilunari.

Length $1\frac{1}{2}$ inch. Breadth $0\frac{2}{4}$ inch.

An ovate smooth shell, with a very small and low spire. The whorls are carinated near the suture by a fold which runs along the spire like a little wall. The space between this fold and the suture is flat, not excavated. The characters of the pillar-lip are concealed by rock. It is a very distinct species, and cannot be compared with any fossil with which I am acquainted.

Locality, Pondicherry.

3. *Nerita oviformis*, sp. nov. Pl. XII. fig. 13.

N. testâ ovatâ, globulosâ, inflatâ; spirâ brevi, obtusissimâ; anfractibus 3 lævibus; aperturâ ovato-pyriformi.

Length $1\frac{1}{4}$ inch. Breadth $0\frac{1}{2}$ inch.

A smooth egg-shaped shell with a very obtuse spire, the distinction between the whorls marked only by the suture. The characters of the pillar-lip are concealed by rock. It is as distinct from described fossil forms as the last species.

Locality, Pondicherry.

4. *Nerita compacta*, sp. nov. Pl. XV. fig. 6.

N. testâ ovatâ, subglobosâ, lævigatâ (sub lente minutissimè striatâ), spirâ minutâ, obtusissimâ; suturâ impressâ; anfractibus tribus; aperturâ lunato-truncatâ, labro columellari incrassato.

Length $0\frac{1}{2}$ inch. Breadth $0\frac{4}{10}$ inch.

This beautiful and curious little *Nerita* resembles remarkably some of the varieties of the living *Littorina neritoides*. It is ovato-globose, with a very small and obtuse spire of three whorls, indicated only by the deeply impressed suture. To the eye the surface is smooth, but the lens shows a double striation, consisting of—1st, well-marked regular equidistant lines of growth, and, 2nd, very minute radiating striæ, as if the remains of a glistening epidermis. The mouth is lunate, and truncated by the thickened pillar-lip. Its nearest ally is the species last described.

Locality, Trinchinopoly.

Genus PHASIANELLA, Lamarck.

1. *Phasianella? incerta*, sp. nov. Pl. XIII. fig. 8.

I have applied this name provisionally to a fine fossil shell, from Pondicherry, exhibiting a spire of five gradually decreasing, slightly convex whorls, and a large ventricose, ovate body-whorl. It is smooth, and resembles *Achatina Zebra* in form. The mouth is unfortunately partly concealed and partly broken, but I have little doubt that better specimens will show it to be a *Phasianella*. The specimen figured measured 2 inches in length and $\frac{11}{10}$ across the body-whorl.

Genus TURRITELLA, Lamarck.

1. *Turritella pondicherriensis*, sp. nov. Pl. XIII. fig. 4.

T. testâ elongatâ, crassâ, anfractibus concaviusculis, ad suturas marginatis, incrassatis, rugosis, in medio 4-5 costatis, costis filiformibus, interstitiis striatis; suturis profundis; aperturâ angulatâ, basi carinatâ, planâ.

Transverse diameter of lowest whorl $1\frac{3}{10}$ inch. Height $0\frac{6}{10}$ inch. The largest specimen must have been nearly 5 inches long when entire.

A strong shell, resembling a *Nerinæa*. The whorls are very flat and concave in the centre, where from four to five thread-like ribs encircle them spirally: the lowermost of these threads is most prominent. The whorls are divided from each other by a very deep suture, which is margined by the thickened and irregular crenated upper margin of the continuous whorl. The base is flat and keeled, and the aperture is quadrangular.

Locality, Pondicherry.

2. *Turritella monilifera*, sp. nov. Pl. XIII. fig. 2.

T. testâ conicâ, anfractibus convexis, transversè 3-costatis; costis granulatis, in anfractibus superioribus æqualibus; costâ inferiori in anfractu ultimo obsoletâ; aperturâ rotundatâ, basi convexâ.

Transverse diameter of lowest whorl $0\frac{8}{10}$ inch. Height $0\frac{1}{2}$ inch.

Shell moderately elongated, tapering, with rather ventricose whorls divided by a deep suture. There is a considerable space between the uppermost transverse ridge of one whorl and the lowermost of another. Of two specimens examined, one had eleven whorls; the other was a fragment of a much larger example.

It is distantly related to the *Turritella granulata* of the Blackdown greensand.

Locality, Pondicherry.

3. *Turritella ventricosa*, sp. nov. Pl. XIII. fig. 3.

T. testâ brevi, anfractibus ventricosis, superioribus 4-costatis, ultimo 9-costato, costis lævibus; aperturâ ovato-rotundâ; basi rotundatâ.

Breadth of last whorl $0\frac{1}{2}$ inch. Height $0\frac{4}{10}$ inch.

A ventricose shell of few whorls (in one instance seven), the last comparatively much the largest. They are banded by distant regular spiral ribs, the uppermost of which is distant from the suture. The mouth is slightly angulated at the base.

Locality, Pondicherry.

4. *Turritella Sowerbii*, sp. nov. Pl. XV. fig. 4.

T. testâ conicâ, anfractibus (9) planis ad suturas angulato-impressis, cingulis tribus, cinctis; aperturâ suborbiculari.

Length $0\frac{4}{10}$ inch. Breadth of last whorl rather less than $\frac{1}{10}$ of an inch.

A tapering shell, with nine whorls, which are flat in the centre, and suddenly and angularly sloped off towards the deep suture. Three filiform ridges wind round the volutions, two forming the edges of the flattened space, and the third occupying its centre. The base is rather convex, and the mouth nearly round. The species is gregarious.

Locality, Trinchinopoly.

Genus SCALARIA, Lamarck.

1. *Scalaria turbinata*, sp. nov. Pl. XII. fig. 18.

S. testâ brevi, turritâ, anfractibus 7 ventricosis longitudinaliter costatis, (costis in ultimo anfractu 15) interstitiis striatis; basi carinato; aperturâ suborbiculari.

Length of largest specimen 1 inch. Breadth $\frac{1}{2}$ inch.

A short conical species, having seven ventricose whorls, which are crossed by fifteen rather slender, equal, elevated, continuous ribs, closely packed on the upper whorls. The base is carinated centrally by a spiral rib, below which the longitudinal ribs become less marked. The mouth is slightly angulated by the projection of the basal rib. The interspaces of the ribs are striated. The great breadth of the lowest whorl gives a very conical and distinct form to this shell. There are two specimens in the collection, both from Pondicherry. No recorded cretaceous *Scalaria* resembles it.

Locality, Pondicherry.

Genus VERMETUS, Adanson.

1. *Vermetus? anguis*, sp. nov. Pl. XIII. fig. 1.

To this genus in all probability belongs the fragment of an uncoiled spiral, consisting of two loose turns of angulated rugose whorls spirally striated and semi-plicated.

Locality, Pondicherry.

GENUS CHEMNITZIA, D'Orbigny.

1. *Chemnitzia undosa*. (*Melanopsis undosa*, G. B. Sowerby, MSS.) Pl. XV. fig. 11.

C. testâ turrîtâ, anfractibus 9, convexiusculis, regulariter undulato-plicatis; spiraliter tenuè striatis; ultimo basi lævigato, aperturâ pyriformi.

Length 3 inches. Greatest breadth (of body-whorl) 1 inch.

Shell turreted; whorls 9, slightly convex in the centre, depressed, as if by an obsolete spiral groove, near the deep suture. They are crossed by strong ribs or plications which are suddenly bent in the depressed portion of the whorls. The surface of the shell is minutely striated spirally. When observed with a lens, the interspaces of the striæ are seen to be alternately narrower and broader, and to be decussated by very fine striations of growth. There are fifteen plications on the body-whorl. They become obsolete below the middle. The mouth is pyriform.

Locality. This species occurs at Verdachellum and at Trinchinopoly. The forms are identical in both localities.

GENUS CERITHIUM, Adanson.

1. *Cerithium sphaeruliferum*, sp. nov. Pl. XIII. fig. 6.

C. testâ turrîtâ, anfractibus planis, lineis spiralibus tuberculorum, alternis multò majoribus, cinctis; suturis impressis; basi concentricè sulcatâ.

The fragment preserved of this very distinct species admits of measurement only on the second whorl, which is $\frac{4}{12}$ ths of an inch in length and $\frac{8}{12}$ ths in breadth. This whorl is banded by three series of large bead-like tubercles, separated by as many rows of minute ones. On the body-whorl the row of granules near the suture is the only one much developed, the granules of the other rows being small. On the base, the interspaces of the spiral grooves are not granulated. The sutures separating the whorls are very distinctly marked, and rather wide and deep.

Locality, Pondicherry.

2. *Cerithium scalarioideum*, sp. nov. Pl. XIII. fig. 7.

C. testâ turrîtâ, anfractibus (7-8) planatis, longitudinaliter (16) costatis, costis nodulosis, sulcis spiralibus decussantibus; suturis profundis; basi lævi, bicarinato, carinis crenulatis distantibus; aperturâ orbiculari, canali angusto.

Entire length $1\frac{2}{12}$ inch. Breadth of second whorl $0\frac{5}{12}$ inch. Length of second whorl $0\frac{5}{12}$ inch.

Shell turreted, gradually tapering, with seven or eight flattened whorls, which

are crossed by sixteen longitudinal ribs, broken into tubercles by the decussation of deep spiral furrows. The whorls are separated by a deep suture. The base bears two crenulated or almost granulated spiral ridges; the rest of its surface is smooth. The mouth is rounded and the canal narrow.

This species is allied to *Cerithium pustulosum* of D'Orbigny, and *Cerithium Dupineanum* of the same author, both French species, the former from the Craie chloritée, the latter from the Neocomien.

3. *Cerithium Trinchinopolitense*, sp. nov. Pl. XV. fig. 10.

C. testâ brevi, anfractibus 6 ventricosis, angustis, costatis, ultimo magno; longitudinaliter 12-costatâ, costis spiralibus 4-5 decussantibus; basi convexâ lævi; caudâ latâ, brevi.

Length rather less than $\frac{2}{10}$ ths inch. Breadth $0\frac{1}{10}$ inch.

A small conical species with very tumid narrow whorls, crossed by strong longitudinal ribs and decussated by spiral furrows. The base is convex and smooth, and the mouth terminates in a broad and short canal. It is nearly allied to some lower greensand forms.

Locality, Trinchinopoly.

Genus TRITON, Lamarck.

1. *Triton? atavus*, sp. nov. Pl. XIII. fig. 14.

T. testâ elongatâ, fusiformi, anfractibus (6 an 8?) tumidis, ultimo (1) varicoso; ore rotundato, caudâ angustatâ.

Length 3 inches. Breadth of body-whorl $1\frac{1}{2}$ inch. Length of aperture without canal 1 inch.

A single very imperfect specimen, the generic position of which is however almost certain and very interesting, since the genus, so far as I am aware, has not been observed in cretaceous rocks before. It resembles in form the common *Triton variegatus* and its allies. The surface is so injured as to render its character uncertain, but there are traces of spiral striæ and also of nodulations in the upper whorls. The varix is distinct.

Locality, Pondicherry.

Genus MUREX, Linnæus.

1. *Murex fluctuosus*, sp. nov. Pl. XIII. fig. 19.

M. testâ (brevi) inflatâ; anfractibus convexis rotundatis, longitudinaliter costatis, spiraliter sulcatisque; costis prominentibus, distantibus, continuis; sulcis spiralibus numerosis crenatis, interstitiis elevatis crenatis.

Length of remaining portion of body-whorl $1\frac{3}{12}$ inch. Breadth of body-whorl $1\frac{7}{12}$ inch. Length of second whorl $0\frac{7}{12}$ inch.

A very imperfect specimen of a very well-marked species. The diagnostic character embodies all its features, so far as shown in the example described. Its nearest allies seem to be the shells named by D'Orbigny *Fusus Hieranus* and *Fusus neocomiensis*, both French cretaceous forms.

Locality, Pondicherry.

2. *Murex pondicherriensis*, sp. nov. Pl. XIII. fig. 20.

M. testâ inflatâ, anfractibus convexis, tumidis, ad suturas planiusculis, longitudinaliter spiraliterque decussato-costatis; aperturâ latâ, ovatâ, canali brevi.

Length 1 inch. Breadth of last whorl $0\frac{3}{4}$ inch. Length of aperture nearly $0\frac{3}{4}$ inch.

A ventricose, short-spined shell, with a very large and tumid body-whorl which is crossed by fifteen longitudinal ribs, decussated and rendered strongly nodulose by equidistant spiral ribs. This is also the case in the upper whorls. The mouth is ovate and the canal short and broad.

Locality, Pondicherry.

3. *Murex trinchinopolitensis*, sp. nov. Pl. XV. fig. 7.

M. testâ oblongâ, turrîtâ, crassâ, anfractibus 6, longitudinaliter costatis, transversè costato-striatis, costis longitudinalibus crassis, prominentibus, variciformibus, supernè subangulatis; aperturâ oblongâ, labro externo incrassato.

Length $1\frac{3}{10}$ inch. Breadth $0\frac{7}{10}$ inch.

Shell oblong, thick, whorls six, those of the spire, which is rather more than half the length of the body-whorl, gradually decreasing and angulated: all, as well as the body-whorl, crossed by strong ribs, which are angulated at some distance from the suture: these ribs resemble varices, are rounded and nearly equal. There are eleven of them on the body-whorl, that at the back of the mouth being strongest and most variciform. They are crossed by regular equidistant spiral cords, which are obsolete above the angle of each whorl. Between each pair of spiral cords are three or four deep spiral striæ; their interstices are minutely fenestrated by lines of growth, which also cross over the spiral threads. The mouth is obscured by stone. The canal was short. The shell has much the aspect of a Triton.

Locality, Trinchinopoly; a single specimen in fine preservation.

Genus PYRULA, Lamarck.

1. *Pyrula pondicherriensis*, sp. nov. Pl. XII. fig. 19.

P. testâ oblongo-pyriformi, spirâ brevissimâ, convexiusculâ, anfractibus 3, costis longitudinalibus spiralibusque regulariter fenestratis: aperturâ (oblongâ) labro externo margine dentato.

Length of largest specimen 3 inches. Breadth $1\frac{1}{2}$ inch.

Shell pear-shaped, oblong, very regular in form and sculpture. The spire is scarcely prominent and of only three whorls. The body-whorl is regularly partitioned by numerous equidistant spiral ribs, decussated by similar longitudinal ones. The spiral ribs proceeding to and projecting from the outer margin of the mouth form denticulations.

Fusus infracretaceus and *Fusus ornatus*, both Neocomian fossils from the Aube, species constituted by M. A. D'Orbigny, are allied, especially the latter, to the Indian fossil, which however comes nearer a cretaceous species figured by Römer.

Locality, Pondicherry.

2. *Pyrula cancellata*, G. Sowerby, MSS. Pl. XV. fig. 12.

P. testâ ventricosâ, crassâ, spirâ brevissimâ conicâ, anfractibus 5, ultimò latè pyriformi, supernè carinato, supra carinam concavisculo, undulato-striato et spiralter latè sulcato; labio interno incrassato, reflexo, infernè umbilicato, umbilico lato, marginato.

Length 1 inch. Greatest breadth 9 lines.

Shell broadly pyriform, with a very short spire, the surface marked by undulated striæ and spiral sulcations. The last whorl is strongly carinated above, the space between the carination and the suture sloping but slightly concave. The pillar-lip is broad and spreading. The columella is perforated by a broad umbilicus which is margined superiorly.

“This species somewhat resembles in general form the *Pyrula ficulnea* of the London clay and Calcaire grossier; it may however easily be distinguished by having a longer canal, by the anterior part of the last volution being covered by coarse cancellations, and by its rather open umbilicus.” G. B. Sowerby, MSS.

Locality, Trinchinopoly. The only specimen is in bad condition.

GENUS ROSTELLARIA, Lamarck.

1. *Rostellaria cancellata*, sp. nov. Pl. XIII. fig. 18.

R. testâ conicâ, spirâ longâ, anfractibus 6, rotundatis, bicarinatis, costis longitudinalibus spiralibusque distantibus reticulatis.

Length $0\frac{1}{2}$ inch. Spire $\frac{1}{2}$ inch. Breadth with lip $\frac{1}{2}$ inch.

A young shell, but easily distinguished by its wide window-like sculpture, formed by the distant spiral ribs crossing other equally distant longitudinal ones. The spire is much produced.

Locality, Pondicherry.

2. *Rostellaria securifera*, sp. nov. Pl. XIII. fig. 17.

R. testâ lævi, spirâ conicâ, anfractibus rotundatis, carinatis, labro externo longè producto, carinato, bihamato (hamis obtusis?).

Breadth of body-whorl with its claw $2\frac{2}{12}$ inches. Narrowest part of claw $0\frac{8}{12}$ inch. Across the hooks about $1\frac{6}{12}$ inch.

A fragment of a large and very distinct species, having a much-produced half-ber-shaped outer lip, which is carinated at the back. The surface appears to have been quite smooth. It approaches some gault forms.

Locality, Pondicherry.

3. *Rostellaria palliata*, sp. nov. Pl. XIII. fig. 15.

R. testâ elongatâ, lævissimâ, politâ, spirâ productâ, attenuatâ, labro externo in spiram producto et apicem incrustante.

Largest specimen 2 inches long. Spire 1 inch. Breadth $0\frac{8}{12}$ inch.

A beautiful and very remarkable species, having a spire nearly equal to the body-whorl in length, but, though bare in the young specimen, becoming when full-grown enveloped in the callus-like continuation of the outer lip, which envelopes it so that only the body-whorl and part of the second, third, and fourth volutions are exposed, the apex being entirely covered. The surface is beautifully smooth and polished.

Locality, Pondicherry.

Genus STROMBUS, Linnæus.

1. *Strombus uncatu*s, sp. nov. Pl. XIII. fig. 16.

S. testâ latè ovatâ, crassâ, anfractibus 6, convexiusculis; spirâ exsertâ, lævi: ultimo anfractu supernè regulariter flexuoso-sulcato; labro externo dilatato, latè aliformi, posticè incrassato, margine crassissimo, supernè sinuato, emarginato, infernè caudâ hamatâ; labro interno crassiusculo, spiram vix incrustante.

Length $1\frac{8}{12}$ inch. Breadth $1\frac{2}{12}$ inch. Length of body-whorl $1\frac{4}{12}$ inch.

Somewhat triangular in form in consequence of the peculiar shape of the wing-like outer lip, which is notched above and gradually curves to the canal, which suddenly turns forward in the form of a hook. The back of the lip is strongly thickened. The body-whorl is marked for its upper two-thirds with flexuous regular sulcations, ten to twelve in number. The spire is smooth and short, but prominent. The superior cleft claw of the lip does not rise as high as the suture of the body-whorl. The young shell is smooth and resembles a Buccinum. The cast is smooth and polished. It is distantly allied to the French Neocomian *Rostellaria alpinus*. To the next species it is intimately related. They are both abnormal forms of the genus *Strombus*.

Locality, Pondicherry, where it appears to be common.

2. *Strombus contortu*s, G. B. Sowerby, MSS. Pl. XV. fig. 9.

S. testâ oblongâ, crassâ, spirâ exsertâ, anfractibus 6, superioribus costatis, ultimo semicos-

tato, costis longitudinalibus numerosis, subgibbosis, anticè lævi, labro externo margine crassissimo, lobato, lobo hamato, dorsaliter canaliculato, anticè contorto; labio interno incrassato, calloso, lævissimo, spiram incrustante; caudâ angustâ, hamatâ, intortâ.

Length $1\frac{5}{16}$ inch. Breadth 1 inch. Length of body-whorl 1 inch.

Nearly allied to the last species, but at the same time very distinct from it. The general form is somewhat triangular in consequence of the prolongation of the outer lip, which is bordered externally by a very thick margin which contracts centrally, where a single lobe projects in a hook-like form and appears pedunculated, since it widens out after leaving the body-whorl: the curve of the hook is upwards, and its apex reaches to about a line with the suture of the first volution. Beneath the hooked lobe the body-whorl very gradually narrows, and at the extremity is strongly curved inwards, forming a hooked canal. The upper half of the body-whorl is ornamented by strong ribs, gibbous in the centre and variable in number. The inner lip is callous, and incrusts the front of the spire. The whorls of the spire are all ribbed.

Locality, Trinchinopoly.

GENUS VOLUTA, LINNÆUS.

1. *Voluta pyriformis*, sp. nov. Pl. XII. fig. 1.

V. testâ pyriformi, spirâ brevissimâ, anfractibus 5, lævigatis, supernè ad suturam obsolete excavatis; aperturâ lanceolatâ, columellâ 4-plicatâ; plicis obliquis fortibus, æquidistantibus.

Length $4\frac{1}{2}$ inches. Breadth 2 inches. Height of spire $0\frac{4}{12}$ inch.

Although this shell appears smooth, it is really minutely striated by fine lines of growth: the lower part of the columella is quite smooth, slightly expanded, flattened and polished: the folds of the pillar-lip gradually disappear. From appearances presented by one of the specimens, it is probable that when alive the shell was marked by regular, rather distant, fine longitudinal lines of a light colour on a dark ground. No known cretaceous form of *Volute* approaches this species. It belongs to the same group with the tertiary *Voluta Lamberti*, though very distantly related to that species. The Cutch fossils described by Mr. Sowerby under the name of *Turbinellus bulbiformis* have some relations to this *Volute*.

Locality, Pondicherry.

2. *Voluta purpuriformis*, sp. nov. Pl. XII. fig. 2.

V. testâ ovatâ, spirâ brevi, anfractibus 7, superioribus convexiusculis, omnibus ad suturam læviter excavatis, sulcato-striis, striis in medio ultimi anfractûs obsolete.

Length $2\frac{1}{2}$ inches. Breadth $1\frac{1}{2}$ inch. Height of spire $0\frac{9}{12}$ inch.

An ovate *Purpura*-like shell, with rounded whorls and a short spire. The surface of the body-whorl is furrowed at the lower part by deep regular spiral striæ,

which become rather suddenly obsolete in the centre, but are again strongly marked close to the suture, where all the whorls are slightly hollowed out. The plications of the columella are obscured by rock, but the shell is evidently a *Voluta* of the same group with that last described. Young specimens are not so ventricose as old ones.

Locality, Pondicherry.

3. *Voluta septemcostata*, sp. nov. Pl. XII. fig. 3.

V. testâ elongatâ, fusiformi, anfractibus scabris, convexiusculis, longitudinaliter 7-costatis, costis crassis rotundatis.

Length of the broken specimen $1\frac{1}{2}$ inch. (Probable entire length $1\frac{4}{12}$ inch.) Breadth (full) $0\frac{7}{4}$ inch. Length of second whorl $0\frac{5}{12}$ inch.

Shell lanceolate, whorls probably six or seven; under the lens the surface is rough through raised striæ of growth. The cast is smooth. The ribs become nearly obsolete at the suture, and are very tumid a little above the centre of each whorl.

The London clay *Voluta costata*, is related, but distantly, to this species. A species from the Craie chloritée of France, *Voluta Renauxiana*, is equally near it.

Locality, Pondicherry.

4. *Voluta muricata*, sp. nov. Pl. XII. fig. 4.

V. testâ ovatâ, spirâ brevi, anfractibus 5, ultimo supernè subangulato, longitudinaliter (14) costatâ, spiraliter sulcatâ, costis muricatis, plicis inferioribus frequentioribus; aperturâ lanceolatâ.

Length $0\frac{1}{2}$ inch. Breadth $0\frac{7}{2}$ inch. Height of spire $0\frac{5}{4}$ inch.

An ovate shell, barred by fourteen longitudinal ribs which are decussated and muricated by transverse ones, which are distant at the upper part of the body-whorl, where they leave nearly square interstices, but are much more frequent in the middle and very numerous towards the canal, where the longitudinal ribs become obsolete. The sutures are very slightly compressed. The plaits on the pillar-lip are not exposed.

The London clay *Voluta Lima*, comes very near this species, but is easily distinguished by the presence in the former of a canal winding round the summit of the whorls.

Locality, Pondicherry.

5. *Voluta Camdeo*, sp. nov. Pl. XII. fig. 5, a, b.

V. testâ ovato-oblongâ, spirâ exsertâ, anfractibus 6, planatis supernè subangulatis, prope suturam canaliculatis; longitudinaliter multiplicatis; ultimo infernè de medio spiraliter striato, suturis profundis.

Length $0\frac{4}{12}$ inch. Breadth $0\frac{3}{4}$ inch.

A very beautiful species. The whorls are all ribbed longitudinally; the ribs very numerous, rounded, and about as broad as the interspaces. The spire is of some length and turreted in consequence of the flatness of the whorls, which suddenly turn in towards the suture, the angle being furrowed by a deep and narrow canal. The sutures are deeply impressed. The lower half of the body-whorl is marked by regular, rather distant, well-defined spiral striæ.

Locality, Pondicherry.

6. *Voluta cincta*, sp. nov. Pl. XII. fig. 6.

V. testâ oblongâ, spirâ conicâ, anfractibus 6, supernè angulatis, longitudinaliter costatis, costis in angulis turgidis et prope suturam subobsoletis, spiraliter sulcatis, sulcis numerosis interstitiis striatis, marginibus internalibus crenulatis; aperturâ angulatâ, elongatâ, 4-5-plicatâ.

Length $1\frac{1}{4}$ inch. Breadth $0\frac{9}{12}$ inch. Spire $0\frac{1}{2}$ inch.

A more or less Cone-like shell, variable in form and sculpture, the number of longitudinal ribs and the strength of the spiral ones varying in almost every specimen. The former are usually about eighteen. One character is however constant; the summits of the whorls are angulated and more or less flattened. The flattened space is marked by spiral striæ only, and is bordered at the suture by a thickened crenulated rim.

The eocene *Voluta undosa* is related to this species, but differs in sculpture. No described cretaceous form approaches it.

Locality, Pondicherry; also at Trinchinopoly.

7. *Voluta breviplicata*, sp. nov. Pl. XII. fig. 7, a, b.

V. testâ ventricosâ, spirâ brevi, longitudinaliter plicatâ; anfractu ultimo inflato, supernè plicato, plicis numerosis, brevibus, evanescentibus, spiraliter striato, striis in medio distantibus, infernè approximatis; columellâ excavatâ; aperturâ oblongâ.

Length of last whorl 1 inch. Breadth $0\frac{9}{12}$ inch.

This volute, which is very distinct from all its companions, is easily recognised by its ventricose body-whorl, crimped at the upper part by numerous short plications, which are decussated near the suture by two deep sulcations, representing the canal seen in the last species. These sulcations are part of a series of spiral striæ which become very distinct in the central portion of the body-whorl, and are very numerous at its lower part. The pillar-lip is broad and expanded, and marked at its lowest portion by a shallow groove. The mouth, in the specimen examined, is obscured by rock.

Locality, Pondicherry.

8. *Voluta citharina*, sp. nov. Pl. XII. fig. 8, a, b.

V. testâ fusiformi, spirâ turrîtâ, anfractibus complanatis, supernè angulatis, longitudinaliter multiplicatis, spiraliter striatis: aperturâ lanceolatâ, columellâ 4-plicatâ.

Variat sulcis spiralibus supernè obsoletis.

Length 1 inch. Breadth $0\frac{1}{2}$ inch. Spire $0\frac{4}{12}$ inch.

A very elegant fusiform shell, with somewhat flattened volutions, angulated sharply near the suture, so as to give a turreted aspect to the spire. They are all barred by numerous longitudinal ribs nearly as broad as the interspaces, crossed by spiral striæ, which however do not muricate them, and are most numerous towards the canal. The sutures are impressed. The plaits upon the pillar-lip are strong, elevated and nearly equidistant. The cast is smooth and does not exhibit a trace of the angles of the whorls.

Locality, Pondicherry.

9. *Voluta radula*, G. Sowerby, MSS. Pl. XII. fig. 9.

V. testâ oblongâ, spirâ brevi, anfractibus 5, longitudinaliter (18-20) plicatis striatisque, spiraliter sulcatis; plicis nodulosis; suturâ profundâ; aperturâ lanceolatâ.

Variat plicis longitudinalibus obtusis, plus minusve distantibus.

Length $1\frac{2}{12}$ inch. Breadth $0\frac{3}{12}$ inch. Spire $0\frac{4}{12}$ inch.

A very variable shell, more or less ovate in consequence of variations in the length of the spire. All the whorls are longitudinally ribbed and spirally sulcated; the sulcations strongly marked, decussating and tuberculating the thick ribs. The first sulcus near the suture on the body-whorl is sometimes deeper than the others. The suture is deeply impressed.

It is a near ally of the tertiary *Voluta lima*.

Locality, Pondicherry, where it appears to be abundant.

10. *Voluta Trinchinopolitensis*, sp. nov. Pl. XV. fig. 5.

V. testâ oblongâ (spirâ brevi?), anfractu ultimo prope suturam angulato, supernè costatâ costis (12) crassis, brevibus, distantibus (sulcis spiralibus nullis); aperturâ —?

Probable length, when entire, $3\frac{1}{4}$ inches. Breadth $1\frac{3}{4}$ inch.

A fragment of a large and strong volute, very distinct from any of the other species in the collection. The body-whorl is ornamented at its upper part by strong, distinct, short, vanishing ribs: the lower half is smooth. The summits of the whorls are angled. Two of the plications of the body-lip are visible.

Locality, Trinchinopoly.

Genus CYPRÆA.

1. *Cypræa Kayei*, sp. nov. Pl. XII. fig. 20.

C. testâ globosâ, inflatâ, lævigatâ, spirâ exsertiusculâ, anfractibus 5.

Length $1\frac{3}{4}$ inch. Breadth $1\frac{7}{12}$ inch. Height $1\frac{1}{4}$ inch.

A very globular shell, with a smooth surface or faintly striated by lines of growth. The mouth is very narrow, widening a little below. The spire is slightly prominent and very regular: the whorls composing it are nearly flat. The cast is smooth.

Locality, Pondicherry.

2. *Cypræa Newboldi*, sp. nov. Pl. XII. fig. 21.

C. testâ ovatâ, lævi, in medio gibbosiusculâ, extremitatibus subcompressis, spirâ occultâ.
Length $1\frac{2}{10}$ inch. Breadth $0\frac{8}{10}$ inch. Height $0\frac{6}{10}$ inch.

Ovate, swelling out centrally, compressed and slightly attenuated at the extremities. Mouth widening a little below, very narrow in the centre. Outer lip gibbous centrally. Denticulations of both lips rather deeply placed. Surface smooth.

Locality, Pondicherry.

3. *Cypræa Cunliffei*, sp. nov. Pl. XII. fig. 22.

C. testâ ovatâ, minutissime transversè striatâ; spirâ occultâ.
Length $0\frac{8}{10}$ inch. Breadth $0\frac{5}{10}$ inch. Height $0\frac{4}{10}$ inch.

A very elegant, regularly ovate shell; the lower extremity is very slightly produced. The surface is marked by very fine regular transverse striæ. The mouth is narrow and of nearly equal dimensions throughout. The spire is hidden.

Locality, Pondicherry.

Genus OLIVA, Bruguière.

1. *Oliva vetusta*, sp. nov. Pl. XII. fig. 23, a, b.

O. testâ elongatâ, lanceolatâ, lævi, nitidâ, spirâ productâ, columellâ expansâ.
Length $0\frac{4}{10}$ inch. Breadth $0\frac{2}{10}$ inch.

A smooth polished shell with a produced spire of three or four slightly convex whorls. The columella is expanded, and the body-lip reflected broadly over the canal and marked by four obsolete sulcations.

This is the first species of its genus found associated with cretaceous forms.

Locality, Pondicherry.

Genus EULIMA, Risso.

1. *Eulima antiqua*, sp. nov. Pl. XII. fig. 17.

E. testâ lævissimâ, turriculatâ, anfractibus 9, planatis, superioribus latis, striis duabus obsoletis ad suturam cinctis.

Length $0\frac{1}{2}$ inch. Maximum breadth of body-whorl $0\frac{5}{20}$ inch.

Shell very smooth, but impressed near the shallow suture of the nearly flat whorls with two obscure striæ; body-whorl ovate, whorls of spire rather broad and very gradually diminishing. Though the mouth is broken this fossil is evidently an *Eulima*, and approaches nearly some existing species.

Locality, Pondicherry.

GENUS *TORNATELLA*, Lamarck.

1. *Tornatella labiosa*, sp. nov. Pl. XII. fig. 24.

T. testâ ovato-oblongâ, spirâ exsertâ, anfractibus convexiusculis (ultimo subinflato), spiraliter sulcatis, sulcis numerosis, longitudinaliter striatis, interstitiis lævibus; aperturâ lato-lanceolatâ, labro interno calloso, externo subincrassato, striato.

Length $0\frac{1}{2}\frac{1}{5}$ inch. Breadth $0\frac{1}{2}\frac{1}{5}$ inch.

Shell ovate, the whorls rather flattened, yet the last swelling out at its lower part so as to appear inflated. The spire is prominent and formed of five or six whorls. All the whorls are deeply sulcated spirally. The sulcations are strongly striated longitudinally. The interspaces are smooth and as broad as the furrows. The mouth is lanceolate, broad below and somewhat lunate. The pillar-lip is callous above and partially striated. The cast is smooth.

Locality, Pondicherry.

2. *Tornatella curculio*, sp. nov. Pl. XII. fig. 25.

T. testâ cylindricâ, spirâ brevi, anfractibus 6, planatis, spiraliter sulcatis, sulcis numerosis, longitudinaliter striatis, interstitiis angustioribus; suturis profundis; aperturâ?

Length $0\frac{8}{10}$ inch. Breadth $0\frac{1}{2}$ inch.

A cylindrical shell, the whorls very flat, suddenly bending in to the deep suture, all deeply striated or sulcated spirally, the sulcations marked by numerous fine longitudinal striæ, which do not cross the somewhat broader interspaces. None of our specimens show the mouth.

Locality, Pondicherry.

3. *Tornatella semen*, sp. nov. Pl. XV. fig. 2, a, b, c.

T. testâ ovatâ, tumidâ, politâ, spirâ prominenti, acutâ, anfractibus 5, convexis, spiraliter punctato-striatis, striis longitudinalibus distantibus leviter decussatis; columellâ contortâ, buplicatâ.

Length $0\frac{3}{10}$ inch. Breadth $0\frac{2}{10}$ inch.

Shell ovate, with a prominent but rapidly decreasing spire. The surface is finely striated spirally, the striations punctate. At first glance it seems smooth and polished. The body-whorl is very tumid. The mouth is concealed by rock in the only perfect specimen in the collection; but there is a fragment which shows a contorted pillar-lip with two strong folds, the uppermost largest.

Locality, Trinchinopoly.

GENUS RINGICULA, Deshayes.

1. *Ringicula? acuta*, sp. nov. Pl. XV. fig. 2.

N. testâ oblongâ, lævi, spirâ prominenti, acutâ, anfractibus 5, superioribus planatis, ultimo infernè tumido, labio externo incrassato.

Length $0\frac{2}{10}$ inch. Breadth rather more than $0\frac{1}{10}$ inch.

A little smooth shell, with a conical and acute spire, the whorls of which are separated by a rather deep suture. The body-whorl is rather flattened at the upper part, tumid below, and is obscurely marked by lines of growth. The outer lip is thickened. The mouth is concealed by rock, but the general aspect of the shell is that of a *Ringicula*.

Locality, Trinchinopoly.

GENUS NATICA, Lamarck.

1. *Natica pagoda*, sp. nov. Pl. XII. fig. 14.

N. testâ elongato-conicâ, vix umbilicatâ, lævigatâ, striis longitudinalibus minutis, spirâ turratâ, anfractibus 6, ad suturam planatis sulcatisque, superioribus convexiusculis, ultimo rotundato, aperturâ ovato-lanceolatâ.

Length $1\frac{1}{2}$ inch. Breadth $0\frac{9}{12}$ inch. Spire $0\frac{4}{12}$ inch.

This species has a very large and rounded body-whorl; and a much-produced, turreted acute spire. The whorls are deeply channeled, though narrowly, along the line of suture, and are flattened or slightly angled for some distance beyond. The surface is to the eye smooth, but when examined with a lens shows minute and regular striæ of growth. The umbilicus is either very small or almost obsolete.

It is nearly allied to the lower greensand *Natica rotundata*, but is much more produced in the spire.

Locality, Pondicherry.

2. *Natica obliquistriata*, sp. nov. Pl. XII. fig. 12.

N. testâ subglobosâ, subumbilicatâ, anfractibus convexis, sub lente obliquè striatis, supra planis, suturis excavatis, decussato-striatis, aperturâ oblongâ.

Length 1 inch. Breadth $0\frac{8}{10}$ inch.

Smooth and polished at first glance, but on closer observation seen to be marked with fine oblique undulating striæ. On the summits of the whorls at the line of suture there is a broad shallow impression which is striated by four or five deep spiral striæ, decussated by lines of growth. The shell is thick. The cast is smooth.

Locality, Pondicherry.

3. *Natica suturalis*, G. Sowerby, MSS. Pl. XV. fig. 1.

N. testâ subglobosâ, spirâ brevi, obtusâ; anfractibus 5 lævigatis, supernè subangulatis, prope suturam canaliculatis; ad suturam marginatis; umbilico angusto.

Length $0\frac{6}{10}$ inch. Breadth $0\frac{5}{10}$ inch.

Shell globose, smooth, in very young specimens spirally striated. The whorls are depressed near the suture and channeled. The canal is traversed by regular lines of growth, and is separated from the suture by a raised margin. The spire is obtuse. The mouth is rather wide. The pillar-lip is grooved by a deep and defined but narrow umbilicus, which is bounded externally by a shallow groove.

Locality, Trinchinopoly.

4. *Natica? rugosissima*, sp. nov. Pl. XIV. fig. 7.

N. testâ subglobosâ, spirâ parvâ, depressâ, anfractibus 4 transversè rugosis, sulcis profundis irregularibusque ornatis; umbilico?

Breadth $0\frac{7}{12}$ inch. Height $0\frac{4}{12}$ inch.

A remarkable shell, easily distinguished by its very low spire and the deep sulcations or rather plications which ornament the whorls.

Locality, Verdachellum.

GENUS CALYPTRÆA, Lamarck.

1. *Calyptræa? elevata*, sp. nov. Pl. XII. fig. 10, a, b.

C. testâ conicâ, lævi, expansâ, apice obtuso, centrali.

Breadth $1\frac{2}{12}$ inch. Height $0\frac{7}{12}$ inch.

A large and very convex yet very broad shell; it appears to have been smooth or very slightly undulated concentrically. The apex is obtuse and central. Though the internal structure of this shell is unknown, there can be little doubt of the propriety of referring it to the genus *Calyptræa*.

Locality, Pondicherry.

2. *Calyptræa? corrugata*, sp. nov. Pl. XII. fig. 11, a, b.

C. testâ valdè conicâ, inflatâ, concentricè corrugatâ, longitudinaliter obsoletè striatâ, apice excentrico, contorto.

Breadth $0\frac{7}{10}$ inch. Height $0\frac{5}{10}$ inch.

Shell very tumid, regularly wrinkled concentrically, and somewhat obscurely marked with longitudinal striæ. The apex is very much out of the centre and turned down, though rather obtuse. I place this shell provisionally in *Calyptræa*, but it may prove to be a form of *Pileopsis*, or some allied shell. It is next to im-

possible, at present, to determine with certainty the genus of a fossil *patelliform* shell, or even the family of which it is a member.

Locality, Pondicherry.

GENUS DENTALIUM, Linnæus.

1. *Dentalium arcotinum*, sp. nov. Pl. XII. fig. 16.

D. testâ subulatâ, tereti, subarcuatâ, lævi, sub lente striis concentricis minutissimis ornatâ.
Length $1\frac{7}{12}$ inch. Breadth at mouth $0\frac{2}{12}$ inch.

A very slightly bent shell, bearing a considerable resemblance to the recent *Dentalium entalis*, to which indeed it approaches more nearly than to any known secondary forms. The surface when magnified is seen to be marked by very minute concentric striæ.

Locality, Pondicherry.

2. *Dentalium?* *hamatum*, sp. nov. Pl. XV. fig. 8.

D. testâ cylindricâ, concentricè striatâ, extremitate posteriori arcuatissimâ.
Length, exclusive of the hook, $1\frac{1}{10}$ inch. Breadth at the mouth nearly $0\frac{9}{10}$ inch.

This shell, which is shaped singularly like a fish-hook, is possibly not that of a mollusk, but the calcareous case of an annelide. Yet as all the known species of *Ditrupa*, the genus of tubicular annelides, with which a *Dentalium* may be confounded, have contracted mouths, whilst all living *Dentalia* have the greatest diameter of the shell at the aperture, I prefer provisionally placing it in the latter genus.

Locality, Trinchinopoly. It appears to have been gregarious.

Acephala Palliobranchiata.

GENUS TEREBRATULA, Bruguière.

1. *Terebratula arabilis*, sp. nov. Pl. XVIII. fig. 12.

T. testâ orbiculari, subdepressâ, concentricè sulcatâ, sulcis numerosis, profundiusculis; margine frontali obsoletè bisinuato, foramine magno.

Length $1\frac{4}{12}$ inch. Breadth $1\frac{2}{12}$ inch. Thickness $0\frac{7}{12}$ inch.

A very broad or rather orbicular species, depressed, the ventral valve especially. Both valves are ploughed, as it were, by shallow, regular concentric furrows. The surface is minutely punctate. The frontal margin in full-grown shells becomes slightly bisinuated. The beak of the ventral valves is truncated so as to present a large foramen. In process of growth the shell widens, young specimens being much longer than wide, old ones as broad as long.

The *Terebratula albensis* of Leymerie, from the chalk of France, closely resembles this species in form, but has not the concentric sulcations.

Locality, Pondicherry.

2. In the Verdachellum collection there is a fragment of a plicated *Terebratula* evidently nearly allied to some greensand species.

Acephala Lamellibranchiata.

Genus CLAVAGELLA, Lamarck.

1. *Clavagella semisulcata*, sp. nov. Pl. XVII. fig. 1.

C. valvulis ovatis, depressis, inæquilateralibus, prope umbones obsoletè sulcatis striatisque. Tubo recto, extremitate conchiferâ magnâ, clavatâ, tuberculatâ.

Breadth of a valve $0\frac{3}{4}$ inch. Length $0\frac{1}{2}$ inch.

Valves large, ovate, with the beaks near one end, ends rounded; one half the surface, that nearest the beaks, marked with transverse furrows and striæ. The surface of the investing tube is rugose and tuberculated in front of the shell. The tube is cylindrical, smooth, and very much smaller than its clavate extremity.

The *Clavagella cretacea* of M. D'Orbigny is its nearest ally.

Locality, Pondicherry.

Genus FISTULANA, Bruguière.

1. *Fistulana*? *aspergilloides*, sp. nov. Pl. XVII. fig. 2.

F. tubo tereti, longo, cylindrico, concentricè subsulcato, extremitate abruptè truncatâ, convexiusculâ.

Length $3\frac{1}{2}$ inches. Breadth at base $0\frac{5}{10}$ inch.

This fossil approaches so nearly in aspect to a living *Fistulana* of the Indian seas, that I can scarcely doubt its relations to that genus.

Locality, Pondicherry.

Genus PANOPÆA, Menard.

1. *Panopæa orientalis*, sp. nov. Pl. XVII. fig. 4.

P. testâ transversè oblongâ, valdè inæquilaterali, concentricè regulariter undulato-sulcatâ, extremitatibus rotundatis, hiantibus.

Length $1\frac{1}{2}$ inch. Breadth 3 inches. Length from beak to farthest extremity $2\frac{1}{2}$ inches.

Shell very inequilateral, yet equally rounded at both ends, gaping at the extremities ; the surface marked with regular distant furrows. It belongs to a group of *Panopææ* very difficult to define specifically, ranging through many strata, probably from the palæozoic rocks upwards into the tertiaries, but chiefly concentrated and most numerous in the lower cretaceous beds. *Panopæa plicata* and some other lower greensand species are nearly allied to this Indian form, which however I cannot satisfactorily unite with any of them.

Locality, Pondicherry (and Verdachellum).

GENUS PHOLADOMYA, Sowerby.

1. *Pholadomya connectans*, sp. nov. Pl. XVII. fig. 5.

P. testâ transversè ovatâ, inæquilaterali, extremitatibus rotundatis (subhiantibus) concentricè sulcatâ, in medio longitudinaliter decemcostatâ, costis radiantibus.

Length $0\frac{1}{2}$ inch. Breadth $1\frac{7}{8}$ inch. Thickness $0\frac{9}{16}$ inch. Length from beak to farthest extremity $1\frac{4}{8}$ inch.

A well-marked and handsome species, most nearly allied to the *Pholadomya ovalis* of the upper oolite, and to the *P. parvula* of the oolite of Hanover. It connects such forms with *Pholadomya Martini* of the lower greensand.

Locality, Pondicherry.

GENUS POROMYA, Forbes.

CHAR. GEN. Testa plus minusve globulosa, æquivalvis, posticè paululùm producta, tenuis, punctata. *Cardo* in valvulâ dextrâ dente cardinali valido, *lateralis nullo*; in valvulâ sinistrâ dente cardinali obsoleto, foveâ ligamentali oblongâ. *Umbones* anticè retorti. *Impressiones musculares* duæ. *Sinus palliaris* parvus.

The position of this very natural and well-marked genus, indicated in my Report on the Invertebrata of the Ægean, is between *Corbula* and *Neæra*; and when the animal shall have been examined, it will most probably be found closely resembling that of the last-named genus. The existing species of *Poromya* are two; one, nearly allied to the first of the fossil forms here described, inhabits the Chinese seas, and was described by Mr. Hinds under Mr. Sowerby's name of *Neæra hyalina*. I have examined the specimens of this beautiful shell in Mr. Cuming's unrivalled collection. The second *Poromya anatinoides* was found by myself in the eastern Mediterranean, where it lives only in very great depths. It is not so near the Indian fossil species as the first, but is very closely allied, indeed possibly identical, with a species found fossil in the English and Belgian crags, and described

by M. Nyst under the name of *Corbula granulata*. The *Corbula æquivalvis* of Goldfuss, a fossil from the greensand of Westphalia, also belongs to this genus and is nearly allied to the Pondicherry species.

1. *Poromya globulosa*, sp. nov. Pl. XVII. fig. 6.

P. testâ inflatâ, suborbiculari, subinæquilaterali, anticè subsinuatâ, politâ, lævigatâ, sub lente punctis minutissimis numerosis in seriebus obliquis dispositis ornatâ; umbonibus tumidis, incurvatis.

Length $0\frac{7}{10}$ inch. Breadth $0\frac{3}{4}$ inch. Thickness of united valves $0\frac{1}{2}$ inch.

Shell much-inflated, almost globular, but slightly produced and compressed at one extremity. The surface appears smooth and polished to the naked eye, but is really, as may be seen by using the lens, minutely and regularly punctate, the punctations numerous and arranged in oblique lines. This character is lost when the shell is worn, as the punctations do not perforate it. The beaks are turned towards the shorter end, and there is an appearance of a cordate lunule.

Locality, Pondicherry.

2. *Poromya lata*, sp. nov. Pl. XV. fig. 14.

P. testâ tenui, latâ, convexâ, lævi, (sub lente radiato-punctatâ, punctis distantibus,) subinæquilaterali, extremitatibus rotundatis, postico subrostrato.

Length $0\frac{8}{10}$ inch. Breadth 1 inch.

An oblong very thin shell, slightly produced at one end and there somewhat depressed. The surface is smooth to the eye, but under the lens is seen to be marked by regular radiating lines of distant graniferous punctations.

Locality, Trinchinopoly.

Genus CORBULA, Bruguière.

1. *Corbula striatuloides*, sp. nov. Pl. XVIII. fig. 14.

C. testâ ovatâ, subcompressâ, incrassatâ, sulcato-striatâ, rostratâ, rostro carinatâ.

Length $0\frac{3}{12}$ inch.

A small, ovate, thick, transversely-furrowed shell with a more or less carinated beak. It is nearly allied to the British lower greensand *Corbula striatula*, but is more compressed.

Locality, Verdachellum.

Genus SOLECURTUS, De Blainville.

1. *Solecurtus obscurus*, sp. nov. Pl. XVII. fig. 3.

S. testâ transversè striatâ, valdè inæquilaterali, elongatâ, compressâ, extremitatibus rotundatis, umbonibus obtusissimis.

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Length from end to end $2\frac{2}{12}$ inches; from beak to frontal margin $0\frac{7}{12}$ inch; from beak to farthest extremity $1\frac{7}{12}$ inch. Thickness of united valves $0\frac{7}{24}$ inch.

A cast, with a portion of the shell attached showing the striated surface. The cast is obsoletely sulcated across. The hinge-line is margined and somewhat compressed.

Locality, Pondicherry.

Genus TELLINA, Linnæus.

1. *Tellina?* *pondicherriensis.*, sp. nov. Pl. XVIII. fig. 15.

T.? testâ transversè striatâ, ovato-elongatâ, valdè inæquilaterali, extremitatibus rotundatis, umbonibus acutis.

Measurement from end to end $0\frac{7}{12}$ inch. From beak to frontal margin $0\frac{5}{12}$ inch. Thickness of united valves $0\frac{2}{12}$ inch.

The frontal margin is nearly straight. The cast is smooth.

Locality, Pondicherry.

Genus PSAMMOBIA, Lamarck.

1. *Psammobia?* *inconspicua*, G. B. Sowerby, MSS. Pl. XV. fig. 18.

P. testâ transversè oblongâ, latâ, depressâ, lævi seu substriatâ, subinæquilaterali, margine dorsali arcuato.

Length $0\frac{8}{10}$ inch. Breadth $1\frac{5}{10}$ inch.

A single valve, not in very good condition, but very distinct from any other shell in the collection, and most probably a species of *Psammobia*.

Locality, Trinchinopoly.

Genus MACTRA, Lamarck.

1. *Mactra tripartita*, G. B. Sowerby, MSS. Pl. XV. fig. 17.

M. testâ transversè oblongâ, subtriangulari, depressiusculâ, subæquilaterali, concentricè sulcatâ, sulcis numerosis confertis, regularibus, lateribus truncatis, apice acuto.

Breadth 1 inch. Length $0\frac{8}{10}$ inch. Height $0\frac{2}{10}$ inch.

The only species of its genus in the collection. The surface is beautifully grooved by numerous regular close transverse striations, which suddenly become much stronger on the truncated sides. The cast is smooth.

Locality, Trinchinopoly.

Genus LUCINA, Bruguière.

1. *Lucina jugosa*, sp. nov. Pl. XVII. fig. 7.

L. testâ orbiculari, depressâ, concentricè regulariter sulcatâ, sulcis numerosis (50), margine cardinali acutâ.

Length $1\frac{5}{4}$ inch. Breadth $1\frac{2}{2}$ inch. Thickness $0\frac{1}{2}$ inch.

A shell in form much resembling an *Artemis*, orbicular, depressed, and ornamented with numerous regular concentric striæ. Its nearest relative is perhaps the Grignon fossil named by Lamarck *Lucina concentrica*.

Locality, Pondicherry.

2. *Lucina fallax*, sp. nov. Pl. XVII. fig. 8.

L. testâ orbiculari, compressâ, latere antico obsolete sinuato, concentricè sulcatâ striatâque, striis longitudinalibus minutissimis ornatâ.

Length and breadth nearly 1 inch.

The cast of this shell is smooth and polished, but exhibits traces of minute longitudinal striæ, regular but obsolete. The muscular impressions are long and very strongly marked.

Locality, Pondicherry.

GENUS ANATINA, Lamarck.

1. *Anatina arcuata*, sp. nov. Pl. XVI. fig. 5.

A. testâ inæquilaterali, transversè lanceolatâ, arcuatâ, compressâ, anticè subangulatâ, rotundatâ, dilatâtâ; posticè longè rostratâ, rostro truncato, bicarinato, carinis obtusis; transversè sulcatâ striatâque, sulcis concentricis regularibus subdistantibus, in carinam non productis.

Length opposite beak $1\frac{1}{4}$ inch. Breadth $5\frac{1}{2}$ inches. Greatest breadth of wide end $1\frac{1}{2}$ inch. Thickness of united valves $0\frac{3}{12}$ inch. Length of beak $2\frac{3}{12}$ inches. Its breadth at the extremity $0\frac{6}{12}$ inch.

A much-compressed, bent, elegantly sulcated shell, with one extremity broad and rounded, except towards the cardinal margin, where it is slightly angulated; the other tapering to a narrow beak truncated at the extremity and bearing two obtuse keels on its surface. The marks of the hinge-appendages cause a deep curved linear impression on each valve, proceeding from the beaks. The cardinal margin is rather straight. In young specimens the beaks are more tumid and the shell much shorter in proportion.

This elegant species is nearly allied to the *Anatina Robinaldina* described by M. D'Orbigny from the Neocomian beds of France.

Locality, Pondicherry.

GENUS ASTARTE, Sowerby.

1. *Astarte planissima*, sp. nov. Pl. XV. fig. 23.

A. testâ suborbiculari, valdè compressâ, concentricè sulcatâ striatâque, sulcis distantibus, regularibus, interstitiis declivis, ad marginem dorsalem subspinosis.

Length $0\frac{6}{10}$ inch. Breadth $0\frac{6}{10}$ inch.

Shell slightly quadrate in outline, very much depressed, ornamented with concentric striæ, filling up regular deep distant concentric furrows. Ten or eleven large

sulcations are seen on the surface of a shell of the above dimensions. In the interior the presence of these sulcations is indicated only on the upper half of the shell. The ribs which separate them are sloping, and rise into tubercles or short spines where they terminate at the margin. This character approaches so nearly that seen in the existing *Lucina spinifera*, that I have some doubts, in the absence of the hinge, of the shell being a true *Astarte*. The pallial impression is entire, and the muscular impressions are very strong.

Locality, Trinchinopoly.

Genus *CARDITA*, Bruguière.

1. *Cardita orbicularis*, sp. nov. Pl. XVII. fig. 11.

C. testâ orbiculari, convexâ, costis longitudinalibus (22) rotundatis (squamosis?).

Length $0\frac{1}{2}\frac{3}{4}$ inch. Breadth $0\frac{1}{2}$ inch.

A single specimen in bad condition, but evidently a very distinct species. Its nearest known allies are tertiary forms, but the genus extends throughout the Cretaceous system.

Locality, Pondicherry.

2. *Cardita striata*, sp. nov. Pl. XIV. fig. 1.

C. testâ suborbiculari, subdepressâ, longitudinaliter costatâ striatâque, costis (30) 4-striatis.

Length $0\frac{1}{2}$ inch. Breadth the same.

A very distinct species remarkable for its sculpture, the surface being ornamented with thirty or more radiating ribs, each of which is marked by about four longitudinal striæ.

Locality, Verdachellum.

Genus *CARDIUM*, Linnæus.

1. *Cardium bisectum*, sp. nov. Pl. XVII. fig. 9.

C. testâ elongatâ, angustè oblongâ, inflatâ, lateribus subcompressis, concentricè striis minutis ornatâ, dimidio longitudinaliter striato-sulcatâ, sulcis subcentralibus (10) majoribus; umbonibus prominentibus incurvatis.

Length $2\frac{1}{2}$ inches. Breadth $1\frac{3}{4}$ inch. Thickness $2\frac{1}{2}$ inches.

Remarkable for its elongated, tumid and compressed form, and singular division of the shell into two parts, the one longitudinally sulcated, the other almost smooth. Consequently one-half of the margin only is crenulated. The cast is smooth and shining. *Cardium impressum*, a Neocomian species described by Deshayes, is distantly related to this form.

Locality, Pondicherry.

2. *Cardium lucerna*, sp. nov. Pl. XVII. fig. 10.

C. testâ transversè oblongâ, subinflatâ, subinæquilaterali, longitudinaliter crebrisulcatâ, costis quadratis (28) obsoletè squamosis, latere postico lævi, antico rostrato, rostro brevi, compresso, lævi; umbonibus tumidis, concentricè substriatis.

Length 1 inch. Breadth $1\frac{1}{4}$ inch. Thickness of united valves $0\frac{1}{2}$ inch.

An elegant lamp-shaped shell, ornamented with longitudinal ribs, and having one extremity prolonged into a smooth and compressed beak. In form it resembles the living *Cardium Cumingii* described by Broderip. Its nearest ally is probably the *Cardium subdinense*, a species described by M. D'Orbigny from the Craie chloritée of France.

3. *Cardium incomptum*, G. B. Sowerby, MSS. Pl. XV. fig. 16.

C. testâ convexâ, obliquè suborbiculari, radiatim costatâ, costis (20-22) prominentibus sub-squamosis.

Length $0\frac{5}{10}$ inch. Breadth $0\frac{5}{10}$ inch. Height of a valve $0\frac{2}{10}$ inch.

A Cockle of the same group with *Cardium edule*. The shell is tumid, more or less obliquely round, and ornamented with radiating ribs, which are prominent and separated by deep sulcations.

Locality, Trinchinopoly.

4. *Cardium intersectum*, sp. nov. Pl. XVIII. fig. 8.

C. testâ convexâ, suborbiculari, subdepressâ, subangulatâ, concentricè sulcatâ, striis ad angulum posticum costâ radiali obscurâ lævi interruptis, sulcis post radium fortioribus.

Length $0\frac{6}{10}$ inch. Breadth $0\frac{1}{2}$ inch.

A somewhat depressed species remarkable for its peculiar sculpture. From the beak to the angle of the siphonal side there runs a smooth, gradually enlarging ray or obsolete rib, which interrupts the concentric striæ of the remainder of the shell, or rather separates the deep concentric striæ of the anteal and central portions from the deep transverse sulci in the space above the siphonal margin.

There is only a single imperfect specimen of this very distinct species in the collection. It is from Verdachellum.

5. *Cardium altum*, G. B. Sowerby, MSS. Pl. XV. fig. 13.

C. testâ oblongâ, tumidâ, posticè subtruncatâ, angulatâ, longitudinaliter substriatâ, anticè lævigatâ, in medio concentricè sulcato, sulcis regularibus, interstitiis æquantibus.

Testâ decorticatâ reticulato-striatâ.

Testâ juniori subquadratâ, acutè angulatâ.

Length $1\frac{7}{10}$ inch. Breadth $1\frac{4}{10}$ inch. Height $0\frac{6}{10}$ inch.

The differences presented by this shell at different periods of its growth and in various states of preservation are very remarkable, and, unless noted, sure to mislead. When young (fig. 15) it is a nearly smooth shell, of a more or less suborbicular or quadrate form, strongly and angularly truncate at the siphonal side, and there marked by longitudinal striæ. When full-grown it becomes ovate, the angulation gradually disappears, the siphonal side is marked by obscure striæ which suddenly cease at the angle, the opposite side is quite smooth, and the interspace is marked by close, regular, numerous concentric sulcations. But whether old or young, if it be decorticated, the markings of the surface become altogether different; the siphonal truncated portion becomes deeply punctato-striate, and the whole of the remainder of the shell is finely decussated.

This *Cardium* belongs to the same group with *Cardium subhillanum*, *C. sphaeroideum*, *C. concentricum*, and other cretaceous forms. It is very near to the last-named species, from the greensand of Halden.

Locality, Trinchinopoly.

6. *Cardium Hillanum*, Sowerby.

I have not thought it necessary to figure this species, as the specimens agree in every essential character with British examples from Blackdown. The transverse sulcations are rather coarser than in ordinary varieties, but after comparing the Indian species with a considerable suite of the European, I could not draw any line between them, since varieties exactly corresponding occurred among the latter.

Locality, Verdachellum and Trinchinopoly.

Genus ISOCARDIA, Lamarck.

1. *Isocardia subsinuata*, sp. nov. Pl. XVII. fig. 12.

I. testâ suborbiculari, inflatâ, concentricè regulariter sulcatâ, latere antico obsoletè tri-sinuato, umbonibus prominentibus, distantibus, incurvatis.

Length $0\frac{5}{8}$ inch. Breadth $0\frac{8}{12}$ inch. Thickness $0\frac{1}{12}$ inch.

This very beautiful and well-marked *Isocardia* needs no further description than that given in the diagnosis. It is very distinct from any species with which I am acquainted.

Locality, Pondicherry.

Genus VENUS, Linnæus.

1. *Venus arcotensis*, sp. nov. Pl. XV. fig. 19.

V. testâ orbiculari, subobliquâ, inæquilaterali, plus minusve convexâ, politâ, concentricè striatâ, striis confertis, irregularibus, margine lævi, umbonibus prominentibus, lunulâ minutâ.

Length $1\frac{5}{10}$ inch. Breadth $1\frac{4}{10}$ inch. Height of a valve $0\frac{3}{10}$ inch.

This shell varies in degree of convexity. It approaches certain species of *Artemis* in outline. Mr. G. B. Sowerby regarded it as a variety of the *Cytherea semisulcata* of Lamarck, a fossil of the Paris basin. There are sufficient differences however to lead us to infer that were colour present—a character so important in this genus that very similar fossil forms from different beds can never be identified with certainty—we should find the Indian very different from the French species.

Locality, Trinchinopoly.

2. *Venus analoga*, sp. nov. Pl. XV. fig. 20.

V. testâ transversè oblongâ, depressâ, inæquilaterali, lævi seu substriatâ, margine lævi, umbonibus obtusis, lunulâ — (occultâ).

Length $0\frac{5}{10}$ inch. Breadth $0\frac{8}{10}$ inch. Height of a valve $0\frac{2}{10}$ inch.

An ovate, depressed, smooth and polished species gracefully rounded at the extremities. The surface is marked by obsolete striæ of growth. Compared by Mr. G. B. Sowerby with the *Cytherea nitidula* of Deshayes, an eocene fossil.

Locality, Trinchinopoly.

3. *Venus eximia*, sp. nov. Pl. XV. fig. 21.

V. testâ transversè ovatâ, subæquilaterali, depressâ, politâ, concentricè regulariter sulcato-striatâ, marginibus lævibus, umbonibus prominentibus, parvis, lunulâ oblongâ.

Length $0\frac{8}{10}$ inch. Breadth 1 inch. Height of a valve $0\frac{2}{10}$ inch.

A much-depressed oblong shell, beautifully marked by deep, close and regular concentric striations. The anteal cardinal margin slopes suddenly and obliquely, so as in young specimens to give an angular appearance to the outline; the beaks are small but very prominent. Considered by Mr. G. B. Sowerby identical with the eocene *Cytherea elegans* of Lamarck. There are however sufficient distinctions to keep them apart, independent of the improbability of their being identical.

Locality, Trinchinopoly.

GENUS ARTEMIS, Poli.

1. *Artemis lenticularis*, sp. nov. Pl. XVIII. fig. 7.

A. testâ orbiculari, depressâ, concentricè regulariter striatâ, margine vaginali arcuato-obliquâ.

Length and breadth $0\frac{1\frac{1}{2}}{1\frac{1}{2}}$ inch.

The above characters are scarcely sufficient to separate this species from an existing *Artemis* of the European seas, *Artemis linctæ*, yet we can scarcely doubt that they are very distinct from each other. The curve of the vagino-cardinal margin is different, and this character in the genus *Artemis* usually accompanies others of importance. Most probably the colour of the species when alive—a

most important source of character among the *Veneridæ*—was well-marked and characteristic. A greensand shell from Germany, the “*Lucina lenticularis*” of Goldfuss, is very similar in outline to the Indian fossil.

Locality, Verdachellum.

Genus NUCULA, Lamarck.

1. A single species of this genus, as now restricted, is contained in the Pondicherry collection. It is a smooth, polished, transversely ovate shell, very inequilateral, angulated behind and rounded before; the margins are smooth; these characters would almost apply to many *Nuculæ*, recent and fossil, for the variations of form in this genus have been as slight and unsatisfactory in time as they are now in space. It may provisionally be named *Nucula indefinita*; though difficult to define, I have little doubt that when well-preserved specimens shall have been procured it will prove very distinct.

Genus LEDA, Schumacher.

1. *Leda striatula*, sp. nov. Pl. XVII. fig. 14.

L. testâ transversè oblongâ, compressâ, subæquilaterali, striis subobliquis ornatâ, posticè latè sed brevirostratâ, subangulatâ, anticè rotundatâ.

Length $0\frac{7}{12}$ inch. Breadth $0\frac{4}{12}$ inch. Thickness of united valves $0\frac{2}{12}$ inch.

A very distinct and well-marked species, remarkable for its compression, broad beak, and surface ornamented with very fine, numerous oblique striæ. It is allied most nearly to the *Nucula scapha* of D’Orbigny, a lower greensand species found in both France and England.

Locality, Pondicherry.

Genus ARCA, Linnæus.

1. *Arca japetica*, sp. nov. Pl. XVI. fig. 2.

A. testâ inflatâ, carinatâ, transversè ovatâ, anticè obliquè truncatâ, posticè angustatâ, lateribus striatis, in medio sulcato-striatâ, margine frontali recto; areâ cardinali latâ, umbonibus prominentibus distantibus.

Extreme length $2\frac{1}{2}$ inches. Extreme breadth $2\frac{3}{4}$ inches. Thickness $2\frac{1}{12}$ inches. Distance between beaks $0\frac{7}{12}$ inch. Area $1\frac{1}{12}$ inch.

A strong, inflated, carinated, longitudinally sulcated species with an extensive cardinal area. It is allied to the *Arca exaltata* of Nilsson, a lower greensand species.

Locality, Pondicherry.

2. *Arca Gamana*, sp. nov. Pl. XVI. fig. 3.

A. testâ inflatâ, carinatâ, transversè subquadratâ, lævigatâ, anticè obliquè truncatâ, angulatâ,

posticè rotundatâ, margine frontali subtruncato; areâ cardinali lanceolatâ, umbonibus prominentibus.

Length $0\frac{1}{2}$ inch. Breadth $0\frac{1}{4}$ inch. Thickness $0\frac{1}{8}$ inch. Distance between beaks $0\frac{5}{8}$ inch. Breadth of area $0\frac{9}{8}$ inch.

A smooth moderately-inflated form with a lanceolate cardinal area. It is nearly allied to the *Arca ligeriensis* of D'Orbigny, a French Craie chloritée species.

Locality, Pondicherry.

3. *Arca brahminica*, sp. nov. Pl. XVI. fig. 1.

A. testâ subinflatâ, obsolete carinatâ, transversim subquadratâ, lævigatâ, anticè obliquè subtruncatâ, posticè rotundatâ, margine frontali rotundato, areâ cardinali angustissimâ, umbonibus approximatis.

Length $2\frac{1}{4}$ inches. Breadth 3 inches. Thickness (valves united) 2 inches. Distance between beaks $0\frac{5}{8}$ inch. Breadth of area $0\frac{7}{4}$ inch.

The small area, as compared with the size of the shell, and the peculiar outline sufficiently distinguish this Ark. The surface bears traces of longitudinal striæ and lines of growth. It is allied to European upper greensand forms.

Locality, Pondicherry.

4. *Arca Clellandi*, sp. nov. Pl. XVI. fig. 4.

A. testâ compressâ, anticè rotundatâ, posticè obliquè truncatâ, angulatâ, post angulum lævigatâ, reliquâ testâ regulariter radiato-sulcatâ, areâ angustissimâ, umbonibus approximatis.

Length $0\frac{4}{10}$ inch. Breadth $0\frac{5}{8}$ inch.

The surface of this shell and of the cast is marked by twenty-five radiating furrows, each twice as broad as the intermediate ribs. The space behind the angle is nearly smooth, or slightly marked by transverse furrows of growth. The postæ angle of the cardinal margin is very sharp. The dentition is obscure.

Locality, Pondicherry; a single specimen.

5. *Arca abrupta*, sp. nov. Pl. XIV. fig. 2.

A. testâ inflatâ, gibbâ, obliquè trigonâ, abruptè truncatâ, fortè carinatâ, carinâ elevatâ, longitudinaliter concentricèque striatâ, umbonibus approximatis, prominentibus.

Length 3 inches. Breadth the same. Height of a single valve $1\frac{1}{2}$ inch.

A remarkable gibbous triangular species, very abruptly truncate and carinate. The keel is elevated and the highest part of the shell. The truncation is marked by an obscure curved sulcus. It is allied to the *Arca decussata* and *Arca fibrosa* of the upper greensand of Blackdown, but is more sharply keeled and triangular than either. *Arca Beaumontii* of the French Craie chloritée is also its near ally.

Locality, Verdachellum.

6. *Arca trinchinopolitensis*, sp. nov. Pl. XV. fig. 16.

A. testâ inflatâ, gibbâ, subtetragonâ, abruptè truncatâ, carinatâ, angulo obtuso, post angulum subsinuatâ, sublævigatâ, reliquâ testâ decussato-striatâ; areâ parvâ, lanceolatâ, umbonibus prominentibus.

Length $1\frac{1}{2}$ inch. Breadth $3\frac{5}{10}$ inches. Height $1\frac{6}{10}$ inch.

Nearly allied to *Arca decussata* and to its allies. Young shells are striated all over. The hinge presents numerous small radiating teeth in the central portion and four oblique large ones at each side. The posterior muscular impression is strengthened by a ridge.

Locality, Trinchinopoly and Verdachellum. The specimens from the former place are somewhat wider.

GENUS PECTUNCULUS, Lamarck.

1. *Pectunculus subauriculatus*, sp. nov. Pl. XVII. fig. 13.

P. testâ obliquè-orbiculari, subauriculatâ, striis transversis longitudinalibusque ornatâ, umbonibus obtusis.

Length $0\frac{1}{2}$ inch. Breadth $0\frac{1}{2}$ inch.

Shell oblique, rounded, with obsolete ears, the surface marked with striæ both ways, the longitudinal striæ minute and very regular. It is allied to, but distinct from, the greensand *Pectunculus umbonatus*.

Locality, Pondicherry.

GENUS TRIGONIA, Bruguière.

1. *Trigonia orientalis*, sp. nov. Pl. XVIII. fig. 11.

T. testâ transversè suborbiculari-ovatâ, depressâ, posticè latè subrostratâ, concentricè sulcatâ, plicis intermediis rotundatis, lævigatis, areâ sublævigatâ.

Length $1\frac{2}{3}$ inch. Breadth 2 inches.

Shell roundish ovate, depressed, marked by regular transverse sulcations, which are broader than the elevated smooth ribs which separate them. The postæal area is smooth, or nearly so. In the specimen figured there are about twenty-five transverse ribs.

Locality, Pondicherry

2. *Trigonia suborbicularis*, sp. nov. Pl. XVIII. fig. 10.

T. testâ suborbiculari, subæquilaterali, posticè latè subrostratâ, concentricè sulcatâ, costis intermediis elevatis, læviusculis, areâ supernè lævigatâ, prope cardinem transversè striatâ.

The sulcations are much narrower and more numerous in this species than in

the last. The outline is also very different. They are however nearly allied, and, with the next, belong to a group of *Trigoniæ* (*T. affinis* and *T. excentrica* are examples) which in Europe are characteristic of the lower part of the Cretaceous system.

Locality, Pondicherry.

3. *Trigonia semiculata*, sp. nov. Pl. XVIII. fig. 9.

T. testâ obliquè obovatâ, depressâ, subrostratâ, tertiâ parte profundè regulariter transversè sulcatâ, reliquâ testâ lævigatâ.

Length $1\frac{1}{2}$ inch. Breadth $2\frac{4}{12}$ inches.

Depressed, obovate, broadly beaked; the beaked end smooth, the remainder of the shell for about two-thirds of its surface transversely sulcated by more than sixty shallow furrows. Near the beak the entire shell is sulcated across; so also is the young shell. The nearest relative of this species is the *Trigonia affinis* of the upper greensand.

Locality, Verdachellum.

4. *Trigonia aliformis*, Parkinson. Pl. XIV. fig. 3.

There are small, but well-preserved specimens of this species in the Verdachellum collection, which cannot be distinguished from British examples.

Genus AVICULA, Bruguière.

1. *Avicula nitida*, sp. nov. Pl. XVI. fig. 6.

A. testâ lævi, tumidâ, obliquè trigonâ, anticè dilatâtâ, compressâ, posticè acutè rostratâ, basi rostri abruptâ, umbonibus prominentibus, margine dorsali recto.

Oblique measurement from beak to foremost part of margin $1\frac{1}{4}$ inch. Dorsal line $1\frac{1}{2}$ inch. Thickness of united valves $0\frac{3}{4}$ inch.

A smooth, shining species, broadly triangular and considerably produced on the short side. It is a very distinct and rather peculiar form.

Locality, Pondicherry.

Genus MYTILUS, Linnæus.

[Section A. *Mytilus auctorum*.]

1. *Mytilus nitens*, sp. nov. Pl. XVI. fig. 8.

M. testâ lævigatâ, transversè obscurè sulcatâ, ovato-lanceolatâ, lineâ cardinali rectâ, posticè sinuatâ, anticè rotundatâ, umbonibus prominentibus.

Oblique distance from beak to furthest margin $0\frac{7}{12}$ inch. Line of hinge $0\frac{5}{12}$ inch. Thickness of united valves $0\frac{5}{12}$ inch.

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Resembling many known forms, both cretaceous, tertiary, and recent, but apparently sufficiently distinct from all.

Locality, Pondicherry.

[Section B. *Modiolus auctorum*.]

2. *Mytilus (Modiolus) cypris*, sp. nov. Pl. XVI. fig. 7.

M. testâ oblongâ, depressâ, lævi, marginibus parallelis, umbonibus subterminalibus, extremitatibus rotundatis.

Length from beak to extreme margin $0\frac{6}{10}$ inch. Breadth across the centre $0\frac{5}{25}$ inch.

Locality, Pondicherry. Specimen bad.

3. *Mytilus (Modiolus) typicus*, sp. nov. Pl. XIV. fig. 4.

M. testâ cuneato-oblongâ, convexâ, dorso tumido, margine frontali expanso transversè striato-costato, striis in latere cardinali fortioribus, elevatis, plerumque in medio bifurcatis, fasciculo obliquo striarum longitudinalium in centro dorsi decussatis.

Length from beak to margin 4 inches. Greatest breadth $1\frac{3}{4}$ inch.

A very remarkable form, combining the characters of several sections of this variable genus. The beaks are placed at the shortest end, very near it, and from them runs diagonally a tumid dorsal convexity to the anterior margin of the dilated opposite extremity. The dorsal margin is nearly straight, and angulated anteriorly. The dorsal side of the central ridge is marked by bifurcating striæ and the ridge itself by a bundle of fine oblique striæ marking its course. The space in front of the central ridge is nearly smooth.

Locality, Verdachellum.

4. *Mytilus (Modiolus) flagelliferus*, sp. nov. Pl. XVI. fig. 9.

M. testâ elongatâ, lanceolatâ, subarcuatâ, anticè dilatâtâ, diagonaliter bipartitâ, divisione dorsali costis arcuatis flagellatis, ventrali lævigato, umbonibus obtusis, terminalibus.

Length from beak to farthest margin $4\frac{1}{2}$ inches. Greatest breadth at dilated end 1 inch. Median breadth $0\frac{3}{4}$ inch. Greatest thickness, valves united, $0\frac{7}{12}$ inch.

This species is remarkably razor-shaped, with very terminal beaks. The hinder half of the surface, which is divided into two parts by a diagonal obtuse ridge, is marked by curved ridges or ribs, which on the back are trifurcated, like a whip of three thongs. The front division is smooth, or marked by furrows of growth. The young shell is marked with obsolete longitudinal striæ. This species is nearly allied to the *Modiola plicata* of the Cornbrash, but in the latter the plications divide into twenty or even more thongs.

Locality, Pondicherry.

5. *Mytilus (Modiolus) pulcher*, sp. nov. Pl. XIV. fig. 6.

M. testâ tumidâ, valdè inæquilaterali, tetragonâ, obliquè carinatâ, carinâ diagonali, obtusâ, longitudinaliter transversèque striis minutis regularibus ornatâ; margine dorsali compresso, frontali subsinuato, umbonibus recurvis gibbosis (nucleo lævi, polito).

Beak to anterior angle $1\frac{5}{12}$ inch. Greatest breadth $1\frac{6}{12}$ inch. Greatest thickness $0\frac{9}{12}$ inch. Hinge-line $0\frac{8}{12}$ inch or a little more.

A very curious and beautiful form, which at first sight so closely resembles a *Cypricardia* or a *Myaoncha* that its relationship to *Mytilus* seems obscure. On close examination however, the hinge appears to be that of a *Mytilus*, and making allowances for exaggerations of parts, the general form does not really depart very far from that of some existing species of the section *Modiolus*. The fine striæ obliquely crossing each other on the surface of the shell confirm the relationship. When the shell is held up with its back towards the observer, the outline of the united valves appears nearly tetragonal. The cast is very smooth and highly polished.

Locality. It appears to be plentiful at Pondicherry.

GENUS PINNA, LINNÆUS.

1. *Pinna arata*, sp. nov. Pl. XVI. fig. 10.

P. testâ lanceolatâ, compressâ, undique longitudinaliter regulariterque sulcatâ.

At $2\frac{1}{2}$ inches from the beak this *Pinna* measures $0\frac{1}{2}$ ths of an inch broad. The fragment is 3 inches long. It appears to be distinct from any described or figured fossil form.

Locality, Pondicherry.

2. *Pinna restituta*, Hoeninghaus.

Fragments of considerable size from Pondicherry, undistinguishable from this greensand species.

3. *Pinna decussata*, Goldfuss.

Fragments of a fine *Pinna* occur in the Verdachellum collection, which appear to be identical with the species so named from the cretaceous strata of Westphalia.

GENUS PECTEN, Bruguière.

1. *Pecten quinquecostatus*, Sowerby.

Of this very characteristic cretaceous species there are specimens in the collection, from both Pondicherry and Verdachellum, which cannot be distinguished from specimens from the greensand of Blackdown.

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2. *Pecten obliquus*, Sowerby.

In the Verdachellum collection are specimens not to be distinguished from the lower greensand *Pecten obliquus* of the beds in the Isle of Wight.

3. *Pecten orbicularis*, Sowerby?

A fragment not sufficiently perfect to admit of certain identification.

Locality, Verdachellum.

4. *Pecten virgatus*, Nilsson. Pl. XV. fig. 22.

Two very perfect valves, differing in no essential particulars from the European greensand form.

Locality, Trinchinopoly.

5. *Pecten verdachellensis*, sp. nov. Pl. XIV. fig. 5.

P. testâ orbiculari, depressâ, longitudinaliter costatâ, costis numerosissimis, tenuibus, squamosis, alternatis majoribus; auriculis æqualibus radiato-costatis.

Length and breadth $1\frac{6}{12}$ inch.

In most of the specimens the scales of the rays of this very distinct *Pecten* are worn away, so that the latter appear as if crossed by numerous thread-like striæ. The cast is more or less smooth, but exhibits traces of the ribs and scales towards the margin.

Locality, Verdachellum.

Genus LIMA, Bruguière.

1. *Lima obliqui-striata*, sp. nov. Pl. XVIII. fig. 13.

L. testâ obliquâ, ovatâ, convexâ, longitudinaliter costatâ, transversè (obsoletè) striatâ; striis lateralibus obliquis.

Length $0\frac{8}{12}$ inch. Breadth $0\frac{6}{12}$ inch.

Resembling *Lima undata* in outline. Remarkable for having the numerous longitudinal ribs crossed by transverse striæ which become oblique towards the sides. It is nearly allied to *Lima granulata* from the greensand of Westphalia, figured by Goldfuss, pl. 104. fig. 5.

Locality, Verdachellum.

Genus SPONDYLUS, Linnæus.

1. *Spondylus subsquamosus*, sp. nov. Pl. XVIII. fig. 1.

S. testâ obliquâ, suborbiculari, valvâ dextrâ complanatâ, affixâ, longitudinaliter striatâ et transversè plicatâ; valvâ sinistrâ convexâ, sulcatâ, sulcis numerosissimis regularibus longitudinalibus, costis elevatis acutis, ad marginem squamis paucis.

Lower valve with beak 3 inches long. Breadth $2\frac{3}{4}$ inches. Thickness $2\frac{1}{4}$ inches. Upper valve $2\frac{1}{2}$ inches in length.

This fine species has the smaller valve very regularly eared. The sculpture of the surface is regular, and varied by a few arched scales placed at irregular distances towards the margin. There are traces of decussating striæ between the ribs. The beak is triangular. It is nearly allied to the Neocomian *Spondylus Roemeri*, described by Deshayes.

Locality, Pondicherry.

2. *Spondylus calcaratus*, sp. nov. Pl. XVIII. fig. 2.

S. testâ ovatâ, obliquâ, valvâ dextrâ affixâ, ad umbonem rostratâ, longitudinaliter striatâ, transversè plicatâ; valvâ sinistrâ convexâ, longitudinaliter sulcato-striatâ (interstitiis rotundatis), obsolete nodulosâ.

The largest specimen measures 4 inches, without beak, in length. A middle-sized individual has the following proportions. Length of upper valve $3\frac{4}{12}$ inches; of lower valve with its beak 4 inches. Breadth of either valve $3\frac{3}{4}$ inches. Length of beak $0\frac{1}{4}$ inch. Breadth about $1\frac{1}{2}$ inch. Thickness $1\frac{3}{4}$ inch.

Very nearly allied to the last, but presenting differences which induce me to regard it as specifically distinct. The large and differently formed beak, the rounded instead of sharp ribs, and the nodulose surface serve to distinguish it.

Locality, Pondicherry.

Genus Plicatula, Lamarck.

1. *Plicatula septemcostata*, sp. nov. Pl. XVIII. fig. 4.

P. testâ subobliquâ, suborbiculari, convexiusculâ, inæquivalvi, longitudinaliter costatâ, costis septem majoribus, subangulatis (subsquamosis); apice affixâ.

Length $1\frac{2}{12}$ inch. Breadth $1\frac{2}{12}$ inch. Thickness of united valves $0\frac{5}{12}$ inch.

A nearly orbicular, slightly oblique shell, depressed and inequivalve. The surface is ribbed longitudinally; seven of the ribs rise prominently and angularly. The nearest allies of this species are oolitic.

Locality, Pondicherry.

2. *Plicatula multicostrata*, sp. nov. Pl. XVIII. fig. 3.

P. testâ ovatâ, depressâ, longitudinaliter costatâ, costis numerosis, alternatis minoribus abbreviatis.

Length $0\frac{7}{12}$ inch.

A species allied to some cretaceous forms, and well-marked by the peculiar arrangements of the numerous ribs, which are alternately larger and smaller, the smaller ones stopping short.

Locality, Verdachellum.

GENUS GRYPHÆA, SOWERBY.

1. *Gryphæa stomatoidea*, sp. nov. Pl. XVII. fig. 15.

G. testâ inferiori ovatâ, transversè obsoletè sulcatâ, in dorso excentricè turgidâ, umbone intorto, sessili.

Greatest length $2\frac{2}{12}$ inches. Breadth below beak $1\frac{3}{12}$ inch. Length from keel to margin $1\frac{1}{12}$ inch. Height $0\frac{5}{12}$ inch.

The more or less carinated turgid back, so keeled that it exhibits a long slope towards the intorted beak, distinctly marks this *Gryphæa*, which in many respects is nearly allied to the *Exogyra* (*Gryphæa*) *subcarinata* of Count Munster, a species from the greensand of Westphalia.

Locality, Pondicherry.

2. *Gryphæa orientalis*, sp. nov. Pl. XIV. fig. 6.

G. testâ ovato-trigonâ, lævigatâ, haliotoideâ, gibbâ, carinatâ, carinâ sublaterali.

Length 5 inches. Breadth 4 inches. Greatest height $1\frac{3}{4}$ inch.

This large *Gryphæa* closely resembles the *Gryphæa sinuata* and *G. lævigata* of the lower greensand. It differs slightly in habit and more importantly in having the widest slope from the keel on the side of the beaks, and not, as in the European species named, on the opposite side.

Locality, Verdachellum.

GENUS OSTREA, LINNÆUS.

1. *Ostrea pes-leonis*, sp. nov. Pl. XVIII. fig. 5.

O. testâ crassâ, ovatâ, subarcuatâ, irregulariter longitudinaliter radiato-sulcatâ, sulcis in plicis fortissimis ad marginem externum mutatis, abruptis, angulatis.

Length $4\frac{7}{12}$ inches. Breadth $2\frac{1}{2}$ inches. Greatest height $2\frac{1}{4}$ inches.

A ponderous, ovate, slightly bent shell, deeply but irregularly sulcated longitudinally, the furrows towards the margin becoming very deep, angular, and separated by very strong, high, ridgy, acutely angular plications. It closely resembles the *Ostrea Marshii* of the English oolites, but appears to be specifically distinct.

Locality, Pondicherry.

2. *Ostrea tegulæna*, sp. nov. Pl. XVIII. fig. 6.

O. testâ æquivalvi, lineari-lanceolatâ, arcuatâ, dorso sulcato, sulco lævi, æquali; lateribus abruptis, plicis numerosis truncato-squamosis, ad dorsum abruptè prominentibus; latere interno dimidio expanso, plicis angustioribus arcuatis.

Length of largest valve $3\frac{1}{2}$ inches. Breadth at the expanded part $1\frac{3}{4}$ inch. The specimen figured was smaller, but exhibits all the proportions and characters of the shell in great perfection.

On all the specimens there are fifteen plications on the outer side, seven on the expansion, and six on the inner unexpanded portion of the shell. The canal of the back is very regular. The near allies of this species are *Ostrea carinata*, *O. pectinata* and *O. larva*, all cretaceous.

Locality, Pondicherry.

3. *Ostrea amorpha*, G. B. Sowerby, MSS. Pl. XV. fig. 24.

O. testâ irregulari, crassâ, subæquivalvi, valvâ superiori obtusè plicatâ.
Length 2 inches. Breadth 1 inch.

Whilst there can be no question that this formless oyster is distinct from any other species in the collection, it is impossible to describe it in more definite terms than those given in the diagnosis.

Locality, Trinchinopoly.

4. In the Verdachellum collection are bad specimens of a fourth species of Oyster, very nearly allied to, if not identical with, the greensand *Ostrea prionota*; but better examples are required for certain determination.

ARTICULATA.

Crustacea.

The carapace of a Crab is contained in the Pondicherry collection, and is represented in Plate XVI. fig. 12.

Annelida.

GENUS DITRUPA, Berkeley.

1. *Ditrupa? longissima*, sp. nov. Pl. XIX. fig. 13.

D. testâ cylindricâ, longissimâ, arcuatâ, concentricè regulariter striatâ, striis minutissimis (nucleo lævi).

Length of specimen $4\frac{1}{2}$ inches. Diameter $0\frac{1}{10}$ inch.

A very long, regularly curved, cylindrical shell. The surface is marked with very minute concentric striæ. The cast is smooth. The habit is so truly that of a testaceous tubicular Annelide, and the regularity of form so similar to the aspect of a *Ditrupa*, that, although the mouth is not preserved, I have little hesitation in referring it to that well-marked genus.

It is contained in a mass of rock from Pondicherry, and is associated with *Baculites* and various univalve and bivalve shells.

ECHINODERMATA.

Ophiuridæ.

Genus OPHIURA, Lamarck.

1. *Ophiura*? *Cunliffei*, sp. nov. Pl. XIX. fig. 8.

Part of the disc and arms of a very distinct species, apparently belonging to the typical genus *Ophiura*, and evidently allied to the *Ophiura serrata* of Römer, a species found in the white chalk of Germany and of England. The plates of the disc in the Indian fossil are larger than in any known species of the genus. The disc-shields at the bases of the rays are broadly oblong and somewhat triangular. The scales of the centre of the arms are small and angular; the lateral scales are very large and oblong. The spines are not preserved, but were probably short and obtuse. The figure represents the specimen of the natural size. It was found by Mr. Cunliffe at Verdachellum.

Echinidæ.

The greater part of the specimens of Urchins in this collection were presented by Mr. Cunliffe through Mr. Egerton. Not having been kept so carefully distinct as the shells were, and all the specimens being free from rock, their locality, whether from Pondicherry or Verdachellum, has not been marked. No specimens of *Echinidæ* are contained in the Trinchinopoly collection.

Genus HOLASTER, Agassiz.

Of this genus of *Spatangaceæ* there is a single species in the Pondicherry collection. The genus *Holaster* was established by Agassiz for a group of Urchins differing from *Spatangus* in the arrangement of the latero-dorsal ambulacra, which in the former are radiate and not petaloid, and never placed in depressions. I have for some time been inclined to dispute the propriety of the separation from *Spatangus* of the species presenting these characters, dreading the tendency of many distinguished living naturalists to extreme multiplication of generic groups. Such a practice is unsafe, even in the hands of an Agassiz, and highly dangerous when indulged in by those whose studies have been confined to limited departments of natural history. If carried too far, it will assuredly lead to much confusion, since, when every alliance of a few species presenting unimportant characters in common is elevated to generic rank and endowed with a generic appellation, the natural-history language by means of which general views can be expressed,

will be rendered unintelligible to all but those minutely acquainted with specific zoology and botany. As the giving a name to a group at all is merely an arrangement of convenience—since a numerical sign or a letter would serve all purposes for the student in his closet—the extreme multiplication of names converts the practice into an abuse, and tends to mystify and confuse the science. On the *equal value of generic terms*, the value of natural-history statistics, whether as serving to elucidate the modifications of form or structure in the animal or vegetable series, or as furnishing data for working out the equally important subject of distribution in time and space, must depend. *Genera* therefore should not, it seems to me, be founded without deliberate consideration, full knowledge, and an earnest conviction of the organic importance of the characters on which we base a new genus. Neither genus nor species should be admitted which has not been or may not be clearly defined *in words*; and in the case of the former, if not of the latter also, strong objections might be offered to the employment of merely *comparative* characters alone.

The arrangements of the ambulacra already mentioned, the absence of a dorsal impression, which indicates peculiarities in the arrangement and form of the animal's burying-organs (its spines), taken in conjunction with a peculiar habit, recognisable at a glance, are all organic characters of sufficient importance to warrant the constitution of the genus *Holaster*; and their value is borne out by the peculiar distribution of this genus (now extinct) in time, all its species but one being concentrated, as it were, in the Cretaceous epoch.

1. *Holaster indicus*, sp. nov. Pl. XIX. fig. 4. *a*, *b*.

H. cordatus, inflatus, posticè altior, extremitate anali obtusè rostratâ, infrâ spatio post-orali convexâ, subcarinatâ.

Length $1\frac{6}{10}$ inch. Breadth $1\frac{1}{2}$ inch. Greatest height 1 inch.

Very regularly heart-shaped, nearly as broad as long. Back most convex posteriorly in the space between the two postero-lateral ambulacra. Behind the highest part the body contracts a little as if pinched in, and is narrowly truncated at the anal extremity. The anterior extremity is deeply cordate. The series of pores forming the ambulacra gently diverge, and almost all nearly equally. In each series of the four dorsal ambulacra there are about twenty-four pairs of open pores, the last five being placed distant from each other. The pairs of the several series are not connected by grooves. The anal area is vertically oblong. On the under-surface the most prominent part is the post-oral space, which is oblong, very convex, and has a tendency to carination. The antero-lateral portions (cheeks) are rather tumid.

The nearest allies of this species are the *Holaster suborbicularis* from the upper

chalk of Maestricht and equivalent formations*. That species, however, has the apex of the back in the region of the ocelli. The Indian species has a narrower anterior groove. It is also allied to the *Holaster l'Hardy* of the Neuchâtel greensand, but differs in the disposition of the ambulacra.

Genus BRISSUS, Klein.

(Including *Micraster*, *Schizaster*, and *Brissopsis* of Agassiz.)

1. *Brissus expansus*, sp. nov. Pl. XIX. fig. 7.

B. ambitu suborbiculari; dorso depresso, vertice centrali; ambulacris impressis, antero-lateralibus longioribus, posticis lanceolatis, sulco antico profundo, lateribus abruptis, parallelis; infernè spatio post-orali latè ovato.

Length $2\frac{6}{10}$ inches. Breadth $2\frac{7}{10}$ inches. Greatest height $1\frac{5}{10}$ inch.

Nearly round, or very broadly cordate, depressed but convex. The dorsal ambulacra are all petaloid and narrow, the antero-laterals being to the posterior ones as three to two. The former have about thirty-two pairs of pores, connected by grooves, in each series; the latter about twenty-three. The ambulacral impressions are flat centrally, and the lowermost pore of each pair is advanced a little towards the centre of the plane. The junction of the ambulacral plates in the centre of the depressions appears as a fine undulated ridge. The anterior central ambulacral groove is rather narrow and has very steep parallel sides. The anal end is very obtuse and the truncation slopes rapidly towards the under-surface. The post-oral space is broadly ovate and rather convex, but the cheeks are nearly flat.

This *Brissus* is allied to a common miocene form from Malta.

2. *Brissus inæqualis*, sp. nov. Pl. XIX. fig. 6.

B. ambitu orbiculari-cordato, dorso depresso, vertice subcentrali; ambulacris leviter impressis, antero-lateralibus multò longioribus, posticis ovatis, sulco antico lateribus divergentibus; infernè spatio post-orali latè ovato.

Length $1\frac{8}{10}$ inch. Breadth $1\frac{8}{10}$ inch. Greatest height $0\frac{7}{10}$ inch.

Orbicularly cordate, depressed, but more convex than the last species, to which it is very nearly allied. The sides are more sloping. The frontal furrow is deep, and gradually widens. The antero-lateral ambulacra are very long, and have nearly parallel sides through the greater part of their length. The postero-lateral ones are very short and ovate. The former have twenty-five pairs of pores connected by grooves, placed on the slope of the depression in each series. The latter only

* It is said to occur in greensand at Lyme Regis in England.

twelve or thirteen pairs. The postero-lateral depressions are deepest. The anal truncation is nearly perpendicular. Beneath, the cheeks are very flat or almost concave, and the post-oral space is slightly convex and broadly ovate.

3. *Brissus Rana*, sp. nov. Pl. XIX. fig. 5.

B. ambitu suborbiculari, subangulato, dorso elevato, vertice subcentrali (postico); ambulacris profundè impressis, antero-lateralibus longioribus lanceolatis, posticis ovatis, sulco antico profundo, lato, lateribus subdeclivis, infernè spatio post-orali latè ovato.

Length $1\frac{1}{2}$ inch. Breadth $1\frac{6}{10}$ inch. Greatest height $1\frac{2}{10}$ inch.

A very tumid, subglobose species, slightly broader than long and rather angular in outline. The sides slope steeply. The anal extremity is suddenly and perpendicularly truncate. The anterior and central furrow is rather wide, and has sides which appear to slope, owing to the rounding of their angles. This furrow is not so deep as the latero-dorsal ambulacra. The anterior pair are lanceolate, and the posterior ovate, approximate and very deep. In the former are twenty-three pairs of pores in each series, placed on the slopes of the depression; in the latter eighteen. Beneath, the surface is convex posteriorly in consequence of the form of the post-oral space, but the cheeks are nearly flat.

The nearest allies of this species are tertiary. The chalk "*Spatangus Bucardium*" of Goldfuss also comes near it.

GENUS NUCLEOLITES, Lamarck.

Under this generic term I would include all the *Clypeasteridæ* with petaloid interrupted ambulacra and a supra-marginal anus. The genera *Clypeus*, *Nucleolites*, *Cassidulus*, *Catopygus*, and *Pygorhynchus*, are so many sections, not always very definite, of the genus so constituted. The following table will show their relations at a glance:—

| | | | | | | |
|---|-----------------------------------|----|-------------------------------|---|--|--|
| { | A. | { | Anus placed high up. | { | Mouth with tubercles..... = <i>Clypeus</i> (Klein), Agassiz. | |
| | Anal furrow strongly marked | | Mouth without tubercles | = { | <i>Nucleolites</i> , as restricted by Agassiz. | |
| | { | B. | { | Anus placed far back. | { | Mouth with tubercles..... = <i>Pygorhynchus</i> , Agassiz. |
| | | | | Anal furrow obsolete | Mouth without tubercles | = |
| | | | | (Mouth with tubercles) = <i>Cassidulus</i> , Lamarck. | | |

1. *Nucleolites (Pygorhynchus) testudo*, sp. nov. Pl. XIX. fig. 2. a, b.

N. ovatus, gibbosus, vertice supra-anali, marginibus declivis, sulco anali lanceolato, declivi. Length $1\frac{4}{10}$ inch. Breadth $1\frac{1}{10}$ inch. Height $0\frac{7}{10}$ inch.

Oval, gibbous in the centre, with very abrupt sloping sides. The highest part is in the posterior ambulacral space. The posterior extremity slopes rapidly to the margin and includes the long anal groove. The dorsal ambulacra are very regularly lanceolate and stellate. The pairs of pores are connected by grooves, which are not easily seen, either owing to the imperfection of the specimens, or from their having been originally obsolete. The under-surface is very concave. The mouth is rather excentric, and is surrounded by five strong tubercles, between which radiate in star-like fashion five ovate ambulacra. The spinigerous tubercles of the under-surface are very strongly marked.

2. *Nucleolites (Pygorhynchus) planatus*, sp. nov. Pl. XIX. fig. 3, *a, b*.

N. latè ovatus, depressus, vertice centrali, sulco anali oblongo, verticali.

Length $1\frac{4}{10}$ inch. Breadth $1\frac{2}{10}$ inch. Height $0\frac{1}{2}$ inch.

Broadly ovate, rounded at both ends, much depressed, with gradually sloping sides. The highest portion is in the true centre, but from that to the summit of the anal furrow the depression is very slight. The posterior dorsal ambulacra slightly diverge. The anus is placed in a deep, short vertical furrow. The under-surface is very concave. The mouth is excentric and surrounded by five strong tubercles, between which are the broadly-ovate oral ambulacra. The spinigerous tubercles of the under-surface are strongly marked.

3. *Nucleolites (Cassidulus) elatus*, sp. nov. Pl. XIX. fig. 1. *a, b, c, d*.

N. convexus, tumidus, vertice planato, subcentrali, lateribus abruptè declivis; infrà planus; anus rotundus, prope marginem posteriorem.

Length $2\frac{1}{2}$ inches. Breadth $2\frac{2}{10}$ inches. Height $1\frac{2}{10}$ inch.

Subglobose, flat beneath, very convex above. Summit obliquely depressed, the highest part being behind the centre, sides very steep but sloping. Dorsal ambulacra lanceolate. Anus round, impressed, placed above the margin (which is slightly beaked) at about one-third the height of the side. Mouth slightly excentric, surrounded by five oblong tubercles which are grooved centrally; between them are the diamond-shaped oral ambulacra, each with an oblong central tubercle separating the series of pores, forming a beautiful star-like arrangement. The spinigerous tubercles of the ventral surface are much developed.

ZOOPHYTA.

Helianthoida.

Genus FUNGIA, Lamarck.

1. *Fungia filamentosa*, sp. nov. Pl. XIX. fig. 11.

F. testâ semiglobosâ, circulari, suprâ elevatâ, convexâ, depressione centrali elongatâ, parùm profundâ; lamellis numerosissimis, tenuissimis, regularibus, æqualibus, simplicibus; basi concavâ, lævigatâ, radiato-striatâ; striis numerosissimis, simplicibus, æqualibus, lineis distantibus incrementi vix interruptis; margine acuto.

Diameter $0\frac{7}{10}$ inch. Height $0\frac{4}{10}$ inch.

The smoothness of the excavated base and extreme regularity of the very fine lamellæ distinguish this *Fungia* from most described forms. It belongs to the group usually referred to *Cyclolites*. The *Cyclolites discoidea* of Blainville (a greensand fossil) is its nearest ally. *C. elliptica* of Lamarck, a nummulitic limestone species, is also nearly allied to it.

Locality, Pondicherry.

Genus TURBINOLIA, Lamarck.

1. *Turbinolia arcotensis*, sp. nov. Pl. XIX. fig. 9. *a, b*.

T. testâ cylindricâ, conicâ, elongatâ, disco excavato, lamellis (30) fortibus radiato; lateribus undulatis, striatis, striis tenuibus, confertis, regularibus, æqualibus.

Diameter of disc $0\frac{6}{10}$ inch. Entire length (or height) $1\frac{2}{10}$ inch.

A conical species, usually slightly bent, with finely and regularly striated sides, and a star of many strong prominent lamellæ. The specimens are rarely well-preserved. The species is gregarious. It approaches nearly several cretaceous and also some tertiary forms.

Locality, Pondicherry.

Genus CLADACORA, Ehrenberg.

In the Pondicherry collection are fragments of a coral apparently belonging to this genus. They are cylindrical, slightly undulated, and closely and regularly longitudinally striated. (Plate XIX. fig. 10.) In the absence of better specimens I abstain from giving any specific appellation.

Bryozoa.

Traces of incrusting corals of this order, probably belonging to *Flustra* and *Lepralia*, are seen on several shells in the collection, but not sufficiently perfect to warrant definition.

PART THE SECOND.—*Inferences drawn from a study of the Species.*

THE total number of species of Invertebrata collected by Mr. Kaye and Mr. Culliffe in ancient fossiliferous beds of South-Eastern India, and presented to the Geological Society, is 178, of which 165 are Mollusca, two Articulata, eight Echinodermata, and three Zoophytes. The greater proportion are from Pondicherry; Verdachellum and Trinchinopoly furnishing comparatively few. The deposits at the three places named are connected with each other zoologically by the associations of certain species common to two of them with others found in the third. Thus, *Pecten quinquecostatus* and *Panopæa orientalis* occur in both Pondicherry and Verdachellum beds; *Voluta cincta* at Pondicherry and Trinchinopoly; *Chemnitzia undosa* and *Cardium Hillanum* at Verdachellum and Trinchinopoly. These identifications are so certain, that there can be no question of the mutual geological relations of the beds and of their being members of one system. In what geological epoch that system should be placed is the first inquiry to which we seek an answer.

At first glance the assemblage of specific forms in this collection seems very anomalous to the European geologist. Accustomed to regard certain generic forms as decided indications of secondary and others of tertiary age, he sees in these Indian fossils numerous species associated, lying side by side in the same stratum, which if found in separate beds would have led to the inference of their having lived at very different and distant epochs. Thus in the Pondicherry beds we have numerous species of *Ammonites*, *Baculites*, *Hamites* and other genera, distinctly of secondary age, associated with varied forms of *Voluta*, *Oliva*, *Cypræa*, *Murex*, and other genera which are usually regarded as characteristic of strata of tertiary origin. Indeed the latter so prevail in the Trinchinopoly part of the collection, that had it alone been brought to Europe, no other inference could have been drawn from it safely than that the strata at Trinchinopoly were decidedly tertiary.

When however we examine the whole collection critically—species by species—we find that its tertiary aspect is more in appearance than in reality. Out of the numerous species in this invaluable collection, very few indeed are described forms. But there are a few well-known European species in it, and every one is *cretaceous*. It happens fortunately that some of these occur in all three collections. In the Pondicherry collection we find *Pecten quinquecostatus*, one of the most characteristic of cretaceous species; a *Pinna* undistinguishable from *Pinna restituta*; two beautiful *Ammonites* (*A. Juilleti* and *A. Rouyanus*), between which

and the French "Neocomian" species, whose names I have adopted, I can draw no specific distinctions; and two *Nautili* which appear to be identical with the *Nautilus lævigatus* and *Nautilus clementinus* of M. D'Orbigny, species from cretaceous beds in France. In the Verdachellum collection we have *Pecten quinque-costatus* again, quite undistinguishable from Blackdown examples, *Pecten obliquus*, precisely the same as specimens from the Isle of Wight, and fragments of a *Pecten* apparently identical with our *Pecten orbicularis*. Also *Trigonia aliformis* and *Cardium Hillanum*, very characteristic cretaceous forms, and an Oyster, in all probability one of our greensand species. In the Trinchinopoly collection are *Cardium Hillanum*, apparently common, and a *Pecten* which I cannot separate from the greensand *Pecten virgatus*.

On the other hand, however similar at first glance some of the shells may seem to tertiary species, on close inspection they have, every one, proved to be distinct. So far then as positive identifications go, the plain inference respecting the age of the beds at the three localities is, that they are *Cretaceous*.

However clear this conclusion may appear, it cannot be unhesitatingly received, even upon such evidence, in the case of beds so far distant and under such very different circumstances of climate, &c., from any cretaceous beds with which we are sufficiently acquainted. It might be that in the region in which these strata were formed, certain species had lived on to a later epoch than they had in less-favoured localities; or, having commenced their existence at one point in space at an early epoch, they might in the course of time become so distributed, that at length, in consequence of changes in the distribution of land and water, they would survive at a later period only in some sea far removed from their birthplace. These possibilities must always be taken into account in all comparisons of geological formations far apart. Except in the case of species known to have an extended vertical as well as horizontal range and yet to be distinctly limited to an epoch, it is dangerous to draw conclusions as to the synchronism of beds under such circumstances. In this case, however, the bivalve mollusca named as identical with European species are all widely distributed forms, and yet everywhere distinctly cretaceous.

But the inference of the cretaceous date of the Southern Indian beds is borne out by, to my mind, higher considerations than such identifications of species. Among the facts of a general character made known to us by palæontological research, there is, perhaps, none more interesting than the restriction of the minor groups in large genera, capable of considerable and definite variations of form, to limited portions, so to speak, of time, and the consequent indication afforded us of the probable age of the strata in which they occur, in the absence of familiar forms. This is also true of the arrangement in time of genera in certain families. *Ammono-*

nites and *Terebratula*, and the several genera of *Cephalopoda* and *Echinidæ*, are familiar examples. The inestimable researches of Von Buch have, above all others, furnished us with this invaluable key to the ages of deposits, one which will assuredly prove in the end of far greater importance than the identification of strata by identical fossils. In the collections before us there are fortunately numerous forms, above all others capable of furnishing us with such a clue to the age of the beds. The fossil Cephalopods, so beautifully preserved in this collection, are so numerous and so varied that they alone might settle the question. Twenty-one out of twenty-eight well-marked *Ammonites* belong to sections of that great genus, pre-eminently and characteristically cretaceous, and of the seven remaining, five are the near allies of cretaceous forms. The *Hamites*, *Baculites* and *Ptychoceras* all have similar relations. The Gasteropoda, though at first sight more like tertiary than cretaceous forms, include many very nearly allied to known upper and lower greensand species. The *Pleurotomariæ* of the collection are peculiarly cretaceous. The genera *Tornatella*, *Strombus*, *Rostellaria*, *Murex*, *Pyruia*, *Vermetus* and *Nerita*, though the association of them appears tertiary, have all representatives in the cretaceous strata of Europe, and some in older rocks. *Voluta* itself, the genus which contributes most to the tertiary aspect of the collection, has representatives, and those not peculiar forms, as low down as the upper greensand in Europe, and occurs also in cretaceous strata in North America. *Turritella*, *Cerithium*, *Dentalium* and *Trochus* are genera represented in more ancient formations, and, owing to the peculiarities of their sculpture, as likely to present resemblances to recent forms in the oldest beds as in the newest. *Chemnitzia*, *Scalaria*, *Eulima*, *Ringicula* and *Natica* are genera having no greater weight in the argument for similar reasons, or else on account of their fossil relations being at present insufficiently known. There are three genera however among the Pondicherry Gasteropoda hitherto unrepresented in formations older than the tertiary epoch: these are *Cypræa*, *Oliva* and *Calyptræa*. The determination of the last is doubtful, but the species of the two former certainly have their nearest allies among tertiary and recent forms.

Every genus of bivalve testacea in the collection is already known in cretaceous strata or older. The peculiar forms of *Cardium*, *Arca*, *Trigonia*, *Mytilus*, *Pholadomya* and *Gryphæa*, all genera presenting subdivisions remarkably limited in their distribution in time, are characteristically cretaceous. The species of *Panopæa*, *Anatina*, *Pectunculus*, *Nucula*, *Lima*, *Pecten*, *Plicatula*, *Clavagella* and *Solecirtus* are all most nearly related to described European cretaceous forms of those genera. The tertiary aspect of the Trinchinopoly beds is derived from the presence of numerous bivalves recalling recent forms, but really more from their state of preservation than from being more nearly allied to recent shells than cretaceous

species of the same genera in Europe. This may be said of the examples of *Venus*, *Mactra* and *Psammobia*, genera in which the characters, so far as form is concerned, are not likely to present extreme modifications at any epoch. The same is true of *Cardita*, *Pinna*, *Avicula* and *Spondylus*, associated in the Pondicherry beds.

The few *Echinodermata* in the collection lead to similar conclusions. The species of *Holaster* and *Nucleolites* are characteristically cretaceous forms, and though the *Brissi* are perhaps most nearly allied to described tertiary species, there are others not very far removed in European cretaceous beds. The few Zoophytes are such as to lead to no conclusion of importance either one way or the other.

Were these beds tertiary or bordering on tertiary, in such a tropical region, we should expect to find examples of genera still abounding there, and common in tertiary strata of more northern latitudes,—examples of *Conus* and *Pleurotoma* for instance; but there are none. Moreover, admitting for a moment their tertiary origin, we might reasonably expect that the species in the collection identical with described forms would, if anything, be identical with the tertiary forms found in the Cutch beds; but it is not so. The collections of Captain Grant and Captain Smee furnish no identifications. We find them all in cretaceous strata as far away as Europe.

But though the closer we inquire into the evidence afforded by these fossils of the age of the beds in which they are contained, the more clear does it become that they are cretaceous, we have still to seek a reason for that mixed cretaceous and tertiary *facies* presented by the assemblage at first glance, and which led to doubts respecting the epoch of the Southern Indian strata. It doubtless depends on the greater development of generic forms, which though, as we have seen, with only three exceptions, also known in cretaceous strata in Europe, are yet so rare with us and so comparatively prevalent in the Indian beds, whilst many of them are familiar as characteristic of tertiary beds in Europe, that we are naturally inclined at first sight to associate with their presence the notion of a tertiary origin for the beds in which they occur. It appears to me that the right inference from their presence (since not one of the species is identical with any known tertiary form) is, not that the deposits containing them are either tertiary or necessarily connected with tertiary, but that the genera in question commenced their appearance or attained a great development *earliest* in the Eastern Seas, which, when we recollect that in those very seas at the present day are found the great specific assemblages or capitals of those genera, whilst they have either disappeared or have few representatives in the seas of other geographical regions, is exactly what we should expect, *à priori*, to find. This fact would go far to support the theory, that genera, like species, had geographical birthplaces, as they have geographical capitals or centres.

Respecting the relative ages of the three deposits (Pondicherry, Verdachellum and Trinchinopoly) in which the species described have been collected, two of them, Verdachellum and Trinchinopoly, appear to belong to a different epoch of the cretaceous æra from Pondicherry. The two former have several species in common (and those species among the most prolific in individuals) which are not found in the third. In them are found most of the species identical with European forms. In several of the genera, found at Pondicherry as well as at the places named, the forms are altogether distinct; although, judging from the evidence afforded by mineral character and association of species, the conditions of depth and sea-bottom at the time of the deposition of the strata seem to have been the same. The difference therefore must have depended on a representation of species by species in *time* and not in *depth*.

The beds apparently contemporaneous, viz. Trinchinopoly and Verdachellum, may be regarded as equivalent to the upper greensand and gault. The European species they include are either characteristic upper greensand and gault forms, or else such as occur in those strata. The new species they contain are either closely allied to known upper greensand or gault species, or peculiar to the Indian beds. On the other hand, the Pondicherry deposit may be regarded as belonging to the lowest division of the cretaceous system. In it almost all the fossils are new. Such as are analogous to known species are allied to fossils of the lower greensand of English geologists, and Neocomien of the French. In the genus most developed in this deposit, viz. *Ammonites*, three-fourths of the species belong to sections especially characteristic of the "Lower Neocomian" of the Mediterranean basin, whilst of the remainder as many representatives of oolitic fossils occur as of upper greensand species. The resemblance between many of the Pondicherry *Ammonites* and those of Castellane in the south of France is very remarkable.

Considered in regard to the distribution of animal life during the cretaceous epoch, this collection is of the highest interest. It shows that during two successive stages of that æra, the climatal influence, as affecting marine animals, did not vary in intensity in the Indian, European and American regions, whilst the later of the two had specific relations with the seas of Europe which are not indicated by the earlier. The cause of this remarkable fact is not to be sought in a more general distribution of animal life at one period than at another, but rather in some great change in the distribution of land and sea, and in a greater connexion of the Indian and European seas during the epoch of the deposition of the upper greensand than during that of the lower.

The fact, that of the few species found in these Indian cretaceous beds which are common to analogous beds in distant regions, the majority are such as have a great vertical range, supports the law pointed out by M. de Verneuil and Count D'Ar-

chic with respect to palæozoic fossils, and by myself among tertiary and recent forms, viz. that the range of the geographical distribution of species is usually correspondent to the range of their distribution in time.

We have already seen that this collection affords strong evidence in favour of the proposition, that the marine faunas of distant localities, under similar conditions of climate, depth and sea-bottom, maintain their relations rather by the representation of forms by similar forms than by identity of species.

In every point of view this collection is of the highest interest. The fossils are as beautiful as they are interesting, and specimens of the finer species seem to be abundant. It is most desirable that further inquiries be made into the stratigraphical relations of the beds whence they were procured. Verdachellum and Trinchinopoly will doubtless yield many more species than have yet been brought to Europe.

EXPLANATION OF THE PLATES.

PLATE VII.

- Fig. 1 *a.* *Ammonites Garuda*: *b.* back view: *c.* septal suture.
 2 *a.* *Ammonites Juilleti*: *b.* back view: *c.* septal suture.
 3 *a.* *Ammonites Rembda*: *b.* its keeled back.
 4 *a.* *Ammonites Yama*: *b.* back view.
 5 *a.* *Ammonites Pavana*: *b.* back view.
 6 *a.* *Ammonites Siva*: *b.* back view: *c.* septal suture.
 7 *a.* *Ammonites Soma*: *b.* back view: *c.* septal suture.
 8 *a.* *Ammonites Ganesa*: *b.* back view: *c.* septal suture.
 9 *a.* *Ammonites Vishnu*: *b.* back view: *c.* septal suture.
 10 *a.* *Ammonites Surya*: *b.* back view.
 11 *a.* *Ammonites Durga*: *b.* back view.

PLATE VIII.

- Fig. 1 *a.* *Ammonites Brahma*: *b.* outline of back: *c.* a young shell: *d.* septal suture.
 2 *a.* *Ammonites Cunliffei*: *b.* outline of back: *c.* a young shell: *d.* septal suture.
 3 *a.* *Ammonites Kayei*: *b.* outline of back: *c.* septal suture.
 4 *a.* *Ammonites Cala*: *b.* outline of back: *c.* septal suture.
 5 *a.* *Ammonites Varuna*: *b.* outline of back: *c.* septal suture.
 6 *a.* *Ammonites Rouyanus*: *b.* back view: *c.* septal suture.
 7 *a.* *Ammonites Nera*: *b.* outline of back: *c.* septal suture.
 8 *a.* *Ammonites diphyloides*: *b.* outline of back: *c.* septal suture.
 9. Outline of the fragment of *Ammonites ? indicus*.

PLATE IX.

- Fig. 1 *a.* *Ammonites Egertoni*: *b.* outline of back: *c.* septal suture.
2 *a.* *Ammonites Chrisina*: *b.* outline of back: *c.* septal suture.
3 *a.* *Belemnites? fibula* (a fragment): *b.* section.
4 *a.* Alveolus of a *Belemnites*: *b.* one of the septa showing the position of the siphuncle.
5 *a.* *Turrilites? planorbis*: *b.* view of the back.

PLATE X.

- Fig. 1 *a.* *Ammonites Menu*: *b.* outline of back: *c.* septal suture.
2 *a.* *Ammonites Sugata*: *b.* outline of back: *c.* septal suture.
3 *a.* *Ammonites Gaudama*: *b.* fragment showing the form of its back.
4 *a.* *Baculites vagina*: *b.* septal suture: *c.* section showing the surface of one of the chambers.
5 *a.* *Baculites teres*: *b.* section.
6 *a.* *Hamites undulatus*: *b.* section.
7 *a.* *Hamites nereis*, outline of a portion: *b.* section.
8. Specimen of *Hamites tenuisulcatus*, showing the form of its extremity, which is coiled in the manner of the genus *Helicoceras* of M. A. D'Orbigny. The outline is not a restoration, but represents a specimen in the collection. The surface of the coiled portion is abraded.

PLATE XI.

- Fig. 1 *a.* Outline of a portion of *Hamites large-sulcatus*: *b.* septal suture: *c.* section.
2 *a.* Outline of a portion of *Hamites rugatus*: *b.* septal suture: *c.* section.
3 *a.* Fragment of the posterior portion of *Hamites tenuisulcatus*, showing the curve: *b.* section of the same: *c.* part of the same species above the curved (*d.*) section: *e.* part of a septal suture showing the bifurcated saddles.
4 *a.* Outline of a portion of *Hamites indicus*: *b.* septal suture, showing the bifurcated lobes and saddles: *c.* section.
5 *a.* Largest specimen (not entire) of *Ptychoceras siphon*: *b.* portion of a young specimen: *c.* one still younger: *d.* lateral, dorsal and ventral lobes of the chambers in the full-grown example: *e, f, g.* sections.
6 *a.* Outline of a portion of *Hamites subcompressus*: *b.* septal suture: *c.* section.
7 *a.* *Ammonites Indra*: *b.* outline of back: *c.* septal suture.

PLATE XII.

- Fig. 1. *Voluta pyriformis*.
2. *Voluta purpuriformis*.
3. *Voluta septemcostata*.
4. *Voluta muricata*.
5 *a, b.* *Voluta Camdeo*.
6. *Voluta cincta*.

- Fig. 7. *Voluta breviplicata.*
8. *Voluta citharina.*
9. *Voluta radula.*
10 *a, b. Calyptræa elevata.*
11 *a, b. Calyptræa corrugata.*
12. *Natica obliquistriata.*
13. *Nerita oviformis.*
14. *Natica pagoda.*
15. *Natica munita.*
16 *a. Dentalium arcotinum: b. section.*
17. *Eulima antiqua.*
18. *Scalaria turbinata.*
19. *Pyrula pondicherriensis.*
20. *Cypræa Kayei.*
21. *Cypræa Newboldi.*
22. *Cypræa Cunliffei.*
23 *a, b. Oliva vetusta.*
24 *a, b. Tornatella labiosa.*
25. *Tornatella Curculio.*

PLATE XIII.

- Fig. 1. *Vermetus? Anguis.*
2. *Turritella monilifera.*
3. *Turritella ventricosa.*
4. *Turritella pondicherriensis.*
5 *a, b. Nerita ornata.*
6. *Cerithium sphaeruliferum.*
7. *Cerithium scalarioideum.*
8. *Phasianella? incerta.*
9 *a, b. Trochus arcotensis.*
10 *a, b. Trochus rotelloides.*
11 *a. Trochus radiatulus: b. magnified portion of the surface near the suture of the body-whorl, showing the radiating striæ.*
12. *Trochus Rajah.*
13. *Pleurotomaria indica.*
14. *Triton? atavus.*
15 *a, b. Rostellaria palliata: c. young shell.*
16 *a. Strombus uncutus: b. young shell.*
17. *Rostellaria securifera.*
18. *Rostellaria cancellifera.*
19. *Murex fluctuosus.*
20. *Murex pondicherriensis.*

PLATE XIV.

- Fig. 1 *a. Cardita striata*: *b.* magnified portion of the surface.
 2. *Arca abrupta.*
 3. *Trigonia aliformis.*
 4. *Mytilus typicus.*
 5 *a. Pecten verdachellensis*: *b.* portion of its surface magnified.
 6. *Gryphæa orientalis.*
 7 *a, b. Natica rugosissima.*
 8 *a. Pleurotomaria verdachellensis*: *b.* portion of the body-whorl magnified.
 9 *a. Ammonites Buddha*, part of the body-whorl: *b.* portion of the back.
 10 *a. Ammonites Sacya*: *b.* back view: *c.* portion of the dorsal surface magnified, showing the transverse striæ and the form of the varix.

PLATE XV.

- Fig. 1 *a, b. Natica suturalis.*
 2 *a. Tornatella semen*, natural size: *b.* magnified portion of the surface of the body-whorl: *c.* outline of the columella, showing the two folds.
 3. *Ringicula acuta*: *a.* magnified: *b.* natural size.
 4 *a. Turritella Sowerbii*: *b.* magnified portion, showing the sculpture of a whorl.
 5. *Voluta trinchinopolitensis.*
 6 *a, b. Nerita compacta.*
 7 *a. Murex trinchinopolitensis*: *b.* portion of the surface magnified.
 8 *a. Dentalium? hamatum*: *b.* section.
 9 *a. Strombus contortus*: *b.* the canal viewed from one side, showing its peculiar curvature.
 10 *a.* Magnified figure of *Cerithium trinchinopolitense*: *b.* its natural size.
 11. *Chemnitzia undosa.*
 12. *Pyruia cancellata.*
 13 *a. Cardium altum*, the full-grown shell: *b.* a young specimen: *c.* sculpture of the surface when decorticated.
 14 *a. Poromya lata*: *b.* magnified portion of the surface.
 15 *a. Cardium incomptum*, natural size: *b.* magnified.
 16 *a. Arca trinchinopolitensis*: *b.* its hinge, beak and area.
 17. *Mactra tripartita.*
 18. *Psammobia inconspicua.*
 19. *Venus arcotensis.*
 20. *Venus analoga.*
 21. *Venus eximia.*
 22 *a. Pecten virgatus*: *b.* a portion of the surface magnified.
 23 *a. Astarte planissima*: *b.* inner surface, showing the pallial and muscular impressions.
 24. *Ostrea amorpha.*

PLATE XVI.

- Fig. 1 *a, b. Arca brahminica.*
2 *a, b. Arca japetica.*
3 *a, b. Arca Gamana.*
4 *a. Arca Clellandi*, natural size : *b.* magnified.
5 *a, b. Anatina arcuata* : *c.* young shell.
6. *Mytilus pulcher.*
7. *Mytilus cypris.*
8. *Mytilus nitens.*
9. *Mytilus flagellifer.*
10. *Pinna arata.*
11. *Avicula nitida.*

PLATE XVII.

- Fig. 1. *Gastrochæna semisulcata* : *a.* with its tube : *b.* the valves detached from the tube.
2 *a. Fistulana aspergilloides* : *b.* section.
3. *Solecurtus obscurus.*
4 *a, b. Panopæa orientalis.*
5 *a, b. Pholadomya connectans.*
6 *a, b. Poromya globulosa* : *c.* magnified portion of its surface.
7. *Lucina jugosa.*
8 *a. Lucina fallax* : *b.* young shell : *c.* cast.

PLATE XVIII.

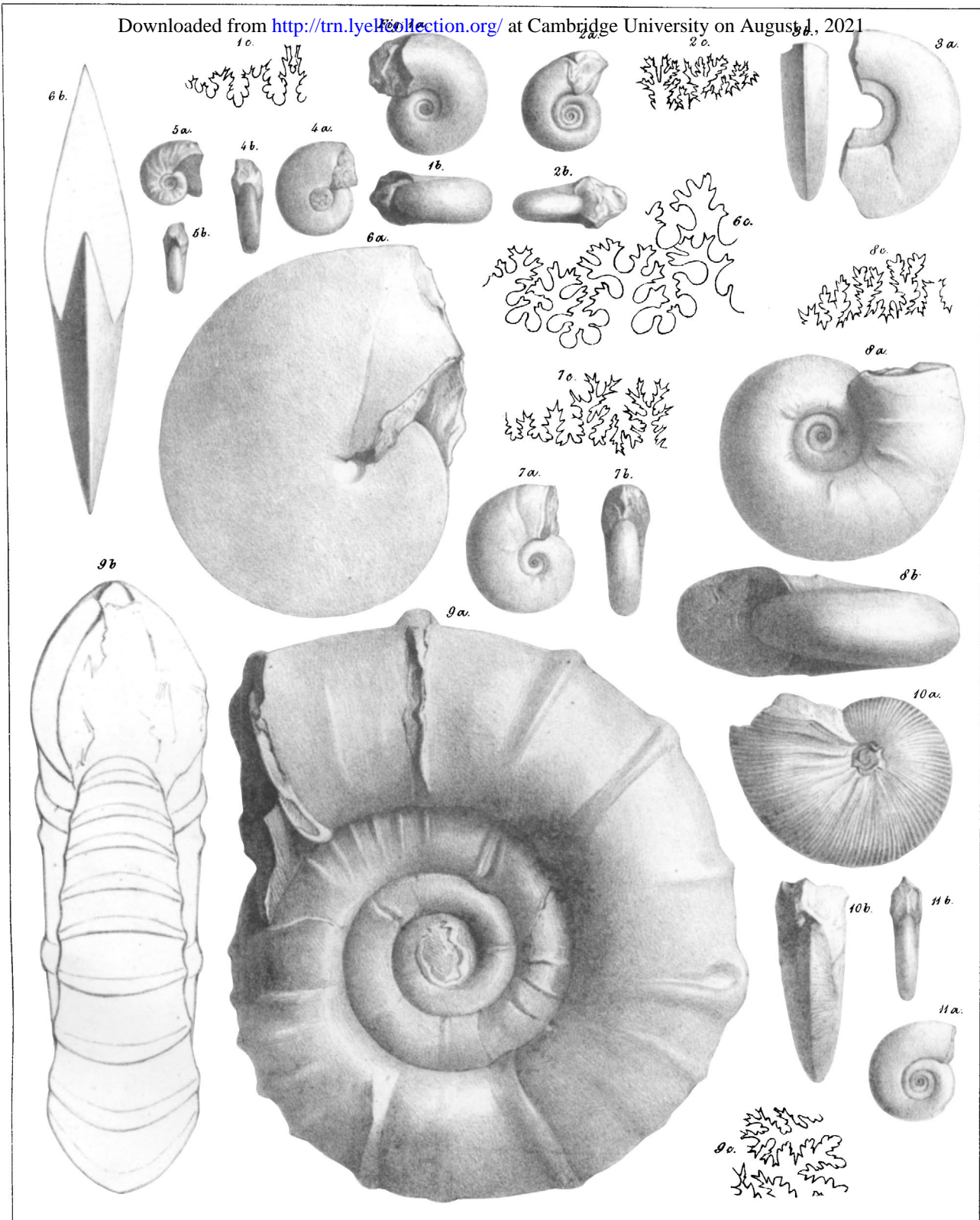
- Fig. 1. *Spondylus subsquamosus.*
2 *a. Spondylus calcaratus* : *b.* young shell.
3. *Plicatula multicostata.*
4. *Plicatula septemcostata.*
5. *Ostrea pes-leonis.*
6. *Ostrea tegulanea.*
7. *Artemis lenticularis.*
8. *Cardium intersectum.*
9. *Trigonia semiculta.*
10. *Trigonia suborbicularis.*
11. *Trigonia orientalis.*
12 *a. Terebratula arabilis* : *b.* profile of a young specimen.
13 *a. Lima obliquistriata* : *b.* magnified portion of its surface.
14 *a. Corbula striatuloides*, natural size : *b.* magnified.
15. *Tellina pondicherriensis.*

PLATE XIX.

- Fig. 1. *Nucleolites elatus*: *a.* lateral view: *b.* anal extremity: *c.* one of the latero-dorsal ambulacra: *d.* oral ambulacra and parts about the mouth.
- 2 *a.* *Nucleolites Testudo*: *b.* profile.
- 3 *a.* *Nucleolites planatus*: *b.* profile.
- 4 *a.* *Holaster indicus*: *b.* profile.
- 5 *a.* *Brissus Rana*: *b.* profile.
- 6 *a.* *Brissus inæqualis*: *b.* profile.
- 7 *a.* *Brissus expansus*: *b.* profile of a smaller specimen.
8. *Ophiura Cunliffei*.
- 9 *a.* *Turbinolia arcotensis*: *b.* section of its summit.
10. *Cladacora*, sp.?
11. *Fungia filamentosa*: *a.* side-view: *b.* from above: *c.* base.
12. Carapace of a Crab.
13. *Ditrupa longissima*.
-

The President and Council regret to announce, that while these papers were passing through the press, they received intelligence of the death of Mr. Kaye, at Madras. They have thus to lament the loss to science of a young and accomplished Geologist, who, at the time of his death, was continuing those researches of which the papers now published contain the first results.

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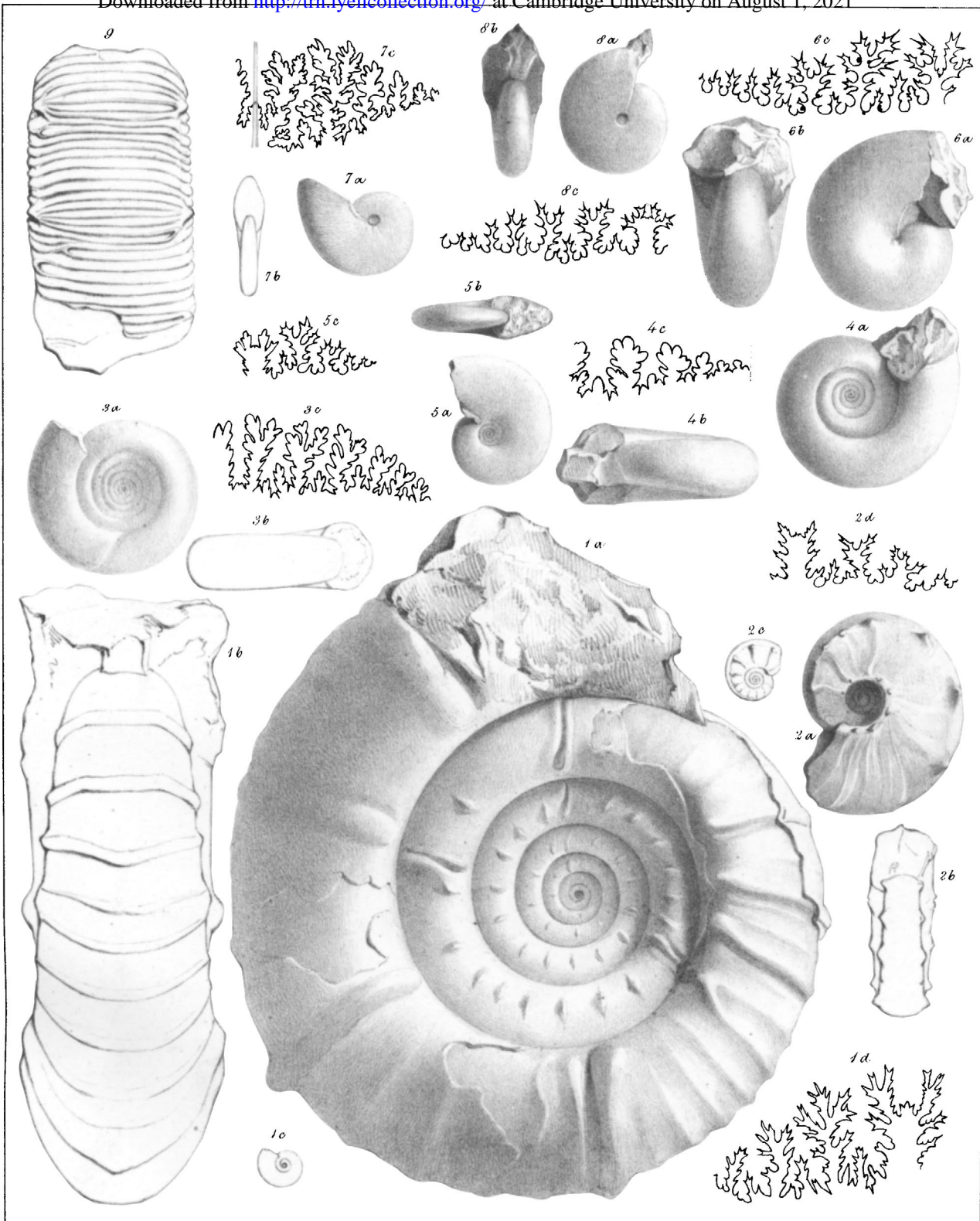


C. R. Bone lith

Hullmandel & Walton Lithographers

Fig. 1 a. b. c. *Ammonites Garuda. n. s.*
 2. a. b. c. " *Juilletii. d'Orb.*
 3. a. b. " *Rembda. n. s.*
 4. a. b. " *Yama. n. s.*
 5. a. b. " *Pavana. n. s.*
 6. a. b. c. " *Siva. n. s.*

Fig. 7. a. b. c. *Ammonites Soma. n. s.*
 8. a. b. c. " *Ganesa. n. s.*
 9. a. b. c. " *Vishnu. n. s.*
 10. a. b. " *Surya. n. s.*
 11. a. b. " *Durga. n. s.*



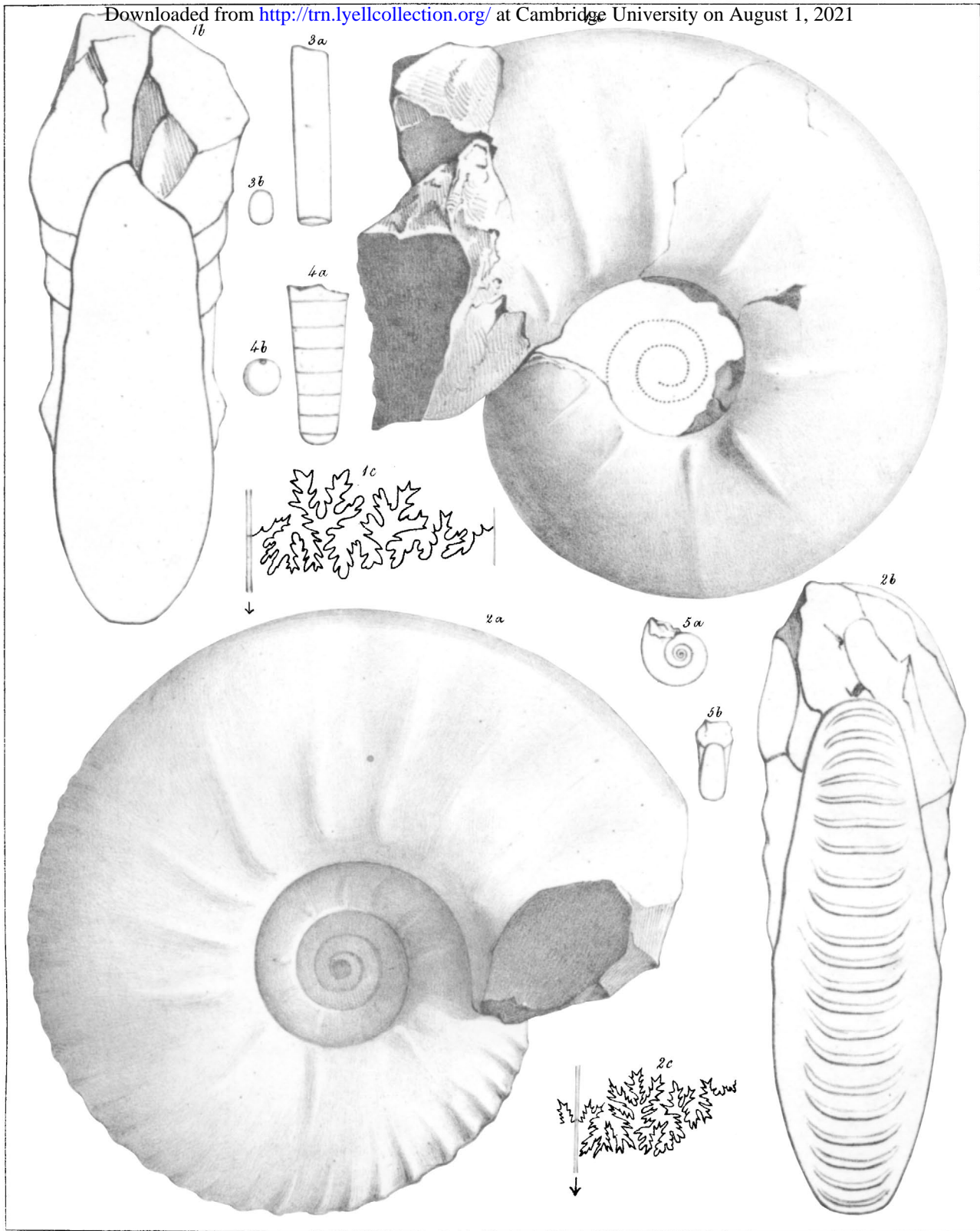
O.R. Bone lith

Hüllmandel & Walton Lithographers.

Fig. 1. a. b. c. d. *Ammonites Brahmanus*.
 2. a. b. c. d. " *Cunliffii* n. s.
 3. a. b. c. " *Kazeyi* n. s.
 4. a. b. c. " *Calu* n. s.
 5. a. b. c. " *Vavina* n. s.

Fig. 6. a. b. c. *Ammonites Royanus* n. s.
 7. a. b. c. " *Nora* n. s.
 8. a. b. c. " *Aphylloides* n. s.
 9. *Ammonites? Indicus* n. s.

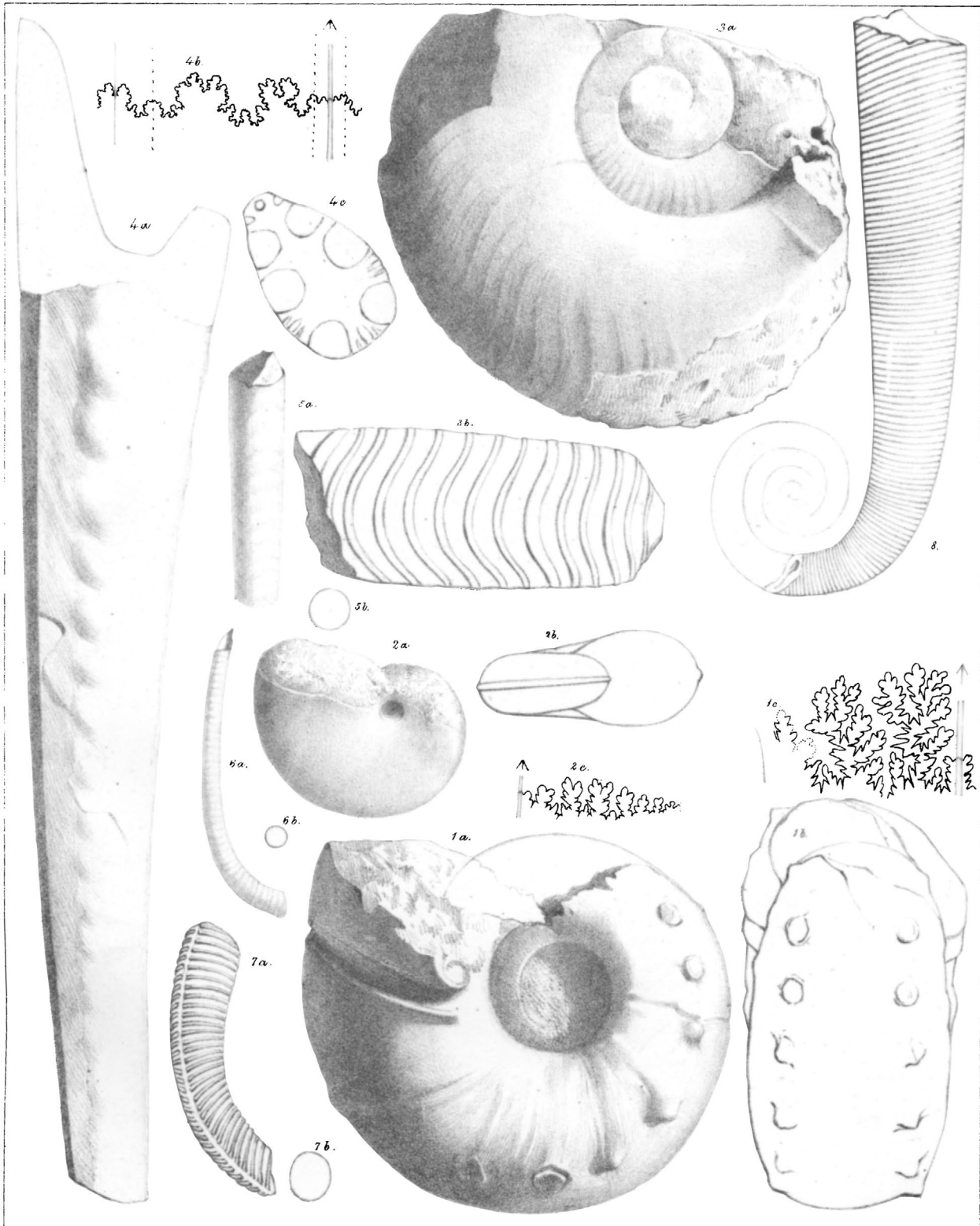
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C.F. Bone lith.

Hillmandel & Walton Lithographers

- = {
 - 1. a. b. c. *Ammonites Egertoni* n. s.
 - 2. a. b. c. " *Christina* n. s.
 - 3. a. b. *Belemnites? fibula* n. s.
 - 4. a. b. *Belemnites*.
 - 5. a. b. *Turritites? planorbis* n. s.



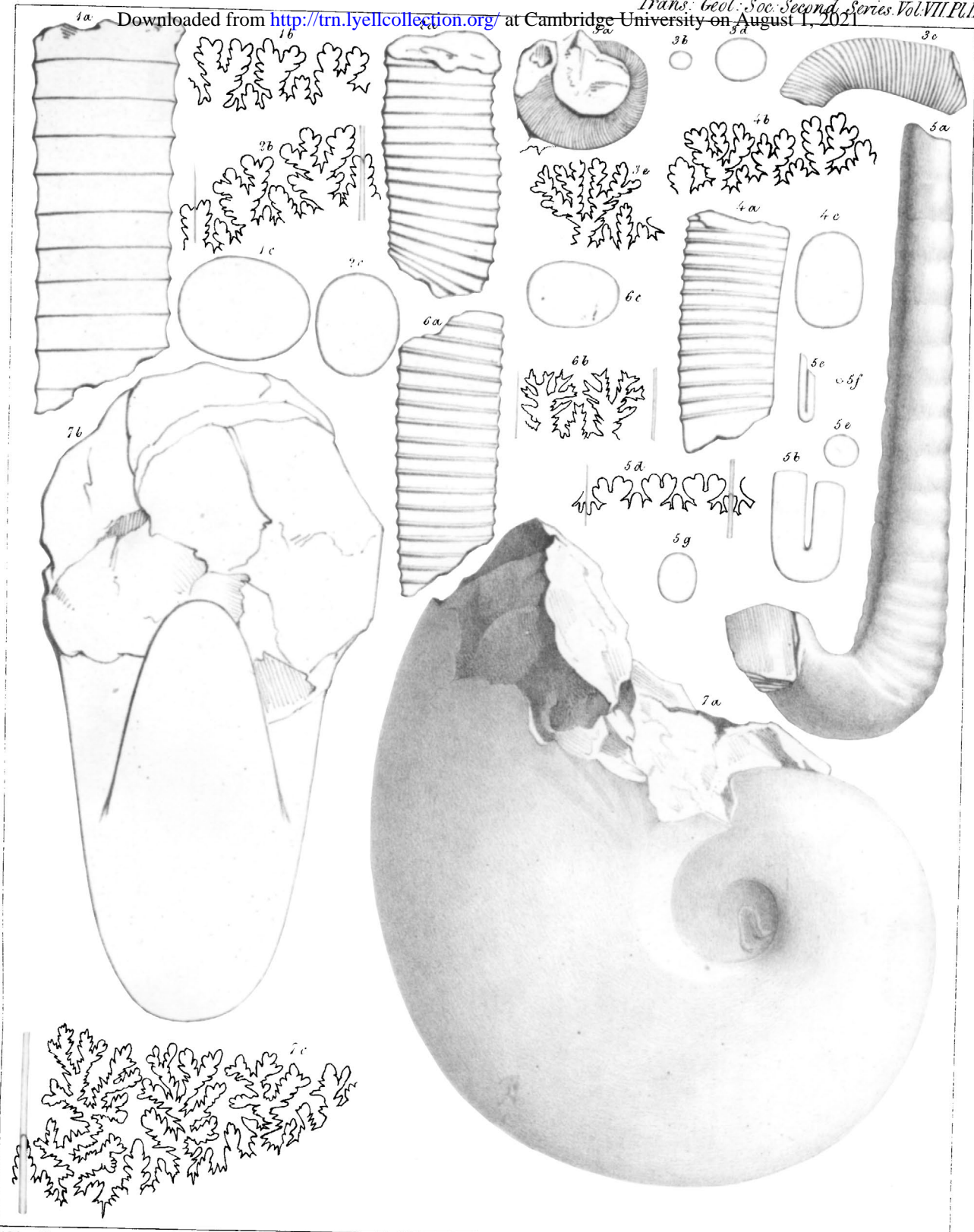
G.R. Bone lith.

Hullmandel & Walton Lithographers

Fig. 1 a b c *Ammonites Menu*, n. s.
 2 a b c. " *Sugala*, n. s.
 3 a b " *Gaudama*, n. s.
 4 a b c. *Baculites vagina*, n. s.

Fig. 5 a b. *Baculites toros*, n. s.
 6 a b *Hamites undulatus*, n. s.
 7 a b. " *neretis*, n. s.
 8 " *tennisulcatus*, n. s.

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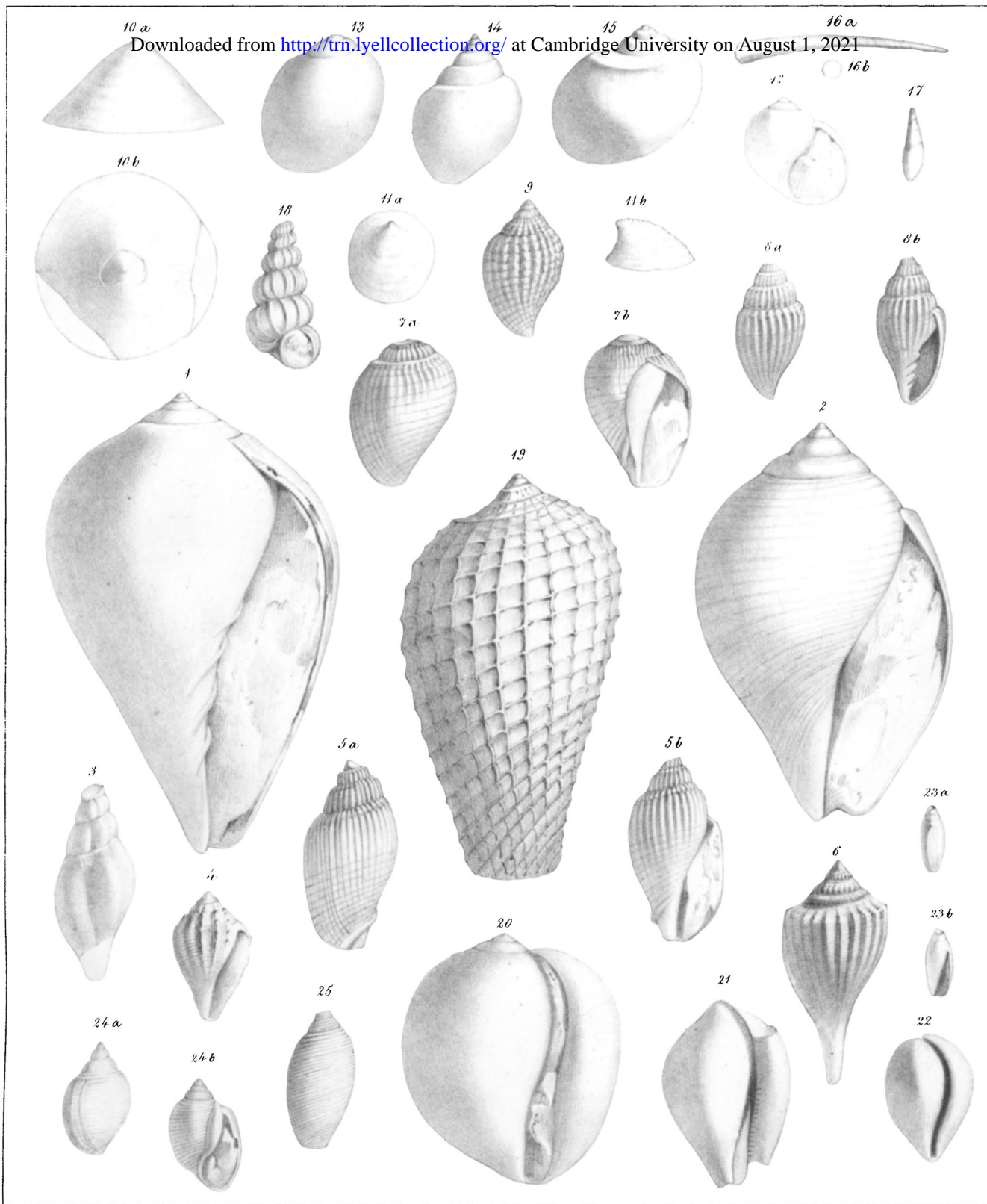
C.R. Some 3th.

Humboldt & T. Geomorphographes

Fig 1. a. b. c. *Hamites large-sulcatus*. n. s.
 2. a. b. c. " *rugatus*. n. s.
 3. a. b. c. d. e. *tenuisulcatus*. n. s.
 4. a. b. c. " *Indicus*. n. s.

Fig 5. a. b. c. d. e. f. g. *Psychoceras siphoe*. n. s.
 6. a. b. c. *Hamites subcompressus*. n. s.
 7. a. b. c. *Ammonites Indus*. n. s.

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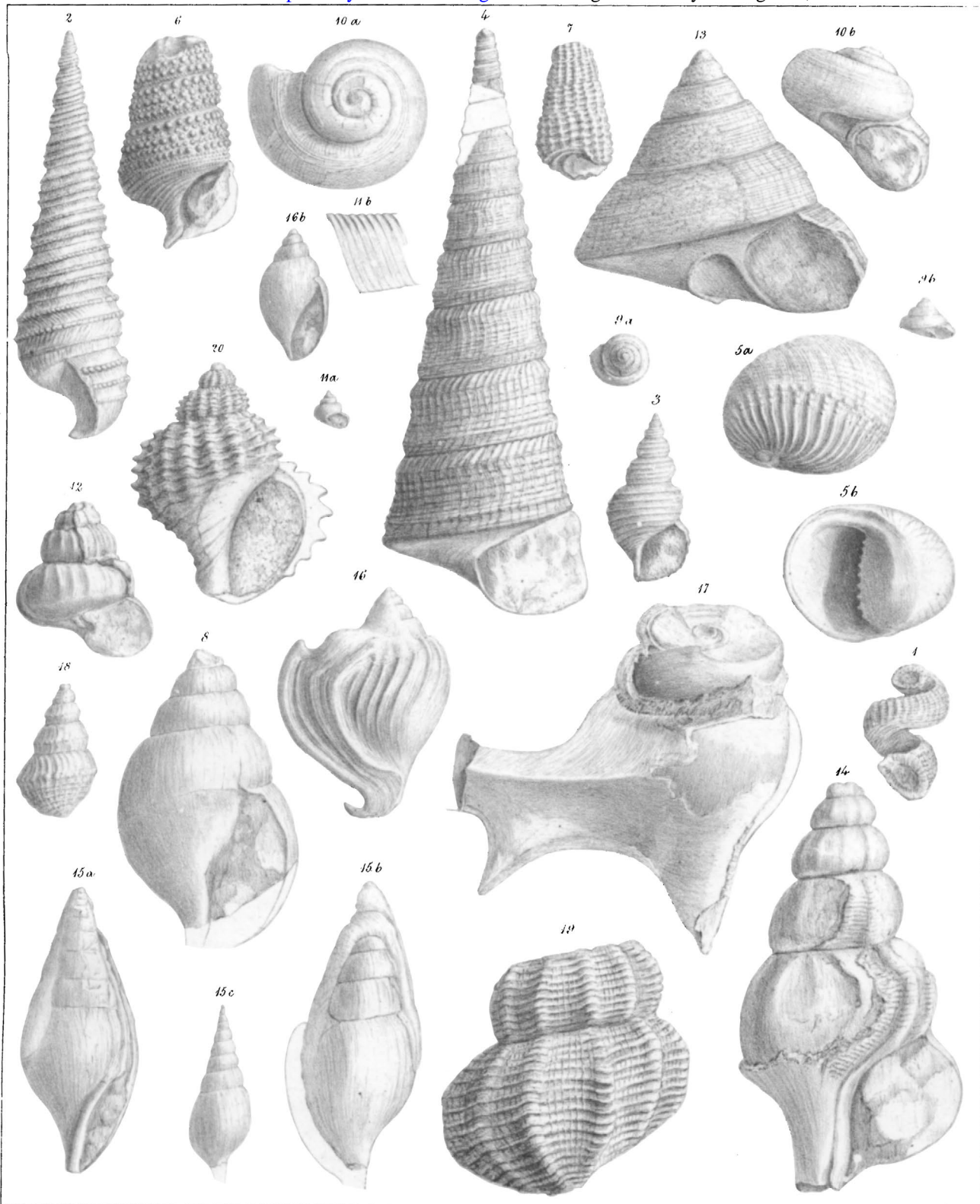
C. B. Bonelli.

Hillmandel & Walz Lithographers.

- 1. *Veluta pyriformis*. n. s.
- 2. " *purpuriformis*. n. s.
- 3. " *septemcostata*. n. s.
- 4. " *muricata*. n. s.
- 5. a. b. " *canidia*. n. s.
- 6. " *cincta*. n. s.
- 7. a. b. " *breviplicata*. n. s.
- 8. a. b. " *altharina*. n. s.
- 9. " *radula*. (C. Sow. ?)

- 10. a. b. *Calyptrea levata*. n. s.
- 11. a. b. " *corrugata*. n. s.
- 12. " *obliquistriata*. n. s.
- 13. *Natica oviformis*. n. s.
- 14. *Natica pagoda*. n. s.
- 15. *Natica manita*. n. s.
- 16. a. b. *Dentalium arcotinum*. n. s.
- 17. *Eulima antiqua*. n. s.
- 18. *Scalaria turbinata*. n. s.

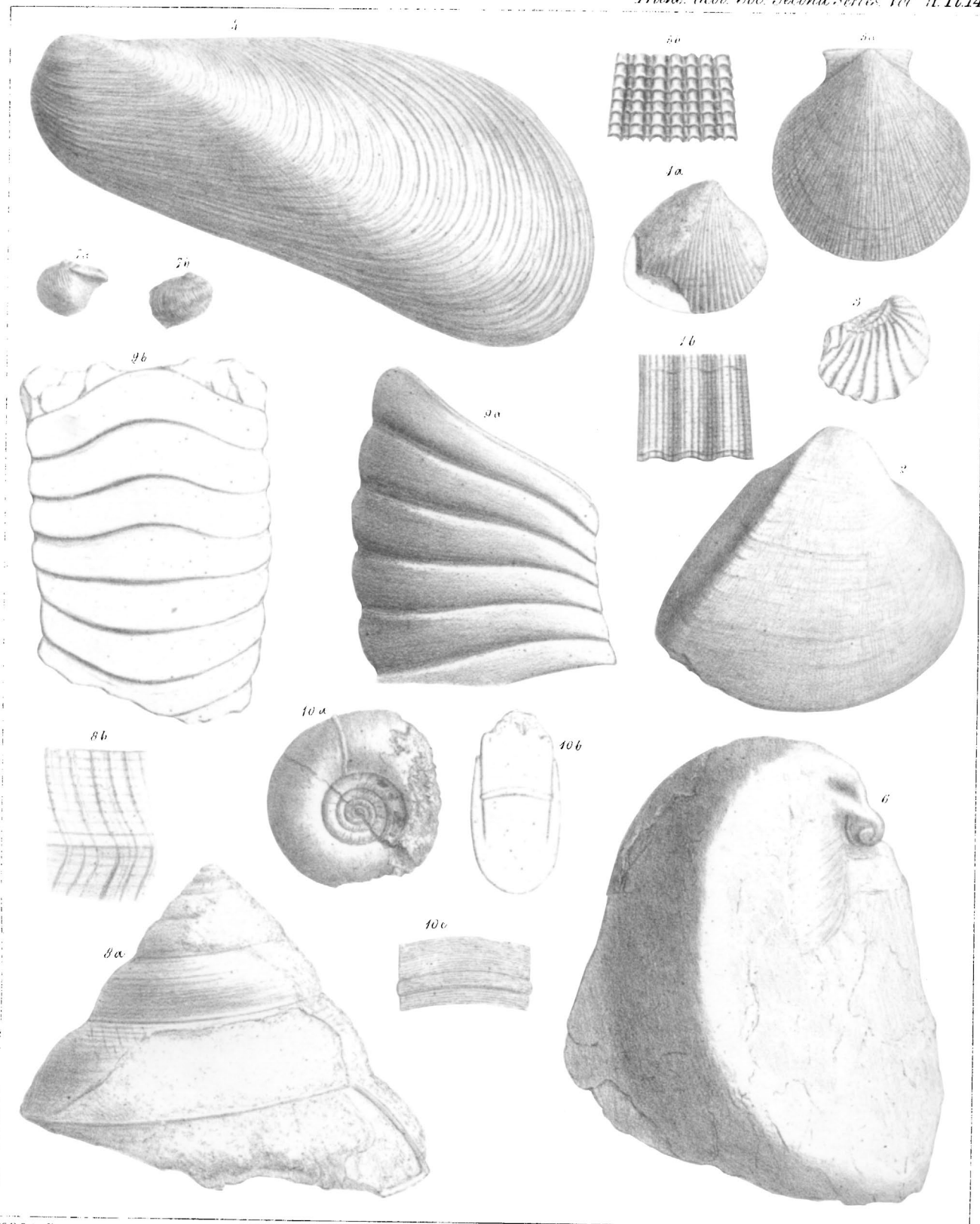
- 19. *Pyruca pendulocherriensis*. n. s.
- 20. *Cypræa Keyei*. n. s.
- 21. " *Newboldi*. n. s.
- 22. " *Cunliffei*. n. s.
- 23. a. b. *Oliva vetusta*. n. s.
- 24. a. b. *Ternatella labiosa*. n. s.
- 25. " *curculio*. n. s.



W. H. Baily del.

Richardson & Walton lithogr. sc.

Fig. 1. *Fornelus anguis*, n.s. 6. *Cerithium sphaeruliferum*, n.s. 11. a. b. *Trochus radiatulus*, n.s. 16. a. b. *Strombus uncatas*, n.s.
 2. *Turritella morulifera*, n.s. 7. *scalaroideum*, n.s. 12. *Rajah*, n.s. 17. *Kostellaria scintillata*, n.s.
 3. *varicosa*, n.s. 8. *Platystrophia* ? *incerta*, n.s. 13. *Pleurotomaria Indica*, n.s. 18. *cancelifera*, n.s.
 4. *Pondicherriensis*, n.s. 9. a. b. *Trochus areolaris*, n.s. 14. *Triton atavus*, n.s. 19. *Murex fluctuosus*, n.s.
 5. a. b. *Nerita ornata*, n.s. 10. a. b. *rotelloides*, n.s. 15. a. b. c. *Kostellaria palliata*, n.s. 20. *Pondicherriensis*, n.s.

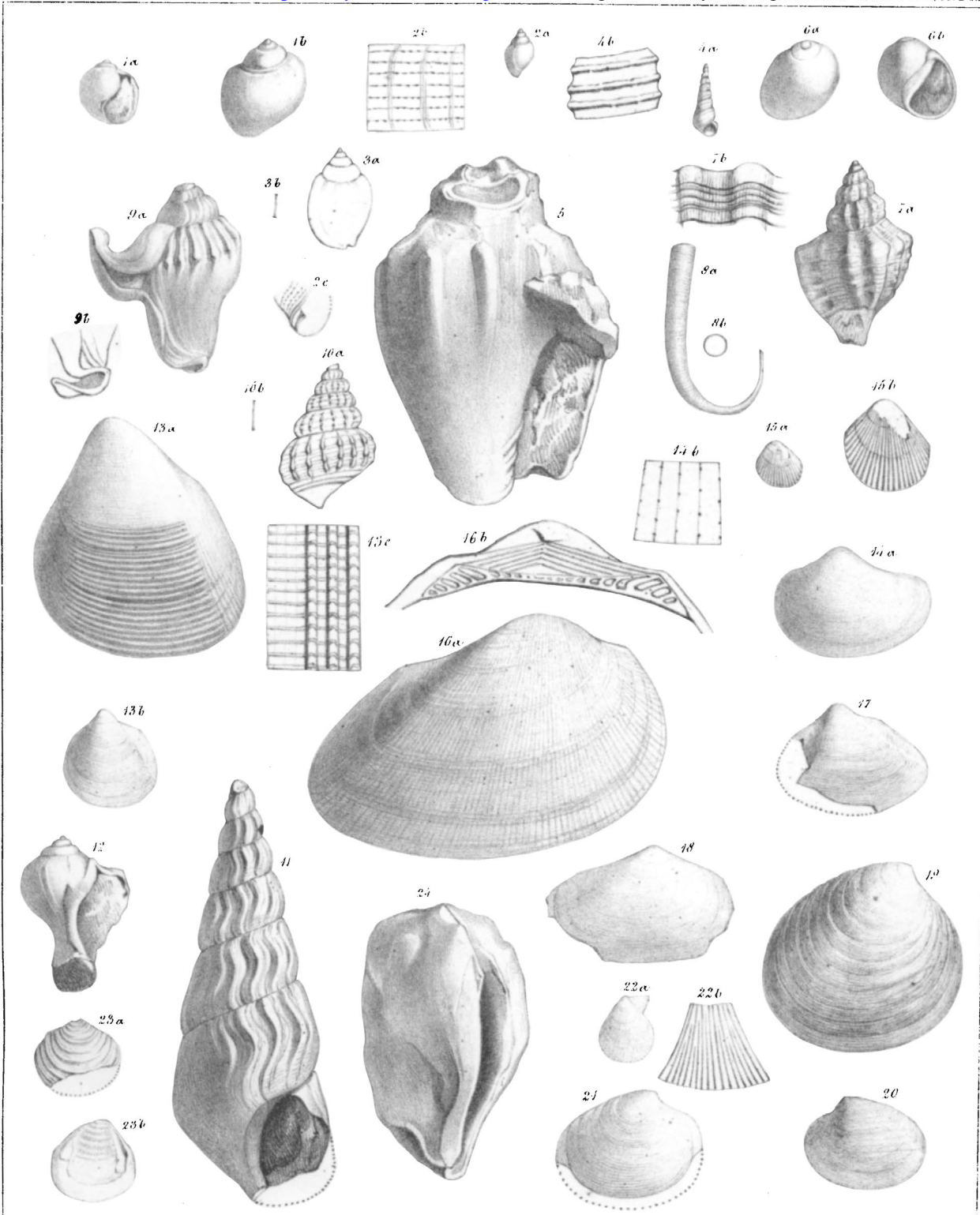


W. D. Dalry, lith.

Hallmandel & Walton lithographers.

Fig. 1. a. b. *Cardita striata*, n. s.
 2. *Arca abrupta*, n. s.
 3. *Trigonia aliformis*, Lamk.
 4. *Modiola typica*, n. s.
 5 a. b. *Pecten verdachellensis*, n. s.

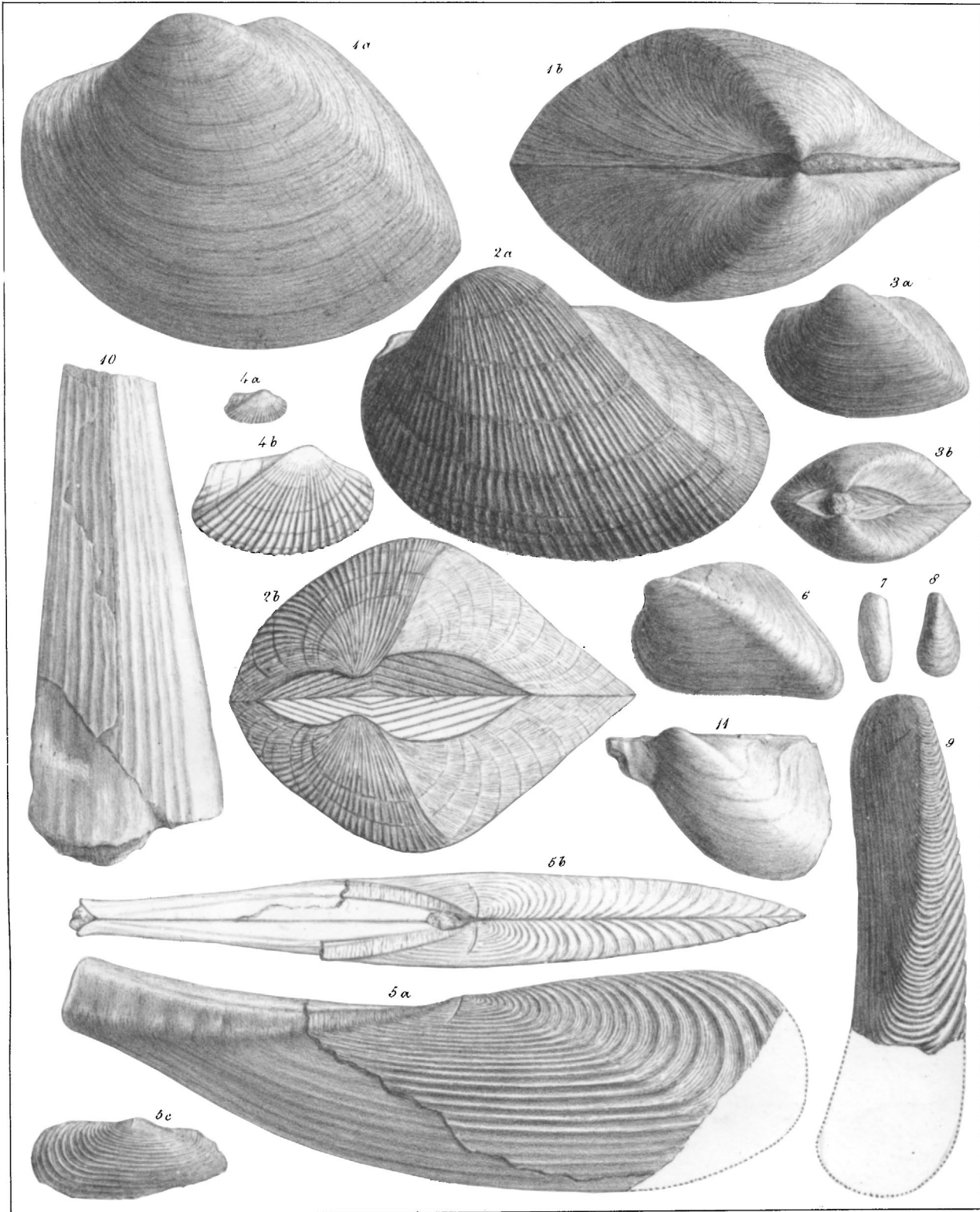
Fig. 6. *Gryphaea orientalis*, n. s.
 7. a. b. *Natica rugosissima*, n. s.
 8. a. b. *Pleurotomaria verdachellensis*, n. s.
 9. a. b. *Ammonites Buddha*, n. s.
 10. a. b. c. " *Saxya*, n. s.



G. F. Bonelli.

Hallmandel & Walton lithographers

- | | | | | | |
|---------------|---|-----------|---|-----------|--|
| Fig. 1. a. b. | <i>Natica saturnalis</i> (G. Sow?) | 9 a. b. | <i>Strombus contortus</i> (G. Sow?) | 17. | <i>Maetra tripartita</i> n. s. |
| 2. a. b. c. | <i>Lornatella semen</i> n. s. | 10 a. b. | <i>Conchium Trinchinopolitensis</i> n. s. | 18. | <i>Psammobia inconspicua</i> (G. Sow?) |
| 3. a. b. | <i>Ringicula acuta</i> n. s. | 11. | <i>Chemnitzia undosa</i> (G. Sow?) | 19. | <i>Venus arcotensis</i> n. s. |
| 4. a. b. | <i>Tarritella Sowerbi</i> n. s. | 12. | <i>Fyrula cancellata</i> ? n. s. | 20. | " <i>analogica</i> n. s. |
| 5. | <i>Voluta Trinchinopolitensis</i> n. s. | 13. a. b. | <i>Cardium altum</i> (G. Sow?) | 21. | " <i>caimica</i> n. s. |
| 6. a. b. | <i>Nerita compacta</i> n. s. | 14. a. b. | <i>Poromya lata</i> n. s. | 22. a. b. | <i>Pecten virgatus</i> (Wilson?) |
| 7. a. b. | <i>Murex Trinchinopolitensis</i> n. s. | 15. a. b. | <i>Cardium incomptum</i> (G. Sow?) | 23. a. b. | <i>Astarte planissima</i> n. s. |
| 8. a. b. | <i>Dentalium</i> ? <i>hamatum</i> n. s. | 16. a. b. | <i>Arca Trinchinopolitensis</i> n. s. | 24. | <i>Ostrea amorphica</i> (G. Sow?) |



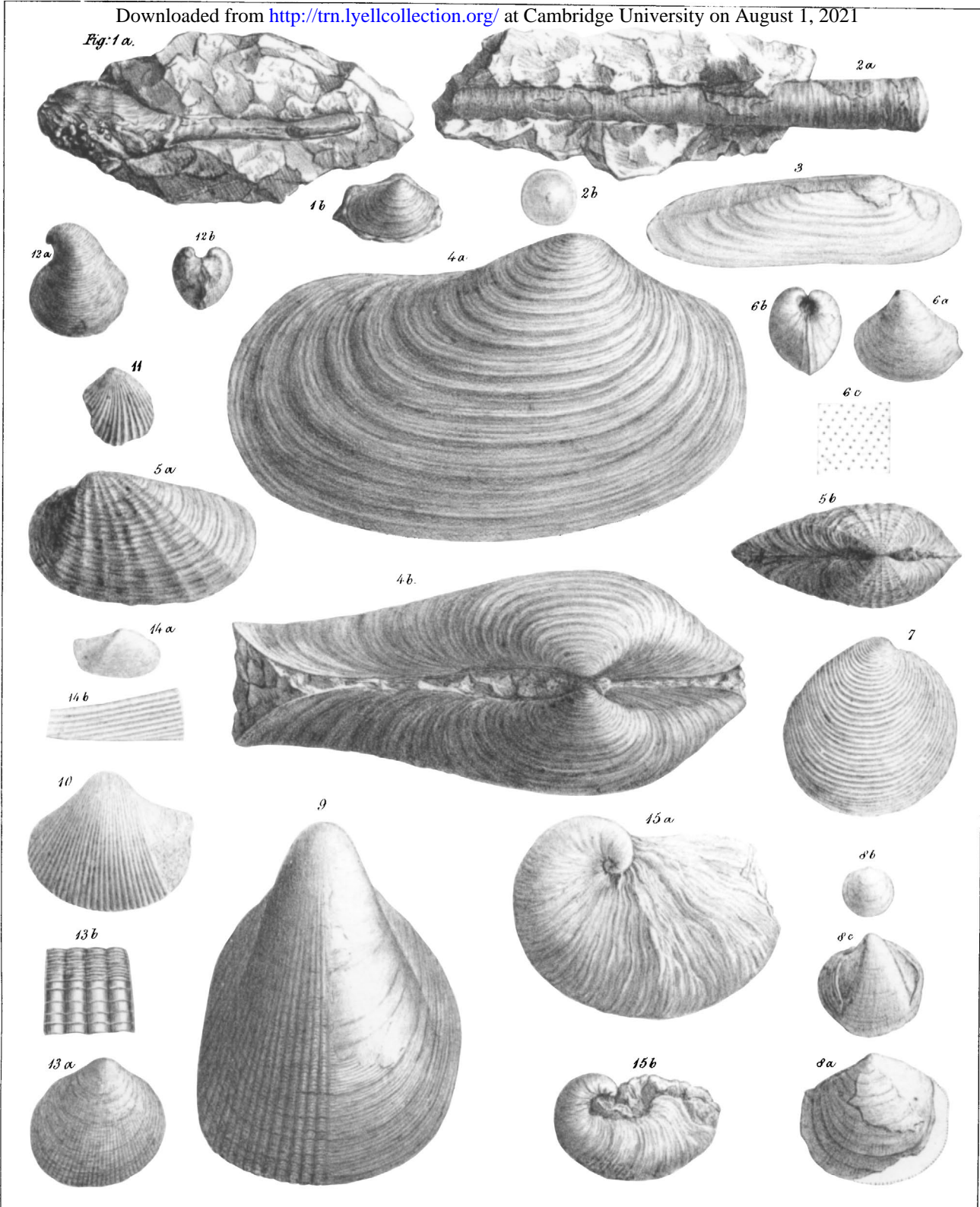
W. H. Baily lith.

Hullmandel & Walton Lithographers

Fig. 1. a. b. *Arca Brahminica*. n. s.
 2. a. b. " *Tapesca*. n. s.
 3. a. b. " *Gamana*. n. s.
 4. a. b. " *Clellandi*. n. s.
 5. a. b. c. *Anatina arcuata*. n. s.
 6. *Mytilus pulcher*. n. s.

Fig. 7. *Mytilus cypris*. n. s.
 8. " *nitens*. n. s.
 9. " *flagellatorus*. n. s.
 10. *Pinna arata*. n. s.
 11. *Aricula nitida*. n. s.

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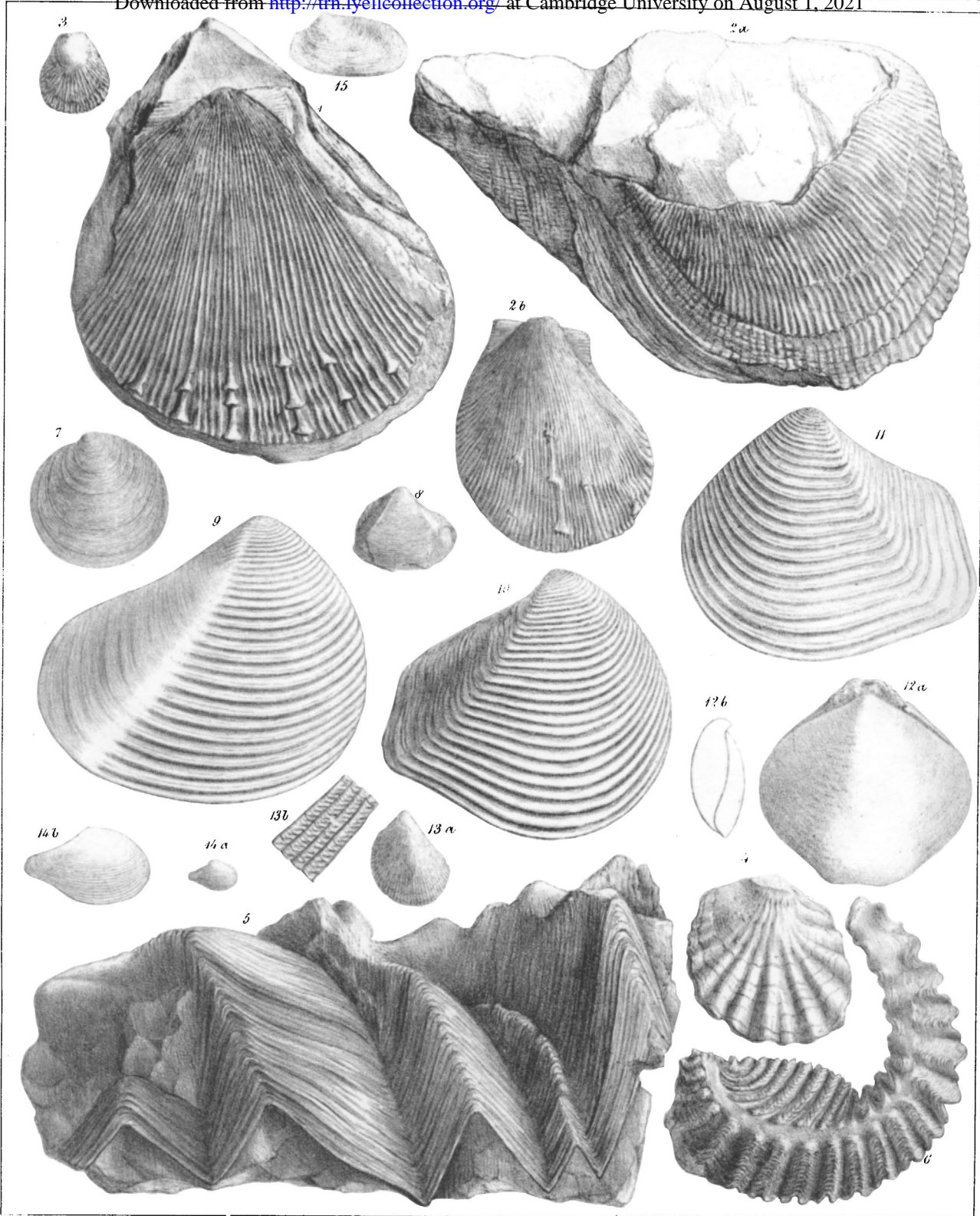


W.H. Baily del.

Hullmandel & Walton Lithographers.

Fig. 1. a. b. *Gastrochana semisulcata*. n. s.
 2. a. b. *Pistularia aspergilloides*. n. s.
 3. *Solecurtus obscurus*. n. s.
 4. a. b. *Panopaea orientalis*. n. s.
 5. a. b. *Pholadomya connectans*. n. s.
 6. a. b. c. *Poromya globulosa*. n. s.
 7. *Lucina jugosa*. n. s.
 8. a. b. c. " *fallax*. n. s.

Fig. 9. *Cardium bisectum*. n. s.
 10. " *lucerna*. n. s.
 11. *Cardita orbicularis*. n. s.
 12. a. b. *Isocardia subsinuata*. n. s.
 13. a. b. *Pectanculus subauriculatus*. n. s.
 14. a. b. *Nucula striatula*. n. s.
 15. a. b. *Gryphæa stomatoidea*. n. s.

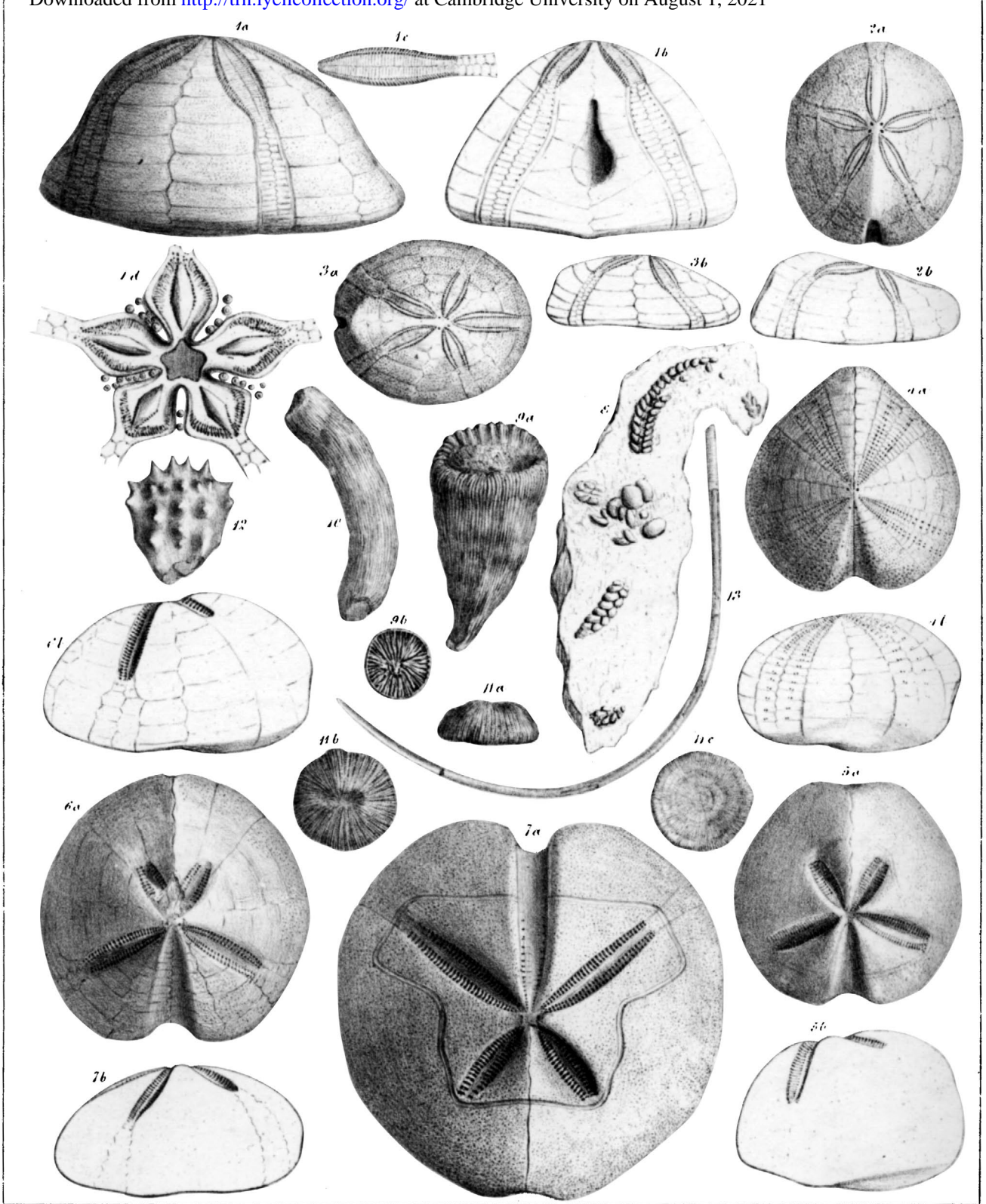


W. H. Bailey lith.

Hullmandel & Walton Lithographers.

Fig 1. *Spondylus subsquamosus*. n. s.
 2. a. b. " *calcaratus*. n. s.
 3. *Licatulula multicostrata*. n. s.
 4. " *7 costata*. n. s.
 5. *Ostrea pes leonis*. n. s.
 6. " *tegularia*. n. s.
 7. *Artemis lenticularis*. n. s.

Fig 8. *Cardium intersectum*. n. s.
 9. *Trigonia semiculata*. n. s.
 10. " *suborbicularis*. n. s.
 11. " *orientalis*. n. s.
 12. a. b. *Terebratulula arabitis*. n. s.
 13. a. b. *Lima obliqua striata*. n. s.
 14. a. b. *Corbula striatulaoides*. n. s.
 15. *Tellina Pondicherrensis*. n. s.



W. H. P. lith.

Hulme & Walton Lithog. & Print.

Fig 1. a. b. c. d. *Nucleolites clatus* n.s.
 2. a. b. " *testudo* n.s.
 3. a. b. " *planatus* n.s.
 4. a. b. *Holaster Indicus* n.s.
 5. a. b. *Bristus rana* n.s.
 6. a. b. " *inæqualis* n.s.
 7. a. b. " *expansus* n.s.

8. *Ophiura Cuvillieri* n.s.
 9. a. b. *Purbinolia areolaris* n.s.
 10. *Cladocera* sp?
 11. a. b. c. *Prongia filamentosa* n.s.
 12. Carapace of a Crab.
 13. *Ditripia longissima* n.s.