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**Account of Twenty-six Species of Polyparia  
obtained from the Eocene Tertiary Formation of  
North America**

Charles Lyell and W. Lonsdale

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they were generally open; and obliteration of the pores, where it occurred, was probably due chiefly to the infiltration of calcareous matter. The vesicle, as shown in the woodcut, resembled, in the form of the opening, that of typical *Cellepora*, but the structure itself was more immersed in the body of the cell.

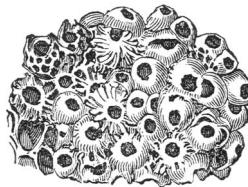
*Localities.* — Williamsburg, Evergreen.

#### 10. *Cellepora similis.* (sp. n.)

Lobed or convoluted; cells globular, confusedly aggregated, surface non-foraminated, more or less traversed by reticulated or radiating ridges; mouth large, circular, terminal; a large hood-shaped projecting gemmiferous vesicle.

This coral possessed all the leading characters of typical species of the genus, and it resembled *C. pumicosa* in the form of the cells, and in the confused mode of aggregation: in that species radiating ridges near the junction of the cells may also occasionally be detected, but to a much less extent than in the fossil under consideration. The leading distinction between the fossil and recent polyparians consisted in the perfect vesicle of the former, when exhibited in sheltered places, not having a long spinous process; and there were other minor peculiarities, as the total absence of a transverse plate near the bottom of the aperture.

*Locality.* — Williamsburg.



*Cellepora similis.*

The figure represents the general characters of an outer unprotected surface greatly magnified; but the vesicle is not given in its perfect state or with the projecting hood; it exhibits accurately the radiating or reticulating ridges.

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## II. Account of Twenty-six Species of POLYPARIA obtained from the Eocene Tertiary Formation of North America.

The following is a list of these corals: —

1. *Ocellaria ramosa Lonsdale.* (sp. n.)
2. *Flabellum? cuneiforme Lonsdale.* (*Anthophyllum cuneiforme Conrad.* MS. label.)
3. *Endopachys alatum Lonsdale.* (sp. n.)
4. *Dendrophyllia laevis Lonsdale.* (sp. n.)
5. *Dendrophyllia?*
6. *Cladocora (?) recrescens Lonsdale.* (sp. n.)
7. *Caryophyllum subdichotoma Lonsdale.* (sp. n.)
8. *Madrepora tubulata (?) Lonsdale.* (*Astrea tubulata De France.*)
9. *Porites.*
10. *Tubulipora proboscidea (?) Lonsdale.* (*Pustulopora proboscidea (?) Milne Edwards.*)
11. *Tubulipora.*

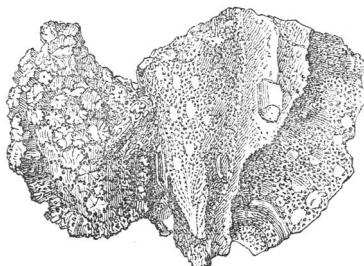
12. *Idmonea maxillaris* *Lonsdale.* (sp. n.)
13. *Idmonea commiscens* *Lonsdale.* (sp. n.)
14. *Idmonea.*
15. *Lichenopora.*
16. *Farcimia.*
17. *Vincularia.*
18. *Hippothoa tuberculum* *Lonsdale.* (sp. n.)
19. *Eschara tubulata* *Lonsdale.* (sp. n.)
20. *Eschara petiolus* *Lonsdale.* (sp. n.)
21. *Eschara incumbens* *Lonsdale.* (sp. n.)
22. *Eschara linea* *Lonsdale.* (sp. n.)
23. *Eschara viminea* *Lonsdale.* (sp. n.)
24. *Lunulites sexangula* *Lonsdale.* (sp. n.)
25. *Lunulites distans* *Lonsdale.* (sp. n.)
26. *Lunulites contigua* *Lonsdale.* (sp. n.)

#### A. *Polyparia Amorphozoa.*

##### 1. *OCELLARIA RAMOSA Lonsdale.* (sp. n.)

Branched or lobed; fibres coarse, cylindrical or compressed, intimately reticulated; interfibral lacunæ equal in dimensions to the fibres; canals numerous, vertical in centre of specimen, horizontal towards the exterior, no definite arrangement, form more or less circular, no distinct wall, lower extremity blended with the fibrous structure, inferior sometimes penetrated by converging simple fibres; exterior of specimen partially invested by a thin rugose layer.

The resemblance between the Pyrenean and Artois fossils, on which M. Ramond established his genus *OCELLARIA* \*, and those bodies which Dr. Mantell designated in the first instance *Alcyonium chonoides* †, and subsequently *Ventriculites* ‡, was, it is believed, originally pointed out by Mr. Conybeare §; and Dr. Mantell has identified the *V. alcyonides* || with M. Ramond's *Ocellariae*. To what extent this generic agreement may be accepted, the descriptions in the work on Mont-Perdu do not af-



The right of the figure represents a concave cast of the exterior of *Ocellaria ramosa* of the natural size, with portions near the bottom of the surface crust minutely punctured; the centre of the figure is a conical branch composed entirely of canals with intermediate reticulations; and the left is a series of transverse sections of canals, exhibiting a smooth surface irregularly intersected by fissures, which indicate the extension, originally, of fibres.

\* Voy. au Mont-Perdu, p. 345. pl. 2. f. 1, 2. 1801, but previously described in No. 47. of Bull. Soc. Philom.

† Linn. Trans. vol. xi. p. 401. *et seq.* 1814—1815.

‡ Geol. of Sussex, p. 176. *et seq.* 1822.

§ Outlines Geol. Engl. p. 76. 1822.

|| Trans. Geol. Soc. London, 2d series, vol. iii. p. 205. 1828—1829.

ford the requisite information for determining ; but it is believed that M. Ramond may have associated with his *O. nuda*, obtained in the Pyrenees, the *O. inclusa* from Artois, without a full consideration of all the structural characters, or on a mere resemblance in the nature of the canals and the fibral tissue. How far this supposition, and the conjecture that *O. nuda* does not belong to *Ventriculites*, may be correct, an examination of specimens only can decide. In attempting, however, to ascertain the nature of certain American fossils, and the most nearly allied known genus, it was found that essential differences existed between those remains and *V. alcyonoides* as well as *V. radiatus* ; while so far as M. Ramond's figures of *Ocellaria nuda*, particularly (1 b.), could be relied on, a considerable agreement was apparent ; and it has therefore been deemed advisable to consider the Mont-Perdu fossil as distinct from *Ventriculites*, and to associate generically with it these fossils from America.

*Ocellaria ramosa* consisted apparently of a fibrous body not divisible, as in *Ventriculites*, into layers of different composition, and penetrated by irregularly arranged canals — also of a partially developed, thin, investing, non-fibrous crust. Neither the solid casts representing the inter-fibral lacunæ, nor those which occupied the canals exhibited in the fossil any signs of contraction : there was also a total want in the calcareous matrix of all indications of a thick, gelatinous, coriaceous, or other covering. The canals sprung apparently from the axis of the specimens, and after ranging for some distance more or less vertically, diverged outwards in every direction, the plane of the opening coinciding with that of the surface. At the lower extremity they blended with the fibral structure ; and it is believed that they were, to a certain extent at least, progressively obliterated. In other portions of their range they were often penetrated irregularly by simple fibres, and sometimes in a manner which gave the transverse section a star-like or radiated aspect. Mr. C. B. Rose, of Swaffham, has pointed out a similar appearance in *Ventriculites*.\* In transversely fractured specimens, the calcareous matter, which occupied the canals, presented generally a smooth but irregularly impressed surface, which had been clearly moulded on a soft or yielding material ; and in more than one instance proofs were obtained of two successive similar surfaces at distances exceeding a line, and their position was shown by a cross fissure or narrow interval, due to the removal of the original body. In some cases the canals were few in number or distant ; but in one specimen they were so numerous as to occupy nearly the whole of it, the interspaces being limited to a single series of very short fibres or merely connecting processes, without the least signs of contractions. The partially developed outer crust presented its greatest thickness and persistence near the base of the specimen, where it completely concealed the fibres and canals ; but in other places its extent was limited,

\* Loudon's Mag. Nat. Hist. vol. ii. p. 335. fig. 93 b. 1828—1829.

and it had been pierced by single projecting fibres as well as by the terminations of the canals. Independent of the prominent transverse rugosities, subordinate lines parallel to them were noticed in some of the thicker crusts.

*Localities*.—Jacksonboro', Georgia; Eutaw, South Carolina.

### B. *Polyparia Anthozoa.*

#### 2. *FLABELLUM?* CUNEIFORME. (sp. n.)

Conical, compressed; pedicle small, cylindrical, lateral processes few, minute; lamellæ numerous, united centrally in lower portion of the cone, sides finely tuberculated; terminal cup deep, lined by lamellæ of variable breadth, not united in the centre, upper edges convex; outer wall thin, smooth externally, minutely foraminated.

This fossil, named in MS. by Mr. Conrad *Anthophyllum cuneiforme*, was removed from the genus noticed on the MS. label, because it differed essentially in structure from the corals to which it is conceived *Anthophyllum* should be restricted (*antè*, p. 496.) In considering it as a *Flabellum*, the describer has been guided by the resemblance to the polypidoms assigned to that genus by M. Michelin (Icon. Zooph. pl. 9. f. 11—14.); but the determination is given doubtfully on account of M. Milne Edwards considering the *Diploctenium* of Goldfuss as identical with the *Flabellum* of Lesson (Lamk. Anim. sans vert. 2d ed. vol. ii. p. 364.); because the describer had not the power of comparing the Maestricht and recent corals with each other, or with the American fossil; and because the stated characteristic of *Flabellum*, a disunion of lamelle in the centre ("la ligne médiane est vide," Icon. Zooph. p. 44.), is either wanting in the fossil under consideration and others allied to it, or confined to what may be called the region of the terminal cup.\* It is nevertheless evident that M. Michelin has rendered good service in removing from *Turbinolia* the polypidoms referred by him to *Flabellum*, and having thus disturbed the regular transmission of determinations not well-considered. A clear, restricted, definition of *Turbinoliæ*, and a right assignment to other genera of many of the species included among them, has long been wanted. Ehrenberg, by establishing *Desmophyllum*, *Cyathina*, and *Monomycetes*, made an excellent beginning, and to them may be transferred some at least of the attached polyparians which have been regarded as *Turbinoliæ*, and single unbranched *Caryophylliæ*; while a careful study of the recent *Iluanthus* or mud *Actinia* † of Prof. E. Forbes will, it is conceived, lead to a right understanding and separation of the turbinated corals found in schistose strata, originally muddy, which exhibit no proofs of terminal or lateral attachment. Pallas, in de-

\* Consult the following figures referred to by M. Michelin in his descriptions of *F. avicula* and *F. cuneatum*, Goldf. Petref. pl. 37. f. 17. Parkinson, Org. Rem. ii. pl. 4. fig. 9. Beiträge, or Berlin Trans. 1832.

† Annals Nat. Hist. vol. v. p. 184. pl. 3. 1840.

scribing *Madrepora trochiformis*, or the *M. simplex turbinata* of Foug<sup>t</sup>, a well-known Gothland coral of similar characters, says that it perhaps lived in sand.\* These remarks are submitted to the reader's attention, because some free or sharply terminated corals exhibit signs of not having been permanently invested by the polype.

Only casts of the terminal cup and of portions of the exterior of *F.? cuneiforme* were examined.† The chord of the arched or upper extremity of the interior of the cup was in some cases nearly an inch, and the inferior parallel breadth and the greatest depth were both five lines. These dimensions, it is conceived, would leave for the lower part of the cone, or that in which the lamellæ were centrally united, a depth of five lines. The lamellæ as well as the other portions of the original coral were wholly removed; but from the curved impressions on the casts of the interspaces in the terminal cup there had evidently been no union of the lamellæ along the central line, but an open narrow space, while the base of the casts uniformly exhibited as clear proofs of a perfect blending or reticulated structure. The lamellæ which lined the cup were shown by the same means to have been of unequal breadth, and to have had finely tuberculated surfaces. The thinness of the original wall was proved by the narrow interval between the casts of the cup and of the exterior, and its foraminated structure by numerous filiform processes which traversed about half the interval.

M. P. Gervais identifies *Flabellum pavoninum* (Lesson), with *Turbinolia rubra* (Guoy et Guimard) ‡, but he affords no additional information respecting the earlier habits of the polype. Whether the American fossil was at any time wholly enclosed in the animal, the specimens afforded no means for determining; but there can be no doubt that it, as well as others believed to be generically identical with it, was not only attached by the base, but received additional support, during one period of growth at least, from lateral appendages developed sometimes slightly, sometimes to a considerable extent. These processes, which often exhibit sharp, fractured edges, were evidently formed by secretions transmitted through the minute channels visible in them, and connected with the interior structure; while their variable dimensions, as well as unequal distribution in different species, depended apparently upon the form and wants of the animal, or the degree of irritation arising from its having occupied a sheltered or exposed position. Their existence, it is believed, necessarily leads to the conclusion that the exterior was not, during a certain portion of the polype's life, covered by a soft persistent mantle conforming in shape to the outline of the coral; nor does it appear that any of the fossil

\* Elenchus, German translation, pl. 2, p. 59. 1787. Consult also Dr. Fleming's notice of *Fungia turbinata*. Wern. Mem. vol. ii. p. 250.

† It has been found necessary to omit figures of these which had been prepared.

‡ "C'est le même animal que le *Turbinolia rubra*." Sup, Dec. Sc. Nat. t. i. p. 484.

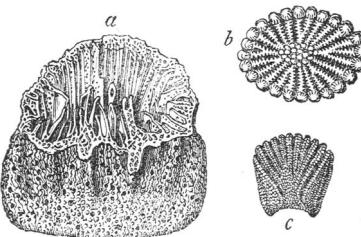
bodies furnished with them were so thickened on the outer surface that the processes became partially or wholly overlaid. These characters are considered deserving of attention, as they may assist, conjointly with other structures, in determining how far poly-parians, at one period fixed and at another free, are capable of being generically united.

*Localities.*—Eutaw; Wilmington; Cave Hall.

### 3. ENDOPACHYS ALATUM.

Wedge-shaped, expanded at the base, irregularly ribbed; about twelve prominent, broad, simple lamellæ, intermediate lamellæ numerous, of variable breadth, grouped, sides minutely tuberculated; outer surface in the lower part almost wholly occupied by small papillæ, with few intermediate foramina; in middle region, openings more numerous, in uppermost papillæ few, structure reticulated; ribs formed of similar structure; thickening towards the base considerable, traversed throughout by the foramina.

Two Alabama eocene corals exhibited characters which demanded special attention. One specimen represented by figure *a*, and believed to be generically allied to the other delineated (fig. *b. c.*) resembled closely the *Turbinolia semigranosa* of M. Michelin (Icon. Zoophy. pl. 43. f. 2. 1845.); and it is with fossils usually assigned to that genus that the American coral must be compared. In both the small and larger specimens there was a total want of a pedicle, or of a cicatrised detached surface—the sharp, wedge-shaped lower termination of the former being slightly concave, and beset with minute points, while the same extremity of the large specimens, though thin, was rounded, and uniformly coated with the small tubercles which covered the general outer surface (see fig. *c.*). To this extent, therefore, a perfect agreement existed with *T. crispa*, *T. sulcata*, and *T. mixta*, but the resemblance proceeded no further. In those species, recognised types of the genus, the external surface was not modified or thickened by secretions either from within or without; whereas the Alabama coral was progressively altered in aspect by the development of tubercles secreted through foramina connected with the internal structure. Again, in the Turbinoliæ above mentioned, the lamellæ preserved great simplicity of arrangement under all conditions, while in the American coral they were exceedingly complex in the full-grown state, varying greatly in breadth, and united in groups: still farther, the boundary in *Turbinolia crispa*, *sulcata*, and *mixta*, is also very simple, consist-



*a.* Mature specimen of *Endopachys alatum* fractured in the upper part. (Mag. 1½, linear.)

*b.* Upper termination (Mag. twice, linear) of a small coral belonging to the genus;

*c.* A side view of the same specimen magnified rather less than twice.

ing of a vertical layer traversed by the outer extension of the lamellæ, and it is not visibly foraminated; but in the Alabama fossil the boundary is highly perforated, as well as the portions of the lamellæ immediately adjacent, the whole composing a reticulated almost spongeous structure. This aggregate of differences marked, it was conceived, something more than a specific distinction from the typical *Turbinoliæ* with which the comparison was made.

In extending the inquiry to other fossils for the purpose of ascertaining if similar essential structures could be detected under modified conditions, it was found that they were all combined in that manner in *Turbinolia elliptica*, with the addition, however, of clear proofs in different specimens, that this coral was at one time fixed, but at another free. How far the habits of species may render necessary a prolonged or brief attachment, or even one of so short duration that a very minute individual would be necessary to afford signs of a once fixed base, no information has been obtained; but it is conceived that the want of such a character in the Alabama coral cannot be regarded as more than a minor specific distinction.

No lateral processes adapted to afford additional support were noticed in either of the fossils, nor any impediments to the exterior having been perfectly enclosed by the polype, the plan of producing the uniform thickening not being incompatible with such an envelopment; nevertheless, no indications of it were observed beyond the absence of parasites and of interruptions to the uniform production of the papillæ.

In the characters of the lamellæ, the manner of their blending with the outer wall, and the general nature of the exterior, these polypidoms agreed with the *Dendrophylliæ* of M. De Blainville; while the mode of growth was perfectly dissimilar. This union in the same coral of the habits of Ehrenberg's *Fungina* with the structures of some of his *Ocellina*, families belonging to distinct orders in that author's classification, is considered of sufficient importance to deserve the reader's attention being directed to it.

Believing that the Alabama coral (fig. *a*), the species called *Turbinolia elliptica*, and probably *T. semigranosa*, have a unity of composition and more than specific distinctions from *T. crispa*, *T. sulcata*, and *T. mixta*, it is proposed to consider them as the basis of a new genus, for which the term *ENDOPACHYS* \* was suggested by Mr. Lyell, and the following characters are proposed:—

A stony lamelliferous coral, single, conical or wedge-shaped, fixed in the earlier stages of growth, free in the older; lamellæ numerous, variable in character, grouped, highly foraminated near the centre and periphery; no transverse diaphragms; middle a union of broader lamellæ, with a transverse reticulation; boundary wall greatly foraminated, so blended with the lamellæ as to form at the junction a reticulated structure, progressively thickened by papillæ secreted from within; detached base gradually overlaid by papillæ similar to those of the general surface.

\* Ενδον, within; παχυς, thick: in allusion to the thickening from within.

The smaller specimen (fig. c.) will be found to resemble greatly *T. semigranosa* (Icon. Zooph. pl. 43. f. 2.), differing, however, slightly in its outline, and more markedly in the external sculpturing, and in the surface being covered to a greater extent by papillæ. The characters of the lamellæ in the French fossil are not given, but in the Alabama specimen (fig. b.), they were of nearly equal breadth, partially grouped, and densely covered by sharp tubercles projecting far across the interspaces; between the lamellæ and the external ribs was in general a slight furrow. These characters differ greatly from those represented in figure a; and as it was impossible to ascertain by sections the young condition of that fossil, it was considered advisable to figure the smaller specimen without venturing to determine its precise nature.

Concerning the larger coral (fig. a) no additional remarks appear requisite; but it may be stated, that the papillæ strongly resemble those which coat the under side of *Fungia agariciformis*; and that in the light porous stone of Stoudenmire Creek (South Carolina), casts occur, possibly derived from an analogous body, though they have greatly the aspect of impressions from a sponge.

*Localities.* — Alabama; Stoudenmire Creek?

#### 4. DENDROPHYLLIA LÆVIS. (sp. n.)

Branches with a persistent, central, lamelliferous structure, and many lateral shoots scarcely projecting beyond the thickened surface of the stems; lamellæ numerous, unequal, about ten principal plates in the side shoots; cast of the outer surface generally smooth, sometimes finely ribbed in young branches, or near the extremity of the shoots.

This fossil resembled *Oculina* in the mode of branching, and in the numerous lateral shoots scarcely extending above the surface of the main stem; but in none of Lamarck's or De Blainville's typical species of that genus does a master star or lamelliferous column range continuously throughout the centre of the branches. Ehrenberg unites *Oculina* with *Dendrophyllia*, but De Blainville was apparently justified, on account of the structure just noticed, in making a marked distinction. In the side shoots scarcely projecting above the surface, the American coral resembles *Dendrophyllia digitalis* (De Blainv.), found in the tertiary deposits of Touraine, but in all other particulars the differences are very great. (Consult M. Michelin's excellent figure, Icon. Zooph. pl. x. f. 10.; also Guettard's Mém. t. iii. p. 512. pl. 53. f. 8.)

In the specimens of the coral which were examined, the whole of the original substance had been removed, and even casts of the central structure were partially wanting. The most illustrative portion is represented in the wood-cut. Of the nature of the thickened matter in which the lateral shoots were originally im-



In the upper part of the figure (Mag. twice, lin.) is represented a portion of a main stem of *Dendrophyllia lœvis*, with a side branch structurally disconnected from it; also casts of burrowing parasites; and in the lower a cast of the exterior of the coral with portions of side branches.

bedded, no opinion could be formed, except that it was probably very solid or similar to that of *Oculinæ*, there being no vestiges of casts of capillary tubes or of a reticulated structure, though abundant proofs of the matter having been penetrated by burrowing animals. The signs of lamellæ in transverse sections of the central part were very faint, but sufficient to show that the broadest were twelve in number, and that the intermediate ones varied from one to four. The surface of this inner cast was slightly traversed by lines indicating the vertical range of the broadest lamellæ, and by traces of irregularly disposed striae. Between the cast and the base of the side-shoots was an extremely narrow space, proving that there was originally no structural interblending of lamellæ in the offset and main stem. The shoots at the inferior termination were obliquely conical, but they soon attained their full dimensions, so far as could be inferred from the specimens, the greatest diameter being about  $\frac{1}{10}$  of an inch, or  $\frac{2}{3}$  that of the central cast — a disproportion observable in recent *Dendrophylliæ*. Their range was limited also to less than a line. The general outer surface was apparently smooth, but uneven as in some *Oculinæ*; and the cast of it bore traces of parasitic *Bryozoa*, an additional indication to that of the numerous burrowing animals that the polypes had perished some time previously to the specimen being enclosed in its matrix.

*Localities.* — Wilmington; Shell Bluff.

#### 5. DENDROPHYLLIA?

Several worn casts, possibly fragments of a *Dendrophyllia*, claimed a notice, though their generic determination could not be ascertained. They were slightly conical or cylindrical, the lower termination not unfrequently preserved, presenting the same character as that of the lateral shoots of *Dendrophyllia lavis*. The specimens had a nearly uniform diameter of half an inch at the upper extremity; and the greatest length was about an inch. The characters of the lamellæ, so far as they could be ascertained, agreed with those of *Dendrophyllia*, and in the reticulated structure of the very partially preserved exterior, as well as in the mode of union with the lamellæ, there were still further agreements. In these particulars, a resemblance also with the Alabama coral *Endopachys alatum* existed, but in no instance was a trace of a pedicle detected, nor any indication of a surface which had once been attached.

*Localities.* — Mulberry, Cooper River; Eutaw.

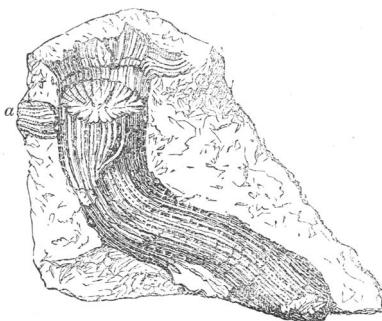
#### 6. CLADOCORA? RECRESCENS. (sp. n.)

Branched; branches variously disposed, nearly cylindrical; outer wall thin, not thickened externally when old, porous, strongly but irregularly ribbed, and marked by lines indicative of renewals of growth; lamellæ numerous, unequal, sides foraminated and hispid; interstitial laminae or diaphragms distant; centre a complicated reticulation; branches produced from germs developed without the area, or on the side of pre-existing stems.

This fossil agrees in many essential points, as in the amount of connection between the branches and the offsets, in the characters of the lamellæ, and in the total absence of external thickening, with the *Madrepora ramea*, var. of Esper (Pflanzenthire, tab. 10.), which has been referred by Lamarck to *Caryophyllia*\*, by De Blainville to *Dendrophyllia*†, and by Ehrenberg, but with a doubt, to *Cladocora*. ‡ With respect to these generic assignments it may be stated, that believing Ehrenberg's definition of each of the genera to be the best, Esper's

coral or its fossil analogue cannot be regarded as a *Caryophyllia*, on account of the branches being due to the development of germs, and not to a structural subdivision of the polype; nor as a *Dendrophyllia*, on account of the total absence of external thickenings. With respect to *Cladocora*, it can only be said, that a comparison of a specimen of Esper's coral with the American fossil proved an agreement in the principal characters; but as Ehrenberg doubted his generic determination that of the fossil is similarly marked. The peculiarity in the renewal of growth sufficiently indicates specific differences in the two polypidoms.

The specimens of *C.?* *recrescens*, which were examined, consisted wholly of casts either of the exterior or of the internal structure, but sufficient was indicated to enable the original composition to be inferred. The coral probably attained considerable dimensions, as the fragments were numerous and some portions of stems were half an inch in diameter. The thickness of the outer wall was universally inconsiderable, being represented by an exceedingly slight interval (see figure). The proofs of its having been perforated consisted in numerous thread-like processes which crossed that narrow interspace, and thickly studded also the rounded edges of the casts of the intervals between the lamellæ. The external ribs or furrows impressed upon the matrix, were likewise occasionally indented with small conical pits, due to tubercles on the original coral. The foramina in the sides of the lamellæ were represented by similar filiform processes; and the hispid projections on the surface by indentations in the casts of the interspaces between the lamellæ. The transverse lamina or diaphragms



A specimen of *Cladocora* (?) *recrescens* of the natural size. At *a* the characters of the side branch clearly prove that it did not originate in a subdivisional process. Indications of renewed growth are exhibited in the transverse lines on the east of the exterior.

\* Animaux sans Vertebres, 2d edit. ii. p. 353. No. 10. *Caryophyllia cornigera*.

† Manuel d'Actinologie, p. 354. *Dendrophyllia cornigera*.

‡ Die Corallenthire des rothen Meeres, p. 85. *Cladocora* ? *Anthophyllum*; or Berlin Transactions, 1832.

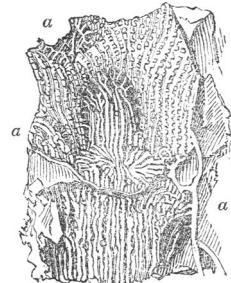
were represented by curved smooth casts nearly on the same level around the stem, in some cases, but in others unequally distributed. The supposed indications of renewals of growth consisted of sharp furrows (*a*) generally inclined downwards and outwards; and they were sometimes nearly on the same range around the casts, but they were often disposed obliquely; and they occurred at very irregular intervals. The side branches diverged most frequently at considerable angles, and without any approach to symmetry of arrangement. They were not formed in the slightest degree of pre-existing structures, the component parts of the parent stem being continued persistently upwards; and there was the same amount of interval between the base of the offset and the cast of the interior of the stem, as between the latter and the ordinary surrounding matrix. The interval was also traversed by filiform processes. There was, however, in general, more or less of irregularity at the point of issue, but without the slightest tendency to such an amount of structural blending, as would authorise the inference that the branch was a subdivisional offset from the parent.

*Localities.*—Jacksonboro'; Eutaw, South Carolina.

#### 7. CARYOPHYLLIA SUBDICHOTOMA. (sp. n.)

Main stem cylindrical; branches numerous, short, slender, very divergent; outer wall thin, porous, surface finely ribbed and furrowed; lamellæ numerous, unequal, very irregular near the periphery; centre union of lamellæ; branches produced by subdivision of pre-existing structures.

The specimen preserved in the collection under consideration was of such limited extent that the characters of this coral could be ascertained but very partially. The fossil, however, clearly belonged to the family *Dædalina* of Ehrenberg, the branches arising from a subdivision of previously existing structures; and of established genera it was most nearly allied to the *Caryophyllia* of that authority.\* There were nevertheless, as stated below, peculiarities in the characters of the branches, and in



The lower half represents part of a main stem of *Caryophyllia subdichotoma*, and from the transversely fractured surface near the centre of the figure, springs a branch composed partly of prolongations of the structures constituting the main stem; portions of other branches are shown near *a*. The upper half exhibits a concave cast of the exterior of the coral. (Mag. twice, linear.)

\* The *Caryophyllia* of Ehrenberg is considered by that authority to be equivalent to the *Lobophyllia* of De Blainville, and the two generic names were probably proposed about the same time (1831?). It has, however, been thought advisable to retain the use of the term *Caryophyllia* as restricted by Ehrenberg, because it includes certain of Lamarek's original species, characterised by the important feature of the branches arising from a perfect subdivisional process, and because the *Caryophyllia* of De Blainville, though also restricted, includes recent and fossil corals of very heterogeneous natures, referable, for the greater part, to other well-distinguished genera.

the structure of the lamellæ near the circumference, which indicated something more than specific differences from figured Caryophylliæ, and apparently demanded the suggesting of a new genus. It was, however, deemed right not to venture so far, on the limited amount of information supplied by the specimen, but to leave to other better provided observers, who could determine the full characters of the coral, the assigning a proper generic appellation.

The single specimen, a cast, was about an inch in height and four lines in diameter, and consisted of a cylindrical stem (partially removed in the figure) with portions of three branches. The main stem had been composed of numerous lamellæ, partly united in the centre without any distinct structure, and greatly subdivided or reticulated near the circumference. The original wall was apparently very thin except at the divergence of the branches, and its general porous structure was proved by transverse filiform processes, or their fractured extremities on the ridges representing external furrows. The cast of the outer surface exhibited also other signs of minute foramina and reticulations. The branches were essentially composed, at their commencement, of certain of the lamellæ of the parent stem, including in the principal example given in the figure some of those which composed the central portion of the latter. The branches, however, differed from those of true Caryophylliæ in being of limited dimensions, and not effecting a bifurcation; also in diverging laterally and suddenly, and in permitting the main stem to be continued perpendicularly upwards. In this respect there was an agreement with the *Dendrophyllia* of De Blainville; but in that genus, the branches are not composed of previously existing lamellæ, being developed from germs. The amount of extension outwards of the branches was not shown.

*Locality.* — Shell Bluff.

#### 8. MADREPORA TUBULATA?

Branched; branches irregularly divergent, cylindrical, slender, composed chiefly of long, lamelliferous tubes, springing from the centre, and diverging slightly; intermediate structure foraminated; no continuous central tube; lamellæ twelve, six very narrow, and limited in vertical range; surface terminations of tubes small, irregularly distant; interspaces echinata.

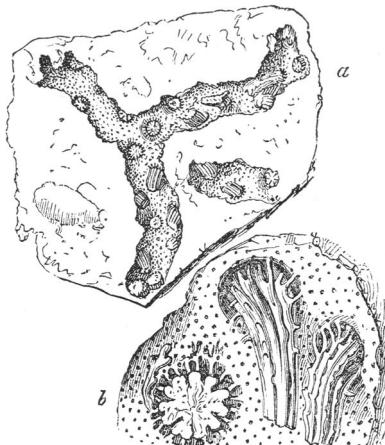
*Astrea tubulata* De France? Dic. Sc. Nat. t. 42. p. 384.  
*Astroïte tubulaire* Guettard's Mémoires, t. iii. p. 511. pl. 53. f. 1—3. (Normandy between Melleraut and Mortagne, also Lisieux.)

The resemblance of the American fossil to Guettard's figures was considerable, and the description of the latter, so far as it extends, agreed with the structure of the former; but the details are not sufficiently ample to warrant the conclusion that the fossils are specifically identical. The general structure of the coral, the limitation of the lamellæ to 12, and the mode of producing additional tubes or stars, rendered the removal from the

genus *Astrea* necessary; while in all these particulars, the agreement with the *Madrepora* of Lamarck (*Heteropora* of Ehrenberg) appeared to authorise the altered assignment.

The remains of *Madrepora tubulata*? consisted wholly of casts of the exterior and of the lamellæ tubes. The diameter of the branches in no case exceeded three lines, or that of the unmagnified figure (a). The tubes sprang successively from the axis and wholly composed it, to the perfect exclusion of a central, continuous tube or star. As they gradually diverged, they separated, slightly increasing in diameter; and near the surface termination they suddenly bent outwards, their relatively great length (three lines), and small width producing the scattered distribution of the terminal stars. In Guettard's figures, the branches have a greater diameter, and the casts of the stars are closer. The lamellæ through a considerable portion of the tubes were apparently confined to the six broader, the casts of the six narrow commencing about one third from the upper extremity: both series had evidently consisted of solid plates, and not of interrupted ones as in *Porites*. So far as could be ascertained, there was no distinct, central structure. The nature of the interspaces between the tubes was very imperfectly exhibited, the remains being limited to a few filiform processes, extending from the casts of the tubes to the exterior; but the original structure constituted a considerable portion of the branches near the surface, and the lamellæ tubes were completely imbedded in it from the points of separation. The surface casts of the branches were closely and finely punctured, the indentations being surrounded frequently by a circle; and near the terminations of the tubes were, in some cases, casts of short ribs. The production of additional lamellæ tubes was apparently confined to the centre.

*Locality.*—Jacksonboro'.



a. Concave cast, natural size, of *Madrepora tubulata*, exhibiting the irregular distribution and convergence downwards of the lamelliferous tubes.

b. Portion of another specimen, magnified six times, linear, to give the characters of the tubular casts and of the indented cast of the exterior of the branch.

## 9. PORITES.

Only the casts of a few terminal stars of this coral were examined; and they did not permit a comparison with published tertiary species or the establishment of definite characters. The casts showed that the stars were slightly concave, and in close contact with a perfect structural blending at the lines of junction; and that the number of interrupted lamellæ, in the best-defined cases, did not exceed twelve.

*Locality.*—Jacksonboro', Georgia.

C. *Polyparia Bryozoa.*

## 10. TUBULIPORA PROBOSCIDEA ?

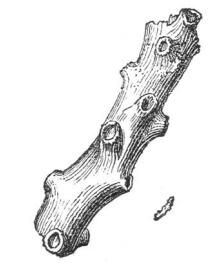
Tubes united in vertical fasciculi or branches, openings irregularly disposed, more or less prominent, no marginal thickening; outer layer investing the fasciculi smooth or transversely rugose.

*An Pustulopora proboscidea?* Milne Edwards, Ann. Sc. Nat. 2nd series, Zool., tome 9. pl. 12. f. 2.; also Recherches sur les Polypes, Mém. sur les Crisies, &c. (Recent; Mediterranean.)

This fossil resembled, in its mode of growth and general structure, the Mediterranean coral referred by Dr. Milne Edwards to *Pustulopora*, on account of the tubes being grouped in vertical fasciculi. It has, however, been deemed right to consider the Rock's Bridge fossil a *Tubulipora*, partly because M. Edwards has shown the close connection between the recent polypidom and that genus; and partly because a coral of common occurrence in deep water on the south-western Cornish coast, and believed to be that described by Mr. Couch, in his valuable "Essay on the Zoophytes of Cornwall," under the name of *Tubulipora deflexa*, combines, occasionally at least, an horizontal or attached with a vertically fasciculated mode of growth, the tubular openings diverging from all sides of the fasciculus. (Ninth Rep. Roy. Cornwall Polytechnic Soc. p. 72., 1841.)

Between the American fossil and Mediterranean coral, no distinction could be detected, so far as a comparison could be made, sufficient to justify a decidedly specific separation; nevertheless, as the entire habits of growth of the two polypidoms could not be ascertained, the specific determination of the fossil specimens must be regarded as very doubtful.

*Locality.*—Rock's Bridge.



*Tubulipora proboscidea.*  
(Natural size and magnified.)

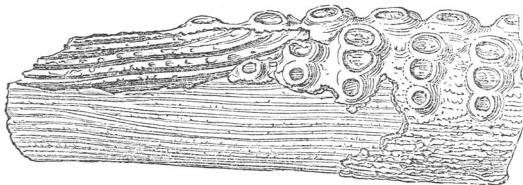
## 11. TUBULIPORA.

A single imperfectly preserved specimen of a *Tubulipora*, possessing characters analogous to those of Lamouroux's *Obelia*, was noticed on a shell imbedded in the white limestone of Eutaw. It was wholly attached, and consisted of three unequal lobes, which sprung from narrow bands composed of two rows of tubes each, and the bands diverged from a central point. The two larger lobes subdivided at the further extremity, and the surface of all three was occupied by abraded tubular openings, which exhibited a slight tendency to a diverging transverse lineal arrangement. In a genus of so great irregularity of growth these characters were not considered sufficient to justify a specific assignment of the specimen.

*Locality.* — Eutaw.

## 12. IDMONEA MAXILLARIS. (sp. n.)

Branches forked, oval, thickness considerable; rows of tubular openings short, alternate, mouths in contact; no central dividing ridge; tubuli very long; reverse surface semi-oval, traversed by longitudinal lines, connected by minute cross lines.



This figure of *Idmonea maxillaris* is so drawn as to represent, not the peculiar feature which suggested the specific name, but the more important characters of the tubular openings, the medial longitudinal groove between the rows, and the great range of the tubes within the branch, exposed in the upper fractured part where the openings are wanting: the figure gives also the striae exhibited on the surface and beneath the thin outer layer.

Viewed in front, this coral resembled a Maestricht fossil, considered by Goldfuss as a young condition of *Idmonea gradata* (Petref. Corrigenda, p. 244. *Retepora disticha*, p. 29. tab. 9. f. 15. a, b), but it differed essentially from mature specimens of that species, and from Goldfuss's figures, just cited, in the plan of bifurcation, as well as in the great length of the tubes and the form of the branches. From Lamouroux's typical species (*I. triquetra*, Exp. Methodiq. p. 80. tab. 79. f. 18—15.), and some tertiary species of similar form, it was conspicuously distinguished, not merely by the rounded outline of the reverse side, but also by its great thickness.

The bifurcations occurred at irregular distances, sometimes equalling  $3\frac{1}{2}$  lines, and without any prominent precursory increase

in width ; the branches also exhibited nearly their full dimensions from the very points of divergence, springing upwards after a short curve almost vertically. The portion occupied by the tubular openings formed but a small part of the circumference of the branch ; and when a fragment was placed horizontally and sideways with the rows of apertures upwards, the latter bore some resemblance to a series of teeth in a maxillary bone. The mouths were generally limited to three in each row, the outermost being the smallest. The great range of the tubuli explained apparently the considerable dimensions of the reverse portion, the interior of the branches consisting almost wholly of tubes, of one character, but decreasing in size from front to back. The uniform semi-oval outline of this portion would apparently indicate that the branches were free, or not affected during growth by pressure : nevertheless, a triangular shape does not, it is presumed, necessarily imply an attached reversed surface, M. Milne Edwards's figure of *I. radians* having a decided broad pedicle, though the branches have "la forme de prismes à trois plans" (Recherch. sur les Polyp., Mém. sur les Crisies, &c. p. 25. pl. 12. f. 4.). M. Milne Edwards was, however, fully justified in making the inference that *I. triquetra*, on account of its slightly concave reverse surface, was probably attached to the stem of a marine plant, there being in the fine collection of oolitic polyparia in the cabinet of Mr. Walton, of Bath (England), a specimen believed to be referable to that species, attached dorsally to a Terebratula obtained from the Bradford clay. It is scarcely necessary to remark, that species of other genera of Tubuliporidæ are affixed indifferently to fuci, testacea, or pebbles.

The whole of the reverse surface exhibited white longitudinal lines, with interspaces much less in width than the diameter of the tubuli. Their true nature was not ascertained; but it was believed that they were not the walls of capillary tubes, similar to those which constitute the reverse side of old specimens of *Hornera*, as they occasionally united, and the interspaces were crossed by irregular filaments. No exterior thickening or change dependent upon age was noticed ; and a fixed dorsal surface seen in some species, would prevent, it is presumed, all marked alterations on that side, as it is difficult to conceive that polypes generically identical could possess in certain species a complicated series of vessels requisite for developing a considerable additional surface, and want it in others.

*Locality.* — Wantoot, South Carolina.

### 13. IDMONEA COMMISCENS. (sp. n.)

Branches forked, triangular; rows of tubular opening extended nearly to the dorsal surface ; no medial ridge or furrow, but an intermingling of mouths ; range of tubuli limited ; reverse or dorsal surface irregular in outline.

In the triangular form of the branches this fossil resembled the

tertiary species found at Hautville and Grignon, and figured as well as described by De France or by Milne Edwards under the names of *Idmonea gradata* and *I. coronopus* (De F., Atlas Dic. Sc. Nat. pl. 46. f. 5.; Milne Edw., Recher. sur les Polyp., Mém. sur les Crisie, &c. pp. 24. 23. pl. 12. f. 3.): but it differed in the central blending of the tubular openings; in this character there was a certain amount of agreement with the recent species of Dr. Milne Edwards, *I. transversa* (sp. cit. pl. 9. and 3.), but in the mode of branching, and form of the branches, marked differences were presented.

The reverse surface indicated apparently the irregular effects of extraneous agency, and not an uniformity of contour, as in the preceding species. In some fragments the flattening was complete, but the surface was unevenly impressed; in others, though the triangular form was retained, the reverse side was slightly convex, and in one case partly flat, partly rounded.

*Locality.*—Rock's Bridge.

#### 14. IDMONEA.

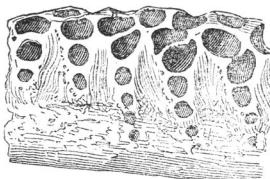
Branches divergent, rounded on the reverse side; rows of tubular openings alternate, projecting, no uniform central blending; no medial ridge or furrow; reverse or dorsal side equal half the thickness of the branch.

The fragments which afforded the above characters were found in the same specimens of friable stone as *Idmonea commiscens*. They amounted to fifteen in number, and exhibited a great general agreement in the rounding and thickness of the reverse side; but some variations occurred in the distribution of the rows of tubular openings. It was, therefore, considered advisable to give the above imperfect notice and a figure, without venturing to assign the fragments definitely either to *I. commiscens* or a distinct species. It remains also to be ascertained what amount of differences might be produced in the characters of a species by one portion of a specimen being fixed and another free.

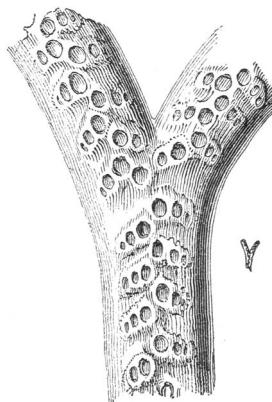
*Locality.*—Rock's Bridge.

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This figure of *Idmonea commiscens*, drawn on a greatly enlarged scale, exhibits accurately the central blending of the openings and the great range of the transverse rows, extending nearly to the dorsal surface.



View of *Idmonea*, of the natural size and greatly magnified.

## 15. LICHENOPORA.

The imperfectly preserved coral assigned to this genus was less than three lines in diameter, and was attached, except at the slightly reflected margin, to a bivalve imbedded in the white limestone of Eutaw. The surface was convex, and traversed by irregular radiating rows of tubular openings. The intermediate or non-projecting tubular openings were detectable in some places between the ridges as well as in the centre; and a weathered portion displayed a congeries of tubuli of much less diameter than those with projecting mouths.

The coral resembled a *Lichenopora* of common occurrence at Dinant and other Touraine localities, but the state of preservation did not admit of a careful comparison.

*Locality.* — Eutaw.

## 16. FARCIMIA.\*

Of this coral, only the lower part of an internode, less than a line in length, and half a line in diameter, was observed. The greatest number of consecutive cells was six, and of alternate rows ten. The whole of the cells appeared to be immature, the surface exhibiting large oval openings without a distinct mouth, and bounded by a narrow band sloping downwards from the outer margins of the cells. The foramen or chamber in which it is believed gemmules are matured, was distinct and placed as in *Farcimia salicornia*, as well as in Crag and Touraine species between the consecutive cells.

The condition and nature of the specimen did not permit a comparison with other known *Farcimiæ*.

*Locality.* — Rock's Bridge, Eutaw, in South Carolina.

## 17. VINCULARIA.

Four sided, slightly bent or straight; opposite cells similarly situated; boundaries of cells oval, surface with a narrow depression in the centre, mouth semi-circular at the distal extremity of the depression.

Seven fragments of this coral, the largest about a line in length, and including four successive cells, supplied the materials for the above imperfect notice. The characters will be found to agree generally with those of *Vincularia fragilis* of De France and De Blainville (Dic. Sc. Nat. Atlas, and Man. d'Actinol. pl. 67. f. 3.; *Glauconome tetragona* Münster and Goldfuss, Petref. tab. 36. f. 7.);

\* Dr. Fleming's *Farcimia* is of posterior date to Cuvier's *Salicornia* or *Salicornaria*, but the latter name had been applied, long before, to a well-known genus of plants

but as the figures given by these authorities differ greatly from that more recently published by M. Michelin (Icon. Zoophy. pl. 46. f. 21.), unaccompanied, however, it is to be regretted, by the descriptive details which would have removed all difficulties, the compiler of these notices refrains from assigning any specific appellation to the American coral. The chief distinction between De France or Goldfuss's figures and the specimens under consideration, consisted in the narrowness of the central depression, a character probably due to changes incident upon age. In one not very satisfactory case, the cavity was apparently filled up, a minute puncture without any raised margin indicating the position of the mouth.

*Locality.*—Rock's Bridge.

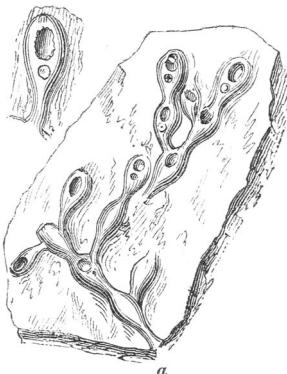
#### 18. *Hippothoa tuberculum*. (sp. n.)

Cells pear-shaped, variously arranged; connecting tubuli generally short or wanting, rarely long; membranous aperture large, oval; solid surface or walls smooth, convex; a minute tubercle near proximal extremity of aperture.

In the form of the cells, and the characters of the membranous opening this fossil resembled greatly the recent *Hippothoa catenularia* of Dr. Fleming (Brit. Anim. p. 534.); but in numerous specimens of that coral obtained on the coasts of Devon and Cornwall, a minute tubercle near the aperture was in no instance detected. In two cases this projection was replaced, probably on account of abrasion, by an equally small cavity.

With respect to the large opening covered in the recent state, as mentioned by Dr. Johnstone, with a membrane (Brit. Zoophytes, p. 265.), cases were observed in the American fossil of what appeared to be a partial and even a total obliteration (see fig. *a*); and in a specimen of *Hip. catenularia*, the membrane in a few instances had been so thickened as to have become white and opaque.

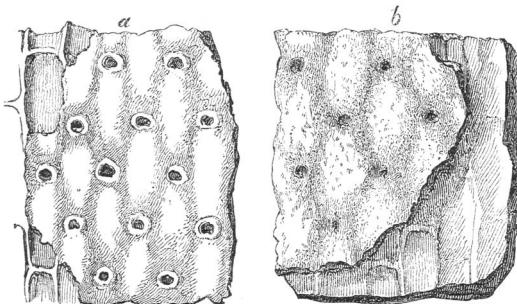
*Locality.*—Rock's Bridge.



This figure of *Hippothoa tuberculum* exhibits (greatly enlarged) the general mode of growth, and the tubercle or cavity at the proximal end of the oval aperture. At *a* are cells with the surface wholly covered.

19. *ESCHARA TUBULATA*. (sp. n.)

Foliaceous; cells elongated, rows defined by a slight furrow, no marked separation between successive cells, surface slightly convex; mouth small, transversely oval, margin thickened; interior of cells, sides nearly straight; dorsal separation of opposite layers imperfect.



a. Mature cells of *Eschara tubulata*.

b. Aged cells, the fractured portion exhibits imperfectly separated dorsal surfaces. (Magnified 12, linear.)

The above characters were obtained from a specimen an inch in length and nine lines in width, but which gave only more aged conditions of the coral. The cells in their narrow, lengthened form resembled the tubuli of *Diastopora*; but the mouths were strictly in the plane of the outer surface, and there was not the slightest tendency to a free portion at the distal termination, or to an underlying at the proximal; the whole outer structure being on one level, and the back of the interior parallel to it. No clear indications of vesicles were noticed. In the most aged cells, occupying the lower portion of the specimen, the exterior was lozenge-shaped, or had an increased breadth, the longitudinal furrows were almost obliterated by the thickening of the surface, and the mouths were generally very much contracted and in some cases filled up. Every attempt to separate the dorsal surfaces in this and two following species failed.

*Locality*.—Wilmington.

20. *ESCHARA PETIOLUS*. (sp. n.)

Foliaceous, springing from a stalk-like base; cells oblong, surface slightly convex, porous, bounded by a faint furrow, mouth longitudinally oval; sometimes a small triangular pit by its side; interior of cells lozenge-shaped; dorsal surfaces not separable; connecting foramina near the base of the lateral and terminal walls.

No immature cells were observed, but in the youngest state exhibited, the mouth had a projecting margin which gradually

disappeared in more advanced conditions; while in still older, the aperture was depressed, and in the most aged totally obliterated (see figure). Other changes, dependent upon age, consisted in the diminution in number and distinctness of the pores, and in the increased convexity of the surface, with a corresponding greater depth in the separating furrows. An exposed dorsal surface was traversed by fractured edges of the walls.

In the accompanying figure (which is magnified seventeen times in linear dimensions) the greater portion represents mature cells, and the right lower part aged cells, with obliterated mouths and nearly closed foramina.

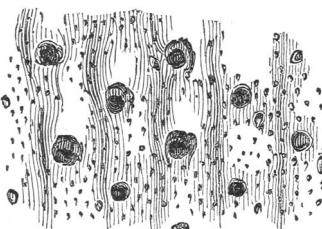
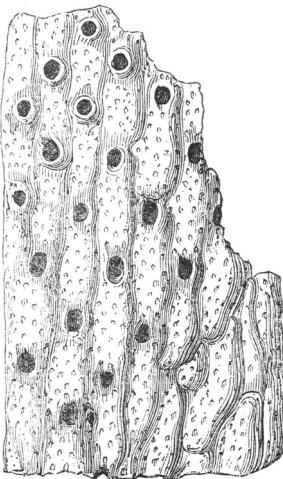
*Locality.* — Eutaw.

#### 21. ESCHARA INCUMBENS. (sp. n.)

Foliaceous; cells oval, surface slightly convex, porous, boundary a very faint furrow, mouth round or transversely oval, notched in mature state, and margin slightly thickened; a round foramen sometimes on one side of mouth; interior of cells, lateral walls slightly curved, terminal arched or nearly straight; dorsal surfaces not separable; gemmuliferous (?) vesicle large, semi-globular, resting on next succeeding cell; connecting foramina near the base of side and terminal walls.

In addition to the aggregate of differential characters, this species is distinguished by the large overlying gemmuliferous (?) vesicle. From the mode of blending with the surface on which it rests, this chamber might be mistaken for an irregularly developed cell; but its true nature was shown by the absence of distinct pores in the lamina forming the outer covering, by the great size and inclined position of the opening, and by the true mouth of the cell, being detectable within the chamber, in its right position. In the oldest observed condition of the coral, the outer surface was greatly thickened, and the mouth of the cells was partially or wholly obliterated.

*Locality.* — Rock's Bridge.



The figure represents the general characters of the surface of *Eschara incumbens*, magnified sixteen times, linear. The unforaminated portions express the chambers alluded to in the description; and the shaded part above the mouth of the cell the entrance to the chambers, the edges of the covering being, in these instances, more or less removed by abrasion, and the mouth of the cell exposed.

22. *ESCHARA LINEA*. (sp. n.)

Foliaceous; cells oval or oblong, sometimes bounded incompletely by a slightly raised line; surface nearly flat, very porous; mouth transversely semi-oval, margin thickened, notched or plain on the proximal edge; occasionally a foramen on one side of the mouth penetrating obliquely or towards a corresponding chamber at the distal angle of the interior of the cell; dorsal separation perfect, surface ridged or flat.

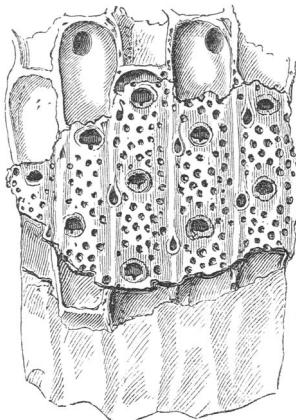
The above characters were only obtained from older conditions of the coral. The raised lines were in portions of the specimens prominently developed, but in others were entirely wanting. In some cells so connected with the general surface as to indicate that they belonged to the species, the covering was much less porous, and in a few instances smooth or solid, while the mouth and adjacent vesicles, occasionally two in number, were much more prominent. These variations had been apparently produced by curvatures in the growth of the specimen. The pores differed in size and form, sometimes assuming the character of distinct, round foramina. No connection was traced between the obliquely penetrated vesicle and the small chamber at the angle of the cell; but occasionally a distinct arched solid layer ranged from the opening of the vesicle to the distal angle of the cell. The characters of the perfectly separated, flat, dorsal surface are indicated in the figure.

*Locality.* — Eutaw.

23. *ESCHARA VIMINEA*. (sp. n.)

Foliaceous; cells elongated, surface convex, porous, mouth transversely oval, depressed, proximal edge a notched plate; occasionally one or two foraminated vesicles at the corners of the proximal margin; dorsal separation perfect, surface ridged.

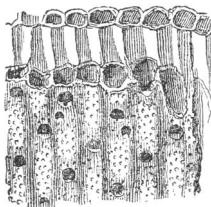
This species was distinguished by the wicker-like character of the general surface. Mouthless cells were noticed among those in a mature condition. The aged state presented a greatly thickened outer surface, the boundary of the cell being defined by a deep continuous groove; the oral apertures were also obliterated and the pores rendered indistinct.



The centre of the figure represents mature cells of *Eschara linea* magnified 20, linear; the upper part abraded cells, with indications of the pits at the angles noticed in the description, and oval foramina: the faintly-tinted lowest portion represents a perfectly separated dorsal surface.

The accompanying figure represents a specimen of *Eschara vminea*, considerably magnified. In the upper part are shown a perfectly separated dorsal surface formed of angular ridges, and an intersection of the cells belonging to the same layer: in the lower part is exhibited a series of mature cells.

*Locality.* — Eutaw.



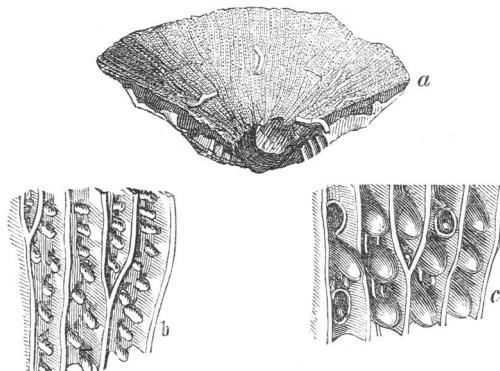
#### 24. LUNULITES SEXANGULA. (sp. n.)

Obtusely conical; cells hexagonal in alternate rows, surface covered, raised near the distal extremity, depressed in the centre, a hemispherical tubercle frequently at the proximal end; mouth nearly central, transverse, very narrow; casts of interior of the cells hexagonal, parallel to the convex and concave surfaces; concave surface casts of irregularly radiating punctured ridges and narrow furrows, the ridges traversed more or less regularly by a row of tubercles; interval between the convex and concave surface equal depth of cells.

*Locality.* — Wilmington.

#### 25. LUNULITES DISTANS. (sp. n.)

Conical; casts of cells cylindrical, short, rounded at the lower extremity, oblique to the surfaces of the cone, arranged in rows radiating from the centre and divided by thin plates; opening of cells oval; two or more foramina connecting successive cells, and several on the projecting portion; inner or concave surface broadly ribbed, foraminated; distance between the convex and concave surfaces much greater than the depth of the layer of cells, and traversed by minute channels, or tubuli.



a. Cast of the concave surface of *Lunulites distans* magnified twice, linear. The irregularity at the base represents the pebble to which the specimen was originally attached; fractured portions of the dividing plates, exceeding nevertheless the depth of the rows of cells, are given near the irregularity.

b. Portion greatly enlarged, to show the detached character and almost linear distribution of the filaments or casts of tubuli connecting the concave surface with the cells.

c. Exhibits, greatly enlarged, the considerable oval openings of the cells on the convex surface, together with casts of the cells of the connecting foramina, and likewise the dividing plates.

This fossil resembles, in the arrangement of the cells and the form of the opening, *Lunulites radiata* and *L. urceolata* as figured by Goldfuss (Petref. 12. f. 6 and 7.), but it differs from these species in its great relative size, and, so far as its state of preservation would permit of a comparison, in many of its structural details.

The specimens consisted almost wholly of casts of the interior of the cells, of the intermediate radiating plates, representing apparently grooves between the rows of cells, casts of the minute connecting channels, and impressions of the concave surface. The diameter of one of the larger specimens was 11 lines, and the depth of the cone, in the original, was probably 5 lines; but different specimens varied considerably in the relative measurements. Some fragments presented also great irregularities along the lines of renewed growth; and casts of vermiform as well as elliptical perforations (containing in one case a minute lithodomous shell) frequently occurred in the space between the layer of cellular casts and the concave surface. The only specimen of the convex exterior which was examined was greatly worn, but it exhibited oval openings equal in dimensions to the area of the cells; and in some fragments, where casts of the cells had been removed, the same want of an exterior covering was exposed (fig. c.). In this respect *L. distans* agreed with other species, having the cells similarly arranged in radiating, non-alternate rows. Professor Goldfuss, however, states that the middle cells of *L. radiata* were closed, but he does not allude to a distinct oral aperture in the covering — a character which has been noticed in one specimen of a *Lunulites* with similarly arranged cells; and which is often strongly exhibited in species with alternate rows.\* The filiform processes representing the foramina which connected the cells (fig. c.), ranged, in consequence of the partially overlying position of the casts, from the upper side of one to the under side of the next, when the specimen was placed with the apex downwards, and they differed not in character from the other processes or casts of minute channels which passed from the uncovered projecting part of the cell to the concave surface (fig. b, c.). Similar filaments extended laterally to the dividing plates. In general, the separating laminae were much broken, but in some cases they ranged continuously between the two surfaces of the specimen. The additional rows of cells were irregularly interpolated on the lines of the dividing plates. No very clear signs of intermediate chambers, or shallow circular cavities, between the rows of cells were exhibited; but on the fragment which gave imperfectly the convex surface, faint indications were detected of depressions similar to those exhibited by Goldfuss in plate 12. figures 6 and 7 of the Petrefacta German., and by other authorities who have

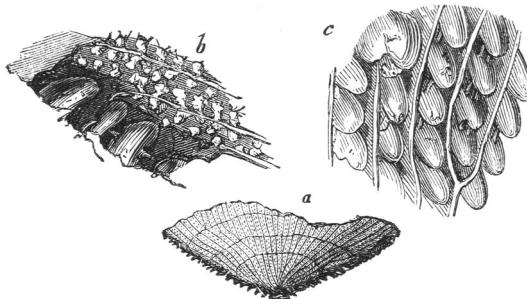
\* Consult figures of *Lunulites umbellata*, &c., referred to in the notice on the Miocene Lunulites, ante, p. 504.

delineated *Lunulites* with parallel non-alternate rows.\* The characters of the concave surface could not be fully ascertained, but no signs were noticed of irregular thickenings from the margin or lines of renewed growth towards the centre.

*Localities.*—Wilmington, Wantoot?

#### 26. LUNULITES CONTIGUA. (sp. n.)

Conical; casts of cells cylindrical, short, oblique to the surface, opening round, rows parallel, not alternate, divided by thin plates, successive cells connected by foramina; concave surface broadly ribbed, closely indented; distance between the two surfaces slightly exceeding depth of layer of cells; a series of shallow chambers between the rows of cells.



*a.* Cast of the concave surface of *Lunulites contigua* magnified twice, linear.

*b.* Portion of the same, greatly enlarged, to exhibit the irregular nature and blending of the indentations on the surface: also the small interval between the rounded ends of the casts of the cells and the concave surface.

*c.* Exhibits, greatly enlarged, the lineal arrangement of the cells, the connecting filaments or casts of foramina, and the separating plates.

This species resembled the last in the characters of the cells, the connecting foramina, and the radiating plates; but it differed in the distance between the surfaces slightly exceeding the range of the cells, and in the ribs of the concave cast being densely covered by minute points sometimes blended together; no filaments similar to those which project from the equivalent portion of *Lunulites distans* were noticed.

Casts only of the interior structures, as in the preceding species, were noticed, and the characters they exhibited are fully given in the wood-cuts.

*Locality.*—Wilmington.

July, 1844—Sept. 1845.

\* For an observation respecting these chambers see the notice on the miocene species, *ante*.