

XLVI.—*Contributions towards a General History of the Marine Polyzoa.* By the Rev. THOMAS HINCKS, B.A., F.R.S.

[Continued from p. 92.]

[Plates XVI. & XVII.]

II. FOREIGN MEMBRANIPORINA (*continued*).

Membranipora tenella, n. sp. (Pl. XVI. fig. 7.)

Zoëcia elongate, tapering off gradually below; aperture oval, more or less elongated, occupying (usually) three fourths of the front of the cell, with a narrow and smooth margin, except at the bottom, where it is slightly expanded and punctate, covered in by a delicate, translucent and shining membrane; lower portion of the cell tapering slightly downwards, smooth and glossy, with a single nodule in the centre, or two, one on each side. *Avicularia* none. *Oœcia* (?).

This species presents no very striking features. The whole zoarium is of singularly delicate material, and very bright and hyaline. The *zoëcia* vary somewhat in shape, having the aperture at times much elongated and narrowed; they are disposed rather irregularly in lines. Cells are of frequent occurrence which give origin at the upper extremity to two abnormally narrow ones, the result of a longitudinal division of the bud.

Loc. Florida, on weed (*Miss Jelly*).

Membranipora Flemingii, Busk, var.
(Pl. XVI. fig. 8.)

Zoëcia turbinate; area enclosed by a raised margin, crenated on the inner surface, occupying three fourths of the front of the cell, with a calcareous lamina, minutely pitted, which fills in about two thirds of it; aperture moderate, markedly trifoliate; the lower portion of the cell (below the area) of variable size, tapering downwards to a point; an *avicularium* in the centre of the lower margin of the area, placed transversely, sloping obliquely upwards, with an acute mandible; *avicularian* chamber subturbinate. No spines. *Oœcia* (?).

Loc. Unknown. On a foreign species of *Retepora* (*Miss Jelly*).

This seems to be a spineless form of the well-known *M. Flemingii*. The zoarium, in the only specimen examined, is remarkably bright and silvery; the lower portion of the cell

is well developed, and the form distinctly turbinate. There is no trace of spines. The avicularium is not unfrequently single and central in this species.

The present form is worth noting for its beauty and the peculiarity of its appearance, but it has no claim to be accounted more than a variety.

Membranipora pedunculata, Manzoni.

(Pl. XVII. figs. 2, 2 a.)

M. pedunculata, Manz. Bryozoi foss. Ital. contr. 4 (1870), p. 7, pl. ii. fig. 7.

Zoecia irregularly massed together, forming a thick white crust, or running out into linear series and disposed in single file, pyriform, oval above, and below narrowing off to a point, so as to appear somewhat stalked, suberect, the cell-wall strongly calcified, dense, smooth, porcellaneous, rising from the base to the bottom of the aperture, where it is highest; aperture sloping off to the top of the cell, occupying usually about half the front surface, wholly covered in with membrane, oval, with a smooth raised margin, expanded towards the bottom into a rather broad border. *Avicularia* none. *Oecia* "globose, smooth, imperforate" (*Manzoni*).

Loc. Ceylon, on weed (*Miss Jelly*).

Range in time. Italian Pliocene deposits, Castell' Arquato (*Manzoni*).

The dense white walls are a conspicuous feature in this species. From the base of the aperture the cells taper off rapidly to a point, so as to appear almost pedunculate. In the mass they are suberect; and the aperture, which slopes upward, is subterminal. When running out in single series they present a very *Hippothoa*-like appearance; in this condition they are often very slightly united, and in some cases are wholly disjunct. Many small rudimentary zoecia are scattered over the colony amongst the normal cells.

There would seem to be no material difference between the Ceylon form and the Tertiary species described by Manzoni under the name of *M. pedunculata*, which must therefore take its place in the recent fauna.

Membranipora polita, n. sp. (Pl. XVII. fig. 1.)

Zoecia disposed in regular transverse rows, of a solid, white, smooth, ivory-like material, expanding above and tapering off downwards, separated by very distinct narrow sutures, very prominent in front, usually with a smooth umbonate swelling immediately below the aperture, often much grooved

transversely across the front wall; aperture subterminal, occupying about one third of the whole length, with a membranous covering, arched above, lower margin straight or slightly curved outwards; peristome thickened and often somewhat elevated at the sides. *Avicularia* none. *Oæcia* (?).

Loc. Glenelg, Australia, incrusting stems of weed (*own collection*).

Both this species and the preceding belong to the section of the genus of which *M. catenularia*, Jameson, is the best-known representative.

Membranipora corbula, n. sp. (Pl. XVII. fig. 6.)

Zoæcia short-oval, distinct, front wall wholly membranous; margins thin, bearing a number of somewhat compressed spines (usually four on each side and one at the bottom), which bend rather abruptly over the area, the extremities meeting and crossing in the centre, but not uniting; orifice semicircular, on each side of it two tall and stout spines, of which the foremost are usually curved and of gigantic size. *Oæcium* shallow, rounded, smooth, much thrown back, with a raised rib across the front, a little above the oral margin. *Avicularia* none.

Loc. Australia, on other Polyzoa (*own collection*).

A very pretty form, with bright glittering cells, which creeps over the stems of various Polyzoa. It has much the appearance of a *Membraniporella*; but the spines are never united so as to form a single piece; it is properly ranked amongst the spiniferous *Membraniporæ*. At the same time it must be admitted that through such a form as the present the two groups are brought very close together.

An attempt will be made hereafter to give at least a rough estimate of the number of described species (recent) which are referable to the present genus.

Family Microporidæ.

MICROPORA, Gray.

?*Micropora coriacea*, Esper, var. (Pl. XVI. fig. 6.)

Zoæcia irregularly lozenge-shaped, front surface very slightly convex, minutely granular, with numerous small punctures, often covered with a brown epidermis; margin thin, very slightly granular or beaded, not much elevated, of about equal size throughout (not enlarged at the base of the orifice); orifice semicircular. *Avicularia* none. *Oæcia* large, rounded, somewhat elongated, with a knob in front, from which two

ribs pass off to the margin, so as to enclose a triangular space.

Loc. Mediterranean or Red Sea (*R. S. Newall*).

This form seems to be a variety of *M. coriacea*, distinguished by the total absence of the nodulous enlargement of the margin on each side immediately below the orifice. This character can hardly be accounted of much importance, as it is one of those which are found to be liable to great variation. I have not noticed avicularia on the present form; but they are often wanting on the normal *M. coriacea*.

STEGANOPORELLA, Smitt.

Steganoporella Rozieri, Audouin.

This species was figured by Savigny in his work on Egypt; and subsequently by Busk in his 'Catalogue,' from specimens obtained by Mr. Darwin in South America. It occurs in various parts of the world, but with certain modifications, which are extremely interesting as illustrating the range of variation and indicating the elements of structure which are most liable to change.

In the normal *S. Rozieri* the raised margin terminates above on each side in "a small tuberosity," and the front of the cell is represented as decidedly elliptical; avicularia are altogether wanting; the oecium is large, globose, and somewhat bilobate.

In Mazatlan a form occurs (described by Busk as a species under the name *Membranipora gothica**) which seems to be distinguished from the foregoing chiefly by the non-development of oecia and the presence of large avicularia. The oecium (according to Busk) is "represented by one or two rounded eminences at the bottom of the cell in front." This variety is very abundant at Santa Monica, California, where it spreads profusely over weed; I have figured it from a specimen obtained in this locality (Pl. XVI. fig. 3).

Another form has been received from India (Pl. XVI. figs. 1, 1a). In this the marginal tuberosities, which are so conspicuous a character in the two preceding, are wanting; avicularia are present, which bear a general resemblance to those of *S. gothica*, Busk, though they are furnished, I believe, with a somewhat different mandible; and there is a large bilobate oecium, like that of the normal *S. Rozieri* (Pl. XVI. fig. 1a).

Yet another variety has occurred, from Australia, which

* Quart. Journ. Micr. Sc. 1856, pl. vii. figs. 5-7.

agrees in general character with all the foregoing, and in common with the normal form and *S. gothica* possesses the tuberosities. But the avicularium has undergone a very striking modification, and is furnished with an elongate, tapering, and somewhat falciform mandible (Pl. XVI. fig. 2). Oœcia have not been met with.

I confess I cannot regard the differences just noted as having any specific value in the face of the striking resemblance in general character and in the more permanent features amongst the various forms. No importance can attach to the presence or absence of the marginal tuberosities, whilst the avicularia are too uncertain in their occurrence and too variable in form to be relied upon *alone* as diagnostic characters. The apparent suppression of the oœcium in *S. gothica* has no greater claim, I believe, to be accounted a specific distinction. We know that in *Lepralia Pallasiana* this structure is generally undeveloped, and only occurs in rare instances.

The various forms just enumerated may be arranged as follows:—

Steganoporella Rozieri, Audouin.

1. Normal form. With marginal tuberosities and large bilobate oœcium; avicularia wanting.

2. Form *gothica*. With marginal tuberosities; destitute of oœcia; avicularia large, with triangular mandible.

Loc. Mazatlan (*Dr. Philip Carpenter*); California (*own collection*).

3. Form *indica*. Without tuberosities; avicularia large, with somewhat elongate, slender, pointed mandible; large bilobate oœcium.

Loc. India (*Miss Jelly*).

4. Form *falcifera*. With marginal tuberosities; avicularia large, with much elongated, tapering, falciform mandible; oœcium (?).

Loc. Australia (*Miss Jelly*).

Steganoporella elongata, n. sp. (Pl. XVI. fig. 4.)

Zoœcia very much elongated, narrow, subquadrangular, covered in by a coarse, granulated, and punctured lamina, which slopes steeply up from a little below the orifice to the lower lip; on each side of the sloping portion a small foramen, usually filled in by a granular covering; margin strongly beaded; orifice small, narrow between the lower and upper margins. *Avicularia* small, scattered over the zoarium in the line of the cells, occupying a distinct area marked off by a

granular border; the mandible triangular, directed obliquely upwards. *Oæcia* (?).

Loc. Africa (*Miss Jelly*).

Steganoporella Jervoisii, n. sp. (Pl. XVI. fig. 5.)

Zoæcia quadrangular, about twice as long as broad, closed in by a glossy, transparent lamina, which is thickly covered with minute white disks; margin much raised, thin, smooth; the lamina (which is often intersected and divided into segments by opaque-white lines) depressed below, elevated towards the orifice, where it is smooth, and having on each side of it a foramen; orifice arched above, the lower margin slightly curved outwards, taller than broad, with a raised thin margin; on each side of it a prominent nodule, glassy and transparent below, with a conspicuous opaque-white summit. *Avicularia* infrequent, placed in the line of the cells on a distinct area; mandible somewhat raised, pointed, directed straight upwards. *Oæcia* (?).

Loc. Adelaide, Australia, on weed (*Miss Gatty*).

This is a singularly beautiful species, distinguished by its glossy, transparent, speckled lamina and the prominent opaque-white nodules which flank the orifice on each side.

The following recent species are probably referable to the genus *Steganoporella*:—*Eschara impressa*, Moll. (= *Membranipora gracilis*, Reuss; *M. calpensis*, Busk; ? *M. andegavensis*, Busk; *M. bifoveolata*, Heller; *Micropora impressa*, Waters); *Flustra Rozieri*, Audouin; *Membranipora gothica*, Busk (= *S. Rozieri*, form *gothica*, mihi); *Membranipora magnilabris*, Busk; *S. Smittii*, Hincks.

III. FOREIGN CHEILOSTOMATA (Miscellaneous).

Family Microporellidæ.

MICROPORELLA, Hincks.

Microporella fissa, n. sp. (Pl. XVII. fig. 4.)

Zoæcia ovate, somewhat elongate, separated by distinct furrows, the front surface convex, minutely granulated, traversed by nodulous ridges which pass from the margin towards the centre, punctate or areolated round the edges; the centre of the cell occupied by an elliptical depression, within which is a narrow, longitudinal, slit-like pore; orifice semi-circular; peristome thin, much raised, especially above, where it bends in hood-like fashion over the mouth, the inner edge of the lower lip very minutely crenate; immediately below the

inferior margin an *avicularium*, placed transversely, with pointed mandible directed obliquely upwards; in some cells this avicularium is absent and is replaced by a very large avicularium placed at one side of the orifice, the beak much elongated and somewhat falciform, the mandible expanded at the base and tapering off to a point above, directed upwards. *Oæcia* (?). Frequently a pointed avicularium on the lower part of the cell.

Loc. Indian Ocean (*Miss Jelly*).

Flustra coronata, Audouin, *Lepralia marsupiata*, Busk, *Porellina stellata*, Verrill, as well as the present form, may be added to the list already given of species referable to this genus.

Family **Myrizoidæ** (part), Smitt.

SCHIZOPORELLA, Hincks.

? *Schizoporella sanguinea*, Norman, var.
(Pl. XVII. fig. 3.)

Zoæcia flattish, quadrangular, in linear series, separated by raised lines; surface punctured and roughened by ridges and nodules; orifice depressed, much broader than high, arched above, lower margin straight, with a central sinus, and on each side a small notch. In a line below the inferior margin three small circular *avicularia*—one central, and one on each side between the orifice and the side wall. *Oæcia* (?).

Loc. Red Sea or Mediterranean (*R. S. Newall*).

The only character by which this form can be distinguished from *S. sanguinea*, Norman, is the triplet of circular avicularia below the orifice. They appear to be generally present, and always occupy, so far as I have seen, the same positions. Taking into account, however, the inconstant character of the avicularian appendages in this group, it seems better to rank the present form as a variety.

Family **Escharidæ** (part), Smitt.

PORELLA, Gray.

Porella rostrata, n. sp. (Pl. XVII. fig. 5.)

Zoæcia enlarged above, narrowing off towards the base, rounded at the top, bounded by a slightly raised line; surface smooth and shining, bearing several bosses or umbos of various size; front wall rather abruptly raised towards the inferior margin, below depressed; orifice (primary) arched above, slightly narrowed towards the lower margin, which is straight; peristome (in the adult) raised, forming a secondary

orifice, arched above, the sides inclining slightly inwards, the lower margin (which is somewhat curved outwards) bearing a round *avicularium*; within it three denticles, the central one hammer-shaped, the two lateral acute; immediately below it a tall and very stout rostrum, with a smaller one on each side of it, the three stretching across the cell; at the top of the orifice usually two or three similar processes of smaller size, sometimes two spines on the upper margin. *Oœcia* (?).

Loc. Australia (*Miss Jelly*).

In this curious species the cells are often separated from one another, an open space or groove lying between the margins.

MUCRONELLA, Hincks.

Mucronella (?) *tubulosa*, n. sp. (Pl. XVII. fig. 7.)

Zoœcia large, irregularly arranged, suberect; surface white, smooth, and glossy, very convex and subcarinate in front; orifice suborbicular, depressed; peristome very much raised on the sides and in front, so as to form with the wall of the neighbouring cells a wide funnel-shaped shaft, in which the mouth is quite concealed; peristome carried up in front into a massive central mucro; at the base of it a large linguiform *avicularium*, much raised; mandible directed downwards. *Oœcium* rounded above, somewhat compressed and flattened towards the orifice, smooth or very minutely roughened, placed at some distance above the mouth, towards the upper part of the oral shaft.

Loc. Australia (*Miss Jelly*).

This is a remarkable form, distinguished especially by the position of the ovicell, and the ample funnel-shaped shaft in which the mouth is immersed. The arrangement of the zoœcia is also peculiar. I have only had the opportunity of examining a small fragment and can hardly determine with certainty its generic place. For the present it may be referred to *Mucronella*, with which it has apparent affinity.

EXPLANATION OF THE PLATES.

PLATE XVI.

- Fig. 1.* *Steganoporella Rozieri*, Audouin, form *indica*. 1 a. Oœcium.
- Fig. 2.* *Steganoporella Rozieri*, Audouin, form *falcifera*.
- Fig. 3.* *Steganoporella Rozieri*, Audouin, form *gothica*, Busk.
- Fig. 4.* *Steganoporella elongata*, n. sp.
- Fig. 5.* *Steganoporella Jervoisii*, n. sp. 5 a. Avicularium.
- Fig. 6.* *Micropora coriacea*, Esper, var.
- Fig. 7.* *Membranipora tenella*, n. sp.
- Fig. 8.* *Membranipora Flemingii*, Busk, unarmed variety.

PLATE XVII.

Fig. 1. *Membranipora polita*, n. sp.

Fig. 2. *Membranipora pedunculata*, Manzoni.

Fig. 3. *Schizoporella sanguinea*, Norman, var.

Fig. 4. *Microporella fissa*, n. sp.

Fig. 5. *Porella rostrata*, n. sp. 5a. Young cells showing the tridentate lower margin of the orifice.

Fig. 6. *Membranipora corbula*, n. sp.

Fig. 7. *Mucronella tubulosa*, n. sp.

XLVII.—On the *Flint Nodules of the Trimmingham Chalk.*

By W. J. SOLLAS, M.A., F.R.S.E., F.G.S., Professor of Geology in University College, Bristol.

[Plates XIX. & XX.]

Personal.—In 1873 Mr. Jukes-Browne gave me some very interesting specimens of flint nodules which he had obtained from the chalk of Trimmingham, Norfolk. To the examination of these I devoted a great part of the summer of 1874, preparing some hundreds of drawings of the sponge-spicules which are associated with them. After a visit to the Trimmingham cliffs together, my friend Jukes-Browne and I arranged to write a joint paper on them, he undertaking their general geology and leaving the description of the flints to me. Jukes-Browne's paper was ready for publication a year or more ago; but mine seemed in danger of indefinite postponement, when I heard from Mr. G. Jennings Hinde, F.G.S., that he too was at work on the same or a very similar subject. This led me to embody my results in the following paper, which was read before section C of the British Association during its meeting at Swansea this summer. It will appear as an abstract in the Annual Report, and is given here in full as a sequel to Mr. Jukes-Browne's, which appeared in the 'Annals' of last month.

The Flint Nodules.—In form they vary greatly: some are flabellate, some irregularly conical; others consist of a somewhat ellipsoidal body seated on a short stalk, while many are irregular and amorphous. They consist of chalk and silex in various proportions; sometimes the chalk forms the greater part of a nodule, sometimes it is altogether absent. Between a nodule consisting of a solid mass of silex, black throughout, except on the surface, and one consisting chiefly of siliceous chalk there are any number of others forming a complete transitional series. Commonly the flint is traversed by a number of winding anastomosing passages, which are occu-



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