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Art. IX.—*Two New Species of Bryozoa.*

By W. M. Bale, F.R.M.S.

(With Plate VIII.)

[Read 13th July, 1922.]

The two species of Bryozoa to be described belong to the series of forms included by Busk in the genus *Catenicella*. The members of this genus are among the most abundant of the Bryozoa which are found on our beaches, and are known to seaside visitors as "curly seaweeds." Nearly all of them are found in Australia, and but few elsewhere; none at all in the Northern Hemisphere. In MacGillivray's Catalogue of recent Victorian Polyzoa are comprised about 35 species, including those separated by him under the name *Claviporella*. The greater number of species were originally described by Busk, others have been added by Wyville Thompson, MacGillivray, Maplestone, and Wilson. Many fossil forms were described by MacGillivray and Maplestone in the publications of this Society, some of them identical with recent forms.

More recently Levinsen has dismembered the group, assigning a number of new generic names to many of the species, and adopting for the rest the name *Catenaria* instead of *Catenicella*. Whether all Levinsen's genera will be accepted is uncertain; for the present I retain the old classification as given in MacGillivray's Catalogue.

The two species before us were handed by me to Mr. Bretnall, of the Australian Museum, the only Australian zoologist known to me to be now working on the Bryozoa. Mr. Bretnall intended to describe them, but, unfortunately, illness, the result of war injuries, has temporarily interrupted his work, so I have undertaken the task.

Our first species is a very interesting one. It was among a quantity of material sent to me by Mr. E. H. Matthews, of Largs, South Australia, and it was recognised at first sight as different from any of the known forms. The outstanding difference between it and more familiar forms is that the alae or lateral expansions of the zooecia are perfectly clear and uncalcified, contrasting strongly with the darker more opaque substance of the remainder of the cell. Comparison with other species, however, shows instances of similar structure, though to a far less extent. In *C. plagiostoma* and *C. intermedia*, for example, that portion of the alae which is at the top of the zooecia seems as free from calcareous matter as in the present species; while in other forms, such as *C. alata*, the alae, though strongly calcified, contain definite areas wholly chitinous.

Mr. Bretnall informs me that in Levinsen's system this species would come under the proposed genus *Pterocella*, or may possibly have to be separated as a new genus. After the discoverer I name it *Catenicella* (or *Pterocella*) *matthewsi*. It appears plentiful at Corny Point, Spencer's Gulf, where Mr. Matthews collected it.

The other species belongs to MacGillivray's genus *Claviporella*, distinguished from *Catenicella* by the keyhole-shaped orifice of the zooecium, and by its obtuse tubular processes. There are only a couple of rough mounts left by Goldstein, and marked in pencil, "*Cat. MacCoyi*, new." Goldstein's general collection of Bryozoa was disposed of in his life-time, and is supposed to have been sent to England, but the slides in question were among a quantity of unfinished material handed to me after his decease. Mr. Bretnall has already pointed out that in Miss Jelly's "Synonymic Catalogue of the Bryozoa," are included several species ascribed to Goldstein, but without any reference. Miss Jelly was assisted by Waters, with whom Goldstein corresponded, and the presumption is that she got these names from him, but it seems extraordinary that Waters should have sanctioned the inclusion in the list of species which had never been described, and especially the reference of two of MacGillivray's published species as synonyms of these nomina nuda. *C. MacCoyi* was one of the names included, and it will now be accounted for as *Claviporella goldsteini*. Possibly some of the other species may be identical with those since described by others.

In passing, I should like to add a few words on the methods of preparing and mounting these polyzoaries. Too often they have been described from examples of the dry material only; MacGillivray's specimens, except a few special ones which were mounted in fluid, and which have gone or are going, the way of all fluid mounts, are mounted dry. This method is in some cases incapable of showing all the detail. For example, there are two species, *Thairopora jervoisi* and *Diploporella cincta*, which contain numerous minute spicules, the former species especially having them in great profusion, and very evident in balsam mounts, yet the friend to whom I showed them —though familiar with the species for many years as a dry mount— was not yet aware of their existence. Similar insufficient methods have been responsible for the descriptions of "openings" in the alae of various species, which are really only clear areas, and minute avicularia have sometimes been overlooked. The method which I have been accustomed to use in mounting polyzoaries and polypidoms is to boil them in water till all air is removed, transfer them to methylated spirit, thence to phenol, and thence to balsam. For clean specimens this suffices, but if very dirty they should be first heated in liquor potassae to remove foreign matter. This is also useful for swelling out tissues, which have shrunk in drying; for example, it is often impossible to decide whether the chitinous alae have openings in them when they are shrunk together. As mentioned further on, also, it is often desirable to decalcify and stain. Liquor potassae is sometimes too strong, and acetic acid may give better results, but of course it is only available when decalcification is desired.

CATENICELLA MATTHEWSI, n. sp. (Plate VIII., Figs. 1a-1f).

Colonies about an inch in height, much branched, branches always springing from geminate zooecia.

Zooecia elongate oval, with about 11-13 small round fenestrae with fissures converging to a minute sub-oral pore. Orifice semi-elliptic, contracted at base, with two lateral teeth. Avicularian processes long and narrow, at angles of about 45° with the axis, avicularia terminal, very minute. Alae very large, not calcified, hyaline, apparently structureless.

Ooecium galeate, terminal on one of the cells of a geminate pair; orifice transverse, wider than high, below the lip two long, linear, widely divergent fenestrae with three or four small round ones.

Type in the National Museum Collection.

This is a remarkable species, which it is impossible to mistake for any other, owing to the unique character of the alae. The zooecia are oval, more convex behind than in front; at the back they appear somewhat barrel-shaped, in front they are more ventricose, and in the lower half is a thin lateral extension on each side with a convex outer border, more conspicuous after decalcification. The zooecia at the ends of the side branches are commonly rather narrower than the others, and possess narrower alae.

The orifice is rather large, semi-elliptic, but with the sides becoming convergent near the base, and at the points where the convergence begins there are two lateral teeth. The lower side of the orifice is somewhat convex, and below it is a minute pore, connected with the lip by a straight fissure. The operculum is of similar form to the orifice; its rim is slightly thickened, with an enlargement just at the points subtending the lateral teeth. It has no ornamentation except a vertical bar or median thickening which runs from the top of the operculum downwards for about two-fifths of its length, and is continuous with the rim. The back of the zooecium is plain.

The fenestrae are small, and form an outer series of seven or eight, enclosing a sub-triangular area in which are from two to five others. They are connected by rough-edged fissures with the sub-oral pore.

The avicularian processes form long narrow arms rising from the shoulders of the zooecia, tapering outwards to about the middle, and then enlarging slightly to the obtuse ends. The avicularium itself is very minute (only about 15 μ from base to apex); it is of the usual sub-triangular form, with rounded angles and a thinner median area; the apical tooth generally found in the larger forms is wanting. A similar avicularium is usually sessile in the upper part of the area between the two cells of a geminate pair.

The alae are wide and form the most striking feature of the species. The lower chambers are outwardly convex, and the superior ones are still more so; on the summit of the geminate zooecia especially they form large inflated bladder-like expansions. At the two outer angles of the avicularian process the alae form little prominent points, and occasionally the superior inflation of a geminate pair tends towards a bilobed condition, and may run out into similar points. The most remarkable feature of the alae is the entire absence of calcification or of any perceptible structure; they are therefore only visible by their outline, and by any lines of shrinkage which may be

present. With a pocket lens they are invisible, and the same is the case when they are examined in the microscope between crossed nicols. In the dry specimens they are more or less shrunken, the superior chambers especially being much contracted, but treatment with acetic acid or liquor potassae plumps them up and removes shrinkage marks, restoring them to what I suppose to have been their original condition. They have no external openings nor specialised areas.

Only four ooecia were seen. In each case they were at the end of a small side branch springing from the older part of the shoot, where the ramification was sparse. The ooecium is geminate with a zooecium, which is not necessarily terminal. The orifice is quite unlike that of the zooecia, being widened laterally and narrowed to the ends, its form is accentuated by its being seen foreshortened owing to its position in the lower part of the pear-shaped ooecium. Below it are two long, widely-divergent fenestrae, with three or four minute round ones. There is a sub-oral pore. The ooecial chamber is a densely cribrose structure, opaque and strongly calcareous. It is encircled by a band, plain below, undulated above, the median undulations being extended upwards into vertical bands reaching the top of the ooecium, the back band being very wide, the front one less so. In one case there was also a very narrow lateral band. The bands are very finely granular, and resemble a veil overlying the coarse structure. On the summit of the ooecium are two short obtuse processes surrounded by a slight chitinous web. From analogy it seems likely that these processes may support avicularia, but I was not able to discover any.

Decalcification with acetic acid, by removing the semi-opaque material from the sides of the zooecia and the avicularian processes renders the whole transparent, and makes them as clear and structureless as the alae. It leaves the tissues somewhat flaccid, so that many of the zooecia become more or less crumpled; this, however, is not material, as some of the cells, especially the older ones, retain their shape sufficiently, except that the back shrinks a little. The only points of structure which I observed to become wholly obliterated were the fissures which converge from the fenestrae towards the suboral pore; these are evidently confined to the calcareous layer, as they disappear completely. The fissure connecting the suboral pore with the orifice is not affected. But though the alae and the body of the cell are thus made to appear alike hyaline and structureless, they seem to be of different composition, as they reacted differently to a staining process. The stain used was an anilin "indigo-blue," mixed with acetic acid, and giving a blue or green stain varying according to proportion. Ordinarily the corneous joints between the cells, normally a deep yellow, came out an intense green, as did the tendrils which spring from the back of some of the cells. The zooecia themselves, with the avicularian processes (that is to say, all parts which had been originally calcified), were also green, while the alae, as well as the fenestrae, became bright purple.

There are two species which are allied in many respects to the present, though differing widely in their general aspect from it, and

also from each other; these are *C. alata* and *C. carinata*. Apart from mere differences in the form of the zooecia, and of the alae, the structure of the latter is very distinctive. In *C. alata* they are far wider than in our species, in *C. carinata* they are narrower, but in each case they are strongly calcareous, though presenting several large, clear spaces, which have been described by Busk, MacGillivray and others as "openings," but which are really areas wanting the calcareous layer. They may be aptly described as "fenestrae," and just as the small fenestrae on the front of the zooecia usually have fissures (in the calcareous layer only), proceeding from them towards the orifice, so these large fenestrae have similar fissures. The most important distinction, then, between these two species and *C. matthewsi* is that in the former the alae possess certain limited areas of an uncalcified hyaline substance, while in the latter the whole of the alae are similarly constituted.

All three species agree in the possession of the very long avicularian chambers, with the minute avicularia seated on their obtuse extremities. Thompson and Busk mentioned these little avicularia in *C. alata;* in *C. carinata* Busk failed to find them. As, however, he described the avicularian chambers as open in front, which is not the case, it appears likely that he may have observed corroded specimens. The avicularia seem to be readily lost in this species; in the only specimen which I have available only two or three remain. In my slide of *C. alata*, on the other hand, containing a great number of zooecia, almost all are intact. So far as I can judge, the avicularia in these two species are alike; as they are all edgewise in the slides, however, I cannot make out their exact form; but they seem to me to have the angles more rounded, and, therefore, to approach more nearly to a semi-circular form, than those of *C. matthewsi*.

The orifice in *C. alata* does not differ much from that of our species, that of *C. carinata* is so concave below as to approach the circular form, but in both species the lateral teeth are present, and in both the operculum has the vertical bar more or less distinct.

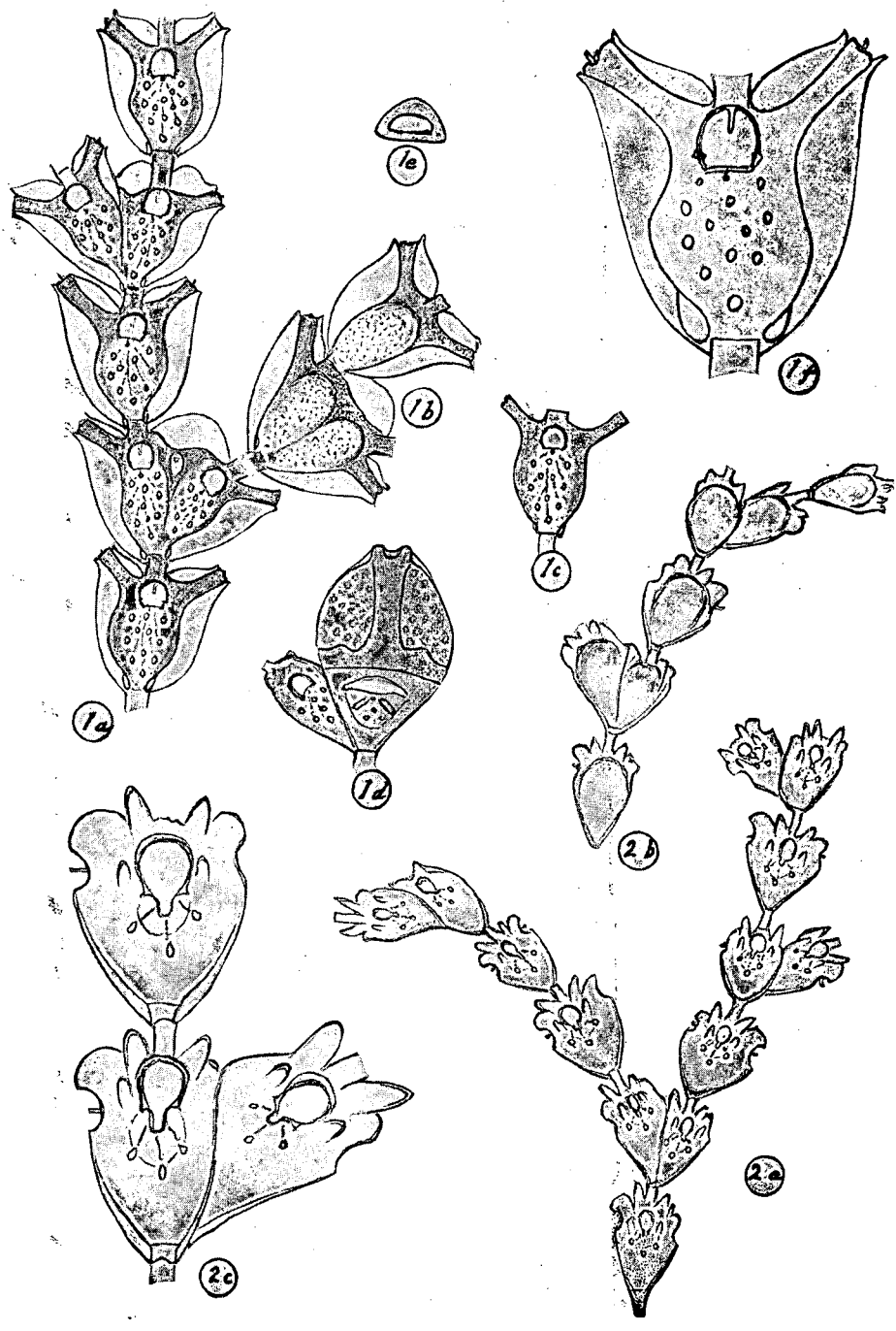
The ooecia of *C. alata* and *C. carinata* are very similar, they agree in possessing a modified zooecium sessile on the top of the ooecium; in this respect they differ from the species before us.

CLAVIPORELLA GOLDSTEINI, n. sp. (Plate VIII., Figs. 2a-2c).

Catenicella maccoyi, Goldstein, nomen nudum, Jelly, Synonymic Catalogue of the Bryozoa.

Shoots very small, branches springing from geminate cells, but also occasionally from the side of a single cell.

Zooecia oval, with a large gaping avicularium on each side, generally unequal, a small rounded, slightly thicker, sub-oral area embracing the inferior prolongation of the orifice; a pseudo-pore surrounded by three minute but distinct fenestrae, all connected with the orifice by rough-edged fissures; a prominent obtuse process at each side of the orifice and two larger ones above; front papillose, back without conspicuous markings, nearly smooth.


1a
1b
1c
1d
1e
1f
2b
2c
2e

Ooecia (?)

Type in the National Museum Collection.

The specimens available do not exceed about half an inch in height. In some instances the branches spring from the sides of single zooecia, and there may even be one on each side. This is the character on which Wilson founded the genus *Catenicellopsis*, but it was not deemed valid by MacGillivray, who mentions having met with the same character in *Claviporella*. It is only in a few of the proximal internodes in one of these specimens that it occurs; higher up the typical mode of branching is constant.

There are usually four obtuse processes, as in *C. aurita*. The avicularia are most commonly unequal, but not differing otherwise; sometimes the inequality is considerable, but there are not in these specimens any of the gigantic forms sometimes found in *C. aurita*.

The ornamentation of the zooecium affords a ready means of distinguishing the species from its allies. In place of the large elliptic pore of *C. aurita* we have here a minute pseudo-pore, often quite indistinct, and the broad band surrounding the pore is here represented by a less distinct circular area. The fenestrae in *C. aurita* are mostly four or five, and somewhat irregular; in our species there are almost invariably three, regularly placed, and though so minute, both the fenestrae and their fissures are sharply defined. This character also distinguishes the species from *C. imperforata* and *C. pulchra*, which latter species, moreover, has an oval central pore and narrower zooecia.

Large circular cavities behind the zooecia are extremely numerous, indicating where tendrils have been detached. The cavities are inside the zooecium, and the tendrils have been broken off flush with the surface, only one remaining. If they all existed at once some of the branches must have fairly bristled with them, but being so brittle it is likely that as new zooecia were produced the tendrils fell from the older ones. In some cases two had existed on a single zooecium.

EXPLANATION OF PLATE VIII.

Fig. 1a *Catenicella matthewsi* × 30.
„ 1b „ back.
„ 1c „ between crossed nicols.
„ 1d „ Ooecium.
„ 1e „ Avicularium × 400.
„ 1f „ Decalcified × 75.
„ 2a *Claviporella goldsteini*, × 30.
„ 2b „ back.
„ 2c „ × 75.

END OF VOLUME XXXV., PART I.

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