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Geelong Naturalist 6(4): 73-84

NOTES ON VICTORIAN HYDROIDA.

PART VI.

1916

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1916

(With Plates X. and XI).

AGLAOPHENIA MULDERI, Bartlett.

(Plate X., Figs. 3-3b.)

Aglaophenia mulderi, Bartlett. "G. Nat." (2nd Ser.) Vol. III., p. 66. Fig.

Hydrocaulus monosiphonic, unbranched, attaining a height of about half an inch; pinnæ close, alternate, one on each internode, both series springing from the front o the hydrocaulus. Hydrothecæ urceolate, narrowed towards the base, set at an angle of about 35 degrees; a conspicuous intrathecal ridge obliquely encircling the cell near the base; aperture with four teeth on each side and one in front, back adnate. The median tooth is narrow and incurved; the first pair of lateral teeth from the front are triangular, rounded at apex, and project slightly outwards; the second pair long, roughly rectangular in appearance, with margins everted, strongly incurved, almost meeting above the aperture; the third pair broad, rounded at apex and projecting outwards; the fourth pair (which are separated from the third by a broad bay the edge of which projects outwards), are long, narrow, slightly incurved, and are situated one on each side of the back of the cell. Front of hydrotheca with an external longitudinal ridge terminating in a rounded crest. Hydrothecal internodes with 3 or 4 transverse folds or constrictions, one (occasionally obsolete or missing) below the intrathecal ridge and between it and the base of the hydrotheca, one a little more than the same distance above the intrathecal ridge, one just below the base of the lateral sarcothecæ, and, sometimes, one half-way between the last two mentioned constrictions.

Mesial sarcotheca about half the length of the hydrotheca, straight, adnate for nearly two-thirds of its length, terminal and inferior apertures completely confluent. Lateral sarcothecæ divergent, adnate to hydrotheca-margin, curved rather abruptly, free terminal portion conical, directed upwards and outwards, terminal and inferior apertures confluent.

Cauline sarcothecæ conical, two, one below the other, below each pinna, and one in the axil at the base of each pinna.

The aperture leading into the hydrotheca lies immediately below the proximal constriction of the hydrothecal internode. It is circular, with well defined margin. Its upper margin bears a slight protuberance from which spring two very small, slender, curved teeth, which project backwards over the opening. They are not easily seen except under a high power objective.

The partition between the base of the hydrotheca and the median sarcotheca is very thin, and disappears as it approaches the free portion of the sarcotheca, leaving a large opening between sarcotheca and hydrotheca.

Gonosome (?).

This species is apparently rare. It was first described by Bartlett in 1907, and although we have been continually on the look-out for it, have only recently found it. Bartlett's figure and description are inaccurate, and had we not examined the type specimen we would not have referred our specimens to this species. The appearance of the species, however, is so unlike anything else that there is no mistaking it.

Hab.—Barwon Heads, several specimens.

Halicornopsis elegans, Lamarck.

Halicornopsis elegans, Bale. (For synonymy see Biol. Results "Endeavour" ii., 1, 1914, p 56.)

There is a considerable difference between specimens collected by us along the Victorian coast on the one hand and that of a specimen sent to us by the Australian Museum from the "Endeavour" dredgings in Great Australian Bight. The Victorian specimens have the internodes, both of the pinnæ and the hydrocaulus, much shorter. This results in both the hydrothecæ and the pinnæ being more closely set in the Victorian specimens, which thus lack the graceful appearance of the "Endeavour" specimen. In fact the pinnæ often lie so close by that when mounted the "spines" of the hydrothecæ of one pinna overlaps the pinna posterior to it.

The following measurements will show how great the difference is. In example "(a)" the internode bears only one pinna, in "(b)" two, and in "(c)" three.

	Victorian Specimens.	"Endeavour" Specimens.
	mm.	mm.
Length of internode of hydrocaulus (a)	0.32—0.44	0.70
Length of internode of hydrocaulus (b)	0.64—1.09	1.28—1.57
Length of internode of hydrocaulus (c)	—	1.92
Length of internode of pinna	0.27—0.34	0.43—0.49
Diameter of internode of pinna	0.10—0.18	0.10—0.15

In some Victorian specimens all the internodes of the hydrocaulus bear but one pinna each. These internodes are regularly 0.33 mm. in length. In other Victorian

specimens nearly every internode bears two pinnæ, each internode being about 0.66 mm. long, anything over 1 mm. being exceptional. None of the Victorian specimens in our collections have internodes bearing more than two pinnæ each.

In the "Endeavour" specimen the internode bearing a single pinna is the exception, most of them bearing two or three pinnæ. It will be noticed that the difference in diameter of the pinnæ is not so great—nor is there any marked difference in the diameter of the hydrocauli.

PLUMULARIA CAMPANULA, var. GEELONGENSIS, var. nov.

(Pl. XI., Figs 2—2c.)

Hydrocaulus attaining a height of about quarter of an inch, monosiphonic, unbranched, divided into alternate long and short internodes, of which only the former bear hydrothecæ. Pinnæ alternate, springing one from the side of each hydrotheca of the hydrocaulus, divided into alternate long and short internodes of which only the former bear hydrothecæ. Joints below hydrothecæ, both on stem and pinnæ, oblique; joints above same, transverse. Proximal internode of each pinna short and destitute of appendages; the next internode rather longer than the remaining non-hydrothecate internodes, and bearing a sarcotheca only.

Hydrothecæ borne about the middle of the internodes, set at an angle of about 40°, large, campanulate; margin entire, free at back. Sarcothecæ bithalmic, canaliculate, the median one fixed and stout at base, the remainder slender at base and moveable; one borne on a short peduncle at each side of the hydrotheca (except on that side of the stem-hydrothecæ from which a pinna springs), and one on each intermediate internode of stem and pinnæ.

Gonothecæ (?).

Hab.—Corio Bay.

PLUMULARIA OBLIQUA, Saunders.

(Plate XI., Figs 1—1e.)

An examination of specimens of this species in a fresh condition shows that the hollow below the hydrotheca and

between it and the median sarcotheca is filled up with solid chitin to such an extent that the outline forms an unbroken curve from the mouth of the hydrotheca to the base of the hydrothecal internode, involving the stem of the sarcotheca.

The median sarcotheca is very slender at base, and is often missing even in living specimens in otherwise first-class condition. The opening, however, is always present, showing that the sarcotheca has been broken off.

The mammilliform pore is found in the axil of this species. It projects little, if at all.

Most of the specimens we have examined have only one constriction in the pinna at the back of the hydrotheca, but that constriction is very pronounced. The pinnæ, in most of our specimens, are more swollen than those shown in Bale's "Catalogue."

The edge of the hydrothecæ is sometimes slightly everted. The supracalycine sarcothecæ in our specimens are not so much open as in Bale's figures.

PLUMULARIA AUSTRALIS, Kirch.

(Plate X., Figs 1—1b.)

The mammilliform pore in this species projects considerably, and opens not upwards as in most species, but sideways, facing the hydrocaulus. It is protected on one side by a chitinous web which joins the hydrocaulus to the apophyse, and on the other side by the sarcotheca.

Bale describes the sarcotheca in the axis as "bract like." It springs from a slight prominence, is monothalmic, and practically the whole of the side facing the hydrocaulus is open. It is, however, only near the base of the hydrocaulus, where a gonotheca is borne, that the true form of the sarcotheca can easily be seen. The gonotheca lies at right angles to the plane of the pinna, and under pressure of a cover-glass the apophyse is twisted so as to show a side view of the sarcotheca. It is then seen to resemble somewhat the ventilators generally used on a steamship.

PLUMULARIA COMPRESSA, Bale.

(Plate X., Figs 5—5a.)

The description of the mammilliform pore, web and sarcotheca of *P. australis*, Kirch., might equally be applied to *P. compressa*.

The tubular sarcothecæ which are found on the broad hydrorhiza of this species may fairly be taken as typical of those found in a similar position on most species. They have a long, delicate peduncle, and terminate in a shallow cup. They can scarcely be said to be canaliculate. They are not scattered over the hydrorhiza (in this species at all events), as has often been stated, but are borne regularly, in pairs, near the margin of the broad, flat hydrorhiza. In a young hydrorhiza they occur very regularly—usually 2 to 4 pairs between each hydrocaulus, but as the hydrorhiza becomes older they get broken off. The extreme end of a growing hydrorhiza is destitute of them for a short distance back.

Plumularia setaceoides, Bale.

(Plate X., Fig. 2.)

In this species the mammilliform pore is rather prominent, and more noticeable than in some species. It is unprotected (except by the sarcotheca, which is on the opposite side of the apophyse).

In specimens from Corio Bay there are sometimes two sarcothecæ on the lower part of stem internodes, and the stem often ends in a stolon bearing sarcothecæ.

Plumularia pulchella, Bale. (?)

A specimen from Corio Bay is well armed with sarcothecæ. Instead of two in each axil, there are in many cases three, and in one case four. There is one on the lower part of each stem internode, and in one instance two abreast. The short proximal internodes (three of them in one shoot) each bear one; and one stem has a rather long internode, below the internode bearing the first pinna, bearing three sarcothecæ. Long sarcothecæ are also borne on the hydrorhiza.

This species bears a mammiliform pore in each axil.

Branched specimens are not at all uncommon. The branches spring irregularly from near the distal part of the stem internodes, beside the apophyse.

The specimens from Corio Bay resemble *P. flexuosa* in many respects. They all bear sarcothecæ on the lower part of each stem internode, the stem internodes are long in proportion to their diameter, the pinnæ are borne near the summit of the stem internodes, and the stem is not annulated or wrinkled. On the other hand they resemble the typical form of *P. pulchella* in their size (about quarter of an inch in height), the stems, though somewhat wavy in their distal part, are not flexuous in the proximal part of the shoot—where the internodes are quite straight. The whole structure is more robust than *P. flexuosa*.

This form is very plentiful in Corio Bay, but so far we have not found a specimen there bearing a gonotheca.

A specimen of similar habit comes from Hobson's Bay, but in this the stems are almost perfectly straight. It bears a gonotheca which is not sufficiently developed for purposes of identification.

Usually there is only one branch from an internode, but in the Hobson's Bay specimen there are several instances of two branches from an internode, one springing from each side of the apophyse.

The non-hydrothecate internode of the pinna is usually rather short, but sometimes long examples are found, and sometimes there are two or three internodes destitute of appendages between the apophyse and the hydrothecate internode.

If the genus *Monotheca* (Nutting) is to be accepted, both *P. pulchella* and *P. flexuosa* should be assigned to that genus, as should also *P. obliqua*, *P. compressa*, *P. australis*, *P. spinulosa*, *P. hyalina*, *P. aurita*, and *P. excavata*. We do not think, however, that the distinction drawn between the genera *Plumularia* and *Monotheca* (namely, that one has merely a proximal non-hydrothecate and a distal hydrothecate internode, while the other has pinnæ each bearing more than one hydrotheca), is sufficient to warrant their being separated.

P. setaceoides, Bale, var. *crateroides*, Muld. and Treb., often has only one hydrotheca to pinna, and this form would be referable to the genus *Monotheca*. Sometimes, however, the pinnæ each bear two hydrothecæ, with a short intermediate internode bearing a sarcotheca, and this form is an undoubted *Plumularia*.

Plumularia sulcata, Lamarck.

A specimen sent to us from the Australian Museum is abnormal in its manner of growth. One branchlet has two pairs of opposite pinnæ at its proximal part, the remainder being alternate as usual. In the next branchlet to it one pinna gives rise to a secondary pinna, which springs from beside a hydrotheca.

Hab.—50 miles S. of Cape Wiles, S. Australia, 75 fathoms.

Plumularia procumbens, Spencer.

Plumularia setaceaformis, Muld. and Treb., G. Nat. Vol. VI., p. 52.

Mr. Bale, in a note at the conclusion of his paper in Biological Results "Endeavour" iii, V., at p. 336, states that the species *Plumularia setaceaformis*, Muld. and Treb., "is evidently founded on a small specimen of *P. procumbens*, Spencer."

Having read his description of the peculiar form of ramification of several specimens from Great Australian Bight (loc. cit., p. 207), we are of the same opinion. Some of our specimens branch in exactly the same way.

Plumularia filicaulis, Poeppig.

(Plate X., Figs 6a—6b.; Plate XI., Figs 3—3a.)

Like several other species, the above has a thickening of solid chitin not only below, but also at the back of the hydrotheca.

A specimen from Point Lonsdale, with both simple and pinnate shoots from the same hydrorhiza, bears gonothecæ. This is the first time we have seen gonothecæ on the pinnate form, though it is common enough on the simple form, which is more plentiful than the other.

This species also possesses the mammilliform pore in the axil of the pinna. The projection which contains the pore is longer than in any other species we have examined.

The supracalycine sarcothecæ are slender at base and monothalmic, being merely an expanding tube. They are, however, canaliculate. The median sarcothecæ are bithalmic and stout at base (see Pl. X., Fig 6a). Those

in the axils and on the lower part of stem internodes are similar.

Plumularia spinulosa, Bale.

(Plate XI., Fig. 4.)

An examination of specimens in a fresh condition shows that this species too has a thickening of solid chitin below the hydrotheca. It is noticeable in several of our specimens of this species—and the same refers more or less to several other species which have this thickening—that the inner portion of the chitinous thickening appears to be of a denser material than the outer (see figure), and it is the less dense portion (shaded light in the figure), that shrinks on drying or on being transferred too suddenly to a dense medium.

The mammilliform pore is present in the axils. It projects but little.

One of our specimens shows two sarcothecæ in an axil, one at the front and one at the back. This is unusual.

Plumularia asymmetrica, Bale.

From a specimen received from the Australian Museum we notice that this species though asymmetrical as to each pinna, inasmuch as one side of each hydrotheca is higher than the other, yet, if the whole branchlet be considered, it is symmetrical, as the hydrothecæ on the pinnæ on the right side of the branchlet have their right side higher, and the hydrothecæ on the pinnæ on the left have their left sides higher—that is the side further from the branchlet in each case is the longer

Hab.—Great Australian Bight.

Obelia australis, von Lend.

The gonothecæ of this species have the mouth inverted as in *O. geniculata*.

Sertularia pulsilla *Bale*.

Sertularia minima, Thompson, var. *tubatheca*, Muld. and Treb., "G. Nat." (2) VI. (1914), p. 40, pl. IV., fig. 1—1d.

Sertularia tubatheca, Muld. and Treb., "G. Nat." (2) VI. (1915), p. 54, pl. VIII. fig. 1.

Not *Sertularia tubitheca*, Allman, Mem. Mus. Comp. Zool. Havard, V., 1872, p. 24, pl. XVII., figs. 5—6.

Sertularia pusilla, Bale, Biol. Results "Endeavour," iii., V., p. 271, pl. XLVI., figs. 3—6.

This species was originally described by us as a variety of *S. minima*, when we stated it was our opinion it would eventually prove to be a distinct species. The examination of additional specimens confirmed our opinion, and in our next paper we treated it as a new species under the name of *S. tubatheca*, but inadvertently omitted to draw attention to the fact, save by the name.

However, the name we gave it so closely resembles that of Allmans species that it is advisable, in order to avoid confusion, that the new name given to it by Bale should be adopted.

In many of our specimens the nodes are indistinct or quite wanting, as mentioned by Bale. We omitted to mention this in the letterpress, but one of the figures (Plate IV., Fig. 1a) shows the absence of a node both above and below the pair of hydrothecæ.

Sertularella indivisa, Bale.

A specimen from Torquay growing on *Aglaophenia divaricata*, var. *Mc. Coyi*. The hydrorhiza of the *sertularella* runs up the back of the hydrocaulus of the *Aglaophenia*, sending out shoots all the way along.

Another specimen from the same locality is slightly branched.

Sertularella annulaventricosa, Muld & Treb.

Sertularella annulaventricosa, M. and T., "G. Nat." (2), VI., p. 54, pl. VII. and VIII.

S. undulata, Bale, Biol. Res. "Endeavour," iii., V., p. 284, pl. XLVI., fig. 1.

The form described by Bale in his recent paper as *S. undulata* is undoubtedly the same as that described by us a few weeks previously as *S. annulaventricosa*. Our paper was published while Bale's was in the printer's hands.

Hebella, sp.

(Plate X., figs. 4—4c.)

A fine specimen of Hebella from off Barren I. (20 fathoms). In the absence of gonothecæ, we refrain at present from identifying the species. The stolon creeps over the empty tubes of a gymnoblastic species and gives off single calycles irregularly. (The figures are accurately drawn to scale.) The margin of the calycles is everted, and in some instances duplicated.

(To be continued.)

EXPLANATION OF PLATES.

PLATE X.

Fig. 1. *Plumularia australis*, Kirch., axil, from distal part of hydrocaulus, x350.

„ 1a. The same, with sarcotheca removed to show mammiliform pore and web protecting same, x350.

„ 1b. *P. australis*, Kirch., axil, from proximal part of hydrocaulus, showing side view of sarcotheca, x350. (W = web.)

„ 2. *P. setaceoides*, Bale, axil, showing mammiliform pore (m), x350.

„ 3, 3a. *Aglaophenia mulderi*, Bartlett, x125.

„ 3b. *Aglaophenia mulderi*, Bartlett, peristome, x350.

„ 4—4c. *Hebella sp.* (?), x40.

„ 5. *Plumularia compressa*, Bale. Edge of hydrorhiza showing tubular sarcotheca, P = partition forming "transverse markings" on hydrorhiza, W = wall of hydrorhiza, F = thin chitinous flange adhering to seaweed, x350.

„ 5a. *P. compressa*, Bale, Tubular sarcotheca, showing batteries of nematocysts.

„ 6a. *P. filicaulis*, Poeppig, median sarcotheca, x350.

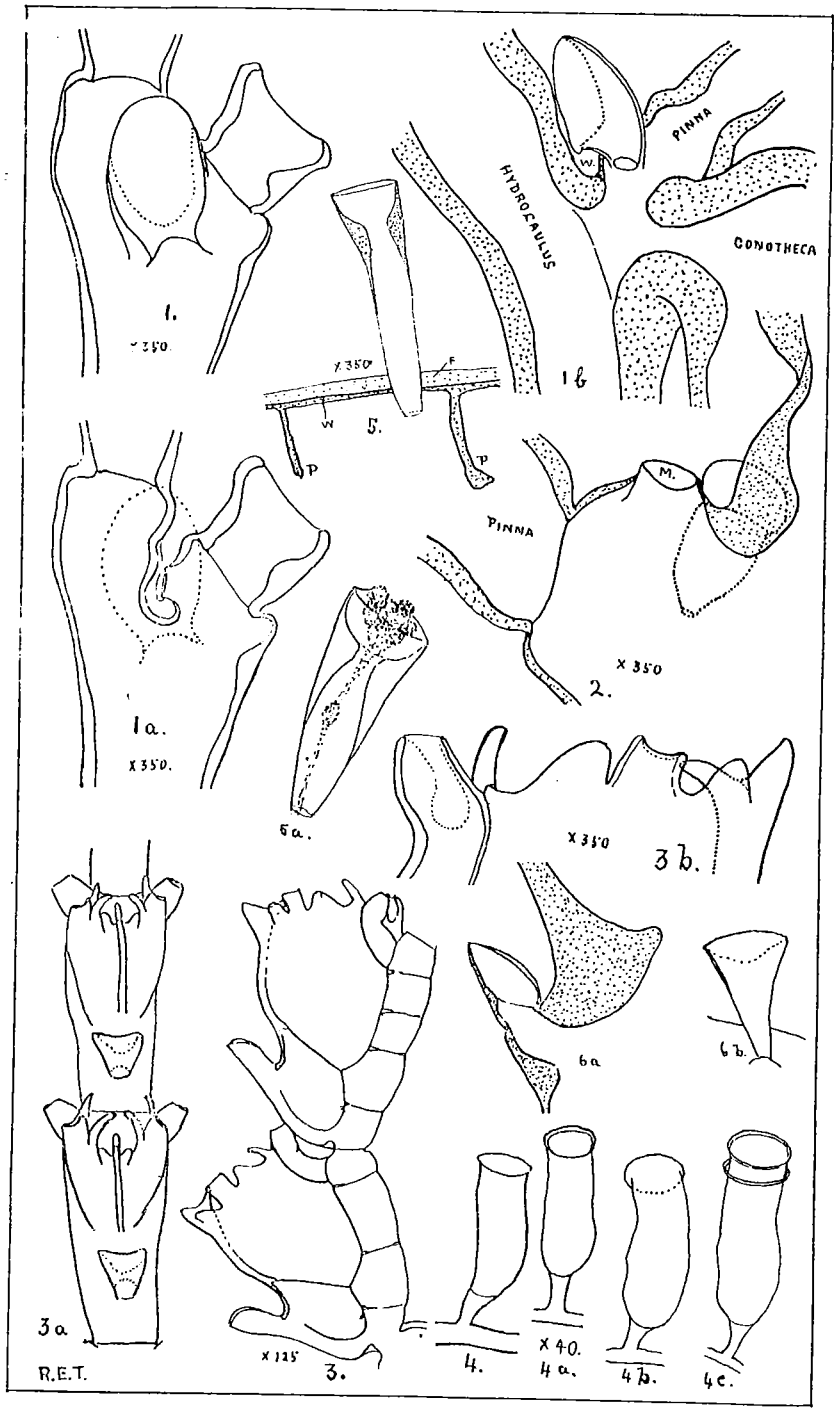
„ 6b. *P. filicaulis*, Poeppig, supracalycine sarcotheca, x350.

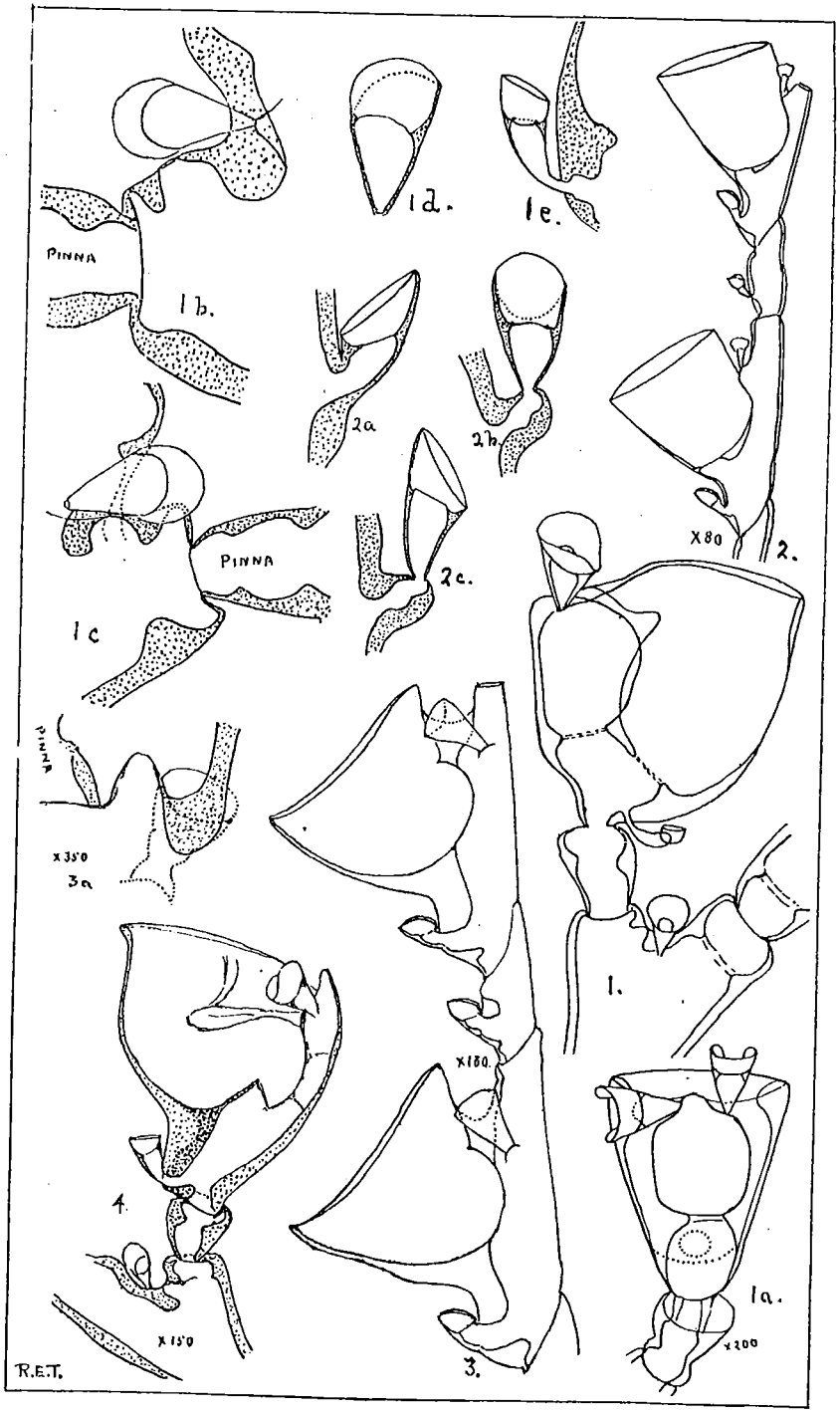
PLATE XI.

Fig. 1, 1a. *Plumularia obliqua*, Saunders, x200.

„ 1b. *Plumularia obliqua*, axil, from proximal part of hydrocaulus, x350.

„ 1c. *Plumularia obliqua,* axil, from distal part of hydrocaulus, x350.
„ 1d. *Plumularia obliqua,* supracalycine sarcotheca, x350.
„ 1e. *Plumularia obliqua,* median sarcotheca, x350.
„ 2. *Plumularia campanula,* var. *geelongensis,* var. nov., x80.
„ 2a. The same, median, sarcotheca, x350.
„ 2b. The same, supracalycine sarcotheca, x350.
„ 2c. The same, supracalycine sarcotheca, twisted to show side view, x350.
„ 3. *Plumularia filicaulis,* Poeppig, x150.
„ 3a. *Plumularia filicaulis,* axil, showing mammiliform pore, x350.
„ 4. *Plumularia spinulosa,* Bale, x150.




PINNA
1b.
1d.
1e.
2a
2b
X80
2.
PINNA
2c.
1c
PINNA
X350
3a
1.
X180
4.
1a.
X200
X150
R.E.T.
3.