VICTORIAN HYDROIDA.

With Description of New Species.

PART IV.

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(With Plates IV to VI).

SERTULARIA MINUTA, Bale.

(Plate IV, figs 4—4c.)

We have not seen it recorded that this species has two small external apertures in the hydrocaulus at the base of the chamber below each pair of hydrothecæ. To prevent repetition of description, we propose to refer to this chamber as the "infrathecal chamber." The opening is a small, circular hole from which a short, fragile, slightly expanding tube protrudes. We have not yet been able to determine the use of this aperture, but it resembles a rudimentary sarcotheca in appearance. These tubes are also found near the edges of the hydrorhiza.

The gonothecæ of this species vary somewhat in size and shape. Some are without the "shoulders" shown in Mr. Bale's figure (Cat. Aust. Hydr. Zooph.), some taper considerably towards the proximal end; most of them have a ring of small internal teeth, but these are sometimes absent. The sporosac contains a ring of tiny granules—slightly refractive.

A specimen from Point Lonsdale, with gonothecæ, has some shoots with as many as six pairs of hydrothecæ. None of the gonothecæ, however, are borne on these long shoots.

SERTULARIA MINIMA, Thompson.

This species, on account of its variability, has given considerable trouble, it being somewhat difficult to reconcile some of the forms as belonging to the same species, and it is only when numerous intermediate forms are found that one can realise the necessity of grouping all the varieties under one specific name. The gonothecæ also vary somewhat. Mr. Bale does not mention in his catalogue that they possess a ring of internal teeth. These are present in all our specimens.

In all of the varieties we have examined we have found the peculiar aperture and tube possessed by *S. minuta*. The aperture, however, is generally smaller, and the tube more often absent. When present, it is not expanding. The position of the tube varies somewhat. When the infrathecal chamber is roughly rectilinear, the tube springs from the lower angles. When, however, the chamber is tapering, the aperture is situated at the back, is usually difficult to detect, and the tube is more often absent.

Plate IV, fig. 3, shows the nearest we have to the typical form of the species. The gonothecæ (fig. 3a) are, however, somewhat larger than that figured in Mr. Bale's Catalogue, and resemble the gonothecæ of his var. *pumiloides*—(see his figure). The tubes are nearly always absent in this form, and the apertures small and difficult to detect. Sometimes they are missing altogether. When present, they are at the back of the infrathecal chamber.

Plate IV (figs. 2 and 2a) shows a close-set, robust variety, not unlike var. *pumiloides*, but with the calycles placed more closely together. The gonothecæ of this specimen are proportionately shorter and broader than those of the preceding variety. The hydrorhiza has transverse markings along edges, the infrathecal chamber being somewhat rectilinear, the apertures and tubes are placed at the angles.

A close-set specimen from Point Lonsdale has two gonothecæ of an unusual and very different form. One is large and pear-shaped, and the other has two shoulders

(Plate IV, figs. 5a and 5b). The hydrorhiza has transverse markings.

Another similar specimen has long, ovate gonothecæ (Fig. 6). In this specimen the hydrorhiza is a simple tube without any transverse markings.

Var. TUBATHECA, nov. var.
(Plate IV, figs. 1—1d.)

Hydrorhiza sometimes a simple tube, and sometimes flattened and with transverse markings along the edges. Hydrocaulus simple, attaining a height of about one-third of an inch; a pair of hydrothecæ to each internode. Hydrothecæ opposite, in contact in front, separated behind, long, tubular, curved outwards, free for about one-third of their length, aperture not contracted, margin with two long lateral teeth.

Gonothecæ—one borne near base of hydrocaulus, and springing from side of same immediately below proximal hydrotheca, large, about one and a half times as broad and four times as long as the length of a hydrotheca, ovate, aperture with a circle of internal teeth, operculate, margin slightly elevated.

Hab.—Queenscliff.

This variety also possesses the apertures and tubes above referred to. In some specimens the infrathecal chamber is somewhat rectangular, in which case the tubes spring from the corners, otherwise they are at the back. The tubes are also found on the hydrorhiza.

The hydrothecæ are usually curved evenly throughout their entire length, and the aperture lies at an angle of about 45 degrees with the stem. Sometimes, however, they are bent more abruptly outwards towards their distal part, and the aperture is then sometimes nearly parallel with the stem. (See fig. 1a.) This may be be the result of injury.

The hydrotheca-wall is produced downwards as in *S. complexa*, but only to a slight extent. This is so in nearly all the varieties.

The joints of the hydrocaulus are oblique, more so than in other varieties of this species we have examined. The distal end of each internode is pointed, while the proximal end is rounded and flattened.

One shoot has 24 pairs of hydrothecæ, and is produced into a stolon. At two-thirds of the way up, a long, branch-

ing stolon grows out of the mouth of a hydrotheca. This stolon also bears small tubes similar to those on the hydrorhiza.

The gonothecæ are sometimes broader in proportion to their length than that described. (See fig. 1d.)

We think this will eventually prove to be a distinct species.

SERTULARIA MUELLERI, Bale.

(Plate V, figs. 2—2e.)

Specimens from Corio Bay appear to belong to the same species as that described by Mr. Bale (Proc. Roy. Soc. Vic., XXVI [N.S.], p. 133).

Mr. Bale's specimens are from Encounter Bay. The habit of growth in the Corio Bay specimens is the same as in the type—densely clothing slender linear algae. Many of the shoots are slender, with distant hydrothecae, the upper part of the internodes being elongated.

The gonothecae in our specimens have higher shoulders than those shown in Mr. Bale's figures.

The tiny apertures referred to in *S. minima* are occasionally to be found, but they are difficult to detect and the tube is absent in all our specimens.

SERTULARIA OBLIQUANODA, n. sp.

(Plate V, figs. 1—1e.)

Hydrorhiza a network of simple anastomosing tubes. Hydrocaulus simple, unbranched, about half an inch in height, divided into internodes by very oblique joints, both the proximal and distal extremities of each internode being sharply pointed. Hydrothecæ in pairs, opposite, in contact with each other in front, separated behind, long, tubular, gradually contracting slightly towards the mouth, free for nearly half their length, upper part curved outwards, aperture vertical, margin membranous, with two very indistinct teeth.

Gonothecæ large, ovate or sub-globular, truncate at top, transversely rugose, aperture operculate, with elevated border and a double row of internal teeth.

Hab.—Torquay and Barwon Heads.

This species is not unlike *S. complexa,* S. F. Clarke. The conspicuously oblique joints, however, at once distinguish it from that species. Occasionally these

joints are duplicated (see fig.), and sometimes an occasional one or two of the nodes in a colony may be missing altogether. The distal end of each internode reaches almost to the base of the hydrothecæ on the internode above it.

The hydrothecæ are more closely set than in *S. complexa* as figured by Mr. Bale (Proc. Roy. Soc., N.S.W., Vol. III., Pl. 18). Occasionally an elongated specimen is found, but the elongation is caused by a greater length of that part of the internode above the hydrotheca, and not by the lengthening of the infrathecal chamber, so that the hydrothecæ are situated at the proximal part of the internodes. (See fig. 1c.)

As the distal end of a shoot is approached, the hydrothecæ often becomes less and less divergent. (See fig. 1b.)

The walls of the hydrothecæ are produced downwards into two points below the inner side of base, as in *S. complexa,* but only for a short distance.

The gonothecæ are fully twice as large as those of *S. complexa.* Most of them are more nearly sub-globular than ovate. In our specimens they are all borne on the lower part of the stem, just below the proximal pair of hydrothecæ.

SERTULARIA TENUIS, Bale.

A fine pinnate form from Corio Bay has stem robust instead of slender. The pinnæ spring at regular intervals on alternate sides of the stem, except in one case where two pinnæ occur in succession on the same side of the hydrocaulus. Between these two pinnæ there are four hydrothecæ, instead of three.

SERTULARIA MACROCARPA, Bale.

A specimen from Barwon Heads, is bi-pinnate, in that several of the pinnæ, normal in their proximal portions, are produced three times their normal length, and in their distal two-thirds are modified into hydrocladiæ, giving rise to secondary pinnæ.

The gonothecæ in this specimen are borne, not on the stem, as described by Mr. Bale, but on the normal pinnæ and secondary pinnæ.

Towards the end of the pinnæ many of the internodes are much elongated, and the pinnæ are often produced into long, straight, narrow tubes. Some of these terminate in a mouth similar to that of a hydrotheca some

bear a pair of slender, elongated hydrotheca, some terminate abruptly, and others give rise to a wavy stolon.

SERTULARIA UNGUICULATA, Busk.

A specimen from Ocean Grove, is bi-pinnate in the same manner as described in the species last above mentioned, but to a less extent.

SERTULARIA MARGINATA, Kirch.

Several specimens from Torquay and Bream Creek.

SERTULARIA ADCOCKI, Bartlett.

We think this is identical with *S. marginata,* Kirch. Unfortunately, neither Mr. Bartlett's description nor figure (G. Nat. Vol. III., p. 63), are accurate. The "small process" referred to by him is merely a thickening in the hydrothecal wall. The plate does not quite exactly correspond with the description, and in one respect is obviously incorrect, as it shows a front view of the hydrothecæ, but a back view of the nodes.

PLUMULARIA DELICATULA, Bale.

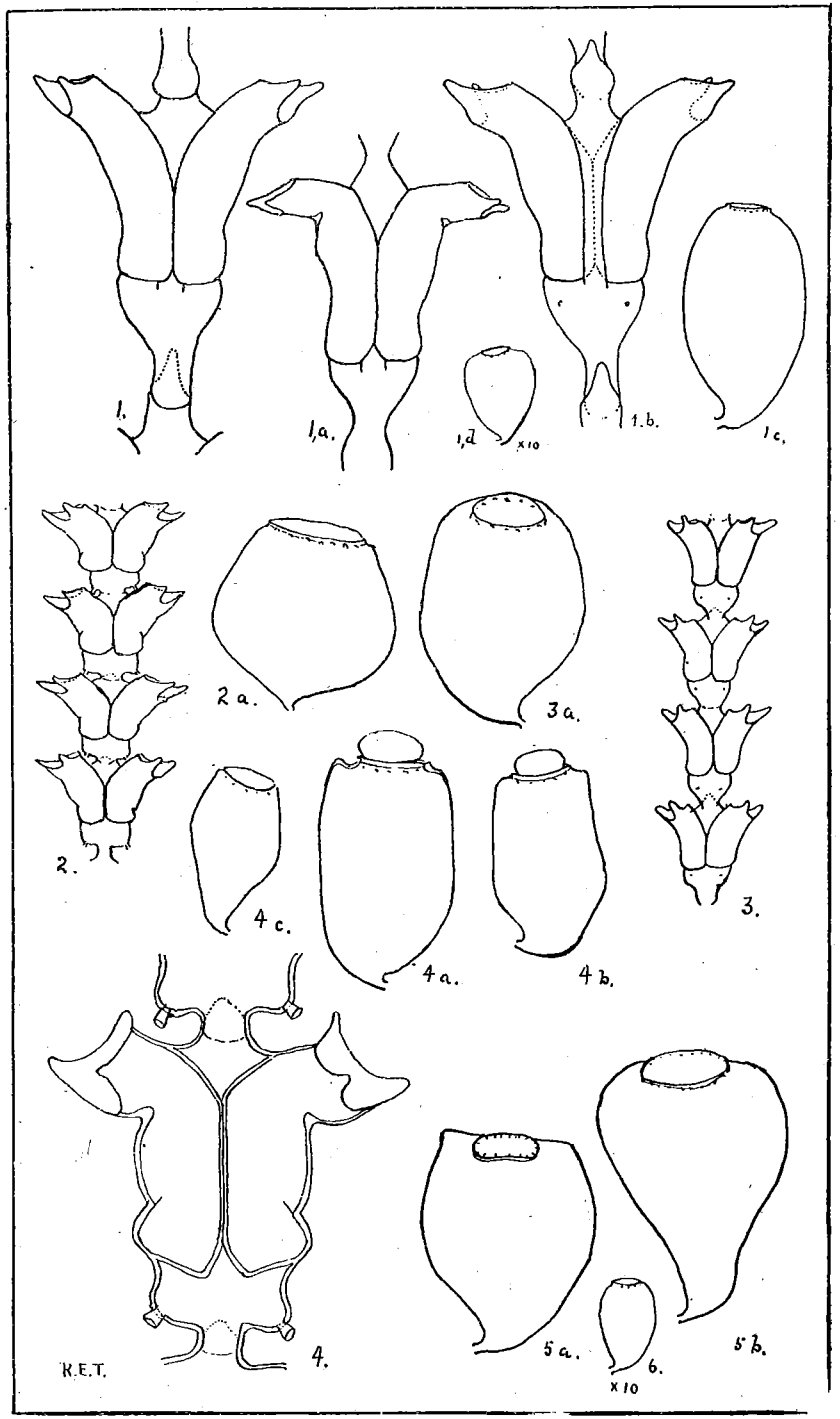
(Plate V, fig. 4.)

A specimen from Bream Creek shows a rather peculiar growth. The hydrocaulus is produced into a long tendril-like growth bearing a number of sarcothecæ. This tendril, which appears to have come into contact with a leaf of seaweed, has given rise to an ordinary hydrorhiza, from which springs a number of new stems. By some means, the first mentioned hydrocaulus has been broken away from the hydrorhiza, from which it grew, and from the broken end of the hydrocaulus a fresh growth has started, growing, of course, in the opposite direction to the original growth, and with hydrothecæ and sarcothecæ facing in the opposite direction from those on the original stem.

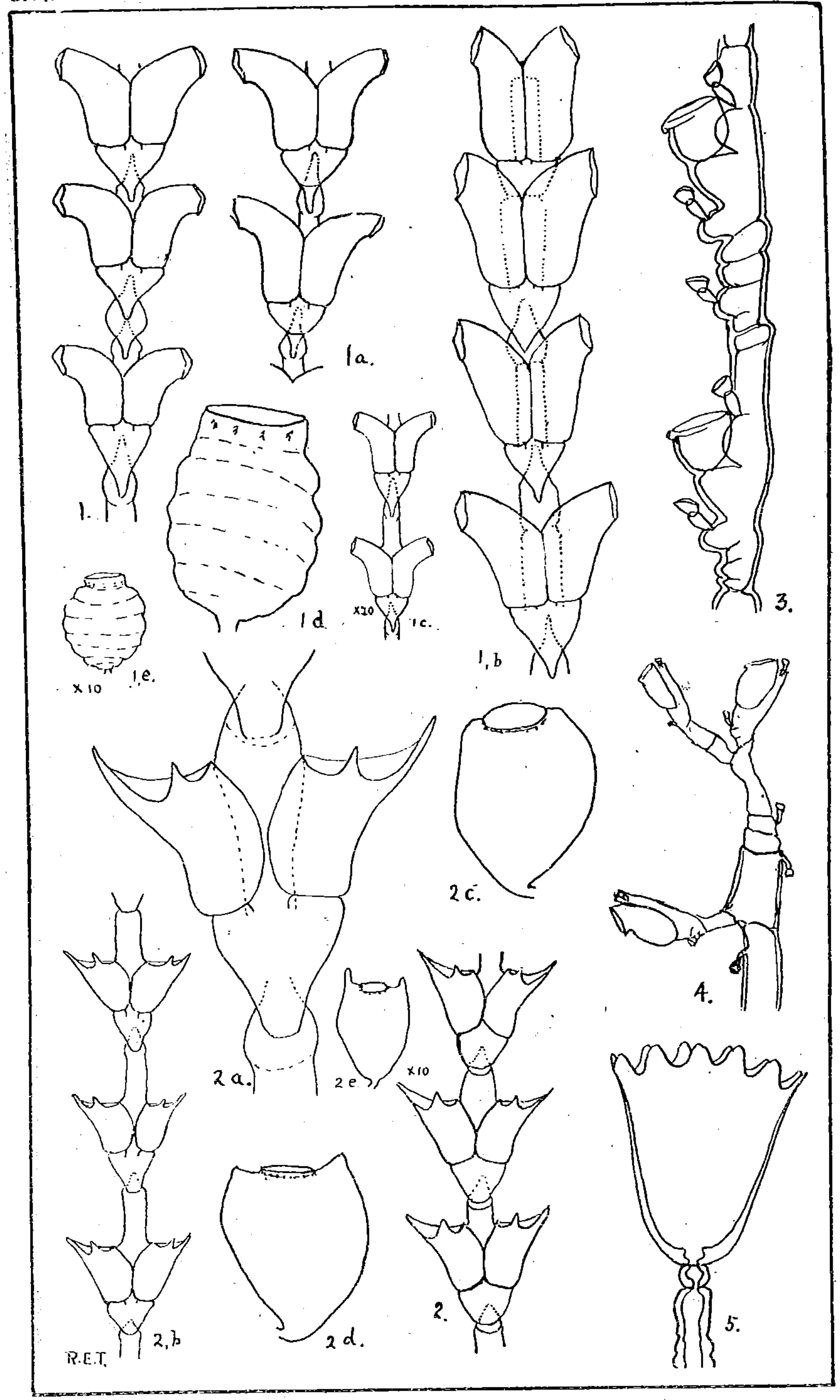
PLUMULARIA CORRUGATA, n. sp.

(Plate V, fig. 3).

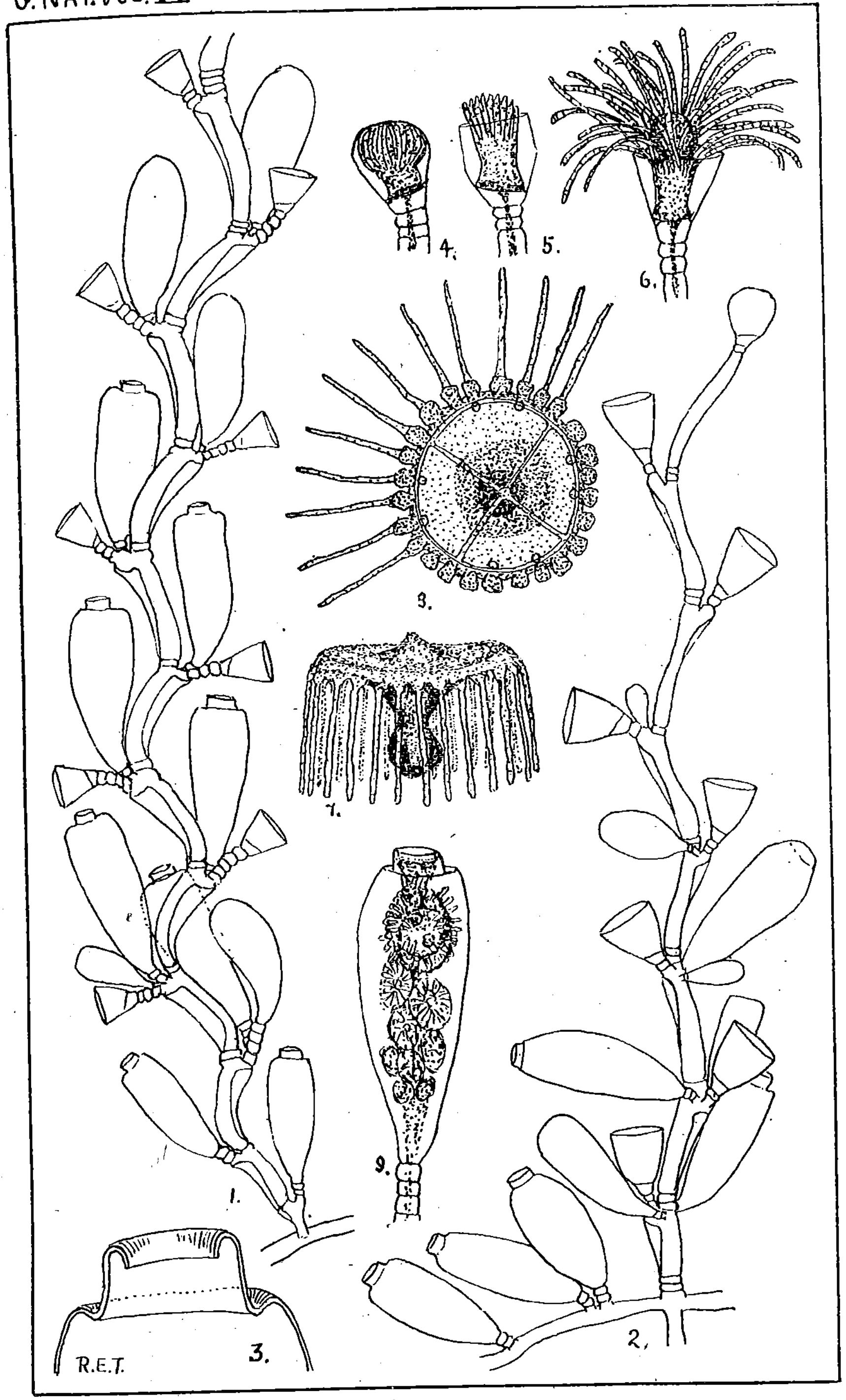
Hydrorhiza, with distant slight indentations along margins; hydrocaulus monosiphonic, unbranched, annulated, attaining a height of about a quarter of an inch; pinnæ one borne at about the middle of each stem internode,



G. Nat Vol. VI. VICTORIAN HYDROIDA. Plate V.



G. Nat. Vol. VI VICTORIAN HYDROIDA. Plate VI.



alternate, recurved, deeply annulated, divided into alternate long and short internodes, of which only the former bear hydrothecæ. Hydrothecæ, distant, each borne on a prominent projection of the pinna, cup-shaped, shallow, about as deep as wide, adnate for its whole length, margin entire, everted in front. Sarcothecæ, bithalmic, canaliculate, slender at base, terminal cup wide and shallow, one below each hydrotheca, and one on each side above it, one between every two hydrothecæ, on the intermediate internode, two in the axil at the base of each pinna, and one on the lower part of each stem internode.

Gonothecæ (?)

Colour.—Pale yellowish and transparent.

Hab.—Barwon Heads, Spring Creek, Torquay.

We referred to and figured this species in "Geelong Naturalist," Vol. IV, (in 1909) and again in 1911, as a variety of *P. setaceoides*, Bale. Since then we have examined a large number of specimens, and are now satisfied that this is a distinct species. The smallness of all its parts, the deep annulations of the stem and pinnæ, and the shallow, everted hydrothecæ at once distinguish it. There are also other differences, as a comparison of the description of the two species will show.

The sarcothecæ on the lower part of the stem internodes are easily broken off, and consequently are often missing.

Obelia geniculata, Linn.

(Plate VI).

We have been fortunate in collecting, on a piece of floating alga, a large number of colonies of this species in a living condition, and witnessed the liberation of the medusæ.

The colonies vary somewhat in appearance. None of them have stems so much thickened as that figured in Mr. Bale's catalogue. Most of them are only slightly zig-zagged, and the thickening of the stem not at all conspicuous. (See Fig. 2). All of our specimens are more or less annulated immediately above each joint of the stem, there being from two to four annulations. The annulations on the stalks of the hydrothecæ and gonothecæ, however, are fewer than in Mr. Bale's figure, the usual number in our specimens being only two or three.

Fig. 1 shows the most strongly annulated, thickened, and zig-zagged specimen we have.

In their immature stage, the hydrothecæ are pear-shaped, and without any external opening. Slightly older hydrothecæ are tubular in their distal portion (see Figs. 4 and 5).

The polyp has a globular shaped proboscis, connected with the body by a narrow neck, usually considerably narrower than shown in Fig. 6. It has about 26 filiform tentacles, not quite as stout as illustrated.

The gonothecæ are borne in the axil of the pedicels of the hydrothecæ, often two in each axil, one springing from each side. They are also borne on the hydrorhiza.

Occasionally they are borne in the place generally occupied by a hydrotheca, sometimes two of them in place of one bell. (See Fig. 1). Dr. C. McLean Fraser (Hydr. from Nova Scotia, Can. Geol. Surv., Vic. Memor. Mus., Bulletin No. 1), mentions a similar arrangement found in an abnormal specimen growing on a copepod parasitic on a sunfish.

In nearly all our specimens, the gonothecæ lie close to the stem, fitting neatly into the curves. In their young stages they are elongate, obovate, and have no sign of an opening or neck at the summit. When mature, the top of the gonotheca is depressed, and from the depression rises a neck, the mouth of which is strongly inverted. (See Fig. 3).

At the time of liberation, the medusæ are about one hundredth of an inch across. The umbrella is flat, discoid and colourless. From the margin hang about 26 filiform tentacles. The four radiating canals and the circular canal are plainly visible, as are also the eight lithocysts, one at the base of each of eight of the tentacles. We could find no trace of any "veil."

From the centre of the upper surface of the disc rises a conical projection, marking the place where the medusa was affixed to the medusastyle. The whole of the upper surface of the bell is closely covered with minute, wart-like projections, giving it a reticulated appearance.

The manubrium is a little shorter than the tentacles. Viewed from below, it is circular, but the mouth shows signs of dividing into four lobes.

CAMPANULARIA TINCTA, Hincks.

Form (f). (Plate V, fig. 5).

A specimen from Torquay, differs from all the others we have, in that the bell expands more and more as the mouth is approached, tending to be everted.

[TO BE CONTINUED].

EXPLANATION OF PLATES.

PLATE IV.

Fig. 1 and 1a. *Sertularia minima*, var. *tubathec a* n. var. x 80.
,, 1b. *Sertularia minima*, var. *tubatheca* (back view) x 80.
,, 1c. *Sertularia minima*, var. *tubatheca* (gonotheca) x 20.
,, 1d. *Sertularia minima*, var. *tubatheca* (gonotheca) x 10.
,, 2. *Sertularia minima*, close-set variety x 40.
,, 2a. ,, ,, ,, ,, (gonotheca) x 20.
,, 3. *Sertularia minima*, (typical form) x 40.
,, 3a. ,, ,, ,, ,, (gonotheca, x 20
,, 4. *Sertularia minuta*, Bale, x 120.
,, 4, a, b and c. *Sertularia minuta*, (gonotheca) x 20.
,, 5a and 5b. *Sertularia minima*, unusual shaped gonothecæ from close-set specimen, x 20.
,, 6. *Sertularia minima*, close-set variety, gonotheca, x 10.

PLATE V.

Fig. 1 and 1a. *Sertularia obliquanoda*, n. sp. x 40.
,, 1b. ,, ,, end of robust shoot, x 40.
,, 1c. *Sertularia obliquanoda*, elongated specimen x 20.
,, 1d. *Sertularia obliquanoda*, gonotheca, x 20.
,, 1e. ,, ,, ,, x 10.
,, 2. *Sertularia muelleri*, Bale, x 40.
,, 2a. ,, ,, ,, x 80.

,, 2b. *Sertularia muelleri*, Bale, slender shoot from same hydrorhiza, x 40.
,, 2c and 2d. *Sertularia muelleri*, Bale, gonothecæ, x 20.
,, 2e. *Sertularia muelleri*, Bale, gonotheca, x 10.
,, 3. *Plumularia corrugata*, n. sp., x 120.
,, 4. ,, *delicatula*, Bale, abnormal growth x 40.
,, 5. *Campanularia tincta*, form (f) x 40.

PLATE VI.

Obelia geniculata, Linn.

Fig. 1. Part of robust colony, with gonothecæ lying parallel to direction of stem, lower gonothecæ in place of hydrothecæ, x 40.
,, 2. Slender colony from same hydrorhiza; gonothecæ, at right angles to stem, at various stages of growth, x 40.
,, 3. Section (vertical) through top of mature gonotheca, x 120.
,, 4 and 5. Hydrothecæ, young stages, x 80.
,, 6. Hydrothecæ, with polyp expanded, x 80.
,, 7. Medusa, side view, x 120.
,, 8. ,, top view (slightly diagrammatic), with half of tentacles forced into same plane as disc, showing radial and circular canals and lithocysts, x 120.
,, 9. Gonotheca, showing medusae, two of them ready to be liberated, x 80.