II.—HYDROID ZOOPHYTES.

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(4 plates.)

The collection of Hydroid zoophytes made by the 'Discovery' Expedition proved to be remarkably rich and interesting. At the first inspection there seemed to be but few species, and these (with the exception of a few solitary forms of *Lampra*) were large, ramified and gorgonia-like in consistency; but a careful examination of these large colonies soon revealed other species of epizoic habits which rapidly increased in numbers as our investigations proceeded. In the end the number of distinct species was twenty-five, or about twice as many as we expected to find.

The large colonies of *Halecium arboreum* support *Perigonimus antarcticus*, *Stylactis halecii*, *Campanularia everta*, *C. laevis*, *Campanulina*, and *Halecium tenellum*.

Perigonimus antarcticus supports *Campanulina A.*, *Eudendrium insigne*, and *Lafoëina longitheca*. *Eudendrium insigne* was also found on a specimen of the Alcyonarian genus *Ceratoisis*. *Sertularella plectilis* and *Campanulina B.* are attached to a colony of *Campanularia verticillata*.

Of the twenty-five species only two—*Obelia geniculata* from the Auckland Islands, and *Dictyocladium fuscum* from Coulman Island—were found outside the limits of McMurdo Bay and the edge of the great ice barrier. In other words, twenty-three of the twenty-five species represent the hydroid zoophyte fauna of the most southerly limit of our knowledge of marine zoology. Two species—*Lampra microrhiza* and *Plumularia glacialis*—were found only at the east end of the barrier.

It seems probable that the part of McMurdo Bay from which these specimens came is covered with a continuous sheet of ice for the greater part of each year and in some years has no open water. There is good reason for believing that the great ice barrier is afloat, and consequently the few specimens obtained by the Expedition at the east end of the barrier may represent samples of a fauna that extends for some distance under the barrier towards the South Pole.

We may regard this collection of Hydroid zoophytes as the representatives of a sub-glacial fauna, and subject to the condition that larvæ or free swimming

gonophores, if they occurred, could never or very rarely reach the surface of the sea. It is, therefore, noteworthy in this connexion that, although there are eight families represented, not a single species exhibits free swimming medusiform gonophores. The only species in the whole collection with free swimming medusæ is *Obelia geniculata* from the Auckland Islands.

The question whether a particular specimen of zoophyte is or is not the type of a new species must be, to a certain extent, a matter of opinion, or perhaps of prejudice, of the systematic zoologist who describes the collection. The actual number of new species in this collection therefore is not a matter of great statistical importance. We regard, however, ten of the twenty-three sub-glacial species as certainly new to science, and five species as probably new. Four species have only been found elsewhere in Southern seas, one on the coast of California, and three are European. Of the three European species only one — *Halecium tenellum* — has hitherto been found in Southern seas.

The noteworthy features of the collection as a whole are: the large proportion of new species, the absence of any definite new generic type, and the occurrence of three species (excluding *Obelia geniculata*, which is well known to occur in Southern seas) that are common species on the British coast.

The most remarkable and interesting species is undoubtedly *Hydractinia dendritica*, a new species, which we have decided to study in greater detail. The question of the extent of degeneration of the gonophores of the sub-glacial species as compared with that of similar species living in open seas, is one that appears to us likely to furnish some interesting results if carefully pursued.

In conclusion we wish to express our sense of admiration and appreciation of the services rendered to science by Mr. Hodgson, the biologist of the Expedition, in collecting these Hydrozoa. The work of boring holes in the ice and of patiently dredging under the severe conditions of an Antarctic winter must have been of a nature that demanded extraordinary skill and enthusiasm in the cause of zoology.

The following is a complete list of the species we have described. They all come from McMurdo Bay, except those with specially named localities.

There is not sufficient material to make any definite statement as to bathymetric range, but it is noteworthy that several species were found in depths ranging from shallow water down to 130 fathoms.

GYMNOBLASTEA.

FAM. BOUGAINVILLIIDAE.

Perigonimus antarcticus, sp. n. 10-130 fathoms.
Eudendrium insigne, Hincks. 10–20 fathoms.
Stylactis halecii, sp. n. 20 fathoms.

FAM. PODOCORYNIDAE.

Hydractinia dendritica, sp. n. 5–10 fathoms.

FAM. TUBULARIIDAE.

Tubularia ralphii, Bale. 10–20 fathoms.
Tubularia hodgsoni, sp. n. 130 fathoms.
Tubularia longstaffii, sp. n. 124 fathoms.

FAM. CORYNIDAE.

Two undetermined species. 0–20 and 100 fathoms.

FAM. CORYMORPHIDAE.

Lampra parvula, sp. n. 10–20 fathoms.
Lampra microrhiza, sp. n. E. end of Barrier. 300 fathoms.

FAM. MYRIOTHELIDAE.

Myriothela (?).

CALYPTOBLASTEA.

FAM. SERTULARIIDAE.

Sertularella spiralis, sp. n. 130 fathoms.
Sertularella plectilis, sp. n. 0–130 fathoms.
Dictyocladium fuscum, sp. n. Coulman Island. 8–15 fathoms.

FAM. PLUMULARIIDAE.

Plumularia glacialis, sp. n. E. end of Barrier. 100 fathoms.

FAM. CAMPANULARIIDAE.

SUB-FAM. CAMPANULARIINAE.

Campanularia verticillata, Linnæus. New variety. 10–20 fathoms.
Campanularia everta, Clark. 0–20 fathoms.
Campanularia laevis, Hartlaub. 0–20 fathoms.

SUB-FAM. HALECIINAE.

Halecium arboreum, Allman. E. end of Barrier and McMurdo Bay. 0–130 fathoms.
Halecium tenellum, Hincks. 10–20 fathoms.

SUB-FAM. LAFOËINAE.

Lafoëina longitheca, Jäderholm. 0–20 fathoms.

FAM. EUCOPIDAE.

Obelia geniculata, Linnæus. Auckland Islands.
Campanulina (A). 0–20 fathoms.
Campanulina (B). 0–20 fathoms.

THE CLASSIFICATION ADOPTED.

One of the greatest difficulties that the systematic zoologist has to meet in writing an account of a collection of Hydrozoa is the determination of the system of classification that he will adopt. There are so many different opinions as to the relative systematic value of the characters presented by the hydrosome and gonosome respectively, and our knowledge of the extent of the modification of these characters by environmental conditions is so imperfect that every system of classification that

has been proposed must present to those who are working upon new materials or on new lines of research many inconsistencies and inconveniences.

The best classification is, after all, the one that is most convenient for the particular class of investigation that the author is engaged upon, and consequently those who approach the Hydrozoa from one side will be inclined to adopt a classification which to authors who approach it from another seems erroneous or unsatisfactory.

It is clearly not to the advantage of Science that the classification of a group of animals should constantly change, and it is better to adopt one which may in some respects seem unsatisfactory than to propose alterations upon any grounds other than those of wide and far-reaching new investigation.

Allman and Hincks, the two great pioneers of the zoology of Hydrozoa, distributed the genera amongst a large number of families; in fact, according to their system a great many genera stand alone, or almost alone, in a family.

The tendency of recent systematists has been to rearrange the genera in such a manner as to reduce the number of families, and this tendency appears to us to be not only more convenient but to be founded on a sound scientific basis.

The system we have used is that adopted by one of us in his essay on the Coelenterata in the Cambridge Natural History, Vol. I.; a system which, like any other, is open to many criticisms in detail, but has been found on the whole to suit our purpose as well as any other.

FAMILY BOUGAINVILLIIDAE.

This family includes, according to our system, the sub-families *Bougainvilliinae* (*Bougainvilliidae*, Gegenbaur), *Margelinae* (*Margelidae*, Hæckel), *Dicorynae* (*Dicorynidae*, Allman), *Eudendriinae* (*Eudendriidae*, Hincks), and the *Bimeriinae* (*Bimeriidae*, Allman).

The hydranths in this family have a single circle of filiform tentacles, and the base of the hydranths is protected by a tube of perisarc.

The inclusion of *Stylactis* in the sub-family *Bimeriinae* is perhaps the most unsatisfactory feature in this arrangement, but as we have found in some cases a short collar-like tube of perisarc at the base of the hydranths (fig. 33, e. p.), which has not been observed, so far, in any species of the family—the *Podocorynidae*—to which in other respects *Stylactis* has many affinities, we have retained it in this family.

SUB-FAMILY BOUGAINVILLIINAE.

PERIGONIMUS ANTARCTICUS.

(Plate I., figs. 1, 2, 3; and Plate IV., fig. 32.)

Perigonimus sp., Hartlaub, Voy. du Belgica, Hydroiden, (1904).

Locality.—Common in McMurdo Bay at depths of 0–130 fms.

The species was found in no less than eleven of the bottles sent to us, and is usually

attached to the stems of *Halecium arboreum*. The character of the bottom on which its support grows is described as stony, gravelly, or very rough ground (Flagon Pt.).

The species differs from most of the species of *Perigonimus* in having fixed gonophores.

On this account it might be placed by some authorities in Allman's genus *Wrightia*, but for reasons that have recently been urged by Motz-Kossowska (**17** : pp. 68–71) we are of opinion that *Wrightia* should be merged with *Perigonimus*. In this particular case the reasons for disregarding the genus *Wrightia* seem to be particularly strong. The size of the colonies and of the individual zooids being much greater than in the only known species of *Wrightia*, the specimens would, in the absence of the gonophores, be undoubtedly referred to the genus *Perigonimus*. If *Perigonimus* shares the power or possibility that some other genera of gymnoblastic hydroids undoubtedly possess of variation in the character of the liberation of the gonophores, being in some cases phanerocodonic and in others adelocodonic, we should at least expect that the adelocodonic variation or condition would occur in specimens living in an arm of the sea such as McMurdo Bay, that is for so many months in the year covered with ice.

Hydrosome.—From the ramifying hydrorhiza attached to the *Halecium* several unbranched or occasionally slightly branched hydrocauli arise (fig. 1). They attain to a height of about 8 mm. Many of the hydrocauli appear to be simply unattached branches of the hydrorhiza, and even the pedicels of the gonophores occasionally give off branches of indefinite function and power of growth.

The transition from hydrocaulus to hydranth is gradual, the length of each hydranth being about 1 mm. The hypostome is conical and is surrounded at its base by a circlet of about 10 filiform tentacles each about 0·6 mm. in length. The perisarc is continued as an exceedingly thin film over the hydranth as far as the base of the tentacles. The hydranths vary considerably in shape (fig. 3) and are probably very contractile.

Gonosome.—The gonophores are situated on short pedicels which, in the case of the female, are thickened distally. The colonies appear to be invariably dioecious. In both sexes the gonophore is a degenerate medusa. In both sexes the gonophore is protected by a thin layer of perisarc. It is larger in the female than in the male (1·1 mm. × 0·9 mm. in the female, and 0·9 mm. × 0·7 mm. in the male).

In the female gonophore there is a large sub-umbrella cavity (fig. 3, *su.c.*), the manubrium is well developed and has a well-marked endoderm cavity.

In the young gonophore there is a distinct endodermal layer of cells and mesogloea in the umbrella, but in the adult gonophore (fig. 32) these are reduced to a non-cellular mesogloea except at the margin, where a cord of cells represents the ring canal. There are no radial canals in the adult gonophore.

In the male gonophore the sub-umbrella cavity is completely filled with sperm cells (figs. 2 and 32, sp.).

It is possible that this species of *Perigonimus* is identical with the one obtained by the 'Belgica' in 71° 15′ S. and 87° 39′ W. (**8**: pp. 8–9; Pl. I., fig. 2); but Dr. Hartlaub had not the good fortune to be able to examine and report upon the gonophores.

The hydrosome has also some resemblance to that of the British species *P. coccineus* (Wright, see Hincks, **11**: pp. 97–98) of which the gonophores are not known.

Of the better known British species it has some affinities with *P. serpens* (Allman, **2**: pp. 327–328; Pl. XI., figs. 7–9), but differs from it in the more slender hydrocauli and the more distinct difference between hydrocaulus and hydranth and in the adelocodonic gonophores.

Sars (**21**: pp. 28–32; Pl. II., figs. 37–43) has described a species from 20–30 fathoms off Manger, Norway, which he named *Rhizoragium roseum*. This species appears to us to be so closely related to *Perigonimus antarcticus* that it might with some propriety be placed in the same species. The reason for separating *Rhizoragium roseum* from the genus *Perigonimus* was undoubtedly the adelocodonic medusoid character of the gonophores, but in the character of the hydrosome it is undoubtedly a *Perigonimus*.

Sars describes the "medusa-buds" as uncommonly large (up to 1 mm. in diam.) in proportion to the hydranths, the claviform naked part of which is only 0·3 – 0·5 mm. in diameter. They are not attached to the naked part, but are situated on the creeping hydrorhiza as in *P. muscoides*. The degeneration of the gonophores consists in a reduction of the umbrella-wall and the loss of the radial canals and umbrella-mouth. In the oldest gonophores, however, the margin of the umbrella was thickened, and judging from the figure, it bore rudimentary tentacular processes.

P. antarcticus resembles *Rhizoragium roseum* in many of these characters and also in the shapes and general characters of the hydranths and the number of their tentacles, but differs from it in the slightly branching habit of the hydrocauli and in having some of the gonophores arising near the proximal ends of the hydrocauli instead of only from the hydrorhiza. The gonophores of *P. antarcticus* are protected by a chitinous perisarc, but this is very thin, and may have been overlooked by Sars in his species. We have not found in our species any processes on the gonophores corresponding with the tentacular processes figured by Sars. However, in *Rhizoragium* the tentacular processes only occur in gonophores old enough to contain planulae larvae. In our species, on the other hand, the more mature gonophores exhibit a less well developed marginal thickening and in other respects the umbrella-wall is more degenerate than in the younger stages, and it therefore seems to us improbable that the tentacular processes would be present in stages old enough to contain larvae.

Our conclusion is, therefore, that it is more convenient to regard *Rhizoragium roseum*—which should in our opinion be called *Perigonimus roseus*—and *Perigonimus antarcticus* as distinct species.

SUB-FAMILY EUDENDRIINAE.

EUDENDRIUM INSIGNE.

(Plate I., fig. 4.)

Eudendrium insigne, Hincks, British Hydroid Zoophytes (1868), pp. 86–87.

Localities.—McMurdo Bay, February 20th and 28th, 1902; March 21st, 1903; 10–20 fathoms.

This delicate little hydroid, consisting of small irregularly branched colonies, was found attached to other Coelenterata, such as *Ceratoisis* and *Campanularia*. It did not occur in great abundance, but a few colonies were found in several bottles of specimens obtained in McMurdo Bay.

Hydrosome.—The hydrorhiza consists of a plexus of branching roots loosely attached to its support. At frequent intervals it gives off hydrocauli, which are themselves branched. These stems are very slender, strictly monosiphonic, seldom upright, but growing in a straggling tangle like the stems of a climbing plant searching for a new support. The hydrorhiza and the free hydrocauli are invested by a thin straw-coloured perisarc, which is slightly annulated at the base of and at intervals on the hydrocauli.

There is considerable difficulty in distinguishing between hydrorhiza and the stem, and many of the stems that are now free may possibly have been at one time attached to the support. This difficulty renders the estimation of the height of the colony a matter of conjecture, but it is about 25 mm.

The perisarc frequently ends very abruptly at the base of the hydranths, but in some cases it seems to attenuate gradually.

The hydranths are 0·5 mm. in height and have the usual characters of the genus. There are about twenty filiform tentacles 0·5 mm. in length, arranged in a single verticel at the base of a trumpet-shaped hypostome (fig. 4).

At the base of the hydranth there is a circular groove bounded proximally by a collar of very conspicuous deeply-staining cells (fig. 4, *c.*). Occasionally both collar and groove are apparently absent.

Hincks does not give a clear figure of this groove or collar in the British specimens, but states (p. 87) that "there is a circular groove near the base of the body, from which the gonophores spring—a portion of the structure which I misinterpreted at first, and which led me to suppose that there was a shallow cup round the base of the polypite." From this quotation it would appear that in Hincks' specimens, as in the Antarctic forms, the lower margin of the groove was sometimes slightly swollen out to form a collar. In general form and size the Antarctic specimens resemble the European specimens, but they differ from them in the respect that the perisarc is less "closely ringed throughout."

Although *Eudendrium insigne* appears to be widely distributed in the seas of the Northern hemisphere, it is not included in Hartlaub's list (**10**: pp. 505–509) of Southern species.

SUB-FAMILY BIMERIINAE.

GENUS STYLACTIS.

The generic name *Stylactis* was introduced by Allman for two species referred to the genus *Podocoryne* by Sars (*P. fucicola*, and a variety of *P. carnea*). The principal characters that distinguish the genus from Podocoryne are—(1) The absence of any superficial coenosarc covering the hydrorhizal plexus; and (2) the gonophores in the form of sporosacs instead of free swimming medusæ. From *Hydractinia* the genus is distinguished by the first of these characters, but it agrees with it in the second character.

Allman placed the genus in his family Bimeriidae, and thus removed it from the neighbourhood of the other two genera.

The opinion of later writers appears to favour the view that *Stylactis* is more closely related to *Hydractinia* and *Podocoryne* than Allman's classification suggests.

Bonnevie (**5**: p. 485) unites *Hydractinia* and *Podocoryne* into one genus, *Hydractinia*, and Motz-Kossowska (**17**: pp. 81–85) includes in the same genus the two species that formed the genus *Stylactis* of Allman, and has added a new species *H. pruvoti* from the Balearic Islands, which is intermediate in characters between the species attributed by older authors to the genera *Stylactis* and *Podocoryne* respectively.

We are quite convinced of the general affinities of the three genera, which are indeed emphasised by this collection from the Antarctic Sea in so far as we have a species of *Stylactis* with dactylozooids of a simple kind, and a species of *Hydractinia* without dactylozooids, the usual condition being that *Stylactis* has dactylozooids and *Hydractinia* has not. At the same time, the hydrorhiza of our two forms is so distinct and the minute characters of the gonophores so different that we have thought it better to retain the generic name *Stylactis* and keep it in the family Bougainvilliidae for the present.

STYLACTIS HALECII.

(Plate I., figs. 5, 6; and Plate IV., fig. 33).

Locality:—McMurdo Bay; February 28th, 1902. Found at depths of less than 20 fathoms.

A considerable quantity of this interesting species was found encrusting the thicker stems of *Halecium arboreum*. It arrived in a fairly good state of preservation notwithstanding that the bottle containing it was broken in transit.

Hydrosome.—The hydranths arise directly from an encrusting hydrorhiza

consisting of a dense mass of branching and anastomosing tubes (fig. 6). Each tube is covered with its own very thin sheath of perisarc (fig. 33) and there is no common sheath of coenosarc covering the hydrorhiza as a whole, such as we find in the Podocorynidae. In the central parts of the hydrorhiza the tubes are closely packed, anastomose freely, and are disposed in several layers. At the periphery however the tubes are reduced to a single layer, become more dispersed, and anastomose slightly (fig. 3). There are three kinds of zooids.

In the central part of the colony there are gastrozooids and blastostyles (gonozooids) (fig. 6); at the periphery, gastrozooids and dactylozooids (fig. 5). The gastrozooids (figs. 5 and 6, *gz.*) are 1-2 mm. in height. They exhibit a conical hypostome surrounded by a circlet of six to ten simple tentacles each about 0·5 mm. in length.

The dactylozooids (fig. 5, *d.*) are short finger-like structures 0·25 mm. long by 0·06 in diameter, terminating in a pad distally which bears a battery of nematocysts. The dactylozooids appear to be covered with a chitinous perisarc, but in sections it is seen to be extremely thin or absent at the distal extremity. We have some specimens with the nematocysts discharged, and there can be little doubt therefore that the battery is functional. These dactylozooids have no tentacles. The blastostyles are shorter than the gastrozooids, and usually exhibit neither mouth nor tentacles (fig. 6, *bl.*). There is always a short conical hypostome armed with nematocysts, and occasionally this is surrounded by a circle of four rudimentary tentacles (fig. 6, *bl. t.*).

The body of the blastostyle is usually considerably dilated and has a superficial resemblance to a simple ovoid sporosac.

Gonosome.—The medusoid structure of the gonosome is completely reduced in the male, but as no female blastostyles were found we can make no statement to the effect that the same is true of both sexes. The sperm cells (fig. 33, *sp.*) are found in a dense cluster between the ectoderm and endoderm even in the youngest blastostyles we have examined (0·1 mm. in length), and neither in these nor in the older blastostyles can we find any true medusoid structures.

FAMILY PODOCORYNIDAE.

In this family we include *Podocoryne* (Sars), *Hydractinia* (Allman), and other less well-known allied genera. The very interesting new genus *Hydrodendrium* (Nutting) may, we consider, be now included in this family, as the species *Hydractinia dendritica* connects it with the other species of *Hydractinia.*

HYDRACTINIA DENDRITICA.

(Plate II., figs. 7, 8, 9, 9a, 10.)

Localities.—Specimen A: W.Q., March 21st, 1902; −10 fms. Specimen B: Locality unrecorded. Label lost.

It is necessary in the description of this very remarkable hydroid to refer constantly to the special characters of the two specimens we received. We shall therefore call them specimen A and specimen B respectively.

Specimen A consists of a single continuous colony encrusting the stems of a specimen of *Halecium arboreum*. From this encrusting mass, which possesses all the general features of an ordinary *Hydractinia*, a single upright branching stem arises, which has some resemblance to the stems of *Hydrodendrium gorgonoides* (Nutting **20**: pp. 936–938; Pl. I., figs. 1–6; Pl. VII., figs. 1–2).

Specimen B consists of a large number of brittle and broken stems bearing Hydractinian hydranths, but without any encrusting base or hydrorhiza. It seems probable that all these broken stems belong to one colony, and we are convinced that specimen B belongs to the same species as specimen A.

Specimen A.—There are two regions in this specimen, the encrusting or basal region, and the upright branching stem, the rhizocaulus. The basal part (fig. 9, *enc. r.*, fig. 9a) entirely surrounds the polysiphonic stems of *Halecium arboreum*, only a few pinnules of the supporting hydroid penetrating it and being exposed. It is about 0·4 mm. thick, the outer part to a depth of about 0·2 mm. from the surface containing coenosarc, the lower part consisting of a lacunar skeleton with strands of tissue in some of the lacunæ, whilst others may be empty. The "spines" of other species of *Hydractinia* and of *Podocoryne* are represented in this species by a series of low ridges (fig. 7, *r. sp.*), often continuous with each other, but projecting irregularly on the surface of the colony. They have some resemblance to the hydrophores of *Ceratella* (Spencer **21**), but seem to have no definite relation to the zooids. There are only two kinds of zooids, the gastrozooids and the blastostyles (gonozooids).

The gastrozooids (fig. 7, *gz.*) vary a good deal in length. The usual length is about 2 mm., but they are in some cases as much as 4 mm. in length. There is a conical hypostome surrounded by a single circlet of from 9 to 13 tentacles, each about 0·6 mm. in length. It is evident that the gastrozooids are extremely contractile, and it is noteworthy that in some cases they have been killed introverted, the circlet of tentacles having assumed a position at the base.

The blastostyles (fig. 7, *bl.*) are from 0·3–0·7 mm. in height. They are small and degenerate. They usually exhibit a few small tentacles 0·05 mm. in length, but in some cases no tentacles at all could be seen. They may have a minute mouth, but usually have not. The gonophores (fig. 7, *gph.*) are all probably female and in the form of sporosacs. They occur in a single circlet round the base of the blastostyle.

The upright branching stem of this specimen rises to a height of about 40 mm., and is about 0·8 mm. in diameter at the base (fig. 9, *fr. rhc.*). The ramification is irregular, the eight or nine terminal branches ending in some cases in a long filamentous process. The surface of these branches is remarkably smooth. The

gastrozooids and blastostyles at the base of the stem are very similar to those of the basal encrusting part of the colony, but distally the gastrozooids are smaller and apparently less contractile, and blastostyles are absent.

Specimen B.—Assuming that the pieces in the bottle containing this specimen all belong to one colony, we have estimated that the height of the colony must have been at least 150 mm. There is no encrusting basal support as in specimen A, and the axes of the branches do not show any foreign hydroid or other kind of core. The branches arise irregularly and anastomose freely (fig. 10). They are circular in section, remarkably smooth on the surface, and their maximum diameter is about 3 mm. They are therefore much longer and thicker than the upright branching stem of specimen A, and we may add presumably older. Although there is no true basal part similar to that of specimen A, the encrusting habit is seen in places where sponge spicules and other foreign bodies have been overgrown by the colony.

The skeleton is composed of a series of parallel intercommunicating chitinous tubes, the superficial tubes being externally incomplete, but there are no definite ridges or spines on the surface as in the basal part of specimen A.

On the larger branches there appear to be no zooids at all. At the distal ends there are numerous small immature zooids which may become either gastrozooids or blastostyles, as well as a considerable number of gastrozooids. These gastrozooids (fig. 8, *gz.*) are about 1·5 mm. in height, and therefore slightly smaller than the majority of the gastrozooids of the basal part of specimen A. The mouth is on a conical hypostome which is surrounded by a series of filiform tentacles, 6–10 in number, and each one about 0·6 mm. in length. Proximally to the region where the immature zooids and gastrozooids occur there is a region with numerous ripe blastostyles (fig. 8, *bl.*), and only a few gastrozooids. These blastostyles vary from 0·3 to 0·7 mm. in height, but the majority are larger than those of A. They have 4–8 tentacles 0·1–0·2 mm. in length, and have in some cases a minute mouth. The blastostyles each bear from 1–5 sporosacs (fig. 7, *gph.*) which in our specimens were all male, and when ripe about 0·3 mm. in diameter. The sporosacs are borne *just above* the base of the blastostyle. The branch shown in fig. 7 is somewhat intermediate in character between the region of gastrozooids alone and the typical region of blastostyles.

In comparing the two specimens we notice certain differences between the basal part of specimen A and specimen B which might be regarded by some authors to be of sufficient importance to necessitate their separation into distinct species. Thus, the surface of B is smooth, of the basal part of A ridged; the gastrozooids are smaller in B than in A; the blastostyles of B are on an average larger than in A, and have a larger number of longer tentacles; the sporosacs of B are larger and less numerous than those of A, and are situated *above* the base, and not at the base, as in A. Moreover in B the skeleton has the form of a series of parallel but communicating tubes, whereas in A it has the same irregular lacunar arrangement that is found in *H. echinata* and other species.

The fortunate preservation of a small and probably young branching stem of specimen A, with gastrozooids at its proximal end similar to those of the basal parts and at its distal end similar to those of specimen B ; with a smooth surface similar to that of specimen B, and ramifying and growing without any axial support as specimen B does, may be regarded as conclusive evidence that the specimens belong to the same species.

The species resembles *Hydractinia* in having sessile hydranths, a thick membranous hydrorhiza covered with a continuous sheath of ectoderm and provided with a lacunar chitinous skeleton, and in having adelocodonic gonophores.

On the other hand, it differs from many of the species of *Hydractinia* in forming large unsupported rhizocauline branching stems, and in the absence of dactylozooids.

A species that has close affinities with *H. dendritica* is *H. angusta*, from 71° S. and 87° W. 400 metres (Hartlaub **9**: pp. 7–8 ; Pl. IV., figs. 1–6). It forms branching (?) cylindrical rhizocauline stems. It has also tentaculate blastostyles and no dactylozooids. But it has thorny processes on the surface, which in our species are confined to the basal part; the gastrozooids of our species are quite twice as large and the tentacles are more numerous than in *Hydractinia angusta*.

It differs from *Hydrodendrium gorgonoides* (Nutting **20**: pp. 936–938; Pl. I., figs. 1–6 ; Pl. VII., figs. 1–2) from Hawaii, in having definite blastostyles, in the presence of a large hypostome on the gastrozooid, in the colonies being unisexual, and in other characters. It resembles *Hydrodendrium* in the occurrence of branching brittle rhizocauline stems, in the absence of spines on the surface, and in the absence of dactylozooids.

Hydractinia angusta and *Hydractinia dendritica* form two interesting links in a chain connecting the ordinary species of *Hydractinia* with *Hydrodendrium*. It may be noted here that in addition to the species of *Hydractinia* mentioned above that have no dactylozooids, *Hydractinia parvispina* (Hartlaub), *H. carnea*, var. *inermis*, *H. humilis*, and *H. provuti* (Koss.) are said to have no dactylozooids ; and in other species described by Bonnevie (**6**), Hincks (**11**), and Allman (**2**) no mention is made of these peculiar zooids. The presence of dactylozooids cannot therefore be regarded as a character of the genus.

FAMILY TUBULARIIDAE.

GENUS TUBULARIA (Linn. emend. Allman).

We have found in the collection what appear to be three distinct species of *Tubularia*, but of these, one is represented by a single hydranth, and one by two hydranths. The third species agrees fairly well with the description given in Bale's Australian Zoophytes of a species described in MS. by Halley from Hobson's Bay.

Tubularia ralphi.

(Plate II., fig. 12.)

Tubularia ralphii, W. M. Bale, Cat. Austr. Hydroid Zoophytes Austr. Mus. (1884), p. 42.

Localities.—W.Q., February 28th, 1902; −20 fms. Hut Point, October 18th and November 13th, 1902. Flagon Point, January 17th, 1902; 10–20 fms.

This species is represented in the collection by a group of dead perisarcal tubes and a single hydranth which is not well preserved, as well as by a few immature specimens.

Hydrosome.—The height of the colony is from 60–120 mm. In the W.Q. specimen, five long and slender hydrocauli arise from a contorted hydrorhizal plexus. Each hydrocaulus is unbranched, and considerably narrower at the base than at the distal extremity, where its diameter is about 0·8 mm. The perisarc covering the hydrocaulus is smooth and conspicuous, but becomes very thin and transparent at the base of the hydranth. The hydranth is flask-shaped, and has a dense tuft of distal tentacles and a circlet of about twenty or more proximal tentacles each about 5 mm. in length.

Gonosome.—The blastostyles arise immediately above the proximal row of tentacles. Owing to the condition of the specimen, their number could not be accurately determined.

The ripe gonophores (females only were observed) are somewhat pear-shaped, and provided distally with four rudimentary tentacles. The walls of the umbrella are very thin, but the sub-umbrella cavity is large, and usually contains more than one, but not more than three actinulæ. No trace of tentacles could be observed on these larvæ.

The blastostyles are very short, and the gonophores are borne upon them in dense clusters, so that it is probable that in life they were not pendulous. The blastostyles are about 2 mm. in length, and each ripe female gonophore about 1 mm. in length. The male gonophores of another specimen were not mature.

The only printed description (**4**: p. 42) of the type of this species which was found in shallow water in Hobson's Bay, Victoria, is so short that it is impossible to be certain that our identification of these Antarctic Tubularias is correct, but, except in the fact that our specimens are rather larger than the type in several measurements, there is no good reason for separating them from it.

Tubularia hodgsoni.

(Plate II., fig. 13, and Plate IV., fig. 34.)

Locality.—W.Q., January 1st, 1902; No. 6 hole; 130 fms. No. 11 hole, April 25th, 1903.

Unfortunately, only two zooids of this remarkably interesting species were found.

Hydrosome.—The hydrocaulus springs from a hydrorhiza composed of thin branches ramifying in a sponge. The hydrocaulus is unbranched, and rises to a height of about 40 mm. It is of almost uniform diameter throughout.

The perisarc is thin, membranous, and ends rather abruptly a little below the hydranth, which is marked off from the hydrocaulus by a slight constriction. The height of the cylindrical hydranth is about 5 mm. There is a dense tuft of about 60 tentacles round the mouth. The proximal circlet is composed of about 25 tentacles, 7 mm. in length.

Gonosome.—There are about nine bunches of closely packed spherical gonophores attached in the usual manner to the inner or distal side of the proximal circlet of tentacles. From the position they occupy in the spirit specimen lying close alongside the wall of the hydranth, it seems probable that in life the hydranth was pendulous. The blastostyles are about 5 mm. in length and the gonophores are 0·9 mm. in diameter. The structure of the gonophores is extremely interesting. The umbrella wall consists (fig. 34) of an outer layer of simple ectoderm, a thin layer of mesogloea, and an inner layer of ectoderm cells, which appear to be tri-radiate in section, one of the radii projecting into the mass of sperm cells, and the other two radii forming a continuous thin membrane lining the sub-umbrella cavity. At the distal extremity of the gonophore the inner and outer ectoderm layers are continuous, and between them the umbrella wall is thickened and contains a ring of endoderm cells. In some cases there are four short tentacular thickenings of the ectoderm at the mouth of the gonophore (fig. 34). In the centre of the gonophore there is a well-marked manubrium or spadix, with a lumen and without any clearly-defined ectoderm covering. The sperm cells entirely fill the space between this endodermal spadix and the umbrella wall. The sperm cells lying in contact with the manubrium are evidently in the earlier stages of spermagenesis, those lying at the periphery of the sub-umbrella cavity in the later stages of spermagenesis (fig. 34, *sp.*), so that it may be said that the sperm cells ripen from within outwards.

The absence of any well-defined canals in the gonophore, and the presence of four conical rudimentary tentacles, suggests affinities with Agassiz's sub-genus *Thamnocnidia* (1 : see 2, pp. 399–400, 406, and 416), but apart from this it is not possible to find any close affinities with other species of the genus.

TUBULARIA LONGSTAFFI.

(Plate II., fig. 11.)

Locality.—No. 6 hole, April 8th, 1903; 124 fms.

Only a single specimen of this magnificent Tubularian zoophyte was found, and it bears unfortunately only a single hydranth. As it appears to be quite distinct from *Tubularia hodgsoni* and does not agree with any other species of the genus that has hitherto been described, we propose to call it *Tubularia longstaffi.*

Hydrosome.—The hydrocaulus is unbranched and about 2 mm. in diameter at the distal end. It rises to a height of 70 mm. At its base, where it is extraordinarily slender, there are three or four hydrorhizal branches. It is invested by a continuous smooth tube of perisarc. At the base of the flask-shaped hydranth the hydrocaulus is slightly constricted.

Just above this constriction the hydranth expands to form the support of the proximal circlet of tentacles. The tentacles of this proximal circlet are 25 in number and about 12 mm. in length. Just above this circlet of tentacles arise the eight long slender blastostyles.

From the base of the blastostyles the hydranth narrows rapidly to form the conical hypostome surrounded by a dense tuft of distal tentacles, each about 2 mm. in length.

Gonosome.—The eight blastostyles are in the contracted condition of spirit specimens about 14 mm. in length and bear a great number of flattened gonophores. The gonophores are all female, and about 2 mm. × 2·5 mm. in size. They have no radial or ring canals, but, like *Tubularia hodgsoni*, they have four rudimentary tentacles.

Actinulæ with proximal tentacles.

This form appears to be most closely allied to *T. spectabilis* (Agassiz) from the coast of Massachusetts, described by Allman (**2**: pp. 414–5, see also pp. 416–7), in size and general form; but as the description is not very full, it is not possible to determine the identity of the two species with certainty.

It differs, however, from the description of *T. spectabilis* in having the blastostyles disposed in a single row, and not in two or three rows one over the other.

Moreover, the hydrorhiza of our specimens shows no sign of being "very much contorted, irregularly branched, and densely intertwined."

Corynidae.

Species A.

Locality.—W.Q., McMurdo Bay, February 20th, 1902; −20 fms.

A single hydranth was found at the bottom of the bottle containing various hydroids from this locality, which appears to belong to some genus of the family *Corynidae*. Without further evidence than we possess at present we cannot even venture to suggest the name of the genus to which it belongs.

The hydranth is about 0·7 mm. in height, and almost spherical in shape. It has a conical hypostome and six scattered capitate tentacles. The presence of a short stolon or stem at the base of the hydranth suggests that the species is colonial in habit.

No gonophores are present.

Species B.

(Plate III., fig. 17.)

Localities.—W.Q., Hut Point, November 13th, 1902. W.Q., Hut Point, September 27th, 1902. East end of the Barrier, January 29th, 1902; 100 fms.

Three specimens of a solitary (?) coryniform hydranth were found in the bottles containing hydroids from these localities attached to the sponge spicule débris. The hydrocaulus is 3·5 mm. in length. The hydranth is 2 mm. in height and 0·6 mm. in diameter, cylindrical in shape, with short scattered capitate tentacles 0·3 mm. in length. The proximal end of the hydrocaulus is covered by a chitinous perisarc and gives off 3 or 4 hydrorhizal filaments (fig. 17, *hrh. f.*), for attachment to the sponge spicule débris. No gonophores are present.

Bonnevie describes a solitary form, *Coryne gigantea*, from Hammerfest (**7**: p. 15), but this species differs from our specimens in having a hydranth longer than the hydrocaulus and in having the tentacles arranged in groups of three or four instead of singly.

There is some reason for believing, from the evidence afforded by these specimens, that at least two species of Corynidae occur in the Antarctic Sea.

This is an interesting conclusion, as no specimens of the family were obtained by the 'Belgica' or 'Challenger' expeditions, nor has the family been discovered yet in the Falkland Islands. Hartlaub (**10**: pp. 505–509), however, describes two species of *Coryne*, one species of *Syncoryne* and one species of *Gemmaria* from the coasts of Chili, etc.

It is also noteworthy that these few specimens are the only Hydrozoa in the collection with capitate tentacles; it is therefore quite certain that they are not detached zooids from other large colonies that we have found in the collection, and improbable that they represent initial stages in the life history of these large colonial forms.

FAMILY CORYMORPHIDAE.

The genera belonging to this family that are sufficiently well known to be generally recognised are *Branchiocerianthus*, *Monocaulus*, *Corymorpha*, *Lampra*, *Gymnogonos*, *Heterostephanus*.

The genus *Branchiocerianthus* (Mark **15** and **16**) appears to be perfectly distinct, and does not offer any difficulties to the systematist. *Corymorpha* (M. Sars, 1835) and *Heterostephanus* (Allman) differ from the other genera in producing in both sexes free medusiform gonophores. Allman (**2**: pp. 395–6) introduced the genus *Monocaulus* for the species with adelocodonic gonophores described by Sars as *Corymorpha glacialis*, and he included in the same genus *Corymorpha pendula* (Agassiz) and the giant deep-sea species *Monocaulus imperator*.

Bonnevie (**5**: pp. 469–471) in 1898 instituted the genera *Lampra* and *Gymnogonos*. This authoress includes all the species belonging to this group of genera with "medusoid" gonophores in the genus *Corymorpha*. All species with "pseudo-medusoid" gonophores are placed in the genus *Lampra*, and those with "styloid" gonophores in the genus *Gymnogonos*.

This classification appears to us to be reasonable and will probably serve a useful purpose for some years. Difficulties are sure to arise later when species are found with intermediate characters, but at present we can recognise three distinct steps in the degeneration of the medusiform gonophore which may be used for purposes of classification. There is the "medusoid" gonophore showing some evidence of degeneration, but retaining the endocodon or sub-umbrella cavity, the "pseudo-medusoid" gonophore retaining the umbrella wall, but with no sub-umbrella cavity; and, lastly, the "styloid" gonophore with little or no definite trace of medusoid structure.

Lampra parvula.

(Plate III., figs. 15, 16; and Plate IV., fig. 35.)

Localities.—Off Hut Point and Flagon Point in McMurdo Bay. Sexually mature and full-grown specimens obtained from September to December, 1902, and September, 1903. Young specimens obtained January, February, March and October, 1902, and January, 1903. Depth, 10–20 fms.

A great many specimens of this interesting little species were found in several tubes and bottles from the localities named above. They are attached by root-like processes from the basal end to polyzoa (fig. 15) and to a curious felt-work mass of substance that is mainly composed of sponge spicules (fig. 16). Although *Lampra parvula* presents us with the largest hydroid zooid, except those of *L. microrhiza* and of *Tubularia* in the collection, yet they are considerably smaller than the zooids of any known species of *Lampra* or *Corymorpha*. The zooids of the only known species of *Gymnogonos*, however, are only 10–20 mm. in height. Like many other species of Corymorphidae, the colour of the spirit specimens is dark reddish-brown.

In habit the species closely resembles *Lampra socia* (Swenander, **23**: pp. 6–8, figs. 1–2) from the Trondhjem fjord, several specimens being usually found in groups more or less imbedded in the sponge débris mass. A few very young specimens were found attached singly to the stems of calcareous polyzoa (fig. 15), or more rarely to other hydroids. *L. socia* was found attached to the branches of *Lophohelia prolifera*.

Hydrosome.—The height of the full-grown polyps from the base to the mouth is about 30 mm.

In a great many specimens (fig. 16) there is a sudden diminution in the diameter of the polyp about half the distance from the base to the tentacles. The position of the constriction varies a good deal in different specimens, and in some it is hardly noticeable, the stems gradually tapering from the base to the neck. The thicker basal

portion of the polyp is invested by a fairly thick pellicle of very different appearance from the typical perisarc of the *Tubulariidæ*. In many specimens, which have perhaps shrunk in the preservation, the pellicle is only loosely attached to the body wall.

The distal tentacles are very numerous (60-70) and about 1·5 mm. in length.

In the proximal ring there are about 30 tentacles, each about 10 mm. in length.

Gonosome.—The gonophores are situated in compact bunches in close proximity to the inner aspect of the proximal circle of tentacles (fig. 16). They are almost spherical in shape, the female gonophores being about 1 mm. and the male gonophores 0·8 mm. in diameter.

As in other species of the genus, they are "pseudo-medusoid" in character (fig. 35).

In many specimens ova (fig. 35, *ov. rup.*) may be seen somewhat constricted in the middle and obviously rupturing the wall of the gonophore. Bonnevie (6: p. 21) states that in *Lampra sarsii* the ova "leave the gonophores at a very early stage of their development and remain for a time attached to the mouth of the gonophores."

LAMPRA MICRORHIZA.

(Plate II., fig. 14.)

Locality:—Off the Barrier, January 27th, 1902; 300 fms.

Though small as compared with other Corymorphidae, this is by far the largest hydranth of the collection.

Unfortunately, the two specimens obtained are in a very bad state of preservation, and although sections of the mass of tissues in the position of the blastostyles have been made, it has been impossible to demonstrate with certainty any gonophore structures. It is mainly on account of the dark brown colour that these specimens are referred to the genus *Lampra*.

Hydrosome.—The hydrocaulus rises to a height of 50-60 mm.; it is about 3 mm. in diameter throughout, and proximally is loosely covered by a thin chitinous pellicle (fig. 14, *c. p.*); at the proximal end it gives off a very large number of extremely delicate processes for attachment (fig. 14, *hrh. f.*). The hydranth is not separated from the hydrocaulus by a constriction. The proximal tentacles are 40–50 in number and about 40 mm. in length; the distal tentacles appear to be about 7 mm. in length, but are matted together and cannot be clearly seen in the preserved specimens.

Gonosome.—Blastostyles branched; 5 (?) mm. in length.

FAMILY MYRIOTHELIDAE.

(MYRIOTHELA?)

(Plate III., fig. 18.)

Locality:—W.Q., Hut Point, November 13th, 1902.

A single specimen of a hydroid belonging probably to this family was preserved in a separate tube from this locality.

Hydrosome.—A solitary zooid. The hydrocaulus is about 8 mm. in height and about 2 mm. in diameter for the greater part of its length. At the base it is much thinner and gives off numerous hydrorhizal filaments (fig. 18, *hrh. f.*) for attachment to the sponge spicule débris. It is covered throughout its length by a thin chitinous perisarc with transverse striations.

The hydranth is naked, about 6 mm. in length, and spindle-shaped, thickening gradually from the hydrocaulus, and then gradually tapering to form the conical hypostome. The distal half of the hydranth bears numerous short, thick, scattered conical or hemispherical tentacles (fig. 18, *t.*) the largest of which are situated just above the thickest part of the hydranth.

Gonosome.—No gonophores are present.

Although we are unable to give a generic or specific name to this specimen, we are anxious to record the existence of a member of this family in the Antarctic Sea. Hartlaub, in his summary of the Southern Hydroids, does not mention the family at all, but Jäderholm (**13** : p. 2.) records the occurrence of *M. austro-georgiae* from South Georgia.

FAMILY SERTULARIIDAE.

Sertularella spiralis.

(Plate III., figs. 19, 20.)

Locality.—W.Q., No. 10 hole, July 3rd, 1903; 130 fms.

Several fine colonies of this species were obtained from this hole at the date given above. It is perhaps noteworthy that no other specimens were obtained from any other localities, although at this particular spot the species seems to have been so abundant. Unfortunately, all the colonies were torn away from their attachments, so that in some particulars our description must be imperfect.

Hydrosome.—The slender monosiphonic hydrocaulus is 250 mm. or more in height. It is bent alternately right and left at intervals of 5 mm., and at each geniculation two branches are given off from the major angle. Each of these branches is about 40 mm. in length, slightly geniculated and pinnately branched, the pinnules arising as before from the neighbourhood of the angles. Their internodes are about 2·5 mm. in length. In some cases one or both of the branches themselves are elongated to form an axis similar to the main axis and give rise to secondary branches similar to the primary branches.

The general effect of this method of ramification is to give the appearance of a spiral form similar to that so characteristic of the genus *Hydrallmania*.

The pinnules vary in length up to 30 mm. and are divided into a series of internodes by geniculations, but these internodes are not all of the same length (0·6–1·0 mm.), increasing somewhat in length in the distal parts. Proximally the nodes are not very clearly marked.

Each internode of a pinnule bears one hydrotheca at its distal extremity, but each internode of a branch bears three hydrothecæ, one at the distal extremity, and the other two at intervals of one-third and two-thirds from the proximal end.

The hydrothecæ of the pinnules (fig. 19) are about 0·5 mm. in depth, 0·22 mm. in their greatest diameter, and 0·17 mm, in diameter at the mouth, and have three opercular flaps (fig. 19, *op.*) 0·09 mm. in length. They are somewhat shorter than this in the proximal regions of the pinnules. The two proximal hydrothecæ of the internodes of the branches are decidedly shortened as regards that part of their length which is not adnate. The distal hydrotheca of each internode of the branches is nearly straight and barrel-shaped. A single straight hydrotheca, which is not adnate to any part of a hydrocaulus, is situated between the bases of each pair of branches (fig. 20, *hth.*). Apart from these, the main axis bears no hydrothecæ.

A remarkable feature of the hydranths is the presence of a loose sheath of ectoderm (fig. 19, *ect.*) enveloping the base. The hypostome is conical and surrounded by about fifteen tentacles.

Gonosome.—Only female gonothecæ (fig. 19, *gth.*) have been observed. They are 1·0 × 0·5 mm. in size, ovate, smooth, sessile, and attached below the bases of the hydrothecæ of the pinnules. The gonothecæ are all empty, none of the gonophores being preserved. The planulæ are developed in spherical or somewhat pear-shaped acrocysts (fig. 19, *ac.*), 0·4 mm. in diameter.

This species seems to be quite distinct from any that has yet been described.

Sertularella plectilis.

(Plate III., fig. 21.)

Localities.—W.Q., No. 6 hole, February 15th, 1902; 130 fms. W.Q., McMurdo Bay, February 20th, 1902; 20 fms.

Several large, detached, tangled masses of this hydroid were found in the first-named locality; but in the second locality only a single small colony 12 mm. in height attached to the stem of *Campanularia verticillata* was obtained.

Hydrosome.—The hydrocauli are all extremely slender, not exceeding 0·12 mm. in diameter, irregularly branched, and—as they reached us—in an inextricable tangle. The internodes are about 0·6 mm. in length. The branches arise immediately below the hydrothecæ (fig. 21). A single hydrotheca is situated at the distal end of each internode. As many of them are reduplicated (fig. 21, *r. hth.*), they vary considerably in length. The original length of each hydrotheca appears to be 0·4 mm., but one showing four reduplications is 0·6 mm. The greatest diameter is 0·15 mm., and at the mouth 0·13 mm. The wall is adnate to the hydrocaulus for about one-third of its original length. It is extremely thin. The margin has three opercular flaps, 0·06 mm. in length. About fifteen tentacles surround the bluntly conical hypostome of the hydranths.

Gonosome.—The gonothecæ (fig. 21, *gth.*) are immature and about 0·5 × 0·4 mm. in size. They are all female. They arise from the hydrocauli immediately below the hydrothecæ and are sessile. They are smooth, pear-shaped, and have a straight margin. No gonophores can be seen, the ova being embedded in the blastostyles.

This species is also quite distinct.

Dictyocladium fuscum.

(Plate III., fig. 22.)

Locality.—Cape Wadworth, Coulman Island, January 15th, 1902; 8–15 fms. Bottom stones.

Hydrosome.—The single specimen of this species forms a thick, shrubby, fan-shaped colony, 90 mm. in height, 80 mm. in width in the widest part, and about 25 mm. thick, *i.e.*, in a direction at right angles to the line of greatest width and the line of height. The principal branches arise irregularly from the main stem, but the smaller and ultimate branches are flabellate in their mode of ramification. The colony as a whole is rendered more compact than it otherwise would be by the ends of several branches developing stolons (fig. 22, *st.*) which attach themselves to other branches around the bases of their whorls of hydrothecæ. At the base the colony is polysiphonic, but distally the branches are all monosiphonic. The base and hydrorhiza are missing.

The hydrothecæ (fig. 22, *hth.*) are arranged in six rows and almost always in regular verticels of three, but sometimes the three hydrothecæ of a verticel are not quite on the same plane. They are about 0·8 mm. in length and 0·3 mm. in diameter, and adnate for about one-half to two-thirds of their length. They are very slightly constricted towards the opening, the margin is quite plain and often suddenly everted *quite* close to the edge. Reduplication of the hydrothecæ frequently occurs, but the secondary thecæ project *very* little beyond the margin of the primary ones.

The soft parts are quite macerated.

The general colour of the colony is pale brown.

Gonosome.—Unknown.

The species differs from Professor Nutting's diagnosis of the genus (**19**: p. 105) in the absence of any operculum. In the type species of the genus (*D. dichotomum*, Allman; **3**: pp. 76–77; Pl. 36, figs. 2, 2*a*) the anastomosing stolons coalesce with the mouths of the hydrothecæ, the cavities of the hydrothecæ and stolons being continuous; but in our species these stolons always grasp the hydrocauli at the base of the verticels of hydrothecæ. The species differs from both *D. dichotomum* of Allman and *D. flabellum* of Nutting in the shape of the hydrothecæ and in other characters. Unfortunately Allman does not mention whether an operculum is present in his species or not.

FAMILY PLUMULARIIDAE.

PLUMULARIA GLACIALIS.

(Plate III., figs. 23, 24.)

Locality.—"East end of Barrier," January 29th, 1902; 100 fms.

From the nature of the hydrorhiza, which was curved, it seems probable that the specimens of this species were attached to a weed or zoophyte.

Hydrosome.—A stout fascicled hydrocaulus (fig. 23) 300 mm. in height and 2·5 mm. in diameter near the base arises from the densely matted but imperfectly preserved hydrorhiza.

In the constitution of the hydrocaulus there is a single tube (fig. 23, *t. hcl.*) giving off, alternately right and left, hydrocladia which may be 30 mm. in length and are usually divided into two equal branches. Supporting this single tube that bears hydrocladia are several other tubes (*t. sp.*) which bear nematophores only. The supporting tubes do not surround the hydrocladia-bearing tube, but leave it exposed on one side. The hydrocladia-bearing tube is divided into a series of internodes 1 mm. in length, and it becomes free from its supporting tubes at the distal end, so that the hydrocaulus then becomes monosiphonic. In *Plumularia profunda* (Nutting, **18**: pp. 66–67; Pl. VIII., figs. 2–3), to which our species has some affinities, the supporting tubes entirely surround the hydrocladia-bearing tubes, and the internodes are of two kinds, longer ones supporting two hydrocladia and shorter ones bearing only one hydrocladium. Moreover, in *Plumularia profunda* the hydrocladia are supported on processes arising from the proximal end and not from the middle of the internodes as they are in our species.

A short hydrotheca (0·2–0·3 mm. in height), adnate to the hydrocaulus but not adnate to the hydrocladium, is found at the base of each hydrocladium (fig. 23). The other hydrothecæ are cup-shaped, 0·3 mm. in length and 0·2 mm. in diameter at the mouth. One, or sometimes two, arise from each internode of the hydrocladia, and each one is guarded by two nematophores above (*i.e.* distally) and a single one below. The margins of the hydrothecæ are entire.

Although the label of the bottle containing these specimens bears the inscription "has been dry," some of the hydranths are sufficiently well preserved to enable us to make out some features of the structure of the soft parts. The rounded hypostome is surrounded by a single circlet of about fifteen tentacles, each about 0·15 mm. in length.

Gonosome.—The female gonothecæ are 1·0 × 0·5 mm. in size, and have a remarkable shape (fig. 23, ♀ *gth.*). The aperture is found on the distal flattened end of the pear-shaped structure, but instead of being at right angles to the stem, is turned inwards through an angle of 45° so as to face inwards and upwards. This

inversion of the distal end of the gonotheca is also seen, but to a less degree, in Nutting's figures of *P. profunda*.

The male gonothecæ (fig. 24, ♂ *gth.*) are narrow and bluntly ovate. They are not found on the same colonies as the female gonothecæ. They are 1·0 × 0·4 mm. in size.

Each of the female gonothecæ contains one ovum. In *P. profunda*, however, the gonothecæ contain "a number of developing ova" (Nutting, **18**: p. 67; Pl. VIII., fig. 3).

FAMILY CAMPANULARIIDAE.

The character which distinguishes the hydrosome stage of the *Campanulariidae* from the *Sertulariidae* and *Plumulariidae* is the presence of a stalk supporting the hydrothecæ and gonothecæ. It is true that in sub-family *Lafoëinae* no clear distinction can be drawn between the base of the theca and the stalk of the theca, theca and stalk forming a continuous tube, but there are other reasons for associating this sub-family with the *Campanulariidae*.

The separation of *Obelia* and its allies from the *Campanulariidae* is, perhaps, an unsatisfactory feature of our classification, as there is no important difference in the hydrosome stage of many of the *Eucopidae* and that of many of the *Campanulariidae*. The *Eucopidae* have, it is true, free swimming medusiform gonophores and the *Campanulariidae* have not, but, as has been shown by several authors, this distinction is not one which, in the *Gymnoblastea*, can be used even for generic diagnoses. It is certainly doubtful whether it ought to be used as a family character in the *Calyptoblastea*.

SUB-FAMILY CAMPANULARIINAE.

Campanularia verticillata (Linn.), *var.* grandis.

(Plate IV., fig. 25.)

Sertularia verticillata, Linnæus, Syst. Nat., X. (1758), p. 811.
Campanularia verticillata, Hincks, British Hydroid Zoophytes (1868), p. 167, pl. xxxii., fig. 1.

Localities.—McMurdo Bay, W.Q., February 20th, 1902; 20 fms. Flagon Point, January, 1903; 20 fms.

This magnificent new variety of *Campanularia verticillata* was obtained in great quantities on a large brittle worm tube, 400 mm. long by 5 mm. in diameter, from McMurdo Bay, and a small specimen from Flagon Point.

Hydrosome.—The worm tube is thickly covered with a hydrorhizal plexus giving off at frequent intervals polysiphonic hydrocauli, which attain to a height of 170 mm. and a thickness of 2 mm. at the base. The hydrorhizal plexus also bears scattered polyps of the same type as those borne by the hydrocauli. In addition to the specimens still attached to the worm tube an enormous number of loose broken

hydrocauli were found in the bottle. These may have formed part of the colonies attached to the worm tube, and therefore our estimate of 170 mm. for the height of the colony may be considerably less than it should be.

The colonies branch irregularly and rather sparingly, and the hydrocauli are polysiphonic to their distal extremities. At these extremities there appear to be four to six parallel but anastomosing tubes, each of which bears a single hydranth at regular intervals, and as the hydranths of the tubes arise at the same level, they form a series of verticels round the hydrocaulus.

In tracing these tubes down towards the hydrorhiza other tubes appear, which creep over the primary tubes in an irregular manner and bear hydranths at less regular intervals. In the lower parts of the stem (fig. 25) the secondary tubes are more numerous, and play an important part in building up the substance of the thick base.

In some cases stolons in place of hydranths occur in the verticels of the primary stems. These may perhaps give rise to the secondary branches. Single tubes bearing hydranths and gonophores also occur climbing over polyzoa epizoic on the main hydrocaulus.

The bell-shaped hydrothecæ are 0·6 mm. in length and 0·4 mm. in diameter at the mouth. The pedicel of the hydranth is about 1·5 mm. in length, marked throughout its whole length by a spiral groove. The hydranths have 28–34 tentacles, arranged in a double row, and each about 0·3 mm. in length. The gonothecæ are at first 0·8 × 2·5 mm. in size and pear-shaped, but later, when fertilisation has been effected, become flask-shaped and 0·6 × 3·0 mm. in size. They are supported by short spirally marked pedicels.

The specimens differ from the type specimens of the species in the greater size of the hydrocauli, hydranths and gonophores, in the greater regularity of and greater intervals between the verticels of the hydranths, in the well-defined spiral marking of the pedicels, and in the extreme tenuity of the edges of the hydrothecæ, which renders it impossible to determine with certainty whether the margin is or is not dentate, as it is in the type.

Although *Campanularia verticillata* is a common species in European waters, it is not included in Hartlaub's list of Southern species (**10** : pp. 505–509).

Campanularia everta.

Campanularia everta, Clark, Trans. Conn. Acad., III. (1876), p. 253.

Campanularia everta, H. B. Torrey, Univ. California Public., Vol. I. (1902), pp. 51, 52, pl. iv., figs. 35–37.

Localities.—W.Q., McMurdo Bay, February 20th and 28th, 1902; 20 fms. W.Q., Duct, July 15th, 1902.

This species has been previously described from the Pacific coast of N. America. According to Mr. Torrey it is extremely variable (**24** : pp. 51–52).

It was found in our collection growing on other hydroids, such as *Halecium arboreum*, and also on algæ and polyzoa. It is in some cases continued beyond its support as a tangle of contorted tubes.

Hydrosome.—Unbranched hydrocauli arise from the branching filiform hydrorhiza at intervals to a height of 2·5–10·0 mm. They are usually irregularly annulated above and below, and there is always one well-marked convex annulus immediately below the neck of the hydrotheca. According to Torrey this subthecal annulation constitutes the only constant character of the species (**24**: p. 51).

The hydrotheca is bell-shaped and very constantly 1 mm. in length, but varies considerably in diameter at the distal end (0·4–0·7 mm.) as well as in outline. The margin is usually entire, but may be dentate.

The material was not in a good state of preservation, but apparently the hydranths have about 15 tentacles about 0·6 mm. in length.

Gonosome.—The gonothecæ are pear-shaped (1·0 × 0·8 mm.) and supported by a spirally marked pedicel rising from the hydrorhiza. The gonophores are apparently female, but being badly preserved, details of their structure could not be made out.

We have some hesitation in assigning these specimens to the species *C. everta* of Clark, as they differ in many respects from the original description of the type. But assuming that Mr. Torrey is correct in his statement that the species is very variable, and comparing our specimens with his figures and description, the course we have adopted appears to be a better one than that of founding for them a new specific name. The specimens are clearly more closely related to *C. everta* than to *C. integra*, or any other species of the genus.

Campanularia laevis.

(Plate IV., fig. 26.)

Campanularia laevis, Hartlaub, C., Zool. Jahrb., Supplement VI. (1905), p. 565.

Localities.—W.Q., February 28th, 1902. McMurdo Bay; – 20 fms. W.Q., February 23rd, 1902. Flagon Point.

Several colonies of this very beautiful hydroid were found creeping on the stems of *Halecium arboreum*. The zooids are, with the exception of those of its supporting species, the largest among the Calyptoblasts of the Expedition, and the large bell-shaped hydrothecæ with toothed margins—mounted on their straight but graceful pedicels—are very striking.

Hydrosome.—The creeping hydrorhiza gives rise at intervals to a number of straight, upright, unbranched hydrocauli from 5 to 10 mm. in height. Each hydrocaulus has two or three very obscure annulations at the base, and one clearly marked convex annulation immediately below the hydrotheca.

The hydrothecæ are bell-shaped, slightly curved at the base, and then straight, expanding gradually throughout their whole length. They are from 2·5–3·0 mm. in

length, and from 1·5–2·0 mm. in diameter at the mouth. The margin is armed with 15-20 blunt denticulations. The hydranths are large, but of the usual form in the genus, and provided with about 30 tentacles 1·5 mm. in length.

Gonosome.—The mature gonotheca is 2·5 × 1·2 mm. in size, tall and cylindrical. The proximal part of the gonotheca is slightly swollen, and the distal end almost straight. It is supported by a short annulated pedicel arising directly from the hydrorhiza.

The specimens attributed to Hartlaub's species differ from the type in one or two particulars. The hydrothecæ are not so fully expanded distally, the reduplications (?) of the stem are not so well-marked, and the gonothecæ are very different in shape from those of the specimens from Calbuco.* But without further evidence as to the sex and structure of the gonophores of this type we do not feel justified in creating a special specific name for them.

SUB-FAMILY HALECIINAE.

The genera that are usually included in the sub-family *Haleciinae* (*Haleciidae*, Hincks) are characterised by the rudimentary condition of the hydrothecæ. The tubular structures arising from the hydrocladia surround, like a collar, the base of the hydranths, but are quite insufficient to enclose and thereby afford protection to them when retracted.

It is, in our opinion, unfortunate that the term "hydrophore" has come into general use for this rudimentary form of hydrotheca. There are many examples to be found in the *Calyptoblastea* of hydrothecæ that are not cup-shaped, such as the cylindrical hydrothecæ of *Sertularella formosa* and *Synthecium cylindricum* (*see* Nutting, **19**: p. 14), and it would be practically impossible to limit the use of the term to hydrothecæ that are tubular or cylindrical in shape. The use of the term hydrophore for those hydrothecæ only which are not capable of receiving the retracted hydranth would also be inconvenient. It is, therefore, the best course to adopt to abandon the use of the term hydrophore altogether.

The genus *Halecium* is usually regarded as distinguished from its allies *Diplocyathus* (Allman), *Hydrodendron* (Sars), and *Ophiodes* (Hincks) by the absence of nematophores; but one of us has observed the presence of nematophores on the specimens of *Halecium arboreum* obtained by the 'Challenger' (**3**: p. 10, Pl. IV., figs. 1–3) and now in the British Museum, which were overlooked by Allman, and the specimens which we attribute to the same species have also nematophores. It does not seem to us convenient to again split up the genus *Halecium* into groups containing those which do and those which do not possess nematophores, but rather to add to the characters of the genus, that "nematophores may or may not be present." As regards the use of the term "nematophore," it is necessary to explain that we have adopted the

* On the coast of Chili, approximately 41° S. by 71° W.

plan of regarding it as synonymous with "sarcotheca" and applicable only to perisarcal skeleton. The zooid which the nematophore envelopes (in the case of *Halecium* only very partially) appears to us to be a true dactylozooid, and we have not adopted the use of any of the terms "sarcostyle," "machopolyp," "sarcodal process," etc., suggested by various writers.

The occurrence of the gonothecæ in "coppinia" masses in our specimens of *Halecium arboreum* is a feature of some interest. The number of genera in which this grouping of the sexual zooids occurs is extending as our knowledge advances.

The gonothecæ of the specimens of *Halecium arboreum* and *H. telescopicum* obtained by the 'Challenger' were not observed, but the gonothecæ of *H. flexile*, *H. dichotomum*, *H. fastigeatum*, *H. beanii* and *H. cymiforme* obtained by the same expedition were not in "coppinia" masses. This peculiar grouping of the gonothecæ is not, therefore, a character of the genus, but may indicate a method for the future rearrangement of the species into subgeneric groups.

Halecium arboreum.

(Plate IV., figs. 27, 28, 29.)

Halecium arboreum, Allman, 'Challenger' Reports, Vol. XXIII. (1888), pl. iv., figs. 1–3.

Localities.—The species is evidently abundant in McMurdo Bay, extending from shallow water to depths of 130 fms.

W.Q., McMurdo Bay, February 20th and 28th, 1902;—20 fms. W.Q., Flagon Point, January 17th and February 23rd, 1903; 10–20 fms. W.Q., No. 6 hole, January 31st, 1903; 130 fms. W.Q., February 21st, 1902; 10 fms. W.Q., off cable, February 17th, 1904. East End of Barrier, January 29th, 1902; 100 fms.

The specimens of this species consist of a number of robust colonies rising to a height of 300 mm. from a thick hydrorhizal plexus. A few small colonies from the east end of the Ice Barrier were found attached to the stems of *Plumularia*.

Hydrosome.—The hydrorhiza is a dense plexus of tubes exhibiting a tendency to be grouped together in polysiphonic bundles.

The main stem is a thick polysiphonic hydrocaulus 10 mm. in diameter.

The proximal branches are polysiphonic, like the main stem, and anastomose freely whenever they come in contact with one another. The distal branches are much more numerous and usually monosiphonic. The monosiphonic branches (fig. 27) alone bear the hydrothecæ, but in some cases these branches still bear hydrothecæ after the addition of the first few strengthening tubes.

The ramification of the distal branches is pinnate, and in other parts of the colony it is roughly, but not rigidly, flabellate.

The thickness and roughness of the stem and of the principal branches afford admirable support for the hydrorhizæ of other hydroids, a list of which will be found on page 1.

Up to a height of about 150 mm. the colony consists of only four or five thick (7 mm. in diameter) and occasionally anastomosing stems, bearing a few thinner (3 mm. in diameter) branches which are themselves pinnately branched. Above this region the thick stems branch much more profusely and somewhat pinnately, bearing numerous thinner branches whose method of further ramification is always pinnate.

The ultimate branches (hydrocladia) are jointed, the internodes being 0·6–1·1 mm. in length and about 0·4 mm. in diameter. Each internode bears on one side a single hydrotheca (hydrophore) adnate throughout its whole length, and supporting the base of a hydranth 2 mm. in length (fig. 24, *hyd.*), and on the opposite side a long serpentine dactylozooid (sarcostyle) 1·5 mm. in length and about 0·15 mm. in diameter (fig. 24, *d.*), supported at the base by a nematophore (sarcotheca) 0·15 mm. in length and about 0·15 mm. in diameter.

At the extremity of the dactylozooid there is a battery of nematocysts. In the specimens many of the dactylozooids and nematophores are broken off, but there is little doubt that they are usually, if not regularly, present in the living colony in the position assigned to them. The dactylozooids are very similar to those figured by Hincks for *Ophiodes mirabilis*, although not so clearly "knobbed" at the extremity.

The hydranths are of the typical *Halecium* form. The hypostome is surrounded by a circle of about twenty tentacles each about 0·5 mm. in length.

Gonosome.—The gonothecæ together with some nematophores occur in "coppinia" masses (fig. 28) on the stem and branches. These "coppinia" masses are oval or spherical, densely branched and tangled clumps, 25 × 25 mm. to 60 × 30 mm. in size, having a rough resemblance to the "bedeguar" galls on the stem of the wild rose. The delicate dichotomously ramified branches of these masses bear dactylozooids and nematophores (fig. 29, *d.* and *nph.*) similar to those of the other parts of the colony, and numerous paired gonothecæ (fig. 29, *gth.*), 1·0 × 0·7 mm. in size, which curve sharply backwards, terminating in a hook-like process at the extremity of which is the gonothecal mouth.

The type of this species was found at Kerguelen in 1874.

Halecium tenellum.

Halecium tenellum, T. Hincks, Brit. Hyd. Zoophytes (1868), p. 226, pl. xlv., fig. 1.

Localities.—W.Q., McMurdo Bay, February 20th, 1902;—20 fms. W.Q., Flagon Point, January 17th, 1903; 10–20 fms. W.Q., Flagon Point, February 23rd, 1903. W.Q., off cable, February 17th, 1904. W.Q., D net, June 15th, 1902.

This widely distributed little *Halecium* appears to be fairly common in McMurdo Bay. It is found on sea-weed, *Alcyonium paessleri*, on *Halecium arboreum*, and on other hydroids.

Hydrosome.—The delicate little colonies are about 10 mm. in height and spring from a creeping hydrorhiza. The hydrocauli are monosiphonic, irregularly

annulated and very irregularly branched. They are not more than 0·1 mm. in diameter.

The hydrothecæ are elongated and everted at the margins. They are frequently reduplicated.

The hydranths are 0·5 mm. in length and have about 20 tentacles 0·25 mm. in length. There are no nematophores in this species.

Gonosome.—The gonothecæ are oval (0·8 × 0·5 mm.) or spherical in both sexes. They are situated on short pedicels which may be irregularly annulated as in the British type. They are situated on the hydrocauli in no definite position. There is no evidence of any "coppinia"-like grouping of the gonothecæ.

The species *Halecium tenellum* was obtained by the 'Belgica' expedition in 70° S. by 91° W., and Bale mentions that he has one specimen in his collection from the Australian waters. It has also been found on the south Fuegian coasts and in Smyth Sound (**10**: pp. 505–509). It is common on the British and American coasts and extends into the Arctic seas (Jan Mayen). In fact, it appears to be cosmopolitan in Arctic and Temperate seas.

SUB-FAMILY LAFOËINAE.

LAFOËINA LONGITHECA.

(Plate IV., fig. 31.)

Lafoëina longitheca, Jäderholm, Arch. Zool. Expér. (4), III. (1904), p. iv.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fms.

Two small colonies of this hydroid were found creeping on the free hydrorhiza of *Perigonimus antarcticus*.

Hydrosome.—A well-developed hydrorhizal filament is attached to the support. From this there arise at intervals tall, cylindrical hydrothecæ (fig. 31) 0·7–1·0 mm. in height, slightly annulated at the base, and gracefully everted at the margin. The margin bears about twelve opercular flaps (fig. 31, *op.*), 0·11 mm. in length. Occasionally secondary hydrothecæ arise from the primary ones and attain an additional length of 0·25 mm. There is no distinct pedicel, the diameter of the hydrotheca at the base being almost as great as it is at the distal extremity.

The hydranths are very small, being in the contracted condition not more than 0·4 mm. in length, or about half that of the hydrotheca. A circlet of about eight tentacles surrounds the blunt conical hypostome. Each tentacle is about 0·13 mm. in length.

Numerous upright nematophores, 0·12 mm. (but occasionally 0·2 mm.) in height by 0·02 mm. in diameter, arise independently from the hydrorhiza. They contain a delicate thread of tissue (fig. 31, *d.*), terminating in a pad at the extremity which is armed with a battery of nematocysts.

Gonosome.—Not observed.

The type of this species was found in South Georgia, in depths of 64–250 metres, and although the author gives no figures, we have no doubt of the identity of our specimens with the type.

FAMILY EUCOPIDAE.

GENUS OBELIA.

Obelia geniculata.

(Plate IV., fig. 30.)

Sertularia geniculata, Linnæus, Syst. Nat. X. (1758), p. 812.
Obelia geniculata, Hincks, Brit. Hyd. Zooph. (1868), p. 149, pl. xxv., fig. 1.

Locality.—Auckland Islands, off Port Ross, March 28th, 1904.

This very widely distributed species was found in the material obtained from the Auckland Islands. It has previously been described from numerous localities north and south of, but not within, the tropics (**10**: pp. 505–509; **3**: p. 23; **11**: p. 151).

It is the only species of Hydrozoa in the collection that we have proved to be phanerocodonic, and it is on that account noteworthy that, notwithstanding the rich and varied hydroid fauna that was brought to light by the Expedition, not a single specimen of this species was found under the ice in McMurdo Bay.

A considerable number of luxuriant colonies were found growing on the frond of a *Laminaria*.

Dimensions.

The height of the largest colony. . .	30 mm.
Height of hydranths	0·4 mm.
Length of pedicels of hydranths . . .	0·25 mm.
Size of gonothecæ	0·9 × 0·25 mm.
Length of tentacles	0·4 mm.

The specimens differ from the common British type of the species in having two (instead of one) annular constrictions in the perisarc of the hydrocaulus above each flexure. They also grow more luxuriantly and branch much more freely than the British type.

Hydrosome.—Stem zigzag, sometimes pinnately branched, two deep constrictions of the perisarc above each flexure. The perisarc below each flexure very thick, forming a series of projections from which the short annulated pedicels arise. Hydrothecæ conical, somewhat longer than they are broad, margin entire, perisarc thick. Tentacles of the hydranth about 30 in number. Gonothecæ axillary, urn-shaped, attached by a short annulated pedicel.

Gonosome.—Each blastostyle bears numerous young scattered medusæ.

Genus campanulina.

The genus *Campanulina* was instituted by Professor E. van Beneden for a species that is known to produce one of the medusæ of the genus *Phialidium*. The hydrosome stage is characterised by the conical hydrotheca closed by an operculum formed of convergent segments of its margin and by the conical hypostome.

The specimens obtained by the 'Discovery' have all the important characters of the hydrosome thus described, and so have the specimens described by Dr. Hartlaub (**9**: pp. 10–11; Pl. I., figs. 8–9) under the name *Campanulina belgicæ*, from within the Antarctic Circle.

The absence of the gonophores in both specimens rendered it impossible for us to determine whether they are or are not phanerocodonic. Even if they had proved to be adelocodonic, however, they should in our opinion be still retained in the genus *Campanulina*, as the case of *Perigonimus antarcticus* may serve as a warning that the setting free of the medusæ is not a character that can be used as absolutely diagnostic of a genus when applied to these sub-glacial species. It is interesting to note in this connexion that Mr. Hodgson (**12**: p. 397) states that *Phialidium* medusæ were abundant in McMurdo Bay.

Campanulina A.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fathoms.

A single colony of this delicate little hydroid was found growing over a stem of *Halecium arboreum* and over the *Perigonimus antarcticus* which encrusts it.

Hydrosome.—The hydrocauli are slender (0·05 mm. in diameter and 0·5–1 mm. in length), more or less clearly marked throughout with spiral lines, and very occasionally branched. They arise from a creeping filamentous hydrorhiza.

The perisarc at the distal ends of the hydrocauli gradually dilates to form the "ovato-conic" hydrothecæ, 0·4 mm. in length by 0·1 mm. in diameter. The hydrotheca itself is very thin and evidently very flexible. Its margin is deeply cleft to form about eight triangular flaps (0·1 mm. in length), which can close together to form an operculum. It is difficult to determine with any certainty the exact number of these flaps, as they are extremely thin and transparent.

The hydranths, when contracted, completely fill the hydrothecæ. The hypostome is conical and surrounded by a single circlet of about twenty tentacles, 0·2 mm. in length.

Gonosome.—Unknown.

Campanulina B.

Locality.—McMurdo Bay, February 20th, 1902; 5–20 fathoms.

A single small colony of this form was found on *Campanularia verticillata* (var. *grandis*).

Hydrosome.—Only a few hydrocauli of this very small form were found. They are about 0·1 mm. in length by 0·06 mm. in breadth, and arise from a filamentous hydrorhiza. The hydrocauli are much shorter than in *Campanulina A.* and strongly ringed throughout their length. The hydrothecæ are 0·25 mm. in length by 0·15 mm. in diameter and apparently not so flexible as in A.

Their margins are cleft to form about the same number of opercular flaps.

There are about fifteen tentacles, 0·08 mm. in length.

Gonosome.—Unknown.

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DESCRIPTION OF THE PLATES.

KEY TO THE LETTERING OF THE PLATES.

ac., acrocyst; *bl.*, blastostyle; *c.p.*, chitinous pellicle; *d.*, dactylozooid; *gph.*, gonophore; *gth.*, gonotheca; *gz.*, gastrozooid; *hc.*, hydrocaulus; *hrh.*, hydrorhiza; *hth.*, hydrotheca; *hyd.*, hydranth; *m.*, manubrium; *n.*, node; *nph.*, nematophore; *op.*, operculum; *ov.*, ovum; *p.*, perisarc; *rhc.*, rhizocaulus; *sp.*, sperm; *su.c.*, sub-umbrella cavity; *t.*, tentacle; *u.*, umbrella; *z.*, zooid.

PLATE I.

FIG. 1.—*Perigonimus antarcticus* growing on *Halecium arboreum* (× 2). *hc. H.*, hydrocaulus of *Halecium arboreum*; *hyd.*, hydranth of *Perigonimus*; *gph.*, gonophore of *Perigonimus*.

FIG. 2.—*Perigonimus antarcticus* ♂ (× 20). *hrh.*, hydrorhiza; *m.*, manubrium of gonophore; *p.*, perisarc; *sp.*, sperm filling the sub-umbrella cavity; *u.*, umbrella wall.

FIG. 3.—*Perigonimus antarcticus* ♀ showing variability (due to contraction) of form of the hydranths (× 20). *hc.*, hydrocaulus; *hrh.*, hydrorhiza; *hyd.*, hydranth; *m.*, manubrium of gonophore; *ov.*, ova embedded in the ectoderm of the manubrium; *su.c.*, sub-umbrella cavity; *u.*, umbrella wall.

FIG. 4.—*Eudendrium insigne*. Hydranth (× 30). *c.*, collar of deeply staining cells; *p.*, perisarc.

FIG. 5.—*Stylactis halecii* (× 30). Outer region of colony growing on *Halecium arboreum*; *d.*, dactylozooid; *hc. H.*, hydrocaulus of *Halecium*; *hrh.*, hydrorhiza; *gz.*, gastrozooid.

FIG. 6.—*Stylactis halecii* (× 20). Central region of colony growing on *Halecium arboreum*; *bl.*, blastostyle; *bl.t.*, tentaculate blastostyle; *gz.*, gastrozooid; *hc. H.*, hydrocaulus of *Halecium*; *hrh. P. & C.* hydrorhizæ of *Perigonimus* and *Campanularia*.

PLATE II.

FIG. 7.—*Hydractinia dendritica* encrusting *Halecium arboreum* (× 10). *bl.*, blastostyle; *gph.*, gonophore; *gz.*, gastrozooid; *r.sp.*, ridge-like spine.

FIG. 8.—*Hydractinia dendritica*. Fragment of rhizocaulus (× 20). *bl.*, blastostyles; *gph.*, gonophore; *gz.*, gastrozooid; *rhc.*, rhizocaulus.

FIG. 9.—*Hydractinia dendritica* (× 2). Young rhizocauline colony developing from the encrusting basal region; *enc. r.*, encrusting region; *fr. rhc.*, free rhizocauli.

FIG. 9A.—*Hydractinia dendritica*, encrusting *Halecium arboreum* (× 1).

FIG. 10.—*Hydractinia dendritica*. Part of adult rhizocauline colony (× 1). *rhc.*, rhizocaulus; *z.*, zooids.

FIG. 11.—*Tubularia longstaffi* (× 1). *gph.*, gonophores; *hrh.*, hydrorhiza.

FIG. 12.—*Tubularia ralphi* (× 2).

FIG. 13.—*Tubularia hodgsoni* (× 1).

FIG. 14.—*Lampra microrhiza* (× 1). *c.p.*, chitinous pellicle; *gph.*, gonophores; *hrh. f.*, hydrorhizal filaments.

PLATE III.

FIG. 15.—*Lampra parvula*. Young zooid (× 10). *d.t.*, distal tentacles; *hc.*, hydrocaulus; *hrh. f.*, hyrdrorhizal filament; *hyd.*, hydranth; *p.t.*, proximal tentacles; *P.z.*, polyzoan colony to which the zooid is attached.

FIG. 16.—*Lampra parvula.* Adult and smaller zooids (× 1). *c.p.*, chitinous pellicle ; *f.sp.*, feltwork of sponge-spicules and diatoms in which the basal ends of the zooids are embedded ; *gph.*, gonophores.

FIG. 17.—*Corynidae, sp.* B. (× 10). *hc.*, hydrocaulus ; *hrh. f.*, hydrorhizal filaments ; *hyd.*, hydranth.

FIG. 18.—*Myriothela ?* (× 2). *hrh. f.*, hydrorhizal filaments ; *t.*, tentacles.

FIG. 19.—*Sertularella spiralis.* Part of a pinnule (× 25). *ac.*, acrocyst ; *ect.*, ectodermal sheath around base of hydranth ; *gth.*, gonotheca ; *op.*, opercular flaps.

FIG. 20.—*Sertularella spiralis* (× 25). Part of main axis, showing method of branching ; *br.*, branch ; *hth.*, hydrotheca ; *m.a.*, main axis.

FIG. 21.—*Sertularella plectilis* (× 15). *gth.*, young gonotheca ; *hyd.*, hydranth ; *r. hth.*, reduplicated hydrotheca ; *s. hth.*, simple hydrotheca.

FIG. 22.—*Dictyocladium fuscum* (× 10). *hth.*, hydrotheca ; *st.*, stolon helping to bind the colony together by anastomosing with another branch.

FIG. 23.—*Plumularia glacialis* ♀. Central axis and proximal part of hydrocladia (× 20). ♀ *gth.*, female gonotheca ; *hth.*, hydrothecae ; *nph.*, nematophores ; *t. hcl.*, hydrocladia-bearing tube of central axis ; *t. sp.*, supporting tubes.

FIG. 24.—*Plumularia glacialis* ♂. Part of a hydrocladium (× 40). ♂ *gth.*, male gonotheca ; *hyd.*, hydranth ; *n. hcl.*, node of hydrocladium ; *nph.*, nematophore ; *sp.*, sperm.

PLATE IV.

FIG. 25.—*Campanularia verticillata*, var. *grandis* (× 2). *hc.*, hydrocaulus ; *hrh.*, hydrorhiza ; *hyd.*, hydranth ; *s.*, sponge growing upon the hydrocaulus.

FIG. 26.—*Campanularia laevis* (× 7). *gth.*, gonotheca ; *hc.*, hydrocaulus ; *hrh.*, hydrorhiza ; *hyd.*, hydranth.

FIG. 27.—*Halecium arboreum ;* part of a hydrocladium (× 20). *d.*, dactylozooid ; *hyd.*, hydranth ; *n.*, node ; *nph.*, nematophore ; *p.*, perisarc. (The measurements given in the text are of some particularly well-expanded nematophores that we discovered after this figure was drawn.)

FIG. 28.—*Halecium arboreum.* "Coppinia" mass (× 1). *cp.m.*, "coppinia" mass ; *h.c.*, hydrocaulus.

FIG. 29.—*Halecium arboreum.* Part of "coppinia" mass (× 15). *d.*, dactylozooid ; *gth.*, gonotheca ; *nph.*, nematophore.

FIG. 30.—*Obelia geniculata* (× 3). To show mode of branching.

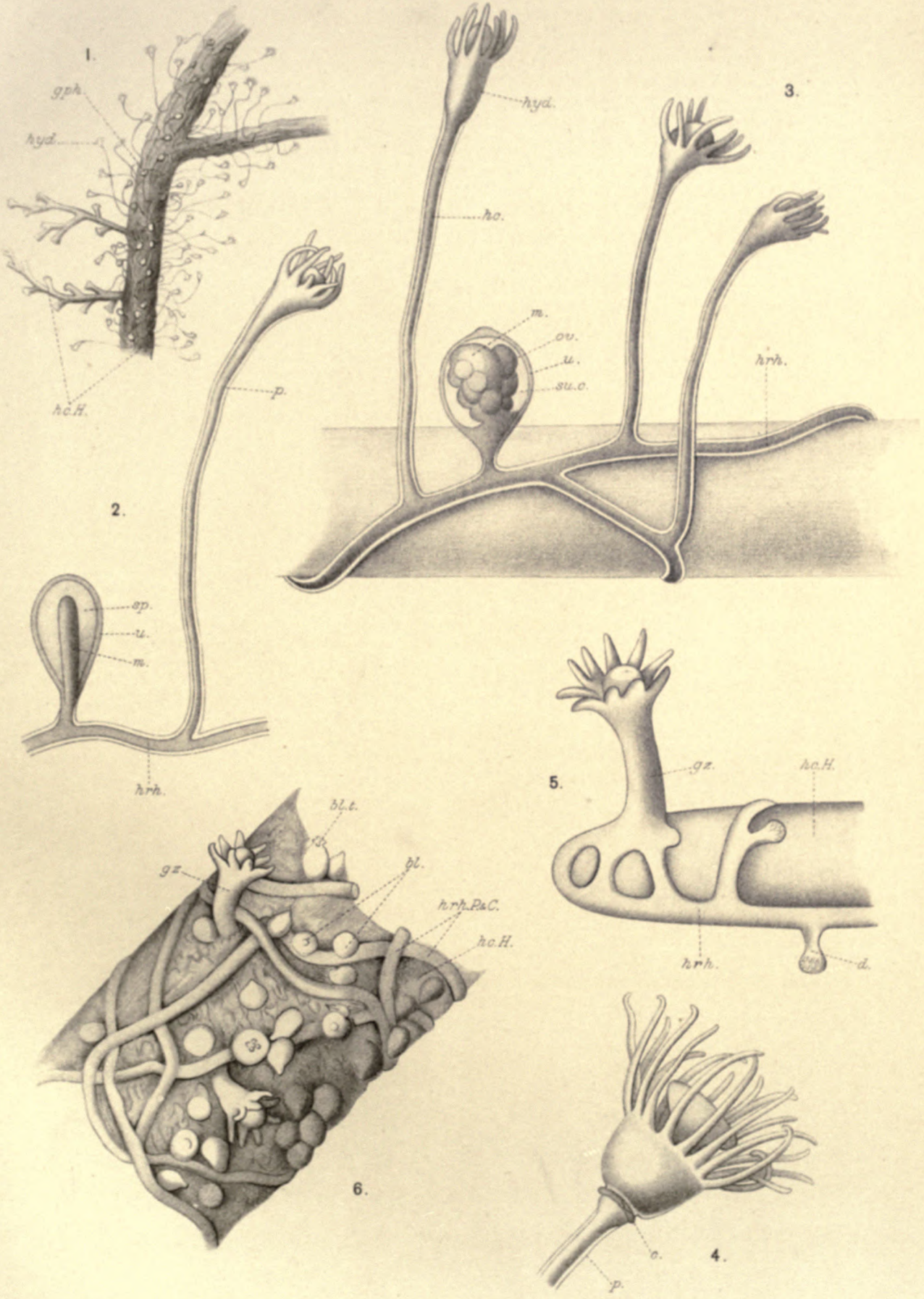
FIG. 31.—*Lafoëina longitheca* (× 50). *d.*, dactylozooid ; *hyd.*, hydranth ; *op.*, opercular flaps ; *p.*, perisarc of hydrorhiza.

FIG. 32.—Diagrammatic longitudinal section of a male gonophore of *Perigonimus antarcticus* (× 50). *ect.*, outer and inner ectoderm of umbrella in contact ; *ect. u. i.*, inner ectoderm of umbrella ; *ect. u. o.*, outer ectoderm of umbrella ; *end. m.*, endoderm of manubrium ; *end. r. c.*, endoderm rod representing the ring-canal ; *ms. m.*, mesogloea of manubrium ; *ms. l.*, mesogloeal lamella of umbrella ; *sp.*, sperm maturing from within outwards, and completely filling the subumbrella cavity ; it is omitted in the figure at *su. c.*, to give greater clearness to the different parts of the gonophore.

FIG. 33.—Diagrammatic longitudinal section of male blastostyle of *Stylactis halecii* (× 50). *c.p.*, collar of perisarc around base of zooid ; *ms.*, mesogloea ; *nc.*, nematocyst in the ectoderm ; *t.*, tentacle (entirely ectodermal) ; other letters as in fig. 32.

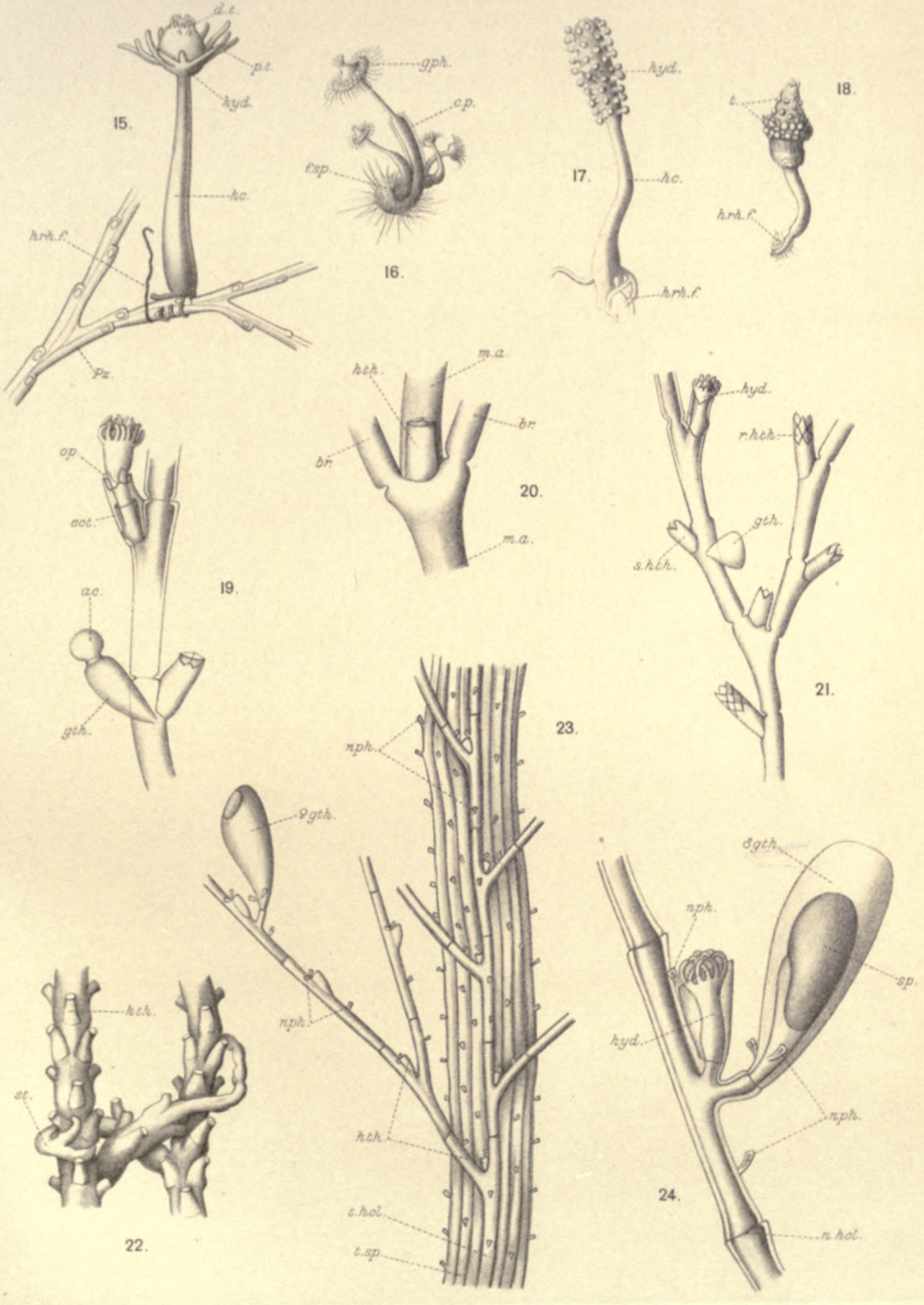
FIG. 34.—Diagrammatic longitudinal section of male gonophore of *Tubularia hodysoni* (× 50). Letters as in figs. 32 and 33.

FIG. 35.—Diagrammatic longitudinal section of female gonophore of *Lampra parvula* (× 30). *end. u.*, endoderm of umbrella ; *ov.*, ovum lying amongst the other rounded and deeply staining cells of the endocodon ; *ov. rup.*, ovum rupturing the "umbrella" and protruding part of its substance through to the exterior ; other letters as in figs. 32 and 33.



PERIGONIMUS ANTARCTICUS (1-3), EUDENDRIUM INSIGNE (4), STYLACTIS HALECII (5,6).

HYDRACTINIA DENDRITICA (7-10), TUBULARIA LONGSTAFFI (11),
T. RALPHII (12), T. HODGSONI (13), LAMPRA MICRORHIZA (14).



LAMPRA PARVULA (15,16), CORYNIDAE Sp. B (17), MYRIOTHELA Sp.? (18), SERTULARELLA SPIRALIS (19,20), S. PLECTILIS (21), DICTYOCLADIUM FUSCUM (22), PLUMULARIA GLACIALIS (23,24).

CAMPANULARIA VERTICILLATA var. grandis (25), C. LAEVIS (26), HALECIUM ARBOREUM (27-29), OBELIA GENICULATA (30), LAFOËINA LONGITHECA (31), PERIGONIMUS ANTARCTICUS (32), STYLACTIS HALECII (33), TUBULARIA HODGSONI (34), LAMPRA PARVULA (35).

III.—TENTACLES OF A SIPHONOPHORE.

Among the specimens to which Mr. Hodgson, on his return from the Antarctic, directed our attention, was an attenuated object which was the subject of a good deal of speculation. Almost simultaneously with the discovery of its hydrozoic nature, I received a copy of an interesting article by Dr. John Rennie, of Aberdeen,* which settled the question. I print Mr. Hodgson's account of his experiences, as it displays most graphically the difficulties of collecting in glacial temperatures. Dr. Rennie has been so kind as to examine the specimens, and has favoured me with the following note and sketches.—F. J. B.

THE "BOOTLACE."

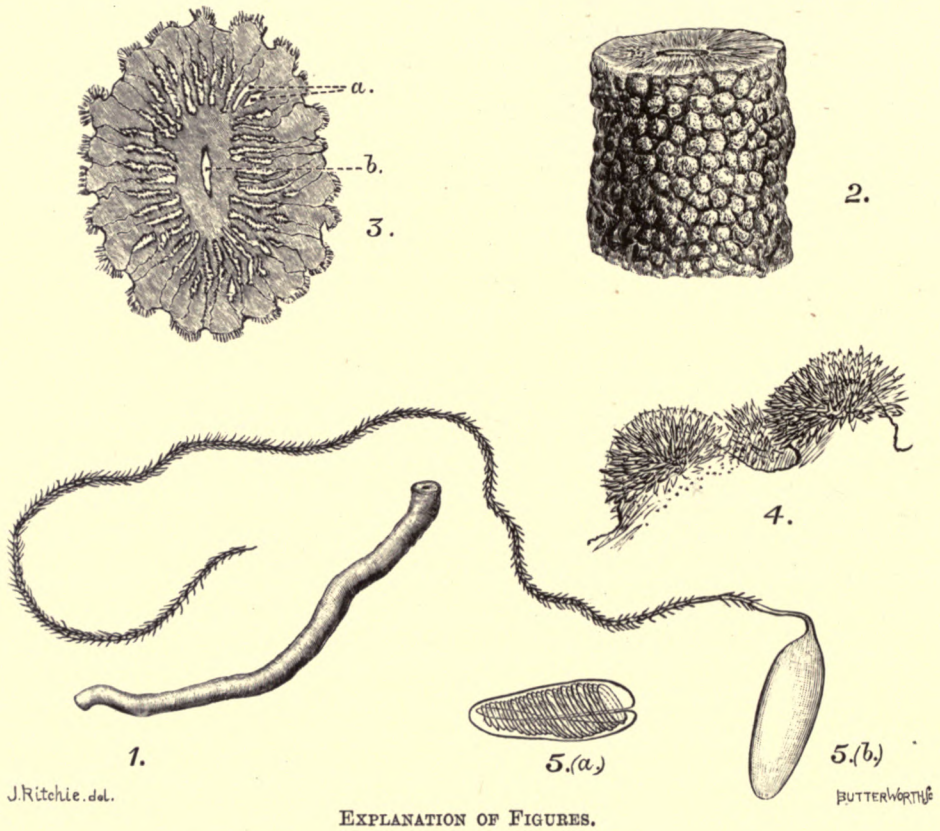
On July 1st, 1902, Lieut. M. Barne, R.N., returning from an excursion sounding through holes in the ice of McMurdo Bay, brought me a specimen of what he termed a "Nemertine," from its superficial resemblance to some more bulky and undoubted nemertines that were constantly being captured. This particular specimen was taken on the sounding-wire some 80 fathoms from the bottom, the total depth of water being 163 fathoms. It was only liberated with considerable difficulty, and arrived on board in an imperfect condition, and, of course, frozen hard. It was about as stout as an ordinary bootlace, somewhat ragged, and of a light brown colour. I judged it to be very nearly twenty feet in length. It so happened that there was no preservative material available at the time, and as sea-water could not be obtained under half an hour, the heat of the ward-room caused the specimen to disintegrate rapidly, and it was lost.

On August 1st, 1902, a stationary trap was hauled at No. 5 hole in 178 fathoms, at a distance of a mile and a half from the ship. On the swabs attached thereto were two specimens of this organism. They lay as tangled masses among the fibres of the swabs, and appeared to be about the same size, or larger, than the original specimen, but stouter and evenly cylindrical throughout. Owing to the hole being choked with ice crystals, no water could be obtained; all specimens had to be brought to the ship "dry." The temperature at this time was $-50°$ Fahr., and under these conditions the specimens were lost.

On December 1st, 1902, at No. 4 hole, the total depth of water being 41 fathoms, a tow-net had been let down to a depth of 8 fathoms. On the line immediately above the tow-net one of these organisms was entangled. As the weather was warm, little

* Scotia Collections.—On the Tentacles of an Antarctic Siphonophore. By John Rennie, D.Sc., University of Aberdeen.

below freezing point, and the water clear, it could be roughly examined before removal. The organism appeared to be an inert and delicate structure, about a quarter of an inch in diameter, which appeared to be uniform throughout its entire length, rounded at both ends, translucent and light brown in colour for the most part, though in places almost colourless. This specimen was secured, but in fragments, preserved in picric acid, and transferred to alcohol. Unfortunately the bottle in which it was kept was one of the only two which failed, and some months later was found to be



EXPLANATION OF FIGURES.

1. Piece of Tentacle. (Natural size.)
2. ,, , enlarged, showing Stinging Areas. × 18.
3. Transverse section: (*a*) Ectodermal Canal; (*b*) Endodermal Canal. × 40.
4. Stinging Areas, showing Cnidoblasts. × 280.
5. (*a*) Cnidoblast, with coiled lasso.
   (*b*) ,, , with lasso shot out. × 500.

practically dry; the specimen was then replaced in alcohol and kept under observation. No other specimen was taken, but from the date of its first capture on Lieut. Barne's sounding-line to the close of our stay in McMurdo Bay it occurred on the lines of the nets and traps frequently, probably not less than fifty times. It was usually much attenuated by being drawn somewhat rapidly through the water, and shredded on the iron bar over which the line ran. This last piece of apparatus was an essential, as the line has to be laid straight out on the ice. A wet line at those temperatures can neither be coiled nor wound on a winch. The organism usually

occupied from ten to twenty fathoms of line as it was drawn up. No time of the year can be definitely stated as to when it was most abundant.

Note by JOHN RENNIE, D.Sc., University of Aberdeen.

The specimens described as "bootlaces" consist of a number of tentacles of a Siphonophore, taken by Mr. Hodgson under the difficulties just described. The state of preservation is not very good, the parts are extremely friable, and break readily on manipulation. It is not possible to tell whether they originally formed one piece* or not. Besides smaller portions, there are nine parts, ranging in length from about 30 cm. to 6 cm., with an almost uniform diameter of 3·6 mm. The surface is in colour a dirty greyish white, and under a low power is seen to be divided up into definitely marked areas (see figs. 1–5), such as distinguish the tentacles found by the Scottish Antarctic Expedition, and described by me.† Cnidoblasts of large size are present in great abundance upon these areas. They possess a lasso, which is at least nine times the length of the cell, and which is barbed throughout its entire length. Ectodermal and endodermal canals of the ordinary type are present, and no further noteworthy features are observable. These tentacles differ from those of the Scottish Expedition, both in colour and consistency, the latter being brownish and of a markedly gelatinous nature even in their badly preserved parts. They appear to belong to a distinct and otherwise unknown form.

* Before being taken from the water the organism was unquestionably in a single piece, and was so whenever it occurred.—T.V.H.

† Proc. Royal Physical Society, Edin. XVI. (1904), p. 25–7.