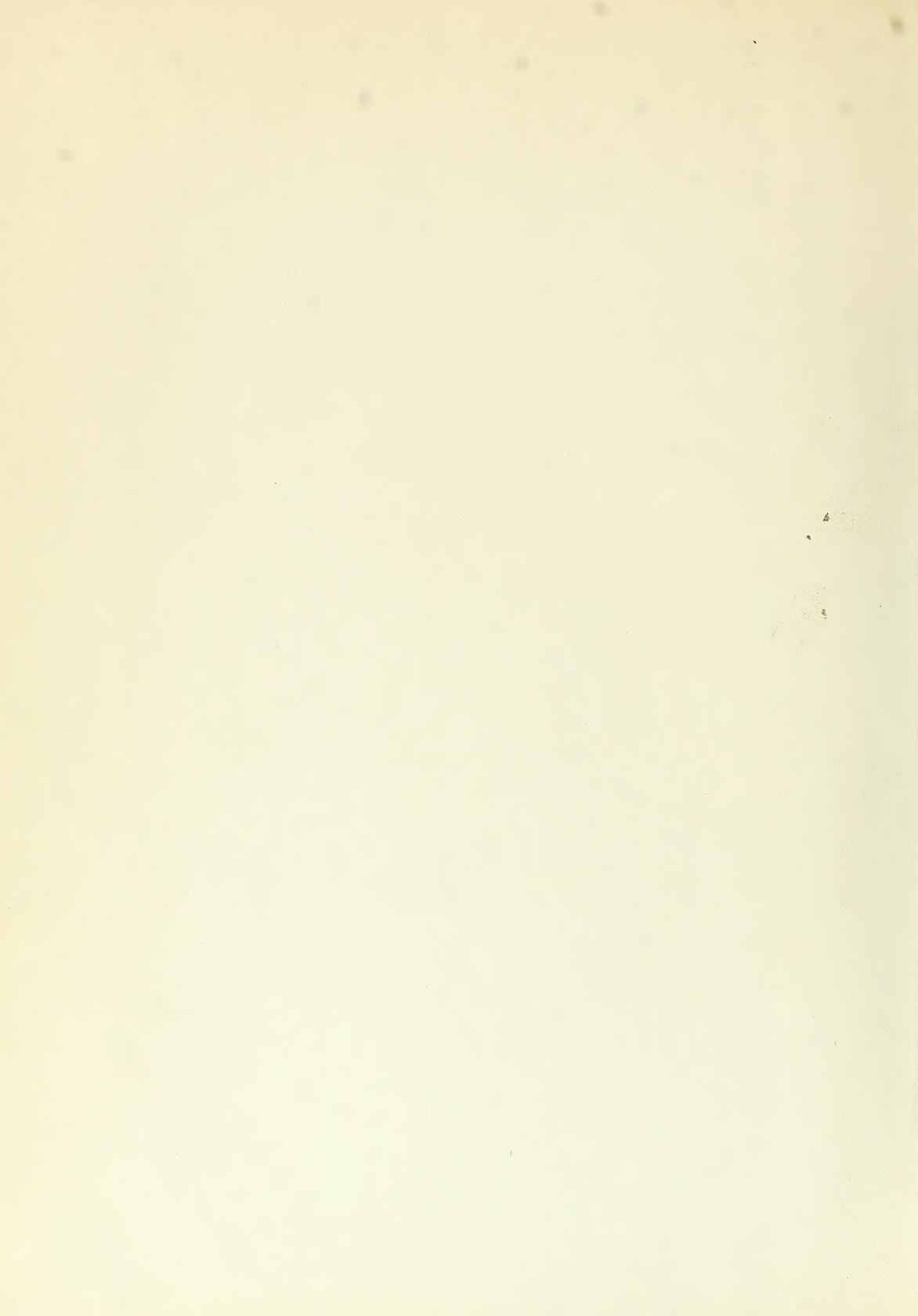


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HYDROIDS
SCOTTISH NATIONAL
ANTARCTIC EXPEDITION

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TRANSACTIONS

OF THE

ROYAL SOCIETY OF EDINBURGH.

VOL. XLV.—PART II.—(No. 18).

THE HYDROIDS OF THE SCOTTISH NATIONAL
ANTARCTIC EXPEDITION.

BY

JAMES RITCHIE, M.A., B.Sc.

The Royal Scottish Museum,
Edinburgh.

[WITH THREE PLATES.]

EDINBURGH:

PUBLISHED BY ROBERT GRANT & SON, 107 PRINCES STREET,
AND WILLIAMS & NORGATE, 14 HENRIETTA STREET, COVENT GARDEN, LONDON.

MDCCCXVII.

Price Three Shillings.





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XVIII.—The Hydroids of the Scottish National Antarctic Expedition. By James Ritchie, M.A., B.Sc., Fullerton Scholar, University of Aberdeen. *Communicated* by W. S. BRUCE, F.R.S.E. (With Three Plates.)

(MS. received May 1, 1906. Read June 21, 1906. Issued separately March 16, 1907.)

The collection of Hydroids hereafter described was made in the years 1902–4 by the Scottish National Antarctic Expedition ship *Scotia*, during her cruises in Antarctic and sub-Antarctic seas.

For the opportunity of examining the specimens I am indebted to Mr. W. S. BRUCE, the energetic leader of the expedition; and I also wish to thank Professor J. ARTHUR THOMSON for much assistance and advice in the course of my work.

The collection, as here described, contains 41 specimens, of which 33 are referable to 27 known species distributed among 15 genera, some of them being new varieties; while the remainder have required the establishment of 7 new species and 1 new genus. One specimen remains specifically undetermined. Thus there are in all 18 different genera, represented by 35 different species.

Before dealing with the detailed systematic aspect of these forms, a few general notes may be inserted:—

(1) The habitat of the forms shows considerable diversity. Sixteen of the specimens were associated with Aleyonarians, being found along with, or growing upon, those forwarded to Professor THOMSON for identification; eight occurred upon larger Hydroids; while two were creeping upon seaweed fronds. Sponges formed the foundation upon which several of the remaining colonies were erected.

(2) With the specimens were associated many types of life. Frequent diatoms and foraminifera lay within the hydrothecæ or upon the stems; various sponges rested upon or surrounded some of the branches; and there were also numerous climbing or encrusting polyzoa, a few cirripede galls, and occasional pycnogonids.

(3) Of new forms described the most interesting is one of those rare types, apart from the Plumularians, in which distinct nematophore structures have been found (ALLMAN, 1883, p. 6; QUELCH, 1885, p. 4), and for it we have formed a new genus, which we have named *Brucella* in honour of Mr BRUCE. The beautiful, highly specialised coppinia-gonosome of this type indicates close affinities with the family Lakoïdæ in which it has been placed.

(4) Another new form, belonging to the genus *Staurotheca*, is also worthy of mention as showing a development of the decussate arrangement of hydrothecæ, which necessitates a slight modification in the generic characters as originally described by ALLMAN (1888, p. 75).

(5) The occurrence among the specimens of the coppinia-gonosome of *Grammaria*, which has only within the last few months been described by HARTLAUB (1905, p. 597), is of interest, since the peculiar structure of this gonosome aggregate necessitates the transference of the genus from the neighbourhood of the Sertulariidae, where it had been placed by ALLMAN in 1888, to close proximity with the far-removed Lafœiidae.

(6) Throughout the genus *Halecium*, here represented by five species, the occurrence of minute, translucent points round the rim of the hydrotheca has been noted (Pl. II. fig. 5). These points, whose use ALLMAN did not happen to observe, are small, dome-shaped thickenings on the inside of the perisarc, placed in a ring just above the base of the hydrotheca, and to these are attached short strands from a disc-like portion at the base of the polyp, which is thus moored to the walls of its insignificant hydrotheca. Such refringent puncta are not confined to the Haleciidae, for similar structures in the same position—just above the floor of the hydrotheca—were observed in the hydrothecæ of *Obelia geniculata*.

(7) The *Scotia* collection contributes also to our knowledge of the geographical distribution of Hydroids. Thus to the already wide distribution, Arctic to Antarctic, of such forms as *Lafœa gracillima* (Spitsbergen, Norwegian coasts, British coasts, Magellan Straits, etc.) or *Obelia geniculata* (Norwegian coasts, British coasts, French coasts, Kerguelen, etc.), still another locality is added, while several new records have been made of the occurrence of less common forms.

(8) As a remarkable case of associated distribution we may refer to *Silicularia hemisphærica*, a simple Campanularian form, which has been recorded from three different localities, namely, Falkland Islands (ALLMAN, 1888), Navarin Island, Tierra del Fuego (HARTLAUB, 1905), and Gough Island (*Scotia*), and in each case it was found in close association with *Obelia geniculata*.

In classifying the specimens according to their geographical occurrence, the regions mapped out by ORTMANN (1896) and made use of by Professor HARTLAUB (1904) have been adopted. Taking these as our standard, we find that ten of our specimens fall into the Antarctic Pelagic Region, all belonging to the Southern Subregion, while twenty-nine, including all the new forms, have been found in the Antarctic Littoral Region. The remaining two were obtained at St Helena.

Before dealing with the systematic aspect of the collection, I should like to express my special indebtedness to Professor HARTLAUB'S "Hydroiden der magalhaensischen Region und chilenischen Küste" in the *Zoologische Jahrbücher* (1905), and to Professor NUTTING'S excellent monographs on the American Hydroids (1900 and 1904).

Arranging the *Scotia* specimens according to the localities in which they were obtained, we get the following list:—

ANTARCTIC PELAGIC REGION.

(a) Antarctic circumpolar subregion.

Nil.

(b) Southern circumpolar subregion.

BURDWOOD BANK, 54° 25' S., 57° 32' W. 56 fms. 1st December 1903.

- * *Hebella striata*, Allm.
- * *Calycella syringa*, Linn.
- Lafoëa antarctica*, Hart.
- * „ *gracillima* (Alder).
- * *Grammaria magellanica*, Allm.
- * *Halecium beanii*, Johns.
- * *Synthecium robustum*, Nutt.
- * *Sertularella filiformis*, var. *reticulata*, n. var.
- * „ *tenella*, Alder.
- * „ *tricuspidata*, Alder.

ANTARCTIC LITTORAL REGION.

FALKLAND ISLANDS.

(a) Port Stanley. 8th January 1903.

- * *Campanularia unguata*, Hinks.
- „ *tincta*, Hinks.
- Sertularella contorta*, Kirch.
- Plumularia magellanica*, Hart.

(b) Cape Pembroke. January 1903 to January 1904.

Sertularella contorta, Kirch.

SOUTH ORKNEY ISLANDS.

(a) MacDougall Bay. November 1903.

Obelia longissima, Pall.

(b) Scotia Bay. 25th March and 6th December 1903.

- Campanularia*, sp.
- Obelia longissima*, Pall.
- * *Halecium interpolatum*, n. sp.
- * *Staurotheca reticulata*, n. sp.
- * *Sertularella rectitheca*, n. sp.

STATION 411, off Coat's Land, 74° 1' S., 22° 0' W. 12th March 1903.

- Hebella striata*, var. *plana*.
- Halecium robustum*, Allm.

GOUGH ISLAND. 22nd April 1904.

- Silicularia hemispherica*, Allm.
- Obelia geniculata*, Linn.
- * *Brucella armata*, nov. gen. et sp.
- Halecium tenellum*, Hinks.
- Sertularella gayi*, Lamx.

CAPE COLONY.

(a) Cape Town Docks. May 1904.

- Plumularia echinulata*, Lamk.
- „ *pinnata*, Linn.

* Indicates a new record for the Geographical Region.

CAPE COLONY—cont.

- (b) 8 miles N. of Dassen Island. 18th May 1904.
Sertularella filiformis, var. *reticulata*, n. var.
 (c) Saldanha Bay. 21st May 1904.
 * *Podocoryne carnea*, Sars.
 * *Halecium halecinum*, Linn.
Thujaria pectinata, Allm.
Sertularella arborea, Kirch.
 * *Antennularia hartlaubi*, n. sp.
 * *Antennopsis scotiae*, n. sp.
 * *Plumularia unilateralis*, n. sp.
Aglaophenia dichotoma (Johns.).

ST HELENA.

- Halecium robustum*, Allm.
 „ *tenellum*, Hinks.

The systematic grouping of the species represented in the *Scotia* collection is as follows:—

I. GYMNOBLASTEÆ.

Family PODOCORYNIDÆ.

Podocoryne carnea, Sars, 1846.

II. CALYPTOBLASTEÆ.

Family HALECIDÆ.

- | | |
|--|---|
| <i>Halecium beanii</i> , Johns., 1847. | <i>Halecium tenellum</i> , Hinks, 1861. |
| „ <i>halecinum</i> , Linn., 1758. | „ <i>interpolatum</i> , n. sp. |
| „ <i>robustum</i> , Allm., 1888. | |

Family CAMPANULARIIDÆ.

- | | |
|---|--|
| <i>Campanularia angulata</i> , Hinks, 1861. | <i>Silicularia hemisphærica</i> , Allm., 1888. |
| „ <i>tincta</i> , Hinks, 1861. | <i>Hebella striata</i> , Allm., 1888. |
| „ sp. | „ <i>striata</i> , var. <i>plana</i> , n. var. |
| <i>Obelia geniculata</i> , Linn., 1758. | <i>Calycella syringa</i> , Linn. |
| „ <i>longissima</i> , Pall., 1766. | |

Family LAFOËIDÆ.

- | | |
|--|---|
| <i>Lafoëa antarctica</i> , Hartlaub, 1905. | <i>Grammaria magellanica</i> , Allm., 1888. |
| „ <i>gracillima</i> (Alder, 1857). | <i>Bruceella armata</i> , n. gen. et sp. |

Family SERTULARIIDÆ.

- | | |
|--|---|
| <i>Sertularella arborea</i> , Kirch., 1884. | <i>Sertularella tricuspidata</i> (Alder, 1856). |
| „ <i>contorta</i> , Kirch., 1884. | „ <i>rectitheca</i> , n. sp. |
| „ <i>filiformis</i> , var. <i>reticulata</i> , n. var. | <i>Thujaria pectinata</i> , Allm., 1888. |
| „ <i>gayi</i> , Lamx., 1821. | <i>Syntheicum robustum</i> , Nutt., 1904. |
| „ <i>tenella</i> (Alder, 1857). | <i>Staurotheca reticulata</i> , n. sp. |

Family PLUMULARIIDÆ.

| | |
|---|---|
| <i>Aglaoiphentia dichotoma</i> (Johns.). | <i>Plumularia unilateralis</i> , n. sp. |
| <i>Plumularia echinulata</i> (Lamk., 1836). | <i>Antennularia hartlaubi</i> , n. sp. |
| „ <i>magellanica</i> , Hart., 1905. | <i>Antennopsis scotica</i> , n. sp. |
| „ <i>pinnata</i> , Linn. | |

I. GYMNOBLASTEÆ.

Family PODOCORYNIDÆ.

Podocoryne carnea, Sars, 1846.

Encrusting three Gasteropod shells from one locality there occur gymnoblastic colonies which cannot be separated from the above species. The nutritive hydranths bear from 8 to 15 tentacles, 12 being most common, while the gonophore-bearing individuals possess only 5 or 6. All the hydranths are in a contracted state, some of the larger measuring about 0·8 mm. in height. Short chitinous spines stud the investing crust at irregular intervals.

The gonophores are borne in threes or fours beneath the tentacles. The medusoid has 8 tentacles, 4 larger and 4 smaller.

Locality, etc.—On empty shells of *Nassa crepidula* from Saldanha Bay, Cape Colony. Trawl. 19th May 1904.

II. CALYPTOBLASTEÆ.

Family HALECIIDÆ.

Halecium beanii, Johnstone, 1847.

Two fragments occur, one 4, the other 7 cm. high. The characters of the species are well shown in the specimens; the polysiphonic stems and branches which distally become monosiphonic; the pinnate arrangement of the branches; the extreme delicacy of the ramuli, especially in the distal regions; the frequent tiers of hydrothecæ and the peculiar female slipper-shaped gonothecæ, with their openings placed medianly instead of at the extremity. In the present specimens, as in ALLMAN'S (1888), only slipper-shaped gonothecæ occur. We note, however, that while the hydrothecæ are in some cases set on a "short basal offset from the distal end of each internode" (ALLMAN, 1888, p. 12), in the majority of cases the primary hydrotheca arises directly from and lies almost against the distal end of the internode, as figured by HARTLAUB (1905, p. 606, fig. B³, *a* and *b*). From within these primary basal hydrothecæ arise the tiers which are so common in the species.

Locality, etc.—Fathoms, 56. Date, 1st December 1903. Burdwood Bank.

Halecium halecinum, Linn., 1758.

A thick clump of stout fascicled stems and branches from the entrance to Saldanha Bay. The stems and branches are truncated at an almost uniform height, are of a dark brown colour, and bear small, hydrotheca-bearing shoots of a pale brown, and evidently of younger age. The general appearance suggests that some agency having damaged the old-established branches, the colonies have made an effort to survive by sending out many small, much-branched shoots from the older and unharmed portions of the stem.

The architecture is similar to that described by HINKS. The hydrothecæ are alternate, one towards the distal end of each internode. They are generally sessile, as described and figured by BILLARD (1904, p. 161) for young branches, and frequently they contain the base of a tier of one or two secondary cups. Rarely in place of such a tier there arises a blind regenerative stolon, the true branches arising just below the hydrothecæ. Thus it comes about that a tier of hydrothecæ frequently appears in the angle between a branch and its offshoot. Small refringent points are present round the edge of the hydrotheca as in the other species of the genus (*vide* p. 525).

Gonosome.—The gonangia, of which only male are present, occur in densely packed rows. They agree with HINKS's description and figure, being slenderly ovate and narrowing proximally into a short stalk with about two rings.

Locality, etc.—Entrance to Saldanha Bay, Cape Colony, in 25 fathoms. Date, 21st May 1904.

Halecium robustum, Allman, 1888.

A fragment of a strongly fascicled, upright, much-branched colony 5 cm. in height. The branches lie roughly in one plane and are often bent at sharp angles, the older rising irregularly from the stem, while the younger are approximately alternate, and arise from the side of the proximal segment of the hydrotheca. The internodes, which are long, but whose length varies from 0.6 to 1.5 mm., are separated by slanting nodes and bear at their distal ends alternate hydrothecæ 0.2 mm. in diameter from margin to margin, adnate at one side to the internode, with an insignificant, non-everted limbus, and rarely with a tier of one or two secondary hydrothecæ. The proximal ends of the internodes are marked by slight annulations. Around the inside of the limbus are situated small, light-refracting prominences, to which, as in the other members of the genus, are attached strands keeping in place a fleshy disc at the base of the hydranth which cuts off the perisarcal cavity from the exterior. The hydranths are large and have a great number of tentacles.

Gonosome.—Not present.

Localities, etc.—(a) Station 411, off Coat's Land. Lat., 74° 1' S; long., 22° 0' W. Depth, 161 fathoms. Surface temperature, 28°.9. Date, 12th March 1904.
(b) St Helena.

The specimens differ from that figured by ALLMAN (1888) in that the branches

frequently have at their bases at least one athecate internode connecting the stem process with the hydrophore-bearing portions of the branch. The present specimens are also frequently annulated, while ALLMAN's figures indicate that the original was smooth.

Halecium tenellum, Hinks, 1861. (Pl. II. fig. 4.)

Several specimens of an extremely delicate and graceful hydroid colony, growing in bunches on the exposed axis of an Aleyonarian, are referable to this species. As HINKS's description appears to be rather vague, I give a detailed description of the specimens. The colonies are short, generally about 15 mm. in length, with unfascicled stems and irregular branches, which arise from the distal ends of the internodes, and in some cases, at least, from the base of a hydrophore. The branches lie for the most part in one plane.

The stem is thin, having near its base a diameter of a little over 0.1 mm., and, like the branches, it is divided into long slender internodes whose length varies between 0.8 and 0.9 mm. The internodes are separated by slanting nodes, between which the stem zigzags, and on each side of which are annular constrictions. The hydrothecæ, which are alternate and lie in one plane, are borne on short processes at the distal ends of the internodes. They are cylindrical, trumpet-shaped, with a large, beautifully everted limbus, and are usually prolonged by several similar segments (from two to five in number), at the bases of which, on a level with the margin of the next lower limbus, arise well-marked annulations. The diameter of a limbus from margin to margin is 0.15 mm.

The fleshy parts are in good condition, and the following points were observed:—The hydranths are large and not wholly retractile, measuring, from mouth of hydrotheca to summit of hypostome, when extended, 0.3 mm. Just above the neck there is a well-defined bulge, and above this again a disc, from the margin of which arise the tentacles, about sixteen in number, enclosing the conical hypostome. Across the interior of the hydrotheca, at the level of the base of the everted limbus, stretches a flattened fleshy disc supported by a perisarcial septum through which, by a small aperture, the coenosarc passes. The disc is moored in its place by numerous delicate strands attached to the perisarc at rather irregular intervals. At the points of attachment there arise from the limbus small, dome-shaped prominences, which, refracting the light, appear as minute, clear dots—the “refringent puncta” of the Challenger Report. The prominences are rather irregularly arranged just above the level of the septum, on which the coenosarcial disc lies, and vary in number from about sixteen to twenty on each limbus.

Gonosome.—The gonangia are ovate, broad in the proximal region, obtusely pointed in the distal. They are supported on short stalks which arise from the sides of the hydrothecæ, and always from the lowest segment in any hydrotheca-tier. They are 0.9 mm. in length by 0.45 mm. in maximum diameter.

Localities, etc.—(a) Growing on the axis of an Alcyonarian (*Thouarella*), and dredged off Gough Island, lat. 40° 20' S, long. 9° 56' W., at a depth of 100 fathoms. Date, 22nd April 1904. (b) St Helena.

Halecium interpolatum, n. sp. (Pl. I. fig. 3; Pl. II. fig. 3.)

A number of colonies, the largest about 4 cm. high, have been found in a shore-pool. The colony is fasciated for the most part, but becomes monosiphonic distally. In the older colonies the lower portion of the stem, which is less than 1 mm. in diameter, is usually destitute of important branches, while the upper portion bears long flexuous branches, often 15 mm. in length, which leave the stem at acute angles and in different planes. This structure gives the colonies the appearance of a miniature tree. The branches arise either singly from the basal segment of a hydrotheca or directly from the hydrocaulus, in diverging pairs, one being at a slightly higher level than the other.

The stem and branches are divided into slender internodes of very different lengths, varying from over 1 mm. to 0·4 mm., and marked at both ends by an annulation. The hydrothecæ are alternate, and are borne at the distal ends of the internodes, two thecate internodes being almost invariably separated by one or more atehcate internodes. Very frequently a short, annulated, hydrotheca-crowned branch arises from the basal segment of a primary hydrotheca. The hydrothecæ are usually simple, consisting of a strongly annulated peduncle about 1 mm. long, surmounted by a well-everted limbus measuring 0·2 mm. from margin to margin. Occasionally a second limbus arises on a short stalk within the first. Around the limbus occurs the row of refringent prominences found throughout the genus, and here, as in the other cases which have been examined, they serve as attachment points for strands supporting a disc at the base of the polyp.

Gonosome.—Not present.

Locality, etc.—Off rocks in shore-pool. Temperature, 30°–32°. Scotia Bay, South Orkneys. 6th December 1903.

One of the branches ended in peculiar, stolon-like outgrowths, as is shown in fig. 3, Pl. II. The specimens, which have probably been cast by some storm into the shore-pool in which they were found, are in poor condition, being almost wholly overgrown by polyzoa. The specific name is intended to suggest the presence of the characteristic atehcate intermediate internodes.

Family CAMPANULARIIDÆ.

Campanularia angulata, Hinks, 1861.

Several specimens about 1 cm. high were found creeping on an alga. The specimens agree with HINKS's description:—slightly branched stems ringed above the origin of the pedicels; strongly ringed pedicels, usually with nine rings, sometimes with only about

five, and tapering somewhat towards their distal ends; hydrothecæ campanulate, even-rimmed, usually on long pedicels. In the present specimens there are present none of the tendril-like stolons mentioned by most writers, but this is not surprising, since in most cases the distal end of the colony is wanting.

Gonosome.—Not present.

Locality, etc.—Port Stanley, Falkland Islands; 64 fathoms. 3rd February 1904.

Campanularia tineta, Hinks, 1861.

This species is represented from one locality, that from which HARTLAUB (1905) has described his specimens. The *Scotia* specimens, while apparently belonging to this species, show a considerable resemblance to *C. cylindrica*, Allm. (1876, p. 114), from which they differ in their diminutive size and in the absence of ringing at the base of the peduncle. The present specimens, which are from 1.5 to 2 mm. high, have a corrugated peduncle averaging some 0.9 mm. in height and surmounted by a ball-like segment which bears the hydrotheca. The hydrothecæ are about 0.7 mm. long by 0.3 mm. in diameter, almost cylindrical, and narrow sharply at the base. The margin is divided into twelve blunt teeth and is frequently marked by a regeneration line. The gonosome is wanting.

Locality, etc.—Creeping on weathered hydroid stems, Port Stanley, Falkland Islands. 3rd February 1904.

Campanularia, sp. (Pl. I. fig. 2.)

Lack of material forbids the assigning of a specific name to this form. Delicate simple stems about 3 mm. high and 0.05 mm. in diameter arise at irregular intervals from a creeping tubular stolon. The hydrothecæ are deep, campanulate, 0.8 mm. in length by 0.5 mm. in greatest diameter, with their cavity cut off from that of the stem by a distinct partition. Their margin is divided into twelve or fourteen teeth, a delicate line sometimes following the curves of the teeth just within the edge. The hydrothecæ, which are marked by delicate, longitudinal lines passing from the notches between the teeth to the base, are borne upon peduncles about 3 mm. long with several rings at the top. These rings seem to be fairly constant, two deep constrictions giving rise to two ball-like divisions which are followed by an indistinctly ringed portion of the peduncle, cut off from the remainder, which is smooth, by another deep constriction.

Gonosome.—Not present.

Locality, etc.—Growing on *Staurotheca reticulata*, Scotia Bay, South Orkneys. Depth, 65 fathoms. Date, 25th March 1903.

The specimen approaches *C. Hinksii* (Alder, 1857), but the typical campanulate form of the hydrothecæ, the blunt teeth, and the peculiar markings on the peduncle, distinguish it from the parallel-sided hydrothecæ, the square-topped teeth, and the

characteristic ringing of *C. Hinksii*, where the first annulation is included in the base of the hydrotheca. From *C. cylindrica*, Allm., and *C. tineta*, Allm., it is also distinguished by its campanulate form and its peduncle characters.

Obelia geniculata, Linnæus, 1758.

Several specimens of this well-marked species were obtained growing on the fronds of a large seaweed—*Macrocystis pyrifera*.

The hydrotheca-bearing shoots, which are generally simple and average only 12 mm. in height, arise from a creeping stolon which ramifies over the surface of the seaweed frond. The trophosome agrees with the description in HINKS's *British Hydroid Zoophytes*, but here the annulations on the peduncle are rather more variable—two or three as well as a larger number being common. Within the hydrotheca, a short distance from the base, a perisarcal ridge is well marked, supporting the flattened basal portion of the polyp. Just above this bracket there occurs an irregular ring of minute refringent spots—small prominences on the inner side of the hydrotheca wall—to which the basal disc of the polyp is attached. These prominences resemble and serve the same purpose as those found throughout the genus *Halecium* (*vide* p. 525). The polyps are well preserved, and show well the large, trumpet-shaped proboscis.

Gonosome.—Absent.

Locality, etc.—Growing on the fronds of *Macrocystis pyrifera*, Gough Island. Lat., 40° 20' S.; long., 9° 56' W. Date, 22nd April 1904.

Obelia longissima, Pallas, 1766.

A large number of weather-beaten colonies were found in the South Orkneys. The specimens are about 8 cm. high and agree closely with HINKS's description and figures. The hydrothecæ are mostly awaiting; those which remain are fragile and much crushed, and probably as a consequence I was unable to detect the blunt teeth which mark the rim. The pedicels, which taper towards the top, are usually altogether ringed, but sometimes only in the proximal and distal regions, the median portion being smooth. A pedicel was frequently noted springing from the axil between branch and branchlet, as mentioned by HINKS (1868).

Subsequent specimens, residue from the seaweed collections, were in better condition.

Gonosome.—Wanting.

Localities, etc.—(a) Macdougall Bay, South Orkneys. November 1903. (b) Off rocks in shore-pool, Scotia Bay, South Orkneys. Temperature, 30° to 32°. Date, 6th December 1903.

The specimens from both localities appear to have been exposed to weathering for some time. Those from (b) especially show traces of rough usage, the branches being

broken off not far from their origin, while the greater number of the stems are covered with polyzoan growths.

Silicularia hemispherica = *Hypanthea hemispherica*, Allman, 1888.

The only representative of this genus in the *Scotia* collection occurs on the frond of *Macrocystis pyrifer*, from Gough Island. The specimens bear out HARTLAUB'S opinion that the length of the peduncle, varying as it does to a considerable extent, is not a safe specific character, for here various peduncles measure 6, 5, 4, 3, 1 mm. In so simple a genus distinctive specific characters are not easily obtained, but the following point to identity with *S. hemispherica*:—Hydrocaulus, creeping, branched, bearing at varying distances pedunculate hydrothecæ and gonangia which usually alternate with one another. The peduncles are exceedingly variable in length, rather less in diameter than the hydrocaulus, with a distal swelling, succeeded by a globular segment, and this in turn by the hydrotheca. The hydrotheca is conical, almost as broad as long, about 0·7 mm. high by 0·5 mm. in greatest diameter, with a markedly oblique margin.

The gonangia are 2 mm. long by 0·6 mm. in diameter, narrowing slightly towards the opening, and considerably towards the base, where they are supported by a distinct peduncle. They are never grouped on the hydrocaulus.

Locality, etc.—Creeping over the fronds of *Macrocystis pyrifer*, Gough Island. Lat., 40° 20' S.; long., 9° 56' W. Date, 22nd April 1904.

Hebella striata, Allman, 1888. (Pl. I. fig. 7.)

Several specimens of the beautiful species described by ALLMAN in the Challenger Reports occur creeping on the stems and branches of various larger Hydroids. The hydrothecæ are large, almost 1 mm. in length by from 0·22 to 0·25 mm. in diameter, cylindrical, borne on short, untwisted peduncles varying in length from 0·25 to 0·4 mm. In some the characteristic ringing exists only on the lower half of the wall, part towards the margin being smooth. The hydranths are in all cases contracted, and in this state occupy only the lower half of the hydrotheca. They are in good condition, and show in their contracted state a bulging body, separated from a fleshy disc at the base of the hydrotheca by a marked constriction, and surmounted by another constriction from above which arises a whorl of tentacles. Within the tentacles there arises a conical hypostome.

Gonosome.—Not present.

Locality, etc.—Creeping on the stems and branches of *Lafoëa gracillima*, *Grammaria magellanica*, *Sertularella filiformis*, Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W.; 56 fathoms. 1st December 1903.

Hebella striata, var. *plana*, n. var. (Pl. I. Fig. 8.)

A colony creeping upon *Halecium robustum*, whose habit and general appearance resemble those of *H. striata*. The hydrothecæ, however, are rather larger, 1·3 to 1·4 mm. in length by 0·28 mm. in diameter, and show no hint of the annular thickenings of perisarc which form the characteristic striations. Marginal reduplications were noted in some cases, while a solitary peduncle was marked by a thickened ring near its base.

Gonosome.—Not present.

Locality, etc.—Creeping on the stems and branches of *Halecium robustum*, from Station 411. Lat., 74° 1' S.; long., 22° 0' W. Depth, 161 fathoms. Surface temperature, 28°·9. 12th March 1904.

In none of the true *H. striata* colonies did there occur hydrothecæ with more than about a third of their surface smooth, the remainder of course being striated, and even these were exceptional. Hence an entirely smooth hydrotheca seems worthy of being considered a distinct variety.

Calycella syringa, Linnæus, 1758.

Arising from a tubular, creeping stolon are several minute, extremely delicate, almost campanulate hydrothecæ whose cavities are separated from those of their peduncles by thin partitions. They are operculated, and are borne on peduncles of variable length which are always marked by many strong annulations.

The absence of gonosomes and the unsatisfactory state of the hydranths render accurate identification impossible, but the trophosome agrees with Hinks's (1868) description of *C. syringa*, except in that the "horn-colour" is lacking.

Measurements.—Hydrotheca: length, including operculum, 0·2 mm.; diameter, 0·1 mm. Peduncle: length, 0·2 mm.

Locality.—Burdwood Bank. Lat., 54° 25' S.; long., 57° 31' W. 56 Fathoms. 1st December 1903.

Family LAFOËIDÆ.

Lafoëa antarctica, Hartlaub, 1904.

The above species occurs on the stems and branches of *Sertularella filiformis*. It agrees in all respects with the description given by HARTLAUB. The large number of the regeneration rings on the hydrothecæ is especially noticeable—six being not unusual. The length of the hydrothecæ, from where they leave the stem at right angles, to the margin, averages 5 or 6 mm., while the diameter is about 1·25 mm.

Locality, etc.—Creeping on the branches of *Sertularella filiformis*, from Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W. Fathoms, 56. Date, 1st December 1903.

Previous Locality.—70° 23' S.; 82° 47' W.

Laföia gracillima (Alder, 1857).

Several specimens referable to this species occur growing on the horny axis of an Alcyonarian. They agree in all but size with the specimens described by BONNEVIE (1899), the largest reaching a height of only 3 cm., while the general size lies between 2 and 3 cm. The colonies are erect and branched, without any distinct stem, the greater number of the branches lying in one plane and showing a tendency to be more strongly developed on one side. Except towards the tip, where they are monosiphonic, the branches are fascicled. The hydrothecæ are long narrow cylinders 0.5 mm. in length by 0.1 mm. in greatest diameter, sometimes with reduplication rings round their margins. They arise irregularly from all sides of the hydrocaulus, and are borne on loosely twisted peduncles bearing two turns of a spiral.

Gonosome.—Not observed.

Locality, etc.—Growing on the axis of an Alcyonarian (Gorgonid) in 56 fathoms. Date, 1st December 1903. Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W.

Grammaria magellanica, Allman, 1888. (Pl. I. figs. 4, 4A.)

Three colonies varying in height from 6 cm. to 16 cm., and in breadth from 7 cm. to 12 cm. The stem is fascicled and thick, reaching just above the base a diameter of about 3 mm. and gradually tapering towards its summit. In two of the specimens it divides about 1 cm. above the base into two or three equally developed, strong branches, and these, together with the stem itself in the other specimen, bear along their length usually alternate ramuli, which sometimes reach a length of 14 cm. These primary ramuli bear secondary, and these again may bear tertiary, pinnæ-bearing branches. On all the branches, and on the main stem between the branches, there are alternately-set pinnæ usually between 10 mm. and 15 mm. in length, which become greatly constricted at their point of origin. All the branches and pinnæ lie in one plane, and in the largest specimen anastomosis occasionally occurs between them. The hydrothecæ are placed in successive planes, in whorls of three, which alternate with one another so that there are six longitudinal rows on the colony. They are cylindrical, and have a circular opening with an even, non-everted margin.

Gonosome.—The gonangia are grouped together into irregular bunches which surround portions of the stem and the bases of such branches as arise from these portions. In the largest of the three colonies two bunches of clustered gonangia were found, the larger 30 mm. long by 3 mm. in diameter, the smaller 20 mm. long by about 2 mm. in diameter, while on another colony a still smaller cluster occurred. These coppiniæ are elongated clusters of compressed gonangia growing closely around the stem for a considerable distance, and bristling with minute projecting tubes which are without the irregular bendings figured by HARTLAUB (1905). Under the microscope the cluster resolves itself into a large number of hexagonal cells, closely resembling honey-

comb—the compressed gonangia—from among which spring many short, uncoiled tubes 0·4 to 0·5 mm. in length.

Locality.—Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W. Depth, 56 fathoms. 1st December 1903.

As the species was named by ALLMAN from small fragments, and as subsequent specimens collected by PAESSLER in 1893 off Australia were also fragmental, I have thought it necessary to give a rather full account of the structure of the colony to supplement the original description. Since HARTLAUB figures only longitudinal and transverse sections of the coppinia (HARTLAUB, 1905, p. 597), representations of the general appearance and magnified surface view have been here included.

Brucella, nov. gen.

We have named this genus after Mr BRUCE, the leader of the expedition.

Generic Characters. Trophosome.—Stem and branches fascicled for the most part, becoming monosiphonic distally; consisting of an axial tube predominantly hydrotheca-bearing, surrounded by peripheral tubes which may occasionally bear hydrothecæ and nematophores. Hydrothecæ tubular, fastened by their bases to a process of the hydrocaulus, their cavity being distinctly differentiated from that of the peduncle. Each hydrotheca is accompanied by a basal pair of nematophores.

Gonosome.—A coppinia, that is, a bunch of clustered gonangia surrounding the hydrocaulus, from which a number of delicate tubes arise.

The genus shows affinities with *Perisiphonia*, Allman (ALLMAN, 1888, p. 43) and *Zygophylax*, Quelch (QUELCH, 1885, p. 4). From the former it can be distinguished by its manner of fascicling, its arrangement of nematophores, and, perhaps not so certainly, by the shape of the hydrothecæ. The chief points of difference are summarised in the following table:—

| <i>Perisiphonia.</i> | <i>Brucella.</i> |
|--|---|
| Axial tube completely enveloped. | Axial tube not completely enveloped. |
| No hydrothecæ on peripheral tubes. | Scattered hydrothecæ on peripheral tubes. |
| Nematophores frequent and regular on peripheral tubes. | Nematophores scattered and irregular on the peripheral tubes. |
| Nematophores present or absent from axial tube. | Two nematophores at base of each hydrotheca on axial tube. |
| Hydrothecæ flask-shaped. | Hydrothecæ tubular. |

From *Zygophylax*, to which it is closely allied, it can readily be distinguished by the distinct differentiation of the hydrotheca cavity from that of the peduncle, and by the scattered nematophores on the peripheral tubes.

A portion of a specimen when softened in caustic potash and dissected, showed a central, predominantly hydrotheca-bearing tube, surrounded by peripheral tubes, which were sometimes simple, sometimes branched, and sometimes bearing scattered hydrothecæ and nematophores. The structure of the fasciculation seemed to resemble that

in *Sertularella gayi* as described by NUTTING, 1904, p. 6, although I found difficulty in tracing the peripheral tubes to their origin. The peripheral tubes certainly never become hydrotheca-bearing to the same extent as in *Sertularella gayi*.

The characters of the trophosome, and especially of the gonosome, appear to indicate close relationship with the Lafoëidæ, in which family the genus has accordingly been placed.

Brucella armata, n. sp. (Pl. II. figs. 2A, 2B, 2C.)

Several specimens have been obtained of a colony for which the above new genus has been formed. The colonies, which are erect and much branched, with both stem and branches thickly fascicled, reach in some cases a height of 6 cm. by a similar breadth. Owing to this great breadth, as compared with height, and to the fact that the many branches lie in one plane, the colony assumes a somewhat flabellate appearance. It is of a pale brown colour, becoming lighter towards the tips of the branches. Except distally, where for a short distance they become monosiphonic, the stem and branches are fascicled, consisting of an axial tube, predominantly hydrotheca-bearing, surrounded by peripheral tubes which may bear occasional hydrothecæ and scattered nematophores. The main *branches*, which may reach a length of 5 cm., leave the stem at irregular intervals, although frequently there is an approximation to alternate arrangement, while those borne by the main branches are regularly pinnate and alternate and are rarely branched. All the branches lie in one plane, and arise from below a hydrotheca, which then lies in the axil of the branch. The cavity of the axial tube is continuous; the tube is not divided into internodes, but bears alternately at regular intervals small processes to which the hydrothecæ are attached. The *hydrothecæ* are biserial, alternate, tubular, with an entire margin which is not parallel to the axis of the hydrocaulus. Their upper side is curved, while the lower is almost straight, and their cavity is cut off from that of the rest of the colony by a strong septal ridge at their junction with the hydrocaulus process. Above this occur one or two delicate, membranaceous intrathecal septa apparently stretching across the cavity of the hydrotheca, while near the edge there are usually two or three lines indicating the presence of marginal reduplications. The length of the hydrothecæ from basal septum to margin is between 0.3 and 0.35 mm., while the greatest diameter is from 0.13 to 0.15 mm. Towards the base they become constricted and rest upon a short process of the hydrocaulus, from each side of which springs a nematophore. The *nematophores* are small, only 0.1 mm. long by 0.04 mm. in diameter, and resemble those found in some of the Eleutheroplean Plumularians, consisting of two joints, the proximal, a narrow tube, the distal, a wider tube opening out slightly towards the margin, round which there is frequently a reduplication line. This whole two-jointed structure is sometimes loosely incased in an unjointed tube. Scattered nematophores of similar structure occur frequently but irregularly on the peripheral tubes. The form of the hydranth could not be distinguished.

Gonosome.—On one specimen were found two clusters of gonangia, the larger measuring 5 mm. in length by 3 mm. in diameter, the smaller 5 mm. by 2 mm. The clusters or coppiniæ form elongated ovals surrounding the stem and the bases of branches in the neighbourhood. They consist of numerous gonangia so closely packed that the sides become compressed and the whole assumes a honeycomb-like structure consisting of a dense mass of polygonal, usually hexagonal, cells, the majority of which communicate with the exterior by an exceedingly short tube. Issuing from this gonangial cluster are frequent tubes of various shapes; a few, especially at the ends, are merely two-jointed tubes like cauline nematophores with their basal joint elongated, while the majority consist of a longer tube 1 mm. in length bearing alternate biserial nematophore-like bodies identical in structure with the nematophores on the trophosome.

Locality, etc.—Growing on the axis of an Alcyonarian (Gorgonid), and dredged off Gough Island, lat. 40° 20' S., long. 90° 56' W., at a depth of 100 fathoms. Date, 22nd April 1904.

The colonies were growing on the horny axis of a Gorgonid Alcyonarian, and appear to have been lying untenanted for some time, for not only has the coenosarc almost wholly disappeared, but foraminifera frequently occur within the hydrothecæ, while barnacles and polyzoa, including a beautifully ringed, snake-like form, *Anguinaria spatulata*—a rare British species—occur growing on the colony.

Family SERTULARIIDÆ.

Sertularella arborea, Kirchenpauer, 1884.

This species is represented by some colonies growing on lamellibranch shells, the largest reaching a height of 8 cm. The specimens possess the characteristics described by HARTLAUB (1900):—Compound stems and branches; branches pinnate and alternate, arising beneath a hydrotheca and divided by slanting nodes into very *short, stout internodes*, each of which bears a hydrotheca; hydrothecæ adnate for about two-thirds of their length, with walls of unequal thickness and hints of *intracalycine teeth*; margin divided into *four small, equal teeth*. Gonotheca very long (about 3 mm.) and narrow, often smooth, sometimes with faint signs of ringing, usually bearing at the distal end four minute teeth, and always arising from between the internode and the side of the hydrotheca near the margin. The specimens show no variations which have not been noted by HARTLAUB (1900).

Locality, etc.—Entrance to Saldanha Bay, Cape Colony; 25 fathoms. Date, 21st May 1904.

Sertularella contorta, Kirchenpauer, 1884.

Several specimens of this species have been obtained from two localities. They are bushy colonies reaching to a height of slightly over 7 cm., almost destitute of branches

near the base, but profusely branched distally. Except in the following unimportant details, the specimens agree with those previously described. While the annulations at the bases of the branches are well marked, the constrictions in the internodes are neither so frequent nor so distinct as those of former specimens. The gonangia closely resemble those described and figured by NUTTING (1904, p. 85). The annulations vary in number, in some cases disappearing altogether in the proximal portion of the gonangium. The teeth at the summit of the gonangium also vary in number; sometimes they seem to be absent, as in KIRCHENPAUER'S specimen (1884), sometimes two are present, as described by NUTTING, but in the present specimens three is also an occasional number.

Localities.—(a) Falkland Islands, Port Stanley. Date, 8th January 1903. (b) Cape Pembroke; shore. January 1903 to January 1904.

It is interesting to note that the present specimens were found in the same locality as were those from which the original description of the species was made by KIRCHENPAUER some twenty years ago.

Sertularella filiformis, var. *reticulata*, n. var.

Several colonies referable to this species have been found, usually growing on polyzoon crusts, in two localities. Of the colonies, which are profusely branched and loaded with gonangia, those from locality (a) reach a height of from 5 to 6 cm. while those from (b) are considerably smaller. The hydrothecæ are adnate to the stem for 0·27 mm. and free for 0·15 mm., while at the opening their diameter is 0·15 mm. They have three teeth, thus differing from ALLMAN'S (1888) description, where two broad cusps are mentioned, and agreeing with NUTTING'S (1904) description of a portion of ALLMAN'S specimen. The present specimens vary slightly from those described by NUTTING in habit and in gonangia. The majority of those from (a) and all the specimens from (b) have closely interwoven and anastomosed branches, and thus present a matted, net-like appearance.

Gonosome.—The gonangia arise from each side of and just below the hydrothecæ. They are top-shaped, 1·7 mm. long, with eight or nine large annular ridges, the widest portion occurring about the second or third ridge from the distal end, where the diameter, not including the ridge, is 0·7 mm. They are surmounted by a tube 0·45 to 0·5 mm. long, whose diameter gradually increases from base to margin, where it is 0·25 mm. wide.

Localities, etc.—(a) Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W.; 56 fathoms. Date, 1st December 1903. (b) Eight miles north of Dassen Island, Cape Colony; 35 fathoms. 18th May 1904.

Sertularella gayi, Lamouroux, 1821.

A strongly fascicled specimen 13 cm. high by 7 cm. broad is referable to this species. The general habit of the colony, with rigid stem 2 mm. in diameter

just above the base, and monosiphonic, roughly pinnate ramuli, is typical. The hydrothecæ are free distally for rather less than half their length, the free portion standing out from the stem almost at a right angle, and being marked on the upper side by a few rather indistinct annular rugosities.

Gonosome.—Not present.

Locality, etc.—Depth, 100 fathoms. Off Gough Island. Lat., 40° 20' S.; long., 9° 56' W. Date, 22nd April 1904.

Sertularella tenella (Alder, 1857).

Small specimens of this delicate colony some 7 mm. long have been found growing on *Syntheceum robustum*. They are quite typical in appearance, agreeing with previous descriptions and figures.

The following are average measurements:—

Internodes.—Length from 0·55 to 0·8 mm.

Hydrothecæ.—Length, 0·5 mm.; widest diameter, 0·25 mm.; diameter at margin, 0·15 mm.

Gonosome.—Not present.

Locality, etc.—From off Burdwood Bank, lat. 54° 25' S., long. 57° 32' W., at a depth of 56 fathoms. Date, 1st December 1903.

Sertularella tricuspidata (Alder, 1856).

A slender, pinnately branched colony 7 cm. high. It lacks the profuse branching and matted appearance of a typical specimen of *S. tricuspidata*, but in other respects it agrees closely with the specific description.

Average Measurements.—Internodes: length, 0·75 mm. Hydrothecæ: height, 0·6 mm.; portion adnate, 0·35 mm.; portion free, 0·4 mm.; diameter at margin, 0·3 mm.

Gonosome.—Not present.

Locality, etc.—From off Burdwood Bank, lat. 54° 25' S., long. 57° 32' W., at a depth of 56 fathoms. Date, 1st December 1903.

Sertularella rectitheca, n. sp. (Pl. I. fig. 5.)

A small, delicate colony some 9 mm. high, growing on the stem of *Staurotheca reticulata*. The stem is slender and unbranched, divided for some distance by slanting nodes into short regular internodes 0·5 mm. long, and produced distally into a tubular tendril-like process which was attached to a portion of the *Staurotheca* colony. The internodes are much broadened half way up their length by a shoulder for the support of the hydrothecæ. These are alternate, cylindrical, about 0·5 mm. high by 0·15 mm. in diameter, adnate up to the distal end of the internode in which they arise, then free for the remaining third of their length. The hydrothecæ are straight, the free portion

being in the same line as the adnate, the whole axis lying practically parallel to the stem. The margins of the hydrothecæ are divided into three teeth, a small one on the adcauline edge, and two large and equal ones on the margin remote from the stem. The number of flaps in the operculum could not be counted.

Gonosome.—Not present.

Locality, etc.—Growing on *Staurotheca reticulata*, Scotia Bay, South Orkneys. Depth, 65 fathoms. Date, 25th March 1903.

Thujaria pectinata, Allman, 1888.

A single specimen some 6 cm. high almost completely enveloped in a dense polyzoon growth. The stem is unbranched and monosiphonic about 1 mm. across, and is divided into equal internodes, each of which bears three pairs of opposite hydrothecæ. A pair of opposite pinnæ arise from each internode, originating between the proximal and median pairs of hydrothecæ. On the pinnæ the nodes are quite distinct, being marked by a constriction (in ALLMAN'S figure they are scarcely indicated), and the hydrothecæ are arranged as on the stem—three pairs to each internode. The hydrothecæ are so closely approximated that the top of one touches the base of the next, but the "free membranaceous extension of the wall" has in every case been destroyed, leaving a rather ragged edge level with the general outline of the pinna. One of the pinnæ, instead of being thecate to the tip, was produced into a long, tubular, tendril-like process.

Gonosome.—Not present.

Locality.—Dredged at the entrance of Saldanha Bay, Cape Colony, in 25 fathoms. Date, 21st May 1904.

Synthecium robustum, Nutting, 1904. (Pl. I. fig. 6.)

About half-a-dozen specimens of this species have been dredged from the locality of Burdwood Bank. The average height is about 7 cm., but two specimens are 11 cm. high by 4 cm. broad, almost twice the size of the specimen described by NUTTING. The branches, which are regularly opposite, are simple in the majority of the specimens, but in some they rarely bear opposite branchlets; and not only in these branchlets, but even in the branches themselves, there is a distinct narrowing of the perisarc immediately above each pair of hydrothecæ. The hydrothecæ have frequently one or two annular striations—lines of reduplication—round their margins. Except in these details the trophosome agrees with NUTTING'S description.

Gonosome.—The gonangia differ somewhat from the dried specimens originally described. They are top-shaped, 2 mm. long by 1 mm. in diameter at the widest part. Distally they are strongly annulated, proximally they are almost smooth, while they are terminated by a low dome, the tubular neck of the original specimen being unrepresented.

Locality, etc.—Burdwood Bank. Lat., 54° 25' S.; long., 57° 32' W. Depth, 56 fathoms. 1st December 1903.

The occurrence in these specimens of branches sometimes simple and sometimes bearing pinnately arranged branchlets, appears to indicate that this character, upon which HARTLAUB founded his *S. chilense* (1905, p. 671), is rather a variation than a character of specific value.

Staurotheca, Allman, 1888 (modified).

Generic Character. Trophosome.—Hydrocaulus fascicled or unfascicled, bearing hydrothecæ in longitudinal rows and arranged in a series of transverse planes, each plane containing two or three hydrothecæ which exactly alternate with those in the planes above and below them.

Gonosome.—Gonangia simple capsules springing from the hydrocaulus and destitute of marsupium.

This genus, as described by ALLMAN, must be slightly modified to include the specimen described below. The alternate arrangement of the successive series of hydrothecæ remains constant, but the generic characters must be widened to include not only opposite hydrothecæ, but also hydrothecæ arranged in whorls of three.

Staurotheca reticulata, n. sp. (Pl. I. figs. 1, 1A, 1B.)

A portion of a branched hydroid colony 8 cm. in length by 4 cm. in breadth. The stem, which is 0.5 mm. in diameter, is unfascicled, and from it arise, at fairly regular intervals of 5 mm., alternate flexuous branches of the same thickness as the stem, which zigzags between their bases. Smaller branches arise from these main branches and anastomose so frequently, sometimes by means of short, tendril-like processes, that free ends are absent except towards the margin of the colony. In some cases the free ends develop hydrorhizal tubes. All the branches lie in one plane, and this, together with the flabellate form of the colony and the prevalent anastomosis, gives the whole a remarkable net-like appearance, the regularity of the meshwork, at least near the stem, being increased by the fact that the main branches on each side of the stem lie roughly parallel. The internodes are irregular, generally containing about three pairs of hydrothecæ in the older branches, while in the younger there is usually a hint of a node between each pair.

The hydrothecæ are placed in longitudinal rows along the stem and branches. In the majority of the branches there are four rows, the hydrothecæ being arranged in opposite pairs, which are placed alternately at right angles with one another. Sometimes there are six rows—the hydrothecæ in this case being placed in a succession of transverse planes, each plane containing three equidistant hydrothecæ, which exactly alternate with those in the planes immediately above and below them. The hydrothecæ themselves are cylindrical and deep, with a circular orifice and a smooth margin marked

sometimes by one or two lines of growth. They are 0.5 mm. in height, and for 0.4 mm. of this distance they are adnate, the free portion curving outwards from the stem.

Gonosome.—The gonangia are ovoid, 0.7 to 0.8 mm. long, and 0.45 mm. in diameter at the widest part, narrowing proximally and terminated distally by a circular orifice at the end of a short bulging prominence. They lie closely apposed to the stem for the greater part of their length, but can easily be detached, and arise on each side of, and just below, a hydrotheca. Thus although one or two gonangia most commonly occur at one level, the full complement at a plane containing a pair of hydrothecæ is four, two to each hydrothecæ.

The colony is of a horn brown colour.

Locality, etc.—Obtained from a gripper on a sounding wire from Scotia Bay, South Orkneys. Depth, 65 fathoms. Date, 25th March 1903.

Family PLUMULARIIDÆ.

Aglaophenia dichotoma (Johns.), Kirchenpauer, 1872. (Pl. III. figs. 2, 2A, 2B, 2C.)

A large number of branched, fan-shaped colonies, 10 cm. high by about 7 cm. broad, with monosiphonic stems. The following details supplement KIRCHENPAUER'S rather meagre description:—The branching, which is characteristic, is strictly dichotomous. The stem and branches are divided into short regular internodes 0.3 mm. long, and from a nematophore-bearing process on each of these a hydroclade arises. The *hydroclades*, which are alternate and closely approximated, are borne on the front of the stem and leave it at an angle of about 45°. They also are divided into short regular internodes 0.3 mm. in length, each with two strong septal ridges extending almost around their walls, one opposite and in line with the intrathecal septum, the other at the level of the bases of the supracalcine nematophores. The *hydrothecæ*, which are closely approximated and obconical, are tilted forward from the stem, the distal portion apparently being free. Their margin, which is not expanded or flaring, is divided into nine teeth, the anterior three being slightly larger and sharper, the middle one bent a little backwards. The intrathecal ridge is strong and oblique, in the same line as the corresponding internodal ridge, and reaching to the opposite wall of the hydrotheca. The supracalcine *nematophores* are not quite tubular. They are large and bulging, but do not reach to the margin of the hydrotheca, while the mesial nematophore, which is extremely narrow near the base but becomes wider distally, just reaches the level of the margin, the distal third of its length being free. The process arising from the stem and branch internodes, upon which the hydroclades are borne, bears about five nematophores similar in structure to those on the hydrotheca. The arrangement also is similar, one being median and proximal, while two are lateral and near the distal end of the process, but there are in addition a lateral and a basal pair.

Gonosome.—The corbula is oval, flattened laterally, 2 mm. long by 1 mm. in

greatest diameter. It has five pairs of adnate costæ, each bearing from ten to twelve not quite tubular denticles along its length and an apparently unpaired, partly free, costa at the proximal end. On the corbula peduncle there is one hydrotheca.

Locality, etc.—The colonies were growing on a sponge, and were dredged at the entrance to Saldanha Bay, Cape Colony, in 25 fathoms of water. Date, 21st May 1904.

Plumularia echinulata, Lamarck, 1836.

Several colonies, the largest 3 cm. in height, were found growing on sponges in the same locality as *P. pinnata*. The specimens differ somewhat from the type described by HINKS (1868) but seem to form a connecting link between *P. echinulata*, type and *P. echinulata*, var. *pinnatoides* of BILLARD (1904, p. 191 *et seq.*). The following points indicate a close relationship to the latter:—Stem internodes in the proximal portions of the colony sometimes bearing two hydroclades, while in the distal internodes, and more generally throughout the colony, only one hydroclade per internode is the rule; intermediate internodes in the hydroclades absent in the specimens examined; supracalyceine sarcostyle unprotected by a nematotheca, as described by HINKS; hydrothecæ deep; gonangia borne on stem. On the other hand, the fact that the margin of the hydrotheca does not reach the level of the succeeding node, and the presence of well-marked and frequent spines on the gonangia, indicate affinities with BILLARD's *type*.

The state of the material prevented observations on the condition of the axillary nematophores from being made.

Locality, etc.—Growing on sponges, coaling jetty, Cape Town Docks. May 1904.

Plumularia magellanica, Hartlaub, 1905. (Pl. III. fig. 1, 1A.)

The specimens collected by Mr BRUCE differ somewhat in the structure of their hydroclades from the specimens of this peculiar species described by HARTLAUB, but the difference is not of specific value. As in HARTLAUB's case, material is scarce.

The most complete colony is 15 mm. in height, and consists of a stem 0.15 mm. in diameter, divided by straight nodes into irregular internodes, each of which bears near its middle a single hydroclade. The hydroclades arise alternately from the stem nodes and are comparatively short—about 1 mm. They are set upon a small process of the stem, from which the first thecate internode is separated by a narrow, somewhat ring-like, athecate internode with slanting nodes. The thecate internodes are narrow at the base, and gradually widen distally until they finally seem to end in a rather shallow cup with expanded walls. From below this cup, and free from it, there arises in the distal portions of the colony a single short process, which bears again an expanding thecate internode from beneath whose hydrotheca another free process is given off, and so on, until each hydroclade bears from two to four or even five hydrothecæ. The

marked angle at which each thecate internode lies with regard to the one preceding it, gives these simple distal hydroclades a helicoid-cyme-like appearance. In the proximal hydroclades—and here our specimens differ from HARTLAUB'S—*two processes* arise below and at the opposite sides of the first hydrotheca, each of which bears a thecate internode, so that after the first hydrotheca the hydroclade possesses two diverging branches each similar to the simple distal hydroclades. Since the double hydroclades arise *laterally and not dorsally*, as HARTLAUB describes, from their internode, it follows that their origins lie in a plane at right angles to the plane of the primary stem processes. The *hydrothecæ* are shallow, with delicate, slightly expanded walls, and smooth margins. They appear to terminate the internode which bears them, are fixed only by their bases to their internode, and their walls are free. A single delicate, shovel-like nematophore lies in the centre of the internode beneath each hydroclade.

Gonosome.—Not observed.

The structure of the whole colony is extremely delicate. In some cases the hydrothecal and internodal walls collapsed in process of mounting for microscopic examination.

Locality, etc.—Growing on a sponge, Port Stanley, Falkland Islands. 3rd February 1904.

Previous Localities.—South of Tierro del Fuego and Island Pictou, Tierro del Fuego Archipelago.

Plumularia pinnata, Linnæus, 1758.

A number of colonies, the largest only about 4 cm. high, occur on sponges and on lamellibranch shells. The colonies agree with HINKS'S description. The following variations were noted in the specimens:—Generally the number of hydroclades per internode is two, but on a number of the distal internodes only one hydroclade occurs. The presence of a basal athecate internode at the origin of each hydroclade, as described by BILLARD (1904, p. 204), was noted, but between the thecate internodes no intermediate athecate internodes were observed.

Gonosome.—While the proximal, and therefore the older, gonangia assumed the spinous form figured by HINKS (1868, Pl. 65), the distal, younger gonangia were somewhat cup-like, with a truncated appearance, due to the inversion of the topmost portion of the gonangium, which, at first inverted, apparently becomes everted in the later stages of growth.

Locality, etc.—Growing on sponges and on lamellibranch shells, coaling jetty, Cape Town Docks. May 1904.

Plumularia unilateralis, n. sp. (Pl. II. figs. 1, 1A, 1B, 1C.)

The specimens for which this species has been formed are small, averaging only 2 cm. in height, with simple recurved stems divided by slanting nodes into regular internodes, in general 0·4 mm. in length, but rather longer towards the base. From the

middle of each internode there arises a single hydroclade. In no case has more than one hydroclade per internode been seen. The *hydroclades*, which are set on short processes of the stem internodes, lie alternately in two planes, these planes being so set forward that the hydroclades appear to arise from only one side of the stem. They leave the stem at acute angles (30° to 45°), and are divided into equal internodes 0.25 mm. long, each of which bears a hydrotheca—one small triangular athecate internode separating the first thecate internode from the stem process. In some cases secondary hydroclades are developed from the side of a hydroclade internode at the level of the base of the hydrotheca. No internodal septæ are present, but the internode bulges proximally to form a support for the hydrotheca. The *hydrothecæ* are cup-shaped, moderately deep, even-rimmed, and for a short distance distally they are free from the internode. They are closely approximated, the margin of a hydrotheca being on a level with the succeeding node. *Nematophores* are absent from the stem, from the stem processes, and from the athecate internodes at the origin of the hydroclades, but one small, shovel-shaped nematotheca occurs in the median portion of the internode just below each hydrotheca, while in the angle between the hydroclade and the free rim of the hydrotheca is a median, unprotected sarcopore.

Gonosome.—Gonothecæ about 1 mm. in length occur in parallel rows along the stem, apparently arising on the inner side of the hydroclade-bearing processes. They are ovate, with somewhat flat tops, and are very shortly stalked. The gonothecæ are seldom smooth, the walls being generally strengthened by seven regular longitudinal ridges, which terminate distally in one or two more or less pronounced spines.

Locality, etc.—Growing on a sponge from the entrance to Saldanha Bay, Cape Colony; 25 fathoms. Date, 21st May 1904.

Antennularia hartlaubi, n. sp. (Pl. III. fig. 4, 4A, 4B.)

Colonies growing on a sponge in thick bunches, with thick fascicled stems which, about 1 cm. from the base, break up irregularly into smaller, still fascicled branches, these finally breaking up into long simple twigs. The latter are divided by straight nodes into regular internodes 0.5 mm. long, each of which bears three equally distant hydroclades so arranged that those on one internode exactly alternate with those on the internodes above and below, a hexastichous arrangement thus being produced. The *hydroclades* are borne on stout processes of the branch internodes 0.15 mm. long, and are divided into unequal internodes which are alternately long and thecate and short and athecate—two athecate internodes separating the first thecate internode from the supporting process. Sometimes, however, two athecate internodes are developed between a hydrotheca-bearing pair. Each internode is marked by two strong internal septa, one proximal, the other distal; but in the longer internodes two more are sometimes developed, one opposite the base of the hydrotheca, the other a little lower. The *hydrothecæ* are shallow, even-rimmed, resting on a broad ledge of the internode

and free for a short distance distally. The *nematophores*, of the usual trumpet-shaped type, have an internal septum which gives them a two-jointed appearance and are arranged as follows:—Three on each thecate internode, two lateral and distal, and reaching a considerable distance above the level of the hydrotheca margin, the other median and proximal and arising just above a slight bulge in the internode; one on each athecate internode, except where two such internodes are developed in succession, when the proximal one is unprotected; on the branches there are two lateral nematophores on the hydroclade-bearing process and one in the angle between this and the branch, but in the next highest internode.

Gonosome.—Not observed.

Locality, etc.—Entrance to Saldanha Bay, Cape Colony, in 25 fathoms. 21st May 1904.

The present specimens approach in general structure *A. decussata*, Kirch. (1876, p. 55), *A. johnstoni*, Kirch. (1876, p. 55), and *A. irregulares*, Quelch (1885, p. 8), for in the first and last of these the hydroclades, although generally two in number per internode, may vary from two to three or even four. In our specimens the hexastichous arrangement appears to be constant, and the species is distinguished from those mentioned above in having exceedingly strongly developed internodal septa.

We have named the above form after Professor CL. HARTLAUB of Heligoland, author of the report on the Belgian Antarctic Expedition hydroids, to whom we are indebted for occasional assistance.

Antennopsis scotiæ, n. sp. (Pl. III. figs. 3, 3A.)

Two much weather-beaten colonies of a pale brownish colour, growing on a sponge fragment and reaching a height of 9 cm. and 4 cm. respectively. Both the colonies are badly weathered; the smaller is overgrown for half its length by the sponge, while the remaining portion is destitute of hydroclades. Here and there at irregular intervals a branch springs from the main stem, but without any definite arrangement. Of the larger specimen about 5 cm. are free from the encircling sponge, and on this almost bare surface a few hydroclades occur. The stem and branches are strongly fascieled, about 2 mm. in diameter, but the coenosarc shows no signs of caniculation (NUTTING, 1900, pp. 68 and 72). The *hydroclades* arise irregularly from all sides of the stem, springing from the outer tubes of the fascicle. Proximally they have from three to six athecate internodes separated by straight nodes, the distal of these, and sometimes that beneath it, being greatly elongated and bearing a number of nematophores varying from two per joint to five on a single long internode. Above this athecate portion the hydroclade is divided by alternate slanting and straight nodes into fairly regular internodes, every alternate one of which bears a hydrotheca. The *hydrothecæ* are stoutly campanulate and large, 0·22 mm. in length by 0·22 to 0·25 mm. in greatest diameter, with entire rim and oblique opening, adnate up to the distal end of their own internode, and afterwards free—the free portion lying over against the intermediate internode, the rim reaching the level of the proximal end of the next hydrotheca-

bearing internode. They are thus closely approximated. The *nematophores* have a widely expanded, trumpet-shaped mouth, and besides those already mentioned, there are three on each hydrotheca-bearing internode, one median and proximal, standing on a slight angle of the internodal perisarc, two lateral, each borne on a process which rests against the side of the hydrotheca. Only one nematophore occurs on each intermediate internode.

Gonosome.—Not observed.

Locality, etc.—Dredged at the entrance of Saldanha Bay, Cape Colony, in 25 fathoms. Date, 21st May 1904.

The general architecture approaches that of *Antennopsis fascicularis* (ALLMAN, 1883, p. 24), but there are differences in the proximity of the hydrothecæ and in the number and distribution of the nematophores.

We have named this species after the *Scotia*—the ship of the Scottish National Antarctic Expedition.

LIST OF LITERATURE CITED.

- ALDER, 1856. *Annals and Magazine of Natural History*.
 ,, 1857. "A Catalogue of the Zoophytes of Northumberland and Durham," in *Trans. Tyneside Naturalists' Field Club*.
 ALLMAN, 1876. *Ann. and Mag. of Nat. Hist.*, 4th ser., vol. xvii.
 ,, 1883. "Report on the Plumularians of the *Challenger* Expedition," *Sc. Reports, Zool.*, vol. vii.
 ,, 1888. "Report on the Hydroids of the *Challenger* Expedition," Part II, *Sc. Reports, Zool.*, vol. xxiii.
 BILLARD, 1904. "Contributions à l'étude des hydrôïdes," in *Annales des Sc. Nat.*, vol. xx.
 BONNEVIE, 1899. *The Hydroïda of the Norwegian North-Atlantic Expedition 1876-78*. Christiania, 1899.
 HARTLAUB, 1900. "Revision der Sertularella-Arten," in *Abh. naturw. Ver. Hamburg*, vol. xvi.
 ,, 1904. "Hydroïden," in *Résultats du voyage du S.Y. "Belgica" en 1897-99*.
 ,, 1905. "Die Hydroïden der magalhaensischen Region und chilenischen Küste," in *Fauna Chilensis*—Supplement VI. to the *Zoologische Jahrbücher*.
 HINKS, 1861. "A Catalogue of the Zoophytes of Devon and Cornwall," in *Ann. and Mag. of Nat. Hist.*, vol. xi.
 ,, 1868. *A History of the British Hydroid Zoophytes*.
 JOHNSTONE, 1847. *A Hist. of the Brit. Zoophytes*, 2nd ed.
 KIRCHENPAUER, 1872. "Ueber die Hydroïdenfamilie Plumulariæ," Part I. Aglaopenia.
 ,, 1876. *Ibid.*, Part II. Plumularia u. Nemertesia, in *Abh. naturw. Ver. Hamburg*, vol. vi.
 ,, 1884. "Nordische Arten und Gattungen von Sertulariden," *ibid.*, vol. viii.
 LAMARE, 1836. *Hist. Nat. des animaux sans vertèbres*, 2nd ed. *Histoire des Polypes*, Paris.
 LAMOUROUX, 1821. *Exposition méthodique des genres de l'ordre des polypiers*, Paris.
 LINNÆUS, 1758. *Systema Naturæ*, ed. 10.
 NUTTING, 1900. "American Hydroids," Part I. Plumulariæ, in *Spec. Bulletin Smithsonian Institute*.
 ,, 1904. *Ibid.*, Part II. Sertulariæ, *ibid.*
 ORTMANN, 1896. *Grundzüge der marinen Tiergeographie*, Jena.
 PALLAS, 1766. *Elenchus Zoophytorum*, Hague.
 QUELCH, 1885. *Annals and Mag. of Nat. Hist.*, ser. v. vol. xvi.
 SARS, 1846. *Fauna Littoralis Norvegiæ*, vol. i.

EXPLANATION OF PLATES.

PLATE I.

- | | | |
|-----|---|---|
| 1. | <i>Staurotheca reticulata</i> , n. sp. | Nat. size. |
| 1A. | " " | Portion of stem and branch showing hexastichous and decussate arrangements of hydrothecæ. |
| 1B. | " " | Portion of branch with gonangia. |
| 2. | <i>Campanularia</i> , sp. | |
| 3. | <i>Halecium interpolatum</i> , n. sp. | Nat. size. |
| 4. | <i>Grammaria magellanica</i> , Allm. | Nat. size, showing gonosome cluster. |
| 4A. | " " | Surface of gonosome cluster. |
| 5. | <i>Sertularella rectitheca</i> , n. sp. | |
| 6. | <i>Synthecium robustum</i> , Nutt. | Gonangium. |
| 7. | <i>Hebella striata</i> , Allm. | Hydrotheca not completely ringed. |
| 8. | " " var. <i>plana</i> , n. var. | |

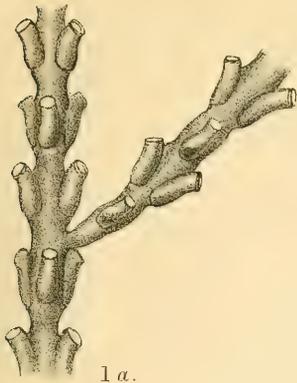
PLATE II.

- | | | |
|-----|---|--|
| 1. | <i>Plumularia unilateralis</i> , n. sp. | Nat. size, growing upon a sponge fragment. |
| 1A. | " " | Stem with hydroclades. |
| 1B. | " " | Gonangia. |
| 1C. | " " | Portion of hydroclade with hydrothecæ. |
| 2. | <i>Brucella armata</i> , n. gen. et sp. | Nat. size, showing coppinia cluster. |
| 2A. | " " | Surface of coppinia cluster. |
| 2B. | " " | Portions of a fascicled and an unfascicled branch, with a creeping polyzoon— <i>Anguinaria spatulata</i> . |
| 2C. | " " | Hydrothecæ. |
| 3. | <i>Halecium interpolatum</i> , n. sp. | Branch, with hydrothecæ, ending in stolons. |
| 4. | <i>Halecium tenellum</i> , Hinks. | Showing attachment of hydranth within hydrotheca. |

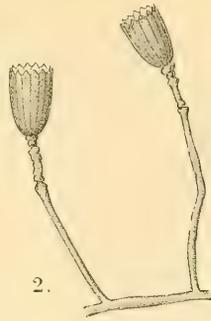
PLATE III.

- | | | |
|-----|--|---|
| 1. | <i>Plumularia magellanica</i> , Hart. | |
| 1A. | " " | Origin of a double hydroclade. |
| 2. | <i>Aglaophenia dichotoma</i> (Johns.). | Nat. size. |
| 2A. | " " | Corbula. |
| 2B. | " " | Hydrothecæ. |
| 2C. | " " | Portion of stem, showing origin of hydroclades. |
| 3. | <i>Antennopsis scotiæ</i> , n. sp. | Nat. size, partially encircled by a sponge. |
| 3A. | " " | Hydroclade with hydrothecæ. |
| 4. | <i>Antennularia hartlaubi</i> , n. sp. | Nat. size. |
| 4A. | " " | Hydroclade with hydrothecæ. |
| 4B. | " " | Stem showing hexastichous arrangement of hydroclades. |

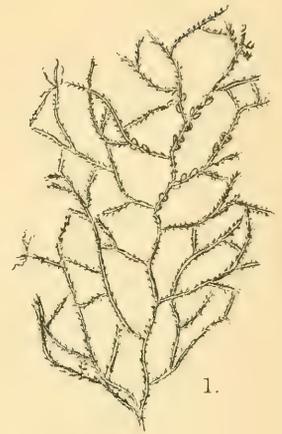
RITCHIE. "SCOTIA" HYDROIDS. — PLATE I.



1 a.



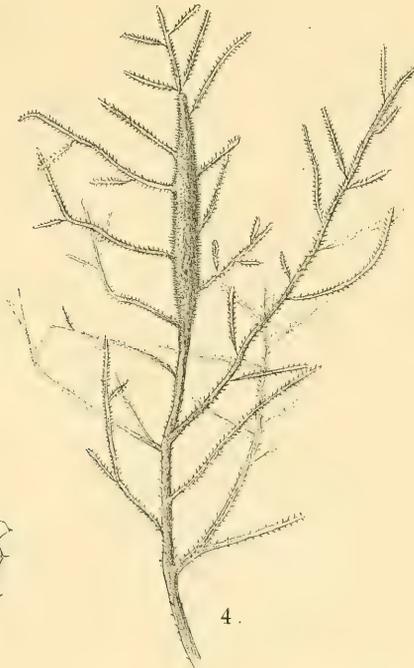
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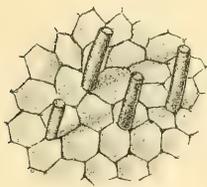
1.



6.



4.



4 a.



5.



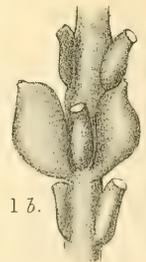
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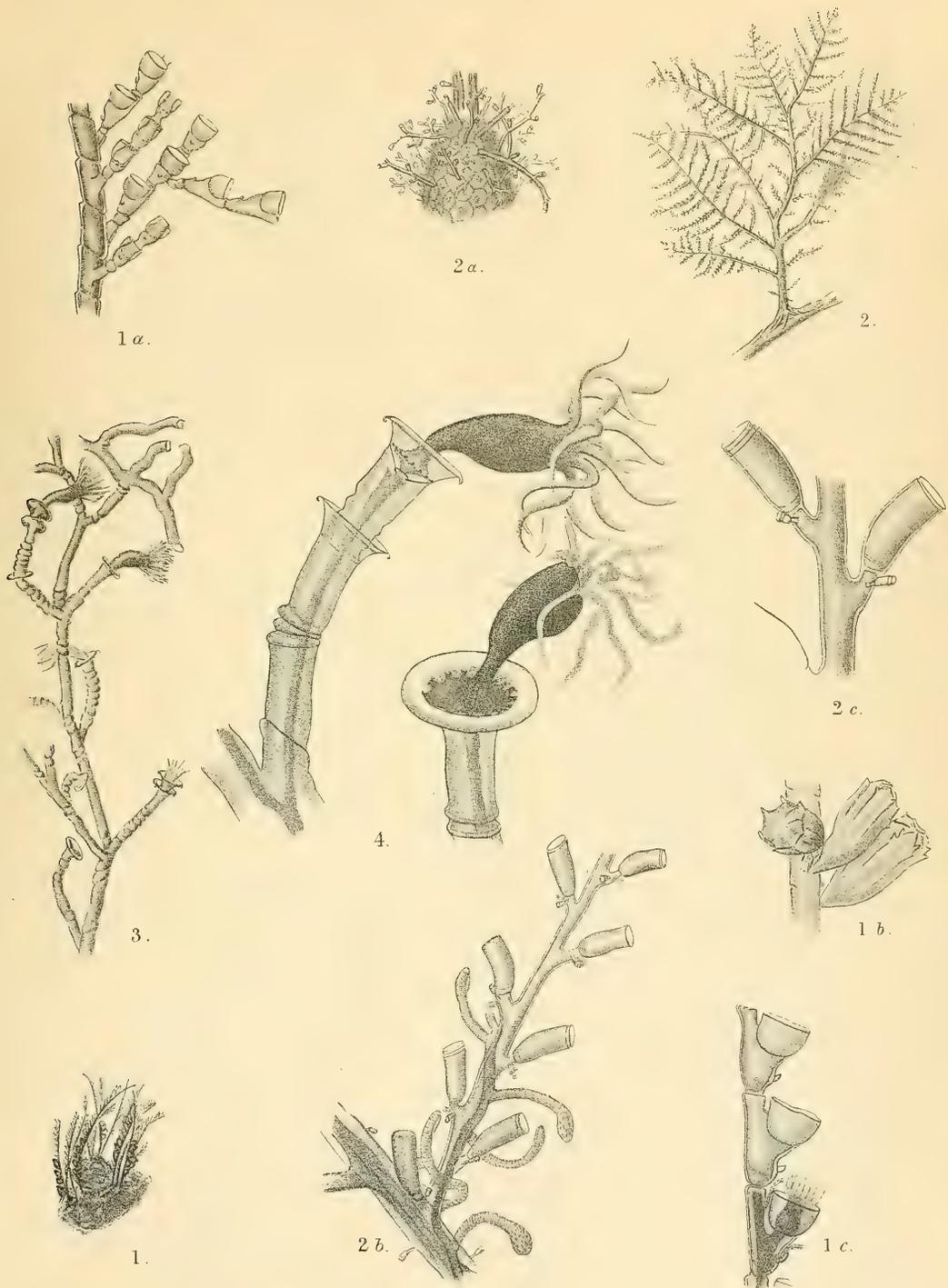


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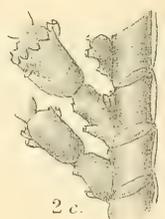
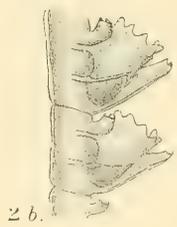
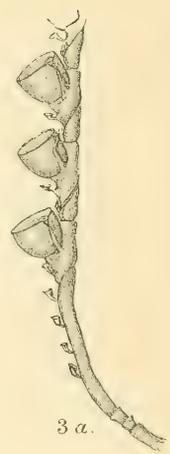
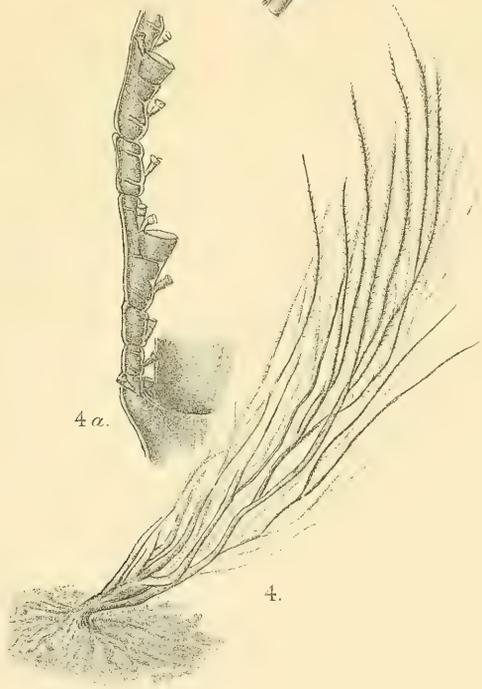
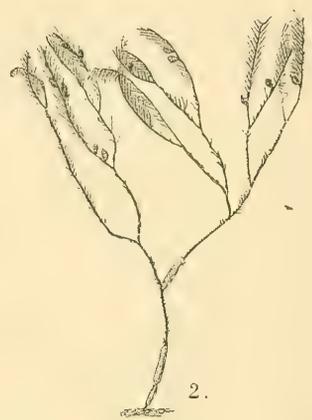
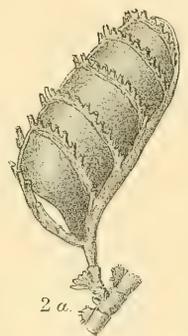


1 b.

RITCHIE: "SCOTIA" HYDROIDS. — PLATE II.



RITCHIE: "SCOTIA" HYDROIDS — PLATE III.



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| „ Part 3. | 0 16 0 | 0 12 0 | | | |
| „ Part 4. | 0 7 6 | 0 5 8 | | | |
| XXXVIII. Part 1. | 2 0 0 | 1 10 0 | | | |
| „ Part 2. | 1 5 0 | 0 19 0 | | | |
| „ Part 3. | 1 10 0 | 1 3 0 | | | |
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