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No. II.

Sponges of the Coasts of Ireland.

II.—The Tetraxonida (concluded).

BY

JANE STEPHENS, B.A., B.Sc.

National Museum, Dublin.

Plates I—VI.

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## SPONGES OF THE COASTS OF IRELAND.

### II.—THE TETRAXONIDA (CONCLUDED).†

BY

JANE STEPHENS, B.A., B.Sc.

National Museum, Dublin.

Plates I—VI.

The part of the Tetraxonida dealt with in this paper comprises only the sponges belonging to the sub-order Sigmatomonaxonellida, Dendy, an account of the sponges in the collection which belong to the sub-order Astromonaxonellida, Dendy, having appeared in a previous paper (28).

A preliminary notice of these Sigmatomonaxonellid sponges has already been published (29). Since that account appeared, one other species, namely, *Plocamia ambigua* (Bowerbank), has been found in the collection. *Stylostichon Dendyi*, Topsent, counted in the preliminary list as one of the species new to the British Isles, has been recorded for the British area under the name of *Cribrella hospitalis*, Schmidt (see p. 47). The sub-order, therefore, is represented by ninety-six species, fifty-two of which are new to the Irish area. Of these, thirty have not been taken previously off any part of the British Isles.

Thirteen species recorded as new in the preliminary notice are here described in full. They are as follows:—

<i>Tylodesma informis.</i>	<i>Ectyodoryx atlanticus.</i>
<i>Esperiopsis incognita.</i>	<i>Eurypon acanthotoxa.</i>
<i>Esperiopsis macrosigma.</i>	<i>Eurypon ditoxa.</i>
<i>Iotrochota acanthostylifera.</i>	<i>Eurypon tenuissimum.</i>
<i>Hymedesmia Helgae.</i>	<i>Eurypon microchela.</i>
<i>Hymedesmia spinosa.</i>	<i>Aeinella pyramidata.</i>
<i>Hymedesmia hibernica.</i>	

The following is a list of the species new to the Irish area. Those species which have not been obtained previously off any part of the British Isles are marked by an asterisk:—

* <i>Gellius flagellifer</i> , R. and D.	* <i>Hymedesmia mutabilis</i> (Topsent).
<i>Oceanapia robusta</i> (Bk.)	* <i>H. crux</i> (Schmidt).
* <i>Metschnikowia spinispiculum</i> (Carter).	* <i>H. digitata</i> , Lundb.

† This paper was completed by the author in 1916. Its publication has been unavoidably delayed.

- \**Halichondria fibrosa* (Frisdt.).  
 \**Phloeodictyon elongatum* (Topsent).  
*Biemna inornata* (Bk.).  
*Tylodesma annexa* (Schmidt).  
*Hamacantha Johnsoni* (Bk.).  
*H. falcula* (Bk.).  
*Esperiopsis villosa* (Carter).  
 \**Mycale fascifibula* (Topsent).  
*Rhaphidotheca Marshall-Halli*, Kent.  
 \**Asbestophuma pennatula* (Schmidt).  
 \**Cladorhiza abyssicola*, Sars.  
*Myxilla fimbriata* (Bk.).  
 \**Lissodendoryx diversichela*, Lundb.  
*Forcepia forcipis* (Bk.).  
 \**Histoderma physa* (Schmidt).  
 \**Histodermella Ingolft*, Lundb.  
*Grayella pyrula* (Carter).  
*Hymedesmia zetlandica*, Bk.  
 \**H. truncata*, Lundb.  
 \**H. Koehleri* (Topsent).  
 \**H. curvichela*, Lundb.  
*H. occulta*, Bk.  
 \**H. baculifera* (Topsent).
- \**Hymedesmia mucronata* (Topsent).  
 \**H. tenuisigma*, Lundb.  
*Anchinoë fictitius* (Bk.).  
*Stylostichon Dendyi*, Topsent.  
*Eurypon clavatum* (Bk.).  
 \**E. hispidulum* (Topsent).  
 \**E. affine* (Topsent).  
 \**E. Lacazei* (Topsent).  
 \**E. viride* (Topsent).  
*Clathria dichotoma* (Esper).  
 ? *C. anchorata* (Carter).  
*Echinoclathria foliata* (Bk.).  
 \**Plocamia microcionides* (Carter).  
*P. ambigua* (Bk.).  
 \**Suberotelites demonstrans*, Topsent.  
 \**Cyamon spinispinosum* (Topsent).  
 \**Rhabderemia Guernei*, Topsent.  
 \**Leptosastra constellata*, Topsent.  
*Phakellia robusta*, Bk.  
*P. rugosa* (Bk.).  
*Bubaris vermiculata* (Bk.).  
 \**Tragosia arctica* (Vosmaer).  
 \**Higginsia Thielei*, Topsent.

In the course of the work carried on round our coasts by the Department the littoral fauna has been systematically examined in only a few localities, notably in Blacksod Bay. The result is that many species of sponges which probably occur in suitable situations all round the coast are only noted here from one or two districts. Many of the littoral sponges in the collection have already been recorded in a paper on sponges of the Clare Island Survey (26), and in an account of a biological survey of Blacksod Bay (8), but full details of the stations at which they were obtained have not yet been given. A few of the commoner species are recorded for the east coast of Ireland in a paper on a survey of the trawling grounds off that coast (23).

It will be seen that the great majority of those sponges which are new to the British Isles have been found growing on coral (chiefly *Lophohelia prolifera*) dredged in deep water off the west and south-west coasts of Ireland. Many of the sponges grow in thin, inconspicuous crusts on the coral. These encrusting species were overlooked, for the most part, by the

authors who described the sponges obtained by the earlier deep-sea expeditions. Professor Topsent, in his monograph on the sponges of the Azores (39) was the first carefully to examine stones, coral and other materials brought up in the dredge for these encrusting species. To his work, especially, and to Dr. Lundbeck's, is due our knowledge of large numbers of such sponges from the North Atlantic Ocean. Many of their species are represented in the present collection. Something of my indebtedness to the works of these two authors may be judged from the frequent references to their publications in the following pages.

Many species were obtained in a single haul at several of the deep-water stations. In one haul of the dredge, at S. R. 151 for example, thirty-seven species were obtained (Tetractinellida 5, Monaxonellida 30, Euceratosa 2). All of these, with two exceptions, were new to the Irish area, six of them being new to science. Twenty-three of the entire number were growing on coral, while a small piece of sandstone had the following six species growing on it over an area of about seventy-five square millimeters:—

<i>Latrunculia Normani</i> (28).	<i>Hymedesmia truncata</i> .
<i>Atergia corticata</i> (28).	<i>Eurypon clavatum</i> .
<i>Rhaphidotheca Marshall-Halli</i> .	<i>Eurypon Lacazei</i> .

The following note taken from the scientific log of the S.S. *Helga* shows that the sponges growing on pieces of sandstone from this station were not only abundant, but were brightly coloured—"sponges of varied colours, dark blue, pale green, yellow and orange, in thin layers, are plentiful on the sandstone."

With regard to the geographical distribution of the sponges mentioned in the present paper, two of the species, *Halichondria panicea* and *Chalina oculata*, have a very wide range, which in the case of the former at least, is almost a world-wide one. Several other species, first known off the British Isles, have been recorded from far-distant localities, such as the coast of Ceylon or the East Indies, but these records are old and need revision. A few species extend from high northern latitudes throughout the North Atlantic Ocean and far to the south of the Equator. One species, *Esperiopsis villosa*, has been taken in both Arctic and Antarctic Oceans, and, except for several localities in sub-Arctic waters, at only one intermediate station up to the present, namely, off the Azores. With the foregoing exceptions the species under consideration are known to occur in various parts of the North Atlantic and Arctic Oceans. Many of them occur from as far south as the Azores to sub-Arctic or Arctic waters. The known range of some of the species is extended northwards, of others southwards, by their discovery off the Irish coast. A number of species, previously taken on only one occasion, now find their second record in the present list.

Several species are known to be common to the Azores and to Ceylon (7, p. 236) but, with the exception of the two almost world-wide sponges already mentioned and the few doubtful instances above referred to, the species now under consideration do not appear to have been taken in either the Indian or the Pacific Ocean.

It may be mentioned, however, that two of the Hexactinellid and several of the Astromonaxonellid sponges recently recorded off the Irish coast (28) are known to occur in either the Indian or the Pacific Ocean, or, in some instances, to range through both these areas.

In conclusion, I wish to thank Professor Dendy for his kindness in allowing me to examine preparations of type specimens in his possession, and in giving me valued advice on many points. I have also to thank Mr. R. Kirkpatrick for giving me every facility to study specimens under his charge in the British Museum. Finally, I wish to express my indebtedness to Miss E. E. Barnes for the great care with which she has made the drawings for this paper.

## ORDER TETRAXONIDA.

## GRADE MONAXONELLIDA.

## SUB-ORDER SIGMATOMONAXONELLIDA.

## FAMILY HAPLOSCLERIDAE.

## SUB-FAMILY GELLIINAE.

*Gellius flagellifer*, Ridley and Dendy.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 5° 4' 17" N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.
- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.
- S. R. 479—28 VIII '07. 51° 20' N., 11° 41' W., soundings 468—560 fms. Trawl. Temperature at 400 fms., 9.55° C.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.
- S. R. 1004—12 VIII '10. 51 miles W.  $\frac{1}{2}$  S. of great Skellig, 51° 22' 30" N., 11° 44' 30" W., soundings 641—636 fms., fine sand. Trawl. Temperature at 630 fms., 7.12° C.

The specimens, which are small and incomplete, are growing on coral (*Lophohelia prolifera* and *Amphihelia oculata*). The largest is about 10 mm. in diameter.

The skeleton consists of ill-defined, slender fibres, containing from 2 to 5 rows of oxea, which run upwards through the sponge, and which are connected by single oxea lying at right angles to them. In places there is a unispicular network.

The maximum size of the oxea is 0.4 mm. by 0.013 mm., but the most usual size is about 0.35 mm. by 0.01 mm. The megascleres are thus rather shorter and a good deal more slender than those of the type-specimens which were obtained by the *Challenger* (24), but they agree exactly with the oxea of one of the *Caudan* specimens (36), and of one of the specimens obtained off the Azores (39).

The C-shaped sigmata vary a good deal in size, having a longer axis from about 0.035 mm. to 0.09 mm. in length.

The flagellate sigmata have a longer axis of 0.09—0.12 mm. and a shorter axis of 0.06—0.09 mm. They do not vary much in shape. The end of the longer arm is sharply bent in like a hook, while the shorter arm sweeps in with a more rounded curve, so that in shape they exactly agree with the figures of

the corresponding spicules of the type (24, Pl. XIII, fig. 10), and of the *Caudan* specimens (36, Pl. VIII, fig. 4b). They are also very similar to Lundbeck's figures (19, Pl. XIV, fig. 2b) of the flagellate sigmata of *Gellius porosa* (Fristedt), a species which, as Professor Topsent has already suggested (39), will probably prove to be indistinguishable from *Gellius flagellifer*. None of the flagellate sigmata seen shows the sharp bend of the shorter arm, which is characteristic of the spicules of the *Ingolf* specimen (19, Pl. XIV, fig. 1c) assigned to *Gellius flagellifer*.

*Distribution*.—Off the east coast of Canada, off the south coast of Iceland, Bay of Biscay, off the Azores and off Marion Island.

Bathymetrical range from 50 to 738 fathoms.

### *Oceanapia robusta* (Bowerbank).

- Helga* LXXXVIII—8 VII '01. 40 miles W.N.W. of Cleggan Head, soundings 78 fms., sand, gravel and stones. Naturalist's dredge. Temperature at 76 fms., 9.1° C.
- W. 7—24 III '04. 27 miles W. by N.  $\frac{1}{2}$  N. of Bray Head, Valencia, soundings 100 fms., sand. Trawl. Temperature at 100 fms., 9.8° C.
- S. R. 178—16 XI '04. 40 miles N.W. by W.  $\frac{3}{4}$  W. of Cleggan Head, 53° 36' 30" N., 11° 15' 30" W., soundings 74 $\frac{1}{2}$  fms., coarse gravel. Oyster dredge.

Only fragments of this species, which has been fully re-described by Lundbeck (19), have been preserved, but from an entry in the log of the *Helga* it is seen that three broken specimens were obtained at S. R. 178.

The fragments examined consists of fistulae or parts of fistulae torn off from the main body of the sponge, and of pieces of the body-wall of one or more large specimens. The largest piece measures about 11 cm. by 9 cm. in extent, while the diameter of the fistulae at the base is about 37 mm.

All the pieces of this species are covered with numerous specimens of one of the Zoanthidae.

*Distribution*.—Off East Greenland, Iceland, the Faröes, the Shetlands, Norway, the Azores, and (doubtfully) off Bahia or Bermuda (*Challenger*). Bathymetrical range from 70 to 912 fathoms.

### SUB-FAMILY RENIERINAE.

#### *Reniera cinerea* (Grant).

Mweeloon, Ardfry, Galway Bay, on spat-tiles.

W. 106—23 VIII '09. 0.7 miles S. of Mallaranny Pier, Clew Bay, soundings 5 $\frac{1}{2}$ –11 fms.

Blacksod Bay, between tide-marks to 5 fms., at the following stations :—

W. 124—18 IX '09.	W. 232—20 IX '11.
W. 164—19 IX '10.	W. 233—21 IX '11.
W. 183—16 III '11.	W. 236—25 IX '11.

The sponge grows in thick, irregularly rounded masses; it is very soft to the touch and is fragile. When alive its colour is pale purple. The oxea usually measure about 0.15 mm. in length, and have a maximum diameter of 0.008 mm.

**Reniera Peachi** (Bowerbank).

Blacksod Bay, between tide-marks to 8 fms., at the following stations :—

W. 124—18 IX '09.	W. 235—24 IX '11.
W. 132—12 III '10.	W. 236—25 IX '11.
W. 185—17 III '11.	W. 237—26 IX '11.
W. 189—20 III '11.	W. 276—26 v '14.

This species is very like the preceding one in form, colour and texture, and it is found growing in the same situations. The oxea are about 0.09–0.12 mm. in length by 0.008 mm.

**Reniera simulans** (Johnston).

*Helga* XXXVIII—2 v. '01.  $\frac{1}{2}$  mile off Ballyvaldon, Co. Wexford, soundings 7 fms.

S. 568—570—24—27 I '08. Ballyvaldon, Co. Wexford, soundings 7–10 $\frac{1}{2}$  fms. Oyster dredge.

W. 106—23 VIII '09. 0.7 miles S. of Mal'aranny Pier, Clew Bay, soundings 5 $\frac{1}{2}$ –11 fms.

W. 109—25 VIII '09.  $\frac{1}{2}$  mile W. by S. of Cloughcormick Buoy, Clew Bay, soundings 5–10 fms., stones.

Blacksod Bay, between tide-marks to 8 fms., at the following stations :—

W. 132—12 III '10.	W. 178—13 III '11.
W. 134—13 III '10.	W. 179—14 III '11.
W. 135—13 III '10.	W. 180—15 III '11.
W. 137—14 III '10.	W. 235—24 IX '11.
W. 140—15 III '10.	W. 236—25 IX '11.
W. 162—17 IX '10.	W. 237—26 IX '11.

S. 597—6 II '11. Ballyvaldon Oyster Beds, Norris Castle Coast Guard Station, Co. Wexford, soundings 7 $\frac{1}{2}$ –8 fms. Naturalist's dredge.

W. 256—5 III '12. Muckamish Tower, Lough Swilly, shore collecting.

As may be judged from the foregoing list of stations, this species is quite common round the coast between tide-marks and in a few fathoms of water. It grows in broad, fairly thin encrustations or forms a network of flattened branches on rocks between tide-marks, or, particularly in a few fathoms of water, the branches may be more erect, rounded and anastomosing.



The sponge is, typically, very hard to the touch and breaks easily. Sometimes a considerable quantity of spongin is present. The colour of the sponge, when alive, is usually rusty-brown, but it may be greyish-brown or grey.

The oxea measure about 0.15 mm. in length, and have a maximum diameter of 0.01 mm.

*Reniera simulans* is one of the commonest species belonging to the genus round our shores and is easily recognised, when alive, by its colour, form and texture.

#### ***Reniera indistincta* (Bowerbank).**

Ballynakill Harbour, 1900.

Blacksod Bay, between tide-marks, at the following stations :—

W. 117—13 IX '09.

W. 188—16 III '11.

W. 234—23 IX '11.

The sponge is very soft and rather slimy to the touch. When alive it is dark grey in colour. All the specimens seen were penetrated in every direction by worm-tubes. The oxea measure about 0.12–0.14 mm. in length by 0.005 mm.

#### ***Reniera fistulosa* (Bowerbank).**

W. 163—18 IX '10. Moyrahan, Blacksod Bay, shore collecting.

A single small specimen in the collection is rather doubtfully referred to this species. The oxea are scarcely 0.125 mm. in length and thus are shorter than those in the type specimen.

No specimens belonging to the foregoing genus were found among the sponges obtained from deep water, but other pieces of *Reniera*, which were obtained between tide-marks or in shallow water remain unidentified, as it was found impossible to name them in the present unsatisfactory state of our knowledge of species belonging to this genus.

#### ***Metschnikowia spinispiculum* (Carter).**

S. R. 353—6 VIII '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–540 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. Two specimens.

The sponge is growing on coral (*Lophohelia prolifera*) in a thin patch, circular in outline, and about 10 mm. in diameter. A second small specimen is growing near it. The species, which was described by Carter (3) under the name *Isodictya spinispiculum*, has been fully redescribed by Lundbeck (19), and is easily recognised by its characteristic acanthostrongyla with bent ends. The spicules agree exactly in size with those of the previously found specimens.

*Distribution.*—Off Cape St. Vincent, *Porcupine* Expedition 1870, St. 25, one specimen (3); off the Azores, five specimens (39); to the east of Greenland and in Denmark Strait, five specimens (19).

Bathymetrical range from 168 to 682 fms.

### *Halichondria panicea* (Pallas).

Between tide-marks, at many stations.

At depths up to 37 fms., at many stations.

It has not been thought necessary to give a list of the stations from which samples of this very common species have been preserved in the present collection.

*Halichondria panicea* is found in abundance between tide-marks all round the coast, wherever it can find any support on which to grow. It can live nearer high water mark than any other species, except possibly *Hymeniacion caruncula*, and thus can stand a great deal of exposure. In sheltered positions on rocky shores, it may often be seen covering many square feet of rock, almost without a break. It very commonly grows on *Fucus* and on roots of *Laminaria*, as well as covering shells, masses of pebbles and so on. It often coats the backs and legs of crabs.

The species is common also in shallow-water dredgings. The greatest depth at which it was dredged by the *Helga* is 37 fathoms. Lundbeck (19, p. 18) states that the greatest depth at which it has been recorded with certainty is 60 fathoms, except for the specimens taken by the Belgian Antarctic Expedition, between 70° and 71° 18' S., which were dredged at 400–569 metres.

The geographical distribution of the species appears to be almost world-wide.

### *Halichondria fibrosa* (Fristedt).

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings, 627–728 fms., coral. Trawl. Temperature at 600 fms. 8.22° C.

S. R. 1004—12 VIII '10. 51 miles W.  $\frac{1}{2}$  S. of Great Skellig, 51° 22' 30" N., 11° 44' 30" W., soundings 641–636 fms. fine sand. Trawl. Temperature at 630 fms. 7.12° C.

Some small pieces of sponge, growing on coral (*Lophohelia prolifera*), agree very well with Lundbeck's description (19) of this species.

The consistence of the specimens is firm and their surface smooth. Where the sponge is protected by the coral from direct contact with the spirit in which it is preserved, the colour is dark greenish yellow. The oxea agree very well in shape and size with the description of the spicules given by Lundbeck. The smaller oxea are from about 0.1–0.26 mm. in length, the longer are from about 0.35–0.55 mm. in length

with a maximum diameter of 0.013 mm. The two groups are not sharply marked off from each other. A few of the spicules have a slight swelling in the middle of the shaft.

*Distribution.*—The species has previously been taken in Behring Straits and off West Greenland in 25–30 fms. (10 and 19), and off the Azores, at the depth of 599 metres (39).

*Phloeodictyon elongatum* (Topsent).

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C. One specimen.
- S. R. 277—15 IX '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and sand. Oyster dredge. Three specimens.

Two small specimens are growing in the calyces of a piece of dead coral (*Lophohelia prolifera*), while a third is nearly hidden from view in a broken end of the coral. Another specimen, of which a fragment only remains, is growing on a Geodine sponge, *Sidonops atlantica*, Stephens.

The largest specimen is about 5 mm. in diameter, and only one broken fistula can be seen. The spicules agree exactly with the figures given by Topsent (34, Pl. IX, fig. 1). They measure 0.15–0.18 mm. in length by 0.015–0.019 mm. in thickness.

*Distribution.*—To the south of Denmark Strait (19), and off the Azores (34).

Bathymetrical range from 174 to 799 fms.

SUB-FAMILY CHALININAE.

*Chalina oculata* (Pallas).

- Helga* I—28 II '01. 1.35 miles S. by W. of Wolf Rock, Co. Wicklow, soundings 9 fms., stones and shells. Oyster dredge.
- S. 199—22 I '04. 6.5 miles S. by E. of Annalong, Co. Down, soundings 18–24 fms. Trawl.
- S. 224—22 VI '04. Lambay Deep, soundings 44 fms., sand. Trawl.
- S. 321—21 VIII '05. 3½ miles N.E. of Howth Head, soundings 8–11¾ fms., sand and shells. Trawl.
- S. 413—19 IV '06. 4 miles N.E. by E. of Rockabill, soundings 20–24¾ fms., fine sand. Trawl.
- S. 432—24 VII '06. 10 miles E. by N. of Rockabill, soundings 36–37½ fms., mud. Trawl.
- S. 546—14 VIII '07. 9½ miles E. by N. of Rockabill, soundings 36–38 fms., mud. Trawl.
- W. 95—26 V '09. 2.1 miles E. ¼ N. of Clare Island Lighthouse, soundings 21 fms. Naturalist's dredge.

Only one specimen was obtained at each of the above stations. The species is, therefore, not abundant, although it is widely distributed round the Irish coast. The smallest specimen in the collection is only 40 mm. in height; it is unbranched and has a well-marked stalk (26).

*Distribution.*—European and American coasts of the North Atlantic; Bay of Bengal; off Fiji and New Zealand.

Bathymetrical range from shallow water to about 80 fms.

***Pachychalina limbata* (Montagu).**

L. 281—18 I '04. Oyster caisses, Fahy Bay, Ballynakill. Shore collecting.

A. 103—20 II '05. Mweeloon Bay, Galway Bay, below weir. Shore collecting.

Galway Bay, Ardfry Main Oyster Beds and Mweeloon, October and December, 1906.

Blacksod Bay, between tide-marks to 5 fms., at the following stations:—

W. 116—12-15 IX '09.

W. 121—14 IX '09.

W. 123—16-17 IX '09.

W. 124—18 IX '09.

W. 163—18 IX '10.

W. 179—14 III '11.

W. 180—15 III '11.

W. 183—16 III '11.

W. 185—17 III '11.

W. 189—20 III '11.

W. 232—20 IX '11.

W. 234—23 IX '11.

W. 236—25 IX '11.

W. 246—2 III '12.

W. 223—22 VIII '11. Off Killary Harbour, 2.1 miles N.N.E. of Rinivyle Rocks. Dredge.

This species is dredged at depths of a few fathoms, and is also taken at low water mark along sheltered coasts. It is not often found between tide-marks on exposed shores. Along parts of the coast that have been carefully investigated, such as Blacksod Bay, the species proved to be widely distributed, but not abundant. It grows most commonly on *Zostera*, *Fucus* and Corallines, but is also found growing on oyster and other shells, and underneath large stones.

The finest specimen in the collection is covering both valves of a living mussel. It is 70 mm. by 50 mm. in extent.

*Pachychalina limbata* forms little, rounded cushions on the broad leaves of *Zostera* or *Fucus*, or oval or pear-shaped masses encircling the narrower branches of coralline sea-weed.

The colour when alive is ochre-yellow or brownish-yellow. The sponge is very compressible. Both in external appearance and structure the species is quite unlike any other sponge found in shallow water off the Irish coast.

*Distribution.*—Off the British Isles, Sweden, north coast of France and north coast of Spain, off the Azores and off Senegal. \*

SUB-FAMILY *DESMACELLINAE*.*Bienna inornata* (Bowerbank).*Halichondria inornata*, Bowerbank.

Plate II, fig. 2.

S. R. 178—16 XI '04. 40 miles N.W. by W.  $\frac{3}{4}$  W. of Cleggan Head,  $53^{\circ} 36' 30''$  N.,  $11^{\circ} 15' 30''$  W., soundings  $74\frac{1}{2}$  fms., coarse gravel and stones. Oyster dredge. Temperature at  $74\frac{1}{2}$  fms.,  $10.8^{\circ}$  C. One specimen.

The sponge is massive and somewhat broken; it is studded with specimens of one of the Zoanthidae. The surface appears smooth, but under the lens it is seen to be very minutely hispid. The colour in spirit is dark greyish-brown.

The main skeleton is made up of fibres consisting of multiseriably arranged spicules. These fibres run upwards through the sponge, branching at intervals; beneath the surface they spread out slightly, and the tips of the terminal spicules project a little beyond the surface of the sponge. The principal fibres are connected by spicules lying singly or in bundles which are placed at right angles, or more or less obliquely, to the principal fibres.

The dermal skeleton consists of a network of fibres, made up of multiseriably arranged spicules, which lie tangentially to the surface. The pores are seen in the meshes of the network, the whole being very similar to the well-known dermal reticulation of *Halichondria panicea*. In places this somewhat regular network is obscured and the spicules lie singly or in bundles tangentially to the surface.

The pores, which in parts of the dermis are so numerous that the dermal membrane is reduced to a sieve, are usually between 0.075–0.125 mm. in diameter.

Spicules:—

(1) The megascleres vary from styli to tylostyli. The shaft is slightly curved and slightly fusiform. The length is 0.45–0.75 mm. by 0.01–0.013 mm.

(2) Sigmata. These occur scattered throughout the sponge. They are slightly contort, and their longer axis is from 0.025–0.03 mm. in length.

The Irish specimen, which is referred with some hesitation to Bowerbank's species (1), agrees with the type in the arrangement of the skeleton and in the size of both megascleres and microscleres; but the megascleres differ somewhat in shape in the two specimens. In the Irish specimen they vary from styli to tylostyli, the latter having oval or mucronated heads. In the type the tylostyli have usually well-rounded heads,

but spicules with less well-defined heads, similar to those in the Irish specimen, are to be seen scattered among the others, so that it is difficult to make any clear distinction between the spicules of the two specimens.

Professor Topsent, with some doubt, refers several specimens to this species under the names *Biemna inornata* and *Desmacella inornata* (34 and 39).

#### *Tylodesma annexa* (Schmidt).

S. R. 504—12 ix '07. 50° 42' N., 11° 18' W., soundings 627-728 fms., coral. Trawl.

This species is represented by a very small fragment, only 3 or 4 mm. across, growing on a piece of coral (*Lophohelia prolifera*).

Owing to the careful descriptions and figures of the species given by Topsent under the name *Desmacella annexa* (34 and 36), and by Lundbeck under the name *Biemna annexa* (19), it was possible to identify this small fragment.

The spicules agree exactly with the descriptions given, and the species is easily recognised by the presence of the characteristically shaped toxa and of the sigmata of two sizes. The tylostyli have a maximum size of about 0.88 mm. by 0.012 mm.

Thiele (30) has pointed out that *Desmacella*, the genus under which this species was first described, is a synonym of *Hamacantha*, Gray, while Bowerbank's *Desmacidon Peachii* is the type species of Gray's genus *Biemna*. He therefore proposed the new genus *Tylodesma* for the reception of species such as the above, with halichondroid skeleton.

*Distribution*.—North Atlantic at many stations between 18° Lat. N., to 65° 28' Lat. N. (19), and in the Mediterranean. Bathymetrical range 21 to 728 fathoms.

#### *Tylodesma informis*, Stephens.

Plate II, fig. 1.

- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250-542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.
- S. R. 479—28 VIII '07. 51° 20' N., 11° 41' W., soundings 468-560 fms. Trawl.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.

All the specimens are growing on coral (*Lophohelia prolifera*). The largest is in the form of a thick encrustation and is about 20 square mm. in extent.

The surface of the sponge is even, but under the lens it is seen to be minutely hispid. No oscula were seen. The colour in spirit is greyish-white. Refrangent granules, the *cellules sphéruleuses* of Topsent, are abundant and measure 0.013 mm. in diameter.

The main skeleton is an irregular reticulation of tylostyli. Sometimes the spicules are collected into bundles of short fibres. In places some of the tylostyli pierce the dermal membrane and project very slightly beyond it.

The dermal skeleton consists of broad strands of tylostyli closely packed together and lying tangentially to the surface. In specimens that are evidently not so contracted the tylostyli are not so densely crowded, and pores are to be seen in the meshes of the dermal network. No oscula could be found.

Spicules :—

(1) Tylostyli. The shaft is slightly curved and fusiform. The head is well-defined, oval or rounded. At the other end the spicule tapers to a rather short point. The size varies considerably, from about 0.37 mm. by 0.008 mm. to 1.3 mm. by 0.027 mm.

(2) Sigmata. These occur in considerable numbers scattered throughout the sponge and in the dermis. They are contort. and their longer axis varies from 0.035 to 0.045 mm. in length.

#### **Hamacantha Johnsoni** (Bowerbank).

1864. *Hymedesmia Johnsoni*, Bowerbank (1).

1882. *Hymedesmia Schmidtii*, Carter, partim (6).

1904. *Hamacantha Schmidtii* (Carter), Topsent (39).

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. One specimen.

S. R. 480—28 VIII '06. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. Two specimens.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627—728 fms., coral. Trawl. Four specimens.

S. R. 1840—19 v '14. 50 miles S.W. by W.  $\frac{3}{4}$  W. of Great Skellig. 51° 12' N., 11° 29' 30" W., soundings 354—436 fms. Trawl. One specimen.

In 1864 Bowerbank (1) figured the spicules of a sponge from Madeira which he named *Hymedesmia Johnsoni*. He did not describe the species beyond giving an account of the large microscleres which have such a striking appearance. The fact that the sponge was so incompletely described has led to great confusion.

Ridley and Dendy as long ago as 1887 (24, p. 59) stated that the megascleres in Bowerbank's preparation of this sponge in the British Museum were oxecote. In spite of this statement

later authors, judging from Bowerbank's figure of the spicules (1, Vol. I, Pl. XVIII, fig. 293), maintained that the megascleres were styli or a mixture of styli and oxea. A careful examination of the figure will, I think, show that the spicules hitherto taken to be styli are oxea, represented with a longer or shorter piece broken off one end.

The unbroken spicules are seen to be oxea.

An examination was made of the type-slide of *Hymedesmia Johnsoni* in the British Museum, and the following spicules were found to be present:—(1) Oxea from about 0.45 to 0.5 mm. by 0.008 mm.; (2) Diancistra of two sizes, namely, 0.1–0.15 mm. in length and 0.03–0.035 mm. in length; and (3) slightly contort sigmata 0.02–0.025 mm. in length.

In short, in size and character the spicules agree exactly with those of the specimens described and figured by Topsent (39) under the name *Hamacantha Schmidtii* (Carter).

Carter (6) first applied the name *Hymedesmia Schmidtii* to a sponge from the coast of Florida described by Schmidt as *Desmacella Johnsoni* (25). There is a slide of Schmidt's in the British Museum labelled "*Desmacella Johnsoni*, Florida." This preparation has oxea (occasionally a few styli) and diancistra of three forms. No toxa or sigmata were seen, but the slide was, perhaps, not exhaustively searched. The oxea are not shaped like those of specimens from the eastern parts of the North Atlantic which Carter also named *Hymedesmia Schmidtii*, and the specimen is no doubt distinct from them. Lundbeck (19, p. 108, footnote) has already suggested that this is the case.

On the other hand Carter's figures of *H. Schmidtii* (6, Pl. XI, fig. 21) agree with the type of *H. Johnsoni*, and with specimens described by Topsent as *Hamacantha Schmidtii*.

It is clear, at any rate, that the sponge with oxea, diancistra of two sizes and sigmata, must now be known as *Hamacantha Johnsoni* (Bowerbank).

A slide in Carter's collection, now in Professor Dendy's possession, labelled "*Desmacella Johnsoni*, Sdt. = *Hymedesmia Johnsoni*, Portugal: Schmidt's specimen," agrees exactly with Bowerbank's type of *H. Johnsoni*.

All the specimens in the present collection are growing on corals, *Lophohelia prolifera*, *Amphihelia oculata* and *Desmophyllum crista-galli*. The spicules measure as follows:—(1) Oxea 0.45–0.6 mm. in length with a maximum diameter of 0.01 mm. The most usual length is 0.5 mm. (2) Diancistra of two sizes, the larger 0.145–0.16 mm., and the smaller 0.03–0.035 mm. in length. (3) Sigmata, slightly contort, with a longer axis, 0.02–0.025 mm. in length.

A description and figures of the species are given by Professor Topsent under the name *Hamacantha Schmidtii* (39).

*Distribution*.—At the entrance of the English Channel, off Portugal, the Azores and Madeira.

Bathymetrical range from 110 to 728 fathoms.



| *Hamacantha falcula* (Bowerbank).

1874. *Halichondria falcula*, Bowerbank (1).

1882. *Hymedesmia Johnsoni*, Carter, (6).

1902. *Hamacantha Bowerbanki*, Lundbeck (19).

1904. *Hamacantha Johnsoni* (Bow.), Topsent (39).

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Temperature at 500 fms., 8.58° C.

A second species of *Hamacantha* was described by Bowerbank under the name *Halichondria falcula* (1). As in the case of the preceding species, a good deal of confusion has arisen with regard to *H. falcula*, owing to the incompleteness of the original description.

A single small specimen, possessing styli, three forms of diancistra and toxa, is in the Irish collection. It has been compared with the type of *Hamacantha falcula*, and the spicules of both agree in every particular. The microscleres are rather rare on the type slides, but all the forms are present. The megascleres are fusiform styli, the drawing of the spicule given by Bowerbank (1, Vol. III, Pl. LXXIV, fig. 2) being quite misleading. The smaller diancistra and the toxa are not, of course, mentioned by Bowerbank.

That Carter's *Hymedesmia Johnsoni*, as he himself suggested (6, p. 297), is the same as *Hamacantha falcula* is proved by the examination of one of Carter's slides, now in Professor Dendy's possession, which is labelled "*Hymedesmia Johnsoni*, Porcupine St. 65, 45 miles N.W. of Shetland."

*Hamacantha Bowerbanki*, Lundbeck (19) agrees exactly with *Hamacantha falcula*. Lundbeck himself suggested that this might prove to be the case, but refrained from definitely identifying the two owing to the impossibility of determining the older species from Bowerbank's description and figures alone.

Topsent, following Carter, has called the species *Hamacantha Johnsoni*.

Only a small fragment of the species is in the collection, and it has not been thought necessary to give any further description of the spicules as detailed accounts and figures of them have been given by Lundbeck (19) under the name *Hamacantha Bowerbanki*, and by Topsent (39) under the name *Hamacantha Johnsoni*. The species is much less common off the west coast of Ireland than the preceding one.

*Distribution.*—The species was first recorded off the Shetland Isles. It is apparently common in northern seas, as it was taken in abundance in the course of the *Ingolf* Expedition at a number of stations lying between the Farøes and Iceland, to the south of Iceland, in Denmark Strait and Davis Strait (19). It is also common off the Azores (39), and has been taken at Madeira.

Bathymetrical range 110 to 1,267 fathoms.

FAMILY *DESMACIDONIDAE*.SUB-FAMILY *MYCALINAE*.*Esperiopsis fucorum* (Johnston).*Isodictya fucorum*, Bowerbank.

Bofin Harbour.

Ballynakill LXIII—23 III '00. Channel off Ross Point, soundings 2-4 fms. Rake dredge.

*Helga* XXXI—1 IV '01. Inishlyre Harbour, Co. Mayo, soundings  $\frac{1}{4}$ -2 fms., gravel, coral, mud and sand. Naturalist's Dredge.

L 36—10 II '02. Roeillaun Rocks, Ballynakill. Shore collecting.

Galway Bay, between 6-14 fms., at the following stations :—

A. 14—9 VI '04.

A. 71—31 VIII '04.

A. 21—5 VII '04.

A. 76—3 IX '04.

A. 27—18 VII '04.

A. 81—13 IX '04.

A. 35—1 VIII '04.

A. 82—15 IX '04.

A. 37—4 VIII '04.

A. 83—19 IX '04.

A. 41—12 VIII '04.

W. 108—25 VIII '09. Inishgowla Harbour, Clew Bay, soundings 1-4 fms.

W. 109—25 VIII '09.  $\frac{1}{2}$  mile W. by S. of Cloghcormick Buoy, Clew Bay, soundings 5-10 fms., stones.

Blacksod Bay, between tide-marks to 8 fms., at the following stations :—

W. 119—13 IX '09.

W. 179—14 III '11.

W. 132—12 III '10.

W. 181—15 III '11.

W. 178—13 III '11.

W. 237—26 IX '11.

Between tide-marks this species spreads over rocks and stones in encrustations of varying thickness. It also often grows on *Fucus*, *Laminaria* roots, *Zostera* and worm-tubes. Specimens growing in shallow water on hydroids, for example, nearly all those dredged in Galway Bay are branched, the branches following the course of the hydroid stems, which form a core down the centre of the sponge. But many of the branches of the sponge seem to be quite independent of the hydroid. These specimens of *Esperiopsis fucorum* were growing in company with branching specimens of *Myxilla rosacea* (see p. 27). A large branching *Esperiopsis fucorum*, dredged at W. 108, shows no sign of having grown on a hydroid.

The colour of all the specimens seen alive was a very rich orange-red, the embryos being an even more vivid shade than the parent sponge.

All the specimens of *Esperiopsis fucorum* received from the Fisheries Branch are from the west coast of Ireland, but the species is fairly common off other parts of the coast.

*Distribution.*—Off the British Isles and off the north coast of France.

Known bathymetrical range from between tide-marks to 14 fathoms.

#### *Esperiopsis villosa* (Carter).

S. R. 277—15 XI '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and sand. Oyster dredge.

The species is represented by a fragment, about 17 mm. across, which is growing over small pebbles and pieces of shells. In spite of its fragmentary state, it is easily identifiable, on account of its distinctive spiculation, which has recently been described at length by Lundbeck (20).

*Distribution.*—Between Scotland and the Faröes (*Porcupine Expedition*), off the east coast of Greenland, off Iceland, in Denmark Strait and Davis Strait, off the Azores, and in McMurdo Bay (British National Antarctic Expedition).

Bathymetrical range from 20 fathoms (Antarctic) to 1,251 fathoms (Azores).

#### *Esperiopsis incognita*, Stephens.

Plate II, fig. 3.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

The sponge is growing in a thin greyish-white encrustation, about 0.45 mm. in thickness, on a piece of dead coral (*Lophohelia prolifera*). The surface is apparently smooth, but under the lens it is seen to be very minutely hispid.

The skeleton consists of short fibres, made up of multi-serially arranged styli, which run obliquely through the sponge from base to surface. The tips of the terminal spicules project very slightly above the surface. In addition to these fibres, there are thick, well-defined branching fibres running more or less parallel to the surface of the sponge. The ends of the fibres fan out and turn towards the surface, so that the tips of the spicules may project a little. These fibres may be as much as 0.125 mm. in diameter.

Spicules:—(1) Styli, straight and slender, 0.4–0.45 mm. in length by 0.006–0.008 mm. (2) Isochelae palmatae of two forms—(a) straight isochelae with rather long, narrow alae, leaving only a short part of the shaft free. Length 0.035–0.055 mm.; (b) very small slender isochelae with slightly curved shaft, 0.013 mm. in length. (3) Sigmata of two forms—(a) sigmata lying in one plane and varying a good deal in size. The longer

axis varies from 0.1–0.32 mm. in length. The maximum thickness of the shaft is about 0.013 mm.; (b) slender, contort sigmata 0.04–0.075 mm. in length.

The sigmata, especially the contort ones, are in very great profusion throughout the sponge.

From an examination of two of Carter's slides, now in Professor Dendy's possession, labelled "*Esperiopsis villosa*, North Atlantic, between Scotland and the Faröes, *Ann. Mag.*, Ap., 1882," it was found that the sponge above described is identical with the specimen referred to as "An unknown Sponge" by Carter, and partly described and figured by him (5). As can be seen from the labels on the slides, and from Carter's later reference to the sponge (6, p. 295), he was inclined to identify it with *Esperiopsis villosa*.

### *Esperiopsis macrosigma*, Stephens.

Plate II, fig. 4.

S. R. 353—6 VIII '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627–728 fms., coral. Trawl.

The sponge is growing in a very thin encrustation on a piece of dead coral (*Amphihelia oculata*), and on a shell of *Arca nodulosa* which was attached to coral (*Lophohelia prolifera*).

The surface of the sponge is smooth, and the colour in spirit greyish-white.

The skeleton consists of bundles of spicules, or of short fibres containing multiserially arranged spicules, which run through the sponge. In places longer, rather ill-defined fibres run more or less parallel to the surface. There are also single spicules or groups of two or three spicules scattered through the sponge.

Spicules:—(1) Styli, slender, straight, tapering evenly to a rather short point. Length 0.37–0.42 mm. by 0.006–0.008 mm. (2) Isochelae palmatae of three forms—(a) the largest are 0.11–0.125 mm. in length, the shaft is straight and is about 0.006 mm. in thickness. The tooth measures 0.024 mm. across; (b) isochelae with rather long, narrow alae, leaving only a short part of the shaft free. Length 0.06 mm.; (c) isochelae with slightly curved shaft, 0.015–0.024 mm. in length. (3) Sigmata of two forms—(a) sigmata lying in one plane and of very different sizes. The longer axis varies from about 0.1–0.4 mm. in length. The maximum thickness is 0.02 mm.; (b) slender, contort sigmata with a longer axis 0.04–0.075 mm. in length.

Several other thin encrusting species of *Esperiopsis* are known. Of these, *Esperiopsis decora*, Topsent (39) and

*Esperiopsis flagellum*, Lundbeck (20), in addition to the large sigmata present, possess flagellate sigmata, and thus differ in this point, not to mention others, from the two preceding species. *Esperiopsis pulchella*, Ridley and Dendy, is clearly marked off by the presence of isochelae arcuatae and the absence of sigmata.

*Mycale aegagropila* (Johnston).

*Desmacidon aegagropila*, Bowerbank.

Ballynakill XVII—19 III '99. Off Ross Point, in 1 fm. Rake dredge.

Bofin XCIX—21 VIII '99. Dawros, Rossth, etc., Ballynakill Harbour. Shore collecting.

Bofin Harbour.

Ballynakill, 1900.

L. 193—13 III '03. Knocknahaw, Ballynakill Harbour. Shore collecting.

L. 283—19 I '04. Ross shore, Ballynakill Harbour. Shore collecting.

Blacksod Bay, between tide-marks at the following stations:—

W. 116—15 IX '09.

W. 132—12 III '10.

W. 119—13 IX '09.

W. 233—21 IX '11.

W. 129—10 III '10.

This species is nearly always found between tide-marks. It is quite rare in even shallow-water dredgings, and only one specimen in the present collection has been so obtained.

The specimens from Bofin and Ballynakill are especially fine. The largest, from the latter locality, is 11 cm. in diameter and is nearly spherical in shape.

*Mycale aegagropila* grows fairly often on *Pecten* and on other shells. The colour of all the specimens seen alive was ochre-yellow, often tinged with dark grey.

*Distribution*.—Off the British Isles and off the north and Mediterranean coasts of France.

*Mycale macilenta* (Bowerbank).

*Hymeniacidon macilenta*, Bowerbank.

L. 193—13 III '03. Knocknahaw, Ballynakill Harbour. Shore collecting.

S. 597—6 II '11. Ballyvaldon Oyster beds, Norris Castle Coastguard Station, Co. Wexford, soundings  $7\frac{1}{2}$ –8 fms., Naturalist's dredge.

W. 233—21 IX '11. Elly Bay, N., Blacksod Bay. Shore collecting.

W. 234—23 IX '11. Barranagh, E., Blacksod Bay. Shore collecting.

This species, differing from the preceding in the possession of anisochelae, which fall into two groups according to size and proportions, and long toxa (26) is not very common off the Irish coast. It occurs between tide-marks and in shallow water, usually as a thin coating on living shells of *Pecten varius*. All the foregoing specimens are on *Pecten varius* shells except one, which is covering the carapace of a crab (*Hyas coarctatus*). The colour of all the specimens seen alive was ochre-yellow.

*Distribution*.—Off the British Isles and off the north coast of France.

***Mycale placoides* (Carter), Lundbeck.**

*Helga* LXXXVIII—8 VII '01. 40 miles W.N.W. of Cleggan Head, soundings 78 fms. sand, gravel and stone. Naturalists's dredge. Temperature at 76 fms., 9.1° C.

*Helga* CXXIX,*d*—11 IX '01. 40 miles W.N.W. of Cleggan Head, soundings 76½ fms., stones. Naturalist's dredge.

S. R. 146—24 VIII '04. 80 miles W.N.W. of Slyne Head, 53° 24' N., 12° 29' W., soundings 181 fms., fine sand. Trawl.

S. R. 177—15 XI '04. 20 miles N. by W. of Eagle Island, 54° 33' 30" N., 10° 24' 30" W., soundings 72½ fms., stones. Oyster dredge.

S. R. 196—11 II '05. 54° 42' N., 10° 34' W., soundings 242 fms., stones (coral). Oyster dredge.

The specimens are all more or less broken, as their texture is very soft and fragile. The largest is 100 mm. long by 77 mm. at the broadest part. It is broader at one end than at the other, and is very similar in outline to the figure of *Mycale lingua* given by Bowerbank (1, Vol. III, Pl. LXXXVII). Numerous large pieces of the sponge were dredged at S. R. 196, and two nearly complete specimens from S. R. 146. Only one or two fragments were obtained at the remaining stations.

The species is here understood as defined by Lundbeck (20), who carefully distinguishes it from its near ally, *Mycale lingua* (Bowerbank). All the Irish specimens agree exactly in spiculation with Lundbeck's description of *Mycale placoides*.

The species is apparently fairly common in deep water off the west and south-west coasts of Ireland as there are numbers of specimens of the sponge in the Irish National Museum, which were obtained by the earlier dredging expeditions off the Irish coast, but which have not yet been recorded.

*Distribution*.—In Denmark Strait, off Iceland, the Farøes, the Shetlands and off Newfoundland.

Bathymetrical range from about 72 to 700 fathoms.

***Mycale rotalis*** (Bowerbank).*Desmacidon rotalis*, Bowerbank.

Blacksod Bay, between tide-marks, at the following stations :—

W. 164—19 IX '10.

W. 233—21 IX '11.

W. 185—17 III '11.

W. 234—23 IX '11.

S. 597—6 II '11. Ballyvaldon Oyster beds, Norris Castle Coast-guard Station, Co. Wexford, soundings  $7\frac{1}{2}$ —8 fms. Naturalist's dredge.

This species is represented in the collection by several specimens taken between tide-marks in Blacksod Bay, and off the Wexford coast in shallow water. The colour of the sponge, when alive, is a beautiful deep scarlet. The species was first recorded from the Irish coast in the Report on the Clare Island Survey (26). It had previously been known only off the south coast of England (1).

***Mycale fascifibula*** (Topsent).*Esperella fascifibula*, Topsent.

S. R. 480—28 VIII '07.  $51^{\circ} 23' N.$ ,  $11^{\circ} 38' W.$ , soundings 468 fms., stones. Oyster dredge.

The species is represented in the collection by a mere fragment, about 3 mm. in its greater diameter. It is growing on a piece of coral (*Lophohelia prolifera*). In spite of its small size it is easily identifiable on account of its characteristic spiculation. The spicules agree exactly in size and shape with the description given of those of the type-specimen (39). The species is well marked by its polytylote styli and its large sigmata, which often occur in bundles.

*Mycale fascifibula* has, up to this, been known from one specimen, or rather fragment, taken off the Azores in 845 metres (39).

The Irish specimen is unfortunately too fragmentary to afford any further information as to the arrangement of the skeleton, more particularly the dermal skeleton, of this interesting species.

***Mycale littoralis*** (Topsent).*Esperella littoralis*, Topsent.

L. 287—2 II '04. Fahy Bay, Ballynakill Harbour. Scraped from bottom of a hulk. Two specimens. Bofin Harbour. One specimen.

These are the first found Irish specimens of this species. They have been already described, with a specimen from Clare

Island, in the report on the sponges of the Clare Island Survey (26).

The species, up to the finding of these specimens, was only known off the French coast at Roscoff, Luc and Banyuls.

*Rhaphidotheca Marshall-Halli*, Kent.

*Esperella rhopalophora*, Schmidt.

*Rhaphidotheca affinis*, Carter.

Plate III, figs. 2, 3.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9-15° C.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.

The genus *Rhaphidotheca* is characterised by the presence of curiously modified styli in the projecting bundles of spicules present at the surface of the sponge. The distal end of these spicules is swollen into a pear-shaped or disc-shaped expansion. The spicules have been called exotyli by Topsent (39, p. 202) and tylostrongyla by Lundbeck (20, p. 31).

Two specimens of *Rhaphidotheca* are in the collection; one of them, namely, that from S. R. 480, possesses exotyli of the shape characteristic of *R. Marshall-Halli*, Kent (18), the other, which was obtained at S. R. 151, possesses exotyli shaped like those of *R. affinis*, Carter (4).

Apart from the shape of the exotyli, the character (together with the shape of the anisochelae) on which the latter species was founded, the only difference that could be seen between the two specimens, after careful comparison, was a very slight and unimportant difference in the size of some of the spicules, a difference which cannot, of course, be taken as of specific value.

With regard to the exotyli, although the majority of these spicules are, in the one specimen, typical of *R. Marshall-Halli*, and in the other, of *R. affinis*, yet the shape of the distal expansion of the spicules varies to some extent in the individual sponge, as can be seen from the series of drawings taken from the two specimens (Pl. III, fig. 2, 3). It thus appears that no sharp distinction can be drawn between the two species as regards the shape of the exotyli. It may be well to mention that the exotyli vary in number in the different specimens, as far as can be seen in the scanty material available for examination. In the type of *R. Marshall-Halli*, as seen from the slide in the British Museum, the great majority of spicules in each bundle of spicules at the surface of the sponge are exotyli, only a very few are unmodified styli. This fact was noticed by Saville Kent in his description of the species (18, p. 219). In the specimen from S. R. 480 the majority of spicules at the



surface are, on the whole, styli. In the specimen from S. R. 151 the modification is less pronounced, even fewer of the surface spicules being exotyli. In this connection it is interesting to note that Lundbeck (20, p. 31) has found examples of quite similar exotyli occurring in very small numbers in the sponge called by him *Mycale lingua* (Bowerbank), the spiculation of which agrees so very closely with that of *R. Marshall-Halli*. On the other hand, in *Rhaphidotheca loricata* (39), which possesses the most highly differentiated exotyli, a thin crust is formed at the surface of the sponge by the discs of the exotyli, the edges of which touch each other.

Of the two Irish specimens, the first-found is dried. It is growing on a piece of sandstone, and little more than its base is preserved. It covers an area of about 25 mm. by 10 mm. The second specimen is in the form of a little cushion, about 15 mm. by 6 mm. in extent. It is growing on a piece of coral (*Amphihelia oculata*).

The skeleton consists of strong, branching fibres, made up of closely packed, multiserially arranged styli, which run to the surface of the sponge. These fibres may be as much as 0.15 mm. in thickness. At the surface the terminal spicules of the fibres spread out in a penicillate manner, and, piercing the dermis, they produce the hispidation of the sponge.

Spicules:—(1) Styli. The shaft is straight and fusiform. One end is rounded, the other tapers to a rather short point.

(2) Exotyli. These spicules are usually slightly longer and thicker than the normal styli. The distal end is swollen into a pear-shaped expansion, which is long in proportion to its width in the *R. affinis* type, and broad in the *R. Marshall-Halli* type, with a flattened or even slightly concave top. As already mentioned, the former type of exotyli is found in the specimen from S. R. 151, the latter in the specimen from S. R. 480. There is often a small tubercle present on the summit of the pear-shaped expansion.

(3) Anisochelae. The large anisochelae occur in rosettes. Their shaft is a little curved; the larger alae occupy about one-third of the length of the chela, and the tooth at the large end is rather narrow; at the small end the tooth is broad. In the small chelae the large alae are longer in proportion to the length of the chela, and take up about one-half the entire length of the shaft.

(4) Sigmata. These are slightly contort and are very numerous throughout the sponge.

(5) Rhaphides. These occur in trichodragmata and are present in immense numbers.

The following are the measurements of the spicules in the Irish specimens:—

Sponge from S. R. 151.

(1) Styli, 0.57–0.73 mm. in length with a maximum diameter of 0.013 mm.

(2) Exotyli, 0.8–1.4 mm. in length with a maximum diameter of the shaft 0.015 mm. and of the head about 0.035 mm.

(3) Anisochelae, 0.025–0.04 mm. and 0.075–0.085 mm. in length.

(4) Sigmata about 0.013–0.02 mm. along the greater axis.

(5) Raphides, 0.06 mm. in length.

Sponge from S. R. 480.

(1) Styli, 0.65–0.77 mm. long by 0.016 mm. in diameter.

(2) Exotyli, 0.8–0.95 mm. long with a maximum diameter of the shaft about 0.025 mm. and of the head 0.055 mm.

(3) Anisochelae, 0.025–0.04 mm. and 0.08–0.09 mm. in length.

(4) Sigmata about 0.02 mm. along the greater axis.

(5) Raphides, 0.08 mm. in length.

Thiele (31) has already placed *Rhaphidotheca affinis*, Carter, as a synonym of *R. rhopalophora* (Schmidt), so that, should it prove to be correct to unite that species with *R. Marshall-Halli*, as done in the foregoing account, we have at present two well-marked species of *Rhaphidotheca*, namely, *R. Marshall-Halli*, Kent, and *R. loricata* (Topsent).

*Distribution*.—Between Scotland and the Farøes (*R. affinis*), off Bergen, Norway, at two localities (*R. rhopalophora*) and off Portugal (*R. Marshall-Halli*).

Bathymetrical range from 41 to 500 fathoms.

#### *Asbestopluma pennatula* (Schmidt).

S. R. 506—12 IX '07. 50° 34' N., 11° 19' W., soundings 661–672 fms. Trawl. Temperature at 600 fms., 8.22° C. Two specimens.

Both specimens are very small and are broken off from their support; they are 20 mm. and 22 mm. in height respectively, with a stalk about 0.4 mm. in thickness. One of the specimens was found entangled in a mass of rooting spicules of *Pheronema Grayi*. The sponges agree exactly with Lundbeck's redescription of the species (20), both in external appearance and in spiculation.

*Distribution*.—Barents Sea, off the east coast of Greenland, off Norway and in the Gulf of St. Lawrence.

Bathymetrical range from 90 to 975 fathoms.

#### *Cladorhiza abyssicola*, Sars.

S. R. 506—12 IX '07. 50° 34' N., 11° 19' W., soundings 661–672 fms. Trawl. Temperature at 600 fms., 8.22° C. One specimen.

The sponge is 25 mm. in height, while the thickness of the stem is barely 0.3 mm. It is branched, the longest branch being 5 mm. in length.

The specimen is broken off from its support, and the lower part of the stem consists merely of the dense spicular core, the flesh being torn away. The sponge was found tangled in a mass of rooting spicules of *Pheronema Grayi*. Descriptions and figures of the species have been given by Lundbeck (20) and Topsent (40).

*Distribution.*—Davis Strait and off the south of Iceland; between Franz-Josef Land and Nova Zembla; off the west and south coasts of Norway; in the Gulf of St. Lawrence; off Madeira and off Teneriffe.

Bathymetrical range from about 130 fathoms at its most northern station to about 1,093 fathoms off Madeira.

### *Myxilla incrustans* (Johnston).

*Halichondria incrustans*, Johnston.

Ballynakill, 1900.

S. 568—570—24—27 I '08. Ballyvaldon, Co. Wexford, soundings 10½—7 fms. Oyster dredge.

W. 183—16 III '11. Elly Bay, South, Blacksod Bay. Shore collecting.

W. 222—22 VIII '11. 2 miles S.W. by S. ½ S. of Clare Island Look-out Tower, soundings 25½ fms., stones. Canvas dredge.

W. 256—5 III '12. Lough Swilly, Muckamish Tower. Shore collecting.

This species, which has been fully redescribed by Lundbeck (20), is not as common off the Irish coast as is the following one. It is easily distinguished from *Myxilla rosacea*, when alive, by its pale yellow colour and more deeply furrowed surface. The smaller specimens are encrusting, the larger form rounded cushion-like masses.

*Distribution.*—Off Jan Mayen and Greenland, along the west coast of Europe from Norway to France, Bay of Biscay, Gulf of St. Lawrence, off south-east Africa.

Bathymetrical range from between tide-marks to about 200 fathoms.

### *Myxilla rosacea* (Lieberkühn).

Plate I, fig. 3.

*Helga CXXXIIId*—13 IX '01. 50 miles N.W. by N. of Cleggan Head, soundings 135 fms., fine sand.

A. 1—14 VIII '02. 20 miles W.N.W. of Cleggan Head, soundings 72½ fms., coarse shells, sand, rock. Dredge.

Galway Bay, between 6 and 14 fms., at the following stations:—

- |                    |                  |
|--------------------|------------------|
| A. 14—9 VI '04.    | A. 81—13 IX '04. |
| A. 27—18 VII '04.  | A. 82—15 IX '04. |
| A. 41—12 VIII '04. | A. 83—19 IX '04. |
- S. R. 200—14 II '05. Rathlin Deep, 55° 20' N., 6° 12' W., soundings 125 fms., stones. Naturalist's dredge.
- S. R. 211—5 V '05. 70 miles S.W. of Fastnet, 50° 20' N., 10° 20' W., soundings 81 fms., coarse sand. Trawl.
- W. 37—2 IX '05. Galway Bay, soundings 16–20 fms., gravel, mud, sand. Trawl. Temperature at 15 fms., 15.4° C.
- W. 68—22 V '09. 2.3 miles E.  $\frac{1}{2}$  N. of Clare Island Lighthouse, soundings 19–25 $\frac{1}{2}$  fms., sand. Trawl.
- W. 72—22 V '09. 3.4 miles S. by E.  $\frac{1}{4}$  E. of Clare Island Lighthouse, soundings 10–10 $\frac{1}{2}$  fms., sand. Oyster dredge.
- W. 87—26 V '09. 3.5 miles S.E.  $\frac{1}{2}$  E. of Clare Island Lighthouse, soundings 13–16 $\frac{1}{2}$  fms., fine sand. Trawl.
- S. R. 807—17 VIII '09. 23 miles W.  $\frac{1}{2}$  S. of Skelligs Light, 51° 37' 30" N., 11° 6' W., soundings 105 fms., fine sand. Trawl.
- W. 109—25 VIII '09.  $\frac{1}{2}$  mile W. by S. of Cloghormick Buoy, Clew Bay, soundings 5–10 fms., stones. Naturalist's dredge.
- W. 116—12–151 IX '09. Feorinyeco Bay, Blacksod Bay. Shore collecting.
- S. R. 1176—22 V '11. 39 miles W.  $\frac{1}{2}$  N. of Blackball Head, 51° 26' 30" N., 11° 2' W., soundings 152 fms., sand. Naturalist's dredge.

When found between tide-marks this species grows in the form of thinner or thicker encrustations, usually under sheltered ledges of rock, or on the sides of rock-pools at extreme low water. It is often dredged in a few fathoms, coating *Laminaria* roots. The specimens from Galway Bay, in 6–14 fathoms, are all branching (Plate I, fig. 3). They are cut off from their support, but some of them can be seen to be growing on hydroid colonies and following the course of the branches of the hydroid. In some well-branched specimens no trace of any hydroid stem can be found. The branches are slightly flattened near the base and markedly compressed towards the tip, where they sometimes divide several times in the same plane, so that the ends of the branches often resemble an elk's horn in shape. Sometimes the sponge branches repeatedly and the branches anastomose. The longest branched specimen is 65 mm. in height. Lundbeck (20) who has carefully redescribed the species, gives an account of similar branched specimens taken off the Farøe Islands.

The colour of the sponge, when alive, is buff yellow, often tinged with red on the more exposed parts, or, more rarely, the red predominates, so that the whole sponge is a more or less uniform deep orange red. The specimens taken from deep water were not seen alive.

*Distribution*.—Off the Faröes, France, Spain, Portugal and the Azores; Mediterranean.

Bathymetrical range from between tide-marks to 153 fathoms.

***Myxilla fimbriata* (Bowerbank).**

*Isodictya fimbriata*, Bowerbank.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge. Three specimens.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. One fragment.

The specimens from W. 141 are small, rounded sponges, one of them being nearly globular. They are growing on small specimens of *Caryophyllia clavus* and on a fragment of rock. The largest is 11 mm. in diameter. The colour in spirit of two of the sponges is light brown, the third is very dark brown, nearly black. They agree both in external appearance and in spiculation with Lundbeck's redescription of the species (20). The remaining specimen is merely a fragment growing on *Lophohelia prolifera*.

\* *Distribution*.—*Myxilla fimbriata* has previously been taken off the Shetland Islands (Bowerbank), and at a number of stations in Davis Strait, Denmark Strait, off Iceland and the Faröes, and off the coast of Norway at depths between 30 and 318 fathoms by the Danish *Ingolf* Expedition (20). It has also been recorded for Baffin Bay, in 169 fathoms, under the name *Cornulum enteromorphoides*, Fristedt (10), an examination of Fristedt's type having shown Lundbeck (22, p. 26) the identity of the two species.

***Lissodendoryx diversichela*, Lundbeck.**

S. R. 196—11 II '05. 54° 42' N., 10° 34' W., soundings 242 fms., stones and coral. Oyster dredge. Temperature at 235 fms., 9.8° C.

The single specimen in the collection is merely a fragment about 45 mm. in height, and nearly as much across its widest part. The colour in spirit is pale yellow.

The spicules agree exactly with Lundbeck's description of the type (20), except that the acanthostyli do not quite reach the maximum size given. The largest acanthostyli in the Irish specimen are about 0.37 mm. by 0.015 mm. The remaining kinds of spicules agree very well in size with the corresponding spicules of the type.

*Distribution*.—In Denmark Strait and off the west coast of Norway, 170–198 fms. (20). It has recently been taken a second time off Norway in 440 metres (41).

**Iophon nigricans** (Bowerbank).*Halichondria nigricans*, Bowerbank.

- S. R. 118a—13 v '04. 2 miles N.E.  $\frac{1}{2}$  E. of Rathlin Island, 55° 19' 45" N., 6° 10' W., soundings 115 fms., rock. Dredge.
- S. R. 174—14 xi '04. 30 miles N. by W. of Eagle Island, 54° 43' N., 10° 35' W., soundings 208 fms., sand and gravel. Oyster dredge.
- S. R. 194—10 ii '05. 54° 49' N., 10° 30' W., soundings 366 fms., rock. Oyster dredge. Temperature at 340 fms., 9.6° C.
- S. R. 196—11 ii '05. 54° 42' N., 10° 34' W., soundings 242 fms., stones and coral. Oyster dredge. Temperature at 235 fms., 9.8° C.

No satisfactory determination can be made of the species described by Bowerbank which are now assigned to the genera *Iophon* and *Pocillon*, until the type specimens are carefully examined and described. But several fragments of an *Iophon* in the collection agree very well, as regards spiculation, with the type-slide of *Iophon nigricans*, and are therefore referred to that species.

Some of the sponges are growing on a *Hydrocoralline*, but most of them are broken off from their support. They are in a fragmentary state, and are soft and very fragile. They vary in colour in spirit from light to very dark brown.

The dermal spicules are strongyla, spined at the ends and measuring 0.23–0.29 mm. in length by 0.006–0.008 mm. in thickness in the different specimens. The length does not vary so much in a single specimen. The acanthostyli are slightly curved, and are spined along the whole shaft. The length is usually between 0.25 mm. and 0.32 mm. with a thickness of 0.013 mm. The anisochelae are 0.025 mm., and the bipocilli about 0.01 mm. long.

**Iotrochota acanthostylifera**, Stephens.

Plate II, fig. 5.

- S. R. 353—6 viii '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. One specimen.
- S. R. 504—12 ix '07. 50° 42' N., 11° 18' W., soundings 627–728 fms., coral. Trawl. Two specimens.
- S. R. 505—12 ix '07. 50° 39' N., 11° 14' W., soundings 464–627 fms. Trawl. One specimen. ♦

The largest specimen forms a coating about 18 mm. by 7 mm. in extent on the branches of a piece of dead coral (*Amphihelia oculata*). It is a good deal injured, and most of the dermal membrane is torn away. Another small piece of

the sponge is growing with *Halichondria fibrosa* (Fristedt) on *Lophohelia prolifera* from the same station. The remaining specimens are the merest fragments, one coating a shell of *Arca nodulosa* which was attached to a piece of *Lophohelia*, the other growing on a Hexactinellid sponge (*Aphrocallistes beatrix*, Gray).

As far as can be seen the main skeleton is an irregular reticulation of acanthostyli. Here and there ill-defined fibres are formed.

The dermal skeleton consists of flat bundles of spicules, or, in places, of longer fibres.

Spicules :—

(1) Acanthostyli. The skeletal spicules are straight or slightly curved acanthostyli, with the head very slightly swollen and thickly spined. The spines on the head are strong, blunt and a little curved. A few small spines are scattered along the shaft. The length is 0.32–0.35 mm. by 0.008 mm.

(2) The dermal spicules are tylota. The shaft is straight and the ends are often unequal, one end being more rounded than the other. They do not vary much in size; they measure 0.3–0.33 mm. by 0.005 mm.

(3) Isanchorae. These measure 0.045–0.05 mm., in length and have 8–10 teeth at either end.

(4) Birotulae, with a length of 0.015 mm., and having about 15 teeth at either end.

The fragments from S. R. 353 and S. R. 505 were found since the preliminary description of this species was published (29). They agree exactly with the type, except that the spicules are very slightly shorter. The tylota and the acanthostyli scarcely reach a maximum length of 0.3 mm., and the isanchorae are 0.035–0.045 mm. in length. The birotulae are of the same length as in the type, namely, 0.015 mm.

Both forms of microscleres are very abundant in the specimens.

*Iotrochota acanthostyliifera* differs from the majority of known *Iotrochota* species in possessing acanthostyli instead of styli. Lundbeck's species, *Iotrochota spinosa* (20) possesses acanthostyli, but is at once marked off from the present species by the possession of birotulae of two sizes and by the absence of isanchorae.

#### **Forcepia forcipis (Bowerbank).**

S. R. 479—28 VIII '07. 51° 20' N., 11° 41' W., soundings. 468–560 fms. Trawl.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings. 468 fms., stones. Oyster dredge.

This species is represented by two minute fragments growing on pieces of coral (*Amphihelia* and *Lophohelia*). The spicules agree exactly in character with the description given by

Lundbeck (20), but they are slightly smaller than the spicules of well-grown specimens.

The spicules measure as follows:—(1) styli, maximum size 0.5 mm. by 0.013 mm.; (2) tylota, 0.25 mm. in length by 0.025 mm.; (3) isochelae, 0.021 mm. long; (4) large forcipes, 0.325 mm. and small forcipes 0.02 mm. in length.

*Distribution*.—Off the Shetlands, between Scotland and the Farøes, and east of Suderø, Farøes.

Bathymetrical range 150 to 560 fathoms.

#### *Histoderma physa* (Schmidt).

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

There is only a mere fragment in the collection growing on coral (*Lophohelia prolifera*), but the species is easily recognisable on account of its characteristic spiculation, which has recently been described at length by Lundbeck (22). The known geographical range of the species is extended southwards by the discovery of the Irish specimen.

*Distribution*.—Baffin Bay, Denmark Strait, between Iceland and the Farøes and off the coast of Norway.

Bathymetrical range from 90 to 450 fathoms.

#### *Histodermella Ingolfi*, Lundbeck.

Plate III, fig. 3.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.

The sponges are growing in crevices of dead coral (*Lophohelia prolifera*). They consist of a thick-walled, rounded or elongated bladder-like body, giving off thinner-walled fistulae. One of the specimens is about 30 mm. long by about 9 mm. in width, the other is more rounded and is about 20 mm. in diameter, but it is impossible to measure accurately as the sponges are more or less hidden in crevices of the coral. Nor is it always possible to determine whether all the fistulae seen are given off from one specimen or from several independent specimens. The colour of the sponge in spirit is yellowish-white, while the contracted choanosome is a deeper yellow, and the small thin-walled fistulae are white.

With regard to the spicules, they agree exactly with those of the first found specimens (22), except that in the specimen



from S. R. 151 the acanthoxea are very slightly spined. The acanthoxea of the sponge from S. R. 480 are exactly as described and figured by Lundbeck.

The spicules in the Irish specimens measure as follows:—(1) tylota, 0.25–0.6 mm. in length with a maximum diameter of 0.019 mm.; (2) acanthoxea 0.2–0.25 mm. in length by 0.016 mm.; (3) isochelae, 0.02 mm. long; (4) sigmata, 0.06 mm. long.

*Distribution.*—The species has previously been taken only to the S.W. of Iceland, at 60° 37' N., 27° 52' W., in 799 fathoms (22).

### *Grayella pyrula* (Carter).

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

Only fragments of this species are in the collection. They seem to be taken from an encrusting specimen which was growing on a tube of *Eunice floredeana* in *Lophohelia prolifera*.

The pore-areas are beautifully preserved, and the oscula also can be clearly seen. The size and character of the spicules and the structure of the skeleton and of the dermal membrane agree exactly with Lundbeck's detailed description of *Grayella pyrula* (22). This species he considers to be always erect, but Topsent describes several encrusting specimens (41).

The spicules measure as follows:—(1) tornota, 0.335–0.4 mm. by 0.005–0.008 mm.; (2) acanthostyli, 0.165–0.2 mm. by 0.009 mm.; (3) chelae, 0.02 mm. in length.

The foregoing measurements are well within the limits given by Lundbeck and Topsent between which the spicules of this species are known to vary.

*Distribution.*—“Between 74° and 38° Lat. N., and between 36° Long. W., and 31° Long. E., with a bathymetrical range from 70 to 752 fathoms,” Lundbeck (22).

### SUB-FAMILY ECTYONINAE.

#### *Hymedesmia zetlandica*, Bowerbank.

Plate IV, fig. 3.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge. One specimen.

The sponge is extremely minute, and is growing on a worm-tube, which is fixed to a small specimen of *Caryophyllia clavus*.

The acanthostyli are set vertically with their heads on the substratum. The dermal spicules are in bundles, but the exact arrangement of the dermal skeleton cannot be made out owing to the extremely small size of the only specimen available.

Spicules :—

(1) The acanthostyli are short and straight. The head is slightly swollen, and is covered thickly with strong pointed spines which are straight or slightly curved. Above the head a short space of the shaft is free from spines. Then come closely set spines to within a longer or shorter distance of the apex of the spicule. These spines are strong and recurved. The acanthostyli terminate in a sharp point. The length varies from 0.08 to 0.145 mm. The diameter above the head is about 0.01 mm.; across the head, including the spines, it is about 0.02 mm.

(2) The dermal spicules are tylota, which are straight and rather uniform in size. They measure 0.225–0.255 mm. in length by 0.005–0.008 mm.

(3) Isochelae arcuatae. These are 0.02–0.027 mm. long, and have a slightly curved shaft and rather short teeth.

(4) Sigmata. These are very characteristic of the species as they occur in bundles. They are extremely slender and are slightly contort. They are 0.05 mm. in length.

*H. zetlandica* is the type species of the genus *Hymedesmia*, Bowerbank (1, Vol. I, p. 190), and it has not been taken since the first found specimens were dredged off the Shetlands (1).

#### *Hymedesmia truncata*, Lundbeck.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

This interesting and clearly-marked species is represented in the collection by one specimen, which is growing on a piece of sandstone in company with several other sponges. It is dried, and looks like a thin, pale, yellowish film spreading over the stone to a considerable extent.

The very characteristic megascleres agree exactly in shape with those of the type specimen (22), but are slightly smaller. The acanthostyli, which do not vary much in size, are only 0.035–0.04 mm. in length; the tylota are 0.21–0.25 mm. long.

*Distribution.*—The species has previously been taken only off the east coast of Greenland, in Denmark Strait, off the north of Iceland and off the Farøes at depths of 50 to 310 fathoms (22).

*Hymedesmia Koehleri* (Topsent).*Leptosia Koehleri*, Topsent.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C. One specimen.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. One specimen.

Both the specimens are growing on coral. From the descriptions given by Topsent (36 and 39) and by Lundbeck (22), the species appears to be rather variable. The two Irish specimens agree closely with each other, but one of them possesses rather longer spicules than the other.

In one specimen the maximum length of the acanthostyli is about 0.24 mm., of the strongyla 0.26 mm., and of the isochelae 0.035 mm. In the second specimen the maximum lengths of the spicules are as follows:—acanthostyli 0.15 mm., strongyla 0.2 mm., and isochelae 0.033 mm.

*Distribution.*—Denmark Strait, and off Iceland and the Faröes; Bay of Biscay, and at a number of stations off the Azores. Bathymetrical range 138 to 1,350 fathoms.

*Hymedesmia curvichela*, Lundbeck.

- S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627–728 fms., coral. Trawl.

This sponge grows in a thin encrustation of considerable extent on a piece of dead coral (*Lophohelia prolifera*). When first seen in spirit the colour of the sponge was a deep blue-green. This colour has since faded. Lundbeck (22) states that the colour of the living sponge is deep blue.

The spicules agree exactly in shape with those of the first found specimens. The only difference seen in the Irish specimen is that the acanthostyli are not quite as long as in the type, the longest measuring 0.55 mm. as against 0.8 mm.

The spicules in the Irish specimen measure as follows:—(1) the longer acanthostyli are 0.4–0.55 mm. in length with a maximum diameter of 0.019 mm., the shorter acanthostyli are 0.14–0.15 mm. by 0.008–0.01 mm.; (2) strongyla 0.425 mm. in length by 0.008 mm.; (3) isochelae arcuatae 0.035–0.04 mm.

*Distribution.*—Denmark Strait and east of the Faröe Islands in 160–330 fms. (22).

**Hymedesmia paupertas** (Bowerbank).*Hymeniacion paupertas*, Bowerbank.

Plate IV, fig. 1.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge.

W. 208—1.5 miles S.E. by E. of the Bills, Co. Mayo, soundings 37½ fms., rock. Naturalist's dredge.

One of the specimens, namely that from W. 208, was obtained in the course of the Clare Island Survey, and was therefore included in the report on the sponges of that Survey (26). It is growing in a thin encrustation about 12 mm. by 9 mm. in extent on a piece of *Porella compressa*. A second specimen has been found among the sponges collected by the Fisheries Branch. It is growing on, and almost completely covering, a small specimen of *Caryophyllia clavus* which is 11 mm. in height with a greater diameter of 9 mm. This sponge is less contracted than the previously described Irish specimen, and, under the lens, very faintly marked oval areas can be made out on its surface. These are pore-areas which contain very numerous small pores, about 0.015–0.03 mm. in diameter. The dermal membrane is supported on the ends of the dermal spicules, which are arranged round these areas, the dermal membrane itself only containing isochelae arcuatae.

Under the lens the surface is seen to be very minutely hispid in places, the hispidation being due to the slight projection of the ends of the dermal spicules. In the more contracted specimen from W. 208 the hispidation is more marked, and is chiefly due to the projection of the long acanthostyli. Here and there the ends of the dermal spicules also project slightly. It is probable, therefore, that the surface is smooth in the living sponge. The colour of the only specimen seen alive was blue. In spirit both specimens are a very pale yellowish colour. Spicules :—

(1) The acanthostyli fall into two groups; the longer have a slightly curved shaft, the head is fairly well marked, and is covered with rather small, but stout, blunt spines; smaller spines extend for a little distance along the shaft. The length varies in the two specimens from 0.3 to 0.55 mm. by 0.012 mm. above the head. The short acanthostyli are 0.12–0.16 mm. in length by 0.005 mm. above the head; they have a head, which is at the most very slightly marked, but it is covered with rather long spines, the diameter, including the spines, being 0.01 mm.; the shaft, which is a little curved, is thickly set with small spines.

(2) The strongyla are straight and slender. One end is slightly thicker than the other. They vary between 0.22 and 0.3 mm. in length in the two specimens by 0.003–0.005 mm.

(3) The isochelae arcuatae have a strongly curved shaft, which is about 0.005–0.008 mm. in breadth in front view. Their length in the two specimens is 0.03–0.035 mm.

*Distribution.*—Off the Shetlands (1), and off the west coast of Ireland (26).

*Hymedesmia similis*, Lundbeck (22) seems to be identical with *Hymedesmia paupertas* (Bowerbank). It is not possible to identify Bowerbank's species solely from that author's description and figures. Bowerbank's figures of the isochela and the small acanthostylus which are referred to by Lundbeck (22, p. 54) are quite misleading.

Since writing the foregoing a third specimen of *Hymedesmia paupertas* has been found in the collection; it is from W. 141, and is growing on *Caryophyllia clavus*.

### *Hymedesmia pansa*, Bowerbank.

Plate IV, fig. 4.

S. R. 1176—22 v '11. 39 miles W.  $\frac{1}{2}$  N. of Blackball Head, 51° 26' 30" N., 11° 2' W., soundings 100 fms., sand. Naturalist's dredge. Ten specimens.

The species is growing in thin encrustations on ten specimens of *Caryophyllia clavus*. The surface of the sponge is smooth, and the colour in spirit a very pale pink. The largest specimen is about 30 mm. by 10 mm. in extent and 0.5 mm. in thickness.

The main skeleton consists of acanthostyli, set vertically with their heads on the substratum. The dermal skeleton is made up of fibres containing multiserially arranged slender spicules, which run parallel with the surface.

Spicules:—

(1) Acanthostyli which can be divided into two groups. The longer have a slightly curved shaft and the head is thickly set with spines, while small, rather scattered spines extend along the shaft, sometimes to half its length. These spicules are usually between 0.22 and 0.3 mm. in length, and have a maximum diameter of 0.009 mm. The shorter acanthostyli are straight or very slightly curved. They are spined along the whole length. The spines on the head are fairly long, those on the shaft recurved. Length 0.1–0.12 mm. by 0.007 mm.

(2) The dermal spicules are very slender stronglylo- to sub-tylotornota, one end being rounded and sometimes very slightly swollen, the other being abruptly pointed. Length 0.18–0.2 mm. by 0.003 mm.

(3) Isochelae arcuatae, with a rather strongly curved shaft. Length 0.019 mm.

The spicules have been compared with the preparations of the type in the British Museum, with which they were found to agree exactly.

*Distribution.*—The species has been previously recorded for Ireland from Birturbuy Bay and Roundstone Bay (1), and from Blacksod Bay (26). Topsent records it for the north coast of France at Roscoff.

#### *Hymedesmia occulta*, Bowerbank.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9-15° C.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.
- S. R. 504.—12 IX '07. 50° 42' N., 11° 18' W., soundings 627-728 fms., coral. Trawl.

All the specimens are growing on coral (*Lophohelia prolifera*). The structure of the sponge and the size and character of the spicules agree exactly with the detailed descriptions of the species given by Topsent (39) and by Lundbeck (22). The spicules have, moreover, been compared with those of the type.

*Distribution.*—Denmark Strait, off Iceland, off the Shetlands and off the Azores.

Bathymetrical range 96 to 1,250 fathoms.

#### *Hymedesmia baculifera* (Topsent).

*Leptosia baculifera*, Topsent.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9-15° C. One specimen.
- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250-542 fms., mud and sand. Trawl. Temperature at 500 fms., 8-58° C. Three specimens.

Two of the specimens are growing on *Lophohelia prolifera*, the other two on the shells of *Arca nodulosa* attached to *Lophohelia*. The specimens agree well with the descriptions of the species given by Topsent (38) and (39) and Lundbeck (22). *H. baculifera* has a wide distribution in the Atlantic and its occurrence was to be expected off the Irish coast. Its bathymetrical range is also exceptionally great, but is only a little more than that of *Hymedesmia Dujardini*, which has been recorded from between tide-marks to 582 fms.

*Distribution.*—Denmark Strait, to the east of the Faröes, off the south of Iceland; Mediterranean, off the Algerian coast; off the Azores; Saldanha Bay, Cape Colony (27).

Hentschel describes a variety from Shark's Bay, S.W. Australia.

Bathymetrical range between tide-marks (Saldanha Bay) to 691 fathoms.

### *Hymedesmia mutabilis* (Topsent).

#### *Hymeraphia mutabilis*, Topsent.

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. One specimen.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. Three specimens.

All the specimens are spreading in thin, greyish-white encrustations on pieces of coral (*Lophohelia* and *Amphihelia*). The surface is hispid. The spicules measure as follows:—(1) acanthostyli 0.45–0.475 mm. by 0.02 mm., and 0.12–0.15 mm. by 0.01 mm.; (2) dermal spicules 0.25 mm. by 0.003 mm.; (3) isochelae arcuatae 0.02–0.045 mm. in length; and (4) sigmata 0.02 mm.

The dermal spicules are the same in all the specimens. They taper from the rounded end to a fine point at the other end. They thus resemble the dermal spicules described and figured by Topsent for his specimen from Station 899 (39, Plate XIV, fig. 3h).

*Distribution.*—Off the Azores, three specimens at depths varying from 200 to 1,360 metres (39).

### *Hymedesmia crux* (Schmidt).

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627–728 fms., coral. Trawl.

The specimens are growing on coral. The species is well characterised by the presence of isochelae which possess a spined shaft. The Irish specimens agree exactly with the description and figures of the species given by Lundbeck (22).

*Distribution.*—*Hymedesmia crux* has previously been taken off Bukenfjord, Norway (Schmidt), and at several stations in Denmark Strait and west of the Faröes.

Bathymetrical range 106 to 728 fathoms.

*Hymedesmia digitata*, Lundbeck.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9·15° C.

The sponge is growing on a piece of dead coral. It agrees in every particular with the description of the type specimens (22). The species has been obtained only once previously, two specimens having been dredged by the *Ingolf* Expedition in Denmark Strait at a depth of 310 fathoms.

*Hymedesmia mucronata* (Topsent).

*Hymeraphia mucronata*, Topsent.

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Trawl. Temperature at 500 fms., 8·58° C. Three specimens.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627—728 fms., coral. Trawl. One specimen.

All the specimens of this well-marked species are growing on dead *Lophohelia prolifera*, except one, which is coating the shell of an *Arca nodulosa* attached to the coral.

Descriptions and figures of the species are given by Topsent (39) and by Lundbeck (22).

*Distribution*.—Davis Strait, 582 fms., and off the Azores at a depth of 880 metres.

*Hymedesmia tenuisigma*, Lundbeck.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9·15° C.

The only specimen in the collection is a thin encrustation on a piece of coral. It is nearly circular in outline, and is about 5 mm. in diameter. The colour in spirit is a rather deep yellow.

The species is well characterised by the possession, as the sole form of microscelere, of sigmata, which are of extreme thinness in proportion to their length.

Only two specimens of *Hymedesmia tenuisigma* have previously been taken. They were dredged in the course of the *Ingolf* Expedition in Denmark Strait, at depths of 138 and 295 fathoms (22).



**Hymedesmia Dujardini** (Bowerbank).*Hymeniacion Dujardinii*, Bowerbank.

S. 568-570—24-27 1 '08. Ballyvaldon, Co. Wexford, soundings 10½-7 fms. Oyster dredge.

The sponge spreads over both valves of the shell of a living *Pecten varius*.

Lundbeck (22) has recently given a full description of the species, and the Irish specimen calls for no special remark.

*Hymedesmia Dujardini* has previously been taken on one occasion off the Irish coast, namely, in Strangford Lough (1).

*Distribution*.—Davis Strait, off East Greenland, Iceland and the Faröes; off the eastern coasts of Great Britain and Ireland and off the north coast of France; Bay of Biscay; Mediterranean; off the Azores.

Bathymetrical range from between tide-marks to 582 fathoms.

**Hymedesmia Helgae**, Stephens.

Plate IV, fig. 6.

S. R. 151—27 VIII '04. 50 miles W. N. W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock.

Dredge. Temperature at 388 fms., 9.15° C. One specimen.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. Two specimens.

Of the three specimens, the largest is growing on a small piece of coral (*Amphihelia oculata*) in company with *Rhaphidotheca Marshall-Halli*, *Histoærmella Ingolfi* and *Cyamon spinispinosum*. A second specimen from the same station is also growing on coral, while the remaining sponge is spreading over a piece of *Retepora*.

The surface of the sponge is smooth, and the dermal membrane is easily detachable in large pieces.

The main skeleton consists of acanthostyli, set vertically, with their heads on the substratum; they do not project above the surface of the sponge.

The dermal skeleton is made up of thick bundles of spicules, which are arranged more or less vertically in the sponge. Beneath the surface they spread out, and are continued as strong fibres running parallel to the surface of the sponge.

The dermal membrane is crowded with numerous isochelæ arcuatae.

Spicules:—

(1) Acanthostyli. The longer have a slightly curved shaft and a head which is not, or is, at the most, very slightly marked. The lower part of the spicule is thickly covered with rather small spines; the remainder of the shaft is set with very small spines, so small that the shaft looks merely roughened. The

length is about 0.25-0.35 mm. by 0.01 mm. The small acanthostyli have a slightly curved shaft which is covered with small, recurved spines along its whole length. The head is not marked, and the length is about 0.125-0.15 mm. by 0.005-0.008 mm.

(2) The dermal spicules are strongyla, which are straight and strongly polytylote. They measure 0.35-0.4 mm., or in one specimen up to 0.5 mm., in length by 0.006-0.008 mm.

(3) The isochelae arcuatae have a strongly, almost semi-circularly, curved shaft, which is very broad in front view. The teeth are short. The length is 0.035-0.04 mm., and the shaft is about 0.008 mm. in diameter in front view.

*Hymedesmia curvichela*, Lundbeck, *Hymedesmia paupertas* (Bowerbank), and *Hymedesmia Helgae* form a series of species possessing much the same style of spicules. With regard to the microscleres, the isochelae, in all three species, are strongly, almost semicircularly, curved. Apart from the differences in the sizes of the megascleres, the first mentioned species differs from the other two in possessing small acanthostyli with a straight shaft, while the last mentioned species possesses large acanthostyli, which are spined along their whole length, the corresponding spicules of the other two being smooth except at the base.

#### *Hymedesmia spinosa*, Stephens.

Plate IV, fig. 5.

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250-542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. Two specimens.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627-728 fms., coral. Trawl. One specimen.

The sponge is growing in a very thin encrustation, greyish in colour in spirit, on pieces of coral (*Lophohelia prolifera*). The surface is very minutely hispid.

The acanthostyli are placed very close together, and are set vertically with their heads on the substratum. The tips of the longer spicules project a little above the surface, at least in the preserved sponge.

The dermal spicules are in bundles, which lie more or less horizontally to the surface.

Spicules:—

(1) The acanthostyli measure from 0.09 to 0.22 mm. in length, with a maximum diameter of 0.013 mm. above the head. They cannot be separated into two groups. The shaft is straight, or sometimes very slightly curved. The head is fairly well marked, and is thickly covered with long, stout, blunt

spines; the remainder of the shaft is set with recurved spines. The longer spicules are much more sparingly spined along the shaft than are the shorter ones, and the spines are smaller.

(2) The dermal spicules are straight, slightly fusiform tornota, measuring 0.18–0.26 mm. by 0.005 mm.

(3) The isochelae arcuatae are very numerous. They have a thick, usually very strongly curved shaft, with short teeth. They measure 0.03–0.038 mm. in length; the shaft is 0.005 mm. thick in side view, and 0.008 mm. in front view.

The species is nearly allied to *Hymedesmia procumbens*, Lundbeck (22), but differs from it in possessing smaller megascleres, and more particularly, in the shape of the chelae.

### *Hymedesmia hibernica*, Stephens.

Plate IV, fig. 2.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge. Two specimens.

The sponge forms a thin encrustation on two specimens of *Caryophyllia clavus*.

The acanthostyli stand vertically with their heads on the substratum; in places the tips of the longest spicules project a little above the surface, but this is probably due to the state of contraction of the sponge. The slender dermal spicules are united in bundles which are placed more or less vertically in the sponge; these bend round beneath the dermis, and are continued as fibres running parallel with the surface.

Spicules:—

(1) The acanthostyli fall into two groups. The longer measure from 0.25 to 0.325 mm. in length by 0.008 mm. They have a slightly curved shaft, and a very slightly marked head, which is thickly covered with short, blunt spines. A few small recurved spines are scattered along the shaft to nearly half its length, but the distance to which the spines ascend naturally varies from one spicule to another. The distal end of the spicule tapers to a rather short point. The shorter acanthostyli are 0.11–0.13 mm. in length by 0.006 mm. The shaft is straight and the head is, at the most, very slightly marked. The base of the spicule is covered with rather long, blunt spines; the shaft is spined throughout its length.

(2) The dermal spicules are slender strongyla measuring 0.22–0.25 mm. in length by 0.0025 mm. They rather tend to become subtylote.

There are no microscleres present in the sponge.

Apart from the absence of isochelae, the new species comes very close to *Hymedesmia paupertas* (Bowerbank), but differs from it in possessing smaller megascleres and, more particularly, in the shape of the small acanthostyli. It differs from *Hymedesmia*

*Dujardini* (Bowerbank) especially in the shape of the longer acanthostyli and of the dermal spicules. It is more closely allied to Lundbeck's three species, *H. primitiva*, *H. longurius* and *H. aquata* (22), but its slender dermal spicules differ in shape from those of the northern species, and, besides differences in size and in spination, its acanthostyli can be distinctly separated into two groups, while the corresponding spicules of Lundbeck's species cannot be so divided.

### *Ectyodoryx atlanticus*, Stephens.

Plate IV, fig. 7.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. One specimen.

The sponge is coating a piece of coral, and is about 15 square millimetres in extent. It is unfortunately a good deal injured.

The main skeleton consists of a network of large acanthostyli, lying usually 3 or 4 together, sparingly echinated by small acanthostyli. A small quantity of spongin is present.

The dermal spicules form thick fibres, but the exact arrangement of the dermal skeleton cannot be made out owing to the injured surface of the only specimen available.

Spicules :—

(1) The large acanthostyli have a slightly curved shaft. The head is swollen and is covered with short, blunt spines. A few spines are sometimes scattered along the shaft for a short distance. On the other hand, some of the spicules are almost quite smooth. These spicules measure about 0.66–0.95 mm. in length by 0.015–0.02 mm. in diameter above the head.

(2) The echinating acanthostyli are small and few in number. The shaft is straight; the head is a little swollen and is covered with rather long spines. The shaft is thickly set with small, recurved spines. The length is 0.1–0.14 mm. by 0.01 mm. above the head.

(3) The dermal spicules are strongyla, with rather unequal ends, one end being slightly thicker than the other. The shaft is often a little crooked. The length is 0.4–0.5 mm. by 0.006 mm.

(4) Isochelae arcuatae. The shaft is fairly strongly curved; it is about 0.01 mm. in breadth in front view. The teeth are rather short. The chelae measure 0.045–0.06 mm. in length.

Lundbeck erected this genus in 1909 (21), and referred to it *Hastatus foliatus*, Fristedt (10), and a second species which he has not yet described. Lundbeck's definition of the genus is as follows :—“Sponges with a reticulate skeleton, echinated (more or less sparingly) by accessory spicules. The skeleton spicules spined or smooth styli, the accessory spicules smaller

spined styli; the dermal spicules diactinal; microscleres isochelae arcuatae solely or together with other forms."

The above mentioned species of Fristedt possesses sigmata in addition to the isochelae, while its megascleres differ altogether, both in size and shape, from those of *Ectydoryx allanticus*.

The spicules figured by Thiele for the sponge called by him *Hymedesmia norvegica* (31, Pl. XXI, fig. 23) are very similar in shape, and also in size, to those of the new species of *Ectydoryx*, except that Thiele states definitely that there is only one form of acanthostylus in his sponge. The arrangement of the skeleton seems to be different and, according to Lundbeck (22, p. 116), suggests a *Stylostichon*.

### Anchinoë, Gray.

*Plumohalichondria*, Carter.

*Clathrissa*, Lendenfeld.

Several specimens are in the collection of the sponge which was called by Bowerbank *Microciona fictitia* (1). The species which has skeletal fibres made up of smooth diactinals echinated by acanthostyli, is obviously not a *Microciona*. It was assigned by Hanitsch (13) and by Topsent (35) to the genus *Plumohalichondria*, Carter. Although this genus was not defined by Carter, that author placed several species under it, the type species being *Plumohalichondria microcionides*, Carter (3). From the description of this species it is seen that *P. microcionides* has fibres made up of smooth diactinals echinated by acanthostyli. This arrangement can be clearly made out in one of the type preparations now in the possession of Professor Dendy. Unfortunately the structure of the dermal skeleton cannot be ascertained from either the description or the slide. The arrangement of the skeleton of *Microciona fictitia*, therefore, agrees with that of *Plumohalichondria microcionides* as far as can be made out. Both species possess isochelae arcuatae as microscleres.

Professor Topsent's revival of the genus *Anchinoë*, Gray (41), for species hitherto assigned by him to *Stylostichon*, directed my attention to the type species of *Anchinoë*, namely, *Hymeniacion perarmatus*, Bowerbank. Bowerbank's description of the species is not sufficient to enable one to make out the structure of the skeleton, nor does Gray's definition of his new genus (11) throw any light on the matter. An examination of the slides of the type specimen in the British Museum showed that the structure of the skeleton agrees exactly, not with the species belonging to *Stylostichon*, but with *Microciona fictitia*. A fortunate preparation, in Canon Norman's collection now in the British Museum, from what is no doubt the same specimen, shows part of the dermis with a pore-area surrounded by oxea, the ends of which support the dermal membrane,

exactly as in *Microciona fictitia*, as will be described later. These pore-areas are indeed indicated in Bowerbank's figure of *Hymeniacion perarmatus* (1, Vol. III., Pl. XXXI, fig. 11) as oval areas surrounded by a slightly raised margin.

Although the structure of the dermis is not known in *Plumohalichondria microcionides* the agreement of the arrangement of the main skeleton and of the form of the spicules in that species and in *Anchinoë perarmatus* is so exact that it is clear that *Plumohalichondria* must be regarded as a synonym of *Anchinoë*.

From the description given by Hallmann (12, p. 146) of the type species of *Clathrissa*, Lendenfeld, namely, *Clathrissa arbuscula*, this genus must also be regarded as synonymous with *Anchinoë*.

The genus *Anchinoë* may be defined as follows: Ectyoniae with a skeleton composed of branching fibres which consists of multiserially arranged smooth diactinals echinated by acanthostyli. No special dermal skeleton. Microscleres isochelae arcuatae solèly, or perhaps with other forms.

*Anchinoë*, therefore, does not replace the genus *Stylostichon*, Topsent, which must still stand with *Stylostichon Dendyi*, Topsent, as its type species.

*Anchinoë fictitius* (Bowerbank).

*Microciona fictitia*, Bowerbank.

*Plumohalichondria fictitia* (Bow.), Hanitsch.

Plate I, fig. 1. Plate VI, fig. 1.

S. 568-570—24-27 1 '08. Ballyvaldon, Co. Wexford. soundings 7-10½ fms. Oyster dredge. Three specimens.

The largest specimen spreads in a thick encrustation over a dead oyster shell; it is 76 mm. by 65 mm. in extent, with a thickness of 8 mm. The second specimen is growing on pebbles and on fragments of shells; it is more or less round, and is about 32 mm. in diameter and 28 mm. in thickness. The remaining specimen is still smaller, and is growing over fragments of shells.

The sponge is firm to the touch and very slightly compressible. The colour in spirit is a pale yellowish-grey. The whole surface, which is smooth, is covered with oval or circular areas, each surrounded by a slightly raised rim. These are the pore-bearing areas, the larger of which measure as much as 2 mm. in diameter. The pores measure about 0.008 mm. in diameter.

The dermal membrane is thin, and stretches over large subdermal cavities. It is supported on the ends of the skeletal fibres.

The main skeleton consists of slightly branching fibres running vertically through the sponge. The fibres consist of

multiserially arranged tornota, closely packed, cemented together by a considerable quantity of spongin, and echinated by acanthostyli. Towards the surface of the sponge the fibres, which here consist only of tornota, curve outwards, and then ascend to the surface, leaving the pore-bearing membrane over the subdermal cavities free, so that the terminal spicules are arranged round these areas and support the dermal membrane on their ends. The terminal spicules of the fibres thus form a kind of palisade round the pore-bearing areas.

There is no special dermal skeleton, isochelae arcuatae being the only form of spicule present in the dermis.

Spicules :—

(1) Tornota, straight or slightly curved; the ends taper rather abruptly to sharp points. Occasionally the ends are very slightly swollen, so that they are more or less lanceolate in shape. Length 0.275–0.35 mm. by 0.003 mm.

(2) Acanthostyli of two kinds :—(a) the shaft is long and slightly curved, the curve being most marked a little above the head, which is slightly swollen and thickly spined. The spines extend for a short distance along the shaft, while a few small spines are sometimes scattered half way or more along the shaft. Length 0.3–0.48 mm. by 0.008 mm.; (b) short, straight acanthostyli with very slightly swollen head. The shaft is thickly spined along its whole length, the spines on the head are straight and sharply pointed, the spines on the shaft recurved. Length 0.12–0.14 mm. by 0.005 mm.

(3) Isochelae arcuatae with slightly curved shaft. Length 0.024 mm. These spicules occur in large numbers throughout the sponge and in the dermal membrane.

The type specimen of *Anchinoë fictitius* was obtained at Guernsey (1). Later on Bowerbank assigned several specimens from Hastings to that species (1, Vol. III, pp. 265 and 352). An examination of the slides labelled *Microciona fictitia* in the Bowerbank collection in the British Museum shows that one of the Hastings specimens, at least, is *Anchinoë fictitius*, but two slides labelled "Diamond Ground, Hastings, from oyster (deep) shell, fig. Pl. LXXXII," proved to be preparations of *Stylostichon plumosum*. One of them, indeed, is relabelled *Microciona Kenti*, which name is a synonym of *Stylostichon plumosum*. Seven other slides of a sponge or sponges from an unknown locality are also preparations of *Stylostichon plumosum*. Several specimens from Westport Bay were named *Microciona fictitia* by Bowerbank (1, Vol. IV.), but all the specimens that were examined proved to be either *Stylostichon plumosum* or *Myxilla rosacea* (26, p. 27).

Recently the species has been reported off the coast of Santander, Spain (17), but the measurements of the spicules given by the author in a previous paper (16), where the sponge is referred to as *Myxilla plumosa*, do not agree with those of the type specimen of *Anchinoë fictitius*.

Up to the present, therefore, the species is known to occur off the south coast of England, off the east coast of Ireland and off the Channel Islands.

**Stylostichon Dendyi**, Topsent.

Plate VI, fig. 4.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9·15° C. One specimen.
- S. R. 277—15 XI '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and shells. Oyster dredge. Five specimens.

These sponges are club-shaped or fan-shaped, several of them exactly resembling in outline the smallest of the three specimens figured by Topsent (41, Pl. IV, fig. 6). The specimen from S. R. 151 is cut off from its support; each of the remaining specimens is growing on a small pebble. The smallest is 14 mm., the largest 30 mm. in height.

The spicules agree exactly with Topsent's amended description (41). The acanthostyli are from 0·18 to 0·35 mm. in length by 0·01–0·018 mm.; the strongyla are 0·3 mm. long by 0·008 mm.; the isochelae vary in length between 0·03 and 0·055 mm.

Professor Topsent has recently revived the genus *Anchinoz*, Gray, for this and allied species, but the reasons for the retention of the genus *Stylostichon* have been already given (see p. 44).

*Distribution.*—Professor Topsent (41) states that the species appears to be common in northern seas, having been found off East Greenland and between Scotland and the Farøes (recorded by Carter as *Cribella hospitalis*, Schmidt), and off Norway. It has also been taken twice off the Azores (34 and 39), so that its occurrence off the west coast of Ireland was to be expected.

Bathymetrical range 106–632 fathoms.

**Stylostichon plumosum** (Montagu).

*Hymeniacidon plumosa*, Bowerbank.

- W. 78—24 v '09. Inishlyre Harbour, Clew Bay, soundings 5 fms. Naturalist's dredge.

Blacksod Bay, between tide-marks at the following stations:—

- |                    |                    |
|--------------------|--------------------|
| W. 116—15 IX '09.  | W. 168—21 IX '10.  |
| W. 132—12 III '10. | W. 179—14 III '11. |
| W. 134—13 III '10. | W. 180—15 III '11. |
| W. 162—17 IX '10.  | W. 235—24 IX '11.  |
| W. 166—20 IX '10.  | W. 238—27 IX '11.  |
- W. 256—5 III '12. Lough Swilly, Muckamish Tower, shore collecting.



This species is common between tide-marks at extreme low water, and is occasionally dredged in a few fathoms.

The colour, when alive, is ochre yellow, often tinged with orange-red or with livid-red. Or sometimes the whole sponge is a uniform deep orange-red. *Stylostichon plumosum* is easily recognised, when alive, by its texture, colour, and strong, peculiar odour.

*Distribution.*—Western coasts of Europe from Norway to France, Gulf of Manar (Carter).

**Pocillon Hyndmani** (Bowerbank).

*Halichondria Hyndmani*, Bowerbank.

- W. 135—13 III '10. Blacksod Bay, Carrigeenmore Rocks.  
Shore collecting.
- W. 141—10 VIII '10. Off Reenacry Head, Co. Kerry, soundings  
37 fms., gravel.
- W. 180—13 III '11. Feorinyeo Bay, North, Blacksod Bay.  
Shore collecting.

This species is represented by several small pieces of sponge, growing on a fragment of shell, on *Pecten varius*, on *Caryophyllia clavus* (from S. R. 141), and on worm-tubes.

**Eurypon clavatum** (Bowerbank).

*Hymenaphia clavata*, Bowerbank.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island,  
54° 17' N., 11° 33' W., soundings 388 fms., stones and  
rock. Dredge. Temperature at 388 fms., 9-15° C.
- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., sound-  
ings 250—542 fms., mud and sand. Trawl. Temperature  
at 500 fms., 8-58° C.
- S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627-  
728 fms., coral. Trawl.

Several specimens of this species are in the collection. With the exception of one specimen, which is growing on a block of sandstone, all are growing on coral (*Lophohelia prolifera*). Even very small patches of this sponge are noticeable on account of the very long spicules which project to a length of, sometimes, 3 or 4 mm. above the dermis.

*Distribution.*—Off the Shetlands, Norway, the northern and Mediterranean shores of France, the Azores and in the Gulf of Mexico.

**Eurypon hispidulum** (Topsent).*Hymeraphia hispidula*, Topsent.

- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Temperature at 500 fms., 8.58° C. Trawl. Two specimens.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. One specimen.
- S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627—728 fms.; coral. Trawl. One specimen.

One of the specimens is growing on the shell of *Arca nodulosa* which was itself attached to *Lophohelia prolifera*. The remaining specimens are growing on pieces of dead coral, one of them being of considerable extent, spreading over several branches of the coral.

The sponges agree closely with the first-found specimens, but there are slight differences in the measurements of the spicules.

The spicules in the Irish specimens measure as follows:—(1) acanthostyli, falling into two groups, the smaller being 0.15–0.24 mm. in length, the larger about 0.4–0.85 mm. in length with a maximum diameter of 0.024 mm.; (2) dermal subtylostyli, 0.275–0.375 mm. with a maximum diameter of 0.008 mm.

Comparing these measurements with those of the type, it is seen that the chief difference lies in the large acanthostyli, which are considerably longer and thicker in the Irish specimens, the measurement for the corresponding spicules in the type being given as 0.5 mm. by 0.017 mm. (39).

*Distribution.*—This species has previously been known from four specimens, all taken off the Azores at 599 to 880 metres.

**Eurypon affine** (Topsent).*Hymeraphia affinis*, Topsent.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

This species, described under the name *Hymeraphia affinis*, from one specimen taken in the Gulf of Mexico (32), has more recently been dredged off the Azores (39). A single small specimen is in the collection. It is growing in a thin crust on a piece of *Retepora*, and is about 10 mm. by 5 mm. in extent. It is of a yellowish colour in spirit.

The large acanthostyli are smooth except at the base, which is thickly spined, but which is not swollen as shown in the figure of the type (32, fig. A, a). The largest acanthostyli measure over 1 mm. in length, and have a maximum thickness

of 0.019 mm. The short acanthostyli are straight or very slightly curved, and are thickly spined along the shaft. The base is covered with rather long, stout, blunt spines. These spicules do not vary much in length, being about 0.1–0.14 mm. in length by 0.008 mm. above the head.

The dermal spicules are styli, very minutely spined on the head. Their maximum length is about 0.6 mm. with a thickness of 0.005 mm. The palmate isochelae are 0.015 mm. in length. The toxa vary much in size from extremely minute to 0.25 mm. in length with a maximum thickness of about 0.003 mm.

Both kinds of microscleres are in extraordinary abundance in the sponge.

From the above measurements it will be seen that the Irish specimen agrees with the Azores specimen rather than with the type as regards the length of the various spicules.

*Distribution.*—Gulf of Mexico (32), Azores 1,360 metres (39).

**Eurypon acanthotoxa**, Stephens.

Plate V., fig. 1.

S. R. 353—6 VIII '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.

The sponge is growing in a small thin patch, about 5 square millimetres in extent, on a piece of dead coral. The surface is hispid.

The acanthostyli are placed closely together, and stand vertically with their heads on the substratum. The dermal spicules are in bundles which seem to lie more or less obliquely to the surface, but their exact arrangement could not be made out owing to the small size of the only specimen available.

Spicules:—

(1) Acanthostyli. These vary in size from about 0.16–0.9 mm. in length by 0.008–0.025 mm. The longer of the spicules have a slightly curved shaft, tapering evenly to a rather short point. The head is thickly covered with short, stout, blunt spines, the remaining part of the spicule being smooth. The shorter acanthostyli have a slightly, or sometimes rather sharply, curved shaft. The head is covered with short, stout, blunt spines. Similar spines sometimes extend a little way along the shaft. The rest of the shaft is set with recurved spines. These two extremes in the acanthostyli are linked together by other acanthostyli of varying lengths and of varying degrees of spination, so that it is not possible to sharply divide the spicules into two groups. On the whole, the first mentioned type of spicule is from 0.5 to 0.9 mm. in length, the latter from 0.16 to 0.3 mm.

(2) The dermal spicules are long, straight, styli, minutely spined on the head. They measure about 0.5–0.75 mm. in length by 0.008 mm.

(3) Isochelae palmatae. These are of the usual Eurypon type and are 0.019 mm. in length. The free part of the shaft is rather long in proportion to the length of the whole spicule.

(4) The toxa have a well rounded bend in the middle of the shaft and very slightly recurved ends. The tips of the larger toxa are covered with spines. These spicules vary very much in size, from extremely minute to about 0.35 mm. in length, with a thickness of 0.003 mm.

Both isochelae and toxa are present throughout the sponge in great numbers.

### **Eurypon ditoxa, Stephens.**

Plate V., fig. 3.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

The sponge is growing in a very thin crust on a piece of *Retepora*. The surface is slightly hispid.

The acanthostyli are placed vertically with their heads on the substratum. The dermal spicules are in bundles set in more or less obliquely to the surface.

Spicules :—

(1) Acanthostyli. The largest of these spicules are slightly curved. The shaft is smooth except at the base, which is thickly covered with short, blunt spines. Length about 0.3–0.6 mm. with a maximum diameter of 0.02 mm. The small acanthostyli are straight or slightly curved; the head is covered with rather strong, blunt spines, and the shaft is thickly set along its whole length with small recurved spines. Length 0.125–0.2 mm. with a maximum diameter of 0.01 mm.

(2) The dermal spicules are styli, which are often a little crooked. The head is very minutely spined, and the shaft tapers at the other end to a very short point. Length 0.4–0.5 mm. by 0.005 mm.

(3) Isochelae palmatae, 0.015 mm. in length.

(4) Toxa of two kinds :—(a) with a wide, even curve and short arms ending in sharp, slightly recurved points. Length 0.08–0.13 mm. with a maximum thickness of about 0.0025 mm.; (b) with very long and very slender straight arms and with a rather abrupt curve in the middle of the spicule. The maximum length is about 0.8 mm.

The microscleres are in immense numbers throughout the sponge.

*Eurypon tenuissimum*, Stephens.

Plate V, fig. 4.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C. One specimen.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge. One specimen.

The sponge is growing in small, very thin encrustations on pieces of dead coral. Its surface is very hispid.

The acanthostyli are set vertically with their heads on the substratum. The largest spicules stand singly at a little distance from each other, the small acanthostyli being placed between them.

The dermal skeleton consists of styli apparently arranged in bundles set vertically to and projecting above the surface, but their exact arrangement could not be made out owing to the scanty material available for examination.

Spicules —

(1) Acanthostyli. The largest of these spicules are from 1 mm. to 1.5 mm. in length with a maximum diameter of 0.021 mm. The slightly curved shaft tapers to a rather short point at the apex. The base is covered with rather short, blunt spines. Sometimes there is a very slight constriction a little above the base. Several of the large spicules are almost free from spines, their base being merely roughened. Smaller acanthostyli about 0.3–0.5 mm. in length, and slightly spined to some distance along their shaft are intermediate both in size and in amount of spination between the foregoing and the smallest acanthostyli, which are about 0.12–0.14 mm. in length with a maximum diameter of 0.015 mm. These latter are straight or slightly curved and are thickly spined along their whole length. The head is covered with short, blunt spines, the shaft with recurved spines.

(2) The dermal spicules are long, slender styli, minutely spined on the head. Only a few of these spicules were seen. Length 0.45–0.7 mm. by 0.006 mm.

(3) Isochelae palmatae, 0.021 mm. in length.

(4) Toxa, very slender with long, straight arms and an abrupt curve in the middle. These spicules are very numerous, and are arranged in bundles. Maximum length about 0.55 mm.

Since the preliminary description of this species was published (29) a second small specimen has been found in the collection which agrees exactly with the type.

*Eurypon tenuissimum* approaches very closely in spiculation to the sponge from the Arafura Sea described by Hentschel under the name *Hymenaphia longitoxa* (15), which possesses as microscleres long slender toxa and isochelae palmatae. The two species differ as regards their skeleton spicules. The

largest spicules in *Eurypon longitoxa* are smooth styli differing in shape from the corresponding spicules of *Eurypon tenuissimum* and about half their length. The small acanthostyli are about half the size of those of the Irish specimen.

*Eurypon microchela*, Stephens.

Plate V, fig. 5.

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. Two specimens.

Both specimens are growing on pieces of dead coral. The sponge is very thin, scarcely reaching a thickness of 0.15 mm. Its surface is very hispid.

The acanthostyli are placed closely together, and are set vertically with their heads on the substratum. The long acanthostyli project far above the surface of the sponge. The dermal spicules, which are not present in great numbers, are in small bundles, and project more or less obliquely above the surface.

Spicules:—

(1) Acanthostyli. The long acanthostyli are very slightly curved and taper to a rather long point. The head is well-marked and is rounded. The base of the spicule is thickly covered with short, stout, blunt spines. A few small spines are scattered a little way along the shaft. These spicules measure about 0.5–0.8 mm. in length by 0.013 mm. above the head. The short acanthostyli are straight and taper to a long, fine point. The head is, at the most, slightly marked, and is covered with rather strong, blunt spines. The shaft is thickly covered with small, recurved spines. The length of the spicules varies from 0.12 to 0.17 mm. by 0.008 mm.

(2) The dermal spicules are slender subtylostyli with a very minutely spined head. The shaft is often rather curved. The length is about 0.3 to 0.4 mm. by 0.003 mm.

(3) Isochelae palmatae are the sole form of microsclere. They are extremely minute, and are not present in great numbers. They are 0.008 mm. in length.

*Eurypon Lacazei* (Topsent).

*Hymeraphia Lacazei*, Topsent.

Plate VI, fig. 5.

S. R. 151—27 VIII '04. 50 miles W. N. W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C. Two specimens.

The sponge is growing in two patches on pieces of sandstone in the form of a thin encrustation, greyish in colour in spirit. The larger specimen is 7 mm. by 4 mm. in extent.

The sponge is strongly hispid, the shafts of the longest spicules projecting about 3 mm. above the dermis.

The arrangement of the skeleton is as described for the type (33), and the spicules measure as follows:—(1) tylostyli up to at least 3.5 mm. in length with a maximum thickness of 0.027 mm. above the head; (2) acanthostyli, 0.075–0.1 mm. in length, by 0.01 mm. above the head; (3) oxea, 0.3–0.4 mm. in length with a maximum thickness of 0.007 mm. These spicules are slightly thicker towards one end than towards the other, the thinner end being towards the surface of the sponge.

Comparing the foregoing measurements with those given for the type, the only noteworthy difference is to be found in the dermal spicules. These spicules are considerably longer in the Irish specimens than in the type, in which they average 0.23 mm. in length. The thickness is about the same in all the specimens.

*Eurypon Lacazei* seems to be a well-characterised species, as most of the species assigned to the genus *Eurypon* possess styli as dermal spicules. It is very similar in spiculation to *Hymeraphia aruensis* of Hentschel, as that author has already pointed out (15).

*Distribution.*—Off the northern and Mediterranean coasts of France, at Roscoff and Banyuls respectively, and off La Calle, Algeria (33 and 38).

#### *Eurypon viride* (Topsent).

*Hymeraphia viridis*, Topsent.

Plate V, fig. 2.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.
- W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge.

There are three small specimens of this interesting sponge in the collection; they are growing on different kinds of coral, namely, on *Lophohelia prolifera*, *Amphihelia oculata* and *Caryophyllia clavus*.

The species is very hispid, the long tylostyli projecting about 2 mm. above the surface of the sponge. The spicules agree exactly with the descriptions given by Topsent (32, 38 and 39). They measure as follows:—(1) tylostyli, about 2.5 mm. in length by 0.015 mm. above the head; (2) acanthostyli, 0.011 mm. in length by 0.008 mm., exclusive of the spines.

In the smallest specimen they are 0.085 mm. in length; (3) raphides, 0.07 mm. and 0.06 mm. long in the different specimens. The raphides are collected into trichodragmata and are in great abundance.

*Distribution.*—Gulf of Mexico (32), off the Azores (34), and in the Mediterranean, off Banyuls and La Calle (38 and 39). Bathymetrical range 37 to 468 fathoms.

***Microciona armata*, Bowerbank.**

S. R. 1176—22 v '11. 39 miles W.  $\frac{1}{2}$  N. of Blackball Head,  $51^{\circ} 26' 30''$  N.,  $11^{\circ} 2'$  W., soundings 100 fms., sand. Naturalist's dredge. One specimen.

The sponge is growing on a coral (*Caryophyllia clavus*) over which it spreads in a thin encrustation about 10 square mm. in extent.

The species does not appear to be common off the Irish coast, where it has been noted only twice previously. The type-specimen was obtained in Belfast Lough (1), while a second specimen was dredged in 3 fms. in Westport Bay (26).

*Distribution.*—Off Sweden, the British Isles, the northern and southern coasts of France and in the Adriatic. Carter records the species from the Gulf of Manaar.

Bathymetrical range from between tide-marks to 100 fathoms.

***Clathria dichotoma* (Esper).**

*Spongia dichotoma*, Esper.

*Raspailia Moebii*, Schmidt.

*Dictyocylindrus abyssorum*, Carter.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island,  $54^{\circ} 17'$  N.,  $11^{\circ} 33'$  W., soundings 388 fms., stones and rock. Temperature at 388 fms.,  $9.15^{\circ}$  C. One specimen.

The only specimen obtained is very small, it reaches a total height of 50 mm. The main stem is 2 mm. in diameter at its thickest part, and, at a height of 3.5 mm. from the base, it divides into two branches.

The synonymy of this species is given on Thiele's authority (31).

*Distribution.*—Between Scotland and the Faröes, off the coast of Norway at several localities, and off Koster Island, Sweden.

Bathymetrical range 65 to 440 fathoms.



? *Clathria anchorata* (Carter).*Dictyocylindrus anchorata*, Carter.*Microciona plana*, Carter.

Plate III, fig. 4.

- S. R. 151—27 VIII '05. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9-15° C.
- S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.
- S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627-728 fms., coral. Trawl.

This species is represented by several small fragments growing on coral and on a Geodine sponge (*Sidonops atlantica*, Stephens). These fragments are very soft to the touch, and appear to be somewhat macerated. No trace of the dermis could be found.

As far as can be seen the main skeleton consists of an irregular reticulation of large styli, cemented together by spongin, a very small amount of which is present, and rather sparingly echinated by acanthostyli. Rather thicker fibres seem to run upwards through the sponge. In the present state of the specimens, at least, the spongin can be clearly seen only at the angles of the meshes and about the bases of the acanthostyli.

The arrangement of the dermal skeleton is unknown.

Spicules :—

(1) Styli. The shaft is slightly curved, the curve lying near the head, and tapers at the other end to a fairly short point. Sometimes the styli are crooked. These spicules measure from about 0.7 mm. to 0.95 mm. in length, with a maximum diameter of 0.015 mm. or 0.02 mm. in the different specimens.

(2) Scattered through the spicule preparations are a few, long, slender styli which perhaps represent the dermal spicules. They have a straight or very slightly crooked shaft, and measure 0.35-0.45 mm. in length by 0.002-0.004 mm.

(3) Acanthostyli. The shaft is straight or slightly curved. The head is well marked and rounded. The spicules are densely covered throughout their length with very small spines, the spines on the head being a little larger than those along the remainder of the shaft. The acanthostyli vary a good deal in size; they are from about 0.17 mm. to 0.35 mm. in length by 0.006-0.008 mm.

(4) Isochelae palmatae are the sole form of microsclere present. They have a rather strongly curved shaft, and they occur in profusion where there are any soft parts of the sponge preserved. They are 0.027-0.03 mm. in length.

This sponge was first identified with *Dictyocylindrus anchorata* from the drawings of the spicules and the description given by Carter (2, p. 251, Pl. XV). There were

reasons, too, for connecting it with *Microciona plana*, Carter (3, p. 238), the descriptions of Carter's two species agreeing especially as regards the measurements of the spicules. Professor Dendy very kindly compared the recently found specimens with Carter's slides, and confirmed this identification stating that Carter's two species could not be distinguished from one another nor from the Irish sponge.

Carter's two sponges were obtained in the course of the Porcupine Expedition. *Dictyocylindrus anchorata* was found growing with a specimen of *Thrombus abyssii* on a piece of coral (*Lophohelia prolifera*) which was dredged at Station 3, 1870, at the western entrance of the English Channel, 48° 31' N., 10° 3' W., in 500 fms. *Microciona plana* was growing on a flat stone dredged off Cape St. Vincent in 374 fms. (Station 25, 1870).

***Echinoclathria foliata* (Bowerbank).**

*Halichondria foliata*, Bowerbank.

*Halichondria mutula*, Bowerbank.

- S. R. 178—16 XI '34. 40 miles N.W. by W.  $\frac{3}{4}$  W. of Cleggan Head, 53° 36' 30" N., 11° 15' 30" W., soundings 74½ fms., coarse gravel and stones. Oyster dredge. One specimen.  
S. R. 196—11 II '05. 54° 42' N., 10° 34' W., soundings 242 fms., stones and coral. Oyster dredge. Temperature at 235 fms., 9.8° C. A fragment.

The species is represented by a fragment growing on *Cellepora* and by a specimen, unfortunately torn from its base but otherwise well preserved. The latter is fan-shaped, and is 90 mm. in height by 125 mm. in breadth.

*Distribution.*—The species has been dredged on three occasions off the Shetlands (1) and (3), off Norway (41), and (?) on the Dogger Bank (1).

Bathymetrical range from 70 to 345 fathoms.

***Ophlitaspongia seriata* (Grant).**

Bofin Harbour.

- L. 296—1 III '04. Roellaun Rocks, Ballynakill Harbour. Shore collecting.

Blacksod Bay, between tide-marks, at the following stations :—

W. 116—15 IX '09.	W. 166—20 IX '10.
W. 129—10 III '10.	W. 168—21 IX '10.
W. 131—11 III '10.	W. 183—16 III '11.
W. 132—12 III '10.	W. 233—21 IX '11.
W. 134—13 III '10.	W. 234—23 IX '11.
W. 137—14 III '10.	W. 235—24 IX '11.
W. 160—16 IX '10.	W. 236—25 IX '11.
W. 162—17 IX '10.	W. 276—26 v '14.
W. 163—18 IX '10.	

Lough Swilly, between tide-marks, at the following stations :—  
 W. 245—2 III '12. W. 256—5 III '12.

This species is very common along the Irish coast. It is easily recognised, when alive, by its bright red colour and compressible texture. It is known off the Irish coast only between tide-marks, and has not yet been taken in even shallow water dredgings.

*Distribution.*—Off the British Isles, Channel Isles, France, Spain and Portugal.

*Plocamia microcionides* (Carter).

*Hymenaphia microcionides*, Carter.

Plate VI, fig. 2.

- S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island, 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9·15° C.
- S. R. 196—11 II '05. 54° 42' N., 10° 34' W., soundings 242 fms., stones and coral. Oyster dredge. Temperature at 235 fms., 9·8° C.
- S. R. 277—15 XI '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and shells. Oyster dredge.
- S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250—542 fms., mud and sand. Trawl. Temperature at 500 fms., 8·58° C.
- S. R. 480—23 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.
- S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627—728 fms., coral. Trawl.

The specimens of *Plocamia* in the collection have been compared with a slide of the type of *Plocamia microcionides* (Carter), and have been found to agree with it in every particular as regards spiculation. Dermal spicules (tornota), not mentioned by Carter in his description of the species (3), are present on the type slide. All the Irish specimens are growing on coral (*Lophohelia* and *Amphihelia*) with the exception of two which are coating, respectively, a shell of *Arca nodulosa* attached to coral, and a piece of *Retepora*.

The sponge grows in a thin crust. The surface is very hispid, the long styli projecting 1·5 mm. or more above the dermis. In small specimens, especially, the outline is circular or oval, and the sponge does not thin out perceptibly towards the sides, so that the unbroken edge is rounded off abruptly. The colour in spirit is pale yellowish. Altogether the species has a very characteristic appearance. The largest specimen seen measures about 23 mm. by 15 mm. in extent and about 0·5 mm. in thickness.

The arrangement of the skeleton is as usual in the genus. The acanthostrongyla form a thick basal layer on which the styli and acanthostyli stand vertically. The large smooth styli project for a considerable distance beyond the surface of the sponge. The acanthostyli do not pierce the dermis.

The dermal skeleton is formed of bundles of tornota lying horizontally or obliquely to the surface. In places the bundles are thick, being formed of numerous tornota, in other parts of the sponge the tornota are much scarcer and lie in bundles of two or three.

The thickness of the sponge naturally varies in different specimens. In a well-grown specimen it is about 0.5 mm., and of this, the layer of acanthostrongyla takes up about 0.3-0.38 mm.

Spicules :—

(1) Styli. These vary considerably in size, but their shape is characteristic, as the shaft is slightly constricted at the head. Their length is about 0.4 mm. to 2.3 mm. with a maximum diameter of about 0.03 mm. There is no trace of spines on any of these spicules.

(2) The acanthostyli are slightly curved, and are covered with small spines along their whole length. They measure about 0.15-0.25 mm. in length, with a maximum diameter of about 0.013 mm.

(3) The acanthostrongyla are curved and are covered with short strong spines with a truncated top, which is microspined. The ends of the spicule are usually more thickly spined than is the middle of the shaft. The length is 0.09-0.125 mm. by 0.008-0.01 mm.

(4) Tornota. These are slightly fusiform, and taper evenly to rather long points. They are about 0.275-0.4 mm. in length by 0.01 mm.

(5) The isochelae arcuatae are numerous and are 0.024-0.027 mm. in length.

This species approaches *Plocamia ambigua* (Bowerbank) very closely in spiculation, both possessing tornota as dermal spicules and isochelae arcuatae as the sole form of microsclere. The arrangement of the skeleton is similar in the two species. The most noticeable difference is the possession by *Plocamia microcionides* of very large smooth styli, while the corresponding spicules of *Plocamia ambigua* are spined at the head. The type specimen of the latter species possesses very slender styli and tornota, but other specimens have been seen with much thicker spicules. When the tornota are thick they are slightly fusiform and are abruptly pointed at both ends, while the slightly fusiform tornota of *Plocamia microcionides* taper gradually to rather long points. This difference, which is not great, may not hold good when further specimens are examined, as sometimes the tornota of *Plocamia microcionides* have a tendency to become shorter pointed.

The acanthostrongyla of *Plocamia microcionides* have short, stout, truncated spines, with microspined top, instead of the small, pointed spines of the older species, and the spicules themselves are much thicker.

The type specimen of *Plocamia microcionides* was dredged by the *Porcupine* at Station 25, near Cape St. Vincent, in 374 fathoms (3, p. 390). Professor Topsent has referred specimens, at first named by him *Plocamia microcionides*, to *Plocamia ambigua* (39). The specimens recently recorded by Topsent under the latter name probably belong to Carter's species (41).

***Plocamia ambigua* (Bowerbank).**

Plate VI, fig. 3.

S. R. 480—28 VIII '07. 51° 23' N., 11° 33' W., soundings 468 fms., stones. Oyster dredge.

After the preliminary report on the present collection was published (29), and after the account of the preceding species was written, a specimen of *Plocamia ambigua* was found growing on a piece of coral beside a specimen of *Plocamia microcionides*. This specimen of *Plocamia ambigua* agrees very well with the type as regards spiculation. It possesses slender, short-pointed tornota, large styli spined only at the base, small acanthostyli, rather slender acanthostrongyla covered with sharply-pointed spines, and isochelae arcuatae.

The species appeared to be marked off from *Plocamia microcionides* chiefly by the possession of large styli spined at the base, instead of large smooth styli, and by the pointed spines of the acanthostrongyla instead of the truncated spines with microspined summits of the corresponding spicules of *Plocamia microcionides*.

Both the species differ from the type and other species of *Plocamia* in possessing isochelae arcuatae instead of isochelae palmatae.

***Suberotelites demonstrans*, Topsent.**

S. R. 277—15 XI '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and sand. Oyster dredge. One specimen.

The sponge is club-shaped and is very similar in outline to the type specimen (34, Pl. IV., fig. 9). It is only 9 mm. in height by 6 mm. at its widest part.

The spiculation agrees exactly with the description given of the type, except for the unimportant difference that the spined spicules are very slightly smaller. They have a maximum size of 0.175 mm. by 0.01 mm.

*Distribution.*—The species is known from six specimens obtained at different stations off the Azores in 200–845 metres (34 and 39).

*Raspailia pumila* (Bowerbank).

- L. 108—17 VI '02. Off Coastguard Bay, Ballynakill Harbour, soundings 4-8 fms. Naturalist's dredge. Two specimens.  
 S. 597—6 II '11. Ballyvaldon Oyster beds, Norris Castle Coastguard Station, Co. Wexford, soundings  $7\frac{1}{2}$ -8 fms. Naturalist's dredge. One specimen.

The specimens are much branched, and the largest is about 100 mm. in height. The spicules measure as follows:—(1) styli, up to about 1.7 mm. in length with a maximum diameter of 0.021 mm.; (2) oxea, 0.45-0.7 mm. long with a maximum diameter of 0.005 mm.; (3) acanthostyli, 0.1-0.175 mm. by 0.008 mm.

*Raspailia Howsei* (Bowerbank).

- W. 131—11 III '10. Feorinyeeo Bay, North, Blacksod Bay. Shore collecting. One specimen.  
 W. 168—21 IX '10. Feorinyeeo Bay, North, Blacksod Bay. Shore collecting. Three specimens.

Several small specimens, of which a short description has previously been given (26), agree fairly well with Bowerbank's account of *Raspailia Howsei*. The acanthostyli are extremely scarce, and seem to occur only towards the base of the sponge. The spicules measure as follows:—(1) styli up to nearly 2 mm. in length, with a maximum diameter of 0.016 mm.; (2) oxea, 0.4-0.55 mm. by 0.005 mm.; (3) acanthostyli 0.07-0.1 mm. by 0.008 mm.

With regard to the identification of the foregoing specimens it should be stated that the British species described by Bowerbank, which are now assigned to the genus *Raspailia*, are in a very unsatisfactory state. It appears to be impossible to identify them with any certainty until the type specimens are re-examined and described. The specimens of *Raspailia* in the collection must, therefore, be regarded as being only named provisionally.

*Cyamon spinispinosum* (Topsent).*Hymenophia spinispinosa*, Topsent.

- S. R. 353—6 VIII '06.  $50^{\circ} 37' - 50^{\circ} 40''$  N.,  $11^{\circ} 32'$  W., soundings 250-542 fms., mud and sand. Trawl. Temperature at 500 fms.,  $8.58^{\circ}$  C.  
 S. R. 480—28 VIII '07.  $51^{\circ} 23'$  N.,  $11^{\circ} 38'$  W., soundings 468 fms., stones. Oyster dredge.  
 S. R. 504—12 IX '07.  $50^{\circ} 42'$  N.,  $11^{\circ} 18'$  W., soundings 627-728 fms., coral. Trawl.

Several specimens were obtained at each of the above stations. They form very thin crusts, sometimes of considerable extent, on a branching coral (*Lophohelia prolifera*)

and on a specimen of *Desmophyllum crista-galli*. Another specimen spreads over the shell of *Arca nodulosa* which is attached to a piece of *Lophohelia*. The sponge is slightly hispid, and is greyish in colour when in spirit.

The spicules agree exactly in size and shape with the description of the type (39).

The species is assigned to the genus *Cyamon*, Gray, which has recently been re-defined by Professor Dendy (?).

*Cyamon spinispinosum* differs from other species of the genus in having the principal skeletal styli slightly spined instead of smooth.

*Distribution*.—Off the Azores in 550 metres.

#### *Rhabderemia Guernei*, Topsent.

S. R. 353—6 VIII '06. 50° 37'—50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627–728 fms., coral, Trawl.

One specimen from S. R. 353 is growing as a small, thin encrusting patch on a piece of coral (*Lophohelia prolifera*.) The colour in spirit is a pale yellowish white. Other specimens from the same station are growing in cavities of the coral, and were only exposed to view on breaking it up. The specimens from S. R. 504 are also growing in cavities of *Lophohelia*, and were discovered only on decalcifying a piece of coral. The colour in spirit of these specimens is pinkish purple, which, however, fades on exposure to the direct action of the spirit. Among the spicules are always spinispirae of Clionids and other spicules foreign to the sponge.

The spiculation agrees exactly with that of the type (34) except for the unimportant difference that the rhabdostyli are rather more slender in the Irish specimens, having a maximum diameter of 0.01 mm., and the microstyli are rather shorter, being 0.07 mm. in length. The thraustoxea are 0.06 mm. long.

*Distribution*.—Off the Azores in 736 metres.

#### *Spanioplion armaturum* (Bowerbank).

*Hymeniacidon armatura*, Bowerbank.

W. 106—23 VIII '09. 0.7 miles S. of Mallaranny Pier, Clew Bay, soundings 5½–11 fms.

The single small specimen in the collection was dredged in the course of the Clare Island Survey (26). Two other specimens of the species were also obtained during that survey in Westport Bay. The type was found in Strangford Lough (1).

*Distribution*.—Off the coast of Ireland, the Channel Islands and the northern and Mediterranean coasts of France.

Bathymetrical range from between tide-marks to 11 fathoms,

*Leptosastra constellata*, Topsent.

S. R. 151—27 VIII '04. 50 miles W.N.W. of Eagle Island. 54° 17' N., 11° 33' W., soundings 388 fms., stones and rock. Dredge. Temperature at 388 fms., 9.15° C.

S. R. 480—28 VIII '06. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.

Both specimens of this species are spreading in very thin encrustations over pieces of coral (*Lophohelia prolifera*). They agree in every particular with the type specimen which was dredged in 1,165 metres off the Azores (39).

*Leptosastra constellata* is particularly interesting, as it affords a unique example of an Ectyonine sponge which possesses a superficial layer of densely crowded spherasters. Professor Dendy, discussing this species (7, p. 134), suggests that these asters may be derived secondarily from the acanthostyli present in the sponge.

FAMILY *AXINELLIDAE*.

*Axinella pyramidata*, Stephens.

Plate I, fig. 2. Plate VI, fig. 6.

W. 141—10 VIII '13. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge. One specimen.

The sponge, which is 15 mm. in height and 17 mm. in diameter at its summit, is cut off from its support. It is shaped somewhat like a three-sided pyramid standing on its apex, except that the sides are deeply cut vertically into a series of flattened lobes. The summit is flat, but here and there it rises into small knob-like elevations. The surface of the sponge is hispid, and the colour in spirit is a pale yellowish.

The skeleton consists of closely set plumose columns of spicules, which run vertically upwards through the sponge and then bend out towards the surface, where they end in brushes of styli which project for a part of their length beyond the dermis. A considerable amount of spongin is present cementing the spicules together.

Spicules:—

(1) Styli. These vary in length from about 0.23 mm. to 1 mm., with a diameter of 0.01–0.016 mm. The shorter styli are often as thick as the longer ones. In the shorter spicules the shaft is usually rather sharply bent at a little distance above the head; at the other end it tapers to a fairly short point. The longer styli are usually slightly curved.



There is sometimes a slight swelling on the shaft of the styli at a little distance above the head.

(2) Oxea. These are about 0.3-0.6 mm. in length by 0.01-0.013 mm. They are sharply and irregularly bent, and taper at either end to a rather short point. Sometimes the ends are rounded off. Many of the oxea have a slight swelling about the middle of the shaft.

*Phakellia ventilabrum* (Johnston).

*Helga* LXXXVIII—8 VII '01. 40 miles W.N.W. of Cleggan Head, soundings 78 fms., sand, gravel and stones. Naturalists' dredge. Temperature at 76 fms., 9.1° C. Two specimens.

S. R. 85—5 II '04. 6½ miles W. by S. of Skelligs Light, 51° 44' N., 10° 43' W., soundings 72-75 fms., coarse gravel. Trawl. One specimen.

S. R. 135—9 VIII '04. 50 miles W.N.W. of Cleggan Head, 53° 36' N., 11° 27' W., soundings 105 fms., fine sand. Dredge. Temperature at 100 fms., 9.75° C. One specimen.

S. R. 178—16 XI '04. 40 miles N.W. by W. ¾ W. of Cleggan Head, 53° 36' 30" N., 11° 15' 30" W., soundings 74½ fms., coarse gravel and stones. Oyster dredge. Five specimens.

W. 37—2 IX '05. Galway Bay, soundings 16-20 fms., gravel, mud and sand. Trawl. Three specimens.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Dredge.

The specimens vary in diameter from 10 mm. to 120 mm. They are fan or cup-shaped. The species is easily distinguishable at sight from *Tragosia infundibuliformis*, which assumes similar shapes but which differs in texture.

Some of the specimens, namely, those from W. 37, were dredged in shallower water than is usual for the species.

*Phakellia ventilabrum* has previously been recorded only twice for Ireland, namely, off the south and south-west coasts, but there are many specimens in the Irish National Museum, obtained by the earlier dredging expeditions off the Irish coast, which have remained unrecorded up to the present.

*Distribution*.—Arctic Ocean, off the north coast of Norway, European and American coasts of the North Atlantic, off Brazil and to the north of the Falkland Islands.

Bathymetrical range 16 to 1,035 fathoms.

*Phakellia robusta*, Bowerbank.

*Helga* CXXIX—11 IX '01. 40 miles W.N.W. of Cleggan Head, soundings 76½ fms., stones. Naturalist's dredge.

There are only two small pieces of this species, which is well marked off from the preceding one by the presence of large flexuous oxea instead of flexuous strongyla.

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*Phakellia robusta* is apparently not as common as *Phakellia ventilabrum*, but, on the other hand, it has been considered by some writers to be identical with the preceding species, so that possibly it has been obtained oftener than the records show.

**Distribution.**—Off the eastern shores of the North Atlantic from the Shetlands to the Azores, off the coast of Maine, U.S.A., and off the Mediterranean coast of France.

Bathymetrical range 60 to 110 fathoms.

***Phakellia rugosa* (Bowerbank).**

*Dictyocylindrus rugosus*, Bowerbank.

*Helga CXXIXd*—11 ix '01. 40 miles W.N.W. of Cleggan Head, soundings 76½ fms., stones. Naturalist's dredge. One specimen.

S. R. 178—16 xi '04. 40 miles N.W. by W. ¾ W. of Cleggan Head, 53° 36' 30" N., 11° 15' 30" W., soundings 74½ fms., coarse gravel and stones. Oyster dredge. One specimen.

Both the specimens are very small and both are club-shaped. One measures 8 mm. in height by 5 mm. at its widest part, the other is 15 mm. by 4 mm.

The three species of *Phakellia* in the collection possess styli and flexuous diactinal spicules, but the present species is characterised, as Professor Topsent has already pointed out (41), by the presence of both flexuous strongyla and oxea, thus being easily distinguished from the two preceding species, *Phakellia ventilabrum* possessing only flexuous strongyla and *Phakellia robusta* only flexuous oxea.

**Distribution.**—Off East Greenland, off the Orkney and Shetland Islands, off Norway and off Sweden.

Bathymetrical range from 44 to 240 fathoms.

***Bubaris vermiculata* (Bowerbank).**

*Hymeraphia vermiculata*, Bowerbank.

S. R. 353—6 viii '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C. One specimen.

The only specimen in the collection of this well-marked species is growing on a piece of *Lophohelia prolifera*. It forms a thin crust on the coral only 3 or 4 mm. in extent.

**Distribution.**—The distribution of this species, including the form described as var. *erecta*, is wide. It has been taken off the east coast of Greenland, from 72° 37' N., 20° 00' E. southwards along the western coasts of Europe and throughout the North Atlantic to the Azores, South Atlantic and Southern Ocean (Challenger).

Bathymetrical range from about 90 to 1,600 fathoms.

*Tragosia infundibuliformis* (Johnston).

*Helga* CXVII—23 VIII '01. 36 miles W.N.W. of Cleggan Head, soundings 74½ fms., sand, shells, gravel and stones. Dredge. One specimen.

*Helga* CXXIXd—11 IX '01. 40 miles W.N.W. of Cleggan Head, soundings 76½ fms., stones. Naturalist's dredge. One specimen.

W. 5—23 III '04. 3-5 miles S.W. by S. of Great Skellig, soundings 60-65 fms., fine sand. Temperature at 60-65 fms., 7-45° C.

10 miles W. of Slyne Head. 1 IX '04. One specimen.

W. 82—25 V '09. 10 miles W. ½ S. of Clare Island Lighthouse, soundings 41-42 fms., rocks. Two specimens.

W. 141—13 VIII '10. Off Reenacry Head, Co. Kerry, soundings 37 fms., gravel. Four specimens.

W. 208—21 VIII '11. 1.5 miles S.E. by E. of the Bills, Co. Mayo, soundings 27½ fms., rock. Naturalist's dredge. One specimen.

The specimens vary from 16 mm. to 65 mm. in diameter. They are either cup or fan-shaped. Judging from the number of specimens in the Irish National Museum, which were obtained by the earlier dredging expeditions off the Irish coast, the species is not uncommon in the Irish area, but it had not been recorded for that area until the specimens taken by the *Helga* in the course of the Clare Island Survey were noted (26).

*Distribution.*—European shores of the North Atlantic from the Farøes to France.

Bathymetrical range from 24 to 345 fathoms.

*Tragosia arctica* (Vosmaer).

*Phakellia arctica*, Vosmaer.

*Axinella arctica* (Vosmaer), Topsent.

*Helga* CXX—24 VIII '01. 77 miles W.N.W. of Achill Head, soundings 382 fms.

There is in the collection a large piece of a thin, fan-shaped sponge about 15 cm. in height by 22 cm. in breadth. It is torn and is much macerated. The spicules present are styli and oxea. They agree in shape with those of Vosmaer's species, *Phakellia arctica* (42) with a preparation of the type of which they have been compared, but the oxea are longer and thicker than in the type specimen.

As far as can be seen in the macerated state of the sponge, the arrangement of the skeleton agrees well with the account given by Professor Topsent (41) of specimens of this species

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dredged off the coast of Norway, and described by him under the name of *Axinella arctica* (Vosmaer). Rather strong, branching fibres, consisting of multiserially arranged oxea run upwards through the centre of the sponge from the base to the free edge. From both sides of this system of fibres, short fibres, consisting of styli, run to the surface of the sponge, where, as can be seen in undamaged specimens, they end in bundles of styli, which project beyond the styli. These fibres are united by oxea placed at right angles to them.

The spicules measure as follows:—

(1) Oxea, 0.375–0.6 mm. in length with a maximum diameter of 0.02 mm.

(2) Styli, 0.3–0.75 mm. in length with a maximum diameter of 0.02 mm.

In the type specimen the oxea are from 0.3–0.46 mm. in length with a maximum diameter of 0.014 mm.; the styli are from 0.3–0.7 mm. in length with a maximum diameter of 0.02 mm.

Comparing the foregoing measurements, it will be seen that the oxea in the Irish specimen are longer and thicker than those in the type, and that the oxea and styli are of the same maximum thickness, instead of the latter being thicker than the former as in Vosmaer's specimen. In both these points the Irish specimen agrees with the Norwegian specimens, as Professor Topsent states that in them the oxea have a maximum diameter of 0.02 mm., and that the oxea and styli scarcely differ as regards their measurements.

With regard to the genus to which this species should be assigned, I have referred it to *Tragosia* rather than to *Axinella*, as the arrangement of the skeleton agrees so closely with that of *Tragosia infundibuliformis*, the type species of Gray's genus *Tragosia*. *Tragosia infundibuliformis*, although it has not such well-defined central fibres as occur in *Tragosia arctica*, yet has thick strands of oxea here and there in the centre of the sponge. In some specimens these strands of oxea are much more noticeable than in others. From the centre of the sponge fibres consisting of styli run to the surface and are united by oxea placed at right angles to them, as in Vosmaer's species.

*Distribution*.—Arctic Ocean, to the north of Norway, and North Atlantic Ocean, off the west of Norway.

Bathymetrical range from 143 to 382 fathoms.

#### *Higginsia Thielei*, Topsent.

S. R. 353—6 VIII '06. 50° 37'–50° 40' N., 11° 32' W., soundings 250–542 fms., mud and sand. Trawl. Temperature at 500 fms., 8.58° C.

S. R. 479—28 VIII '07. 51° 20' N., 11° 41' W., soundings 468–560 fms. Trawl.

S. R. 480—28 VIII '07. 51° 23' N., 11° 38' W., soundings 468 fms., stones. Oyster dredge.

The species is represented by three small fragments growing on pieces of *Lophohelia prolifera*. The spicules agree exactly, both in size and shape, with the descriptions and figures of the spicules of the first-found specimens (39). The spined microxea are slender, being about 0.002 mm. in thickness; they thus agree with the corresponding spicules of the specimens from the first two stations mentioned by Topsent (39, Pl. XIII, fig. 5b).

The species has previously been found at four stations off the Azores, at depths varying from 200 to 1,250 metres.

### *Hymeniacion caruncula*, Bowerbank.

Bofin, Co. Galway.

Blacksod Bay, at many stations.

This species is represented in the collection from places where shore-collecting was systematically carried out in the course of work done by the Fisheries Branch.

*Hymeniacion caruncula* is not found, or is, at least, very rare in even shallow water dredgings off the Irish coast, but, with *Halichondria panicea*, it is the commonest sponge between tide-marks round our shores. It grows very high between tide-marks, often in exposed positions.

*Distribution*.—Off the European shores of the North Atlantic from the British Isles to Portugal; off the Azores and the Cape Verd Islands, and off South-west Africa.

### *Halicnemis verticillata* (Bowerbank).

*Hymenaphia verticillata*, Bowerbank.

S. R. 194—10 II '05. 54° 49' N., 10° 30' W., soundings 336 fms., rock. Oyster dredge. One specimen.

S. R. 277—15 XI '05. 50 miles W.N.W. of Eagle Island, 54° 17' 30" N., 11° 34' W., soundings 550 fms., gravel and shells. Oyster dredge. Two specimens.

S. R. 504—12 IX '07. 50° 42' N., 11° 18' W., soundings 627-728 fms., coral. Trawl. Temperature at 600 fms., 8.22° C. Two specimens.

The specimen from S. R. 194 is the largest. It is a thin encrustation about 35 mm. by 20 mm. in extent; it is cut off from its support.

The sponges from S. R. 277 are growing on pebbles, while the remaining two are spreading over coral (*Lophohelia prolifera*).

This well-characterised species was described by Bowerbank (1) from a specimen dredged off the west coast of Ireland. It was assigned by Gray, first to a new genus *Naenia* (11, p. 516), and later in the same paper to another new genus *Laothoë* (11, p. 543). Topsent (37) refers the species to *Halicnemis*, Bowerbank, of which the type species is *Halicnemis patera*, Bowerbank.

*Distribution.*—Off the North Cape, Norway (10), off the Shetlands and Orkneys (1 and 3), and off the west coast of Ireland (1). The species was recorded by Schmidt (25) off Florida, but a preparation from Schmidt's specimen in the British Museum labelled "*Hymenaphia verticillata*, Bk. var., Florida," does not belong to this species.

Bathymetrical range from 100 to 728 fathoms.

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## EXPLANATION OF PLATES I.—VI.

## PLATE I.

- Fig. 1. *Anchinoë fictitius* (Bowerbank), on oyster shell. Natural size.
- Fig. 2. *Axinella pyramidata*, Stephens. Seen from the side (*a*) and from the top (*b*) of the sponge,  $\times 2$ .
- Fig. 3. *Myxilla rosacea* (Lieberkühn). Branching specimen. Natural size.

## PLATE II.

- Fig. 1. *Tylodesma informis*, Stephens.  
*a, b, c*, tylostyli,  $\times 140$ ; *d*, sigma,  $\times 600$ .
- Fig. 2. *Biemna inornata* (Bowerbank).  
*a, b, c*, stylus and tylostyli,  $\times 140$ ; *d*, sigma,  $\times 600$ .
- Fig. 3. *Esperiopsis incognita*, Stephens.  
*a*, stylus,  $\times 330$ ; *b*, plane sigmata,  $\times 140$ ; *c*, contort sigmata,  $\times 330$ ; *d, e*, isochelae palmatae,  $\times 600$ .
- Fig. 4. *Esperiopsis macrosigma*, Stephens.  
*a*, stylus,  $\times 330$ ; *b*, plane sigmata,  $\times 140$ ; *c*, contort sigmata,  $\times 330$ ; *d, e, f*, isochelae palmatae,  $\times 600$ .
- Fig. 5. *Iotrochota acanthostylifera*, Stephens.  
*a, b*, acanthostyli,  $\times 330$ ; *c*, tylotum,  $\times 330$ ; *d*, isanchora unguifera,  $\times 900$ ; *e*, birotula,  $\times 900$ .

## PLATE III.

- Fig. 1. *Rhaphidotheca Marshall-Halli*, Kent, from S. R. 480.  
*a*, stylus,  $\times 140$ ; *b*, exotylylus,  $\times 140$ ; *c, d*, anisochelae,  $\times 600$ ; *e, f, g*, distal ends of exotyly,  $\times 140$ ; *h*, raphides,  $\times 600$ ; *i, j*, sigmata,  $\times 600$ .
- Fig. 2. *Rhaphidotheca Marshall-Halli*, Kent, from S. R. 151.  
*a*, stylus,  $\times 140$ ; *b*, exotylylus,  $\times 140$ ; *c, d*, large anisochelae,  $\times 600$ ; *e, f*, distal ends of exotyly,  $\times 140$ ; *g*, raphides,  $\times 600$ ; *h*, sigma,  $\times 600$ ; *i*, small anisochela,  $\times 600$ .
- Fig. 3. *Histodermella Ingolff*, Lundbeck.  
Oxea,  $\times 330$ ; *a*, from S. R. 480; *b, c*, from S. R. 151.
- Fig. 4. (?) *Clathria anchorata* (Carter).  
*a*, stylus,  $\times 140$ ; *b*, head of stylus,  $\times 330$ ; *c*, (?) dermal stylus,  $\times 330$ ; *d, e*, acanthostyli,  $\times 330$ ; *f*, isochela palmata,  $\times 600$ .

## PLATE IV.

- Fig. 1. *Hymedesmia paupertas* (Bowerbank).  
*a, b*, acanthostyli,  $\times 330$ ; *c*, strongylum,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .
- Fig. 2. *Hymedesmia hibernica*, Stephens.  
*a, b*, acanthostyli,  $\times 330$ ; *c*, strongylum,  $\times 330$ .
- Fig. 3. *Hymedesmia zetlandica*, Bowerbank.  
*a, b*, acanthostyli,  $\times 330$ ; *c*, tylotum,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ ; *e*, sigma,  $\times 600$ .
- Fig. 4. *Hymedesmia pansa*, Bowerbank.  
*a*, strongylotornotum,  $\times 330$ ; *b, c*, acanthostyli,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .
- Fig. 5. *Hymedesmia spinosa*, Stephens.  
*a, b*, acanthostyli,  $\times 330$ ; *c*, tornotum,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .
- Fig. 6. *Hymedesmia Helgae*, Stephens.  
*a, b*, acanthostyli,  $\times 330$ ; *c*, strongylum,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .
- Fig. 7. *Ectyodoryx atlanticus*, Stephens.  
*a*, echinating acanthostylus,  $\times 330$ ; *b*, large acanthostylus  $\times 140$ ; *c*, strongylum,  $\times 330$ ; *d*, head of a large acanthostylus,  $\times 330$ ; *e*, isochela arcuata,  $\times 600$ .

## PLATE V.

- Fig. 1. *Eurypon acanthotoxa*, Stephens.  
*a*, large acanthostylus,  $\times 140$ ; *b, c*, smaller acanthostyli,  $\times 330$ ; *d*, dermal stylus,  $\times 140$ ; *e, f*, toxa,  $\times 330$ ; *g*, isochela palmata,  $\times 600$ .
- Fig. 2. *Eurypon viride* (Topsent).  
*a*, raphides,  $\times 600$ ; *b*, head of tylostylus,  $\times 140$ ; *c*, acanthostylus,  $\times 600$ .
- Fig. 3. *Eurypon ditoxa*, Stephens.  
*a*, small acanthostylus,  $\times 330$ ; *b*, head of large acanthostylus,  $\times 330$ ; *c*, large acanthostylus,  $\times 140$ ; *d*, dermal stylus,  $\times 330$ ; *e*, isochela palmata,  $\times 600$ ; *f, g*, toxa of two forms,  $\times 600$  and  $140$  respectively.
- Fig. 4. *Eurypon tenuissimum*, Stephens.  
*a*, large acanthostylus,  $\times 140$ ; *b*, head of large acanthostylus,  $\times 330$ ; *c, d*, smaller acanthostyli,  $\times 330$ ; *e*, dermal stylus,  $\times 140$ ; *f*, head of dermal stylus,  $\times 330$ ; *g*, isochela palmata,  $\times 600$ ; *h*, toxon,  $\times 140$ ; *i*, part of same,  $\times 330$ .
- Fig. 5. *Eurypon microchela*, Stephens.  
*a*, large acanthostylus,  $\times 140$ ; *b*, dermal stylus,  $\times 330$ ; *c*, head of large acanthostylus,  $\times 330$ ; *d*, small acanthostylus,  $\times 330$ ; *e*, isochela palmata,  $\times 600$ .

## PLATE VI.

Fig. 1. *Anchinoë fictitius* (Bowerbank).

*a, b*, acanthostyli,  $\times 330$ ; *c*, tornotum,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .

Fig. 2. *Plocamia microcionides* (Carter).

*a*, acanthostylus,  $\times 330$ ; *b, c*, small and large styli,  $\times 140$ ;  
*d*, tornotum,  $\times 330$ ; *e, f*, acanthostrongyla,  $\times 330$ ;  
*g*, isochela arcuata,  $\times 600$ .

Fig. 3. *Plocamia ambigua* (Bowerbank).

acanthostrongylum,  $\times 330$ .

Fig. 4. *Stylostichon Dendyi*, Topsent.

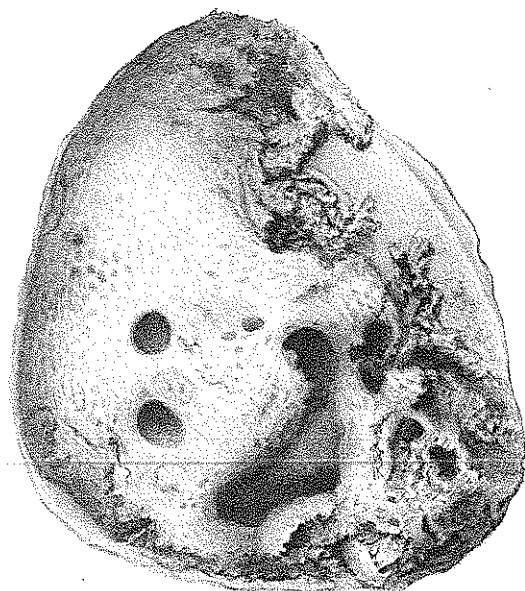
*a*, strongylum,  $\times 330$ ; *b, c*, acanthostyli,  $\times 330$ ; *d*, isochela arcuata,  $\times 600$ .

Fig. 5. *Eurypon Lacazei* (Topsent).

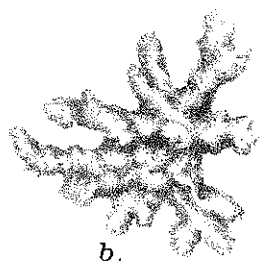
*a*, oxeum,  $\times 330$ ; *b*, acanthostylus,  $\times 600$ ; *c*, head of tylostylum,  $\times 140$ .

Fig. 6. *Axinella pyramidata*, Stephens.

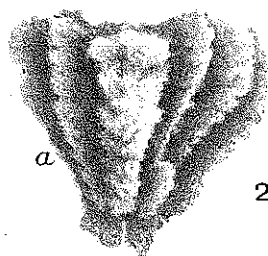
styli and oxea, all  $\times 140$ .



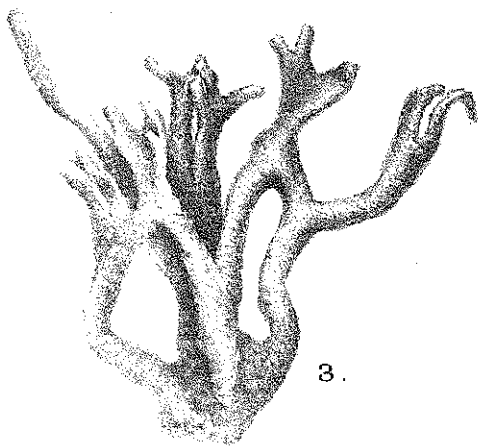
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b.



a.



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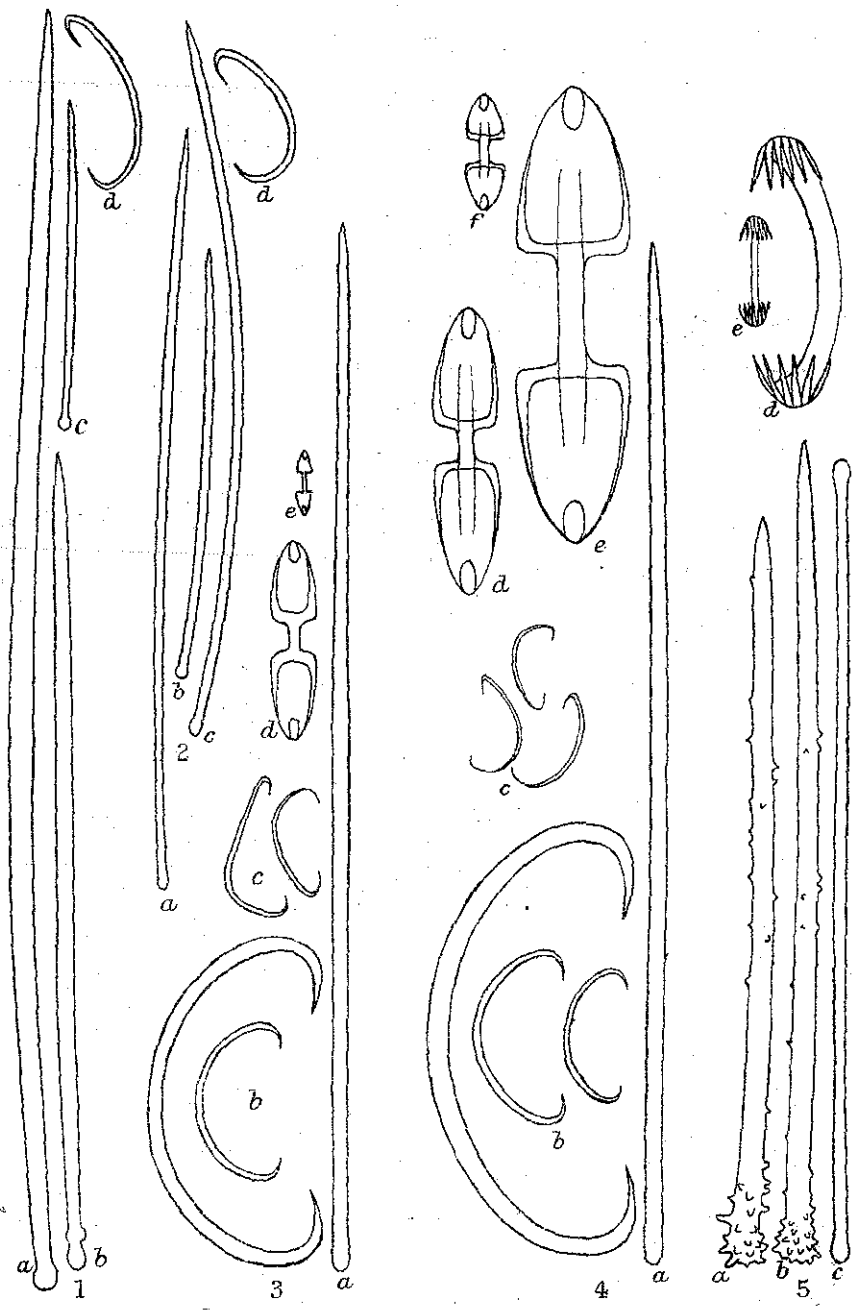
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Fig. 1, *Anchinoë fictitius*.

Fig. 2, *Axinella pyramidata*.

Fig. 3, *Myxilla rosacea*.



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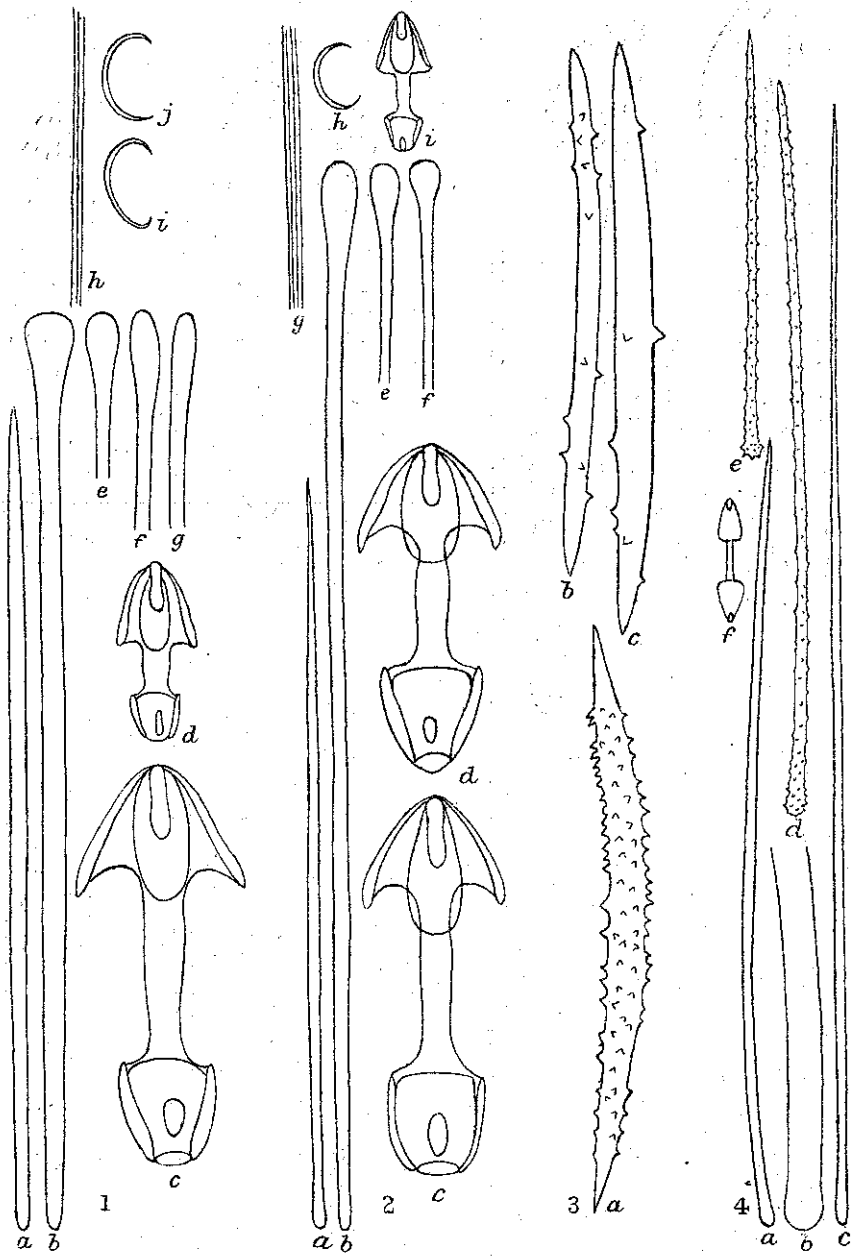
Fig. 1. *Tylodesma informis*

Fig. 2. *Biemna inornata*.

Fig. 5. *Ictrochota acanthostylifera*.

Fig. 3. *Esperiopsis incognita*.

Fig. 4. *E. macrosigma*.

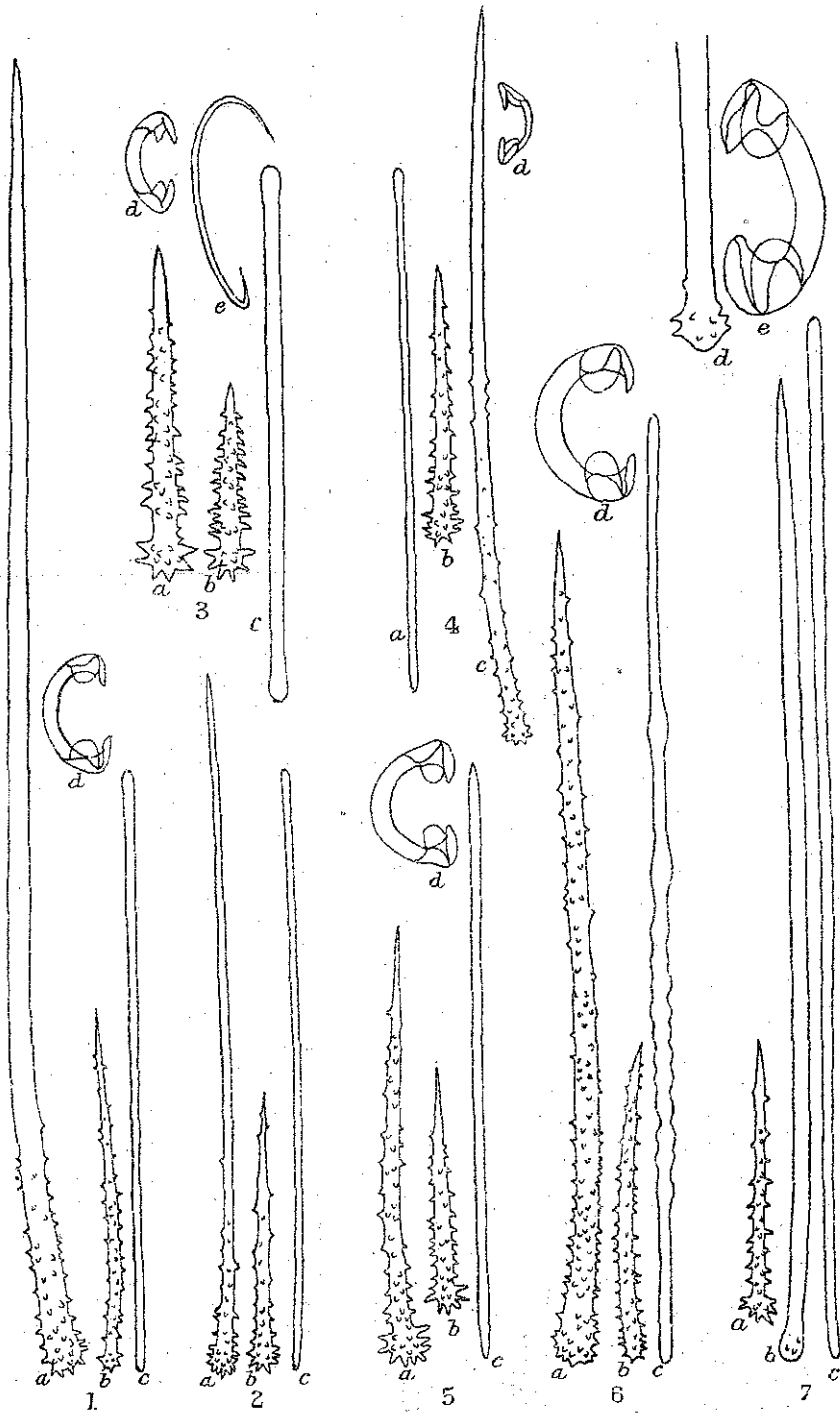


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Fig. 1. *Rhaphidotheca Marshall-Halli*.

Fig. 2. *Histodermella Ingolfi*.

Fig. 4. *Clathria anchorata*.



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Fig 1 *Hymedesmia paupertas*.

Fig 2 *H. hibernica*.

Fig 3. *H. zetlandica*.

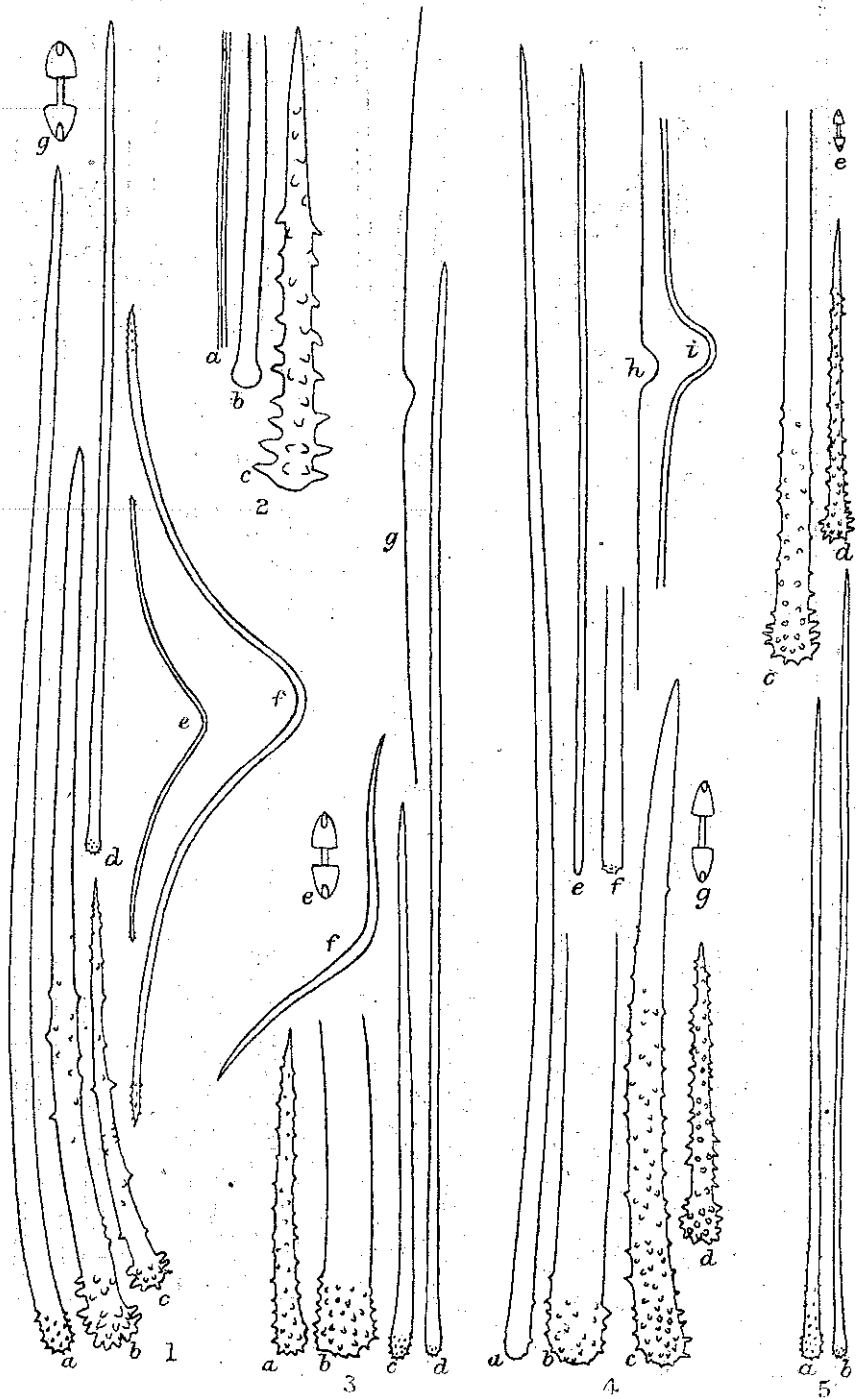
Fig. 4. *H. pansa*.

Fig. 5. *H. spinosa*.

Fig. 6. *H. Helgae*.

Fig. 7. *Ectyodoryx atlanticus*.





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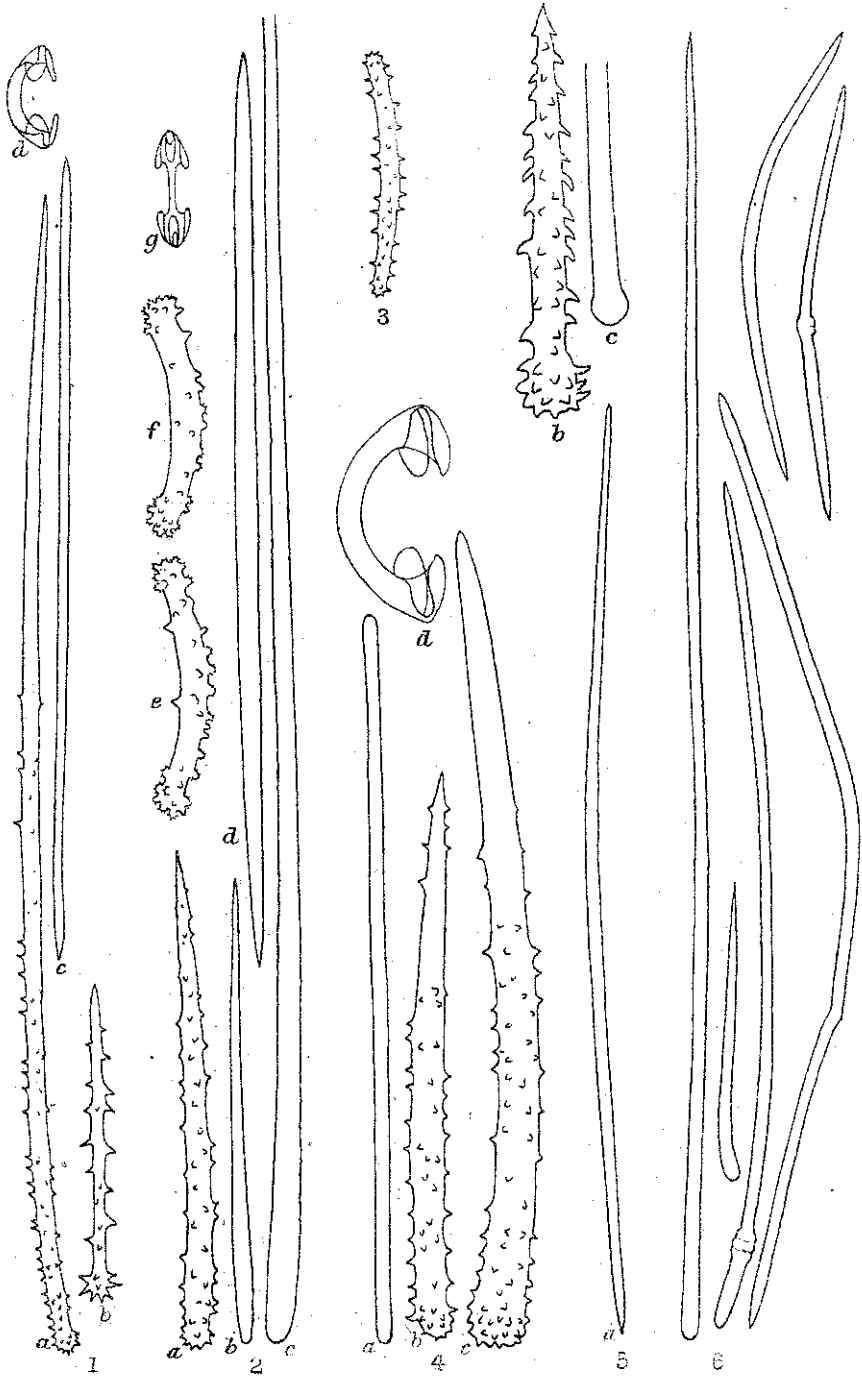
Fig. 1. *Eurypon acanthotoxa*.

Fig. 3. *E. ditoxa*.

Fig. 2. *E. viride*.

Fig. 4. *E. tenuissimum*.

Fig. 5. *E. microchela*.



Eileen E. Barnes, del.

Fig. 1. *Anchinö fictitius*.

Fig. 2. *Plocamia microcionides*.

Fig. 3. *P. ambigua*.

Fig. 4. *Stylostichon Dendyi*.

Fig. 5. *Eurypon Lacazei*.

Fig. 6. *Axinella pyramidata*.