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DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION
FOR IRELAND.

FISHERIES BRANCH.

SCIENTIFIC INVESTIGATIONS,
1907.

No. V.

Aleyonarian and Madreporarian Corals of the Irish
Coasts,

by JANE STEPHENS, B.Sc.,

National Museum, Dublin,

with

Description of a New Species of *Stachyodes*

by Professor S. J. HICKSON, F.R.S.

This paper may be referred to as:—

"*Fisheries, Ireland, Sci. Invest.*, 1907, V, [1909]."

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ALCYONARIAN AND MADREPORARIAN CORALS OF THE IRISH COASTS,

BY

JANE STEPHENS, B.Sc.,
National Museum, Dublin,

with

DESCRIPTION OF A NEW SPECIES OF STACHYODES

BY PROF. S. J. HICKSON, F.R.S.

Pl. I.

Some time ago Professor Hickson (1905) published a preliminary account of certain Alcyonaria dredged by the *Helga* off the Irish coast. Since then many additional specimens belonging to this group have been obtained. With the description of these specimens Professor Hickson has very kindly allowed me to incorporate his final account of the first Alcyonarian Collection, which includes one new species, *Stachyodes Versluysi*, and eleven others, most of which are new to the Irish area. In each case, to avoid confusion, Professor Hickson's name is given after the species he has determined.

The Alcyonaria taken off the west coast of Ireland add to our knowledge of the geographical distribution of deep-sea forms. Professor Hickson (1905) has already drawn attention to the interesting discovery of the Precious Coral, *Corallium Johnsoni*, off the west coast of Ireland.

In the account of the deep-sea Alcyonaria recently collected by the *Investigator* in the Indian Ocean, seven species are given as common to both Indian and Atlantic Oceans. Of these, two are now recorded for the Irish area, namely *Funiculina quadrangularis*, which has frequently been taken in the North Atlantic, and *Callistephanus Koreni*, which up to this has only been found off Ascension Island and in the Indian Ocean.

The discovery of *Caligorgia flabellum* off the Irish coast adds another species to the list of those common to the two oceans.

As might have been anticipated, a number of species hitherto only taken off the Azores, Madeira, and the Eastern States of North America, are now found to occur in deep water off the west coast of Ireland.

Like the Alcyonaria, the Madreporarian Corals in this list are nearly all new to the Irish coast. Perhaps the most interesting among them, and also the most beautiful, are the specimens of *Stephanotrochus diadema* and *Flabellum alabastrium*.

In conclusion I have to thank Dr. E. P. Wright for very generously placing at my disposal fragments of interesting type specimens, and Professor J. Arthur Thomson for most kindly examining several specimens, especially some belonging to the difficult genera *Acanthogorgia* and *Paramuricea*, and giving me his valuable advice and assistance.

ALCYONARIA.

ORDER STOLONIFERA.

FAMILY CORNULARIIDAE.

Sarcodictyon catenata, Forbes.

Helga, CXXIXd.—40 mi. W.N.W. of Cleggan Head, 76½ fms.; bottom temperature, 9°30 C.; 11th September, 1901.

“This species was dredged at the above locality.”—S. J. HICKSON.

Additional record :—

S.R. 480.—Lat., N., 51° 23'; Long., W., 11° 38'; 468 fms.; temperature at 400 fms., 9°55° C.; 28th August, 1907.

The specimens obtained at this station were of a pale yellowish colour, with colourless spicules.

This species has been previously taken a few times off the north-east, south, and west coasts of Ireland.

ORDER ALCYONACEA.

FAMILY ALCYONIIDAE.

Alcyonium digitatum, Linn.

S.R. 118.—2½ mi. N.E.½E. of Rathlin Island, Lat., N., 55° 20'; Long., W., 6° 8'; 103 fms.; 13th May, 1904.

S.R. 118a.—2 mi. N.E.½E of Rathlin Island, Lat., N., 55° 19' 45"; Long., W., 6° 10'; 115 fms.; 13th May, 1904.

“*Alcyonium digitatum* is usually found in shallow water up to 40-50 fms. It has, however, been taken in deep water, and is known to occur in the Bay of Biscay at depths of over 300 fms.”—S. J. HICKSON.

Additional records.

Alcyonium digitatum has been frequently dredged by the *Helga* in shallow water up to a depth of 45 fms. off many parts of the Irish coast.

It was obtained at almost every station off the east coast, where it was found in great abundance, but there are no records of its occurrence in deeper water except those cited above.

***Anthomastus agaricus*, Studer.**

S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; temperature at 400 fms., 9.55°C .; 28th August, 1907.

A small specimen of *Anthomastus*, measuring only 6 mm. across the disc, is with some doubt referred to this species, which was described by Studer (1901) from two specimens obtained off the coast of Newfoundland. The colony bears only four autozooids. As in *A. agaricus* the disc is sharply marked off from the peduncle, and its edge is thin and cut into lobes, but the surface of the disc is much more convex than in the Newfoundland specimens. The spicules bear a close resemblance to those figured by Studer.

FAMILY NEPHTHYIDAE.

***Eunephtya (Duva) rosea* (Kor. and Dan.)**

S.R. 223.— $53^{\circ} 7' \text{N}$.; $14^{\circ} 50' \text{W}$.; 500 fathoms; 12th May, 1905.

Helga, CXX.—77 mi. W.N.W. of Achill Head, 382 fathoms; 24th August, 1901.

“I have compared the specimens sent to me by Mr. Holt with a specimen of *Duva rosea* from the Trondhjemsfjord in Norway, and I am convinced that they are specifically the same. The species was originally described by Koren and Danielssen (1883) from the Norwegian coast under the generic name *Duva*. The group of genera to which it belongs have not been very carefully compared as regards their anatomical structure, and do not present any very characteristic features in the characters of their spicules, method of ramification, etc., to render their separation an easy task. The species have consequently been shifted about from genus to genus by different authors. In the recent important monograph on the family Nephthyidæ by Kükenthal (1907) it is placed in the genus *Eunephtya* of Verrill (1869). Verrill's description of the genus was quite inadequate, and it is impossible to determine what Verrill

"intended to include in or exclude from his genus *Eunephthya*. The genus *Duva* was well described and figured by Koren and Danielssen in 1883, and for that reason we should be perfectly justified in retaining the genus *Duva* and ignoring Verrill's genus *Eunephthya* altogether. However, as Kükenthal has on grounds of precedence adopted Verrill's generic name and has given in his paper an elaborate diagnosis of the species included in this genus, I have decided with some hesitation to call the species *Eunephthya rosea*. The most perfect specimen is 60 mm. in height and 45 mm. in greatest breadth. It seems to approach most closely the description of Kükenthal's *E. rosea* var. *umbellata*. The colour in spirit is white. A smaller incomplete specimen in the same bottle appears to have been dead when taken and is of a darker grey colour. The specimen from off Achill Island is only 26 mm. in height, and is not so compact in growth as the other specimens, but an examination of the spicules and polyps does not afford any substantial reasons for giving it a distinct specific name.

"A feature of some interest in connection with these specimens is the great depth of water in which they were found. The specimens of *E. rosea*, *forma typica* of Kükenthal were obtained from the coast of Norway at depths of 80-100 metres, but the depth of his specimens from Spitzbergen of *E. rosea* var. *umbellata* is not known. The various varieties of the closely allied species *E. spitzbergensis* are mostly found in deep water, the variety *violacea* (*D. flava*. Dan.) having been found at a depth of 1,187 metres.

"It is probable that, as Kükenthal himself suggests, the three species *E. rosea*, *E. spitzbergensis*, and *E. florida* will ultimately be joined together as one species and that the united species will then be found to have a wide geographical and bathymetrical distribution. The larger specimen from S.R. 223 was a female. In the larger ova no germinal vesicle nor any trace of nuclear structure can be seen in any of the sections. This is apparently the same stage in the history of the ova as that described by myself (1899) and Hill (1905) for *Alcyonium*, in which the nucleus is dispersed or fragmented. The presence of this stage in the ova within the body of the parent zooid does not prove either that the zooids are viviparous or that the fertilisation is effected before the discharge of the ova. It only proves that the ova reach maturity before they are discharged. As no definite sterrulae larvae nor any ova exhibiting early stages of development were found it is not certain that this deep-sea species is viviparous, but the suggestion these facts give is that the species is not viviparous."—S. J. HICKSON.

ORDER PSEUDAXONIA.

FAMILY BRIAREIDAE.

Gymnosarca bathybius, Kent.

- S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; temperature at 400 fms., 9.55° C.; 28th August, 1907.
 S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., 8.34° C.; 30th August, 1907.

This interesting species is represented by several broken colonies, which are growing on dead Madreporarian coral. *Gymnosarca bathybius* was taken on one occasion off the coast of Portugal in 500 fms. (Kent, 1870), and its systematic position has, up to this, remained doubtful. Professor Hickson, in his important paper on the Stolonifera (Trans. Zool. Soc., Lond., XIII., 1894) discusses this species, and on hearing that it had been found among the Irish collection, kindly undertook to examine the specimens. He sends the following preliminary note on the species:—"It has much the appearance of a *Telesto*, but the coelenteric cavities are short and do not extend into the axes of the upright stems. These stems are filled up with an immense number of interlocked spicules, which are very like those of *Telesto trichostemma* in some respects. It is certainly not a Clavulariid nor a Telestid, and may be put, on my authority, in the family Briareidae of the Order Pseudaxonia." Professor Hickson reserves further particulars on the species until he has made a more detailed study of the specimens.

FAMILY CORALLIIDAE.

Corallium Johnsoni, Gray.

Syn. *Pleurocorallium Johnsoni* (Johnson P.Z.S. 1899.)

- S.R. 151.—50 mi. W.N.W. of Eagle Island; Lat., N., $54^{\circ} 17'$; Long., W., $11^{\circ} 33'$; 388 fms.; bottom temperature, 9.15° C.; 27th August, 1904.

"The type specimens of this species were obtained off the coast of Madeira. The single specimen obtained by the Irish fisheries expedition off Eagle Island was a good deal broken, but it clearly belongs to this species (Hickson, 1905). The recent discovery of a specimen of *C. maderense* by the Huxley expedition in 412 fathoms in the Bay of Biscay (Hickson, 1907) and the discovery of this species off the coast of Ireland are among the most interesting new discoveries in the geographical distribution of Alcyonaria. The axis is very hard, and will take a good polish."—S. J. HICKSON.

Note.—By an oversight this species was recorded (Hickson, 1905) as having been taken off Achill Island in 382 fms.

ORDER AXIFERA.

FAMILY ISIDAE.

Ceratoisis Grayi, E. P. Wright.

Helga, CXX.—77 mi. W.N.W. of Achill Head; 382 fms.;
24th August, 1901.

"The original specimen of this species was obtained in deep water off Setubal on the coast of Portugal and was described by E. P. Wright (1869) in a short paper illustrated by two good figures. In the *Challenger* Monograph Wright and Studer state (1889, p. 278) that the species was obtained off the Cape Verde Islands, but I can find no other reference in the literature to any specimens from this locality, and I am inclined to believe that it is a mistake. Gray (1870) states that the type specimen was obtained from a depth of 400 fathoms. There can be no doubt that the specimen from Achill belongs to this species. The specimen at my disposal is small, 25 mm. long, and I have not used it for making preparations; but a good description with figures of the spicules is a desideratum. A specimen assigned by Roule to *C. flexibilis* of Verrill was found by the *Caudan* expedition in 1,410 metres in the Bay of Biscay."—S. J. HICKSON.

Acanella arbuscula, Johnson.

Helga, CXX.—77 mi. W.N.W. of Achill Head; 382 fms.;
24th August, 1901.

"The small specimen which I possess seems to be identical with this species. *A. arbuscula* was found by the *Caudan* expedition at four stations (950-1,710 metres) in the Bay of Biscay, and more recently by the *Huxley* expedition in the Bay of Biscay in 410 fms."

S. J. HICKSON.

Additional records :—

S.R. 327.—60 mi. W. $\frac{3}{4}$ N. of Tearaght Light; Lat., N., $51^{\circ} 43' 30''$ — $51^{\circ} 38''$; Long., W., $12^{\circ} 15'$ — $12^{\circ} 18'$; 550-800 fms.; temperature at 530 fms., $8^{\circ} 95'$ C.; 8th May, 1906.—Fragments.

S.R. 333.—Lat., N., $51^{\circ} 37'$; Long., W., $12^{\circ} 9'$; 557-579 fms.; temperature at 500 fms., $9^{\circ} 20'$ C.; 10th May, 1906.—Two specimens.

S.R. 489.—Lat., N., $51^{\circ} 35'$; Long., W., $11^{\circ} 55'$; 720 fms.; 4th September, 1907.—One specimen.

S.R. 494.—Lat., N., $51^{\circ} 59'$; Long., W., $12^{\circ} 32'$; 550-570 fms.; 8th September, 1907.—Three specimens and fragments.

S.R. 500.—Lat., N., $50^{\circ} 52'$; Long., W., $11^{\circ} 26'$; 625-666 fms.; temperature at 600 fms., $8^{\circ} 22'$ C.; 11th September, 1907.—One specimen.

S.R. 502.—Lat., N., $50^{\circ} 46'$; Long., W., $11^{\circ} 21'$; 447-515 fms.; bottom temperature, 8.8°C. ; 11th September, 1907.—One small fragment.

Specimens of *Acanella arbuscula* were previously taken on one occasion off the south-west coast of Ireland in 750 fms. by the Royal Irish Academy Expedition of 1888.

***Chelidonisis aurantiaca*, Studer.**

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., 8.22°C. ; 12th September, 1907.

S.R. 505.—Lat., N., $50^{\circ} 39'$; Long., W., $11^{\circ} 14'$; 464-627 fms.; 12th September, 1907.—Two small fragments.

Many specimens of this pretty coral were obtained. They are more or less broken, as the branches easily separate at the horny joints. The species was described (Studer, 1901) from specimens taken in deep water off the Azores. Among the Irish specimens the main stem of the larger colonies has a greater diameter than the branches, and the polyps are not strictly confined to the lateral faces of the stem and branches. One colony, which is incomplete, reaches a height of 80 mm. All the type specimens were broken off from their support, but two small colonies in this collection are growing on a piece of dead Madreporarian coral, to which they are attached by means of a flattened disc-like expansion.

FAMILY PRIMNOIDAE.

***Caligorgia flabellum* (Ehrenberg.)**

S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., 8.34°C. ; 30th August, 1907.

S.R. 487.—Lat., N., $51^{\circ} 36'$; Long., W., $11^{\circ} 57'$; 540-660 fms.; temperature at 500 fms., 8.65°C. ; 3rd September, 1907.

S.R. 489.—Lat., N., $31^{\circ} 35'$; Long., W., $11^{\circ} 55'$; 720 fms.; 4th September, 1907.

Several fine specimens belonging to this species, which has recently been fully described by Dr. Versluys (1906), are in the collection.

The largest reaches a height of about 117 cm. and measures 114 cm. across the widest part of the colony. A good idea of its general appearance can be obtained from the colony figured by Dr. Versluys (1906, Pl. v.), to which it bears a close resemblance.

A second specimen, growing from among a mass of *Amphihelia*, is rather more than 1 metre in height, but the branches are not so widely spreading. Two smaller colonies were also obtained.

Caligorgia flabellum has a wide geographical distribution. It has been taken in the Indian Ocean, off the East Indies and Japan, and in the Eastern Pacific off Central America. It has been recorded from the West Indies, but this record is considered doubtful (Versluys, 1906), as the description given is not full enough for a certain identification of the species.

Stachyodes Versluysi, sp. n., Hickson.

“The specimens of this species that were sent to me consist of three pieces, preserved in spirit, from S.R. 223.—Lat., N., $53^{\circ} 7'$; Long., W., $14^{\circ} 50'$; 410-500 fms.; 12th May, 1905; and two dried pieces from *Helga* CXX.—77 mi. W.N.W. of Achill Head; 382 fms; 24th August, 1901. Assuming that the three pieces preserved in spirit are parts of one specimen, as they undoubtedly are, the total length was 780 mm., but it was incomplete at both ends. The dried specimens were together 470 mm., but were also incomplete at both ends. It is noteworthy in the first place that although considerable lengths were obtained there is no sign that they were branched. It is therefore probable, although not absolutely certain, perhaps, that one character of the species is that it is unbranched. The basal end of the spirit specimen is overgrown by a piece of coral (*Lophohelia* v. *Amphihelia ramea*?), but the true base is broken off and lost. The axis at the base is 5.25 mm. in diameter, and diameter of the lower whorls of zooids is about 10 mm. At the distal end (of the specimens) the axis has attenuated to a diameter of 2 mm., and the diameter of the whorl to about 8.25 mm. The axis is throughout of a beautiful bronze colour. There are from $8\frac{1}{2}$ -9 whorls in every 30 mm. of length, the whorls being about 1 mm. apart. The number of zooids in a whorl varies. At the basal end there are about 14 zooids in a whorl, at the other end about 9 zooids in a whorl. In the intermediate regions I have counted 10, 11, and 13 zooids in a whorl. The smallest number in a whorl is 9.

“The zooids are 3.5 mm. in length, if as a measurement of length is taken the distance between the base of the basal scales and the apex of the aboral opercular scale. It seems from this measurement that the zooids are the largest of any known species of the genus, but, as in other characters, come nearest to the zooids of *S. Studeri*, in which the length is 3.25 mm. or less (Versluys, 1906). As in other species of the genus, there are three pairs of large abaxial scales on the body-wall of the zooids and eight large opercular scales.

"Of the three pairs of body-wall scales, the two basal scales have each a proximal process which passes round the side of the base laterally, but does not meet its fellow on the adaxial surface of the zooid. On the distal, abaxial side of these basal scales there is no overhanging part (seitwärts verbreiterte Dorsalpartie welche über der Seitenpartie dieser Schuppen vorragt), as in *S. Studeri*, the scale being simply convex, as in *S. dichotoma*. The median scales are smaller than the others and have the same kind of constriction as in *S. Studeri*, but it is not quite so pronounced as it is in that species.

"The buccal scales are very similar to those of *S. Studeri*.

"The opercular scales exhibit considerable variation, but seem to be more bent inwards than they are in other species. They are all provided with well marked keels extending from the nucleus to the outer edge. In the large abaxial scales the keel is 0.45 mm. in height at the edge.

"Allowing for some variation, the length of the abaxial scales (i.e., the abaxial scale and the four abaxio-lateral scales) is 1.2 mm. At the extreme base they are 0.6 mm. wide, but in some scales that are less bent than the others, they are as much as 1.2 mm. wide at a level just above the base. The adaxial scale is about 0.75 mm. in length, and the adaxio-lateral are intermediate in size between the adaxial and the others. In the character of these opercular scales our species approaches *S. Studeri* in the size of the keel and *S. dichotoma* in the relatively large size of the adaxial scale.

"As regards the scales of the coenenchym it is difficult to give in a few words any idea of the extraordinary range in size, shape, and character of the coenenchym scales in *S. Versluysi*.

"On boiling a piece of the coenenchym in 5 per cent. K.H.O. for a little while large flakes are formed that may have a length of 1 mm. or more, but on further treatment these separate into scales not more than 0.6 mm. in length. I have found it difficult to determine whether many of these scales, even after long treatment with potash, are not really compound. The coenenchym scales of *S. dichotoma* and *S. Studeri* are of an elongated form, and those figured by Versluys are spindle-shaped in outline. Such spicules are also found in *S. Versluysi*, but by far the greater number are much broader, and a great many are as broad as they are long. Many of the scales are oblong, square, leaf-shaped, stellate and quite irregular. As in other species, many of these scales are provided with a distinct keel. In a criticism of Roule's identification

“(1896) of a specimen from the Bay of Biscay as *Calyp-
“terinus Allmani*, Versluys (p. 93) remarks that the
“specimen differs from the type of that species in having
“more scale-like coenenchym spicules, ‘mehr schuppen-
“artigen Rinden-Scleriten.’

“In this character, as well as in the character of
“having nine (or more) zooids in a whorl, the *Caudan*
“specimen seems to agree with the specimen from Ire-
“land and differs from the other species.

“Our specimen clearly differs from the specimens re-
“ferred by Studer (1901) to *Stachyodes Josephinae*
“ (Lindström) and *S. trilepis* (Pourtales) from the Azores.
“As Versluys (1906) has shown, *S. Josephinae* belongs
“to the genus *Calyptrophora*, and the specimen described
“by Studer as *S. trilepis* is probably new. The latter
“differs from our specimens in the character of its rami-
“fication and in the small number (4) of zooids in a
“whorl.

“The description of *S. regularis* (Duch. and Mich.)
“from Guadeloupe is so imperfect that it is, perhaps,
“uncertain whether our species agrees with it or not.
“It certainly agrees with our specimen in having
“numerous (up to 10) zooids in a whorl, but appears to
“differ from them in the small size of the basal scales,
“and in being branched.

“In conclusion, it may be said that it is clearly con-
“venient to regard the Irish specimens as constituting a
“new species, that the specimen described by Roule
“(1896), and obtained by the *Caudan* in 1,220 and
“1,400 metres in the Bay of Biscay, probably belongs to
“the same species, that the closest affinities of the species
“are with *S. dichotoma* (Versluys) and *S. Studeri* (Vers-
“luys) from the Pacific Ocean and East Indian Archi-
“pelago, that it differs from these last-named species in
“in the large number of zooids in each whorl, and in the
“character of the coenenchym spicules. In recognition
“of the great value of his contributions to our knowledge
“of the Primnoidae, I propose to name the species
“*Stachyodes Versluysi*.

“Note.—I wish to refer to an additional character I
“have observed in this species. The aboral surface of
“the tentacles is armed with a crowd of small spicules
“from the base to a short distance from the apex. These
“spicules vary considerably in size and shape. The
“longest are about 0.2 mm. in length, and the smallest
“minute stars. They appear to be usually very thin,
“the longest are spindle-shaped in outline, the smaller
“ones diamond-shaped; but they are all characterised by
“their very sharp tubercular processes. Many of them
“are disposed parallel to the long axis of the tentacle,
“but most of them are quite irregularly placed. There is

"no evidence at present to show whether this character is or is not common to all the species of the genus. The specimen is a male, but none of the testes are quite mature. All the zooids in the whorls I examined bear gonads."—S. J. HICKSON.

FAMILY MURICEIDAE.

Clematissa robusta (Wright and Studer).

S.R. 151.—50 mi. W.N.W. of Eagle Island, Lat., N., 54° 17'; Long., W., 11° 33'; 388 fms.; bottom temperature, 9·15° C.; 27th August, 1904.

"There is only a fragment of this Muriceid, and I have some hesitation in referring it to the same species as the *Challenger* specimen from the Sarmiento Channel, Patagonia. There can be no doubt that the three genera *Clematissa*, *Muriceides*, and *Paramuricea* are closely allied, and that our knowledge of them is still very unsatisfactory.

"In their method of ramification, in the distribution of the zooids, in the character of the coenenchym and axis, and particularly in having swollen terminal extremities to the branches, they are very much alike, but they differ in the character of the spicules of the coenenchym.

"In *Clematissa* the spicules are spindle-shaped or club-shaped, with many branching tubercles, and but rarely become foliate or flattened to form irregular spiny plates (Stachelplatten).

"In the character of the spicules our specimen approaches the description of the spicules of *Clematissa* more closely than that of the other two genera. On comparing it with specimens in the collection of the British Museum I found that in the thickness of stem and branches, in the arrangement of the zooids, in the colour of the axis and coenenchym, and in other characters it approaches *Clematissa robusta* more closely than any other species of the three genera. The genus *Clematissa* was founded by the authors of the *Challenger* volume on the Alcyonaria for three specimens found in depths of 245-360 fathoms in the South Atlantic Ocean, but a new species, *C. sceptrum*, has recently been described by Studer (1901) from Lat. 38° N., and depth, 1,135 metres, off the Azores. The genus is therefore not confined in its distribution to the S. Atlantic waters. The Irish specimen is 100 mm. long, and has three branches. The axis is 2·5 mm. in diameter at a distance of 50 mm. from the end. The axis, with its investing coenenchym, is at the same region 3 mm. in diameter. The swollen terminal knobs of the branches are about 5 mm.

“in diameter. The zooids are contracted, but none of them withdrawn below the surface of the coenenchym. In the contracted condition they project about 2 mm. above the surface of the coenenchym. They are roughly arranged in a spiral manner round the branches, but several zooids are, as usual, not in the direct line of the spiral course. They stand at a distance of about 3.5 mm. apart. There is a somewhat irregular collar of bent spindles round the base of the tentacles and on the aboral surface of each tentacle a few spindles arranged *en chevron* at the base, but distally forming an irregular tuft. The spicules of the coenenchym are very irregularly arranged, and project as small tubercles from the surface, giving the coenenchym a rough appearance like sand paper on examination with a magnifying glass. As is the case with many genera of this family, the spicules are so very varied in shape and size that it is difficult to express their general characters in words and figures. I can recognise, however, three kinds which are relatively common, and numerous intermediate forms which are not so common. The common kinds are (1) the spindles which, when full grown, are about .5 mm. in length, and .07 mm. in breadth, armed with numerous simple and branched tubercles; (2) the clubs, which may be regarded as spindles in which the diameter and the tubercles at one end have become enlarged. These clubs are usually shorter than the full grown spindles, but may be 0.45 mm. in length. (3) Tripod spicules. These spicules probably arise by dichotomous branching of one end of a young spindle. In some cases the three axes are of about the same length, *i.e.*, 0.15 mm., but in the majority of forms one axis is much shorter than the other two. There are many irregular spicules, some intermediate in character between the three types mentioned, and others that seem to be quite amorphous, but there are no spicules of the form known as foliate clubs (*Blattkeule*) or spiny plates (*Stachelplatten*).”—S. J. HICKSON.

Additional Records :—

S.R. 277.—50 mi. W.N.W. of Eagle Island; Lat., N., $54^{\circ} 17' 30''$; Long., W., $11^{\circ} 34'$; 550 fms.; 15th November, 1905.

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., 8.22° C.; 12th September, 1907.

The specimen taken off Eagle Island is a very young colony growing on a fragment of dead Madreporarian coral. It is only 6 mm. in height, but its spicules agree with those of the larger specimen which was taken in 627-728 fms. This latter specimen is 183 mm. high, and gives off only one branch, which is 67 mm. long.

Acanthogorgia muricata, Verrill.

S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., $8^{\circ} 34'$ C.; 30th August, 1907.

Two small colonies of an *Acanthogorgia* were obtained, which seemed to resemble *A. muricata* fairly closely, although they differed from the description of the type specimens in one or two points, particularly in the length of the projecting part of the long spicules round the top of the polyps. Verrill states that the projecting part of these spicules is usually more than two-thirds the length of the calyx. In the Irish specimens the projecting part of the spicules is much shorter in proportion to the length of the calyx. Professor J. Arthur Thomson very kindly undertook to examine one of these specimens and compare it with specimens of *Acanthogorgia* in his large collection. He sends the following note on it:—"In spite of some difficulties I should refer the *Acanthogorgia* to *A. muricata*. It is almost indistinguishable from some of my specimens so named. I believe *A. muricata* to be a variable species, and I do not at present believe much in the distinctness of *A. armata*, *A. spinosa*, *A. Verrilli* from one another or from *A. muricata*."

Paramuricea atlantica (Johnson).

S.R. 479.—Lat., N., $51^{\circ} 20'$; Long., W., $11^{\circ} 41'$; 468-560 fms.; temperature at 400 fms., $9^{\circ} 55'$ C.; 28th August, 1907.—One broken specimen.

S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., $8^{\circ} 34'$ C.; 30th August, 1907.—One broken specimen.

S.R. 500.—Lat., N., $50^{\circ} 52'$; Long., W., $11^{\circ} 26'$; 625-666 fms.; temperature at 600 fms., $8^{\circ} 22'$ C.; 11th September, 1907.—Two broken specimens.

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., $8^{\circ} 22'$ C.; 12th September, 1907.—Seven specimens and fragments.

S.R. 505.—Lat., N., $50^{\circ} 39'$; Long., W., $11^{\circ} 14'$; 464-627 fms.; 12th September, 1907.—Two small fragments.

Several specimens were taken which seem to belong to this species, as far as can be judged from the short description given of the type specimen, which was found in deep water off Madeira, and described under the name of *Acanthogorgia atlantica* (Johnson, 1862).

These specimens form upright, rather rigid colonies, sometimes more than a foot in height. The branches are usually not very numerous, and the branching takes place in one plane. On both the main stem and the branches the verrucae are numerous and are closely arranged together. This is especially the case in one fragment, 280 mm. long, with a diameter of 7 mm., which evidently belonged to a large colony. Here the verrucae are very closely pressed together, and present the

exact appearance of the type specimen as shown in fig. 2, page 195. One of the most complete of the colonies is 185 mm. in height, and measures 100 mm. across the spread of its branches. The main stem has a diameter of 5 mm. Another colony reaches a height of about 330 mm., and is very irregularly branched. It shows anastomosis of some of the branches, and in this respect differs from all the other colonies.

As regards the spicules, only two are figured by Johnson, and unfortunately no measurements are given.

In the Irish specimens the verrucae are surrounded by large spicules (similar to the one figured by Johnson) with spiny projecting points, and branching tuberculated heads which are embedded in the coenenchyma. These complex spicules, often called "Blattkeule," measure 1.05 to 1.45 mm. in length, by .45 to .55 mm. across the branching heads. Smaller ones are also present, and measure .75 mm. in length by .35 to .4 mm. Curved spiny spindles form an operculum, and similar ones lie in a ring round the top of the verrucae. These reach a length of .7 to .9 mm. by .07 mm.

The coenenchyma is crowded with spicules, the points of which project from its surface. These spicules are of very various shapes, the most prominent being large triradiate spiny spicules, and irregularly branching ones. The former measure .45 to .6 mm. between the tips of the rays, and have a thickness of .08 to .11 mm. The latter measure .45 to .7 mm. by .16 to .3 mm. There are also numerous curved, spiny spindles, .25 to .47 mm. in length by .05 mm. in diameter.

It was unfortunately impossible to compare these Irish specimens with the type, although Johnson (1862) states that the latter is now in the British Museum. Mr. Jeffrey Bell informs me that there is no record in the register of that Institution of the specimen ever having been received. I have also to thank Professor Thomson, who very kindly examined two of the Irish specimens and stated that he considered they should be described under this species.

FAMILY GORGONIIDAE.

Callistephanus Koreni, Wright and Studer.

S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; temperature at 400 fms., 9.55°C. ; 28th August, 1907.—Several broken specimens.

S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., 8.34°C. ; 30th August, 1907.—One specimen.

Several specimens of this pretty red coral were taken. The largest rises from a flattened basal attachment to a height of 82 mm. Its greatest breadth is 111 mm., while the main stem has a diameter of about 2 mm. The colony is somewhat fan-shaped. The branches are given off at nearly right angles

to the main stem, and lie in one plane as described by Wright and Studer (1889) and Thomson and Henderson (1906). Some of the polyp spicules are slightly longer and stouter than those in the type specimen. Several small and slender colonies, more or less broken, were also taken. Two of these rise from their expanded basal attachment to a height of 48 mm. and 31 mm. respectively. In these small specimens the branching is not so clearly in one plane as in the large colony.

This species has been previously recorded twice. Fragments of a specimen were taken by the *Challenger* off the Island of Ascension, at 420 fms., and a portion of a colony by the *Investigator* in the Andaman Sea, at 238-290 fms.

ORDER—PENNATULACEA.

FAMILY PENNATULIDAE.

Pennatula aculeata, Koren and Danielssen.

S.R. 353.—Lat., N., $50^{\circ} 37'$ — $50^{\circ} 40'$; Long., W., $11^{\circ} 32'$; 250-542 fms.; bottom temperature, 8.58° C.; 6th August, 1906.—One broken specimen.

S.R. 405.— $15\frac{1}{4}$ mi. W. by $S.\frac{1}{4}$ S. of Tearaght Rock; Lat., N., $51^{\circ} 56'$; Long., W., $11^{\circ} 0'$; 84 fms.; bottom temperature, 9.79° C.; 8th February, 1907.—One specimen.

S.R. 491.—Lat., N., $51^{\circ} 57' 30''$; Long., W., $12^{\circ} 13'$; 491-520 fms.; bottom temperature, 8.53° C.; 7th September, 1907.—One specimen.

S.R. 493.—Lat., N., $51^{\circ} 58'$; Long., W., $12^{\circ} 25'$; 533-570 fms.; 8th September, 1907.—Three specimens.

S.R. 494.—Lat., N., $51^{\circ} 59'$; Long., W., $12^{\circ} 32'$; 550-570 fms.; 8th September, 1907.—Eleven specimens.

This is the first time that *Pennatula aculeata* has been recorded within the Irish area. The specimens vary in length from 28 mm. to 215 mm. All the longest and finest specimens were dredged in 550-570 fms.

Pennatula aculeata has been found in many parts of the North Atlantic, off both its eastern and western shores.

Pennatula bellissima, Fowler.

S.R. 493.—Lat., N., $51^{\circ} 58'$; Long., W., $12^{\circ} 25'$; 533-570 fms.; 8th September, 1907.

A small specimen belonging to this species was obtained, which measures 115 mm. in length.

The species was described (Fowler, 1888) from one specimen taken off the Bahama Islands. In the Irish specimen,

which is a much younger colony than the type, the siphonozoids are not so numerous or so crowded together, but their characteristic arrangement can be clearly seen. The pinnules, of which there are 15 pairs, are set very obliquely on the rachis, and bear 1-2 rows (in a few places 3 rows) of autozoids. There are about 15 developed autozoids on the longest pinnules, which at their bases have a width of 6 mm.

The spicules of both specimens agree in every particular. There are no spicules in the tentacles, a fact not mentioned in the original description, but which I was able to ascertain through the kindness of Mr. Jeffrey Bell in allowing me to examine the type specimen in the British Museum.

In the arrangement of the siphonozoids and autozoids, the manner in which the pinnules are set on the rachis, the characters of the spicules and their absence from the tentacles, these specimens of *Pennatula bellissima* recall *Pennatula grandis*, Ehrenberg.

FAMILY VIRGULARIIDAE.

Virgularia mirabilis (O. F. Müller).

S. 48.— $1\frac{1}{2}$ miles off, Clogher to Dunany, Co. Louth, 9-10 fms., 14th February, 1902.

— $2\frac{1}{2}$ miles off Drogheda Bar, 8 fms., 12th November, 1902.

“Small broken specimens only were obtained of this species.”—S. J. HICKSON.

Additional Records :—

Galway Bay.

S. 553.—10 miles E. of Bailey Lighthouse, Co. Dublin, 41-52 fms.; bottom temperature, $7^{\circ}8'$ C.; 16th August, 1907.

Virgularia mirabilis has been taken several times previously off the N.E. and S.W. coasts of Ireland. The records of its occurrence are not numerous, but this may be due not so much to the scarcity of the species as to the difficulties of its capture.

FAMILY PROTOPTILIDAE.

Protoptilum Thomsoni, Kolliker (?)

“Some pieces of a Sea-pen, too fragmentary to identify with certainty, appear to belong to this species. They were dredged at S.R. 132, 50 miles W.N.W. of Tearaght; Lat., N., $52^{\circ} 3' 30''$; Long., W., $12^{\circ} 0'$; depth, 396 $\frac{1}{2}$ fms.; 7th August, 1904.”—S. J. HICKSON.

FAMILY FUNICULINIDAE.

Funiculina quadrangularis (Pall.).

Three young specimens of this species were obtained, one at S.R. 334.—Lat., N., $51^{\circ} 35' 30''$; Long., W., $12^{\circ} 26'$; 500-520 fms.; bottom temperature, 9.2° C.; 10th May, 1906; and two broken specimens at S.R. 335.—Lat., N., $51^{\circ} 12' 30''$ — $51^{\circ} 17' 30''$; Long., W., $12^{\circ} 18'$ — $12^{\circ} 15'$; 893-673 fms.; 12th May, 1906. The unbroken specimen measures 437 mm. in length. The largest autozooids reach a length of 3-4 mm. and are well supplied with spicules. Spicules are also present in the tentacles. This abundant spiculation is characteristic of young specimens of *F. quadrangularis*. Grieg (1896) and Jungersen (1904) point out that the presence of spicules in this species is very variable, but that the number of spicules is smaller the larger the specimen. In fully developed colonies the tentacles are usually free from spicules. The same writers have shown that the *Leptoptilum gracilis* of Kölliker (1880) is merely a young stage of *F. quadrangularis*.

The Irish specimens, although reaching a considerable length, still differ very much in appearance from the adult.

Funiculina quadrangularis has been recorded from many places both on the eastern and western sides of the North Atlantic, from the Mediterranean, off New Zealand (as *Leptoptilum gracilis*) and in the Bay of Bengal (Thomson and Henderson, 1906).

FAMILY ANTHOPTILIDAE.

Benthoptilum sertum, Verrill.

Pl. I.

S.R. 363.—Lat., N., $51^{\circ} 22'$; Long., W., $12^{\circ} 0'$; 695-720 fms.; temperature at 600 fms., 7.92° C.; 10th August, 1906.

A single specimen of a beautiful Pennatulid was obtained which seems to be identical with that figured by Verrill (1883) and described by him two years later in the American Journal of Science under the name of *Benthoptilum sertum*.

The genus *Benthoptilum* closely resembles *Anthoptilum* in many points, but differs from it in having the autozooids arranged in large, oblique clusters on the rachis, and not in single rows as in the latter genus. These clusters consist of numerous rows of autozooids, which meet on the ventral (called "dorsal" in the original description) side of the rachis, completely hiding its surface. There are six pairs of these groups of autozooids in the Irish specimen. The autozooids

are free for nearly the whole of their length, and are only united very close to the base. The siphonozooids are numerous on all parts of the rachis except along the median line of the dorsal surface, and at the top of the rachis, which ends in a naked cone-shaped extremity. Small groups of siphonozooids occur between the autozooids, and sometimes encroach on their bases.

The specimen is viviparous.

The calcareous axis is four-sided, with rounded edges. Three of the sides are deeply grooved, while the remaining one, which is ventral in position, has an almost flat surface. At a point slightly below the swelling in the peduncle the three grooved sides each measure 3 mm. across, while the fourth has a breadth of 5 mm.

In the description of the type no mention is made of the occurrence of spicules in the peduncle, but numerous calcareous spicules, similar to those in *Anthoptilum*, are found at the base of the peduncle in the Irish specimen. They are oblong in shape, and are often united in groups of four. They vary in size from .007 mm.-.022 mm. by .005 mm.-.007 mm.

In the arrangement of the autozooids and siphonozooids there is an exact agreement between the Irish and the American specimens. The only difference lies in the measurements of the different parts. The former specimen is of a stouter growth, with shorter autozooids, while the latter has a more slender stem and rachis and much longer autozooids, as will be seen from the following measurements:—

	Irish specimen.	Type specimen.
Total length,	365 mm.	300 mm.
Length of stalk,	90 mm.	93 mm.
Diameter of stalk,	11 mm.	5 mm.
Diameter of rachis,	12 mm.	6 mm.
Length of autozooids, (including tentacles).	30 mm.	58 mm.

In spite of these differences in size it does not seem that there are sufficient grounds for creating a new species for the Irish specimen.

There has been no record of *Benthoptilum sertum* since the three type specimens were dredged by the *Albatross* in the North Atlantic, off the eastern coast of the United States, at depths of 843 to 1,073 fms., but a Pennatulid was taken by the *Travailleur* off the coasts of Spain and Portugal (Marion, 1906) which bears a resemblance to it. The *Travailleur* specimen is unnamed and undescribed, but as far as can be judged from the figure given it resembles the Irish specimen fairly closely, and may be a young specimen of the same species.

I have to thank Professor J. Arthur Thomson for very kindly examining this specimen and giving me his valuable opinion regarding it. To him is due the interesting discovery of the viviparity of the species, concerning which he notices that the free embryos in the coelenteron are remarkably large and clear.

FAMILY KOPHOBELEMNONIDAE.

Kophobelemnion stelliferum, Müller.

S.R. 164.—50 mi. W.N.W.Nly. of Tearaght Light; Lat., N., $52^{\circ} 6'$; Long., W., $12^{\circ} 0\frac{1}{2}'$; 363 fms.; bottom temperature, 9.78°C. ; 3rd November, 1904.

“The single specimen of this species is 80 mm. long and bears 13 autozooids.

“The species has a wide distribution, extending from Davis Straits, West Coast of Greenland, to Iceland and the Norwegian Fjords, and has been found in the Färöe Channel, off the coast of Brittany, in the Mediterranean, and also on the American side of the Atlantic Ocean. Its bathymetrical range is also very great. On the Norwegian coast it extends from 20-400 fms. and in the Atlantic Ocean it extends down to depths of over 2,000 fms.”—S. J. HICKSON.

Additional Records :—

S.R. 494.—Lat., N., $51^{\circ} 59'$; Long., W., $12^{\circ} 32'$; 550-570 fms.; 8th September, 1907.—Two specimens.

S.R. 495.—Lat., N., $50^{\circ} 0'$; Long., W., $13^{\circ} 10'$; 346-400 fms.; 8th September, 1907.—Two specimens.

The longest specimen reaches a length of 105 mm.

FAMILY UMBELLULIDAE.

Umbellula encrinus (Linn.) var. **ambigua**, Marion.

S.R. 212.—50 miles W. $\frac{3}{4}$ N. of Tearaght Light; Lat., N., $51^{\circ} 54'$; Long., W., $11^{\circ} 57'$; trawl ca. 350 fms.; bottom temperature, 9.82°C. ; 6th May, 1905.—One specimen.

S.R. 359.—60 miles W. by N. of Tearaght Light; Lat., N., $52^{\circ} 0'$; Long., W., $12^{\circ} 6'$; 465-492 fms.; bottom temperature, 9.04°C. ; 7th-8th August, 1906.—One specimen.

S.R. 487.—Lat., N., $51^{\circ} 36'$; Long., W., $11^{\circ} 57'$; 540-660 fms.; temperature at 500 fms., 8.65°C. ; 3rd September, 1907.—One specimen.

S.R. 493.—Lat., N., $51^{\circ} 58'$; Long., W., $12^{\circ} 25'$; 533-570 fms.; 8th September, 1907.—One specimen.

S.R. 494.—Lat., N., $51^{\circ} 59'$; Long., W., $12^{\circ} 32'$; 550-570 fms.; 8th September, 1907.—Eleven specimens.

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., 8.22°C. ; 12th September, 1907.—One specimen.

No label attached.—One specimen.

Professor Hickson (1905) mentions that a single specimen of *Umbellula* was obtained off the west coast of Ireland. Since then sixteen specimens have been added to the collection. These have all proved to belong to the same species, and Professor Hickson has come to the conclusion that there can be little doubt that they are identical with the *Umbellula ambigua* of Marion, which was dredged by the *Travailleur* in deep water off the coasts of Spain and Portugal (Marion, 1906). He also considers it clear that there are not sufficient grounds for separating Marion's species from *Umbellula encrinus*, differing as it does only in the possession of a very large number of autozooids in relation to the length of the stem, while the autozooids are much smaller than those of specimens of *U. encrinus* with about the same number of autozooids. He therefore names the Irish specimens *U. encrinus* (Linn.) var. *ambigua*, Marion. Jungersen (1904, p. 79, footnote) refers to *U. ambigua* as being possibly identical with *U. Thomsoni*. This is erroneous.

Marion gives the length of his specimen as 400 mm. and the length of the "polyp cluster" 50 mm. The stem thus measures about 350 mm. The length of the autozooids (including the tentacles) is given as 40 mm. Measuring from Marion's drawing this leaves the bodies of the autozooids about 25 mm. in length, and the tentacles 15 mm. The number of the autozooids is unfortunately not mentioned, but judging from the figure they are quite as numerous as in the Irish specimens with stems of 340 mm. and 350 mm. in length, which have 29 to 43 autozooids. Comparing these Irish specimens and Marion's with specimens of *U. encrinus* obtained by the *Ingolf* expedition (Jungersen, 1904) we find that specimens with 40, 25, 41 autozooids had stems 2,350, 1,090, 1,410 mm. in length respectively, and with specimens obtained by the Norwegian North Atlantic Expedition (Koren and Danielssen, 1884), we find that specimens with 35 and 40 autozooids had stems 1,820 and 2,270 mm. in length respectively. If we compare these specimens again we find that the autozooids of the Irish specimens are very much smaller than those of the specimens of the typical *U. encrinus*, while they agree in length with those of Marion's specimen.

The relative lengths will be more clearly seen in the following table :—

[TABLE.]

IRISH SPECIMENS.																		
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Length of stem in mm.	112	153	155	210	223	260	285	305	325	340	340	350	355	375	415	420	46	
Number of autozooids,	6	7	12	9	11	21	15	25	16	32	43	29	31	24	40	24	39	
Length of body of longest polyp in mm.	8	11	10	13	15	17	15	15	20	33	23	20	30	14	20	23	26	
Length of tentacles in mm.	8	10	12	13	16	15	18	17	20	30	23	10	26	12	23	25	30	

	MARION'S SPECIMEN.		INGOLF SPECIMENS.			NORWEGIAN N. Atlantic Specimens.	
	—	—	No. 2	No. 3	No. 10	No. 12	
Length of stem in mm.,	350	.	215	2350	1410	2270	
Number of autozooids,	?	.	7(+4)	40	41	40	
Length of body of longest polyp in mm.,	25	.	12-13	77	60-63	65-70	
Length of tentacles in mm.,	15	.	10-12	ca. 70	60-62	55	

In several of the younger specimens the bilateral arrangement of the autozooids is very clearly seen, as is also the broad band of siphonozooids which runs to the base of the primary autozoid. This band, according to Jungersen (1904) must be considered as dorsal. On the opposite, or ventral, side of the colony the young autozooids arise. In the series of Irish specimens young autozooids may be seen in various stages of development. In most of the specimens minute rudiments of autozooids, resembling the siphonozooids in appearance, are to be seen. It may be added that the numerous calcareous spicules which are present at the lower end of the peduncle average .008-.014 mm. in length by .005-.008 mm. in breadth, and are similar to those occurring in the typical *U. encrinus*.

As regards the distribution of *U. encrinus*, Jungersen says it "is limited to the Arctic Ocean, and to the deeper part of the Atlantic which has the character of the Arctic Sea by being situated west of the coast-banks of the Scandinavian peninsula and north of the submarine ridges connecting Greenland with Iceland, Iceland with the Färöes, and these latter with the Shetland Islands. . . . I doubt very much whether the species *Umb. encrinus* would be found outside the territory so well bounded geographically where it is really known."

These specimens, here named *U. encrinus*, var. *ambigua*, extend the distribution further south, but in a modified form.

MADREPORARIA.

FAMILY TURBINOLIIDAE.

Flabellum alabastrum, Moseley.

A fine specimen of this coral was dredged, living, at S.R. 497.—Lat., N., $51^{\circ} 2'$; Long., W., $11^{\circ} 36'$; 775-795 fms.; 10th September, 1907.

It is 45 mm. in height, the longer diameter measures 68 mm., the shorter, 30 mm.

Flabellum alabastrum was first taken by the *Challenger* in 1,000 fms. off the Azores (Moseley, 1880). Later on many specimens were obtained by the *Hirondelle* (Jourdan, 1895) off Newfoundland and the Azores. Marenzeller (1904) again records it for the North Atlantic.

Stephanotrochus diadema, Moseley.

S.R. 363.—Lat., N., $51^{\circ} 22'$; Long., W., $12^{\circ} 0'$; 695-720 fms.; temperature at 600 fms., 7.92° C.; 10th August, 1906.

S.R. 477.—Lat., N., $51^{\circ} 15'$; Long., W., $11^{\circ} 47'$; 707-710 fms.; bottom temperature, 7.19° C.; 28th August, 1907.

S.R. 489.—Lat., N., $51^{\circ} 35'$; Long., W., $11^{\circ} 55'$; 720 fms.; 4th September, 1907.

Three living specimens of this beautiful coral were taken. Two are perfect, but the third is broken across. In the Irish specimens the quinary septa are not quite so prominent, nor so regularly developed as in the type. The largest specimen has a diameter of 62 mm.; the two smaller ones measure 50 mm. across.

S. diadema resembles in general shape *S. moseleyanus*, Sclater (Proc. Zool. Soc., 1886), but differs from it in the arrangement of the septa. One specimen of *S. moseleyanus* was taken by the *Triton* between the Färöes and Hebrides, and was the first, and, up to this, the only example of this genus dredged in British seas.

Stephanotrochus diadema was first taken by the *Challenger* off the Azores and off Brazil. It has since been found by the *Hirondelle* at the former locality, and has also been obtained off Guadeloupe.

Caryophyllia clavus, Scacchi.

S.R. 331.—Lat., N., $51^{\circ} 12'$; Long., W., $11^{\circ} 55'$; 610-680 fms.; 9th May, 1906.—Two specimens.

S.R. 363.—Lat., N., $51^{\circ} 22'$; Long., W., $12^{\circ} 0'$; 695-720 fms.; temperature at 600 fms., 7.92°C. ; 10th August, 1906.—Three specimens.

S.R. 477.—Lat., N., $51^{\circ} 15'$; Long., W., $11^{\circ} 47'$; 707-710 fms.; bottom temperature, 7.19°C. ; 28th August, 1907.—One specimen.

S.R. 506.—Lat., N., $50^{\circ} 34'$; Long., W., $11^{\circ} 19'$; 661-672 fms.; temperature at 600 fms., 8.22°C. ; 12th September, 1907.—Two specimens.

S.R. 528.—70 mi. S.W. of Fastnet Light; Lat., N., $50^{\circ} 21' 30''$; Long., W., $10^{\circ} 24'$; 85 fms.; bottom temperature, 10.22°C. ; 8th November, 1907.—One specimen.

This species is represented by several large specimens. It has previously been found at many points off the Irish coast. Its geographical distribution is wide, and it has been recorded off the eastern and western coasts of the North Atlantic, in the South Atlantic, in the Indian Ocean (as *Caryophyllia communis*, Seg.), and off the East Indies.

Desmophyllum crista galli, Milne Edwards and Haime.

S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; 28th August, 1907.—Four specimens.

S.R. 483.—Lat., N., $51^{\circ} 37'$; Long., W., $11^{\circ} 56'$; 610-664 fms.; temperature at 550 fms., 8.34°C. ; 30th August, 1907.—One specimen.

S.R. 487.—Lat., N., $51^{\circ} 36'$; Long., W., $11^{\circ} 57'$; 540-660 fms.; temperature at 500 fms., 8.65°C. ; 3rd September, 1907.—One specimen.

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., 8.22° C.; 12th September, 1907.—Six specimens.

Of this species, now taken for the first time within the Irish area, seven well-preserved specimens of various sizes were obtained. The remaining five specimens are in a very worn condition, some of them having the septa almost entirely rubbed away. The largest fresh specimen reaches a length of 50 mm. The longer diameter of its calyx is 30 mm., and the shorter diameter 25 mm.

The geographical distribution of *Desmophyllum crista galli* is very wide. It has been taken off both the eastern and western shores of the North Atlantic, off Patagonia (as *D. ingens*, Moseley), in the Indian Ocean, and in the Pacific Ocean off the west coast of Panama, off the Hawaiian Islands, and off the East Indies.

FAMILY OCULINIDAE.

Lophohelia prolifera (Pallas).

S.R. 151.—50 mi. W.N.W. of Eagle Island; Lat., $54^{\circ} 17'$; Long., W., $11^{\circ} 33'$; 388 fms.; bottom temperature, 9.15° C.; 27th August, 1904.

S.R. 223.—Lat., N., $53^{\circ} 7'$; Long., W., $14^{\circ} 50'$; 410-500 fms.; 12th May, 1905.

S.R. 327.—60 mi. W. $\frac{3}{4}$ N of Tearaght Light; $51^{\circ} 43' 30''$ — $51^{\circ} 38'$; Long., W., $12^{\circ} 15'$ — $12^{\circ} 18'$; 550-800 fms.; 8th May, 1906.

S.R. 329.—Lat., N., $51^{\circ} 22' 30''$ — $51^{\circ} 20' 30''$; Long., W., $11^{\circ} 31'$ — $11^{\circ} 38'$; 215-415 fms.; bottom temperature, 9.55° C.; 9th May, 1906.

S.R. 353.—Lat., N., $50^{\circ} 37'$ — $50^{\circ} 40'$; Long., W., $11^{\circ} 32'$; 250-542 fms.; bottom temperature, 8.58° C.; 6th August, 1906.

S.R. 479.—Lat., N., $51^{\circ} 20'$; Long., W., $11^{\circ} 41'$; 468-560 fms.; temperature at 400 fms., 9.55° C.; 28th August, 1907.

S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; 28th August, 1907.

S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., 8.22° C.; 12th September, 1907.

Many fragments of this coral, both living and dead, have been obtained at the above localities. This species was first taken off the west and south-west coasts of Ireland by the *Porcupine* expedition of 1869-1870. More recently it was found off the Kerry coast by the Royal Dublin Society's Survey of the west coast of Ireland in 1890-1891.

Lophohelia prolifera has been dredged many times in various parts of the North Atlantic. It also occurs in the South Atlantic and in the Indian Ocean.

***Amphihelia oculata* (Linn.).**

- S.R. 151.—50 mi. W.N.W. of Eagle Island; Lat., N., $54^{\circ} 17'$; Long., W., $11^{\circ} 33'$; 388 fms.; bottom temperature, $9^{\circ} 15' \text{C.}$; 27th August, 1904.
- S.R. 359.—Lat., N., $52^{\circ} 0'$; Long., W., $12^{\circ} 6'$; 465-492 fms.; bottom temperature, $9^{\circ} 04' \text{C.}$; 8th August, 1906.
- S.R. 479.—Lat., N., $51^{\circ} 20'$; Long., W., $11^{\circ} 41'$; 468-560 fms.; temperature at 400 fms., $9^{\circ} 55' \text{C.}$; 28th August, 1907.
- S.R. 480.—Lat., N., $51^{\circ} 23'$; Long., W., $11^{\circ} 38'$; 468 fms.; 28th August, 1907.
- S.R. 504.—Lat., N., $50^{\circ} 42'$; Long., W., $11^{\circ} 18'$; 627-728 fms.; temperature at 600 fms., $8^{\circ} 22' \text{C.}$; 12th September, 1907.

This species is represented by many fragments of colonies; both living and dead. It is the first time that *Amphihelia oculata* has been dredged within the Irish area, but the species has frequently been found in the North Atlantic, and also in the Indian Ocean and off the East Indies.

LIST OF REFERENCES.

- Fowler, G. H., 1888.—“On a new *Pennatulula* from the Bahamas.”—Proc. Zool. Soc.
- Gray, J. E., 1870.—“Catalogue of the Lithophytes or Stony Corals in the Collection of the British Museum.”
- Grieg, J. A., 1896.—“On *Funiculina* and *Kophobelemnon*.”—Bergens Mus., Aarbog.
- Hickson, S. J., 1899.—“On the Embryology of *Alcyonium*.”—Br. Assoc. Report for 1898.
- Hickson, S. J., 1905.—“Remarkable Coelenterata from the West Coast of Ireland”—Nature, Vol. LXXIII, and Fisheries, Ireland, Sci. Invest., 1905, V. [1906].
- Hickson, S. J., 1907.—“Alcyonaria, Antipatharia and Madreporaria collected by the *Huxley* in the Bay of Biscay.”—Journ. Marine Biol. Assoc., N. S. VIII.
- Hill, M. D., 1905.—“Notes on the Maturation of the Ovum of *Alcyonium digitatum*.”—Quart. Journ. Micr. Sci., N.S. 49.
- Johnson, J. Y., 1862.—“Descriptions of some New Corals from Madeira.”—Proc. Zool. Soc.
- Jourdan, E. 1895.—“Zoanthaires provenant des Campagnes de l'*Hirondelle*.”—Résultats des Campagnes scientifiques du Prince de Monaco.
- Jungersen, H., 1904.—“Pennatulida of the Danish *Ingolf* Expedition.”

- Kent, Saville, 1870.**—"On two new genera of Alcyonoid Corals taken in the recent expedition of the yacht *Norna* off the west coast of Spain and Portugal."—*Quart. Journ. Micr. Sci.* X.
- Kölliker, A., 1880.**—"Pennatulida of the *Challenger* Expedition."
- Koren and Danielssen, 1883.**—"Nye Alcyonider, Gorgonider, og Pennatulider tilhørende Norges Fauna."
- Koren and Danielssen, 1884.**—"The Norwegian N. Atlantic Expedition. "Pennatulida."
- Kükenthal, W., 1907.**—"Versuch einer Revision der Alcyonarien, II., Die Familie der Nephthyiden."—3 Teil. *Zool. Jahrb.* XXIV.
- Marenzeller, E., 1904.**—"Steinkorallen," *Valdivia Expedition*.
- Marion, A. F., 1906.**—"Etude des Coelentérés atlantiques recueillis par le *Travailleur*, 1880-1881."
- Moseley, H. N., 1880.**—"Report on certain Hydroid, Alcyonarian, and Madreporarian Corals of the *Challenger* Expedition."
- Roule, L., 1896.**—"Résultats scientifiques de la Campagne du *Caudan* dans le golfe de Gascogne."—*Ann. de l'Université de Lyon*, XXVI.
- Studer, T., 1901.**—"Alcyonaires provenant des Campagnes de l'*Hirondelle*."—Résultats des Campagnes scientifiques du Prince de Monaco.
- Thomson, J. A., and W. D. Henderson, 1906.**—"Alcyonarians collected by the *Investigator* in the Indian Ocean, Part I."
- Verrill, A. E., 1869.**—"Remarks on Halcyonoid Polyps."—No. 3, *Amer. Journ. Sci.* (2), Vol. XLII.
- Verrill, A. E., 1883.**—"On *Benthoptilum sertum*."—Annual Report of the Comm. of Fish and Fisheries; and *Amer. Journ. Sci.* (3), XXIX, 1885.
- Versluys, J., 1906.**—"Die Gorgoniden der Siboga Expedition, ii., Die Primnoidae."
- Wright, E. P., 1869.**—"On a new genus of Gorgonidae from Portugal."—*Ann. Mag. Nat. Hist.* (4), Vol. iii.
- Wright, E. P., and T. Studer, 1889.**—"Alcyonaria of the *Challenger* Expedition."

EXPLANATION OF PLATE I.

Benthoptilum sertum, Verrill.

Dorsal aspect, × $\frac{5}{8}$.

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