

ON THE SPONGIDA.*

Before entering on the description of the sponges collected on and near Rockall during the Expedition, it is my pleasant duty to thank the Royal Irish Academy for having placed this interesting collection in my hands for examination.

As all the specimens were preserved in methylated spirits, which macerates, and to a great extent destroys the soft parts of sponges, only their skeleton and external shape could be studied. It has therefore been impossible for me to give more than merely systematic descriptions of them.

The collection comprises *seven* species, three of which appear to be new to science, whilst the other four have already been described. These four have been obtained near the coasts of Great Britain, and the islands adjacent in the north. For this reason, and also because the new species are allied to British sponges, the Rockall sponge-fauna may be considered as very similar to the British. Too little is known of the sponge-fauna of Iceland, Greenland, and the northern part of the Atlantic coast of the United States to enable one to trace any particular affinity between the Rockall sponges and the sponges of those coasts.

Of the seven Rockall sponge species, two are Tetractinellida, and five Monaxonida. The family Pachastrellidæ is represented by the new species *Pachastrella stylifera*; the family Tetillidæ by the well known *Craniella cranium*, O. F. Müller; the family Axinellidæ by the new species *Thrinacophora microdragma*, *Phakellia ventilabrum*, Johnston, and *Phakellia robusta*, Bowerbank; the family Heterorrhaphidæ by the new species *Gellius styliferus*; and the family Desmacidonidæ by *Esperella lingua*, Bowerbank.

Pachastrella stylifera, n. sp.

There are several more or less fragmentary specimens of a sponge in the collection which is most closely allied to *Normania crassa*, Bowerbank (Mon. Brit. Spong., vol. iii., p. 258, pl. 81) = *Pocillastra compressa*, Sollas ("Challenger," Tetractinellida," p. 98), but distinguished from this and other species of *Pocillastra* (*sensu*, Sollas), by the presence of large styles. Assuming that the Styles are really absent in *Pocillastra compressa* (they could scarcely have escaped Bowerbank and Sollas if they were present in that species), I establish for these Rockall sponges a new species with the specific name *stylifera*, in which their distinguishing peculiarity is expressed. Since I have united *Pocillastra*, Sollas, with *Pachastrella*, O. Schmidt ("Tetractinelliden der Adria," pp. 86, 91, 95), this new sponge receives the name *Pachastrella stylifera*.

One of the specimens is a fragment of a plate only 7 mm. thick, with a free sharp margin; the others are lamellæ 15 mm. thick. One side of the plate is covered by oscules which are very regularly scattered, uniformly about 6 mm. apart, and 1.5 mm. wide in the thick specimen, but decreasing in size and increasing in number towards the free margin in the thin specimen. On the opposite side no larger openings are to be seen. Oscular tubes, equal in width to the oscules, traverse the plate transversely, and extending beyond the middle of it

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in some cases nearly reaching the opposite side. There is no cortex, and the whole sponge is traversed throughout by fairly wide canals.

The skeleton consists of large smooth amphioxes, styles, triaenes, small spined amphioxes, chelotropes, short-spined spirasters and long-spined spirasters. The three first-named forms of spicules can be considered as megascleres, and the four last-named as microscleres. The large smooth amphioxes and the styles are radiately arranged, and extend, partly isolated, partly united, in loose bundles, from the base of attachment through the middle of the plate towards the free margin, giving off branches to the two faces which curve outwards in a plumose fashion, and abut nearly vertically on the surface. The large smooth amphioxes greatly exceed the styles in number. The triaenes, which are rather scarce, are confined, as is usual, to the surface where they extend their lateral branches tangentially, while the shaft lies radially and points inwards. The four kinds of spicules which I consider as microscleres are very numerous, and scattered in dense masses throughout the sponge. On the surface a slight accumulation of the short-spined spirasters is met with.

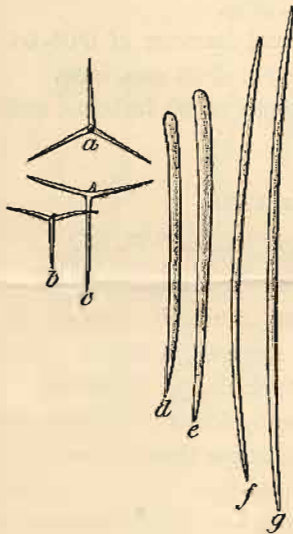


FIG. 1.—Megascleres of *Pachastrella stylifera*.
× 30.

- a, Orthotriaene, seen from above.
b, c, " " the side.
d, e, Styles.
f, g, Amphioxes.

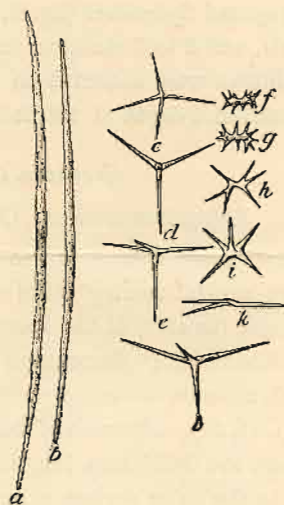


FIG. 2.—Microscleres of *Pachastrella stylifera*. × 300.

- a, b, . Thorny Amphioxes.
c, d, e, i, Chelotropes. [rours rays.
f, g, . Small, stout Spirasters, with nume-
h, i, k, . Large, slender Spirasters (few rays).

The large, smooth Amphioxes (fig. 1, f, g) are 2–2.3 mm. long, and in the middle 0.03–0.045 mm. thick, slightly curved and gradually attenuated towards the two equal and not very sharply-pointed ends.

The Styles (fig. 1, d, e), are 1.3–1.5 mm. long, at the rounded end 0.05–0.07 mm. thick, slightly curved and tapering gradually to the other sharply-pointed end.

The *Triaenes* (fig. 1, *a, b, c*) are *Orthotriaenes*, with nearly straight or slightly-curved lateral rays. The angle between these and the shaft is about 110° . The shaft is straight, conical, and sharply-pointed. The lateral rays are 0.2-0.3; the shaft is 0.23-0.4 mm. long; rays and shaft are about 0.02 mm. thick at the base. The axial threads are in most triaenes remarkably stout.

The small, spined *Amphioxes* (fig. 2, *a, b*) are 0.18-0.22 mm. long, and in the middle 0.0035-0.004 mm. thick, slightly curved and gradually attenuated towards the two equal and not very sharply-pointed ends. The surface of the spicule is covered with very small and distant spines.

The *Chelotropes* (fig. 2, *c, d, e, l*) are partly regular, similar to the lines connecting the centre of a Tetraeder with its corners (fig. 2, *c, l*), partly more triaen-like, showing a distinction between a shaft and lateral rays (fig. 2, *d, e*). The rays are 0.023-0.033 mm. long, at the base 0.001-0.003 mm. thick, straight, conical, and sharp-pointed.

The short-spined *Spirasters* (fig. 2, *f, g*) are 0.015-0.02 mm. long, and have fairly numerous, usually 12 to 15, stout conical spines, 0.005 mm. long.

The long-spined *Spirasters* (fig. 2, *h, i, k*) have a maximal diameter of 0.03-0.04 mm., a very short axis, and 3 to 6 straight, conical, slender spines, 0.01-0.02 mm. long.

The specimens were collected on Rockall Bank in a depth of 60 fathoms, and 16 miles south of Rockall in a depth of 120 fathoms.

Craniella cranium, O. F. Müller, 1789.

Alcyonium cranium, O. F. Müller, "Zoologia Danica," Pl. 85.

Of this well-known sponge, which has already been found in many North Atlantic localities, there are several semispherical specimens, the largest of which measures 22 mm. in diameter. Some (or all?) of the specimens grew on other sponges; a case of Symbiosis also recorded by Bowerbank ("Monograph of British Sponges," vol. iii., pl. 14, p. 85).

The spicule measurements are in harmony with those given by Sollas ("Challenger" Tetractinellida," pp. 51, 52), only some of the sigmes are somewhat larger than the largest mentioned by him. These are 0.015 mm. long and about 0.0005 mm. thick.

Attached to the outer surface of one of the specimens are a few spherical *gemmules* covered with a dense fur composed of short, radially arranged protriaens protruding a considerable distance beyond the surface.

The specimens were collected on Rockall Bank, in a depth of 60 fathoms.

Thrinacophora microdragma, n. sp.

There are numerous fine specimens of a sponge in the collection which obviously belong to Ridley's genus *Thrinacophora*, but which is clearly distinguished from the other species of this genus by its external shape and the smallness of its spicules and dragmes. To this peculiarity the specific name refers.

All the specimens have a short peduncle, with circular transverse section, which in the largest attains a diameter of 11 mm. From the upper end of this peduncle, which is not at

all, or only slightly, longer than thick, a frondose lamella arises, which forms a cup or a fan, or a shape intermediate between these. The free upper margin of the frondose lamella is more or less deeply incised and divided into lobose parts. Some of the incisions may reach down to the base of attachment on the peduncle. The largest of the specimens is fanshaped, the fan being 140 mm. high, 160 mm. broad, and at the base 4–5 mm. thick; towards the margin it gradually thins out to a thickness of only 2–3 mm. The marginal parts of the smaller specimens have the same thickness, but their basal parts are thinner, the degree of thinning out being the same in all specimens. The surfaces of the peduncle and lamellæ are smooth, but pierced by numerous circular, regularly distributed holes, which are at the base about 1–2 mm. apart, and 0.4–0.5 mm. wide. Towards the margin they are a little smaller and closer together. There is no difference in the structure of the two faces of the lamella. In some of the specimens a network of deep and narrow furrows is observed on the surface. I imagine that these furrows have been produced by the contracting action of the spirit in which the specimens are preserved.

The skeleton consists of amphioxes, styles, and orthodragmes. The amphioxes and

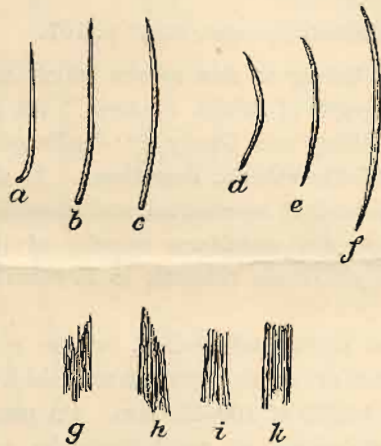


FIG. 3.—Spicules of *Thrinacophora microdragma*.

a, b, c, . . . Styles. × 30.
d, e, f, . . . Amphioxes. × 30.
g, h, i, k, . . . Orthodragmes. × 300.

The *Amphioxes* (fig. 3, d, e, f) are sharp-pointed and strongly curved, some nearly angularly bent in the middle (fig. 3, d), 0.25–0.5 mm. long, and 0.01–0.015 mm. thick.

The *Styles* (fig. 3, a, b, c) are conical, the blunt end being their thickest part, and sharp-pointed at one end. Sometimes the rounded end appears slightly inflated, so that the spicule assumes a subtylostyle shape. The styles are slightly or strongly curved, the curvature being always greatest near the blunt end (fig. 3 a). They measure 0.3–0.6 mm. in length, and are 0.012–0.016 mm. thick.

styles form loose bundles, rising from the peduncle and extending through the middle of the lamellæ radially towards their margin. These bundles give off slender branches, curved in a plumose fashion, so as to abut vertically on the faces of the fronds. The branches are connected by numerous transversely situated spicules in such a manner that a sort of a network, with quadratic meshes, which have about the same width as the length of the spicules, is formed. However, this network is by no means regular, nor always clearly defined; often the spicules appear scattered pretty irregularly. Tufts of spicules, similar to those forming the inner skeleton, are met with on the surface in regular arrangement, each of the branches of spicule bundles being crowned by such a tuft. The orthodragmes are scattered throughout the sponge, but more numerous on the surface than in the interior; they are often arranged in clusters.

The *Orthodragmes* (fig. 3, *g, h, i, k*) are flattened, in band-shaped bundles of slender knitting-needle-like spicules. These bundles measure 0.015–0.02 mm. in length and 0.005–0.006 mm. in width.

Besides these spicules I have found *one* style with a bifurcated end. This is particularly interesting if we take into consideration that another species of this genus, *T. funiformis*, possesses spicules terminally divided into several branchlets or spines. The spicule observed by me is a diaen, with lateral blunt rays. It might be considered as an atavistic abnormality.

Besides this, I have observed a few sigmes. These may be foreign; but, if they should be proper to the sponge, I would expect that similar sigmes would also be found in the other species; for they may, on account of their scarcity, have been overlooked, or considered as foreign, and not mentioned.

In one case I saw the knitting-needle-like elements of the dragmes arranged radially, so as to form an euaster.

All the specimens were collected 16 miles south of Rockall Bank, in a depth of 120 fathoms.

Phakellia ventilabrum, Johnston, 1842.

Halichondria ventilabrum, Johnston, "History of British Sponges, etc.," p. 107.

About half of all the specimens of sponges collected belong to this species which has already been carefully described by Bowerbank ("Monograph of British Sponges," vol. i., p. 186; vol. ii., p. 122; vol. iii., pl. xxii., p. 57). Ridley and Dendy ("Challenger," Monaxonida," p. 170) have united this species with *Phakellia robusta*, Bowerbank. In the Rockall collection, not only *P. ventilabrum*, but also *P. robusta* is represented, and according to this material the two species are certainly distinct; the vermiform spicules of the specimens referable to *P. ventilabrum* being amphistrongyles, those referable to *P. robusta*, amphioxes.

The Rockall specimens of *Phakellia ventilabrum* are short, pedunculate, fan- or cup-shaped, frondose, with deep marginal incisions. The fronds are on an average 3 mm. thick—thinner at the margin, thicker at the base—and attain a height of 100–150 mm. On many of them a *Polythoa* lives symbiotically. The spicules are vermiform amphistrongyles and styles. The vermiform amphistrongyles are more or less irregularly bent, some so much so as to form more than a semicircle. The chord connecting their truncated ends is 0.5–0.85 mm. long, and the spicules are 0.016–0.018 mm. thick. The styles are conical, slightly curved near the blunt end, 0.4–0.6 mm. long, and 0.01–0.014 mm. thick. There are *no* amphioxes.

The specimens have been dredged on Rockall Bank in a depth of 60 fathoms, and 16 miles south of Rockall in a depth of 120 fathoms.

Phakellia robusta, Bowerbank, 1866.

"Monograph of British Sponges," vol. ii., p. 120.

There are only a few fragmentary specimens of this species in the collection. They are frondose, 7 mm. thick, and attain a height of 80 mm. The sponge lamella is folded along

lines radiating from the base of attachment. The margin is rounded, and divided by small incisions into lobose parts. Some of these show indications of growing out into cylindrical digitate processes. This sponge is very much harder than *P. ventilabrum*, but like the latter partly overgrown at the base with *Polythoa*.

The spicules are vermiform amphioxes and styles. The *vermiform amphioxes* are irregularly, but not nearly so strongly, bent as the vermiform amphistrongyles of *P. ventilabrum*. They are 1-1.2 mm. long, in the middle 0.02-0.03 mm. thick, and very sharply pointed. The styles are only slightly curved, 1.4-1.6 mm. long, and 0.02-0.025 mm. thick. There are no amphistrongyles.

All the specimens have been collected on Rockall Bank in a depth of 60 fathoms.

Gellius styliferus, n. sp.

Hitherto only sponges with exclusively diactinal megascleres have been placed in the genus *Gellius* (Ridley and Dendy, "Challenger" Monaxonida," p. 37; "Lmdenfeld, Das System der Spongien," p. 408). If I here describe a sponge with both diactinal and monoactinal spicules as a species of *Gellius*, I do so because (1) it agrees in every other respect with the species formerly described as *Gellius*, chiefly with *G. calyx*, Ridley and Dendy; (2) because the monoactinal spicules, the styles, which it possesses are very scarce; and (3) because there is only a single, small, fragmentary specimen of it at my disposal, and I hardly like to establish a new genus on so insufficient a foundation. In future, when more is known about this and allied species, it will probably become necessary to establish a new genus for their reception.

The specimen of this species in the Rockall collection is a fragment of a probably erect, cylindrical sponge 25 mm. in diameter. The surface is smooth. The interior is rendered very lacunose by the presence of numerous wide longitudinal canals in the axis of the sponge.

The skeleton consists of styles, amphioxes, amphistrongyles, and sigmes. The amphioxes and sigmes are very numerous, the amphistrongyles and styles very scarce. Loose fibres composed chiefly of the amphioxes, with a few styles and amphistrongyles interspersed, extend longitudinally through the sponge. These "main fibres" give off very indistinct branches composed of loose spicules, the interstices between which are filled up by other loose, mostly longitudinally disposed spicules. On the surface a network of tangential spicules, single or forming small bundles of two to four, are met with. This dermal skeleton consists entirely of amphioxes. The sigmes are scattered throughout the sponge, apparently in the canal walls; they are most numerous on the outer surface.



FIG. 4.—Spicules of *Gellius styliferus*.
a, b, c, Styles $\times 30$.
d, e, f, Amphistrongyles $\times 30$.
g, h, i, Stout Amphioxes $\times 30$.
k, Slender Amphiox $\times 30$.
l, m, n, Sigmes $\times 300$.

The *Styles* (fig. 4, *a, b, c.*) are curved, the more so the longer they are. They are simply rounded off at one end and not very sharply pointed at the other, 0.8–2.5 mm. long, and in their upper cylindrical part near the blunt end 0.02–0.024 mm. thick.

The *Amphistrongyles* (fig. 4, *d, e, f.*) are straight or slightly curved, simply rounded off at each end, of perfectly uniform thickness throughout, 0.25–0.8 mm. long, and 0.013–0.02 mm. thick, the shorter ones often being thicker than the longest.

The *amphioxes* are of two kinds:—*Stout amphioxes* (fig. 4, *g, h, i.*) forming the bulk of the skeleton, and *slender amphioxes* (fig. 4, *k.*) scattered in between the former. It is possible that the slender amphioxes may be young stages of the stout ones. I here describe them as distinct, because no intermediate forms, which would support that view, have been met with.

The *Stout Amphioxes* (fig. 4, *g, h, i.*) are slightly curved, sharp pointed, 0.4–0.47 mm. long, and in the middle 0.014–0.017 mm. thick.

The *Slender Amphioxes* (fig. 4, *k.*) are slightly curved, sharp pointed, about 0.36 mm. long, and 0.008 mm. thick.

The *Sigmes* (fig. 4, *l, m, n.*) are slender, spirally twisted, double hooks, 0.02–0.25 mm. long.

This sponge was dredged on Rockall Bank in a depth of 60 fathoms.

Esperella lingua, Bowerbank, 1866.

Hymeniacidon lingua, Bowerbank, "Monograph of British Sponges," p. 187.

Although the Rockall specimens of this sponge possess orthodragmes, which were not described by Bowerbank as occurring in his *Hymeniacidon lingua*, I place them in this species (1) because they agree in all other respects with the description of that species given by Bowerbank ("Monograph of British Sponges," vol. i., pl. 6, figs. 144–147; pl. 18, fig. 297; vol. ii., p. 187; vol. iii., pp. 119, 287, pl. 47, fig. 8; pl. 77, figs. 1–6); and (2) because it is known (Ridley and Dendy, "'Challenger' Monaxonida," p. 66) that Bowerbank has, in another similar case, omitted to mention the dragmes.

Among the Rockall sponges there are specimens of this species from depths of 60 and of 120 fathoms. The former are fragments of a sponge possessing, apparently, lobose, cylindrical branches 10–15 mm. thick. The latter are much larger, lobose, massive, erect, and attain a height of 240 mm., and a maximum horizontal diameter of 80 mm.

The spiculation of the Rockall specimens is the following (the dimensions given are averages):—*Large style*, 0.7 × 0.014 mm.; *slender style*, 0.37 × 0.003 mm.; *large anisochel* (mostly in rosettes), 0.09 mm. long; *small anisochel* (scattered), 0.04 mm. long; *sigme*, 0.08 mm. long; *orthodragme*, 0.07 × 0.027 mm.

The specimens were obtained on Rockall Bank in a depth of 60 fathoms, and 16 miles south of Rockall in a depth of 120 fathoms.