XII.—*Sponges from the Atlantic Coast of Canada.*

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(Presented by J. F. Whiteaves and read May 20, 1896).

The following paper is an attempt to make as complete a catalogue as possible of the marine sponges of the Atlantic coast of Canada and of the River and Gulf of St. Lawrence, with descriptions of such as appear to be new.

With few exceptions, the specimens referred to were collected either by Sir William Dawson or Mr. J. F. Whiteaves.

The sponges collected by Sir William Dawson were obtained at various dates since the year 1845. Between the years 1845 and 1855 he collected specimens off Sable Island and the coast of Nova Scotia, and between the years 1855 and 1889, in the River and Gulf of St. Lawrence, from Murray Bay to Gaspé Bay. The greater part of his collection, however, was obtained between the years 1860 and 1880, when he dredged at depths varying from 15 to 20 fathoms.

Mr. Whiteaves spent the summers of 1867 and 1869 in dredging in Gaspé Bay and its immediate vicinity in depths of from about 10 to 50 fathoms. With facilities afforded by the Dominion Government, he was, in 1871, 1872 and 1873, enabled to dredge in the greatest depths to be found in the Gulf, between Anticosti and the Bird Rocks and between Anticosti and the Gaspé peninsula; he obtained, along with other deep-sea forms of life, many highly interesting sponges. Mr. Whiteaves is the only person who has dredged in the greatest depths of this region, the maximum depth being 313 fathoms. Accounts of the results of his expeditions of the years 1871, 1872 and 1873 were embodied in the official reports for those years, published by the Department of Marine and Fisheries. In the last of these, Mr. Whiteaves gives a list of thirteen species of sponges, and, subsequently, in the American Journal of Science and Arts, vol. vii., March, 1874, a detailed description of a tetractinellid sponge,[1] obtained, between Anticosti and the Gaspé peninsula, during the summer of 1873.

Supplementary to the list of recent marine sponges referred to in this paper, is a short note on a tetractinellid sponge, *Craniella Logani*, Dawson, from the Leda Clay of Montreal and Ottawa, and a description of some spicules of hexactinellid sponges, also from the Leda Clay at Montreal.

[1] Thenea muricata, Bowerbank (see page 204).

MONAXONIDA.

Halichondria panicea, Johnston.

Halichondria panicea, Johnston. 1842. British Sponges, p. 114, pl. x. and pl. xi. fig. 5.
" " Bowerbank. 1866. Mon. Brit. Spong., vol. ii., p. 229; vol. iii., p. 97, pl. xxxix. and p. 99, pl. xl.
" " Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9.
" " Verrill. 1874. Am. Jour. Sci. and Arts, vol. vii., p. 505.
Amorphina panicea, Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 421.

Many specimens of this sponge have been collected at various localities in the Gulf of St. Lawrence; in outward form, they agree well with the specimens figured by Johnston and Bowerbank.

The maximum length of the spicules varies, in different individuals, from 0·369 to 0·452 mm.; the greatest thickness is 0·013 mm.

Localities.—Gaspé coast, Rivière du Loup, Murray Bay, thirty-four specimens, dry, Sir William Dawson; between Pictou Island and Cape Bear, in from 46 to 48 fathoms, thirteen specimens, in alcohol, J. F. Whiteaves; Prince Edward Island, one specimen, dry, Prof. John Macoun; Indian Cove, between Grand Grève and Ship Head, W. B. Lambe, 1893.

Distribution.—River and Gulf of St. Lawrence; coast of New England (Verrill); Vancouver Island (G. M. Dawson, Rev. Geo. W. Taylor); Queen Charlotte Islands and Behring Sea (G. M. Dawson).

Foreign distribution.—Coast of Great Britain (Johnston, Bowerbank); Basse Rocks, off south-east coast of Ceylon (Carter); Kerguelen Island (Carter, Challenger); Torres Strait (Ridley "Alert"); Japan (Challenger); coast of Norway, Nova Zembla, Greenland (Fristedt).

Eumastia sitiens, O. Schmidt.

(Plate I., fig. 1.)

Eumastia sitiens, O. Schmidt. 1870. Grundz. einer Spong.—Fauna des Atl. Geb. p. 42, pl. 5, fig. 12.
" Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 426, pl. 24, fig. 13 and pl. 27, fig. 11.

The original type of this species is from Greenland, as are also several specimens that Fristedt mentions in his work (vide supra). In Canada the species occurs abundantly in all parts of the Gulf of St. Lawrence.

The largest specimen in the collection is about 75 mm. long, 55 mm. broad and 50 mm. high, including the fistulæ, which have an average length of 20 mm. The smallest perfect specimen is only 7 mm. broad and bears on its upper surface six fistulæ, each about 5 mm. long. Every size between these two is represented in the collection, and all have the long, usually branched, delicate fistular processes. One other specimen of considerable size completely envelopes the carapace of a crab (apparently of the genus *Hyas*).

In some of the specimens the oxea have a maximum size of 0·698 by 0·013 mm.; in one a size of 0·876 by 0·017 mm. is reached.

Localities.—Murray Bay, seven specimens, dry, and one in alcohol; Rivière du Loup, Metis, Gaspé, thirteen specimens, dry, Sir William Dawson; between Pictou Island and Cape Bear, in from 46 to 48 fathoms, twelve specimens and some fragments, in alcohol, J. F Whiteaves; Yarmouth, Nova Scotia, one specimen, in alcohol, Prof. John Macoun.

Distribution.—River and Gulf of St. Lawrence and southern coast of Nova Scotia; Greenland (O. Schmidt, Fristedt).

Foreign distribution.—Pitlekai (lat. 67° 05′ N., long. 187° W.), lat. 65° 10′ N., long. 169° 50′ W.

Reniera rufescens, Lambe.

Reniera rufescens, Lambe. 1892. Sponges from the Pacific coast of Canada and Behring Sea, Trans. Royal Soc. Canada, vol. x., p. 75, pl. iv. fig. 6 and pl. v., figs. 12, 12*a*.

A few small specimens which show the characteristic mode of growth of this species.

The oxea vary in length from 0·189 to 0·124 mm. and in thickness from 0·013 to 0·006 mm.; in form and size they are the same as those of the type specimens from Petropaulowski, Kamtschatka.

Localities.—Gaspé coast, eight specimens, dry, Sir William Dawson; Orphan Bank, off the entrance to the Baie des Chaleurs, one small fragment, in alcohol, J. F. Whiteaves.

Reniera mollis, Lambe.

Reniera mollis, Lambe. 1893. Sponges from the Pacific coast of Canada, Trans. Royal Soc. Canada, vol. xi., p. 26, pl. ii., figs. 3, 3*a*.

There is in the Redpath Museum, McGill College, Montreal, a specimen of this sponge encrusting a large piece of rock. The oscula are very noticeable, being large and prominent. The spicules are of the same size as those of the type specimens from Vancouver Island; length from 0·229 to 0·170 mm.; thickness from 0·006 to 0·009 mm.

Localities.—Coast of Labrador, one specimen, dry, Sir William Dawson; Orphan Bank, off the entrance to the Baie des Chaleurs, two small fragments, in alcohol, J. F. Whiteaves.

Chalina oculata, Pallas.

(Plate I., figs. 2, 2*a*.)

Spongia oculata, Pallas. 1766. Elenchus Zoophytorum, p. 390.
Halichondria oculata, Johnston. 1842. British Sponges, page 94, pl. iii., figs. 1, 2.
Chalina oculata, Bowerbank. 1864. Mon. Brit. Spong., vol. i., p. 208, pl. xiii., fig. 262; vol. ii., p. 361; vol. iii., p. 169, pl. lxvi., figs. 1, 2, 3.

This sponge is common in the Gulf of St. Lawrence and Bay of Fundy and is found for some distance up the River St. Lawrence. In the specimen figured (Plate I., fig. 2), the oxea range in size from 0·144 by 0·009 mm. to 0·098 by 0·0049 mm. (Plate I., fig. 2*a*).

Localities.—Rivière du Loup, Nova Scotia, five specimens, Sir William Dawson; between Ste. Anne des Monts and Cap Chat, one specimen, dry; Nova Scotia, one specimen, dry, property Nat. Hist. Soc. Montreal; Five Islands, Minas Basin, Bay of Fundy, one specimen, dry, C. W. Willimott; Joggins, Nova Scotia, one specimen, dry, T. C. Weston. Mr. Whiteaves mentions that it occurs not infrequently in the Gulf of St. Lawrence.

Foreign distribution.—Between England and Belgium (Pallas); Northumberland coast and Firth of Forth (Johnston); coast of England (Bowerbank).

Gellius arcoferus, Vosmaer.

(Plate I., figs. 3, 3*a*, 3*b*.)

Gellius arcoferus, Vosmaer. 1885. The sponges of the "Willem Barents" expedition, 1880 and 1881, p. 29, pl. iv., figs. 18, 19 and pl. v., figs. 87–90.
" " Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 438, pl. 24, figs. 15–17.

A few examples of this sponge were dredged in the Gulf of St. Lawrence. They are all quite flat, about 18 mm. thick, not exceeding 120 mm. across and of a rich grayish-yellow colour when dry.

The spicules are as already described.—— oxea; length from 0·406 to 0·484 mm., average thickness 0·019 mm. (Plate I., fig. 3). Sigmata; length from 0·013 to 0·019 mm. (Plate I., fig. 3*a*). Toxa; from 0·065 to 0·176 mm. in length, and varying in thickness from 0·003 to 0·011 mm. (Plate I., fig. 3*b*). A very few styli also occur; they vary in length from 0·327 to 0·432 mm. and have an average thickness of 0·019 mm.

[1] Report on deep-sea dredging operations in the Gulf of St. Lawrence, 1874.

Locality.—Dredge A 1, off Cape Gaspé and Cap des Rosiers, 75 to 80 fathoms, stones, four specimens, dry, J. F. Whiteaves, 1872.

Distribution.—Gulf of St. Lawrence; Greenland, lat. 59° 33′ N., long. 43° 25′ W. (Fristedt).

Foreign distribution.—Lat. 77° 7′ N., long. 49° 37′5 E. and lat. 72° 36′5 N., long. 24° 57′5 E. (Vosmaer); northeast from the eastern Taimur peninsula, lat. 76° 52′ N., long. 116° E. (Fristedt).

GELLIUS FLAGELLIFER, Ridley and Dendy.

(Plate I., figs. 4, 4*a*, 4*b*, 4*c*, 4*d*.)

Gellius flagellifer, Ridley and Dendy, 1886. Ann. and Mag. Nat. Hist. ser. 5, vol. xviii., p. 333; and 1887, Rep. Monaxonida, Zool. Chall. Exp., vol. xx., p. 42, pl. xiii., figs. 5, 10.

Desmacella porosa, Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 440, pl. 24, figs. 36, 37 and pl. 28 fig. 15.

Three sponges referable to this species were collected in the Gulf of St. Lawrence. They are massive and somewhat irregular in shape; one specimen is, roughly, about 55 mm. broad and 20 mm. high; another is slightly larger, and a third, preserved in alcohol, is about 22 mm. long and 12 mm. high. When dry they are extremely friable.

There is little difference in the size of the megasclera, but the microsclera vary considerably in shape as well as in size. Oxea; length from 0·255 to 0·307 mm. (Plate I., fig. 4*a*). Sigmata; average width from curve to curve 0·065 mm. (Plate I., figs. 4*b*, 4*c*. 4*d*); a smaller form of the ordinary shape and about 0·026 mm. is also present in small numbers.

Vosmaer has described a variety of *Gellius vagabundus*[1] (O. S.), with spicules so similar to those of *G. flagellifer* that Ridley and Dendy think it is "not improbably referable" to their species.[2] Vosmaer gives the "Arctic and Atlantic (Florida)" as the geographical distribution of his sponge, so that it would not be very surprising to find it occurring at even such a distant locality as off southern Australia.

Locality.—Dredge A. Off Cape Gaspé and Cap des Rosiers, 5 miles from shore, in 38 fathoms, small stones, two large specimens, dry, J. F. Whiteaves, 1871; and dredge A 1, in the same locality, 75 to 80 fathoms, stones, one small specimen, in alcohol, J. F. Whiteaves, 1872.

Distribution.—Gulf of St. Lawrence; Davis Strait, lat. 61° 15′ N., long. 49° 11′ W. (Fristedt).

Foreign distribution.—Off Marion Island (Challenger).

[1] The sponges of the "Willem Barents" Expedition, 1880 and 1881, p. 28, pl. v., figs. 36, 37, 38.

[2] Rep. Monaxonida, Zool. Chall. Exp. vol. xx., p. 43.

Desmacella Peachii var. Grœnlandica, Fristedt.

(Plate I., figs. 5, 5*a–e*.)

Desmacella Peachii, Bowerbank. (O.S.) var. *Grœnlandica*, Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 441, pl. 24, figs. 38-45 and pl. 28, fig. 14.

A specimen of this species was dredged between Anticosti and the Gaspé peninsula; it is 26 mm. long, 19 mm. broad and about 12 mm. thick, and has its dermal membrane, which is thin and very fragile when dry, well preserved. A few circular osculer openings, about 0·75 mm. in average diameter, are seen at rather distant intervals on the surface. An examination of the dermal membrane revealed no pores.

The spicules of the St. Lawrence sponge are as follows: *Megasclera.*—Large, stout, gradually and sharply pointed, smooth styli, thickest at the base and frequently considerably bent towards the basal end, measuring from 0·807 to 1·37 mm. in length and from 0·017 to 0·027 mm. in thickness (Plate I., fig. 5*a*). *Microsclera.*—(1) Sigmata of two sizes (*a*) very large, stout sigmata, varying in length from 0·058 to 0·163 mm. and in thickness, at the centre of the curve, from 0·013 to 0·006 mm. (Plate I., figs. 5*b*, 5*c*) and (*b*) much smaller, more slender, sigmata from 0·019 to 0·032 mm. long, with an average thickness of 0·001 mm. (Plate I., fig. 5*d*); no contort sigmata of either size were seen. (2) Long, very slender rhaphides, arranged in loose bundles; average size 0·275 by 0·001 mm. (Plate I., fig. 5*e*).

The dermal membrane, besides containing bundles of raphides, in great abundance, arranged in a loose, reticulating manner, also holds sigmata in large numbers, especially the smaller form, and comparatively few styli. The sigmata and raphides also occur in the main skeleton.

Locality.—Between Anticosti and the Gaspé peninsula, in 200 fathoms, one specimen, dry, J. F. Whiteaves, 1873. Fristedt's specimen from the east coast of Greenland was dredged in 130 fathoms.

Esperella lingua, Bowerbank.

(Plate I., figs. 6, 6*a—f*.)

Hymeniacidon lingua, Bowerbank. 1866. Mon. Brit. Spong., vol. ii., p. 187.
Raphiodesma lingua, Bowerbank. 1874. Mon. Brit. Spong., vol. iii., p. 237, pl. lxxvii., figs. 1-6.
Esperia lingua, Vosmaer. 1885. The Sponges of the "Willem Barents" Expedition, 1880 and 1881, p. 30, pl. i., fig. 17, pl. iv., figs. 21, 22 and pl. v., figs. 73-77.
" Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 419.

There are a few large sponges, massive in form and lobate, from the Gulf of St. Lawrence, which are clearly identical with Bowerbank's

specimens from the islands off the north coast of Scotland. Bowerbank failed to recognize the presence of pore-areas, which were found by Ridley and Dendy, to exist in his type specimen, and which are admirably preserved in one of the specimens from the Gulf of St. Lawrence.

In 1887 Ridley and Dendy described[1] a sponge, *Esperella Murrayi*, from Port Jackson, Australia, which was remarkable for having pore-areas resembling cracks on the surface; also, in a foot-note,[2] they state that, "on examining Bowerbank's dried type, we found the pore cracks in one or two places in a most perfect condition and were enabled to make a microscopic preparation which showed them to be identical with those of *Esperella Murrayi*, even down to the presence of the transverse bands of muscular (?) tissue."

After a careful study of the lucid and exhaustive description of *Esperella Murrayi*, the writer fails to see any essential difference in spiculation, in skeletal arrangement, or in general form, between the Canadian examples of *E. lingua* and the Australian sponge, *E. Murrayi*.

The measurements of the spicules of a specimen preserved in alcohol are as follows: (1) Tylostyli; length varying from 0·685 to 1·15 mm. (Plate I., fig. 6). (2) Large palmate anisochelæ, frequently occurring in rosettes; maximum length 0·104 mm. (Plate I., figs. 6*b*, 6*c*). A smaller form, with an average length of 0·045 mm., and probably an immature stage of the larger anisochelæ, occurs in great abundance, especially in the sieve-like membrane of the pore-areas. (3) Sigmata; average length 0·026 mm., simple and contort (Plate I., figs. 6*d*, 6*e*). (4) Trichodragmata; length 0·06 mm. (Plate I., fig. 6*f*).

In a specimen from Portland, Maine, collected by Sir William Dawson, the tylostyli are not quite so large; they vary in length from 0·342 to 0·575 mm. (Plate I., fig. 6*a*).

Locality.—Dredge A 1. Off Cap des Rosiers and Cape Gaspé, in 75 to 80 fathoms, stones, two specimens and some fragments, dry; also one specimen preserved in alcohol, J. F. Whiteaves, 1872. One specimen, dry, Gaspé, Sir William Dawson.

Distribution.—Gulf of St. Lawrence; northeast coast of the United States (Verrill); Greenland, lat. 61° 15′ N., long. 49° 11′ W. and lat. 59° 3′ N., long. 43° 25′ W. (Fristedt).

Foreign distribution.—Western Islands, Outer Skerries and Unst, Scotland (Bowerbank); lat. 72° 36′5 N., long. 24° 57′5 E., lat. 72° 14′8 N., long. 22° 30′9 E. and lat. 75° 13′ N., long. 15° 46′1 E. ((Vosmaer); European Arctic Ocean and Barents Sea (Fristedt).

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[1] Rep. Monaxonida, Zool. Chall. Exp., vol. xx., p. 67, pl. xiii., figs. 11, 13, 14, 16, 17, 18 and pl. xiv., figs. 1, 1*a*.

[2] *Ibid.*, p. xxxix.

Esperella modesta. (Sp. nov.)

(Plate I., figs. 7, 7*a*—*d*.)

Sponge slightly lobed; growing through and partially enveloping a densely branched sea-weed (Plate I., fig. 7). *Colour*, when dry, brownish-yellow. *Texture*, moderately firm, not elastic. *Surface*, even, somewhat rough. *Oscula*, circular openings, level with the general surface, about 1·5 mm. in diameter. Examined when dry.

Skeleton.—Irregular, with an indistinct reticulate arrangement of stylote spicules. Loose, rather slender fibres of spicules pass to the surface and are connected together by spicules which show very little tendency to form definite fibres, but are loosely and irregularly disposed. There is seemingly no distinct dermal arrangement of the skeleton. A rather large proportion of spongin is present.

Spicules.—Megasclera; of two sizes. (1) Stout, rather abruptly pointed, strongly bent, smooth styli, from 0·091 to 0·196 mm. long, with an average thickness of 0·006 mm. (Plate I., fig. 7*a*). (2) Slender, gradually and sharply pointed, strongly bent, smooth styli, varying in length from 0·124 to 0·150 mm., and averaging 0·003 mm. in thickness (Plate I., fig. 7*b*). *Microsclera;* small palmate anisochelæ, measuring from 0·019 to 0·021 mm. in length; occurring in moderate numbers (Plate I., figs. 7*c*, 7*d*).

Locality.—Gaspé coast, one specimen, dry, Sir William Dawson.

Cladorhiza abyssicola, M. Sars.

(Plate I., figs. 8, 8*a*—*c*.)

Cladorhiza abyssicola, M. Sars. In G. O. Sars's paper on Some Remarkable Forms of Animal Life from the great deeps off the Norwegian coast, p. 65, pl. vi., figs. 16-31, 1872.
" " Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9.
" " Carter. 1874. Ann. and Mag. Nat. Hist., series 4, vol. xiv., p. 218, pl. xiv., fig. 22.

A specimen of this sponge was dredged by Mr. Whiteaves in the Gulf of St. Lawrence, between Anticosti and the Gaspé peninsula. The specimen (Plate I., fig. 8), is 56 mm. high, exclusive of the root, which was absent when brought to the surface of the water; the main stem had been severed at A (see figure[1]), evidently by the dredge.

The spicules of the Canadian specimen are as follows: *Megasclera;* moderately stout, rather bluntly pointed smooth styli, thickest at mid-length; maximum size about 0·655 by 0·019 mm. (Plate I., fig. 8*a*). *Microsclera;* (1) Small anisochelæ (Plate I., figs. 8*b*, 8*c*), that appear

[1] In the figure the root has been restored after Sars's original figure.

to have not more than three claws or teeth at the large end and three minute teeth at the small end ; average length 0·02 mm. (2) Very large, stout, simple sigmata, with a maximum length of 0·10 mm. and about 0·006 mm. thick at the centre of the curve (Plate I., fig. 8*d*). (3) Small, slender sigmata that appear to be always contort and confined to the enlarged distal ends of the branches ; average size 0·04 by 0·003 mm. (Plate I., fig. 8*e*).

Locality.—Between Anticosti and the Gaspé peninsula, one specimen, preserved in alcohol, in 200 fathoms, deep sea mud, J. F. Whiteaves, 1873.

Foreign distribution.—Coast of Norway (Sars), between the north coast of Scotland and the Færöe Islands (Carter).

Cladorhiza Nordenskiöldii, Fristedt.

(Plate I., figs. 9, 9*a*—*f*.)

Cladorhiza Nordenskiöldii, Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 455, pl. 25, figs. 56-59 and plate 31, fig. 25.

A portion of a sponge, evidently the root, which agrees perfectly in skeletal arrangement, as far as the specimen admits of comparison, and in the shape and size of the spicules with Fristedt's specimen from the east coast of Greenland, was dredged by Mr. Whiteaves between Anticosti and the Gaspé peninsula (Plate I., fig. 9).

Fristedt's specimen is described as consisting "of a stem, 225 mm. in length, the greatest thickness being 5 mm., the smallest 2 mm., and of branches, which are very minute, not exceeding 0·5 mm. and placed laterally, the upper part of the sponge being compressed. The lower part is expanded and attached to a hard object. The sponge has not, as the other *Cladorhizæ* (Wyv. Thomp.) roots." Judging from Fristedt's figure of his specimen, the lower part of the sponge looks as if it had been broken across, nor is any decided basal expansion shown.

The upper portion of the sponge is wanting in Mr. Whiteaves's specimen. The sponge has been broken at the lower part of what was evidently the stem. The upright stem, at its base, suddenly bends at right angles, forming a horizontal continuation, from which proceed four vertically downward directed roots, about 25 mm. long and from 2 to 5 mm. thick, two of which have been broken off. The thickness of the stem is nearly 3 mm.

Spicules.—(*a*) *Megasclera ;* (1) Stout styli, often considerably bent at the middle, thickest at midlength, obtusely but sharply pointed at one end and narrowly rounded at the other; from 0·575 to 0·780 mm. long (Fristedt, 0·9—1 mm. long), forming the axis of the sponge (Plate I.,

fig. 9*a*). (2) Very numerous, small, slender, bluntly pointed, spined tylostyli, generally slightly bent near the base, with small but well marked heads (Plate I., fig. 9*b*); from 0·203 to 0·065 mm. in length and 0·003 to 0·004 mm. in thickness (Fristedt, 0·12 mm. long). These spicules occur in great abundance in the cortex. (*b*) *Microsclera.*—(1) Anisochelæ, few in number (Plate I., figs. 9*c*, 9*d*); average length 0·052 mm. (Fristedt, 0·06 mm. long). (2) Slender sigmata, simple and contort (Plate I., figs. 9*e*, 9*f*); average length 0·019 mm. (Fristedt, 0·02 mm. long).

Until more specimens of this sponge shall have been obtained which show the entire shape, it is thought advisable to refer the specimen collected by Mr. Whiteaves provisionally to Fristedt's species.

Locality.—Between Anticosti and the Gaspé peninsula, in 200 fathoms, one specimen, dry, J. F. Whiteaves, 1873. Fristedt's Greenland specimen was dredged in 130 fathoms.

Desmacidon (Homœodictya) palmata, Johnston.

(Plate II., figs. 1, 1*a*—*f*.)

Halichondria palmata, Johnston. 1842. British Sponges, p. 92, pl. ii., figs. 1, 2, 3, 4, 5.

Isodictya palmata, Bowerbank. 1866. Mon. Brit. Spong., vol. ii., p. 311 and vol. iii., p. 133, pl. liii., figs. 1–7.

Chalina palmata, Carter. 1882. Ann. and Mag. Nat. Hist., series 5, vol. x., p. 109.

Desmacidon (Homœodictya) palmata, 1887. Ridley and Dendy. Rep. Monaxonida, Zool. Chall. Exp., vol. xx., p. 108.

This seems to be a common sponge on the Atlantic coast and is represented in the collection by a number of specimens, none of which have attained a greater height than 11½ inches. They resemble in general appearance the specimen figured by Johnston more than they do the one represented by Bowerbank. In a number of cases they are attached to valves of *Modiola modiolus*, L., and one or two specimens have grown on small pebbles.

Spicules.—(*a*) *Megasclera;* oxea, varying in length from 0·124 to 0·222 mm. and in thickness, from 0·003 to 0·013 mm. (Plate II., fig. 1*a*). (*b*) *Microsclera;* palmate isochelæ, with an average length of 0·029 mm. (Plate II., figs. 1*c*, 1*d*, 1*e*, 1*f*). In nearly all the specimens examined a few styli are present, but they occur only in very small numbers (Plate II., fig. 1*b*).

Localities.—Nova Scotia, one specimen, and Sable Island, one specimen, flabellate in form, dry, Sir William Dawson; Five Islands, Minas Basin, Bay of Fundy, twenty specimens and a number of fragments, dry, C. W. Willimott, 1892.

Distribution.—Nova Scotia; northeast coast of United States (Verrill).

Foreign distribution.—Coasts of England and Scotland (Johnston and Bowerbank).

Iophon chelifer, Ridley and Dendy.

Iophon chelifer, Ridley and Dendy. 1886. Ann. and Mag. Nat. Hist., series 5, vol. xviii., p. 349.
" " Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp. vol. xx., p. 119, pl. xvi., fig. 3 and pl. xvii., figs. 1, 3, 8.
" " Lambe. 1893. Sponges from the Pacific coast of Canada, Trans. Royal Soc. Canada, vol. xi., p. 30, pl. ii., figs. 7, 7*a*—*f*.

This sponge occurs on the Gaspé coast and in spiculation is exactly similar to the specimens from the Vancouver district. There are four fragments in all ; they are amorphous, honey-combed and of a dark-brown colour ; the largest piece is about 32 mm. through.

Locality.—Gaspé, four small fragments, dry, Sir William Dawson.

Distribution.—Gulf of St. Lawrence ; Vancouver Island (G. M. Dawson).

Foreign distribution.—Off the Cape of Good Hope, off Prince Edward Island (lat. 46° 41′ S., long. 38° 10′ E.) and off Crozet Island (Challenger).

Myxilla incrustans, Johnston.

(Plate I., figs. 10, 10*a*, 10*b*, 10*c*, 10*d*.)

Halichondria incrustans, Johnston. 1842. British Sponges, p. 122, pl. xii., fig. 3 and pl. xiii., fig. 5.
Halichondria saburrata, Johnston. 1842. Ibid, p. 120, pl. xi., fig. 3 and p. 197.
Halichondria incrustans, Bowerbank. 1866. Mon. Brit. Spong. vol. ii., p. 249 ; vol. iii., p. 108, pl. xliv., figs. 7-12 and vol. iv., p. 110.

This species is represented in the collection by two specimens ; one incrusts the under or flat valve of *Pecten* (*Amusium*) *tenuicostata*, Mighels, to a thickness of 8 mm., the other is a small unattached piece about 25 mm. broad and 10 mm. thick.

Measurements of the spicules gave the following results—(*a*) *Megasclera ;* (1) Styli, entirely spined ; from 0·124 to 0·209 mm. long and 0·003 to 0·009 mm. thick (Plate I., fig. 10). (2) Tornota, slightly spined at the ends, varying in length from 0·144 to 0·209 mm. with a maximum thickness of 0·006 mm. (Plate I., fig. 10*a*). (*b*) *Microsclera ;* (1) isochelæ ; from 0·032 to 0·045 mm. long (Plate I., fig. 10*b*). Small isochelæ, evidently young undeveloped forms of the large ones, are present ; they have a maximum length of 0·019 mm. The large forms seem as a rule to have two teeth at each end, but they are also tridentate. (2) Sigmata, simple and contort ; from 0·019 to 0·032 mm. in length (Plate I., fig. 10*c*, 10*d*).

Locality.—Gaspé coast, two specimens, dry, Sir William Dawson.

Foreign distribution.—Coasts of Great Britain (Johnston, Bowerbank).

Clathria delicata. (Sp. nov.)

(Plate II., figs. 2, 2*a*—*h*.)

Sponge erect, consisting of numerous, long, slender, separate and rather distant stem-like processes which arise from a common incrusting basal expansion and divide dichotomously or trichotomously and sometimes anastomose. The terminal portions of the stem-like processes are generally bifurcate but are sometimes trifurcate and often simple. Near their bases and after dividing the stem-like processes are slender, about 3 mm. in diameter, and circular in section, but before branching or dividing they are compressed laterally and frequently attain a breadth of about 7 mm. *Colour*, dull, reddish-brown. *Texture* rather soft, yielding, elastic. *Surface* hispid.

Skeleton.—Consisting of a very irregular reticulation of loose fibres that have a general direction upward and outward toward the surface. The fibres are composed of stout subtylostyli and slender styli with a large proportion of horny matter present and are echinated by spined subtylostylote spicules. The outer ends of the fibres are formed of loose bundles of spicules projecting beyond the surface. The whole skeleton is very irregular in its formation and shows a tendency to become plumose.

Spicules.—Megasclera; of three kinds. (1) Stout, sharply pointed, slightly bent subtylostyli with the base minutely spined; variation in length from 0·196 to 0·353 mm. with an average thickness of 0·013 mm. (Plate II., fig. 2*a*). (2) Slender generally rather twisted, sharply pointed styli; varying in length from 0·157 to 0·262 mm. with an average thickness of 0·003 mm. (Plate II., fig. 2*b*). (3) Stout, sharply pointed spined echinating subtylostyli measuring from 0·072 to 0·242 mm. in length and about 0·009 mm. in thickness (Plate II., fig. 2*c*). *Microsclera;* of two kinds. (1) Small palmate isochelæ about 0·013 mm. long; few in number (Plate II., figs. 2*d*—*g*). (2) Small, smooth toxa, 0·026 to 0·058 mm. long; these are rather scarce (Plate II., fig. 2*h*).

Localities.—Prince Edward Island, one specimen, dry, attached to an oyster shell, Sir William Dawson; Prince Edward Island, north shore, three specimens, growing on oyster shells, Dr. James Fletcher, Ottawa. There are in the Redpath Museum collection two dried specimens of this species collected by R. J. Fowler at Portland, Maine, U.S.A.

This sponge seems to be a common form off our Atlantic coast, where it frequents the oyster beds, attaching itself to the oyster shells.

Phakellia ventilabrum, Johnston.

(Plate II., figs. 3, 3*a*, 3*b*.)

Halichondria ventilabrum, Johnston. 1842. British Sponges, p. 107, pl. vii.
Phakellia ventilabrum, Bowerbank. 1864. Mon. Brit. Spong., vol. 1, p. 186; vol. ii. p. 122 and vol. iii, p. 57, pl. xxii., figs. 1-7.

Phakellia ventilabrum, Verrill. 1873. Am. Jour. Sci. and Arts, vol. vi., p. 440 and vol. vii., p. 413.
Phakellia ventilabrum? Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9.

The examples of this sponge, about twenty in number, from the Gulf of St. Lawrence are as a rule cup-shaped with short, rather slender stalks and with walls about 5 mm. thick in large well developed specimens. A breadth of 6 inches across the mouth of the cup,[1] with a total height of about 5 inches is frequently attained. When very young, before the cup has formed at the upper end of the stalk or is only beginning to develop, the sponge is very different in shape to the spreading sometimes almost fan-shaped mature sponge.

The styli have an average size of 0·440 by 0·013 mm. and are slightly curved (Plate II., fig. 3*a*). Very slender styli are also often present, which, as a rule, are considerably bent or twisted; they measure 0·274 mm. in average length and 0·003 mm. in thickness (Plate II., fig. 3*b*).

Localities.—Gaspé coast, Metis, Rivière du Loup, Murray Bay, nineteen specimens, dry; Murray Bay, one young specimen, in alcohol, Sir William Dawson; dredge A No. 8, eight miles southeast of Bonaventure Island, Gaspé, in 56 fathoms, stones and coarse sand, four young specimens in alcohol, J. F. Whiteaves.

Distribution.—River and Gulf of St. Lawrence (Sir William Dawson); Gulf of St. Lawrence (J. F. Whiteaves); northeast coast of United States (Verrill).

Foreign distribution.—Off coasts of Great Britain (Johnston); Shetland Islands and Loch Fyne (Bowerbank); between Scotland and the Færöe Islands and off Cape St. Vincent (Carter); lat. 72° 14′8 N., long. 22° 30′9 E. (Vosmaer); off Brazil and northeast of the Falkland Islands (Challenger).

Suberites ficus, Johnston.

(Plate II., figs. 4, 4*a*, 4*b*, 4*c*.)

Halichondria ficus, Johnston. 1842. British Sponges, p. 144, pl. xv., figs. 4, 5.
Hymeniacidon ficus, Bowerbank. 1866. Mon. Brit. Spong. vol. ii., p. 206 and vol. iii., p. 92, pl. xxxvi, figs. 10-17.

Two specimens of this sponge were obtained from Sable Island, off the coast of Nova Scotia. The larger of the two specimens is attached to the upper valve of a specimen of *Pecten* (*Amusium*) *tenuicostata*, Mighels, and bears a remarkable resemblance in outer form to the specimen figured by Bowerbank (vide supra); it is about 195 mm. high, 83 mm. in maximum breadth and about 36 mm. thick in the upper part. On the inner surface of the valve of the shell are four young sponges of the

[1] One specimen obtained by Prof. Verrill off the coast of Maine, measured two feet across, *op. cit.* vol. vi., p. 440.

same species. The other specimen is growing on the inside of a valve of a specimen of *Cyprina Islandica*, L.

The spicules of the Sable Island specimens are of the following sizes :—*Megasclera ;* tylostyli varying in length from 0·163 to 0·406 mm. and in thickness from 0·008 to 0·003 mm. (Plate II., fig. 4*a*). *Microsclera ;* the "inflato-cylindrical" spicules of Bowerbank ; from 0·019 to 0·039 mm. long, with a maximum thickness of 0·003 mm. (Plate II., figs. 4*b*, 4*c*).

Locality.—Sable Island, two specimens, dry, Sir William Dawson.

Foreign distribution.—Coasts of Great Britain (Johnston and Bowerbank).

Suberites hispidus, Bowerbank.

(Plate II., figs. 5, 5*a*, 5*b*. 5*c*. 5*d*.)

Tethea hispida, Bowerbank. 1864. Canadian Naturalist, second series, vol. i., p. 304.
Tethea hispida, Verrill. 1874. Am. Jour. Sci. and Arts, vol. iii., p. 40.

This sponge was first described by Bowerbank from a specimen dredged by Sir William Dawson, at Portland, Maine. The author of the species received a small slice of the specimen when dry, but from the smallness of the piece was not able fully to make out some of the salient characters of the sponge. In the original description no measurements of the spicules are given.

Later a single specimen was dredged by Mr. Whiteaves, in the Gulf of St. Lawrence, who at the time recognized its indentity with the type of the species.

The sponge is sessile, subhemispherical with a moderately convex upper surface ; found growing on rocks. The type specimen, which was found growing partly on a specimen of *Balanus porcatus*, Da Costa, and partly on the rock to which the barnacle was attached, has a maximum breadth of 37 mm. and a height at the centre of about 12 mm. Mr. Whiteaves's specimen was evidently attached to a stone from which it was separated by the dredge ; it measures 33 mm. across and is 15 mm. high. *Colour* in spirit, a dull yellowish-gray. *Texture* firm, compact. *Surface* even, very hispid. *Osculum*, a depressed opening, about 6 mm. in diameter, situated at the centre of the summit. In the type specimen the depression of the oscular opening below the general surface, is not apparent, owing to the shrinkage of the sponge due to drying.

Skeleton.—Loose fibres, about 0·137 mm. thick, composed of tylostylote spicules, pass from the base of the sponge to the surface. The spicules of the fibres diverge slightly on approaching the surface. A cortex about 0·411 mm. thick and made up of two sizes of tylostyli is present in the upper portion but is entirely absent at the base. The smaller tylostyli, radiating outward, are densely packed together and project

slightly beyond the surface. The larger tylostyli form an inner cortical layer and are loosely and irregularly disposed. The dense outer portion occupies scarcely one-third of the entire thickness of the cortex. Projecting beyond the general surface and with their bases embedded in the cortex are tylostyli similar in form to those of the main fibres but much longer. At the margin of the osculum the projecting tylostyli are directed toward a point a little above the centre of the opening.

Spicules.— (a) *Megasclera :* (1) stout, fusiform, gradually and sharply pointed tylostyli, with rather feebly developed heads; forming the skeleton fibres (Plate II., fig. 5*a*); length from 0·959 to 1·78 mm., with an average thickness of 0·027 mm. (Bowerbank's *skeleton spicula*). (2) Small, sharply pointed often slightly bent tylostyli varying considerably in thickness and generally with well developed heads; confined to the dermal layer of the cortex (Plate II., fig. 5*b*); length from 0·091 to 0·189 mm., thickness from 0·002 to 0·004 mm. (Bowerbank's *secondary series of defensive spicula*). (3) Stout, sharply pointed, slightly bent tylostyli, with well marked heads (Plate II., fig. 5*c*); forming the inner layer of the cortex; they vary in length from 0·232 to 0·575 mm. and in thickness from 0·006 to 0·013 mm. (Bowerbank's *tension spicula*). (4) Long, slender, sharply pointed tylostyli, with heads slightly more marked than those of the tylostyli of the skeleton fibres; projecting far beyond the general surface (Plate II., fig. 5*d*); maximum length 3·6 mm., maximum thickness 0·02 mm. (Bowerbank's *primary series of defensive spicula*).

Localities.—Portland, Maine, one specimen, dry and one in alcohol, Sir William Dawson; dredge J, twenty-four miles south by west of East Point, Anticosti, in 212 fathoms, mud and stones, temperature of mud 40° Fahr., one specimen, preserved in alcohol. J. F. Whiteaves. 1871.

Distribution.—Northeast coast of United States (Sir William Dawson, Verrill); Gulf of St. Lawrence (J. F. Whiteaves).

Polymastia robusta, Bowerbank.

(Plate II., figs. 6, 6*a*, 6*b*.)

Euplectella robusta, Bowerbank. 1860. List of British Marine Invertebrate Fauna, Rep. of Brit. Ass., p. 236.
Polymastia robusta, Bowerbank. 1866. Mon. Brit. Spong., vol. ii, p. 62, vol. iii., p. 23, pl. x., figs. 5-8, and vol. iv., p. 31.
Polymastia robusta? Verrill. 1874. Am. Jour. Sci. and Arts, vol. vii., p. 44.
" " Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp. vol. xx., p. 210, pl. xli., fig. 8.

A number of specimens of this sponge in a good state of preservation. The one figured (Plate II., fig. 6) is 52 mm. long., 42 mm. broad and about 4 mm. thick. On its upper surface are fifteen fistulæ, having a maximum diameter of 3 mm. at the base and not exceeding 25 mm. in length. Another specimen has twenty-eight fistulæ, having an average

length of 16 mm. No openings are visible at the distal ends of the fistulæ. The pores are beautifully shown over the entire surface, both of the body of the sponge and of the fistulæ. By slitting one of the latter, the pores were seen leading into the interior canal as well as the opening by which the canal communicates with the main portion of the sponge. When dry the fistulæ collapse and become strap-shaped.

Mr. Whiteaves informs me that when freshly dredged, the sponge is orange-red approaching to scarlet in colour and that it is found growing on rocks in patches sometimes several inches across.

The size of the spicules in different specimens varies considerably. The large tylostyli of the body of the sponge are from 0·479 to 1·0 mm. long and from 0·006 to 0·02 mm. thick (Plate II., fig. 6*a*). The cortical tylostyli are from 0·260 to 0·095 mm. long with an average thickness of 0·006 mm. (Plate II., fig. 6*b*). Spicules similar in size and form to those of the main fibres of the body of the sponge occur in some numbers, beneath the cortex, parallel to the surface.

Localities.—South of Cow Head, Prince Edward Island, in 12 fathoms, seven specimens, preserved in alcohol, J. F. Whiteaves, 1873. One specimen, dry, Portland, Maine, Sir William Dawson. The latter specimen has fistulæ reaching a length of 35 mm. with a maximum basal diameter of 4·5 mm.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves); Portland, Maine (Sir William Dawson); south of Nova Scotia (Challenger); north-east coast of United States (Verrill).

Foreign distribution.—Coast of Northumberland (Bowerbank).

Polymastia mammillaris (Müll.) Bowerbank.

(Plate III., figs. 1, 1*a*—*d*.)

Halichondria mammillaris, Johnston. 1842. British Sponges, p. 142, pl. xvi., fig. 2.
Euplectella mammillaris, Bowerbank. 1860. List of British Marine Invertebrate Fauna, Rep. of Brit. Ass., p. 236.
Polymastia mammillaris, Bowerbank. 1866. Mon. Brit. Spong., vol. ii., p. 71, vol. iii., pl. xl. figs. 1–11 and vol. iv., p. 32.
Polymastia mammillaris? Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9.
" " Vosmaer. 1885. The sponges of the "Willem Barents" Expedition, 1880 and 1881, p. 14, pl. i., figs. 5, 6 and pl. iii., figs. 10–12, 21.
" " Ridley and Dendy. 1887. Rep. Monaxonida Zool. Chall. Exp. vol. xx., p. 211.

Represented in the collection by three specimens from the Gulf of St. Lawrence. They have the usual strap-shaped fistulæ, as described by Bowerbank, with their distal ends frequently much broader than the breadth at mid-height, as well as a smaller form circular in section throughout its length and with truncated, often slightly inflated ends.

The surface of the main part of the sponge is densely hispid owing to the presence of long projecting tylostyli.

A large, stout, oscular tube, situated in the midst of the fistular processes, is present in each of the specimens. In the most perfect specimen (Plate III., fig. 1) the tube is 15 mm. high, 7 mm. broad at the base and tapering gradually to the distal end terminates in an oscular opening 3·5 mm. broad (see *os* in figure). This specimen is 42 mm. long, 26 mm. broad with thirty-five fistulæ about 14 mm. in average length. Another specimen from the same locality has fistulæ about 16 mm. in length, but the oscular tube is short and broad in proportion to its height; the tube is 7·5 mm. high and 4·5 mm. broad. One other specimen from a different locality has thirty fistulæ whose maximum length and breadth are 11 and 2·5 mm. respectively. Its oscular tube is of the same length as the fistulæ, but is proportionately stouter.

The measurements of the spicules are :

1. *Cortical tylostyli*—(*a*) *from the dermal layer of the cortex ;* length from 0·137 to 0·287 mm., thickness from 0·013 to 0·020 mm. (Plate III., fig. 1*a*) ; (*b*) *from the inner layer of the cortex ;* length from 0·479 to 0·753 mm., average thickness 0·013 mm. (Plate III., fig. 1*b*).

2. *Tylostyli from the main fibres ;* average length 1·5 mm., average thickness 0·027 mm. (Plate III., fig. 1*c*).

3. *Projecting tylostyli ;* maximum length 5·18 mm., thickness showing a variation of from 0·013 to 0·627 mm. (Plate III., fig. 1*d*).

Localities.—Twelve miles northwest of Bear Head, Anticosti, in 120 fathoms, mud, temperature of mud 38° Fahr., one specimen preserved in alcohol, J. F. Whiteaves, 1871. Fifteen miles from Cap des Rosiers, in 160–170 fathoms, mud and stones, temperature of mud 38° Fahr., two specimens preserved in alcohol, J. F. Whiteaves, 1872. Eighteen miles southwest by south of Southwest Point, Anticosti, in 210 fathoms, one young specimen, in alcohol, J. F. Whiteaves.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves) ; northeast coast of United States (Verrill) ; south of Nova Scotia (Challenger).

Foreign distribution.—Coast of Devon and northeast coast of Ireland (Johnston) ; Larne Lough, Ireland, Guernsey, Shetland and Orkney Islands (Bowerbank) ; lat. 75° 20′5 N., long. 46° 40′ E., lat. 71° 18′ N., long. 42° 41′ E., lat. 77° 7′ N., long. 49° 37′5 E., and lat. 72° 29′ N., long. 25° 48′ E. (Vosmaer).

Trichostemma hemisphæricum, M. Sars.

(Plate II., fig. 7, 7*a*—*e*.)

Trichostemma hemisphæricum, M. Sars. In G. O. Sars's paper on Some Remarkable Forms [of Animal Life from the great deeps off the Norwegian coast, p. 62, pl. vi., figs. 1–15. 1872.

Trichostemma hemisphæricum, Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9 and Am. Jour. Sci. and Arts, vol. vii., p. 2.

Polymastia hemisphærica, Vosmaer. 1885. The sponges of the "Willem Barents" Expedition 1880 and 1881, p. 12, pl. i., figs. 4, 20, 21. pl. ii., figs. 17-20, pl. iii., figs. 1-5 and pl. v., figs. 8-16.

There are three specimens of this sponge from the Gulf of St. Lawrence. The largest specimen is 64 mm. long, 37 mm. broad, with a thickness of about 17 mm. Near the basal edge the belt formed by the projecting spicules is about 6 mm. broad. There is no cortex on the basal surface which presents the appearance of having been attached to a stone. The upper surface bears about sixty papillæ, the largest of which do not exceed 3 mm. in height and have a maximum basal diameter of 6 mm. There appears to be a minute osculum at the summits of some of the papillæ.

Spicules taken from the largest specimen gave the following measurements :

Tylostyli from the fibres of the interior ; length varying from 0·369 to 0·876 mm., thickness from 0·016 to 0·010 mm. (Plate II., fig. 7*a*).

Cortical tylostyli ; from 0·089 to 0·169 mm. long and from 0·002 to 0·006 mm. thick. (Plate II., figs. 7*b*, 7*c*, 7*d*).

Projecting tylostyli from basal edge ; maximum size 2·5 by 0·02 mm. (Plate II., fig. 7*e*).

Of the other two specimens, one is similar in form to the above but smaller, whilst the remaining one is considerably smaller but is higher in proportion to its breadth. The small specimen bears papillæ which occasionally reach a height of 5·5 mm.

Locality.—Between Anticosti and the north shore of the Gulf of St. Lawrence, eight miles distant from Charleton Point, Anticosti, in 112 fathoms, large and small stones, three specimens, in alcohol, J. F. Whiteaves, 1871.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves) ; northeast coast of United States (Verrill).

Foreign distribution.—Lofoten, Norway (Sars) ; Arctic Ocean, off the coast of Norway (Vosmaer).

Tentorium semisuberites, Schmidt sp.

(Plate III,, figs. 2, 2*a*—*c*.)

Thecophora semisuberites. Schmidt. 1870. Spong. Atlant. Gebiet., p. 50, pl. vi., fig. 2.

Thecophora ibla, Wyville Thompson. 1873. The Depths of the Sea p. 148, fig. 24.

Thecophora semisuberites, Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence, p. 9.

Thecophora ibla, Verrill. 1874. Am. Jour. Sci. and Arts, vol. vii., p. 500, pl. viii., fig. 8.

Thecophora semisuberites, Vosmaer. 1885. The Sponges of the "Willem Barents" Expedition, 1880 and 1881, p. 18, pl. i., figs. 23, 24, and pl. iii., figs. 22-26.

Tentorium semisuberites, Vosmaer. 1885. Bronn's Klass. u. Ordn. d. Thierreichs, Porifera, p. 329, pl. ii., fig. 4; pl. xxi., fig. 19.

" " Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp., vol. xx,, p. 221.

Thecophora semisuberites, Fristedt. 1887. Sponges from the Atlantic and Arctic Oceans and the Behring Sea (translation), Vega-expeditionens vetenskapliga arbeten, p. 433.

There are twelve specimens of this interesting sponge, three of which are contracted so as to present the "scaly" appearance noticed by Wyville Thompson in some of his specimens (op. cit.).

The largest specimen (Plate III., fig. 2) is 28 mm. high, with a diameter of 18 mm., and has six oscular tubes proceeding from the rounded summit. The number of oscula is variable in different specimens, ranging from a single one to as many as six.

Speaking of the contractile powers of this sponge, Ridley and Dendy (*vide supra*) say: "When the specimen is in an expanded condition, the top appears evenly rounded, when, on the other hand, the animal is contracted, the top of the sponge owing to the arrangement of the brushes of spicules immediately below the surface, becomes uneven and 'scaly' in appearance. Evidently, when living, the sponge possesses great power of contractility, a power which would appear to be shared in large measure by the oscular tube."

Measurements of the spicules taken from the St. Lawrence specimens gave the following results:—

Tylostyli from the main fibres; maximum size 2·4 by 0·02 mm. (Plate III., figs. 2*a*, 2*b*).

Tylostyli from the cortex of the top; variation in length from 0·274 to 0·670, and in thickness from 0·013 to 0·018 mm. (Plate III., fig. 2*c*).

Localities.—Northern part of the Gulf of St. Lawrence, in from 20 to 96 fathoms, twelve specimens, in alcohol, J. F. Whiteaves, 1871-2-3. Eight miles southeast of Bonaventure Island, Gaspé, in 56 fathoms, stones and coarse sand, one specimen, in alcohol, J. F. Whiteaves, 1872.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves), off Nova Scotia (Challenger); Baffin Bay, Omenak Bay, west and east coast of Greenland (Fristedt); Greenland (Schmidt); northeast coast of United States (Verrill).

Foreign distribution.—Off the Shetland Islands (Wyville Thompson); lat. 72° 36′5 N., long. 34° 57′5 E. (Vosmaer); Inaccessible Island (Challenger); European Arctic Sea and Barent's Sea (Fristedt).

Stylocordyla borealis, Lovén.

(Plate I., figs. 11, 11*a*—*f*.)

Hyalonema borreale, Lovén. 1868. Öfversigt af. K. Vetenskaps Akademiens Förhandlingar, Stockholm, p. 105 and (translated) 1868 Ann. and Mag. Nat. Hist., series 4, vol. ii., p. 81.

Hyalonema longissimum, M. Sars. In G. O. Sars's paper on Some Remarkable Forms of Animal Life from the great deeps off the Norwegian coast, p. 70, pl. vi., figs. 35–45. 1872.

Stylocordyla borealis, Wyville Thompson. 1873. The Depths of the Sea, p. 113, fig. 13.

Polymastia stipitata, Carter. 1876. Ann. and Mag. Nat. Hist. series 4, vol. xviii., p. 393.

Stylocordyla stipitata, Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp., vol. xx., pl. xliii., figs. 6, 7, 8, 9, p. 223.

About a dozen specimens of this sponge were dredged during the summer of 1873 by Mr. Whiteaves,[1] in from 200 to 220 fathoms, between Anticosti and the south shore of the Gulf of St. Lawrence.

Lovén, in the description of his sponge (Ann. and Mag. Nat. Hist.), stated that the spicules of the stem had "near the middle a slight but distinct globular inflation or nodule," and that the spicules of the radiating fibres of the head are "of exactly the same type as those of the stem but smaller."

G. O. Sars considered *H. longissimum* to be very nearly related to *H. boreale*, but described it as a distinct species (vide supra).

In describing *Polymastia stipitata* (op. cit. p. 395) Carter wrote thus, "At first I thought *Polymastia stipitata* was Sars's *Hyalonema longissimum*, since some of the specimens of the former are exactly like his figures: but there is no central inflation of the spicule in any of them"; "the forms represented by Lovén's, Sars's and Thompson's figures respectively of the entire sponge are all present among those dredged up on board the "Porcupine," none of which have any central inflation on the spicule: or if so, it must be the exception; for after repeated examinations I have not found one."

In the Report on the Challenger Monaxonida by Ridley and Dendy (vol. xx., p. 223), the following paragraph occurs, "It appears to us highly probable that Lovén's *Hyalonema boreale* is really the same species as Carter's *Polymastia stipitata* in spite of the fact that the larger oxeote spicules in the former sponge are described as having a central inflation, a character which may perhaps be considered as abnormal, for Lovén had only two specimens for examination. Still we are not as yet convinced of this identity."

Vosmaer, in the "Sponges of the 'Willem Barents' Expedition, 1880 and 1881," (p. 11), expresses the opinion that Sars's *Hyalonema*

[1] Identified by him (see Report deep-sea dredging operations Gulf St. Lawrence p. 9) with G. O. Sars's species.

longissimum and Lovén's *Hyalonema boreale* are only varieties of the same species. He accepts only one species, and under the name of *Stylocordyla borealis* places *H. boreale*, Lovén. *H. longissimum*. Sars. *Stylocordyla borealis*, Wyville Thomson, and *Polymastia stipitata*, Carter.

It is interesting to note that in the Canadian specimens the large oxeote spicules of the stalk and of the radiating fibres of the head have a decided central inflation. The largest of these specimens (Plate I., fig. 11) is about 67 mm. high and has a small, narrowly rounded head 4 mm. high and 2 mm. broad; its stem is comparatively stout, about 1·3 mm. thick at mid-height and 2 mm. thick just above the expanded basal portion. Another and much smaller specimen is only 29 mm. high and has a very large head in proportion to its size and a stalk about 0·7 mm. thick at mid-height; its broadly ovate head is 5·7 mm. in length and 4·3 mm. broad. A small, slightly raised osculum, not quite circular in outline, with a maximum width of 0·5 mm., is situated a little to one side of the summit of the head. In another individual the head is swollen above and constricted in the lower part; its height is 7 mm. and its maximum breadth 4·5 mm.; the stalk has an average thickness of 0·5 mm. Some of the specimens have subcylindrical heads rounded slightly at the apex. In many cases the stalk is very slender and does not exceed 0·33 mm. in thickness.

The measurements of the spicules of a large specimen are as follows:—

Oxea of the stalk; average length 1·5 mm., average thickness 0·032 mm. (Plate I., figs. 11*a*, 11*b*).

Small cortical oxea of the stalk; varying in length from 0·052 to 0·078 mm. and with an average thickness of 0·003 mm. (Plate I., fig. 11*c*).

Oxea of the radiating fibres of the head: maximum length 0·753, maximum thickness 0·013 mm. (Plate I., figs. 11*d*, 11*e*).

Large cortical oxea of the head; varying in length from 0·229 to 0·458 mm., with an average thickness of 0·006 mm. (Plate I., fig. 11*f*).

Small cortical oxea of the head; slightly larger than those of the stalk, from 0·085 to 0·104 mm. long and 0·004 in average length.

It seems likely that some specimens of this sponge may have oxeote spicules in which a central inflation is well developed, whilst other specimens of the same species from the same or a different locality may have spicules in which the inflation is only slightly indicated or not developed at all.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves); northeast coast of the United States (Verrill); south of Halifax, Nova Scotia (Challenger).

Foreign distribution.—North Sea and coast of Finmark (Lovén); off the coast of Finmark (Vosmaer); Lofoten, Norway (Sars); between

the north of Scotland and the Faröe Islands (Wyville Thomson, Carter): off Bahia, Brazil, and lat. 46° 16′ S., long. 48° 27′ E., between Marion and Crozet Islands (Challenger).

Cliona celata, Grant.

(Plate III., fig. 3.)

Cliona celata, Grant. 1826. Edin. New Phil. Journ. i., p. 78; ii., p. 183, pl. 2, fig. 7.
Halichondria celata, Johnston. 1842. British Sponges, p. 125 and p. 197.
Raphyrus Griffithsii, Bowerbank. 1864. Mon. Brit. Spong., vol. i., p. 201; vol. ii., p. 354; vol. iii., p. 165, pl. lxiv., figs. 1-5.
Hymeniacidon celata, Bowerbank. 1866. Mon. Brit. Spong., vol. ii., p. 212, and vol. iii., p. 95, pl. xxxviii., figs. 5, 6.
Vioa celata, Schmidt. 1870. Grundz. einer Spong.-Fauna des Atl. Geb., p. 76.
Papillina suberea, Schmidt. 1870. Op. cit., p. 77.

Grant, in his original description, describes two varieties of this species, "(*a*) massive and rude (*b*) sinuous, the shape depending on the form of the holes in old oyster shells which the sponge occupies and fills." These two forms were described later by Bowerbank, who retained the specific name *celata* for Grant's variety (*b*) and made the other variety the type of his genus *Raphyrus* under the name of *R. Griffithsii*. In 1875[1] Carter pointed out that *Raphyrus Griffithsii* is the free form of *Cliona celata*.

In the collection at Ottawa, there are two oyster shells perforated by this sponge, but no Canadian specimens of the free form have been seen by the writer.

The tylostylote spicules of the Prince Edward Island specimens vary in length from 0·220 to 0·320 mm. and have an average thickness of 0·0049 mm. The spicules are slender, generally slightly curved, gradually and sharply pointed and have the large spherical head, as a rule, subterminal. (Plate III., fig. 3).

Locality.—Prince Edward Island, north shore, two specimens, dry, in oyster shells, Dr. James Fletcher, Ottawa. 1893.

TETRACTINELLIDA.

Thenea muricata, Bowerbank.

(Plate III., fig. 4.)

Tethea muricata, Bowerbank. M.S. 1858. Phil. Trans. Roy. Soc., p. 308, pl. xxv., fig. 18.
" " Bowerbank. M.S. 1864. Mon. Brit. Spong., vol. i., pp. 25, 108, figs. 35, 301, 305.
Tisiphonia agariciformis, Wyville Thompson. 1873. The Depths of the Sea, pp. 74, 167, fig. 7.

[1] Ann. and Mag. Nat. Hist., series 4, vol. xvi., p. 197, and series 5, vol. ix., pp. 347, 349.

Tethea muricata? Whiteaves. 1874. Report on deep-sea dredging operations in the Gulf of St. Lawrence and Am. Jour. Sci. and Arts, vol vii., p. 2.

Dorvillia echinata, Verrill. 1874. Am. Jour. Sci. and Arts, vol. vii., p. 501.

Thenea Wallichii and *Thenea muricata*, Sollas. 1882. Ann. and Mag. Nat. Hist., series 5, vol. ix., p. 427, pl. xvii.

Thenea muricata, Vosmaer. 1885. The sponges of the "Willem Barents" Expedition, 1880 and 1881, p. 4.

" " Sollas. 1887. Rep. Tetractinellida, Zool. Chall. Exp. vol. xxv., p. 95, pl. vii., fig. 3.

Tethea muricata was first mentioned by Bowerbank as a M.S. name in 1858; since then it has been described under different names by many authors. Sollas in the Ann. and Mag. Nat. Hist. enters at some length into the history of this sponge and describes its characters. A complete synonymy by the same author may be found in vol. xxv. of the Challenger Reports.

The specimens collected by Mr. Whiteaves are somewhat abnormal in shape. The osculum instead of being situated in the centre of the upper portion is at one side, whilst the "equatorial recess" occupies the other side. The roots proceed from the rather pointed base.

Locality.—Between Anticosti and the south shore of the Gulf of St. Lawrence, in 220 fathoms, three rather small but perfect specimens, preserved in alcohol, J. F. Whiteaves. 1873.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves); northeast coast of the United States (Verrill); Baffin Bay, lat. 75° 26′ N., long. 67° 27′ W., Davis Strait, lat. 59° 33′ N., long. 43° 25′ W. and east coast of Greenland (Fristedt).

Foreign distribution.—Vigten Island, Norway (Bowerbank); off the coast of Portugal and off the Færöe Islands (Wyville Thompson); Kors Fiord, Norway (Sollas); lat. 71° 52′2 N., long. 19° 47′ E. to lat. 72° 36′5 N., long. 25° 58′ E. (Vosmaer).

CALCAREA.

LEUCOSOLENIA CANCELLATA. Verrill.

(Plate III., figs. 5, 5*a*, 5*b*, 5*c*, 5*d*.)

Leucosolenia cancellata, Verrill. 1874. Explorations of Casco Bay, Pro. Am. Ass. Adv. Sci., p. 393.

The only specimen representing this species consists of a small colony forming an irregular mass about 14 mm. across at the broadest part and 6 mm thick.

The spicules are triradiate and quadriradiate. Simple triradiates and triradiates with an incipient or aborted fourth ray are the principal and most abundant spicules; they vary considerably in size, but the average length of the basal ray, which is slightly longer than the two lateral

rays, is about 0·131 mm. with a breadth at the thickest part of about 0·009 mm. The rays are slender and obtusely pointed. (Plate III., figs. 5, 5*a*).

The quadriradiates are few in number and occur in the gastral surfaces of the tubes. The fourth or apical ray is more slender and not so long as the facial rays and is slightly curved at its extremity ; the facial rays are similar in form to the rays of the triradiates. An average sized quadriradiate gave the following measurements : length of basal ray 0·124 mm., greatest thickness 0·009 mm. ; length of lateral rays 0·104 mm. (Plate III., fig. 5*b*). A few small quadriradiates, which are probably young forms, also occur ; their rays are short, stout, acutely pointed and about 0·032 mm. in length with a thickness at the base of 0·006 mm. (Plate III., figs. 5*c*, 5*d*).

Locality.—Orphan Bank, off the entrance to the Baie des Chaleurs, one specimen,[1] in alcohol, J. F. Whiteaves. 1873.

Distribution.—Gulf of St. Lawrence (J. F. Whiteaves) ; northeast coast of the United States (Verrill).

Sycon protectum. (Sp. nov.)

(Plate III., figs. 6. 6*a*—*g*.)

Sponge small, represented by a single specimen, egg-shaped, attached by its broadly rounded base and with a large osculum at the upper end surmounted by a fringe of long, delicate spicules ; total height 9 mm., greatest breadth 3·75 mm. ; length of oscular fringe 4 mm. *Colour* in spirit a very pale yellowish-gray ; the oscular fringe is of a glistening white. *Texture* firm. *Surface* even, hispid. *Osculum* circular 1·5 mm. wide.

The wall of the sponge, 0·5 mm. thick, incloses a large central cavity and is traversed by radial tubes about 0·055 mm. wide.

Skeleton.—There is a regular disposition of triradiate spicules in the intervals between the radial tubes. An examination of the dermal surface reveals the openings of the radial tubes, about 0·131 mm. apart from centre to centre, arranged in regular rows ; between the openings oxeote spicules deeply embedded in the parenchyma project beyond the outer surface. The spicules of the dermal skeleton are of a peculiar shape ; they are triradiate, with the basal ray bent at mid-length at right angles to the plane in which the lateral rays lie ; they are arranged round the dermal openings of the radial tubes, about twelve to each opening, so that the bent basal rays are directed toward each other over the openings of the tubes (Plate III., fig. 6*g*). The gastral skeleton is made up of quadriradiate spicules whose apical rays project beyond the gastral sur-

[1] Identified by Prof. Verrill with the type of the species from the coast of Maine.

face. The openings of the radial tubes on the gastral surface are about 0·068 mm. wide and from 0·109 to 0·137 mm. apart from centre to centre. The thickness of the wall of the sponge decreases in thickness as the osculum is approached.

Spicules.—(1) *Triradiates*, of the tubar skeleton, with stout, gradually and sharply pointed rays; basal ray up to 0·209 mm. in length; the lateral rays have an average length of 0·111 mm.; thickness of rays at base from 0·006 to 0·009 mm. (Plate III., fig. 6*a*). (2) *Triradiates*, of the dermal surface, with two stout, straight, sharply pointed lateral rays and a third ray equally stout, which is bent almost at right angles to the direction of its basal part and which is curved slightly upward at its outer end; average length of bent ray 0·065 mm.; average length of lateral rays 0·111 mm.; thickness of the three rays near the base from 0·006 to 0·009 mm. (Plate III., figs. 6*b*, 6*c*, 6*d*). (3) *Quadriradiates*, of the gastral skeleton, with long, moderately straight, gradually and sharply pointed, rather slender facial rays and an apical ray of the same thickness; facial rays, about 0·131 mm. in length; apical ray up to 0·085 mm. long; thickness of rays at base about 0·006 mm. (Plate III., fig. 6*e*). (4) *Oxeote spicules;* stout, generally straight, rather abruptly but sharply pointed; up to 0·982 mm. by 0·019 mm. in size (Plate III., fig. 6*f*). Very slender oxeote spicules, about 0·002 mm. thick, are associated with the stout ones; their length has not been ascertained as, on account of their extreme slenderness, they are generally broken. (5) *Ocular spicules;* long, slender oxea, varying considerably in thickness; from 0·003 to 0·013 mm. thick and up to 4 mm. in length.

Locality.—Eight miles southeast of Bonaventure Island, Gaspé, in 56 fathoms, stones and coarse sand, one specimen, in alcohol, J. F. Whiteaves. 1872.

Sycon asperum. (Sp. nov.)

(Plate II., figs. 8, 8*a*, 8*b*, 8*c*.)

The only specimen of this species in the collection is 10 mm. high and 5 mm. broad; it is narrowly oval in lateral outline and has an ocular opening, about 1 mm. wide, situated in the upper part and fringed by comparatively short oxeote spicules. *Colour* in spirit, grayish-white. *Texture* firm. *Surface* very rough.

Skeleton.—Radial tubes, about 0·109 mm. wide, lead from the dermal to the gastral surface through the thin wall of the sponge which has a maximum thickness of 0·95 mm. The outer surface presents an irregular net-work of ridges between which are deep sunken areas; in these areas are to be seen the outer openings of the radial tubes. The gastral openings of the tubes are closely but rather irregularly disposed over the even inner surface of the wall; they are from 0·074 to 0·111 mm. wide. The tubar skeleton is composed of triradiate spicules having the basal ray

directed outward. The spicules of the outer surface are the same as those of the tubar skeleton ; those which make up the ridges have their basal rays pointed outward, but those occupying the surface of the sunken areas between the ridges have their basal rays directed inward instead of outward. Quadriradiates are present in the gastral surface. Stout oxeote spicules proceed from the ridges far beyond the outer surface ; their inner ends frequently penetrate deeply into the wall of the sponge.

Spicules.—(1) *Triradiates*, of the tubar skeleton and of the dermal surface, with gradually and sharply pointed rays ; the basal ray is straight, up to 0·164 mm. long and 0·009 mm. thick at the base ; the lateral rays are generally slightly curved and about 0·109 mm. long (Plate II., fig. 8*a*). (2) *Quadriradiates*, of the gastral surface, with short, stout, apical rays which project beyond the gastral surface and are curved slightly toward the osculum ; the facial rays are long, sharply pointed, up to 0·098 mm. long and 0·006 mm. thick at the base ; the apical rays vary in length from 0·026 to 0·065 mm. and in thickness from 0·006 to 0·013 mm. (Plate II., fig. 8*b*). (3) *Oxeote spicules*, of the dermal surface, stout, obtusely but sharply pointed, up to 1·15 by 0·205 mm. in size ; the proximal end is generally stouter than the distal end (Plate II., fig. 8*c*). The oxeote spicules surrounding the oscular opening are almost the same in size as those of the dermal surface ; their average thickness is 0·013 mm.

Locality.—Eight miles southeast of Bonaventure Island, Gaspé, in 56 fathoms, stones and coarse sand, one specimen, in alcohol, J. F. Whiteeaves. 1872.

Grantia Canadensis. (Sp. nov.)

(Plate III., figs. 7, 7*a*, 7*b*, 7*c*.)

Sponge small, tubular, erect, attached by its base to an alga ; it is 14 mm. long, nearly 3 mm. broad a little below mid-height and contracted slightly near the upper end where it terminates in an osculum, 1 mm. wide, which is protected by a fringe of linear spicules. A gastral cavity about 1 mm. in width extends the entire length of the sponge and ends above in the osculum. *Colour*, in spirit, pale brownish-red.[1] *Texture*, firm, compact. *Surface*, even, slightly hispid.

Skeleton.—The wall of the sponge is 1 mm. thick and is traversed by radial tubes about 0·082 mm. wide. The tubar skeleton is articulated and composed of triradiate spicules having their basal rays directed outward. A cortical layer of triradiate spicules, similar in form and size to those of the tubar skeleton, lies immediately beneath a thin dermal membrane which is pierced by numerous minute pores, averaging 0·039 mm. in width. The gastral surface is supported by quadriradiate spicules whose apical rays project into the gastral cavity. Stout oxeote spicules

[1] The colour is very probably influenced by the red mud of the bottom derived from the brick-coloured rocks of Prince Edward Island.

are embedded in the wall of the sponge, parallel to the direction of and between the radial tubes; their distal ends frequently extend beyond the dermal surface.

Spicules.—(1) *Triradiates*, of the tubar skeleton and of the cortex, with long, slender, acutely and sharply pointed, straight rays; basal ray with an average length of 0·294 mm., lateral rays averaging 0·196 mm. in length (Plate III., fig. 7*a*); many small and immature forms of these spicules also occur. (2) *Quadriradiates*, of the gastral surface, having long, straight, slender apical rays, about 0·222 mm. long and with facial rays similar in form and size to the rays of the triradiates, only rather more slender (Plate III., fig. 7*b*). (3) *Oxeote spicules*, stout, slightly curved, somewhat obtusely pointed; length about 0·694 mm., thickness 0·013 mm. (Plate III., fig. 7*c*). (4) *Linear spicules*, of the oscular fringe, very slender, straight; about 1·78 mm. in length and 0·0049 mm. thick.

Locality.—Between Pictou Island and Cape Bear, in from 46 to 48 fathoms, one specimens, in alcohol, J. F. Whiteaves, 1873; eight miles southeast of Bonaventure Island, Gaspé, in 56 fathoms, stones and coarse sand, one small specimen, in alcohol, J. F. Whiteaves, 1872; one specimen, dry, Metis, Sir William Dawson.

Fossil sponges from the Leda clay at Montreal and Ottawa.

CRANIELLA LOGANI, Dawson.

(Plate III., figs. 8, 8*a*—*i*.)

Tethea Logani, Dawson. 1857. Canadian Naturalist, vol. ii., p. 421, pl. vii., fig. 16.

This sponge, which was described by Sir William Dawson, is one of the most characteristic fossils of the Pleistocene deposits (Leda clay) of Montreal and its immediate vicinity.

At Sir William Dawson's request, the writer has undertaken a re-examination of authentic specimens furnished by him.

The type specimens were characterized as consisting of spicules which are pointed at both ends and of two sizes, the larger being $\frac{3}{10}$ths of an inch and the shorter $\frac{1}{10}$th of an inch in length. Sir William Dawson in his description says "Mr. Bowerbank of London, who has kindly examined these curious fossils, has no doubt that they belong to the genus *Tethea;* but does not refer them to any species. The spicula resemble the simple ones of *T. cranium*, as figured by Johnston; but our fossils do not afford any that are tricuspidate."

A number of specimens of this species have lately been collected from the Leda clay at Ottawa; they are found preserved in a manner similar to that of the Montreal specimens.

Many of the specimens are preserved with their spicules so undisturbed that it is possible to form a tolerably correct idea of the original skeletal arrangement when alive.

An examination of the Montreal and Ottawa specimens revealed the fact, that, besides the simple oxeote spicules, three other kinds were present, viz.: protriænes, anatriænes and sigmaspires, showing that the sponge was a true tetractinellid and judging from the relative positions of the spicules, probably belonged to the genus *Craniella*, O. S.

The living form most nearly allied to *C. Logani* is probably *C. cranium*, auct., to which the species under consideration bears a strong resemblance, especially in the size of the spicules. Most of the specimens are spherical in shape and remains are abundant of what was evidently the basal anchoring tuft.

The spicules are as enumerated below :—

(a) *Megasclera;* (1) Somal oxea, frequently anisoactinate but often filiform at either end and sometimes with the ends equally but only moderately attenuated ; maximum size 5·6 by 0 054 mm. (Plate III., fig. 8*a*) ; these spicules radiate from the centre or from a point near the centre to the surface. (2) Cortical oxea, rather obtusely but sharply pointed, smooth and slightly bent, from 0·63 to 1·22 mm. long and with a maximum thickness of 0·02 mm. (Plate III., fig. 8*b*) ; confined to the cortex and disposed radiately. (3) Protriænes, reaching a length (broken) of 4·73 mm. ; cladi from 0·041 to 0·111 mm. long, chord from 0·044 to 0·085 mm., maximum thickness of rhabdome 0·013 mm. (Plate III., figs. 8*c*, 8*d*) ; immature forms of this spicule are abundant (Plate III., figs. 8*e*, 8*f*). (4) Anatriænes, measured up to 4·38 mm. in length (broken) ; cladi from 0·178 to 0·274 mm. long, chord from 0·095 to 0·205 mm., average thickness of rhabdome 0·013 mm. (Plate III., fig. 8*g*) ; immature forms occur with cladi 0·041 mm. long and with very slender rhabdomes about 0·006 mm. thick (Plate III., fig. 8*h*). The cladi of the anatriænes are remarkable for their great length. (*b*) *Microsclera ;* (4) sigmaspires, minutely spined ; average length 0·019 mm. (Plate III., fig. 8*i*).

Localities.—Montreal, a number of specimens, Sir William Dawson ; Ottawa, at Odell's brick-yard, several specimens, H. M. Ami, 1888, 1889.

In 1873 Mr. Whiteaves collected a few spicules, belonging to hexactinellid sponges, in the Leda clay at the "Glen" brick works, Montreal.

These spicules are as follows :

1. Heavily barbed, anchor-like spicules with expanded ends having from five to seven stout teeth (Plate III., figs. 9, 9*a*, 9*b*, 9*c*) ; a broken spicule of this kind measured as much as 4·9 mm. in length.

2. A smooth, slender hexact with four short rays in one plane and two long rays at right angles to the other four (Plate III., fig. 9*d*).

3. Smooth pentacts with short, stout, sharply pointed rays varying in length from 0·232 to 0·506 mm. and with a thickness at the base of from 0·068 to 0·041 mm. (Plate III., figs. 9*e*, 9*f*).

4. A small portion of the framework of a sponge probably of the suborder *Dictyonina*, Zittel (Plate III., fig. 9*g*).

EXPLANATION OF PLATES.

PLATE I.

Fig. 1.—*Eumastia silicus* (page 184). Natural size.
Fig. 2.—*Chalina oculata* (page 186). One-half the natural size.
Fig. 2*a*. Oxeote spicule ; × 272.
Fig. 3.—*Gellius arcoferus* (page 186.) Oxeote spicule ; × 136.
Fig. 3*a*. Simple sigma ; × 272.
Fig. 3*b*. Toxite ; × 272.
Fig. 4.—*Gellius flagellifer* (page 187). Natural size.
Fig. 4*a*. Oxeote spicule ; × 272.
Figs. 4*b*, 4*c*, 4*d*. Sigmata ; × 272.
Fig. 5.—*Desmacella Peachii* var. *Granlandica* (page 188). Natural size.
Fig. 5*a*. Stylus ; × 136.
Figs. 5*b*, 5*c*. Large sigmata ; × 272.
Fig. 5*d*. Small sigma ; × 272.
Fig. 5*e*. One of the rhaphides ; × 272.
Fig. 6.—*Esperella lingua* (page 188). Tylostylus ; × 136.
Fig. 6*a*. Tylostylus, from another specimen ; × 136.
Figs. 6*b*, 6*c*. Anisochelæ ; × 272.
Figs. 6*d*, 6*e*. Sigmata ; × 272.
Fig. 6*f*. Trichodragmata ; × 272.
Fig. 7.—*Esperella modesta* (page 190). Natural size.
Fig. 7*a*. Stout stylus ; × 272.
Fig. 7*b*. Slender stylus ; × 272.
Figs. 7*c*, 7*d*. Anisochelæ ; × 272.
Fig. 8.—*Cladorhiza abyssicola* (page 190). Natural size.
Fig. 8*a*. Stylus ; × 136.
Fig. 8*b*. Anisochela, front view ; × 272.
Fig. 8*c*. Anisochela, side view ; × 272.
Fig. 8*d*. Large simple sigma ; × 272.
Fig. 8*e*. Small contort sigma ; × 272.
Fig. 9.—*Cladorhiza Nordenskiöldii* (page 191). Natural size.
Fig. 9*a*. Stylus ; × 136.
Fig. 9*b*. Spined tylostylus ; × 272.
Figs. 9*c*, 9*d*. Anisochelæ ; × 272.
Figs. 9*e*, 9*f*. Sigmata ; × 272.
Fig. 10.—*Myxilla incrustans* (page 193). Spined stylus ; × 272.
Fig. 10*a*. Tornote spicule ; × 272.
Fig. 10*b*. Isochela ; × 272.
Figs. 10*c*, 10*d*. Sigmata ; × 272.
Fig. 11.—*Stylocordyla borealis* (page 202). Natural size.
Fig. 11*a*. Oxeote spicule of the stalk ; × 60.
Fig. 11*b*. Central portion of the same, showing the inflation ; × 272.
Fig. 11*c*. Cortical oxeote spicule of the stalk ; × 272.
Fig. 11*d*. Oxeote spicule from a radiating fibre of the head ; × 136.
Fig. 11*e*. Portion of the same, showing the inflation at mid-length.
Fig, 11*f*. Large cortical oxeote spicule of the head ; × 272.

Plate II.

Fig. 1.—*Desmacidon palmata* (page 192). One-half the natural size.
Fig. 1*a*. Oxeote spicule ; × 272.
Fig. 1*b*. Stylus : × 272.
Figs. 1*c*, 1*d*, 1*e*, 1*f*. Isochelæ ; × 272.

Fig. 2.—*Clathria delicata* (page 194). Natural size.
Fig. 2*a*. Subtylostylus ; × 272.
Fig. 2*b*. Slender stylus ; × 272.
Fig. 2*c*. Echinating subtylostylus ; × 272.
Figs. 2*d*, 2*e*, 2*f*, 2*g*. Isochelæ ; × 272.
Fig. 2*h*. Toxa ; × 272.

Fig. 3.—*Phakellia ventilabrum* (page 194). One-half the natural size.
Fig. 3*a*. Stylus ; × 136.
Fig. 3*b*. Slender stylus ; × 136.

Fig. 4.—*Suberites ficus* (page 195). One-half the natural size.
Fig. 4*a*. Tylostylus ; × 272.
Figs. 4*b*, 4*c*. "Inflato-cylindrical" spicules ; × 272.

Fig. 5.—*Suberites hispidus* (page 196). Natural size.
Fig. 5*a*. Tylostylus, from a fibre of the main skeleton ; × 60.
Fig. 5*b*. Tylostylus from the dermal layer of the cortex ; × 272.
Fig. 5*c*. Tylostylus from the inner cortical layer ; × 272.
Fig. 5*d*. Head of projecting tylostylus ; × 272.

Fig. 6.—*Polymastia robusta* (page 197). Natural size.
Fig. 6*a*. Tylostylus ; × 136.
Fig. 6*b*. Cortical tylostylus ; × 272.

Fig. 7.—*Trichostemma hemisphæricum* (page 199). Natural size.
Fig. 7*a*. Tylostylus from the fibres of the interior ; × 136.
Figs. 7*b*, 7*c*, 7*d*. Cortical tylostyli ; × 272.
Fig. 7*e*. Projecting tylostylus of basal edge ; × 60.

Fig. 8.—*Sycon asperum* (page 207). Twice the natural size.
Fig. 8*a*. Triradiate spicule ; × 272.
Fig. 8*b*. Quadriradiate spicule ; × 272.
Fig. 8*c*. Oxeote spicule ; × 136.

Plate III.

Fig. 1.—*Polymastia mammillaris* (page 198). Natural size.
Fig. 1*a*. Tylostylus from the dermal layer of the cortex ; × 136.
Fig. 1*b*. Tylostylus from the inner layer of the cortex ; × 136.
Fig. 1*c*. Tylostylus from the main fibres ; × 60.
Fig. 1*d*. Head of projecting tylostylus ; × 136.

Fig. 2.—*Tentorium semisuberites* (page 200). Natural size.
Fig. 2*a*. Tylostylus from the main fibres ; × 60.
Fig. 2*b*. Head of same ; × 272.
Fig. 2*c*. Tylostylus from the cortex of the top ; × 136.

Fig. 3.—*Cliona celata* (page 204). Tylostylus ; × 272.

Fig. 4.—*Thenea muricata* (page 204). Natural size.

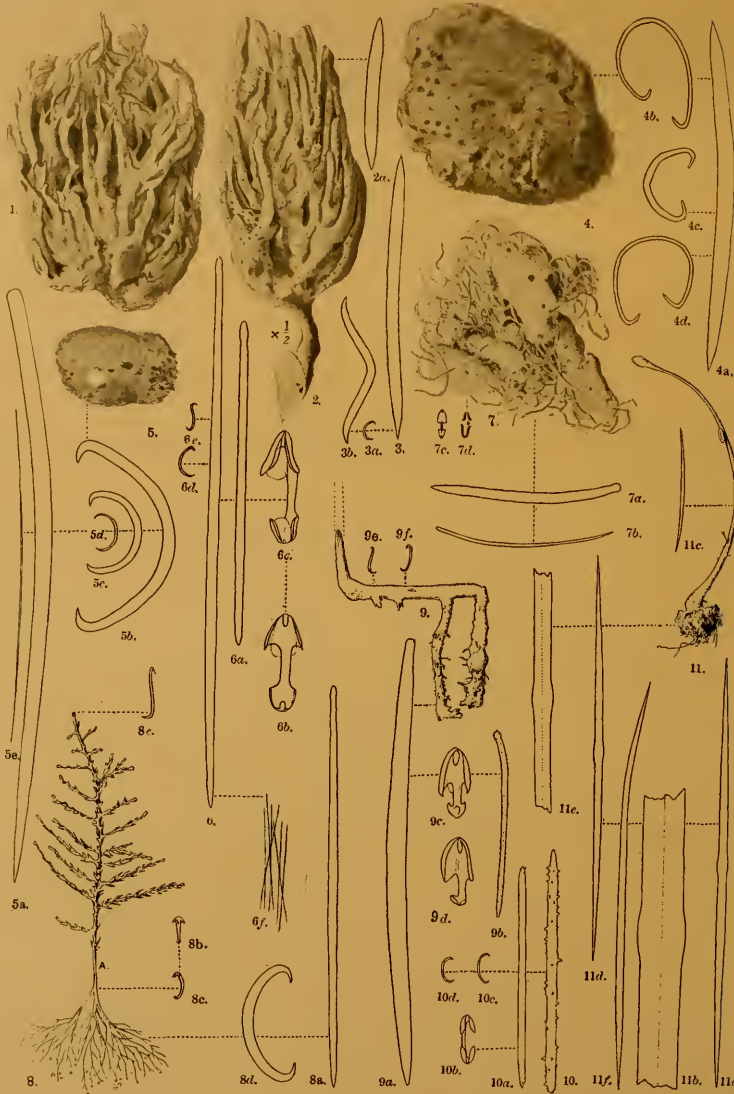
Fig. 5.—*Leucosolenia cancellata* (page 205). Triradiate spicule ; × 272.
Fig. 5*a*. Triradiate with incipient fourth ray ; × 272.
Fig. 5*b*. Quadriradiate spicule ; × 272.
Figs. 5*c*, 5*d*. Small quadriradiate spicules ; × 272.

Fig. 6.—*Sycon protectum* (page 206). Twice the natural size.
Fig. 6*a*. Triradiate spicule of the tubar skeleton ; × 272.
Figs. 6*b*, 6*c*, 6*d*. Dermal triradiate spicules ; × 272.
Fig. 6*e*. Quadriradiate spicule ; × 272.
Fig. 6*f*. Oxeote spicule ; × 136.
Fig. 6*g*. Arrangement of dermal triradiate spicules at the entrance of one of the radial tubes ; × 272.

Fig. 7.—*Grantia Canadensis* (page 208). Twice the natural size.
Fig. 7*a*. Triradiate spicule ; × 272.
Fig. 7*b*. Quadriradiate spicule ; × 272.
Fig. 7*c*. Oxeote spicule ; × 136.

Fig. 8.—*Craniella Logani* (page 209). Natural size.
Fig. 8*a*. Somal oxeote spicule ; × 60.
Fig. 8*b*. Cortical oxeote spicule ; × 136.
Figs. 8c, 8*d*. Cladal ends of protriænes ; × 136.
Figs. 8*e*, 8*f*. Cladal ends of immature protriænes; × 136.
Fig. 8*g*. Cladal end of anatriæne ; × 136.
Fig. 8*h*. Cladal end of immature anatriæne ; × 136.
Fig. 8*i*. Sigmaspires ; × 272.

Fig. 9.—Portion of an anchor-like spicule (page 210) ; × 60.
Figs. 9*a*, 9*b*, 9*c*. Cladal ends of anchor-like spicules ; × 136.
Fig. 9*d*. Slender hexact ; × 60.
Figs. 9*e*, 9*f*. Pentacts ; × 60.
Fig. 9*g*. Portion of dictyonal skeleton of a sponge ; × 60.


1.
2.
× ½
2a.
3.
3a.
3b.
4.
4a.
4b.
4c.
4d.
5.
5a.
5b.
5c.
5d.
5e.
6.
6a.
6b.
6c.
6d.
6e.
6f.
7.
7a.
7b.
7c.
7d.
8.
8a.
8b.
8c.
8d.
8e.
9.
9a.
9b.
9c.
9d.
9e.
9f.
10.
10a.
10b.
10c.
10d.
11.
11a.
11b.
11c.
11d.
11e.
11f.

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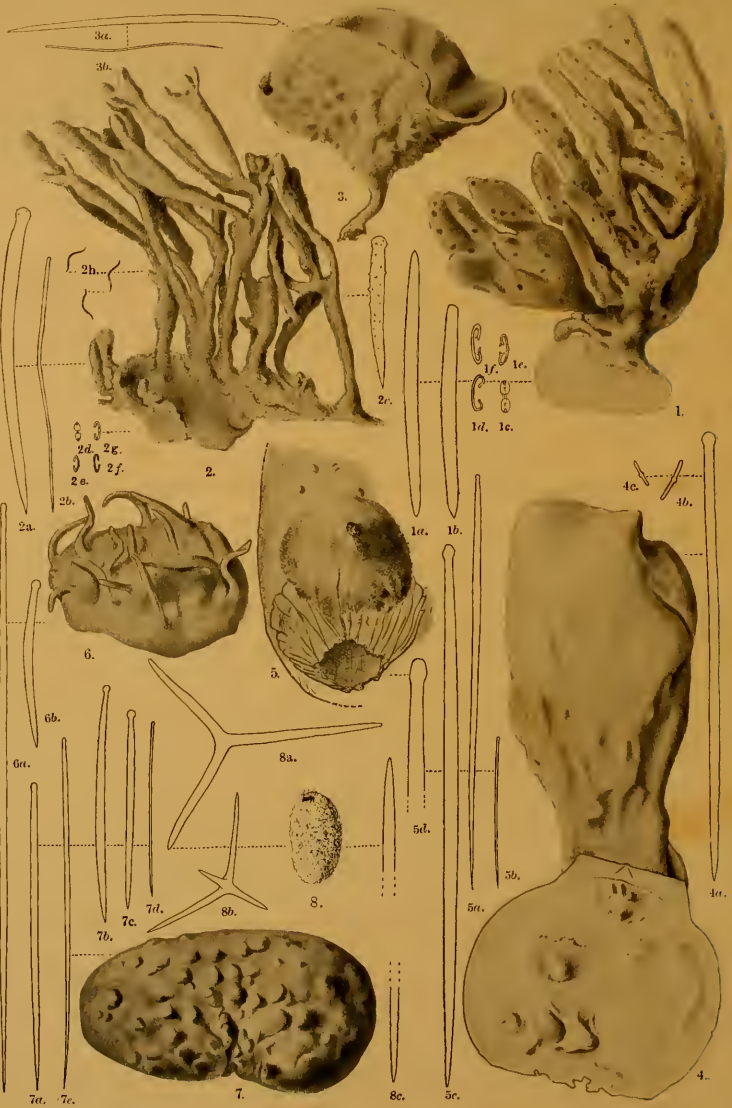
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3b.
3.
1.
1c.
1f.
1d. 1e.
2h.
2c.
2d. 2g.
2e. 2f.
2.
2a.
2b.
1a.
1b.
4c.
4b.
6.
5.
6b.
6a.
8a.
5d.
8.
8b.
7d.
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5a.
4a.
4.
7.
7a. 7c.
8c.
5c.

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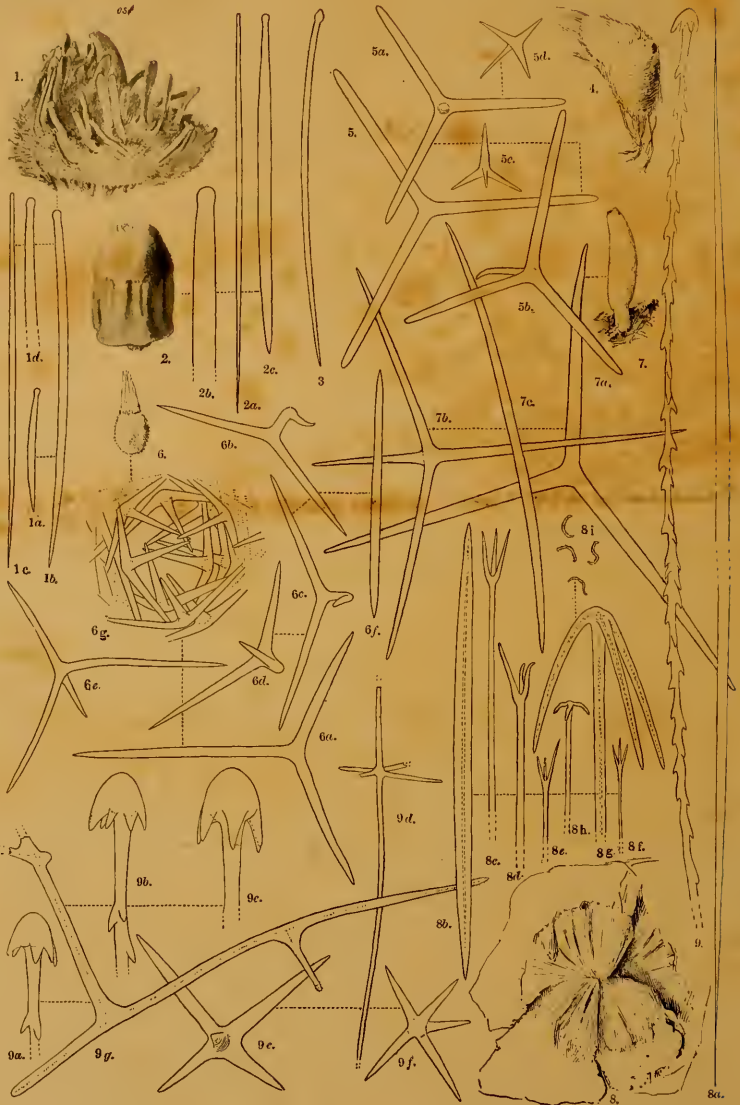
osc
1.
1d.
1a.
1c.
1b.
2.
2b.
2c.
2a.
3
5a.
5d.
4.
5.
5c.
5b.
7.
7a.
7b.
7c.
6.
6b.
6c.
6g.
6f.
6e.
6d.
6a.
8i
8h.
8g.
8f.
8e.
8c.
8d.
8b.
9d.
9b.
9c.
9.
9a.
9g.
9e.
9f.
8.
8a.

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