

V.—*On some Sponges from the Pacific Coast of Canada and Behring Sea.*

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(Presented by J. F. Whiteaves, and read June 1, 1892.)

The sponges referred to in the present paper were collected by Dr. George M. Dawson in 1885, at several localities on the coast of British Columbia, and in 1891 in Behring Sea. It will be convenient to consider the collections made in each of these years, separately, as they appear to belong to two distinct faunæ.

The writer is under great obligations to Mr. Whiteaves for much kindly assistance in the preparation of this paper, and to Mr. Martin J. Griffin, Parliamentary Librarian, for the loan of books that are not in the library of the Geological Survey.

A.—SPECIES COLLECTED IN 1885 FROM THE PACIFIC COAST OF CANADA.

Before describing these it will be as well to note that the other invertebrata collected by Dr. Dawson in 1885 have already been reported upon by Mr. Whiteaves in a paper, entitled "On some Marine Invertebrata dredged or otherwise collected by Dr. G. M. Dawson in 1885, on the coast of British Columbia, with a supplementary list of a few land and fresh water shells, fishes, birds, etc., from the same region," which was read before Section IV. of this Society in 1886, and published in its 'Transactions.'

All the sponges referred to under this heading were obtained by dredging.

MONAXONIDA.

HALICHONDRIA PANICEA, Johnston.

(Plate III, figs. 1 and 2, and Plate V, figs. 1, 1a, and 2, 2a, 2b.)

- Halichondria panicea*, Johnston. 1842. British Sponges, p. 114, pl. x. and pl. xi, fig. 5.
Amorphina panicea, Schmidt. 1870. Spong. Atlant. Gebiet., p. 77.
Amorphina megalorhaphis, Carter. 1881. Ann. and Mag. Nat. Hist., ser. 5, vol. vii. p. 368.
Amorphina megalorhaphis, Ridley. 1884. Zool. Coll. H.M.S. "Alert," Brit. Mus., p. 416.
Amorphina megalorhaphis, Ridley. 1885. Narr. Chall. Exp., vol. i. pt. ii. p. 571.

1.—An encrusting form (Plate III, fig. 2) with an average thickness of 5 mm., found growing on rocks. The oscula are raised above the general level and occupy the summits of conical projections. The size of the spicules varies from 0.403 by 0.013 mm. to 0.176 by 0.006 mm. (Plate V, figs. 2, 2a, 2b). One specimen.

Locality.—Seymour Narrows, Discovery Passage, Vancouver Island, in shallow water.

2.—A massive variety sometimes growing round portions of the fronds of fucoids, represented in the collection by two specimens, the larger of which (Plate III, fig. 1) is

65 mm. long, 60 mm. broad and 35 mm. thick. The spicules of this variety are somewhat more curved than those of the form from Seymour Narrows and vary in size from 0.353 by 0.013 mm. to 0.150 by 0.006 mm. (Plate V, figs. 1, 1a).

Locality.—West coast of Vancouver Island, north of Quatsino Sound, in thirty to fifty fathoms.

This sponge has a considerable variation in general shape, and on that account it is thought desirable to give figures of the specimens in this collection.

ESPERIOPSIS RIGIDA. (Sp. nov.)

(Plate III, fig. 4 and Plate V, figs. 3, 3a—g.)

Sponge erect, stipitate, compressed, palmate, branching dichotomously, with a height of about 155 mm. In the specimen figured the stem attains a height of about 50 mm. before it branches, it then broadens gradually into a palmate expansion with erect, short, stout branches near the summit. Diameter of the stem near the base 8 mm., greatest breadth of palmate part just before dividing 32 mm., with a maximum thickness of 12 mm. *Colour* when alive, bright orange. *Texture* moderately firm, brittle. *Surface* very rough, especially near the extremities of the branches. *Oscula* large circular openings, with an average width of 6 mm., one at the summit of each branch. Examined in the dried state.

Skeleton.—Composed of spiculo-fibre, having a large proportion of spongin, and anastomosing very irregularly (Plate V, fig. 3). There is no special dermal skeleton.

Spicules.—(a) *Megasclera*; ¹ of two kinds.

(1) Smooth styli, sharply pointed, of varying curvature, developing bulbous inflations along the shaft (Plate V, figs. 3a, 3b, 3c); size varying from 0.242 to 0.170 mm. in length by from 0.019 to 0.006 mm. in thickness. (2) Very slender, slightly curved, smooth styli (Plate V, fig. 3d) which occur in small numbers throughout the skeleton; average size 0.170 by 0.002 mm. (b) *Microsclera*; small isochelae (Plate V, figs. 3e—g) of varying size and curvature, abundant; length from 0.026 to 0.01 mm.

The styli develop inflations along the shaft which are variable in number and size. Sometimes the spicules have a distinct tylostylote form but frequently the inflations are scarcely perceptible.

One of the two specimens in the collection has the form of an erect tube with a diameter of 9 mm., a height of 80 mm., and is probably a young sponge. The other specimen is figured on Plate III, fig. 4.

Locality.—Entrance to Malaspina Inlet, mainland of British Columbia, in sixty to seventy fathoms.

ESPERIOPSIS VANCOUVERENSIS. (Sp. nov.)

(Plate III, fig. 5 and Plate V, figs. 4, 4a, 4b, 4c, 4d.)

Sponge compressed laterally, growing in sublabellate, somewhat lobate expansions, the lobes being irregular in their shape and disposition and frequently coalescing. Sur-

¹ The terminology used in this paper is essentially the same as that adopted in the "Challenger Reports."

rounding a fragment of *Corallina officinalis*, L. (Plate III, fig. 5). Height 72 mm., maximum breadth 45 mm., with an average thickness of 17 mm. One large specimen and five fragments. *Colour* when dry, light yellowish brown. *Texture* firm, slightly brittle. *Surface* moderately rough. *Oscula* circular openings flush with the surface with an average width of nearly 2 mm., irregularly disposed on both side of the sponge. Examined in the dried state.

Skeleton.—Composed of a rather irregular reticulation of spiculo-fibre, with no special dermal arrangement. The fibres at right angles to the surface end abruptly without the formation of brushes. (Plate V, fig. 4.)

Spicules.—(a) *Megasclera*; of one kind only, viz: slightly curved, sharply pointed, smooth styli, varying in length from 0.109 to 0.163 mm. and in thickness from 0.013 to 0.006 mm. (Plate V, figs. 4a, 4b). (b) *Microsclera*; of one kind only, viz: Small palmate isochelæ, abundant. Average length 0.019 mm. (Plate V, figs. 4c., 4d).

Locality.—West coast of Vancouver Island, north of Quatsino Sound, in thirty to fifty fathoms.

ESPERIOPSIS QUATSINOENSIS. (Sp. nov.)

(Plate III, figs. 8, 9 and Plate V, figs. 8, 8a, 8b, 8c).

Sponge with a short stem, varying from irregularly subflabellate to subramose (Plate III, figs. 8, 9). The six specimens representing this species in the collection show variations in shape between these extreme forms. The height of the largest specimen including the stem is 200 mm. and the length of the stem itself is about 25 mm. *Colour* when dry varying from creamy or yellowish-white to light brownish-grey. *Texture* firm, tough. *Surface* slightly rough to the touch. *Oscula* ranging in size from 7 mm. to 1 mm. in diameter, arranged in a uniserial row. In the flabellate forms the oscula occupy the upper portion of the sponge and in the ramose forms they are frequently arranged along one side of the subcylindrical branchlets, each of which terminates in a large osculum. Examined in the dried state.

Skeleton.—Consisting of bands of stout, distinct spiculo-fibre radiating outwards to the surface, joined together by less regularly disposed and less robust fibres: the whole forming an irregular reticulation. The outwardly radiating fibres terminate in distinct brushes composed of stylote spicules of the same size as those of the main skeleton (Plate V, fig. 8).

Spicules.—(a) *Megasclera*; one kind. Stout, moderately curved smooth styli, rather sharply pointed (Plate V, figs. 8a, 8b), varying in length from 0.216 to 0.144 mm. in different specimens, with an average breadth of 0.013 mm. (b) *Microsclera*; small palmate isochelæ about 0.026 mm. in length. These latter are scarce and have only been seen by the writer in side view (Plate V, fig. 8c).

Locality.—West coast of Vancouver Island, north of Quatsino Sound, in thirty to fifty fathoms, five specimens. Near Lasqueti Island, Strait of Georgia, one specimen.

ESPERIOPSIS LAXA. (Sp. nov.)

(Plate III, fig. 10 and Plate V, figs. 13, 13a, 13b, 13c).

Sponge (Plate III, fig. 10) ramose, branching and anastomosing in an irregular manner. The branches subcylindrical, tubular, spreading and often becoming palmate, digitate or obscurely lobate at their outer extremities. Represented in the collection by three specimens and a few fragments. Height of the specimen figured about 120 mm., average diameter of the branches 10 mm. *Colour* when dry, light brownish-yellow. *Texture* firm, unyielding. *Surface* rough to the touch. *Oscula* in the form of a circular opening occupying the extremity of each branch or of each lobe when the branch becomes lobate, palmate or digitate. Average diameter 3 mm. Examined when in the dry state.

Skeleton.—Composed of bands of outwardly ascending spiculo-fibre crossed at right angles and in an irregular manner by secondary fibres, forming an irregular reticulation (Plate V, fig. 13.) There is no special dermal skeleton. Each osculum is the outer termination of a canal, with an average diameter of 3 mm., which occupies the centre of each branch.

Spicules.—(a) *Megasclera*; of one kind only. Short, stout, slightly curved, smooth styli with moderately sharp points (Plate V, fig. 13a). Average size 0.222 by 0.013 mm. (b) *Microsclera*. Palmate isochelæ with an average length of 0.026 mm. (Plate V, figs. 13b, 13c).

Locality.—Oyster Bay, Vancouver Island, in twenty fathoms.

MYXILLA LACUNOSA. (Sp. nov.)

(Plate III, fig. 3 and Plate V, figs. 5, 5a—g.)

Sponge massive, sessile, subglobular. The only specimen representing this species has a length of 33 mm., a breadth of 29 mm., and an average thickness of 17 mm. *Colour* when dry, light yellow. *Texture* hard, firm, rather brittle. *Surface* rough, uneven. *Oscula* numerous, confined to the upper and lateral portions of the sponge, irregular in shape and with their inner surfaces hispid. (Plate III, fig. 3).

Skeleton.—An irregular reticulation of loose spiculo-fibre with no special dermal arrangement of the spicules (Plate V, fig. 5). There are tornote spicules scattered throughout which are most abundant in the dermal part of the skeleton.

Spicules.—(a) *Megasclera*; of two kinds. (1) Stout, smooth styli with moderately sharp points which are slightly but rather abruptly bent near the rounded end; length varying from 0.229 to 0.170 mm. with a thickness of 0.013 to 0.006 mm. (Plate V, fig. 5a); (2) tornote spicules, hastately pointed, of the same thickness throughout their length; average size 0.170 by 0.008 mm. (Plate V, fig. 5b). (b) *Microsclera*; (1) Small, tridentate isochelæ, with slightly curved shaft; length averaging 0.039 mm. (Plate V, figs. 5c, 5d). (2) Sigmata, simple and contort, very abundant; length about 0.019 (Plate V, figs. 5e, 5f, 5g).

Locality.—West coast of Vancouver Island, north of Quatsino Sound, in thirty to fifty fathoms.

MYXILLA ROSACEA, Lieberkühn, var.

Plate III, fig. 6 and Plate V, figs. 6, 6a, 6b—f.)

Halichondria rosacea, Lieberkühn. 1859. Archiv. f. Anat. u. Physiol., vol. ix. p. 520, pl. xi. fig. 2.*Myxilla rosacea*, Schmidt. 1862. Spong. Adriat. Meer., p. 71.*Myxilla fasciculata*, Schmidt. 1862. Spong. Adriat. Meer., p. 71.*Myxilla tridens*, Schmidt. 1864. Spong. Adriat. Meer., Suppl. i, p. 36.*Myxilla Esperii*, Schmidt. 1864. Spong. Adriat. Meer., Suppl. i, p. 36.*Myxilla rosacea*, var. *japonica*, Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp., vol. xx., p. 130; pl. xxvi., fig. 3; pl. xxvii., figs. 8, 8a, 8b, 8c; pl. xxviii., fig. 3.

Sponge massive, amorphous, represented in the collection by a single specimen about 60 mm. long, 38 mm. high, and with a breadth of about 50 mm. *Colour* when dry, light yellowish-grey. *Texture* firm. *Surface* uneven. *Oscula* few, small, scattered. Examined in the dried state. (Plate III, fig. 6).

Skeleton.—Similar to that of *Myxilla rosacea*, var. *japonica*, Ridley and Dendy (op. cit.) (Plate V, fig. 6).

Spicules.—(a) *Megasclera*; of two kinds—(1) entirely and strongly spined, stout, slightly curved styli, terminating abruptly in a sharp point and varying in length from 0.281 to 0.242 mm., with an average breadth of 0.019 mm. (Plate V, fig. 6a). (2) Smooth, hastately pointed tornota with the same thickness throughout, average size 0.222 mm by 0.008 mm. (Plate V, fig. 6b). (b) *Microsclera*; of two kinds. (1) Tridentate isochelæ, with very slightly curved shaft; length 0.085 mm. (Plate V, figs. 6c, 6d). (2) Sigmata; length about 0.065 mm. (Plate V, figs. 6e, 6f).

This sponge differs from *Myxilla rosacea* var. *japonica*, chiefly in the size of its spicules which are nearly twice as large as those of the latter. The spines on the styli are more numerous and of greater size and the shafts of the tridentate isochelæ are straighter.

SUBERITES LATUS. (Sp. nov.)

(Plate III, fig. 7 and Plate V, figs. 7, 7a, 7b, 7c.)

Sponge subhemispherical, broadly lobate or subbotryoidal, varying in length from 80 mm. with a breadth of 60 mm. and a height of 40 mm. to a length of 50 mm. with a breadth of 40 mm. and height of 30 mm. *Colour* in spirit yellowish-brown. *Texture* spongy but moderately firm. *Surface* hispid, uneven except on the base where it becomes flat. *Dermal membrane* adhering firmly to the underlying tissues and when viewed under the microscope the sharp pointed ends of the tylostylote spicules are seen piercing it and projecting a short distance beyond. *Pores* circular, scattered, very numerous with an average width of 0.06 mm. *Oscula* few, having an average diameter of 0.1 mm. In the specimen figured there are three oscula. (Plate III, fig. 7.)

Skeleton.—Confused, with scarcely any development of spiculo-fibre. There is a dermal layer of radiately disposed spicules, which are smaller than those of the main skeleton.

Spicules.—All tylostylote. Of two sizes. (1) Long, straight, but sometimes very slightly bent, sharply pointed, smooth tylostyli with well developed heads; (Plate V,

figs. 7, 7a, 7b.) varying in length from 0.294 to 0.524 mm. with a thickness of about 0.013 mm. (2) Much smaller, rather curved, smooth styli with well developed heads with an average size of 0.170 by 0.009 (Plate V, fig. 7c).

Four out of the five specimens collected have the base pierced by a hole, having an average diameter of 15 mm. at the surface, which proceeds spirally into the centre of the sponge and is almost invariably occupied by a small hermit crab,¹ *Eupagurus Brandti*, Benedict, a species closely allied to *Eupagurus Kroyeri*, Stimpson.

Locality.—North coast of Vancouver Island from Nahwitti Bar to Quatsino Sound, one worn specimen, beach. Near Suquash, off Pulteney Point, Malcolm Island, Broughton Harbour, in twenty-five fathoms, sand, gravel and dead shells, three specimens, one of which is figured on Plate III. Off Blunden Harbour, mainland of British Columbia, in six to ten fathoms, sand, one specimen.

TETRACTINELLIDA.

CYDONIUM MÜLLERI, Fleming.

(Plate IV, fig. 1 and plate VI, figs. 1, 1a—i.)

Acyonium cydonium, Müller. Zool. Dan., vol. iii. pl. lxxxxi. figs. 3, 4, 5a.

Acyonium cydonium, Jameson. Mem. Wern. Soc. Edin., vol. i. p. 563.

Cydonium mülleri, Fleming. 1828. British Animals, 5. 516.

Geodia zelandica, Johnston. 1842. Hist. Brit. Sponges, p. 195, pl. iii. figs. 3, 4.

Geodia zelandica, Bowerbank. 1866. Mon. Brit. Spong., vol. ii. p. 45.

Cydonium mülleri, Gray. 1867. Proc. Zool. Soc. Lond., pp. 127, 492.

Geodia zelandica, Bowerbank. 1874. Mon. Brit. Spong., vol. iii. p. 15, pl. vii.

Cydonium zelandicum, Sollas. 1880. Ann. and Mag. Nat. Hist., ser. 5, vol. v., p. 241.

Geodia zelandica, Norman. 1882. Bowerbank, Mon. Brit. Spong., vol. iv. p. 27.

Cydonium mülleri, Vosmaer. 1887. Bronn's Thierreich, Porifera, p. 317.

Cydonium mülleri, Sollas. 1888. Rep. Tetractinellida, Zool. Chall. Exp., vol. xxv. p. 254.

This species is represented in the collection by a single specimen which is undoubtedly identical with the sponge described by Bowerbank in his "Monograph of the British Spongiadae" as cited above. As, however, there are some differences between the spicules of the specimen from Vancouver Island and those of Johnston's types as figured by Bowerbank (op. cit.) it is thought desirable to give figures of the former.

The sponge (Plate IV, fig. 1) is subspherical in shape with an average diameter of 65 mm. *Cortex* 0.7 mm. in thickness (Plate VI, fig. 1).

Spicules.—(a) *Megasclera*; (1) somal oxea (Plate VI, fig. 1a), varying in length from 3.81 to 2.77 mm. with a thickness of 0.08 mm.; (2) minute oxea (Plate VI, fig. 1b), length 0.288 mm., breadth 0.013 mm.; (3) orthotriæne (Plate VI, figs. 1c, 1c'), rhabdome 2.4 mm. in length, cladi 0.7 mm. in length, chord 0.89 mm.; (4) prototriæne (Plate VI, figs. 1d, 1e), rhabdome 7.84 mm. in length, cladi 0.095 mm. in length, chord 0.10.; (5) anatriæne (Plate VI, figs. 1f, 1g), rhabdome 7.5 mm. in length, cladi 0.06 mm. in length, chord 0.150 mm. (b) *Microsclera*; (1) sterrasters (Plate VI, fig. 1h), 0.091 mm. in diameter;

¹ Kindly determined by James E. Benedict, U. S. National Museum, Washington, to whom it was sent through the courtesy of Prof. Sidney J. Smith, Yale College, New Haven, Conn.

(2) oxyasters (Plate VI, fig. 1i), diameter varying from 0·013 to 0·003 mm. Examined when dry.

Locality.—Strait of Georgia near Comox, Vancouver Island, in four fathoms.¹

HEXACTINELLIDA.

BATHYDORUS DAWSONI. (Sp. nov.)

(Plate IV, fig. 2 and Plate VI, figs. 2, 2', 2a, 2a', 2b, 2b', 2c, 2d-i, 2k.)

Sponge (Plate IV, fig. 2) nearly or quite erect, straight or slightly curved, sub-cylindrical, about 275 mm. in height, with a small base where it has a diameter of 20 mm. At midheight the maximum diameter is 50 mm. whence it gradually decreases in breadth until it has a diameter of 35 mm. at its upper extremity. The wall has an average thickness of 7 mm. becoming thinner near the oscular margin which is provided with a fringe of long, smooth, diact marginalia with pointed ends and having an average length of 50 mm. The surface exhibits regularly distributed openings with an average diameter of 0·5 mm. and is rendered villose by the presence of long, sharp pointed, smooth pleuralia which have a maximum length of about 60 mm. The gastral surface is smooth and has openings similar to those seen in the dorsal. *Texture* soft. *Colour* in spirit light yellowish-grey.

Skeleton.—(Plate VI, fig. 2.) Composed of a loose lattice-like reticulation of long, smooth diacts which lie subparallel to the surface.

Spicules.—The parenchymalia consist of: (a) *principalia*, long, slender, smooth, sharp pointed diacts (oxea) with a maximum size of 11·06 mm. by 0·1 mm. (Plate VI, fig. 2'); (b) *comitalia*, long, slender, smooth diacts which have rough inflated and generally bluntly pointed but sometimes round, club-shaped ends (Plate VI, figs. 2a, 2a', 2b, 2b'); maximum size 8·8 by 0·01 mm. These comitalia frequently develop two or four rounded tubercles or elevations at the centre. Besides these there are the following: (c) *intermedia*, (1) numerous oxyhexasters (Plate VI, fig. 2c), having an average diameter of 0·06 mm., with long, bent, smooth terminal rays, (2) numerous oxyhexacts, with straight, smooth, pointed rays (Plate VI, fig. 2d); average diameter 0·085 mm. By the subdivision of one or more rays of the oxyhexacts, forms like the oxyhexasters are evidently developed, as modifications between these extreme forms are numerous. (3) Small discohexasters (Plate VI, fig. 2e) with strong principal rays bearing about six short, slightly divergent, straight terminals. Hypodermal pentacts (Plate VI, figs. 2f, 2g) with a smooth proximal ray about 8 mm. in length, occur in the dermal skeleton. The four tangential rays are spined, generally curved slightly inward and are about one-third the length of the proximal ray. The dermal membrane includes a large number of small rough pentacts and tetracts (Plate VI, figs. 2h, 2i) whose rays are about 0·06 mm. in length. The gastral skeleton is devoid of hypogastralia and consists of numerous rough oxyhexacts (Plate VI, fig. 2k) with rays averaging 0·06 mm. in length.

¹ A single specimen of this species, which is in the Museum of the Geological Survey, had previously been collected by Dr. G. M. Dawson, in 1878, off Cumshewa Harbour, Queen Charlotte Island, in twenty fathoms.

The writer has much pleasure in associating with this sponge the name of Dr. George M. Dawson, to whom science is indebted for so much new information relative to the marine invertebrate fauna of the Pacific coast of the Dominion.

Locality.—Off the mouth of Qualicum River, Vancouver Island, in forty fathoms, sand and gravel, one specimen (figured). Strait of Georgia near Comox, Vancouver Island, in forty fathoms, two specimens, about 90 mm. in length, with some fragments.

APHROCALLISTES WHITEAVESIANUS. (Sp. nov.)

(Plate III, fig. 11 and Plate VI, figs. 3, 3a—n, 3p.)

Sponge funnel-shaped or forming subcylindrical ramifications (Plate III, fig. 11). In the specimen figured, which is unfortunately damaged above, the breadth increases gradually from a narrow base which has a diameter of 9 mm. and a very small surface of attachment, to the upper extremity, the maximum diameter of which is 45 mm.

Skeleton.—(Plate VI, fig. 3.) Composed of a regular, honeycomb like, dictyonal framework with rough beams which are connected together without much thickening at their intersections. The meshes are for the most part quadrangular but sometimes triangular or irregular in shape. The reticulation is much more regular in the dermal part of the skeleton than in the gastral. From the intersections of the framework, stout, sharp pointed continuations of the beams frequently project. These are longest near the gastral surface and curve inward toward the interior of the skeleton. The wall of the cup is about 5 mm. thick and the radial six-sided canals which traverse it have an average diameter of .75 mm.

Spicules.—Rough hexacts with strongly spined distal rays (pinuli) in the dermal skeleton (Plate VI, fig. 3a.) The distal ray varies considerably in size and shape. It may be long and thick, set with large spines: short, stout with few spines: or almost devoid of spines and similar to the four tangential rays. In some cases the proximal ray is very much developed (Plate VI, fig. 3b.) The average length of the pinuli, measuring from the upper end of the spined distal ray to the lower end of the proximal ray is 0.347 mm. Besides the pinuli there are numerous scopulæ which seem to assume two distinct shapes; (a) a stout, rough form (Plate VI, fig. 3c), averaging 0.366 mm. in length, with seldom more than four knobbed prongs and (b) a smaller, almost smooth form with an average length of 0.307 mm. (Plate VI, fig. 3d), with about six rather slender, slightly divergent, knobbed prongs. Both these forms have sharp pointed shafts. The unciates are long, slender and regularly spined (Plate VI, figs. 3e, 3e', 3f), their maximum length being 2.03 mm. The other parenchymalia are: (a) rough hexacts having an average diameter of 0.157 mm., with robust rather sharp pointed rays (Plate VI, fig. 3g). A few rough tetracts with straight rays and rough hexacts with slender, slightly curved rays are present (Plate VI, figs. 3i, 3h) and are possibly modifications of the hexacts; (b) smooth hexacts having an average diameter of 0.06 mm. with stout, sharp pointed rays (Plate VI, fig. 3j). These frequently develop a variable number of rays, sometimes as many as sixteen or eighteen and are often of large size. The one represented on (Plate VI, fig. 3k), has a diameter of 0.091 mm. and the largest one seen, which has a diameter

of 0.163 mm., has eight rays; (*c*) small, rough discohexacts (Plate VI, fig. 3l), with an average diameter of 0.052 mm., whose principal rays sometimes bear long, straight terminals; (*d*) slender, rough discohexasters (Plate VI, figs. 3m, 3n), varying in diameter from 0.052 to 0.045 mm. with two or three slightly bent terminals. Simple, rather bluntly pointed diacts occur. These are rough, becoming almost spinose at each end and bear four central tubercles or inflations (Plate VI, fig. 3p).

I have named this interesting species after Mr. J. F. Whiteaves, at whose suggestion the critical examination of these sponges was undertaken.

Locality.—Strait of Georgia near Comox, Vancouver Island, ten miles south-east of Hornby Island, in forty fathoms, one specimen (figured) and a few fragments.

B.—SPECIES COLLECTED IN 1891 IN BEHRING SEA.¹

MONAXONIDA.

HALICHONDRIA PANICEA, Johnston.

(Plate IV, figs. 3, 4, 5 and Plate V, figs. 9, 9a, 10, 10a, 11, 11a).

1.—A large, massive, rugose form (Plate IV, fig. 3) with a rather cavernous structure; size of spicules (Plate V, figs. 9, 9a) varying from 0.657 by 0.02 mm. to 0.209 by 0.013 mm. Length of the only specimen collected 102 mm., breadth 92 mm., height 80 mm.

Locality.—Atka Island, Aleutian Islands, lat. 52° 20' N., long. 174° 30' W.

2.—A compact form with an even surface and rather dense skeletal structure (Plate IV, fig. 4); spicules ranging in size from 0.412 by 0.013 mm. to 0.176 by 0.009 mm. (Plate V, figs. 10, 10a.) The sponge has a length of 65 mm., a breadth of 55 mm., and a height of 40 mm. One specimen.

Locality.—Atka Island, Aleutian Islands, lat. 52° 20' N., long. 174° 30' W.

3.—A variety represented by a large specimen (Plate IV, fig. 5), very dense in structure with spicules varying in size from 0.726 by 0.02 mm. to 0.117 by 0.004 mm. (Plate V, figs. 11, 11a.) One specimen, very much worn; length 125 mm., breadth 70 mm., thickness 35 mm.

Locality.—St. Matthew Island, Behring Sea, lat. 60° 30' N., long. 172° 30' W.

RENIERA RUFESCENS. (Sp. nov.)

(Plate IV, fig. 6 and Plate V, figs. 12, 12a.)

Sponge (Plate IV, fig. 6) very irregular in form, consisting of variously lobate or short, stout, subramose expansions which frequently coalesce, in some specimens so much so as to become almost massive. Represented in the collection by five specimens and a number of fragments. One of the specimens is encrusting a valve of *Tapes staminea*, Conrad, and two others have grown round fragments of *Corallina officinalis*, L. The sub-

¹ All the specimens referred to under this heading were collected on the beach.

ramose branchlets or expansions vary in diameter from 5 mm. to 14 mm. *Colour* when dry, light yellowish-brown verging into a dull crimson lake. *Texture* fragile, brittle. *Surface* slightly rough to the touch. *Oscula* circular, each at the summit of a branchlet and with an average diameter of 2 mm. Examined when dry.

Skeleton.—(Plate V, fig. 12.) Renierid in arrangement, viz.: a uniserial, moderately regular reticulation.

Spicules.—(Plate V, fig. 12a) small, stout, rather sharply pointed, slightly curved, smooth oxea; average size 0.144 by 0.013 mm.

Locality.—Petropaulowski, Kamtschatka, lat. 60° 30' N., long. 172° 30' W.

ESPERIOPSIS QUATSINOENSIS.

(Plate IV, fig. 7 and Plate VI, fig. 4).

Locality.—Checkagoff Harbour, Atka Island, Aleutian Islands, lat. 52° 20' N., long. 174° 30' W: one very symmetrical specimen of this sponge which has already been described on p. 75.

PHAKELLIA PAPYRACEA, Ridley and Dendy, var.

(Plate IV, fig. 8 and Plate VI, figs. 5, 5a).

Phakellia papyracea, Ridley and Dendy. 1886. Ann. and Mag. Nat. Hist., ser. 5, vol. xviii., p. 478.

Phakellia papyracea, Ridley and Dendy. 1887. Rep. Monaxonida, Zool. Chall. Exp., vol. xx., p. 172, pl. xxxvi, fig. 4.

Sponge (Plate IV, fig. 8) cup-shaped, stipitate with a well developed stalk, the specimen figured having a height of 105 mm., the cup itself being 55 mm. high with a diameter of 60 mm. The thickness of the wall of the cup varies from about 8 mm. near the base to 4 mm. near the thin upper margin. *Colour* when dry, yellowish or brownish-white. *Texture* firm. *Surface* slightly rough to the touch, alike on the outside and inside of the cup. *Oscula* distinct, numerous, on both surfaces. Examined when dry.

Skeleton.—(a) *Main*; irregularly reticulate, open. The primary fibres, strong, distinct with secondary fibres crossing them in a loose and irregular manner. (b) *Dermal*; dense, composed of indistinct brushes of small stylote spicules.

Spicules.—*Megasclera*; of two kinds. (1) Large, stout, slightly curved, smooth styli, rather sharply pointed (Plate VI, fig. 5); size about 0.412 by 0.013 mm. (2) Small, moderately curved, sharp pointed, smooth styli (Plate VI, fig. 5a); size 0.176 by 0.009 mm.

This sponge is represented in the collection by three well preserved specimens which agree fairly well with the description of *Phakellia papyracea*, Ridley and Dendy, and may be considered as a variety of that species, especially if that sponge should eventually prove to be cup-shaped. The wall of the cup, however, is much thicker than in *Phakellia papyracea*, Ridley and Dendy, and the spicules are much smaller.

Locality.—St. Matthew Island, lat. 60° 30' N., long. 172° 30' W.

EXPLANATION OF PLATES.

PLATE III.

All the figures in this plate are of natural size.

- Fig. 1.—*Halichondria panicea* (page 73). Massive variety.
 Fig. 2.—*Halichondria panicea* (page 73). Encrusting form.
 Fig. 3.—*Myxilla lacunosa* (page 76).
 Fig. 4.—*Esperiopsis rigida* (page 74).
 Fig. 5.—*Esperiopsis Vancouverensis* (page 74).
 Fig. 6.—*Myxilla rosacea*, var. (page 77).
 Fig. 7.—*Suberites latus*, side view (page 77).
 Figs. 8, 9.—*Esperiopsis Quatsinoensis*, side views of two specimens showing variations in form (page 75).
 Fig. 10.—*Esperiopsis laxa* (page 76).

PLATE IV.

The figures in this plate are of natural size, unless otherwise stated.

- Fig. 1.—*Cydonium Mülleri* (page 78).
 Fig. 2.—*Bathydorns Dawsoni* (page 79). One-half natural size.
 Fig. 3.—*Halichondria panicea* (page 81). Rugose form, one-half natural size.
 Fig. 4.—*Halichondria panicea* (page 81).
 Fig. 5.—*Halichondria panicea* (page 81). One-half natural size.
 Fig. 6.—*Reniera rufescens* (page 81).
 Fig. 7.—*Esperiopsis Quatsinoensis* (page 82).
 Fig. 8.—*Phakellia papyracea*, var. (page 82).

PLATE V.

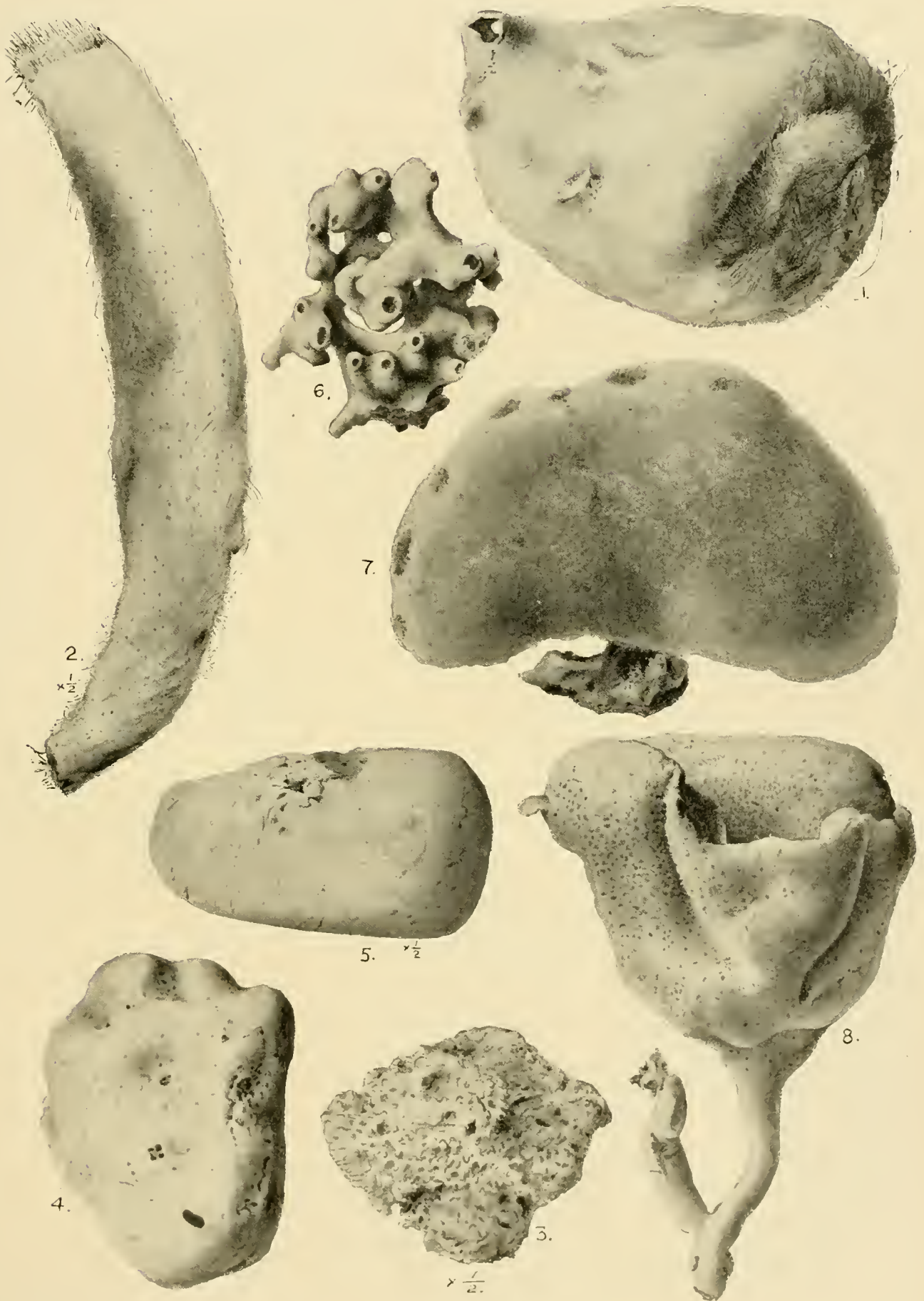
- Fig. 1.—*Halichondria panicea* (page 73). Small oxeote spicule; $\times 272$.
 Fig. 1a. Large oxeote spicule; $\times 272$.
 Fig. 2.—*Halichondria panicea* (page 73). Skeleton arrangement, as seen in section at right angles to the surface; $\times 60$.
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 Fig. 3d. Slender stylus; $\times 272$.
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 Fig. 4.—*Esperiopsis Vancouverensis* (page 74). Skeleton arrangement, as seen in vertical section at the surface; $\times 60$.
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 Fig. 4c. Isochela, side view; $\times 272$.
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- Fig. 8.—*Esperiopsis Quatsinoensis* (page 75). Vertical section at the surface; $\times 60$.
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- Fig. 10.—*Halichondria panicea* (page 81). Oxeote spicule; $\times 272$.
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- Fig. 11.—*Halichondria panicea* (page 81). Large oxeote spicule; $\times 136$.
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- Fig. 12.—*Reniera rufescens* (page 81). Section showing the arrangement of the skeleton; $\times 60$.
 Fig. 12a. Oxeote spicule; $\times 272$.
- Fig. 13.—*Esperiopsis laxa* (page 76). Skeleton arrangement, as seen in vertical section at the surface; $\times 60$.
 Fig. 13a. Stylus; $\times 272$.
 Fig. 13b. Isochela, side view; $\times 272$.
 Fig. 13c. Isochela, front view; $\times 272$.

PLATE VI.

- Fig. 1.—*Cydonium Mülleri* (page 78). Section at right angles to the surface, through the cortex; $\times 8$.
 Fig. 1a. Small oxeote spicule; $\times 42$.
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- Fig. 3.—*Aphrocallistes Whitearsianus* (page 80). Part of the dictyonal skeleton near the dermal surface; $\times 60$.
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