XVII.

REPORT ON THE PORIFERA COLLECTED BY THE DANMARK EXPEDITION AT NORTH-EAST GREENLAND

BY

H. V. BRØNDSTED

The sponges treated in this paper were collected by the Danmark Expedition at North-East Greenland in 1906—08.

The material is astonishing small, only 12 species and also few specimens; whether this circumstance is due to the fact that the dredgings were nearly all undertaken in comparatively shallow water, or to other facts, it is impossible to state.

The material is for the greater part badly preserved, in not too strong alcohol; hence the condition only allowed a study on skeletal arrangement and on spicules: a purely systematic study.

The methods employed have been the usual: dry cutting for study on skeletal arrangements; isolating of spicules by means of Eau de Javelle, which proved far better than Kaliumhydroxyd.

Sponges were obtained at the following stations: 63, 64, 68 a, 72 b, 95 c, 96, 99, 104 b.

The material is much too small to yield matter for a discussion on any biological topic, its value in itself is mainly to contribute to our knowledge on arctic sponge-stock; but in connection with the more considerable materials of other arctic expeditions (as that of the Danish Ingolf-Expedition) it will also possess biological (mainly zoogeographical) interest.

As to the paper itself the following is to be said: 12 species are mentioned: *Calcareous*: *Leucosolenia coriacea* Mont., *Grantia arctica* H., *Leuconia ananas* Mont., *Hexactinellides*: *Rhabdocalyptus arcticus* nov. spec., *Asconema setubalense* Sav. Kent., *Monaxonides*: *Halichondria tenuispiculata* nov. spec., *Reniera cinerea* Grant, *Reniera laxa* Ldbck., *Mycale thaumatochela* Ldbck., *Lissodendoryx indistincta* Frstdt., *Lissodendoryx complicata* Arm. Hans., *Higginsia pyriformis* nov. spec. As will be seen, 3 of these are new species; the remaining 9 species are so well known, described and figured that further report is superfluous.

The figures are all drawn by myself, Pl. XXV by means of Abbes drawing-apparatus from Zeiss. The microscope employed was a Stativ from Zeiss with acromatic systems, oculars of Huyghens.

I shall here express my gratitude to the late Inspector G. M. R. Levinsen of the Zoological Museum of Copenhagen, and to Inspector W. Lundbeck, also of the Zoological Museum, for several valuable hints concerning the preparing of this paper.

PORIFERA

Class I. Calcarea.

Order I. *Homocoela.*

Fam. Asconidae.

Genus Leucosolenia Bow.

Leucosolenia coriacea Mont.

1818. *Spongia coriacea* Montagu [21], p. 116.
1842. *Grantia* — Johnston [13], p. 183, Pl. XXI, fig. 9.
1866. *Leucosolenia coriacea* Bowerbank [3 b], p. 34.
1872. *Ascetta* — Haeckel, [11], II, p. 24, Taf. 3, Taf. 5.
1887. — — Fristedt, [8], p. 405, Pl. 22, fig. 1—2.

3 specimens; color dark brown; greatest length ca. 18 mm., thickness 1—2 mm.

Station 63. Stormbugt, hard bottom, 20—40 m.

Geographical distribution: Cosmopolitan.

Depth: 0—1000 m.

Order II. *Heterocoela.*

Fam. Syconidae.

Genus Grantia Flem.

Grantia arctica H.

1872. *Sycandra arctica* Haeckel [11], p. 353, Taf. 55, fig. 1 a-v; Taf. 60, fig. 15.
1883. *Sycon* — Polejaeff [22], p. 40, Pl. III, fig. 5.
1898. *Grantia* — Breitfuss [4], p. 302.
1898. — — — [5], p. 21.

3 specimens; greatest length 20 mm., breadth 10 mm.; one of the specimens (from Station 95 c) with comparatively slender rhabdes, but then a few more in each bundle.

Station 68 a. Off Cape Bismarck. 40—60 m.
— 72 b. Danmarks Havn. 10—20 m.
— 95. The sound between Renskæret and Maatten. 50—100 m.

Geographical distribution: Arctic circumpolar.

Depth: 20—2000 m.

Fam. Leuconiidae.

Leuconia Grant.

Leuconia ananas Mont.

1818. *Spongia ananas* Montagu [21], p. 97, Pl. 16, figs. 2—3.
1872. *Leuconia* — Haeckel [11], p. 200, Taf. 32, fig. 5 a—f, Taf. 40, figs. 1—8.
1898. — — Breitfuss [4], p. 223.
1898. — — [5], p. 31.

One specimen, oval, length 10 mm., breadth 4 mm., color whitish yellow.

Station 63. Stormbugt, hard bottom, 20—40 m.

Geographical distribution: Greenland, Spitzbergen, Murman-coast, White-Sea, off Norway, Shetland Islands, English coasts, Normandy.

Depth: 10—130 m.

Class II. Hexactinellida.

Subclass I. Lyssacina.

Order I. *Hexasterophora.*

Fam. Rossellidae.

Genus Rhabdocalyptus Jij.

Rhabdocalyptus arcticus nov. spec.
Pl. XXV, Pl. XXVI, figs. 1—7.

The present form is perhaps not at all a *Rhabdocalyptus*, but for the present I refer the sponge to this genus, because its structure and the greater part of the spiculation agree with those of *Rhabdocalyptus*. The fact that makes me doubtful as to the right genus-determination is, that discohexacts are missing entirely, so far as I have observed. The referring of the form to the genus *Bathydorus* is contradicted by the presence of the big prostalia pleuralia.

The sponge (Pl. XXV) is cylindrical, somewhat compressed and constricted towards the summit and the base; 3 specimens form a little colony, the one, however, nipped off. The oscular opening has a diameter of ca. 30 mm. in the biggest specimen, in the smaller ca. 20 mm. The length of the biggest specimen is ca. 110 mm., by 40 mm., of the smaller 80 by 25 mm. The wall varies in thickness

from 1—ca. 8 mm., the consistency is like that of loose felt; color grey; the surface (both dermal and gastral) hispid. The characteristic *pentactine prostalia pleuralia* project 4—5 mm. from the dermal surface of the sponge, the cross naturally placed distally, outside the spongebody; these pentacts, whose rays are imbedded in mud, are only found in a few places, especially where the 3 individuals together form a corner; in other places they are rubbed off (on the figure, Pl. XXV, more are drawn than really observed). The summits of the sponge-individuals are provided with a damaged fringe of *prostalia marginalia.* The canal system and skeletal arrangement are as in the *Rosellidae* in general, and *Rhabdocalyptus* especially.

Spiculation. 1°. *Oxydiacts*, length about 10 mm., form the main skeleton, in fibres principally parallel with the sponge-surface; 2°. *Pentacts* (Pl. XXVI, fig. 4), ca. 6 mm., very strongly hispid (a pronounced *Rhabdocalyptus* criterion); these form the *prostalia pleuralia*, but are also imbedded in the sponge-corpus itself, the tangential rays immediately beneath the dermal membrane; 3°. *Oxypentacts*, (Pl. XXVI, fig. 3), hispid, sustaining the dermal membrane, the distal radial ray rudimentary (criterion for *Rosellidae*). 3 a°. *Oxypentacts*, smooth, the radial ray 3—5 times the tangential ones, in the dermal membrane (?) very rarely found; I regard these spicules as strange elements to the sponge itself. 4°. *Oxyhexasters*, hispid, (Pl. XXVI, fig. 2) form the gastral skeleton (Pl. XXVI, fig. 1), and are also distributed in the parenchyma. 5. *Oxydiacts* (Pl. XXVI, figs. 5—5 c) hispid, the ends rather blunt, a swelling near the middle, a swelling which often assumes the form of 4 knots or even 4 short rays; distributed in the parenchyma. 6°. *Diacts* (Pl. XXVI, fig. 6—6 b) styliform, hispid, length 1—2 mm., somewhat bent near the blunt end, where the axial cross is to be found. 7°. *Oxyhexacts* (Pl. XXVI, figs. 7—7 a) hispid, ca. 0,120 mm.; one or more rays often divided in two (fig. 7 a), always bent in the end; occur everywhere in the sponge.

Station 104 b. Lat. 76°06′ N. Long. 13°26′ W., gravelled clay bottom.

Depth: 250—200 m.

Fam. Asconematidae.

Subfam. Asconematinae.

Genus Asconema Saville Kent.

Asconema setubalense Sav. Kent.

1870. *Asconema setubalense* Saville Kent [14], p. 241.
1887. — — Schulze [26], p. 116, Pl. XXI.

The specimens in hand fully agree with the descriptions given of *A. s.* in the litterature. Whether the fragments have formed one or more specimens, it is impossible to state. The biggest fragment has an extension of ca. 150 mm.

Station 104 b. Lat. 76°06′ N. Long. 13°26′ W., gravelled clay bottom.

Depth: 250—200 m.

Geographical distribution: Atlantic to Arctic ocean.

Class III. Demospongiae.

Subclass I. Monaxonida.

Order *Halichondrina.*

Fam. Homorrhaphidae.

Subfam. Renierinæ.

Genus Halichondria Flem.

Halichondria tenuispiculata nov. spec.

One specimen, somewhat damaged, 25 mm. in length, breadth 10 mm.; consistency tolerably firm; color yellowish brown; surface finely hispid; ostiae ca. 0,1—0,2 mm. in diameter. In the skeleton one can just distinguish vague beginnings towards polyspicular fibres, some of these tending towards the surface of the sponge, and ending with spicules projecting slightly beyond the surface, making this hispid; dermal membrane very delicate, transparent.

The characteristic of the species is, however, the spicules: These are *oxea* (Pl. XXVI, fig. 8 a—d), slightly bent in the middle, rather abruptly pointed, with nearly parallel edges; the length rather constant, about 0,180 by 0,008 mm.: smaller than in any *Halichondria* species, so far as I know; many developmental forms of spicules are found.

Station 63. Stormbugt, hard bottom.

Depth: 20—40 m.

Genus Reniera Nardo.

Reniera cinerea Grant.

1827. *Spongia cinerea* Grant [9], p. 204.
1842. *Halichondria cinerea* Johnson [13], p. 110, Pl. IV, fig. 4.
1866. *Isodictya* — Bowerbank [3 b], p. 241, Pl. XLVIII, figs. 1—5.

1870. *Reniera cinerea* O. Schmidt [25], p. 77.
1902. — — Lundbeck [17], p. 43, Pl. XI, fig. 10.

Some insignificant, damaged specimens, color brownish, on *Delesseria sanguinea*.

Station 72 c. Stormbugt. 15—20 m.

Geographical distribution: Greenland, Jan Mayen, Mossel Bay, Gullmaren, English coasts, The Philippines, British Columbia.

Depth: 20—200 m.

Reniera laxa Ldbck.

1902. *Reniera laxa* Lundbeck [17], p. 46, Pl. II, fig. 6, Pl. XI, flg. 13.

2 specimens agree with the description given by Lundbeck, only the average length of oxea is slightly smaller than in the specimens from the Ingolf Expedition (as the original specimen is found in the Zoological Museum in Copenhagen I have had it for examination). Specimens in hand 5—8 mm., on *Delesseria*.

Station 72 c. Stormbugt. 15—20 m.

Geographical distribution: Davis Strait to Iceland.

Depth: 100—200 m.

Fam. Desmacidonidae.

Subfam. Mycalinae.

Group 1. *Mycaleae*.

Genus **Mycale** Gray.

Mycale thaumatochela Ldbck.

1897. *Esperella intermedia* Vanhöffen [29], p. 248.
1905. *Mycale thaumatochela* Lundbeck [18], p. 39, Pl. X, figs. 2 a—g.
1909. — — — [20], p. 437.

3 specimens, incrusting on Balanus-shells, at largest 1 mm. thick, ca. 10 mm. in length; agrees with Lundbecks specimens, only the styli may diminish to 0,300 mm.

Station 63. Stormbugt. 20—40 m.
— 94. The sound at Cape Bismarck, 20—40 m.

Geographical distribution: Greenland.

Depth: 20—60 m.

Group 2. *Myxilleae*.

Genus **Lissodendoryx** Tops.

Lissodendoryx indistincta Frstdt.

1887. *Hastatus indistincta* Fristedt [8], p. 444, Pl. 25, figs. 13—19.
1905. *Lissodendoryx indistincta* Lundbeck [18], p. 162, Pl. V, fig. 10, Pl. XVI, fig. 3 a—h.

1909. *Lissodendoryx indistincta* Lundbeck [20], p. 440.

Several damaged specimens, one of them completely filled with sand. Fully agree with the description given by Lundbeck. Color yellowish to light-grey.

Station 63. Stormbugt, hard bottom, depth 20—40 m.

Geographical distribution: Greenland, Spitzbergen.

Depth: 10—200 m.

Lissodendoryx complicata Arm. Hans.

1885. *Reniera complicata* Armauer Hansen [12], p. 7, Pl. I, fig. 8, Pl. VI, fig. 8.

1885. *Myxilla grisea* Armauer Hansen [12], p. 12, Pl. I, fig. 3, Pl. VI, fig. 9.

1887. *Clathria corallorhizoides* Fristedt [8], p. 460, Pl. 25, figs. 73—77, Pl. 29, fig. 23.

1905. *Lissodendoryx complicata* Lundbeck [18], p. 167, Pl. V, fig. 11, Pl. XVI, figs. 4 a—9.

1909. — — — [20], p. 440.

Of this beautiful sponge we have 2 specimens; greatest extension ca. 80 mm. Spiculation as in Lundbecks description. On gravel. Color white-yellowish.

Station 96. Off Maroussia. 160—180 m.

Geographical distribution: Greenland, Arctic Sea.

Depth: 300—1400 m.

Fam. Axinellidae.

Genus **Higginsia** Higgins.

Higginsia pyriformis nov. spec.

Sponge small, pear-shaped, with a long slender stalk; the whole length barely 10 mm., the corpus itself 3 mm. by 2 mm.; diameter of stalk ca. 0,3 mm. Osculum at the top of the sponge, diameter ca. 0,4 mm.; a delicate transparent dermal membrane covers the body; color yellowish-brownish, stalk, however, white and clear on account of the small amount of organic matter found in it. The skeleton composed of spiculo-fibres ascending from the base, forming the stalk, ending at the summit, and forming a little spiculo-fringe surrounding the osculum.

Spiculation: Of the known *Higginsia* species *H. pyriformis* mostly resembles *H. Thielei* Topsent as to the spiculation. But in *H.*

pyriformis only two sorts of spicules are found: 1°, *Megascleres tylostyles* (Pl. XXVI, figs. 9—9 b) of a very elegant form; slightly curved, the greatest thickness is about the middle, then gradually tapering to both ends; very finely and quite near the end rather abruptly pointed; 0,60—0,43 mm. by 0,014—0,010 mm. 2°, *Microscleres oxea*, (Pl. XXVI. fig. 10), follow the tylostyles, spined, slightly bent, with a constant swelling near the middle, form much varying; 0,020—0,055 by 0,002—0,003 mm.

Station 99. Lat. 77° N. Long. 17½° W. 300 m.

List of litterature.

1. ARNESEN, EMILY: Spongier fra den norske Kyst. I. Calcarea. (Bestimmungstafel in deutscher Sprache). Bergens Museums Aarbog for 1900. Bergen 1901.
2. —: Spongien von der norwegischen Küste. II. Monaxonida: Halichondrina. Berg. Mus. Aarb. for 1903. Bergen 1904.
3 a. BOWERBANK, J. S.: Monogr. Brit. Spongiadae. I, London 1864.
3 b. — — — II, — 1866.
3 c. — — — III, — 1874.
3 d. — — — IV, (Norman ed.) London 1882.
4. BREITFUSS, L. L.: Die arktische Kalkschwammfauna. Arch. Natg. 64. Jahrg. Bd. I. 1898.
5. —: Kalkschwammfauna des Weissen Meeres und der Eismeerküsten des europäischen Russlands. Mém. de l'Acad. Imp. de Sc. de St. Péterb.'s VIII sér. Vol VI. 1898.
6. BRØNDSTED, H. V.: Porifera in Conspectus Faunae Groenlandicae. Medd. om Grønland XXIII. Kbh. 1914.
7. FLEMING, J.: A History of British Animals. Edingb. 1828.
8. FRISTEDT, F.: Sponges from the Atlantic and Arctic Oceans and the Behring Sea. Vega-Exp. vetensk. Iaktt. IV, 1887.
9. GRANT, G.: Observations and experiments on the structure and functions of the Sponge. Edingb. New Phil. Journ. Vol. II, 1827.
10. GRAY, J. E.: Note on the Arrangement of Sponges, with the description of some New Genera. Proc. Zool. Soc., Ld. 1867.
11. HAECKEL, E.: Die Kalkschwämme I—III. 1872.
12. HANSEN, ARMAUER: Spongiadae. Den norske Nordhavs Exp. 1876—78. Kristiania 1885. (Also English text).
13. JOHNSTON, I.: History of British Sponges and Lithophytes. Edingb. 1842.
14. KENT, SAVILLE: In Monthly Micr. Journ. Nov. 1870.
15. LAMBE, L. M.: Sponges from the Western Coast of North America. Proc. and Trans. Roy. Soc. Canada. XII. 1895.
16. —: Sponges from the Atlantic Coast of Canada, ibid. Second Ser. Vol. II. Sect. 4, 1896.
17. LUNDBECK, W.: Porifera. Homorrhaphidae and Heterorrhaphidae. The Danish Ingolf-Exp. Vol. VI, Part 1. Copenhagen 1902.
18. —: Porifera. Desmacidonidae. Pars. ibid. 1905.
19. —: — — ibid. 1910.

20. Lundbeck, W.: The Porifera of East-Greenland. Medd. om Grønland. Vol. XXIX. København 1909.
21. Montagu, G.: Essay on Sponges. Mem. Vern. Soc. II, 1, 1818.
22. Polejaeff: Calcarea in Rep. Chall. Zool. Vol. VIII. 1883.
23. Ridley and Dendy: Monaxonida in Rep. Chall. Zool. Vol. XX, 1887.
24. Schmidt, O.: Die Spongien des Adriatischen Meeres. Cum Suppl. Lpz. 1862—66.
25. —: Grundzüge einer Spongienfauna des Atl. Geb. 1870.
26. Schulze: Hexactinellida. Chall. Rep. Zool. XXI.
27. Topsent, E.: Porifera in Résultats des Campagn. sc. du Prince de Monaco. Fasc. II, 1892.
28. —: Spongiaires des Açores. Rés. Camp. Sc. Monaco, Fasc. XXV, 1904.
29. Vanhöffen, C.: Die Fauna und Flora Grönlands. Grönl.-Exp. der Gesellsch. für Erdkunde zu Berlin 1891—93. 1897.

20.—5.—1916.

PLATE XXV.

PLATE XXV.

1/1. *Rhabdocalyptus arcticus* nov. sp. pag. 477.

Brøndsted del. *Pacht & Crone phototyp.*

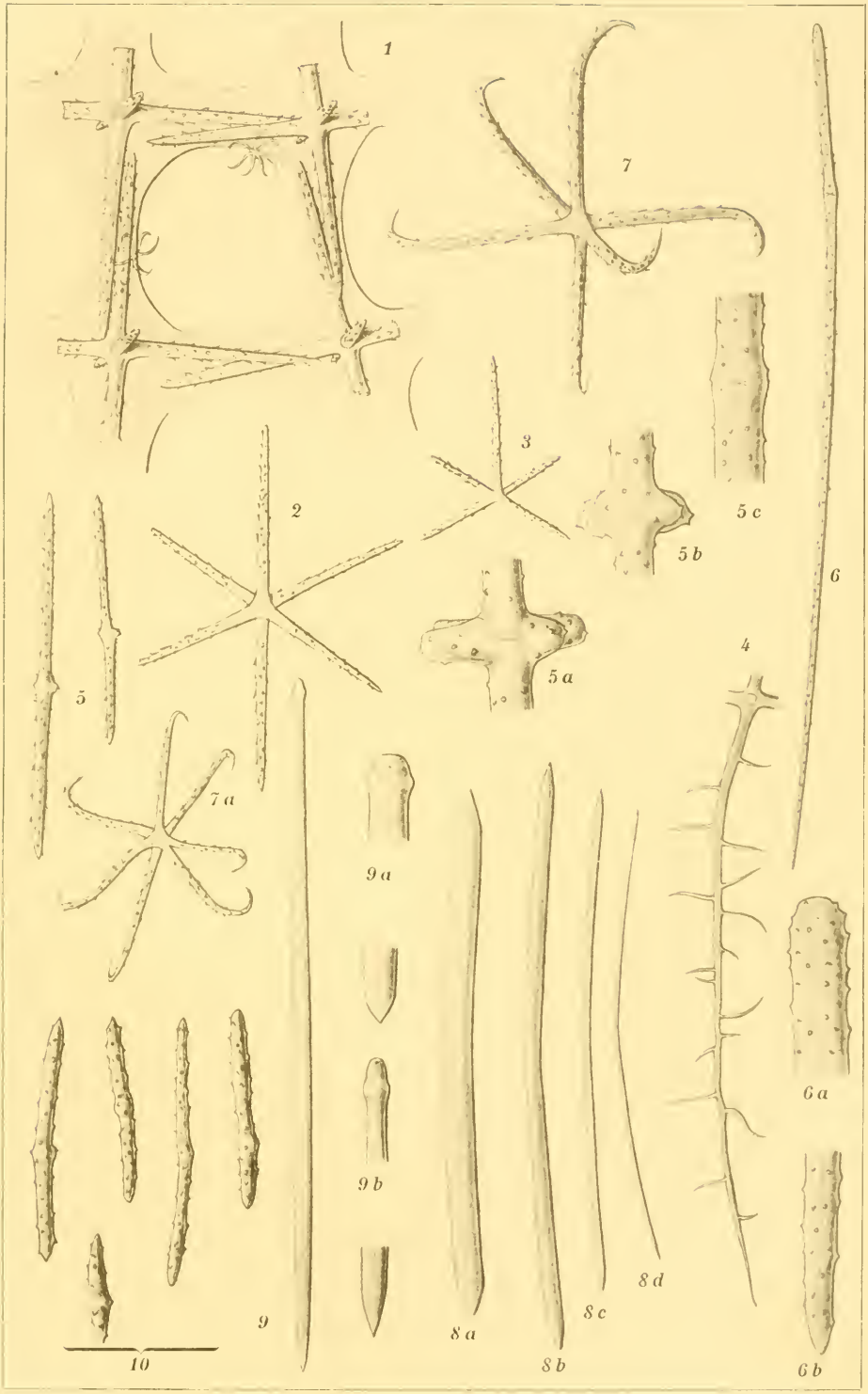
PLATE XXVI.

PLATE XXVI.

Figs. 1—7. *Rhabdocalyptus arcticus* nov. sp., p. 477.
Fig. 1. Gastral membrane with hexacts. × 90.
— 2. Oxyhexacts. × 90.
— 3. Oxypentacts from dermal membrane. × 225.
— 4. Tangential ray of prostalia pleuralia. × 50.
Figs. 5—5 c. Oxydiacts. fig. 5 × 130; figs. 5 a—c × 345.
— 6—6 b. Diact. fig. 6 × 50; figs. 6 a—b × 345.
— 7—7 a. Hexacts. × 405.

Fig. 8. *Halichondria tenuispicnlata* nov. spec. pag. 479.
Figs. 8 a—d. Oxea, grown up and developmental forms. × 345.

Figs. 9—10. *Higginsia pyriformis* nov. spec. pag. 481.
Figs. 9—9 b. Tylostyles. fig. 9 × 130; fig. 9 a—b. × 405.
Fig. 10. *Minute oxea.* × 900.



Brøndsted del. Pacht & Crone phototyp.