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SPONGIA

BY

EMILY ARNESEN

WITH 5 PLATES

REPRINTED FROM

REPORT OF THE SCIENTIFIC RESULTS OF THE "MICHAEL SARS" NORTH ATLANT. DEEP SEA EXPED. 1910

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SIR JOHN MURRAY, K. C. B. and DR. JOHAN HJORT

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I. Preliminary notes.

When the collection of sponges from the cruise of the "Michael Sars" was offered to me for examination, I had at first some hesitation in accepting the onerous task on account of the difficulties in consulting the literature and in procuring the material for comparison, which I regarded as absolutely necessary in such a difficult group as the Sponges, especially as I had to deal with the Hexactinellida and the Tetractinellida, not previously studied by me. My doubts, however, disappeared, when the well-known spogiologist, Mr. Topsent, most kindly offered to place at my disposal his library and collections in the laboratory at Dijon, and I must therefore in the first place heartily thank him for his great kindness and valuable assistance.

The general results with regard to the sponges obtained during the cruise of the "Michael Sars" may be stated as follows: Of the 24 trawlings only 9 included sponges.

19 of the 24 hauls with the trawl were made in the eastern part of the southern section of the cruise, and sponges were obtained at 8 stations, while in the northern section with its 4 stations, sponges were found only at 1 station in the eastern part. Nothing remarkable with regard to the geographical and bathymetrical distribution has been observed. As the cruise extended mostly over very deep water, Calcarea were not likely to be largely represented, and in fact only one specimen, from st. 102, was taken. The other groups, Hexactinellida, Tetractinellida and Monaxonida, were found to be rather evenly distributed over the field of research: Of the Hexactinellida 9 species belonging to 8 genera were obtained at 6 stations: of the Tetractinellida 8 species belonging to 6 genera at 4 stations, and of the Monaxonida, all belonging to the suborder Halichondrina, 15 species referred to 14 genera at 7 stations (see the table II). New species were found only among the Monaxonida, and included representatives of the genera *Chondrocladia*, *Stylotella*, *Echinoclathria*, *Thrinacophora* and *Ciocalypta*.

In the classification I have followed Schulze for the Hexactinellida, v. Lendenfeld for the Tetractinellida, Topsent for the Monaxonida, and Dendy for the Calcarea. With regard to the Monaxonida it ought to be mentioned, that different authors held rather divergent views: Thus while Ridley and Dendy the authors of the first modern system of this group (1887) divided it into 4 families: Homorhaphidae, Heterorhaphidae, Desmacidonidae and Axinellidae, Topsent (1894) sets forth in his: "Reforme de la Classification des Halichondrina" another view, dividing the group into 3 families: Haploscleridae, Pocilloscleridae and Axinellidae. In 1902 Lundbeck adopted in the main the system of Ridley and Dendy. Finally in 1911, after his researches on the larval development of different forms belonging to the Halichondrines, Topsent altered his previous system so as to include: Halichondridae, Hoploscleridae, Pocilloscleridae, Axinellidae (Sur les affinités des Halichondria et la classification des Halichondrines d'après leurs formes larvaires.—Arch: Zool. exper. et génér. 1910 (5) Tome VII, Note & Rev. No. 1, pp. 1.—XV).

Accordingly the classification of the Halichondrina seems to call for further investigations of larval development in order to place it on a sound footing. I therefore have found it most practical to follow Topsent's earlier system, but omitting the arrangement into subfamilies, which as far as I can see can hardly be maintained, in the present state of our knowledge.

List of species obtained by the "Michael Sars" systematically arranged:

Calcarea:

Ordo Calcarea Dendy.

Fam. *Grantiidae* Dendy 1913.

Grantia intermedia Thacker.

Silicea:

Subcl. Triaxonia F. E. Schulze,

Ordo Hexactinellida O. Schmidt.

- A. Hexasterophora F. E. Schulze.
 Fam. *Euplectellidae* Ijima.
 Subfam. *Euplectellina* Ijima.
Euplectella suberea Wywille Thomson,
Malacosaccus floricomatus Topsent.
 Subfam. *Corbitellinae* Ijima.
Regradrella phoenix O. Schmidt.
 Fam. *Rosellidae* F. E. Schulze.
Asconema setubalense Saville Kent.
 Fam. *Coscinoporidae* (Zittel) F. E. Schulze.
Chonelasma sp.?
 Fam. *Aphrocallistidae* F. E. Schulze.
Aphrocallistis beatrix Gray form. *bocagei*
 Percival Wright.
- B. Amphidiscophora F. E. Schulze.
 Fam. *Hyalonematidae* J. E. Gray.
Hyalonema sp.?
Hyalonema infundibilum Topsent.
Pheronema grayi Saville Kent.
- Subcl. Demospongiae Sollas.
 Ordo I Tetractinellida Marshall.
- A. Sigmatophora Sollas.
 Fam. *Tethyopsillidae* (Lendenfeld) Topsent.
Tethyopsilla zetlandica Carter.
- B. Astrophora Sollas.
 Fam. *Stelletidae* Sollas.
Stelletta hispida Buccich.
Thenia muricata Bowerbank.
- Fam. *Pachastrellidae* Carter.
Characella pachastrelloides (Carter) Sollas
- Fam. *Geodiidae* Gray.
Isops pachydermata Sollas.
Sidonops sp.?
- Ordo II Monaxonida Ridley and Dendy.
 Halichondrina Vosmaer.
- Fam. *Haploscleridae* Topsent.
Petrosia friabilis Topsent.
- Fam. *Poecilloscleridae* Topsent.
Chondrocladia michael-sarsii sp. n.
Asbestopluma pennatula O. Schmidt.
Cladorhiza gelida Lundbeck.
Stylotella columella (Bowerbank) Topsent.
Stylotella topsentii sp. n.
Myxilla pectinata (Topsent),
Lissodendoryx complicata Arm. Hansen.
Dendoricella abyssii (Topsent) Lundbeck.
Grayella fallax Topsent.
Echinoclathria hjortii sp. n.
Anchinöe nobilis Ridley and Dendy.
- Fam. *Axinellidae* Ridley and Dendy.
Axinella polypoides O. Schmidt.
Thrinacophora murrayi sp. n.
Ciocalypta weltnerii sp. n.

II. Descriptive part.

I. CALCAREA.

Grantia intermedia Thacker.

Pl. II, fig. 1.

Vide Litter: 32 pag. 770.

St. 102. Two specimens.

Of the two small egg-shaped sponges collected at this station, one is about 14 mm. high by 4 mm. broad with a well developed oscular fringe, about 1 mm. in length, round a conspicuous osculum at the summit; the other is 9 mm. high by 4 mm. broad, with an oscular fringe 1 mm. in length. Colour in spirit pale brown. Surface coarsely hispid with large oxeote spicules projecting in different directions. The thickness of the wall in the larger specimen is about 1.7 mm. of which about 0.14 mm. come on the dermal cortex, the rest on the chamber layer and the feebly developed gastral cortex.

I have not been able to trace the canal system, but the tubar skeleton shows a conspicuous articulate construction, though with slight signs of becoming scattered. The skeleton consists of triradiate, quadriradiate and oxeote spicules.

In the cortex the vast majority are triradiates, but quadriradiates may occur. The triradiates are usually, irregular, showing a tendency to become sagittal. The rays are bent or straight, and of variable length, ordinarily about 0.37 mm. long by 0.014 mm. thick (resembling Thacker's figures. Textfig. 162 a. op. cit).

The tubar skeleton is composed as far as I could make out exclusively of quadriradiates, the facial rays of which form the walls of the six-sided skeletal tube, while the apical ray emerging from each angle projects into the lumen. They are usually sagittal with an oral angle of about 120°; the longest of the facial rays is about 0.440 mm. and the other two about 0.270 mm.; the apical ray is only about 0.030 mm. All the rays are of the same thickness and resemble the triradiates.

The thin gastral cortex is composed of quadriradiates intermingled with triradiates both of about the same shape as those occurring in the tubar and dermal skeleton. The apical ray—somewhat longer than in the quadriradiates of the chamber layer—projects into the gastral cavity.

Large, oxeote spicules emerge from the surface of the sponge without definite order at different angles. Their proximal ends are hidden in the tubar layer of the body-wall. They are spindle shaped, usually not sharply pointed at the ends. They were all broken, so that I have not been able to measure their length exactly, but most certainly they are at least about 2—3 mm. long with a thickness varying between 0.04—0.07 mm. The oxeote spicules composing the oscular fringe are very long and fine, reaching a length of 2—3 mm. and a thickness of 0.004—0.008 mm.

Remark: *Grantia intermedia* Thacker, has been found once off Cape Verde (Crossland Collection) at a depth of 20 fathoms (Boa Vista Island).—Thus belonging to the warm water fauna, while the form here described has been dredged north of the Wyville Thomson ridge (st. 102), at a depth of 1098 m.

This great difference in habitat makes it perhaps uncertain that they belong to the same species, but they agree so well in anatomical structure, except that the tubar skeleton here is exclusively composed of quadriradiates instead of triradiates intermingled with quadriradiates as in the type—a feature, which in the meantime cannot be held to justify a separation into two species.

Locality: North of the Wyville Thomson Ridge (Lat 60° 57' N, Long 4° 38' W); depth 1098 m.: bottom blue mud.

II. SILICEA.

Euplectella suberea Wyville Thomson.

Pl. I, fig. 1.

Vide Litter: 30 pag. 9.

St. 25. Several fragments (about 15).

The specimens obtained are all in rather bad condition, but nevertheless they are doubtless to be recognized as *Euplectella suberea* Wyville Thomson.

Usually they consist only of the basal tuft with a small remnant of the body-wall. Only one specimen, though also much damaged, represents the entire sponge, in which only traces of the tuft are left. This specimen has a subcylindrical form and is 10 cm. high with a diameter

of 5 cm. in the broadest part. Externally it resembles Wyville Thomson's second figure in the Challenger Report (60 pl. V fig. 1), showing similar spiral series of round parietal gaps alternating with series of meshes closed by a flat arching of soft tissue, and the radial rays of the strong pentacts from the longitudinal and circular strands forming the underlying lattice-like meshwork project in spiral rows as lateralia, 2—3 cm. in length. The delicate marginal wreath consists of isolated spicules projecting outwards and upwards.

Spiculation: As to the spiculation in the specimens examined I find that the spicules on the whole correspond well with those figured by Schulze (60 pl. V and pl.

VI fig. 3). All the different forms of principalia, comitalia and parenchymalia are present.

It is specially noteworthy that the rough diacts with the four rudimentary actines from the circular membrane of the parietal gap—spicules characteristic of the species—have been observed in abundance with all their variations. But of the microscleres I have only been able to observe with certainty the hexasters (80 μ), the small gastral and the large dermal floricoles resembling those in 60 fig. 4 and fig. 5. All the other forms seem to be absent.

Geographical distribution. As will be seen from the table *E. suberea* has a wide distribution in the Atlantic.

Date	Locality	Depth	Name of Expedition or Authority	Litterature
1877	North of Scotland.....			Wyville Thomson: The Voyage of the Challenger. The Atlantic vol. I p. 138.
1881	Off the Berlingness	6049 m.	“Travailleur”	Milne Edwards: Comptes rendus T. XCIII p. 871.
1885	North Atlantic	900—2300 m.	“Talisman”	H. Filhol: La vie au fond des mers p. 282.
1886			Edmond Perrier	Edm. Perrier: Les explorations soumarines p. 337.
1887	West of Gibraltar: (Lat. 36° 25' N. long, 8° 12' W.; Lat. 35° 47' N. long, 8° 23' W.)	1097 m. 1994 m.	“Challenger”	F. E. Schulze: Rep. on Challenger Hexactinellida p. 76.
	Between Pernambuco and Bahia: (Lat. 10° 11' S. long, 35° 22' W.).....	2926 m.		
1892	Lat. 38° 23' 45" N. long, 30° 51' 30" W.....	927 m.	“Hirondelle”	Emile Topsent: Result. Camp. scient. Prince du Monaco. Spongiaires de l'Atlantic nord. p. 24.
	Lat. 39° 18' 5" N. long, 33° 32' 15" W.....	1372 m.		
	Lat. 41° 40' 41" N. long, 29° 4' 23" W.....	2870 m.		
1904	Azores: Lat. 37° 54' N. long, 24° 43' 15" W.....	2178 m.	“Princesse Alice”	Emile Topsent: Result. Camp. scient. Prince du Monaco. Fasc. XXV Spongiaires des Açores, p. 38.
	Lat. 39° 11' N. long, 30° 44' 40" W.....	1846 m.		
	Lat. 39° 51' N. long, 26° 54' 45" W.....	1940 m.		
	Lat. 39° 54' N. long, 29° 01' 45" W.....	1900 m.		
1904	S. W. of Cap Bojador: Lat. 24° 35,3 N. long, 17° 4,7' W.	2500 m.	“Valdivia”	F. H. Schulze: Hexactinellida. Wiss. Ergeb. d. Deutsch Tiefsee-Exp. “Valdivia”.
	Pembachannel Zanzibar ¹⁾ : Lat. 5° 24,0' N., 39° 19,8' E. long.....	818 m.		
1910	Spanish Bay: Lat. 35° 34' N., 8° 25' W. long	2300 Globigerina Ooze	“Michael Sars”	

¹⁾ Though not belonging to the Atlantic it is of interest to mention this locality here.—The specimen recorded from the Pembachannel (figured pl. II fig. 15 op. cit.) and one specimen from off Cape Bojador (figured pl. II fig. 6 op. cit.) are in spite of differences in the spiculation from the type referred to *Eup. suberea* with the remark, that it is doubtful, whether they are to be reckoned “als Variationen innerhalb des Speciesbegriffes *Euplectella suberea* W. Th. oder als typische Charaktere differenter, von dem alten durch Wyv. Thomson und mich (Schulze) aufgestellte Artbegriff zu trennender Species zu gelten haben” (op. cit. p. 15).

Malacosaccus floricomatus Topsent.

Pl. I, fig. 2.

Vide litter: 41 pag. 33.

St. 10. One specimen.

At stat. 10 one specimen of a subcylindrical, stalked sponge of a very loose consistency was procured. The body of this sponge is 7 cm. long and has in the middle a diameter of 3 cm. diminishing towards the base to 2 cm. The subcylindrical somewhat twisted stalk is 8 cm. long and of 4 mm. in diameter with a basal bulb 6 mm. in diameter. The surface is finely hispid owing to the projection of the distal rays of the sword-like dermal hexacts, to be described later. Orifices, about 1 mm. in diameter, are rather densely spread over it. Whether there was an opening at the summit cannot be decided, as the upper part was cut off. There is no gastral cavity though a cut certainly appears on one side at the summit, about 1 cm. deep and 0.7 cm. in diameter. But as the walls of this cut exhibit no special spiculation, which is similar to that in the parenchyme I do not think it can be regarded as a rudimentary cloacal cavity.

The specimen thus exhibits a striking resemblance to *Malacosaccus floricomatus* Topsent (op. cit. pl. I, fig. 10). The spiculation also shows more affinity to this species than to the closely allied, *M. unguiculatus* Schulze, though it has not been possible after careful examination to find either the hypodermal spined hexacts (op. cit. pl. VII, fig. 3 c), or the floricomes with numerous secondary rays, like those found by Topsent under the superficial encrust-

ment at the top of the stalk. But all the other forms of spicules have been observed: Thus in the dermal surface there is a layer of swordlike hexacts (like those figured op. cit. 3 a, 3 b), and between them small onychasters, 0.07 mm. in diameter (op. cit. fig. 3 g), together with a few, very slender floricomes. In the parenchyme between the large, flexible, absolutely smooth hexacts there are many robust floricomes (op. cit. fig. 3 f), with a diameter between 0.190—0.300 mm. These are specially large and abundant in the wall of the above mentioned cut. Further there were onychasters, discohexasters and oxyhexasters of the same forms as figured by Topsent in respectively (fig. 3 h, 3 i, 3 k op. cit.).

The rather flexible stalk has a peripheral coating of smaller, slenderer spicules and a central rigid part of rather robust ones. The spicules in both places are hexacts, differently transformed, mostly reduced to triactins (like fig. 3 d op. cit.). In the remaining patches of the skin the same spiculation has been observed as in the dermal skeleton of the body. Besides this there was in the coating of the basal bulb a dense felt, consisting of rather slender hexacts with rays of most variable length and beset with few exceedingly fine prongs—much like those described by Topsent (p. 38) in the "revêtement particulier" from the upper part of the stalk.

I think I am justified in referring—at least provisionally—the specimen at my disposal to *Malacosaccus floricomatus* Topsent, in spite of the absence of the hypodermal spined hexacts and the floricomes with numerous rays.

Geographical distribution. *Malacosaccus floricomatus* Topsent has been recorded from the east of the Azores:

St. 749	Lat. 38° 55' N., long 21° 18' 45" W.	Depth: 5005 m.	Bottom: "vase blanche et globigerines"	3 specimens and 2 stalks
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The "Michael Sars" specimen came from the Bay of Biscay:

St. 10	Lat. 45° 26' N., long 9° 20' W.	Depth: 4700 m.	Bottom: yellow mud	1 specimen
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Regadrella phoenix O. Schmidt.

Pl. I, fig. 3.

Vide litter: 41 p. 39, 30 p. 22.

St. 23. Seven specimens and several basal cups.

Of this species the "Michael Sars" obtained at stat. 23 seven or eight tolerably well preserved specimens, though all without basal cups. About double the number of basal cups were, however, taken at the same station. But as they were found in a separate bottle (together with *Aphrocallistes*) it is impossible to decide, whether they belong to the upper parts of the above mentioned specimens.

The basal cups were generally separated, but often they were attached very close to each other. Some of the cups had inside a coating of *Hamacantha bowerbankii*, and at the common base of fixation a small *Characella pachastrelloides* was attached.

All the specimens seem to have been torn off very close to the base. The largest one is 17 cm. long with a diameter at the middle of about 8.5 cm. and the smaller ones 12 cm. long with a diameter of 5 cm. The sieve-plate, the skeleton of which is pretty well preserved on nearly all the specimens, resembling exactly Topsent's fig. 3 pl. VI 41, has a diameter of 3 to 5 cm. The

dermal surface is much abraded, exposing the parenchymal strands. The thin-edged, circular, parietal apertures, arranged in somewhat irregular oblique rows, have a diameter up to 5 mm.

Spiculation. As to the spiculation: I have observed all the spicules figured by Schulze (26 & 29) and Ijima 11, except the graphiocomes, which were not found, though carefully looked for in several specimens: Onychasters, 0.111—0.147 mm. in diameter, and generally with only two secondary branches were observed in abundance and lophocomes, though fewer in number, 0.145—0.185 mm. in diameter. In the sieveplate-border the characteristic oxypentactins with unequal rays (figured 11 pl. V, fig. 5, fig. 6) were present and in the free

edge of the cuff sword-like hexactins, like those figured in pl. XIII, fig. 2 26, the distal rays of which project as marginal prostalia. Bristle-like prostalia as indicated by Schulze and Filhol I have not observed.

In the dermal surface—though much abraded—the typical hexacts, reproduced in 11 fig. 23 & fig. 24 pl. X, were found and in the gastral surface pentactins.

Geographical distribution. *Regadrella phoenix* has a wide geographical range. Thus, besides having been obtained at several stations in the Atlantic,—as the following list shows,—it has also been recorded from the Pacific by "Albatross" 29 Galapagos, 717 m. and off the Coast of Chili, 3200 m., and in the Indian Ocean by the "Valdivia" 30 Nicobar, 805 m., 1 basal cup.

List of the localities in the Atlantic, where *Regadrella phoenix* has been recorded:

Date	Locality	Depth	Number of specimens	Name of expedition	Literature
1880	Near the Lesser Antilles: { Santa Cruz..... { Barbados.....	453 m. 404—526 m.			O. Schmidt: Spongien des Meerbusens von Mexico Bd. II 1880 p. 61.
1899	St. Lucia and St. Vincent.....	514 m.	1 Skeleton	"Albatross"	F. E. Schulze: Amerikanische Hexactinelliden nach dem Materiale der Albatross-Expedition Jena 1899 p. 20.
1888	Near the Azores:	861 m.	1 mutilated base	"L'Hirondelle"	E. Topsent: Spong. d. L'Atlant nord.— Résult. camp. scient. du Prince Monaco. Fasc. II 1892 p. 25. ¹⁾
1895	.....	1022 m.	2 bases and several fragments	"Princesse Alice"	E. Topsent: Spong. des Açores.— Résult. camp. scient. du Prince Monaco Fasc. XXV 1904 p. 39.
1896	.....	1360 m.	1 macerated fragment	"	
1902	.....	1250 m.	2 fleshy bases	"	
1885	Coast of Morocco ²⁾	882 m.		"Talisman"	H. Filhol: La vie au fond des Mers. Paris 1885, p. 284.
1896	Gulf of Gascony	1220 m. 1410 m.	Fragments Several magnificent specimens in perfect condition		E. Topsent: Résult. sci. cam. du Caudan. Annal. Univers. Lyon: 1896, p. 275.
1910	Spanish Bay: 35° 32' N., 7° 7' W.	1215 m.	7 and several fragments	"Michael Sars"	

¹⁾ In the work cited *Regadrella phoenix* O. Schmidt has been identified with *Rhabdodictyum delicatum* O. Schmidt.

²⁾ If *Regadrella phoenix* O. Schmidt be synonymous with *Trichaptella elegans* Filhol (37 p. 276) as Topsent suggests, but as Schulze (29 p. 22) doubts.

Asconema setubalense Saville Kent.

Pl. I, fig. 4.

Vide litter: 12 a.

St. 102. One specimen.

From this station there is one specimen of a little bag-shaped sponge, 5 cm. long and 3.5 cm. wide, open at both ends, apparently a piece torn from a larger sponge. Its feltlike consistency and characteristic spiculation prove beyond doubt that it is an *Asconema*. All the different kinds of diacts (op. cit. pl. XXI, fig. 7—10) forming the parenchymal interlacement, the dermal and gastral hexacts and pentacts have been observed. Though we have

not found all the four forms of rosettes generally occurring in *Asconema setubalense*—the great discohexasters (op. cit. fig. 11) and the oxyhexasters with brushlike secondary rays (op. cit. fig. 6) being absent—we do not hesitate to refer the fragment to this species. Specimens wanting the great discohexasters have previously been recorded by the "Albatross" (var. *pauperata* Schulze 29 p. 26), and specimens lacking also other microsleres are known from off the Azores 599—1600 m. (41 p. 41). The specimen at my disposal seems to represent a variety between *pauperata* and the simpler variety from off the Azores.

Geographical distribution: *Asconema setubalense* Sav. Kent has hitherto only been recorded from the Atlantic, where it seems to have a wide range:

Date	Locality	Depth	Bottom deposit	Name of expedition or authority Literature
1870	Off coast of Portugal.....	?		"Norna" Sav. Kent: On the "Hexactinellidæ" etc. — Monthly Micr., Journ. Nov. p. 241.
1885	Off coast of Morocco.....	410 m.	Rocky ground	"Talisman" & "Travailleur". Filhol: La vie au fond des mers p. 285.
1887	N. W. of Scotland.....	598—786 m.		"Triton" (st. 4) John Murray vide: F. E. Schulze: <i>Hexactinellida</i> . Rep. Challenger, vol. XXI p. 116.
	Azores:			
1886	Lat. 43° 57' N. long, 9° 27' W.	300 m.	Gravel, rock	"Hirondelle" E. Topsent: Résult. camp. scient. Prince de Monaco. Fasc. II. Spong. de L'Atlant. Nord. 1892 p. 27.
1887	Lat. 38° 23' 45" N. long, 30° 51' 30" W...	927 m.	Gravel, black mud	
1887	Lat. 46° 4' 40" N. long, 49° 2' 30" W.	1267 m.	Stones, mud, shells	
1888	Lat. 38° 48' 30" N. long, 30° 19' W.	861 m.	Sand, stones	
1895	Lat. 37° 42' 40" N. long, 25° 05' 15" W.	1385 m.	Arenaceous mud	"Princesse Alice" E. Topsent: Résult. camp. scient. Prince de Monaco. XV. Spong. des Açores. 1904, p. 40.
1896	Lat. 38° 20' N. long, 28° 04' 45" W.	1550 m.		
1896	Lat. 39° 11' N. long, 20° 24' 15" W.....	1600 m.		
1897	Lat. 38° 52' 50" N. long, 27° 23' 05" W.	599 m.	Coarse sand	
1899	East coast of America:			"Albatross" F. E. Schulze: Amerik. Hexact. nach dem Mater. d. Albatross Exp. 1899, p. 25.
	Lat. 40° 02' N. long, 68° 50' W.	642 m.	Sand	
	Lat. 40° 01' N. long, 68° 54' W.	1170 m.	Sand	
	Lat. 40° 03' N. long, 68° 56' W.	532 m.	Sand, ooze	
	Lat. 42° 49' N. long, 68° 50' W.	—		
	Lat. 44° 35' N. long, 57° 20' W.	—		
	Lat. 41° 54' N. long, 65° 48' 35" W.	185 m.	Stones and sand	
1910	Lat. 60° 57' N. 4° 38' W.....	1098 m.	Blue mud	"Michael Sars"

Chonelasma sp.?

Pl. I, fig. 5

Vide Litter: 26 pag. 320.

St. 10. One specimen.

The specimen obtained by the "Michael Sars" was a 3—4 cm. long mamelliform piece, somewhat irregular

apparently representing an entire individual. The expanded base has most likely been detached directly from the bottom. The sponge is hollow, and the cavity was filled with mud containing a small annelid. The surface exhibits irregular, rounded hillocks and indistinct foldings. The openings of the incurrent and excurrent canals are irre-

gularly scattered and of variable size. No trace of skin or other soft parts is left—only a pumice-like dictyonal framework exhibiting an irregular meshwork of confused strong hexacts with a prickly surface and provided with rather robust pegs. The thickness of the wall is 1–2 mm., and there seems to be no noteworthy differences between the dermal and the gastral surfaces.

Geographical distribution. Of this genus 5 species have been described from the Pacific (*Ch. lamella* Schulze, *Ch. hamatum* Schulze, *Ch. doederleinii* Schulze, *Ch. calyx* Schulze (26 p. 320–326.) and *Ch. tenerum* Schulze (29 p. 81).

From the Atlantic only 2 established species are known *Ch. Schulzei* Topsent (34 p. 33) and *Ch. ijimai* Topsent (41 p. 53) dredged by the "Hirondelle" and "Princesse Alice" off the Azores at depths between 861–1919 m.—The "Caudan" specimen from the Gulf of Gascogne (1710 m.) and the specimens recorded from the West Indies, Bermudas and off the coast of Portugal being all but small undetermined fragments.

The *Chonelasma* from the "Michael Sars" expedition was obtained at the trawling station 10 (Lat. 45° 26' N., Long. 9° 20' W.) during the cruise from Plymouth to Gibraltar at the entrance to the Bay of Biscay at a depth of 4700 m. on a bottom of globigerina ooze.

This specimen cannot with certainty be referred to any distinct species, as the parts on which the specific characters are based are absent, but it may perhaps be identical with *Ch. Schulzei* Topsent, as this species according to Topsent (41 p. 51) seems to be rather common among the Azores and perhaps occurs also off the coast of Portugal—the undetermined fragments recorded from that locality by the "Challenger" exhibiting at least, according to the same author, a close affinity to *Ch. Schulzei*.

Aphrocallistes beatrix J. E. Gray sensu F. E. Schulze.

Pl. I, fig. 5, 6.

Vide Litter: 30 p. 144.

St. 23. Several specimens.

At this station several pieces of *Aphrocallistes* were taken, but only abraded diactinal skeletons or mere fragments of skeletons, so that it has been difficult to determine the species. Of this genus six species have been described, but according to Schulze (30) they are all referable to two species appearing under different aspects "wie etwa die Tarrus-, Nardorus- and Auloplegma-Form irgend einer Kalkschwamm-species" (op. cit. p. 147). The two species regarded as main types are *Aphrocallistes beatrix* J. E. Gray and *Aphrocallistes vastus* F. E. Schulze. The others *Aphr. bocagei* Perc. Wright, *Aphr. ramosus* F. E. Schulze and *Aphr. azoricus* Topsent, are to be regarded as three different aspects of *Aphr. beatrix*, while *Aphr.*

whiteavesianus Lambe is to be regarded as belonging to *Aphr. vastus* F. E. Schulze.

Aphr. vastus with its by-form belongs to the Pacific [*Aphr. vastus* from Japan, 329 m. (26, p. 317) and *Aphr. whiteavesianus* from Vancouver 730 m.]. The other, *Aphrocallistes beatrix*, has been recorded both from the Indian Ocean, the Atlantic and the Pacific.

The type species is known only from the Indian Ocean [Malacca, Bombay and the Andaman 28], the *ramosus*-form¹⁾ from the Pacific (26, p. 319) and the *azoricus*-form from the Atlantic (41, p. 48), while the *bocagei*-form, has a wide range both in the Atlantic [W. Ireland, Coast of Spain, Portugal, France, Cape Verde, Azores, W. Indies etc., between 500–1300 m.], in the Indian Ocean and in the Pacific.

To judge from the geographical data, above mentioned and from the external appearance of the skeletons the "Michael Sars" specimens most likely belong to the species *beatrix* J. E. Gray sensu *Schulzei*.

The main type most surely is not present, only the *bocagei*-form, nearly all the specimens exhibiting the ordinary habit of that form, a tube gradually widening upwards with numerous radial finger-like swellings on the lateral walls "and the axis of the tube exhibiting as a rule a slight curvature" (like those figured 26, fig. 1, pl. LXXXIII, and 30, fig. 6, pl. XIV). Sometimes there are two parallel tubes the lateral swellings of which anastomose. The structure of the diactinal framework corresponds with Schulze's description (p. 314, 26). In most specimens sieve-septa, like those figured in op. cit., pl. LXXXIII, fig. 2 often in several stages are present. A terminal sieve-plate has not been observed as all the upper parts have visibly been broken of.

In some specimens there are small patches with loose spicules still preserved at the base of the finger-like outgrowths, showing a striking resemblance to the spiculation in the *ramosus*-form.

As the *ramosus*-form has only been recorded from the Pacific, the "Michael Sars"'s locality would in case furnish a noteworthy extension of its distribution, the specimens having been obtained from the Spanish Bay (lat. 35° 32' N, long. 7° 7' W) at a depth of 1215 m.

Hyalonema Gray.

Of this genus the "Michael Sars" obtained 8 specimens from stations 10, 23, 35 and 53.

But nearly all the specimens are in a more or less bad condition, and therefore very difficult to identify.

¹⁾ The form obtained off the Azores and determined by Topsent as *Aphrocallistes ramosus* Schulze 34 the autor has later 41 recognized as *Aphrocallistes azoricus* Topsent.

From station 10 there are only two small fragments, one a piece of the body-wall, the other apparently a portion of a central conus—both impossible to recognize.

From station 35 was obtained a twisted basal tuft, 33 cm. long and 0.5 cm. in diameter, with a fragment of the body, 13 cm. long, adhering to its proximal prolongation. The basal tuft bears a single *Palythoa*. The consistency of the body is very loose. Its spiculation comes closest to that of *H. lusitanicum* Barb. du Bocage; but it is doubtful whether it may be identified with this species, especially on account of the pinnules, which in form and size exhibit more likeness with those in *H. thomsoni* Marsh; the distal ray of the great pinnules being 0.77 mm. long and the basal rays 0.09 mm. long; in the small ones the distal ray is 0.26–0.38 mm. long; the basal rays vary much both absolutely and relatively, often they are as long as the distal ray.

The two specimens from station 53 are also in a bad condition, the one consisting only of a hollow, 5 cm. long fragment—most probably a compartment—attached to a firm basal tuft 11 cm. long, which projects into the body for about 3 cm.; the other specimen has a basal tuft 10 cm. long, the proximal prolongation of which projects as a rigid conus into the middle of the body to a height of 1.2 cm. above the margin and apparently dividing the body into four compartments of which only the one is left. As the body-wall of the three compartments has been destroyed, the central conus thus lies quite free. The spiculation exhibits most likeness with that of *H. lusitanicum*. Thus we find the characteristic smooth micro-oxyhexacts, straight and bent, with rays 0.074 mm. long. The pinnules—though the distal ray is shorter and the basal rays seldom blunt as in *H. lusitanicum*—decidedly resemble as regards their bushy appearance, the pinnules of this species. As to the three kinds of amphidiscs they too agree tolerably well in respect of form, but the mesamphidiscs (0.05 mm.) and macramphidiscs (0.17 mm.), are smaller—thus approximating in size to those of *H. thomsoni*. The rest of the spiculation consists of diacts variable in size and thickness, straight or curved, pointed at both ends, and of middle sized oxyhexacts and pentacts with their rays running into a marked point. In the basal tuft there are strong spicules with a variable number of cylindrical rays with rounded rough ends (like those figured 26 pl. XXVIII, fig. 12).

The identification of *H. lusitanicum* is on the whole difficult imperfectly known as it is—erected by Barb. du Bocage for a basal tuft of a sponge found at great depths off Portugal. Had it not been for the amplification of the diagnosis by Schulze based upon a damaged specimen labelled as a gift from du Bocage in the British museum, it would have been impossible to recognize it.

The specimens recorded by the "Gaudan" in the Gulf of Gascogne, 1710 m., are only "lambeaux isolés, avec une touffe de soies fixatrices couverte de *Palythoa*", and those obtained by the "Valdivia" (30) south-west of Cape Bojador, 2500 m., are also only fragments, of which the author remarks „vielleicht handelt es sich um *H. lusitanicum* Barb. du Boc. oder *H. kentii* Schmith."

The only specimens of *Hyalonema* in a condition to be recognized with any certainty are those from station 23, which I think must be referred to *H. infundibulum* Topsent.

The "Mihael Sars" specimens were found at the following localities:

Locality	Depth & bottom	Number of specimens
Spanish Bay:		
35° 32' N., 7° 7' W.	1215 m.	2 macerated specimens.
35° 34' N., 7° 35' W.	1615 m.	20–30 specim. (denuded).
Between Gran Canaria and Cape Bojador:		
28° 8' N., 13° B. 5' W.	1365 m.	2 specimens.
Unkown locality.....		11 dried specimens.

Hyalonema infundibulum Topsent.

(Pl. I, fig. 8).

Vide litter: 34, p. 28, 37, p. 277, 41, p. 32.

St. 23. 2 specimens and 1 fragment.

This form was first obtained by the "Hirondelle" (1888) off Flores (Azores) at a depth of 1372 m. (bottom: sable vaseux et coquilles brisées), and identified by Topsent as *Hyalonema thomsoni* Marsh 34. Later, after having found in the material from the "Gaudan"-Expedition (37), at a depth of 1710 m., "un échantillon d'*Hyalonema* semblable à celui de l'*Hirondelle*" he thinks "maintenant avoir affaire à une espèce voisine de *H. Thomsoni* par la spiculation, mais nettement distincte par ses caractères extérieurs"—and he erects the species *H. infundibulum* Tops.

I believe that the specimens from the "Michael Sars" station 23 (in the Spanish Bay) are to be identified with this species. As to the exterior they agree very well with fig. 12, pl. III (op. cit.), and according to the description (p. 278 op. cit.) they have a cylindroconical form, the superior part of which, as the diagnosis runs "s'enfonce en un entonnoir largement évasé, dont la paroi, tapissée d'une fine membrane criblée partout adhérente aux tissus sous-jacents, se perce de quatre grandes fentes allongées et irrégulières, qui rayonnent autour d'un axe creux, et aussi d'un plus grand nombre d'orifices plus petits et inégaux. situés plus en dehors et dispersés."

It is to be noticed, that Topsent's specimens have no basal tuft nor even a trace thereof, while among the 3 specimens from the "Michael Sars" expedition the one has a tuft 15 cm. long, and the second a hole at the base, from which most probably a tuft has been torn out; the third specimen is only a small piece of the body. Besides this, the "Michael Sars" specimens are larger than those of Topsent, the one with basal tuft, being 11 cm. long with a diameter at the margin of 8.5 cm., and the other one 8 cm. in length with a diameter at the margin of 7 cm.

Spiculation. As to the spiculation I have observed, besides the ordinary smooth diacts and the middle sized hexacts, the characteristic micro-oxyhexacts with straight and prickly rays, 0.110 mm. long—thus somewhat longer than those measured by Topsent, which were only 0.080 mm. (80 μ). Further there are three kinds of amphidiscs, which agree well in form and size with those of *H. infundibulum*—though also somewhat longer than those measured by Topsent: macramphidiscs with a nearly hemispherical umbel and faintly echinated shaft, generally without central nodul, length 0.222 mm.—0.296 mm.; mesamphidiscs with a more bell-shaped umbel being 0.081 mm.—0.120 mm. long and micramphidiscs, 0.022 mm.—0.037 mm. long. As to the pinnules I find those of the "membrane criblée du cloaque" corresponding well with Topsent's description and figure (pl. 8, fig. 3). My measurements give for the unpaired ray 0.120 mm.—0.222 mm. and for the paired ones 0.040 mm.—0.055 mm. The other, more bushy kind of pinnules in my specimens seldom reach the length indicated by Topsent—thus the unpaired rays rarely exceed 0.200—0.300 mm. and the cruciate ones, often thickly spined, are of variable length (from 0.045 mm. to often nearly the length of the distal ray). Besides these spicules there are in the basal pad strong tetracts and hexacts with rough echinated rays. Both agreeing well with those in *H. thomsoni*, and especially *H. thomsoni* var. *exigua* (26, fig. 15 & 17, pl. XXXIV).

The diacts of the basal pad have often echinated ends. The basal tuft consists of few, only 12—16, rather thick spicules, the ends of which are all broken, so that no anchors could be observed.

The presence of a basal tuft, and the approximation as regards the measurements of the spicules to those of *H. Thomsoni*, support Topsent's suggestion (41, p. 32), that *H. infundibulum* may represent only a variety of *H. Thomsoni*.

Geographical distribution: *H. infundibulum* has been taken off the Azores (1372 m.) and in the Bay of Biscay (1710 m. depth).

The "Michael Sars" specimens come from the Spanish Bay (35° 32' 7" W); 1215 metres.

Pheronema grayi Saville Kent.

(Pl. I, fig. 9).

Vide litter: 12, p. 182, 34, p. 29, 41, p. 29).

St. 23. 2 specimens (denuded).

St. 24. 20—30 specimens (denuded).

St. 41. 2 specimens.

Unnamed locality 11 dried specimens.

Though all the specimens from the "Michael Sars" Expedition are denuded, having lost most of their prostalia lateralia and even often the basalia, they seem to be identical with *Pheronema grayi* Saville Kent, to judge from the globular form (the largest specimens measuring about 13 cm. \times 13 cm. and 13 cm. \times 11 cm., the smaller ones 7 cm. \times 7 cm.) and the funnel-shaped cloacal aperture (diam. 3 cm.—4 cm.). Though, it is to be noticed that one of the two specimens obtained at station 41 decidedly shows a cylindrical form (7.5 cm. \times 5.5 cm.) thus resembling *Ph. carpenteri*. The prostalia pleuralia have a scattered disposition, while the prostalia basalia undoubtedly show a tendency to be grouped in bundles; the basal tuft measures 15 cm. The marginal fringe is rather defective, while the zone, 2 cm. below, is as a rule pretty well preserved.

As to the spicules they agree well with the description and figures given by Saville Kent (pl. LXIII, 12) and by Topsent (pl. VII, fig. 9, p. 29, 34, and pl. VII, fig. 2, p. 29, 41).

Geographical distribution: Of the seven recognised species of *Pheronema* three are known from the Atlantic (*Ph. grayi*, *Ph. annæ*, and *Ph. carpenteri*). While the two lastnamed species are from the western Atlantic, *Ph. grayi* has been recorded from off Setubal, Portugal, (depth 1098 m.) and was met with in profusion at the Azores at different stations between 793 and 1557 m.

Tethyopsilla zetlandica (Carter).

(Pl. VI, fig. 6).

Vide litter: 15, p. 31.

St. 24. (NB! There is some doubt whether the specimens are from st. 24 or 41). Two specimens.

One specimen is spheroidal in shape with a diameter of 4 cm., the other oblong, 4 cm. \times 6 cm. Surface rather abraded, though showing a dense hispidity. Root-tuft about 5 cm. long—present only in the oblong specimen. Colour in spirit light yellowish brown. Cortex 2—3 mm. thick.

Spicula: Megasclera: *Cortical oxea*, fusiform, bent or straight with long and evenly tapering ends, about 1.7 mm. long by 0.030 in the middle. *Somal oxea*, anisoactinate, nearly double the size of those in the typical form. *Protriaene*, rhabdome 8.5 mm. long by about 10.050 mm. in the proximal part and tapering from the

middle to the distal end, where it is filiform (0.017 mm. thick). *Anatriaene*, about double the length of those in the type; cladi 0.120—0.170 mm. long.

Geographical distribution: *Tethyopsilla zetlandica* (Carter) has been recorded from the Atlantic (Shetland, Islands and Bahia), Pacific (64—284 m.) and Indian Ocean (15 m.).

The specimens of "Michael Sars" were dredged in the Spanish Bay (35° 34' N, 7° 35' W); depth 1615 m. (NB! If st. 41 proves the right the locality is: Between Gran Canaria and Cap Bojador. (Lat. 28° 8' N, 13° 35' W); depth 1365 m.; yellow mud.

Stelletta hispida Buccick.

Pl. IV, fig. 8.

Vide litter: 15, p. 41.

St. 23. One specimen.

A rounded mass about 4 × 7 × 9 cm. without any base of fixation. Surface much abraded with a net of spined ridges. Cortex, 4 mm. thick, bluish-brown; choanosome light yellow.

Spiculation. Megasclera: *Choanosomal oxea* straight or curved, 3.5—5.9 mm. long by 0.060—0.085 mm. thick. *Cortical oxea*, 1.3 mm. long, 0.017 mm. thick. *Protriaene* (*Ptagiotriaene*?), rhabdome 1.85—2.40 mm. long by 0.100—0.140 mm. thick, cladi 0.100—0.325 mm. long by 0.085 mm. thick. Microsclera: *Strongylaster* and *tylaster*, the single actine of which is about 0.0035—0.007 mm. long. *Oxyaster* with actines of about 0.007—0.018 mm. length.

Geographical distribution. *Stelletta hispida* has been recorded only from the Mediterranean.

The "Michael Sars" specimen is from the Atlantic: Spanish Bay (lat. 35° 32' N, long 7° 7' W.); depth 1215 m.

Thenea muricata Bowerbank.

Vide litter: 15, p. 54.

St. 23. 3 fragments.

Three rather damaged fragments—the largest of which

has a diameter of about 6 cm. It is often difficult to distinguish this species from the closely allied *Th. Schmidtii* Sollas, and the locality affords no clue, the specimens recorded being from a geographical area, the Lusitanian province, where both species are met with. But the small number of plesiasters, one of the usual distinguishing characters, seems to prove, that it cannot be *Th. Schmidtii*.

Geographical distribution: *Th. muricata* has been recorded from the North Polar Ocean down to the Azores.

The "Michael Sars" material was obtained in the Spanish Bay (35° 32' N, 7° 7' W); depth 1215 m.

Characella pachastrelloides (Carter) Sollas.

Pl. IV fig. 4.

Vide litter: 5, p. 403, 34, p. 40, 15, p. 76, 41, 95

St. 23. One specimen.

A small lump about 3 cm. × 3 cm. attached to a basal cup of *Regadrella phoenix*. The surface, rather damaged, is hispid and rough. Pores very fine, and the oscula, about 1 mm., in diameter, are dispersed. Colour in spirit yellowish.

Spiculation. The spicules of the specimen from the "Michael Sars" Expedition agree fairly well with the spicules of those collected by the Princesse Alice (41, p. 95) though on the whole they are somewhat larger in the former. The spiculation of the microscleres is rather doubtful, and no orthotriaenes have been observed.

The spicules are: Megasclera: *Oxea*, 3—4 mm. long by about 0.08 mm., in the thickest ones, *Dichotriaenes* with rhabdomes varying from about 0.800—1.7 mm. by 0.111 mm. in the thicker part; protocladi about 0.170 mm. and deuterocladi about 0.500 mm. Microsclera: large microxea 0.260—0.370 mm. and small microxea, often centrotyles, about 0.05 mm., the spinulation of which is rather doubtful. Amphiasters, 0.026 mm. (very few).

This species has now been recorded from the following localities:

Stat.	Locality	Depth m.	Bottom	Number of Specimens	Name of Expedition Literature
25	Near Cape St. Vincent	682			"Porcupine" Carter: Sponges from the Atlantic Ocean. Annals & Mag 4 ser 18, 1876 p. 403.
60	43° 57' N., 9° 27' W.	300	Sand, gravel, rock ferruginous gravel	1 small fragment 4 large samples	"Hirondelle" Topsent: Sponges Atlantic Nord: Result. des Camp. Scient. Monaco. Fasc II 1892 p. 41.
229	38° 22' N., 30° 34' 39" W.	736			
584	38° 31' N., 26° 49' 15" W. 38° 30' 30" N., 26° 50' 15" W.	845	Rock	1	"Hirondelle" Topsent: Spong. Açores. Result. des Camp. Scient. Monaco. Fasc. XXV 1904 p. 95.
587		38° 36' 40" N., 27° 17' 15" W.	793	Sand		Several
597	38° 27' N., 28° 03' 25" W. Between Pico and San Gorge.	523	Rock	1	"Hirondelle" Topsent: Spong. Açores. Result. des Camp. Scient. Monaco. Fasc. XXV 1904 p. 95.
866	38° 52' 50" N., 27° 23' 05" W. Near Terceira.	599	Coarse sand	Several	
1367	37° 34' N. 28° 56' 45" W.	563	Fine sand	2 fragments	
23	35° 32' N., 7° 7' W.	1215	Yellow mud	1	"Michael Sars"

Isops pachydermata Sollas.

Pl. IV fig. 3

Vide litter: 15, p. 98.

St. 23. One specimen.

An irregular rounded mass about 3 cm. long and 2 cm. broad attached together with a small *Sidonops* sp? to a piece of coral and nearly entirely enveloping it. The uniporal pores and oscula open with chones at the summit of small tubercles. Colour in spirit cream white. Cortex about 1 mm. thick.

This form, if not a typical *Isops pachydermata* Sollas, seems at least to be a variety of this species. As will be seen, the measurements of the spicula agree tolerably well with those in *Isops pachydermata* Sollas but for the subcortical spherasters, which are about double the size and for the presence of the dichotriaenes, sparsely obser-

ved — if they really belong to the sponge and not to the foreign bodies, abundantly present.

The spicules are: Megasclera: *Oxea*, fusiform, usually curved, not sharply pointed, about 2.50 mm. long by 0.06 mm.; *orthotriaene*, rhabdome conical, 1.2—1.7 mm. long by 0.044 immediately below the ramification, cladi 0.680 mm. long by 0.037 at their origin; *dichotriaene*, rhabdome 0.595 mm. long, protoclad 0.206 mm. long and deuteroclad 0.255 mm. long. Microsclera: *sterraster*, ellipsoid, 0.250—0.390 mm. by respectively 0.187—0.272 mm.: *small spheraster* with a large centrum, total diameter 0.018 mm.; *subcortical oxeote spheraster*, total diameter 0.067 mm., centrum well developed, the length of single actine 0.025 mm.; *oxyaster* with 2—8 actines, the length of a single actine in the triod form about 0.060 mm.

Geographical distribution: *Isops pachydermata* Sollas has been recorded from:

St.	Locality	Depth m.	Bottom deposit	Temperature	Nr. of specimens	Expedition or authority Literature
56	32° 9' N., 65° 0' W. (Bermuda)	1966	Coral mud	3° ₄₄	?	"Challenger" Sollas: Tetractinellida, p. 236.
234	39° 2' N., 30° 15' W.	454	ferruginous gravel	?	One very fine specimen	Topsent: Spongia Atl. Nord in Res. Camp. Sci. Monaco fasc. II. 1892, p. 49.
242	38° 9' N., 30° 19' W. (Azores)	861	Sand, cinders	?	Two small	
23	35° 32' N., 7° 7' W. Spanish Bay...	1215	yellow mud	10° ₁₇	One	"Michael Sars"

Sidonops sp.?

Pl. IV fig. 5.

St. 23. One specimen.

St. 24. Two specimens.

All the specimen are spheroidal, that from station 23, attached together with *Isops pachydermata* to a piece of coral, having a diameter of about 2.5 cm. and those from station 24, both free, having respectively a diameter of 6 cm. and 7 cm. They are much abraded, but seem all to have been densely hispid. Colour in spirit yellowish brown. The specimen from station 23 is provided with one praeosculum, 2 mm. in diameter. Of the specimens from station 24 only the larger one has a praeosculum (diameter 7 mm.). I have not been able to identify any of the specimens with any known species. On the other hand I do not consider the material in hand sufficient for erecting a new species.

The spiculation of the specimen from station 23 resembles much that of *Sidonops baretii*, but for the absence of the anatriaenes and protriaenes, which have not been observed, and for the presence of orthotriaenes.

The spicules here observed are: Megasclera: Large *amphioxea*, 4—5 mm. long by 0.170 mm.; small *oxea* 0.370 mm. long; *dichotriaenes*, the rhabdome of which is 4.10 mm. long by 0.170 mm., the protoclad 0.170 mm. and the deuteroclad 0.340 mm.; *orthotriaenes*, rhabdome 5.1 mm. by 0.170 mm. and cladi 0.510 mm. Microsclera: *sterraster*, 0.296—0.370 mm. in diameter; *spined oxyaster* 0.050 mm. in diameter; *spheraster* 0.011 mm.

The spiculation of the specimen with praeosculum from station 24 includes: Megasclera: large *amphioxea* 0.510—0.680 mm. long by 0.085 mm.; small *oxea* 0.320 mm. long; *dichotriaenes*, rhabdome 8.5 mm. by 0.170—0.250 mm., protoclad 0.425 mm. long and deuteroclad 0.680 mm. long; anatriaenes, rhabdome about 23 mm. long, cladi 0.170—0.200 mm. long; *protriaenes*, rhabdome 18.7 mm. long; cladi 0.340—0.530 mm. long by 0.068. Microsclera: *sterraster*, 0.102—0.153 mm. in diameter; *spined oxyasters*, 0.1295 mm. in diameter; *spheraster* 0.007 mm. in diameter.

The spicules of the other specimen from station 24 are of similar dimensions.

Locality: Between Gibraltar and Gran Canaria, lat. 35° 32' N, long 7° 7' W, 1215 metres, and lat. 35° 34' N, long 7° 35' W, 1615 metres. Bottom in both places yellow mud.

Petrosia friabilis Topsent.

Pl. III fig. 5.

Vide Litter: 24, p. 69.

St. 23. One fragment.

A mass 6.5 cm. × 3 cm. × 4.5 cm. of a rather firm but friable consistency. Several circular, sharply marked oscula with a diameter varying from 3 to 6 mm. Colour in spirit dirty yellowish white. The sponge is traversed by large canals. The dermal membrane is rather thick and consists of a dense reticulation of oxea of the same kind as in the choansome, but they are here irregularly arranged. The shape of the oxea agrees well with Topsent's figure (pl. X fig. 4, op. cit.) and with his preparations, which I have had for comparison, but the proportions are somewhat larger varying from 0.333—0.444 mm. in length and being about 0.015 mm. thick.

Geographical distribution. The species has been recorded from the Azores (130—927 m.) and from the southern entrance of the Bay of Biscay (134—300 m.) (op. cit. p. 69) where it is, according to Topsent, a very common species.

The locality of the „Michael Sars“ specimen is the Spanish Bay (35° 32' N, 7° 7' W), 1215 m.

Temperature 10.17° c. (at 1200 m.).

Chondrocladia Michaelsarsii sp. n.

St. 23. One specimen and fragments.

St. 35. One specimen and fragments.

St. 41. Several fragments.

The general appearance of the „Michael Sars“ specimens recalls Oscar Schmidt's figures of *Chondrocladia conrescens* O. Schmidt (25, Taf. X, fig. 89) and Fristedt's figure (9, pl. 31, fig. 26) of *Cladorhiza nobilis* Frist., found by Lundbeck to be synonymous with *Chondrocladia gigantea* Arm. Hansen (17).

With Lundbeck's own figure (17, pl. IV, fig. 1) of *Ch. gigantea* Arm. Hansen it shows on the contrary less resemblance.

Only two specimens are tolerably well preserved, one from station 23 and one from station 35.

The specimen from station 23 has a body 32 cm. in length (+ 7 cm. for the stalk and root) and that from station 35 is 50 cm. in length (+ 1 cm. for the stalk and root). The stalk is in both nearly uniform in thickness throughout the whole length: in the larger specimen 1—2 cm. and in the smaller one 0.5—0.7 cm.

The stem has whorls of irregularly clubshaped branches, about 2 cm. long, set with small globular swellings. Ordinarily there are four branches in each whorl. The branches coalesce with each other and the neighbouring stems seem to do the same, as sometimes two stems form a cross. One of the specimens is forked at the upper end, while the other is undivided and tapering somewhat towards the apex. The surface is minutely hispid, with either irregular, circular or oval apertures here and there. The further anatomical structure corresponds in all essentials with Lundbeck's description of *Chondrocladia gigantea* Arm. Hansen (17, p. 104). Thus there is a crusty layer, easily peeled off, while the dermal membrane proper is difficult to detach. Further there is a copious system of subdermal cavities and canals (where generally annelids have taken shelter). A rope-like, twisted skeletal axis runs throughout the sponge and diverges into the branches. In the stalk—which is rather muddy—there is no lacunous layer between the coating and the axis.

Spiculation. The megasclera are smooth styli: In the axis they are from 1.7 mm. to 3.4 mm. in length, or even longer, and generally about 0.056 mm. in thickness, while in the other parts of the body they obtain only a length of about 1.2—1.7 mm. with a thickness of 0.011—0.030 mm., but there is no distinct separation between them. Thus they are somewhat longer than in *Ch. gigantea* (1.2—2 mm. and 0.56—1.2 mm.) and approach those in *Ch. conrescens* Ridley and Dendy (4.5 mm.); in shape, they are more like those in the former, perhaps not so suddenly tapering at the upper end. Besides the smooth styli there are in the stalk-coating finely granular styli, generally 0.37 mm. long and 0.007 mm. thick, thus also somewhat larger than in *gigantea* (0.118—0.340 mm.) but otherwise resembling them (pl. XIII, fig. 2 c). The microsclera are *isanchorae unguiferae* of the typical chondrocladia-shape, generally with 7 teeth, but sometimes having 6 or 8, and all of one size, about 0.099 mm.—thus agreeing with the „Challenger“-forms. Plenty of sigmata with compressed ends, 0.037—0.063 mm., have been observed in all parts of the sponge, though most abundantly in the branches.

As will be seen from the above description the *Chondrocladia* obtained by the „Michael Sars“ can not easily be identified with any one of the species in question: *Ch. gigantea* Arm. Hansen, *Ch. conrescens* O. Schmidt and *Ch. conrescens* Ridley and Dendy.—Lundbeck thinks the *Ch. conrescens* of Schmidt and that of Ridley and Dendy are two different species, and he is certainly right I believe.—Our form has affinities with each of the three, thus in the absence of small anchorae and in the proportions of the large it corresponds with Ridley and Dendy's *conrescens*, whilst in general ana-

tomical structure it seems to be identical with *Ch. gigantea* Arm. Hansen—and here special notice must be taken of the presence of a stalk-coating with granular styli, which have been observed as mentioned with certainty only in *Ch. gigantea* the "Schlammbelag" in Schmidt's *concrescens* seems most doubtful. As to external aspect it reminds one most of the species figured by Fristedt (= *Cladorhiza nobilis* op cit.), but it resembles also *Ch. concrescens* Schmidt.

Though as a whole, the relationship seems after all to be closest with the *concrescens* of Ridley and Dendy, and were it not for the absence in this of a stalk-coating with granular styli, the widely separated localities, and

the differences in depth as shown by the following list, I would be inclined to refer it to that species.

From these considerations I think it most practical in accordance with the present state of our knowledge to erect a new species, nearly related to the three above mentioned inter se closely allied species. Further researches may perhaps elucidate the true generic relations between them.

Geographical distribution etc. of *Chondrocladia gigantea* Arm. Hansen, *Chondrocladia concrescens* O. Schmidt, *Chondrocladia concrescens* Ridley and Dendy and the *Chondrocladia* from the "Michael Sars" expedition 1910:

Name of species	Locality	Depth	Temperature	Deposit	Number of specimens	Name of Expedition and Literature
<i>Chondrocladia gigantea</i> Arm. Hansen	(St. 48) Lat. 64° 34' N. long, 10° 22' W.....	547 m.	— 0° ₃	Dark grey clay	1 spec. & several fragments.	Norw. North Atlant. Exp. 1887 (Arm. Hansen: Spongidae) Vide also: Lundbeck: <i>Porifera Desmaccideonida</i> (pars) Danish Ingolf Exp. 1905 p. 102.
	(St. 51) Lat. 65° 53' N. long, 7° 18' W.....	2127 m.	— 1° ₁	Biloculina clay		
	(St. 137) Lat. 67° 24' N. long, 8° 58' W.....	827 m.	— 1°	Clay		
	East Greenland	238 m.			1 "	"Vega" Exp. 1887, Fristedt: Sponges from the Atlant & Arct Ocean etc. Vide also Lundbeck (op. cit.). Verrill: Proc. of the U. St. Nat. Mus. II. 1879, p. 204.
	Off Nova Scotia?.....	329 m.			} Fragments	Danish Ingolf Exp. 1905. Vide (op. cit.).
	Between Iceland and Faeroe:					
	(St. 4) Lat. 64° 07' N. long, 11° 12' W.....	433 m.	+ 2° ₅			
	(St. 64) Lat. 62° 06' N. long 19° 00' W.....	1904 m.	+ 3° ₁			
	(St. 101) Lat. 66° 23' N. long, 12° 05' W.....	982 m.	— 0° ₇			
	(St. 138) Lat. 63° 26' N. long, 7° 56' W.....	861 m.	— 0° ₆		} 3 spec.	"Michael Sars" Cruise 1902. Vide, Lundbeck op. cit., p. 108.
	Faeroe Channel:					
Lat. 62° 53' N. long, 4° 17' E.	823 m.	— ?				
Lat. 62° 38' N. long, 4° 40' E.	640 m.	— 0° ₅				
North W. Atlantic.....	238-2127	+ 3° ₁ — 1° ₁				
<i>Chondrocladia concrescens</i> O. Schmidt	West Indies & Florida: Lat. 33° 44' N. long, 83° 13' W.	907-1620 m.	?		2 spec.	Oscar Schmidt: Spongien des Meerbus. von Mexico 1879 p. 83. Vide also Lundbeck op. cit.
<i>Chondrocladia concrescens</i> Ridly and Dendy	North Pacific (st. 248): Lat. 37° 41' N. long, 177° 4' W.	5304 m.	1° ₂			"Challenger" Exp. 1887: Ridley and Dendy, Monaxonida. Rep. Challenger, vol. XX.
<i>Chondrocladia Michaelsarsi</i> sp. n.	Spanish Bay (st. 23): Lat. 35° 32' N. long, 7° 7' W.	1215 m.	10° ₁₇ (at 1200 m.)	Yellow mud	1 spec. & fragments	} "Michael Sars" 1910.
	Off Cape Bojador (st. 35, st. 41): Lat. 27° 27' N. long, 14° 52' W.	2603 m.	?	Yellow mud	1 spec.	
	Lat. 28° 8' N. long, 13° 35' W.	1365 m.	?	Yellow mud	Fragments	
		1215-2603 m.				

Asbestopluma pennatula O. Schmidt.

Pl. III, fig. 3.

Vide litter: 40, p. 28, 17 p. 44.

St. 102. One specimen.

This species is represented only by the upper part (9.3 cm. long) of the sponge, which consists of two dichotomous and anastomosing main branches. The breadth of the stem at the lower somewhat twisted end—probably the beginning of the stalk—is 0.1 cm. The branchlets are nearly invisible and commence from the lowest third of the stem. The specimen is mostly denuded.

Skeleton. The axis, consisting of closely connected parallel *styli* and single *subtylostyli* with their points turned upwards, has rather large canals. It is surrounded by a dense layer of *styli* arranged parallel to the longitudinal axis. The skeleton of the branchlets oppositely inserted in the narrow side of the stem consists of an axis of *subtylostyli* arranged in a fanlike manner in the longitudinal direction of the stem. Patches of the coating have been found consisting of densely interwoven finely spinulous *tylostrongyla*.

Spiculation: Megasclera are *styli*, 0.850—1.15 mm. long and 0.023 mm. thick; *subtylostyli*, about 0.500

mm. long and 0.018 mm. thick, and *tylostrongyla*, irregularly curved and spinulous, varying between 0.040—0.170 mm. in length and reaching up to 0.003 mm. in thickness. Microsclera are *large anisochelae* 0.070 mm. long, *small anisochelae* 0.014 mm. long and *sigmata* 0.018—0.037 mm. long.

These spicula may be identified in all details with the figures of Lundbeck (pl. X fig. 4 a—o, 5—7. op. cit.).

Remark. As to the synonymi of this species I follow Lundbeck. After the reexamination of my species *Esperella plumosa* erected in 1903 (2) I agree with him in regarding it as a synonym of *Asbestopluma pennatula* O. Schmidt. I myself then thought at first it was *Clardohiza nordenskjöldii* Fristedt; but as Fristedt did not mention the small chelæ I could not be certain. But now since Lundbeck states they are present, there is no doubt any longer. I have also had Armauer Hansen's *Esperia bihamatifera* for comparison and find it to be identical with this one.

Geographical distribution: This species has been recorded only from northern areas as is seen from the following list:

Locality	Depth	Name of expedition	Literature
Off Bukkenfjord & Haugesund.....			O. Schmidt: Jahresber. der Commiss. zur Wiss. Unters. deutsch. Meere in Kiel — für 1872—73, 1875 p. 119.
Trondhjems Fjord.....			Arnesen: Spongien von der Norw. Küste, Bergens Mus. Aarbog 1903, No. 1, p. 11.
Lyngen Fjord, Norway.....			Lundbeck: The Danish Ingolf. Exp. vol. VI, Part 2, 1905, p. 51.
Barent Sea.....		"Willem Barents"	Vosmaer: Niederl. Arch. für Zool. Suppl. Bd. I, 1882, p. 47.
Loc?.....		The Norw. North-Atlantic-Exp.	Arm. Hansen: Spongiadæ. Norw. North Atl. Exp. Bd. III, p. 15.
East coast of Greenland.....		"Vega"-Exp.	Fristedt: Vega-Exp. Vet. Iakt. IV, 1887, p. 455.
Gulf of St. Lawrence.....			Lambe: Proc. Roy. Soc. Canada, Ser. 2 II, Sect. IV, 1896, p. 189.
Between Faeroe-Island and Iceland & South of Iceland and Danmark strait.....		Ingolf-Exp.	Lundbeck: Desmacidonidæ (Pars), The Danish Ingolf. Exped., vol. VI, Part. 2. 1905, p. 51.
N. of W. Thomson Ridge 60° 57' N, 40° 38' W.	1098 m.	"Michael Sars" 1910	

Stylotella columella (Bowerbank) Topsent.

(Pl. III fig. 2).

Vide litter: 4, vol. III p. 243, 34 a, p. 536.

St. 37. Two specimens.

Both specimens are erect with lobate or flat anastomosing branches; the one is 30 cm., the other 10 cm.

high, both with a base about 2.5 cm. in diameter. The surface is smooth, uneven, with a thin pellucid dermal membrane. Distinct, round or oval pore-areas are to be seen all over the surface (like those mentioned in *Myxilla panpertas* var.). Colour in spirit light brownish. The plurispiculous fibres of the rate consist of *tornostrongyla*

often verging upon styli, 0.444 mm. long and 0.006—0.011 mm. thick. As I have had Topsent's preparations for comparison I am sure of the identity.

Geographical distribution: This species has been recorded from Exmouth, England (Bowerbank, op. cit.), off Roscoff (Topsent, op. cit.) and from the Mediterranean Coast of France (38, p. 123).

The specimens from the "Michael Sars" were taken between Gran Canaria and Cape Bojador (lat. 26° 6' N, long. 14° 33' W), depth 39 metres; deposit shingel; bottom temperature 15.63° C.

Stylotella topsenti sp. n.
Pl. III fig. 4 & pl. V, fig. 4.

St. 37. One specimen.

Sponge erect, ramouse, with a few long flexible branches dichotomising in whiplike ends (fig. 4). The transverse section of the branches is oblong or triangular. Oscula, about 2 mm. in diameter, are serially arranged along the narrow sides of the branches. Dermal membrane distinct and pellucid (only patches preserved). Consistency rather tough. Colour in spirit light brownish.

Skeleton consists of a somewhat irregular network of densely packed parallel *styli* imbedded in strong spongin fibres. There is no pronounced difference between the fibres, but those radiating towards the surface are somewhat stronger than the other ones. The meshes of the network and the dermal membrane are filled with dense masses of scattered spicules.

Spiculation. The *spicula* of the fibres are *styli* varying in length from 0.230 to 0.296 mm. by 0.195 mm. (in the thickest part). They are either straight, cylindrical, with long and sharply pointed ends or, usually, somewhat fusiform and slightly bent; the other end is simply rounded off. The scattered spicules in the meshes and in the dermal membrane consists partly of *styli* of the same kind as in the fibres, but there are also some very slender, irregularly curved ones, the form of which is difficult to define, but usually they have blunt ends.

The above described form does not agree in any respect with any one of the Atlantic species described by Bowerbank and Topsent (St. Jullieni 38, p. 137), but in form and proportions of spicules it is like one of the four Australian species of Lendenfeldt—(*St. digitata* Lndf. 14, p. 185)—which has a digitate branching form and straight or slightly curved spicules, 0.250 in length and 0.004 mm. in thickness.

Locality. Off Cape Bojador; depth 39 metres; shingel; bottom temperature 15.63° C.

Cladorhiza gelida Lundbeck. (?)
Vide litter: 17, p. 83, 42, p. 5.

St. 102. Several fragments.

At station 102 a few, mostly denuded fragments of *Cladorhiza* were obtained, which externally exhibits most resemblance to Lundbeck's figure of *Cl. gelida* Lndb. (Pl. III fig. 1, op. cit.), but shows certain peculiarities.

Thus besides the filiform appendages tapering towards the point in the characteristic way of *Cl. gelida*, there are also filiform appendages, ending in a globular or club-like swelling (5 cm. long). Further the spicules are about double the size of those indicated by Lundbeck and Topsent. Several fragments have been examined from different parts of the sponge, with the same result, though in the branchlets a few spicules approximating in size to those in the type have also been observed.

All the types of micro-spicules indicated by Topsent (Pl. II fig. 4, 17) have been found except the small sigmates. Thus, the *anisancoræ unguiferae* were present in great abundance, generally varying from 0.051—0.055 mm. (thickness 0.007 mm.); in the branchlets a few measured only 0.037. *Large sigmata*, 0.159—0.259 mm. (greatest thickness 0.259 mm.) were likewise abundant in all parts, while only a few *ancistres*, of about the same size, have been observed. *Sigmansistres*, 0.051—0.092 mm., were numerous especially in the branchlets, where the large sigmata were less frequent.

This difference in the size of the spicules in my specimens, as compared with those in *Cl. gelida* Lndb., has made me hesitate to refer them to that species. But perhaps *Cl. gelida* is like *Cl. longipinna* R. and D. (21, p. 92) in having spicules of different sizes (*anisancoræ* varying from 0.034—0.060 mm.) in different parts of the sponge—the larger ones belonging to the lower surface. At least two of my specimens are fragments broken off very near to the base of the sponge, all the rest being only detached branches—so that it may be so. I therefore think it right to refer them provisionally to *Cl. gelida* Lndbk.

Geographical distribution: *Cladorhiza gelida* Lundbeck is known as an inhabitant of the cold area having been recorded from:—

Date	Locality	Depth m.	Temperature	Name of expedition	Literature
1885	Lat. 31,63° 10' N. long, 5° 00' E. (St. 31)	863		Norw. North-Atlant Exp.	Vide—Lundbeck: Porifera Desmacidonidae (pars) in Da- nish Ingolf-Exp., vol. VI. 2. 1905, p. 86.
1902	Lat. 6,0° 19' N. long, 5° 39' W. (Faroe-Channel)	1134	÷ 0,15° C.	„Mich. Sars“	Ibidem p. 87.
1905	Lat. 69° 57' N. long, 6° 44' W. (St. 112)	2317	÷ 1,1° C.	Ingolf-Exp.	Ibidem p. 83.
	Lat. 69° 31' N. long, 7° 06' W. (Norwegian Sea between Jan Mayen and Iceland)	2394	÷ 1° C.		
1909	Lat. 76° 56' N. long, 9° E. (Spitzbergen (Horn Sound) ...)	1535		„Princesse Alice“	Topsent: Etudes sur qlq. cla- dorhiza. Bull. Institut oceono- graphic Monaco, No. 151. Sept. 1909, p. 6.
1910	60° 51' N., 40° 38' W.,	1098		„Michael Sars“	

Myxilla O. Schmidt. — (Dendoryx Gray 1867).

Myxilla established by Oscar Schmidt in 1862 is a genus which has been much discussed, and its diagnosis has often been changed. Thus while Ridley and Dendy make no distinction between the forms with or without accessory spicules, Topsent (34) refers the former to *Myxilla* and the latter to *Dendoryx*, after having revived (in 1888) Gray's *Dendoryx* of 1867. Thiele however (33, p. 953) states, that Topsent's diagnosis of *Dendoryx* must be applied to *Myxilla*. And finally Lundbeck follows Thiele and includes in *Myxilla* (type *M. rosacea* Lundbeck) thus diagnosed all forms with isancoræ. In this sense also Topsent now recognizes the genus (type *M. incrustans*), as I know by letter enclosing the draft of his paper: "Sur les Eponges de la Scotia" in which he deals with the question. He recognizes the genus *Myxilla* with the above diagnosis and maintains *Dendoryx* in the following sense: "*Dendoryx*, novo sensu, type *D. irregularis* (Bow.) Gray, à squelette reticulé et hérissé aux noeuds, avec isochèles."

Thus, the following species, with which I have identified several specimens from station 53, cannot be called *Dendoryx pectinata*, but ought to be called *Myxilla pectinata* — were it not for the peculiar form of the isancoræ, which has caused Lundbeck (17, p. 153) to suggest, that it may perhaps be an *Ietrochata* without *birotula*. It is difficult to decide this question in the present state of our knowledge, and I therefore consider it most convenient, pending further investigations, to place it under the genus *Myxilla*:

Myxilla pectinata (Topsent) n. var.

(*Dendoryx pectinata* Topsent olim).

Pl. II fig. 2.

Vide litter: 34, p. 100. 41, p. 172.

St. 53. Several specimens.

From this station there are several nut-shaped sponges, about 2—3 cm. in diameter, covering usually the whole inside of musselshells. They have a rather soft consistency — very like small lumps of mud. In spirit the colour is yellowish-grey; but to judge from some spots of the skin still left on the rubbed surface, it was most probably in the living state darker in colour.

Spiculation. Megasclera. The *styli* forming the reticulation of the main skeleton are curved, robust, 1.036 mm. long and 0.026—0.037 mm. thick (near the base), and smooth (occasionally isolated spines are faintly to be observed). The *tylota* forming the dermal skeleton have well marked heads, and are 0.740 mm. long by 0.015 mm. thick. Microsclera: The isancoræ have a doubly curved shaft with the characteristic spoon-like ends, the margin of which is set with pointed teeth, forming a half-circlet shaped comb. I have not been able to count 10 teeth, as in the typical *pectinata*, but only 7 or 8. They appear as two distinct kinds without transitional forms. The larger ones, few in number, are 0.081—0.111 mm. long by 0.0074 mm. thick, the smaller ones 0.030—0.037 mm. long. In the larger ancoræ narrow but rather long alæ are to be observed, much like those in *Myxilla diversiancorata* Lundb. (fig. 27 pl. XV), but not seen in Topsent's figure (pl. X, fig. 6 c, 34).

Remark: Whether *Dendoryx pectinata* Tops. olim, as above mentioned, turns out to be a *Myxilla*, or, as

Lundbeck suggests, may perhaps be an *Iotrochata*, it is at any rate closely allied to the pluridentate species of *Myxilla*, like *M. diversianorata* Lundb., *M. pluridentata* Lundb., *Stelodoryx procera* Tops. (41, p. 175) and *Dendoryx dentata* Tops. (p. 172) — the two last mentioned belonging to *Myxilla* according to Lundbeck (17, p. 150). The smoothness of the styli (like those in *Stelodoryx procera* Tops.), and the larger proportions of the spicula, have made me hesitate in referring the specimens in hand to *pectinata*, on the other hand the ancoræ agree so well with the ancoræ peculiar to this form — even if the teeth are fewer in number, and the size is the same as in *D. dentata* (0.080 mm. instead of 0.060 mm., and 0.030—0.036 instead of 0.020 mm.) — that I think the "Michael Sars" material must represent a variety of *M. pectinata*. Both are from the same locality, the Azores group, but the "Michael Sars" material comes from deeper water (2615—2865 m.) than the form from the "Hirondelle" and "Princesse Alice" (845—1495), "repandue dans tout l'archipel des Açores".

Locality. Between Gran Canaria and Cape Bojador. (Lat. 34° 59' N. long, 33° 1' W.); depth 2615—2865 m. Globigerina ooze.

Lissodendoryx complicata Arm. Hansen.

Vide litter: 17, p. 166.

(Pl. II, fig. 1).

St. 102. 2 specimens.

For external appearance the specimens in hand agree nearly absolutely with Lundbeck's figures, (pl. V, fig. 11 op. cit.). Both are bush-shaped, with compressed anastomosing branches arising from a narrow base—no stalk, nor attachment has been observed. One specimen is 4 cm. high by about 5 × 5 cm. in the other dimensions; the other is 6 cm. high by about 5 × 4 cm.

The spiculation agrees well with the description and figures of Lundbeck (pl. XVI, fig. 4 a—g op. cit.). Though noticed, the large sigmata were found very sparsely in the internal parts and none in the dermal membrane, where only arcuate chelæ and small sigmata were abundant.

Geographical distribution. Leaving out of consideration the undoubtedly erroneous temperature (+6° 5 C.) given by Armauer Hansen (10). *Lissodendoryx complicata* Arm. Hansen is an inhabitant of the cold area, having been recorded from the following localities:—

Locality	Depth	Temperature	Number of specimens	Litterature
(Stat. 84?). (Probably confounded with stat. 87 according to Lundbeck (17 p. 166) Lat. 64° 2' N. long, 5° 35' E.	911 m. (clay)	(+6°,5 C)? ÷ 1°,1 C.	2	Norw. North Atlant-Exp. III, Spong. 1885, p. 7—8, p. 12.
Baffin Bay. Lat. 68° 08' N. long 58° 17' W.	169 fath = 309 m.		1	"Vega" Exp. Vetensk. Iakt. VI, 1887, p. 460.
North of Farøe and South of Jan Mayn:				
(St. 141) Lat. 63° 22' N. long, 6° 58' W.	679 fath = 1242 m.	÷ 0°,6 C.	} 14	Danish Ingolf-Exp. vol. VI, Part. 2, 1905, p. 168.
(St. 143) Lat. 62° 58' N. long, 7° 09' W.	388 fath = 710 m.	÷ 0°,4 C.		
Lat. 70° 32' N. long, 8° 10' W.	470 fath = 860 m.			
	Between: 309—1242 m.	÷ 0°,4 C—÷ 1°,1 C.	Total 18	(East Greenland-Exp. 1891—92) (Vide: Ingolf-Exp. 1905).

Locality: The "Michael Sars" specimens are from the Farøe-Channel. (Lat. 60° 57' N, long, 4° 38' W). 1098 m. Blue mud.

Dendoricella abyssi (Topsent) Lundbeck var nov.

Syn: *Desmacidon abyssi* Topsent 41, p. 204.

(Pl. II, fig. 4).

St. 10. One specimen.

A grey clubshaped sponge of rather firm consistency, 3.5 cm. long and 2.3 cm. broad by 1 cm. thick, somewhat

restricted at the base so as to form a short stalk-like attachment fixed to a stone. One rather large osculum, 5 mm. in diameter, has a somewhat folded margin at the summit. Perhaps there were more oscula, but as the upper part of the sponge is somewhat damaged, this cannot be determined. The surface is shaggy and has a

reticulated appearance owing to the closely set grooves separated by narrow ridges—most like that of *Dendoricella rhopalum* Lundb. (17, p. 127, pl. IV, fig. 4 & 5).

Skeleton. The dermal membrane of the ridges is supported by more or less erect or horizontal fan-like brushes of tornota, with their free ends projecting beyond the surface. The membrane of the grooves has only isochelæ. The choanosome consists of dendritic and anastomosing polyspicular strands of oxea. The outermost ramifications bend towards the surface at more or less acute angles.

Spiculation: The spicules of the ectosome are tornota, often verging upon oxea, about 9.925 mm. long and 0.018 mm. thick and usually straight.

The spicules of the choanosome are straight or usually slightly and evenly curved oxea, generally of equal thickness through-out their length. They are usually 1.5 mm. in length and 0.037 mm. in thickness. The Microsclera, exceedingly abundant in the dermal membrane, but also usually present in the choanosome, are *isochelæ arcuatæ* with a strongly curved shaft, somewhat laterally compressed and with tooth-like alæ, which are of about the same length as the rather short tooth resting on an oblong little tubercle. The length varies from 0.045 mm. to 0.063 mm. and the thickness of the shaft is about 0.0037 mm., seen from the front. Several developmental forms were observed.

The specimen above described shows a striking resemblance to *Desmacidon abyssi* Topsent = *Dendoricella abyssi* (Topsent) Lundbeck (41, p. 204) but in many respects also to *Dendoricella rhopalum* Lundbeck (17, p. 127)—both inter se closely allied deepsea-forms, but from rather different localities, the one (*D. abyssi*) having been recorded (5 specimens) from the Azores (4020—5005 m.) and the other (*D. rhopalum*) from Denmark-strait and Davis-strait (20 specimens; depth 2076—2625 m.). The "Michael Sars" specimen is from a locality intermediate between those mentioned although belonging to the same area as *D. abyssi*. I therefore think it must be referred to *Dendoricella abyssi* (Tops.) Lundb.—if not to the typical form, at least to a variety.

Locality: The "Michael Sars" specimen was obtained at the southern entrance of the Bay of Biscay (45° 26' N, 9° 20' W), 4700 m. Globigerina ooze.

Grayella fallax (Topsent).

Syn: *Yvesia fallax*. Topsent 34, p. 106.

(Pl. II, fig. 3).

St. 37. One specimen.

In external appearance the specimen in hand does not much resemble the type figured by Topsent (op cit.

pl. VI, fig. 13), being 14 cm. long and about 7 cm. in breadth with erect conical lobes diverging from a somewhat narrow base, while the type-specimen is a little massive sponge, "sans papilles, ni pedicelle, 8 mm. cubes de volume". The colour in spirit is yellowish. The surface is minutely granular, and the dermal membrane rather pellucid and easily detached (for large parts of it have been rubbed off).

The spiculation agrees better with that of *Grayella (Yvesia) fallax* Topsent than with that of any other species of the genus.

Spiculation: The smooth, straight tornota forming the main skeleton, are 0.266 mm. long with a thickness of 0.006 mm. The spined, curved styli of the dermal membrane varying from 0.111—0.185 mm. (thickness 0.006) are somewhat longer than in the type. The isochelæ of the same shape as those figured by Topsent op. cit. pl. X, fig. 14 c., are 0.016 mm. long.

Geographical distribution. *Grayella (Yvesia) fallax* Topsent has been recorded by the "Hirondelle" from the Azores (st. 226—between Pico and Fayal), depth 130 m. on a bottom of "gravier, sable et coquilles brisées".

The "Michael Sars" specimen was taken between Gran Canaria and Cape Bojador (lat. 26° 6' N, long 14° 33' W); depth 39 m.; on a bottom with shingle, at a temperature of 15.63° C.

Echinoclathria Carter.

Vide litter: 6, p. 204, 21, p. 159.

Echinoclathria hjorti sp. n.

Pl. II, fig. 5 & pl. V, fig. 3.

St. 37. One specimen.

A digitate sponge with flat branches anastomosing in one plane, thus assuming the outline of a fan about 28 cm. high and 20 cm. in the broadest part. The texture is rather tough and parchment-like. The surface forms a reticulation of very fine meshes, 0.5—1 mm. in diameter. The trabeculae between the meshes have their edges turned outward making the surface minutely uneven. The dermal membrane (mostly rubbed off) is thin and opalescent. The colour of the interior of the sponge is pale dirty yellow. Oscula scattered.

Skeleton consists of a rather close reticulation of strongly developed horny fibres cored and echinated by robust smooth styli.

Spiculation. The megasclera are: 1) robust smooth styli, straight or somewhat curved, sharply or gradually pointed, often with a slight restriction above the base, varying in length from 0.185 to 0.444 mm., with a thickness of 0.030 mm. near the base. Generally the

larger ones are in the fibres, while the smaller ones project from the fibres and are scattered between them. 2) Fusiform tylostyli, smooth, straight or somewhat curved, with a round markedly constricted head and sharply pointed, usually varying in length from 0.111—0.148 mm, with a thickness of 0.0037—0.0148; they are scattered and not exceedingly abundant. 3) Very slender, smooth *subtylostyli* or *tylostyli*, with an oval not markedly constricted head and not always sharply pointed. They vary much in size, 0.185—0.407 mm., and are scattered throughout the sponge. In the dermal membrane they are the only megascleres present and form there a dense felt, in which the spicules are arranged parallelly to the surface. Single, very thick strongyl-tornote spicules, apparently abnormalities, have also been observed. The microsclera are small *palmate isochelæ*, 0.0222 mm. long, not very abundant, but scattered all over the sponge. There have also been observed in abundance smooth, not much curved, toxa, ordinarily with the opening of the curvature about 0.166 mm.; at first I thought they belonged to a foreign sponge, (there being many foreign bodies and spicules present), but they are so regularly distributed throughout the whole sponge, that I must believe they belong to it.

Except the presence of the toxa this sponge in all other respects corresponds perfectly well with the genus *Echinoclathria* Carter. I therefore provisionally at least refer it hereto leaving to a closer examination of this genus, the diagnosis of which only is a preliminary one (Ridley and Dendy op. cit., p. 160), to decide whether the toxa really belong to it or not.

The species to which it makes the nearest approach are undoubtedly *Ech. carteri* R. & D and *Ech. favus* Carter. But as the specific diagnoses of these two species are indefinite, and they may according to Ridley and Dendy ultimately prove to be connected with intermediate forms, I think it most convenient provisionally at least to regard the "Michael Sars" species as distinct especially on account of the different habitats—the earlier known species being from the south coast of Australia, while the "Michael Sars" material is from the north-atlantic coast of Africa. Both agree in having been recorded from rather shallow water—the „Challenger”-material being from within a bathymetrical range of 30—120 meters and that of "Michael Sars" from 37 meter depth.

Locality: Between Gran Canaria and Cape Bojador (Lat. 26° 6' N, long 14° 33' W); depth 39 metres; bottom shingle; temperature 15.63 C.

***Anchinoë* Gray.**

Syn: *Stylistichon* Topsent.

Vide litter: 34, p. 111.

In the letter from Mr. Topsent previously mentioned he remarks that in a paper about to be published:

„*Sur les Éponges des Mers du Nord prises par le Prince de Monaco*”, he now regards his genus *Stylistichon*, established in 1892, as a synonym of Gray's genus *Anchinoë*; in this genus he includes Ridley and Dendy's species of *Myxilla*, which have a skeleton composed of fibres with echinating spicules. Accordingly the species under consideration, with which I have identified one specimen from station 37, must be called *Anchinoë nobilis* (Ridley and Dendy).

***Anchinoë nobilis* (Ridley and Dendy).**

Syn: *Myxilla nobilis* Ridley and Dendy (21, p. 140).

Pl. II, fig. 6.

St. 37. One specimen.

Sponge erect, of a somewhat flattened oval shape with conical digitate processes. Base of insertion not very broad. Texture rather tough. Colour in spirit mouse-grey. Surface uneven, but not hispid. The dermal membrane is translucent, thin, and may easily be peeled off. The most remarkable feature of the surface are the densely placed circular or oval areas, 1—2 mm. in diameter, bounded by a distinct, minutely granular ring. They are pore-areas, in some of which the openings of the subdermal cavities are to be seen with the naked eye. Oscula are small and scattered, their margin flush with the surface, or a little sunken.

Skeleton. The dermal skeleton consists of strongyla arranged in penicillate, erect or somewhat recumbent, bundles supporting the dermal membrane. They are especially localised round the poreareas, where they form a dense palissade bending over the subdermal cavities, here projecting above the surface with their distal ends and forming the minutely granular rings previously mentioned. The spaces of the membrane between the pore-areas have usually only isancoræ and a very few isolated horizontal strongyla.

Spiculation. 1) Acanthostyli verging upon acanthotylostyli, straight or usually slightly curved, 0.59 mm. long and 0.019 mm. thick, gradually tapering towards the apex. The sharp spines are not very close-set except at the base. 2) Smaller acanthostyli, verging upon tylostyli, 0.222 mm. long and 0.007—0.015 mm. thick, usually straight and gradually tapering towards the apex. They are covered by long and sharp closely set spines, especially at the base. 3) Strongyla, smooth usually straight, 0.407 mm. long and 0.0074 mm. thick. They are, all very uniform typical strongyla, except that occasionally they show a tendency towards an abrupt truncation with a faint spinulation at the one end, as in *Myxilla nobilis* R. & D, (fig. 14 & fig. 15, pl. XXVII, p. 140 op. cit). Microsclera are isancoræ spatuliferæ with 3 teeth and a rather curved shaft, 0.044 mm. long and 0.0074 mm. thick.

Remark: The differences in the proportion of the spicules, the presence of typical strongyla (generally not with spinulation at one end as in Ridley and Dendy's *M. nobilis*), and the stronger spinulation in the larger acanthostyli (in Ridley and Dendy's *M. nobilis* restricted to the base) make it most probable, that this is not the typical form of *Anchinoë (Myxilla) nobilis*, but rather a variety of it, connecting this species still closer to the allied *Myxilla (olim.) paupertas (Bow.) Vosm.*, especially to the variety from the Azores (Topsent 41, p. 168).

This is supported by the difference in habitat of the two species: *Anchinoë (Myxilla) nobilis* with its varieties from the Challenger Expedition having been recorded from the western part of the southern Atlantic (Rio de la Plata, 600 fms., and coast of Patagonia), while *Myxilla paupertas* is from the European side of the Atlantic.

Locality: Between Gran Canaria and Cape Bojador (Lat. 26° 6' N, long 14° 33' W); depth 39 m.; bottom shingle.

Axinella polypoides O. Schmidt.

Vide litter: 22, p. 62.

Pl. IV, fig. 1.

St. 37. One specimen.

Sponge ramose, about 28 cm. high, divided into two main branches, from which secondary branches dichotomise, usually in one plane from the inside of the two main branches. The base of the stem is about 2 cm. in diameter, and the branches about 1 cm. The transverse section of the branches is oblong or nearly triangular. Towards the end they are more cylindrical and terminate conically. Colour in spirit brownish. The consistency is very firm owing to the strong axis of spicules. The cortical layer is rather thick and tough, but peels off readily. The dermal membrane has been rubbed off, mere patches being left. Fine pores are spread all over the surface, and at intervals larger, serially arranged, flat stellate depressions (oscula) are to be seen (though not very distinctly on account of the bad condition of the specimen).

Skeleton: The axis is very firm, consisting of densely interwoven fusiform oxea, straight, or regularly bent in the middle, 0.3700—0.4010 mm. long, with a diameter varying from 0.0185 to 0.296 mm. The choanosome consists of oxea, of the same kind as in the axis, and of styli of about the same size (ordinarily 0.4010 mm. by 0.0185 mm.); styli are also to be found in the axis.

Geographical distribution: This species has been recorded from Lesina, usually in deep water, off the coasts of England and Florida (23, p. 80) and off the Mediterranean coast of France.

Locality: Off Cape Bajador (Lat. 26° 6' N. long 14° 33' W); depth 39 m.; bottom shingle; bottom temperature 15.63° C.

Thrinacophora Ridley.

Vide litter: 21, p. 193.

Thrinacophora murrayi sp. n.

Pl. IV fig. 2 & pl. V, fig. 5.

St. 37. One specimen.

Sponge erect, dichotomously branching in one plane, thus having a fan-like outline. Height about 18 cm., diameter of the stem about 15 mm. and of the flattened branches 15—5 mm. Colour in spirit greyish yellow. Texture tough, but flexible. Dermal membrane distinct (mostly abraded). Pores rather small. Oscula seem to be serially arranged, but are difficult to distinguish, the specimen not being in good condition.

Skeleton. The skeleton consists of a thick central axis formed by a dense reticulation of strong fusiform oxea and occasionally of styli cemented together by a horny material, which gives the sponge its firm and elastic character. The axis is coated by a comparatively thin choanosome, which readily peels off. The choanosome consists of a looser irregular reticulation of styli and oxea like those in the axis. From the mesh-edges the spicules project beyond the surface in small brushes. The long setiform spicules forming the axis of the brushes in *Thr. cervicornis* Ridley & Dendy have not been observed. The dermal membrane contains only trichodragmata and isolated long, slender styli.

Spiculation. Megasclera are straight or curved fusiform oxea varying from 0.2960—0.4076 mm. in length with a thickness of 0.0185 mm.; they occur especially in the axis, but are also abundant in the coating. The styli, especially abundant in the choanosome seem to be of two sizes, the slender, smaller ones being 0.2730 mm. long and 0.005 mm. thick, and the larger ones 0.5920 mm. long and 0.0185 mm. thick. They may be straight, but are usually more or less irregularly curved. Microsclera include only trichodragmata, about 0.040 mm. long and 0.010 mm. broad.

It is impossible to identify this form with any one of the earlier known species: *Thr. cervicornis* Ridley & Dendy *Thr. funiformis* Ridley & Dendy and *Thr. spinosa* H. V. Wilson (45, p. 400) [*Thr. spissa* Topsent has been removed to *Rhaphisia spissa* Topsent (41, p. 233)—and *Thr. incrustans* Kieschn. is a doubtful species (33, p. 935)]. But it seems to be nearly related to the two first mentioned inter se closely allied forms.

Locality. The specimen was obtained between Gran Canaria and Cape Bojador (Lat. 26° 6' N. long 14° 33' W), 39 metres on shingle; temperature 15.63° C. It is thus the first known *Thrinacophora* from the Eastern Atlantic (*Thr. funiformis* having been recorded from off the coast of Brazil (Bahia), 7—20 fathoms, *Thr. cervicornis* from off the Philippine Islands, 18 fathoms, and *Thr. spinosa* Wilson from off Costa Rica).

Ciocalypta weltneri sp. n.

Pl. II, fig. 7 & pl. V, fig. 1.

St. 37. 3 specimens in spirit, 2 dried.

There is little doubt that the specimens preserved in alcohol and those in the dried state, in spite of slight divergences to be mentioned later, belong to the same species.

They have all a circular or oval cushion-like base, from which fingerlike, cavernous or hollow processes stand upwards, in external appearance thus resembling *C. pennicillus* Bwbk. (4 vol. III, pl. XIII, fig. 2—4) and *C. tyleri* Bwbk. (4, pl. IV, fig. 9—12). The dried specimens, much abraded and the fingers pressed down into the cushion, are very like *C. tyleri*, which also is figured in the dried state. Those in alcohol having retained their dermal membrane show a more even surface, though minutely granular. The dried specimens measure at the base respectively 8 cm. \times 7 cm. and 8 cm. \times 4 cm.; and they are both about 2—3 cm. in height. The spirit specimens are all about 4 cm. \times 4 cm. with a height of 2—3 cm. The fingerlike processes are 2—5 cm. in length and 0.4—1 cm. in breadth (in the middle). They show a tendency to coalesce; in one of the spirit specimens with especially broad fingers, two of them have coalesced throughout their whole length. The surface is rough to the touch and the consistency rather tough, with large subdermal cavities (the dried specimens are friable).

Skeleton. The skeleton of the basal cushion consists of a confused and dense reticulation of strong vertically running fibres, connected with horizontally ill-defined secondary fibres or isolated spicules. This structure continues upwards into the fingers, where strong reticulated

strands run up in the centre or in the walls. From these strands dense tufts of spicules diverge at right or somewhat acute angles towards and into the dermal membrane. The dermal membrane is further provided with a dense, rather regular network of spicules of the same kind as in the main skeleton. In the dried specimens, where only patches of the membrane are left, the network has not been observed, but only isolated spicules.

Spicules: The main form of spicules both in the outer and central parts are fusiform oxea, usually bent and evenly pointed, but sometimes with the one end less tapering than the other. Length 0.800—1.400 mm. by 0.037—0.055 mm. in thickness. Intermingled with the oxea are styli or subtylostyli, about 0.700 mm. long by 0.037 mm. thick, and occasionally thick strongyla, measuring 0.300—0.800 mm. by 0.037—0.055.

Remark. There can hardly be any doubt that the above described sponges belong to the genus *Ciocalypta* Bwbk., but it has not been possible to identify them with any described species. As already mentioned, they have a close resemblance to *C. pennicillus* Bwbk. and *C. tyleri* Bwbk., but having both styli (subtylostyli) and oxea, they can not be referred to either of them. This form is the only one, except the British *pennicillus*, recorded from the eastern Atlantic. The others having been recorded from off the mouth of Rio de la Plata, the Philippines Islands (21, p. 174—175) and the Australian coast (33, p. 74—76, 7, p. 240, 4, p. 21).

Locality. Between Gran Canaria and Cape Bojador (Lat. 26° 6' N, long 14° 33' W). Depth 39 m. Bottom shingle. Temperature 15.63° C.

Table I.

Distribution of the Sponges collected by the "Michael Sars" 1910 with details of capture.

Locality, date	Gear, depth etc.	Name of species	Order	Specimens obtained
St. 10 Bay of Biscay 45° 26' N., 9° 20' W. 19—21 april	Trawl Depth 4700 m. Globigerina ooze Temp. 2° 56 at 4500 m.	<i>Hyalonema</i> sp.? <i>Malacosaccus floricomatus</i> Tops. <i>Chonelasma</i> sp.? <i>Dendoricella abyssii</i> (Tops.) Lundb.	Hex. " " Mon.	2 fragments 1 1 1
St. 23 Spanish Bay 35° 32' N., 7° 7' W. 5—6 may	Trawl Depth 1215 m. Temp. 10° 17 at 1200 m.	<i>Pheronema grayi</i> Sav. Kent <i>Hyalonema infundibulum</i> (?) Topsent <i>Regadrella phoenix</i> O. Schmidt <i>Aphrocallistes beatrix</i> Gray forma <i>bocagei</i> P. Wright <i>Chondrocladia michaël sarsi</i> sp. n. <i>Petrosia friabilis</i> Topsent <i>Stelletta hispida</i> Buccish <i>Thenea muricata</i> Bow <i>Characella pachastrelloides</i> <i>Isops pachydermata</i> Sollas <i>Sidonops</i> sp. (?)	Hex. " " " Mon. " Tetr. " " "	2 2 and 1 fragm. 7 and several basal cups Several 1 and fragments 1 fragment 1 3 fragments 1 1 1
St. 24 Spanish Bay 35° 34' N., 7° 35' W. 6—7 may	Trawl Depth 1615 m. Temp. 8° 0 at 1575 m.	<i>Pheronema grayi</i> Sav. Kent <i>Tethyopsilla zetlandica</i> Carter <i>Sidonops</i> sp.?	Hex. Tetr. "	20—30 2 2
St. 25 Spanish Bay 35° 36' N., 8° 25' W. 7 may	Trawl Depth 2300 m. Globigerina ooze Temp. 5° 27 at 2000 m.	<i>Euplectella suberea</i> Wyv. Thomson	Hex.	About 25 fragments
St. 35 Canaries—Bojador 27° 27' N., 14° 52' W. 18—19 may	Trawl Depth 2603 m. Globigerina ooze	<i>Hyalonema</i> sp. <i>Chondrocladia michaël sarsi</i> n. sp.	Hex. Mon.	1 basal tuft. 1 and several fragments
St. 37 Off C. Bojador 26° 6' N., 14° 33' 20 may	Trawl Depth 39 m. Shingle Temp. 15° 63	<i>Echinoclathria hjorti</i> n. sp. <i>Grayella fallax</i> Topsent <i>Axinella polypoides</i> O. Schmidt <i>Ciocalypta weltneri</i> n. sp. <i>Trinacophora murrayi</i> n. sp. <i>Stylotella columella</i> (Bow) Topsent <i>Stylotella topsenti</i> n. sp. <i>Anchinoë nobilis</i> Ridley & Dendy	Mon. " " " " " " "	1 1 1 5 1 2 1 1
St. 41 Canaries—Bojador 28° 8' N., 13° 29' W. 23 may	Trawl Depth 1365 m. Globigerina ooze	<i>Chondrocladia michaël sarsi</i> n. sp. <i>Pheronema grayi</i> Sav. Kent	Mon. Hex.	Several fragments 2
St. 53 S. W. of Azores 34° 59' N., 33° 1' W. 8—9 june	Trawl Dept 2615—2865 m. Globigerina ooze Temp. 4° 50 at 1600 m.	<i>Hyalonema</i> sp.? <i>Myxilla pectinata</i> Topsent	Hex. Mon.	2 fragments Several
St. 102 N. of W. Thomson-Ridge 60° 57' N., 4° 48' W. 9—10 august	Trawl Depth 1098 m. Blue mud	<i>Grantia intermedia</i> Thacker <i>Asconema setubalense</i> Sav. Kent <i>Cladorhiza gelida</i> Lundbeck <i>Asbestopluma pennatula</i> O. Schmidt <i>Lissodendoryx complicata</i> Arm. Hansen	Calc. Hex. Mon. " "	2 1 Several fragments 1 2
Unknown locality		<i>Pheronema grayi</i> Sav. Kent	Hex.	11

Table II.

Bathymetrical distribution of the sponge-species collected by the "Michael Sars".

Figures in brackets denote number of localities.

Depth (metres)	Number of species belonging to the				
	Calcarea	Hexactinellidæ	Tetractinellidæ	Monaxonidæ	Total
0—100	8 (1)	8 (1)
101—500
501—1000.....
1001—1500.....	1 (1)	5 (3)	5 (1)	5 (3)	16 (8)
1501—2000.....	..	1 (1)	2 (1)	..	2 (2)
2001—2500.....	..	1 (1)	1 (1)
2501—3000.....	..	1 (2)	..	1 (1)	2 (3)
3001—3500.....
3501—4000.....
4001—4500.....
4501—5000.....	..	2 (1)	..	1 (1)	3 (2)

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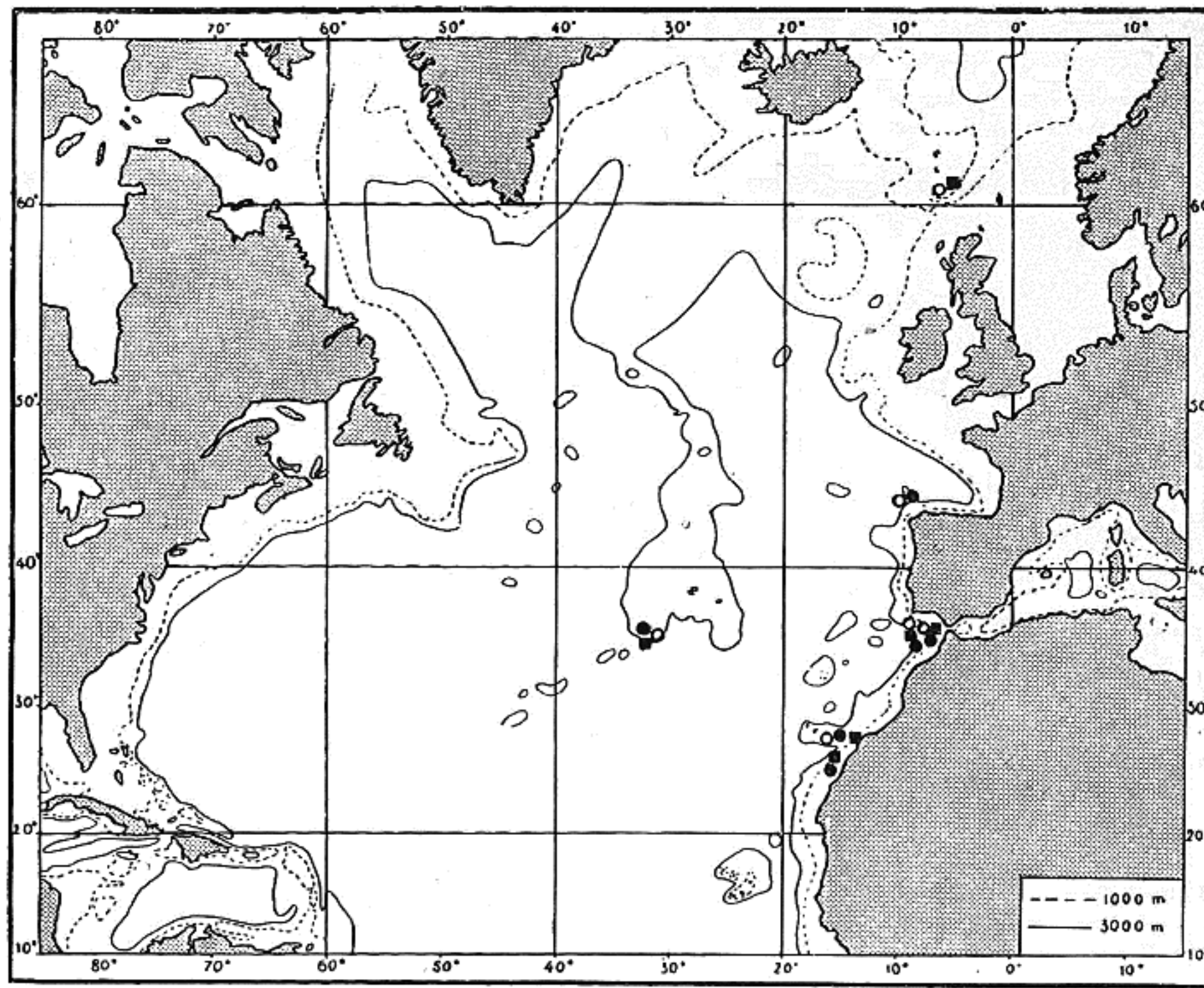
Postscript.

As the publication of my paper has been so unduly postponed and interrupted an explanation is necessary: The manuscript was sent to the press in the spring 1914. I received the first proof at the end of 1915 and had hoped to have the paper published in the beginning of 1916. But the great fire in Bergen in January 1916,

which caused the destruction of the printing works, made this impossible. Later the difficulties of war have prevented it from being printed before now. I have accordingly not been able to take into consideration the literature published after the beginning of 1914.

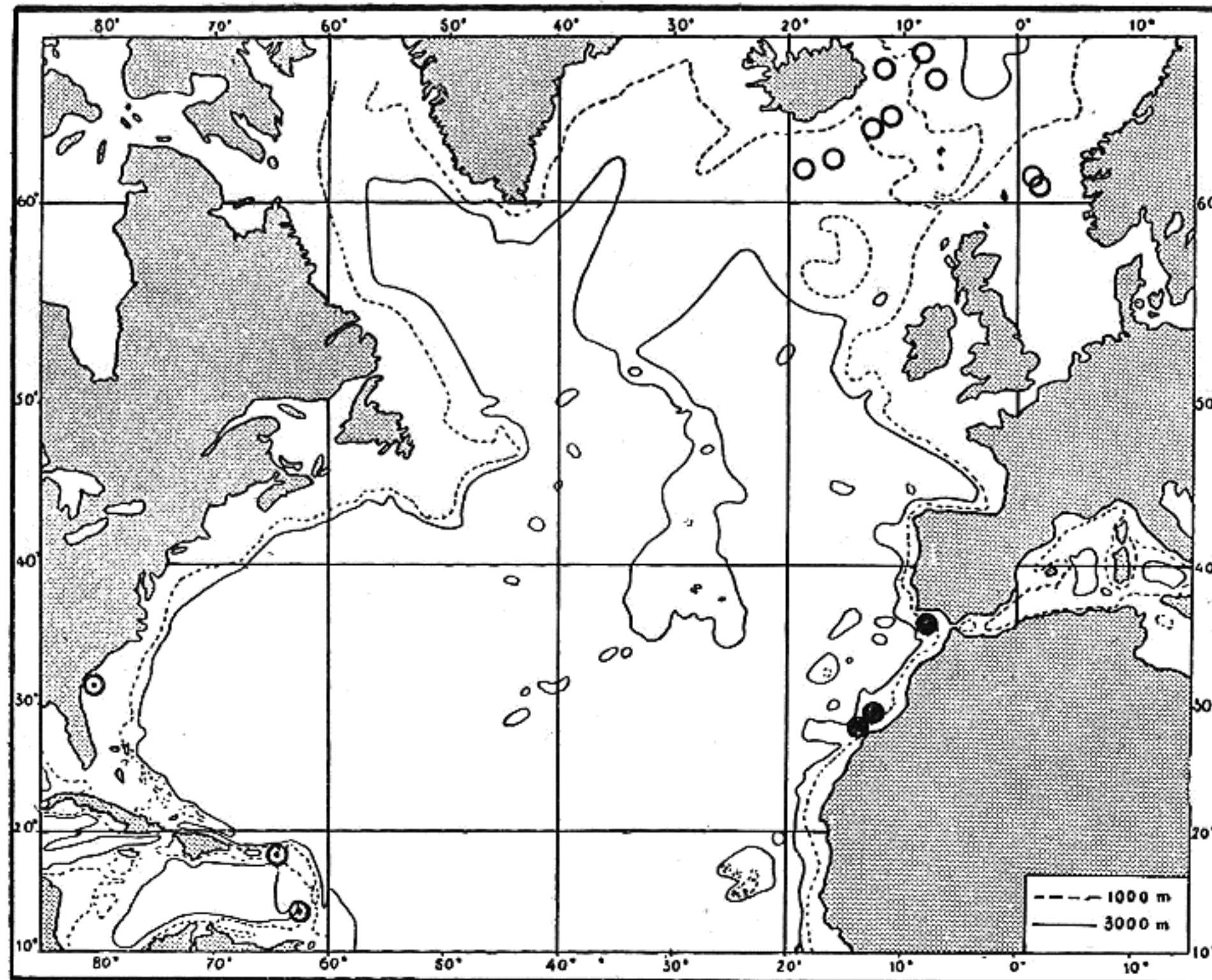
Kristiania, September 1918.

Emily Arnesen.



□ Calcareo ● Monaxonida ■ Tetractinellida ○ Hexactinellida

Chart 1. Stations where sponges were obtained by the "Michael Sars".



○ *Chondrocladia gigantea* ● *Chondrocladia conrescens* ● *Chondrocladia Michael Sarsii*
Arnesen O.S.

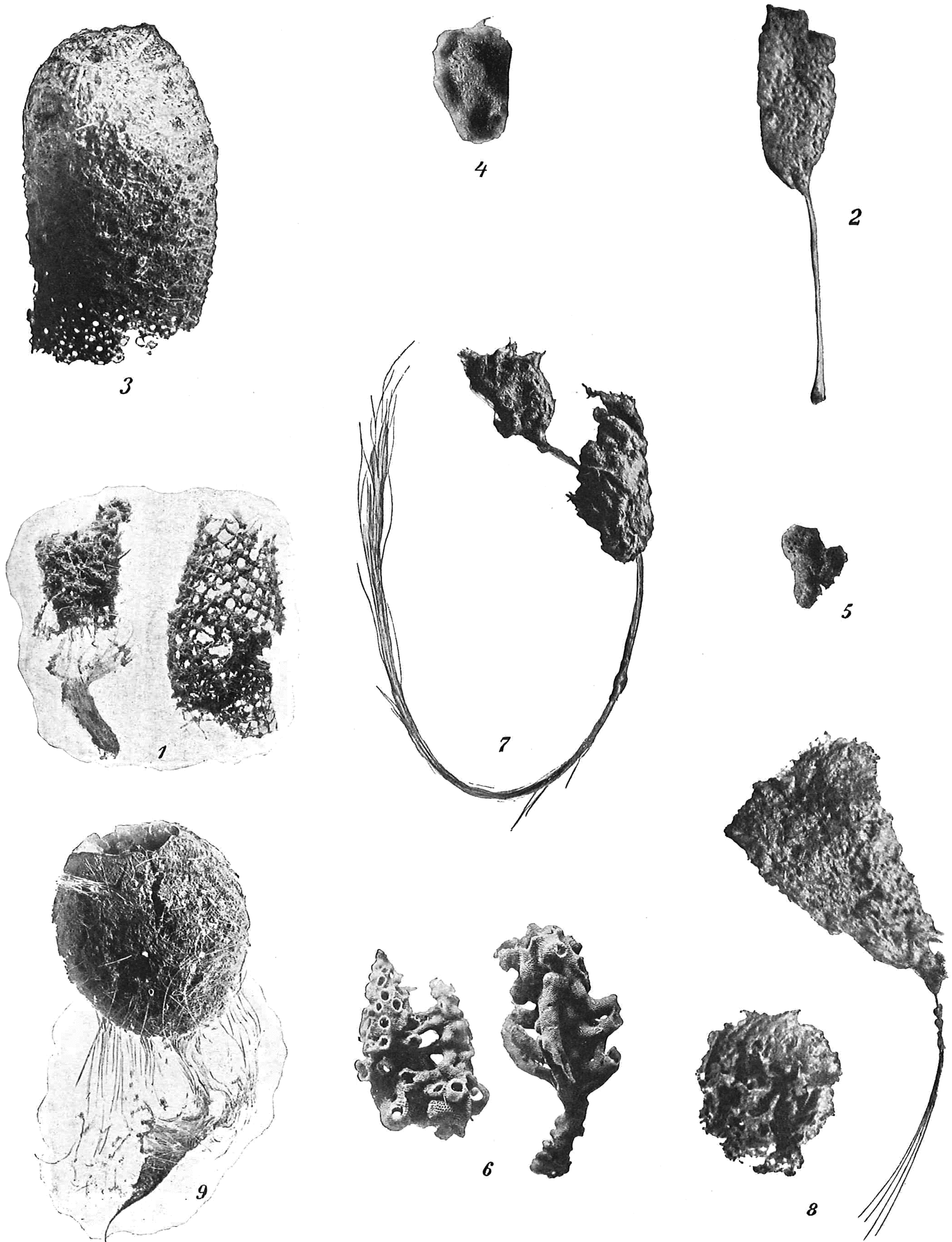
Chart 2. Distribution of Chondrocladia.

PLATES

Plate I.

Hexactinellida.

- | | | |
|---------|--|----------------------------|
| Fig. 1. | <i>Euplectella suberea</i> , Wyv. Thomson. | ($\frac{1}{2}$ nat. size) |
| " | 2. <i>Malacosaccus floricomatus</i> , Topsent. | — " — |
| " | 3. <i>Regadrella phoenix</i> , O. Schmidt. | — " — |
| " | 4. <i>Asconema setubalense</i> , Sav. Kent. | — " — |
| " | 5. <i>Chonelasma</i> sp.? | — " — |
| " | 6. <i>Aphrocallistes beatrix</i> , Gray, form. <i>bocagei</i> P.Wright | — " — |
| " | 7. <i>Hyalonema</i> sp.? | — " — |
| " | 8. <i>Hyalonema infundibulum</i> , Topsent. | — " — |
| " | 9. <i>Pheronema grayi</i> , Sav. Kent. | — " — |
-



Arnesen phot.

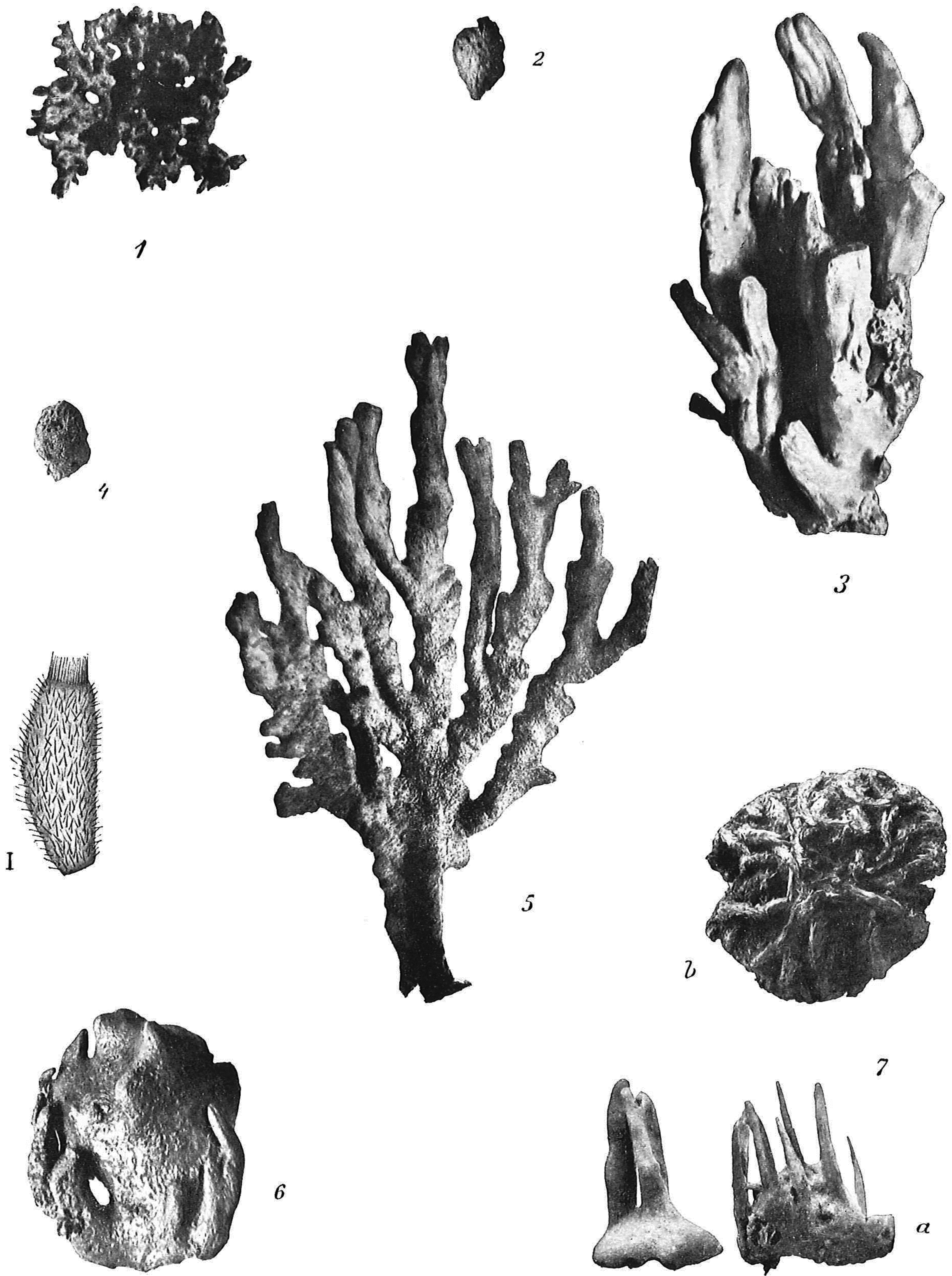
Plate II.

Calcarea.

Fig. 1. *Grantia intermedia*, Thacker. ($\times 3$).

Monaxonida.

- Fig. 1. *Lissodendoryx complicata*, Arm. Hansen. ($1/2$ nat. size)
" 2. *Myxilla pectinata*, (Topsent). — " —
" 3. *Grayella fallax*, Topsent. — " —
" 4. *Dendoricella abyssii* (Topsent) Lundbeck. — " —
" 5. *Echinoclathria hjorti* sp. n. — " —
" 6. *Anchinoë nobilis*, Redley and Dendy. — " —
" 7. *Ciocalypta weltneri* sp. n. — " —
a. alcohol. b. dried.
-



Arnesen phot.

Plate III.

Monaxonida.

- Fig. 1. *Cladorhiza gelida*, Lundbeck. (1/2 nat. size)
" 2. *Stylorella columella*, (Bow.) Topsent. —,—
" 3. *Asbestopluma pennatula*, O. Schmidt. —,—
" 4. *Stylorella topsenti* sp. n. (1/3 nat. size)
" 5. *Petrosia friabilis*, Topsent. (1/2 nat. size)
" 6. *Chondrocladia Michaël Sarsi*, sp. n. —,—
-



Arnesen phot.

Plate IV.

Monaxonida.

- Fig. 1. *Axinella polypoides*, O. Schmidt. ($\frac{1}{2}$ nat. size).
" 2. *Thrinacophora murrayi* sp. n.

Tetraxonia.

- Fig. 3. *Isops pachydermata*, Sollas & *Sidonops* sp.? ($\frac{1}{2}$ nat. size)
" 4. *Characella pachastrelloides* (Carter) Sollas. —" —
" 5. *Sidonops* sp.? —" —
" 6. *Thetyopsilla zetlandica* (Carter). —" —
" 7. *Isops* sp.? —" —
" 8. *Stelletta hispida*, Bucc. —" —
-

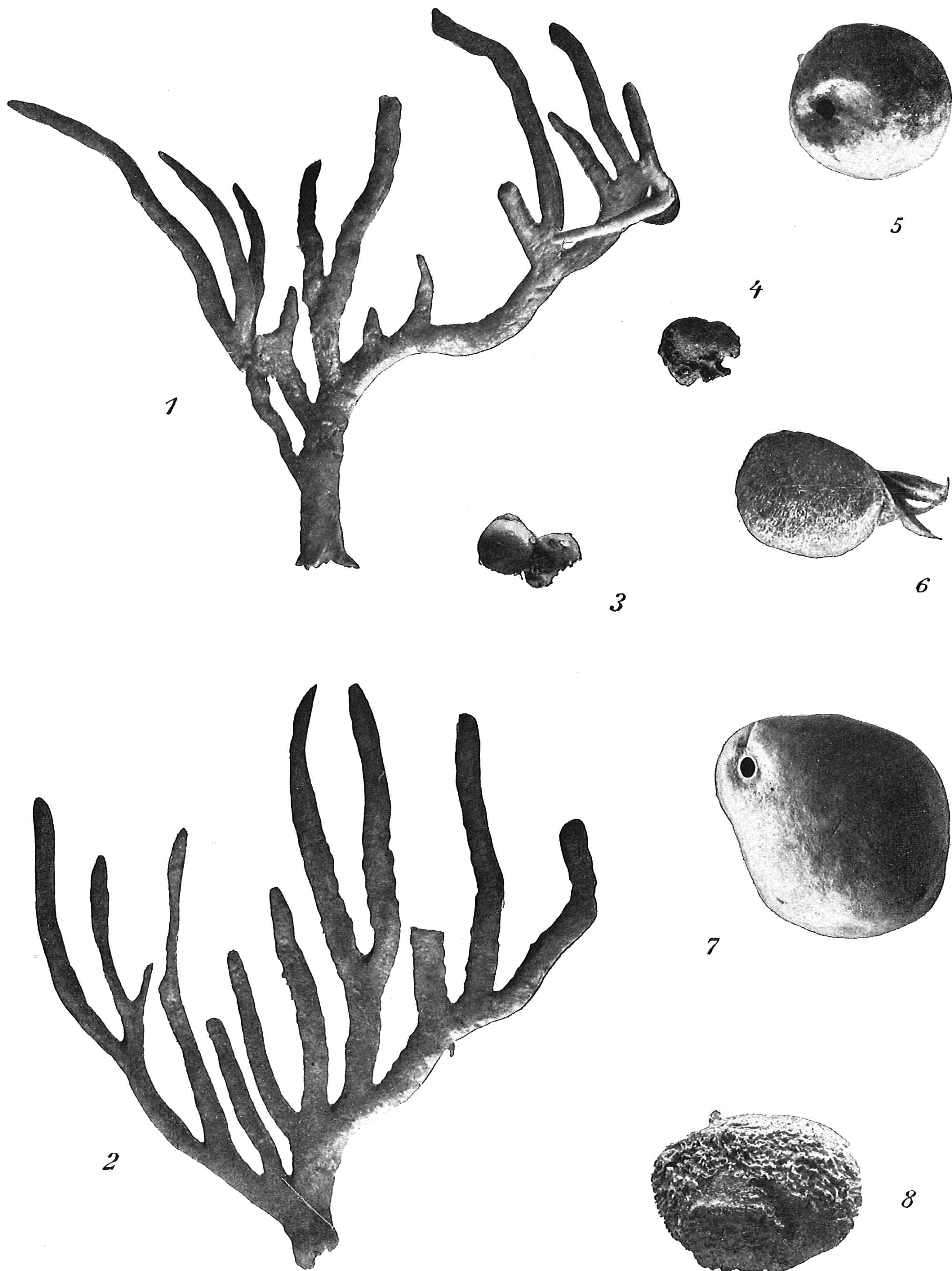
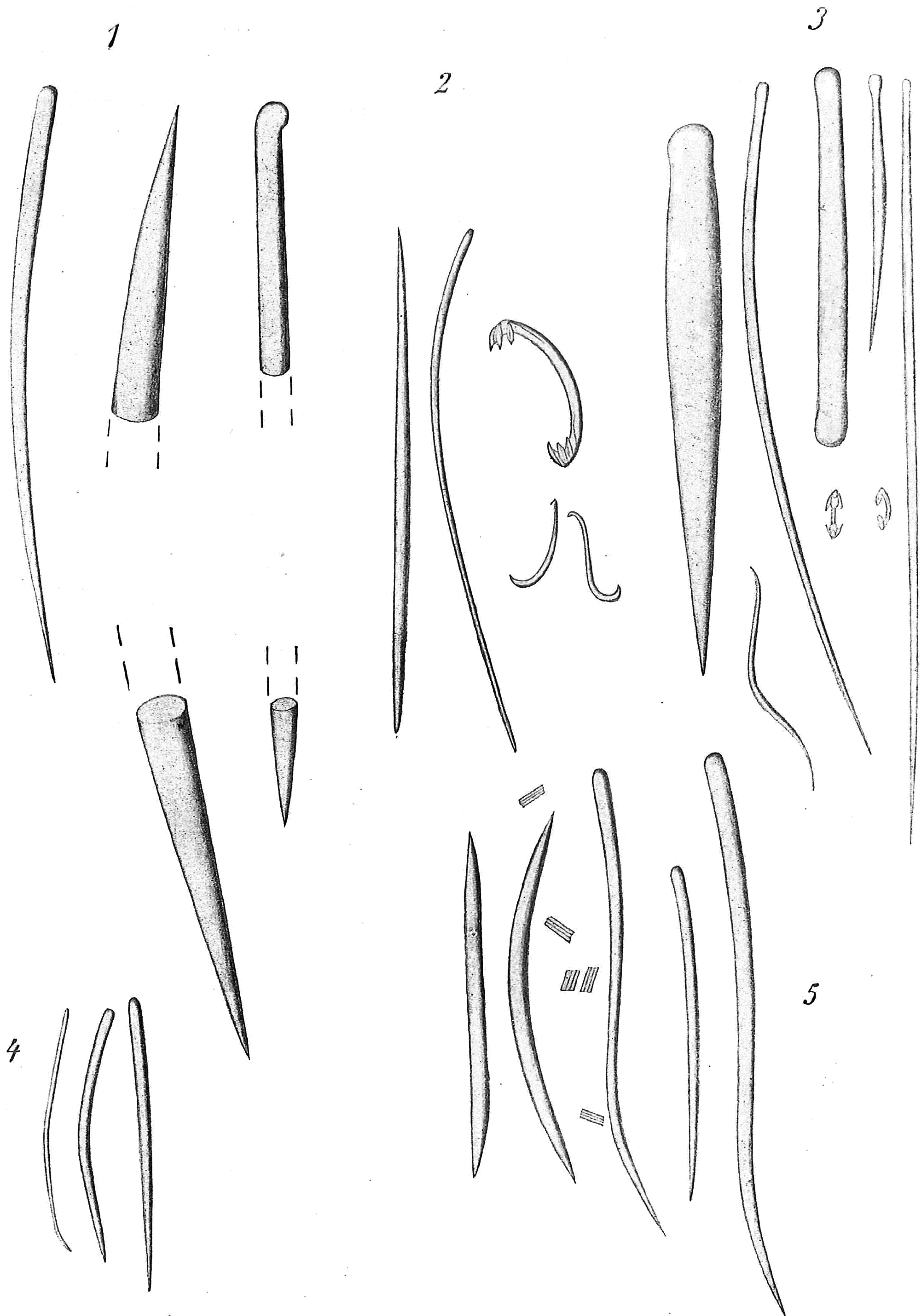


Plate V.

- Fig. 1. *Ciocalypta weltneri* sp. n. a. oxea \times 230, b. subtylostyle \times 230; c. style \times 230.
„ 2. *Chondrocladia Michael Sarsi* sp. n. a. style \times 95; b. granular style from the stalk coating \times 375; c. isancora agnifera with 6 teeth, side view \times 375; d. sigmata with compressed ends \times 275.
„ 3. *Echinoclathria hjorti* sp. n. a. robust style \times 375; b. tylostyli from the dermal membrane \times 375; c. fusiform tylostyle \times 375; d. strongyle-tornote spiculum \times 375; f. toxo \times 375.
„ 4. *Stylotella topsenti* sp. n. styli \times 230.
„ 5. *Thrinacophora murrayi* sp. n. a. oxea \times 230; b. styli \times 230; c. trichodragmata \times 375.
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