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WILL. LUNDBECK: HOMORRHAPHIDÆ AND HETERORRHAPHIDÆ

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THE DANISH INGOLF-EXPEDITION.

VOLUME VI.

1.

PORIFERA.

(PART I.)

HOMORRHAPHIDÆ AND HETERORRHAPHIDÆ.

BY

WILL. LUNDBECK.

WITH 19 PLATES AND 1 FIGURE IN THE TEXT.

TRANSLATED BY TORBEN LUNDBECK.

COPENHAGEN.

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Porifera.

I.

By

William Lundbeck.

The present treatise is the first part of a work on the *Porifera* collected by the Ingolf-expedition. The material for this work, however, does not consist of that of the Ingolf-expedition only, but I have, for the sake of completeness, included all the sea-sponges, found in our Museum, from Greenland, Iceland and the Faröe Islands, and upon the whole from the territory treated of here. The latter material has especially been collected by the Greenland-expeditions that have been sent by the Commission for the geological and geographical examination of Greenland; partly also by the men of war that have navigated the seas round Greenland and Iceland, as also by some other collectors; especially must be mentioned a considerable collection, made by Dr. Mortensen in 1899 at the Faröe Islands. Of the whole material, however, the portion collected by the Ingolf-expedition during its two cruises in 1895 and 1896 forms by far the greater part. The collection of sponges made by this expedition was quite exceptionally great, greater, I think, than any made by any single expedition before. Finally I got from the museum in Bergen by the kindness of Dr. Brunchhorst the sponges of the Norwegian North-Atlantic Expedition, which I have included here, as the earlier work on those sponges needed a revision. The geographical territory of the present work may therefore be given thus: the eastern part of the Davis Strait and the sea north of a line through the southernmost station of the Ingolf at about 57° L. N. across to the south of the Faröe Islands, that is to say, the whole of the North-Atlantic (species from the Norwegian fjords, however, have not been included). From this territory I have endeavoured to include all the species, also those that are not found in the material, but have been mentioned in the literature as found within the territory.

With regard to the terms used in the descriptions I shall premise a few remarks. The terminology employed in describing the spicules is mainly the same as has been used by Ridley and Dendy and by Topsent, and upon the whole by all recent authors, so that an explanation will be unnecessary.

For the more or less membranous part of the body of the sponge which forms the surface and covers the subdermal cavities, the term dermal membrane has been employed. It may be thinner or thicker, and more or less pronounced; where the subdermal cavities are large and widely

spread it is distinct and easily separable, while in forms with small subdermal cavities it may be little or not at all marked off inwardly. The term Ectosome, which is now most frequently used of this part, I have not employed, as the question is not here of a structure of a definite morphological value, and the term dermal membrane is therefore only used as a descriptive term. The dermal membrane may be a thin membrane without spicules, but may also be provided with spicules variously grouped, and in the latter case we may speak of a dermal skeleton, but this skeleton is frequently not distinctly marked off from the other skeleton of the sponge, being only its outer part. The dermal membrane is frequently, especially when it is a thin membrane without spicules, supported on spicules projecting from the skeleton; in such cases I have employed the descriptive expression that the dermal membrane is pierced by spicules and the surface shaggy. In the undamaged sponge a real piercing hardly takes place, but is only apparent; it is also probable that it is especially prominent in specimens kept in spirit, on account of the contraction.

It has been correctly observed by Vosmaer in „Porifera" (Bronn's Klassen und Ordnungen), and by many other authors, that the terms pores and oscula have certainly been used of structures far from always being homologous. Of late the term pore has often been used of the apertures of the incurrent canals in the subdermal cavities, and then the pores of the surface have been called dermal pores (*Ostia* Minchin). This I think unnecessary, as it does not come nearer the homology. Vosmaer (Tijdschr. d. Nederl. Dierk. Vereenig. (2) III, 1890—92, 238) has proposed other terms, trying to establish homologies with regard to the excurrent apertures, so that he calls the aperture with which his „cloaca" opens outward, osculum, and the openings into this cloaca of the excurrent canals procts, when there is only one opening, and proctions, when one canal has more than one opening; in certain sponges the osculum is wanting, and then the apertures of the excurrent canals on the surface are procts or proctions. In the same way he uses the term stomata for the pores on the surface of the sponge, or stomions, if there are more than one pore for each canal. Hitherto he has only tried to establish this terminology in the Hexactinellids and Tetractinellids; whether it may be used there may be doubted, and at all events it cannot be used in the Monaxonids; in forms with large subdermal cavities, for inst., it will be impossible to distinguish between stomata and stomions. Therefore I always use the term pore of the incurrent openings on the surface of the sponge, while I use the term osculum or oscula of the excurrent opening or openings on the surface, but in the latter case it may sometimes be a matter of judgment what is to be called osculum. In a tubular sponge as a *Siphonochalina* or many species of *Reniera* I call the opening of the tube osculum, and in a leafshaped sponge with the excurrent openings on one side I use of those the term oscula. The difficulty occurs at forms of transition between the above mentioned, as for inst. funnel-shaped or open-calicular sponges, but in these cases the signification of the terms used will appear from the description. Minchin is surely right, when he says (Lankester: A Treatise on Zool. II. The Porifera and Coelenterata, 1900 pp. 23 and 36), that most frequently these questions can neither be decided by outer study nor by anatomical examination, but only by the knowledge of the development of the individual forms. For the present we must therefore be satisfied with knowing that the terms used do not imply homologies.

Although, of course, the pores of a given sponge may be found in all degrees between open

and shut, I have thought it serviceable, as a rule, to give the measured limits of the sizes of the pores in the different species.

By the examination of the spiculation and the spicules I have especially endeavoured to give exact measures, as also to give figures of the different forms. As the spicules prove to be upon the whole constant with regard to size and form, they form the best specific characters. At the same time I have tried, as far as possible, always to find the younger phases of the individual forms of spicules, which I have drawn together with the pictures of the fully developed spicules. By this examination it has proved to be a general rule that almost all spicules are begun in about their full length, and then the growth takes place exclusively by apposition, and sometimes by apposition after fixed lines. A growth in conformity with the organic growth does not take place, neither any growth by contemporaneous resorption and apposition. According to this the younger spicules must always be inscribable in the fully developed ones, and from this follows again with regard to the microsclera that the smaller forms are not, as is commonly stated, forms of development of the larger ones, but independent, fully developed spicules [1]). If, for instance, we have a sponge with sigmata, and these, as is generally the case, are varying in size, then the smaller sigmata are not young forms of the larger ones; by apposition the smaller ones would only become thicker, but very little longer. That this view is correct is corroborated by the finding of quite thin young forms having almost the same length as the grown ones. In the single cases account of this fact has been more particularly rendered by the description of the species. In this respect the sponge-spicules, as will be seen, form a parallel to the silicious shells of the diatoms, which, once formed, do not show any growth, properly so called, but only grow by apposition partly after fixed lines. Of microsclera I have in this part only treated of the forms found in Heterorrhaphidæ. With regard to the chelæ and anchoræ quite the same thing has been fully shown by Levinsen (Studier over Svampe-Spicula. Vidensk. Medd. fra den naturh. Foren. i Kobenhavn for 1893. 1894), and in the next part of the present work I expect to corroborate the statements of this author for a great number of forms.

As to systematism I have, for the forms treated of here, chiefly followed Ridley and Dendy, partly also Topsent. I have kept the family *Heterorrhaphidæ* of Ridley and Dendy, as it seems to me to be naturally enough bounded, and I do not, as does Topsent, think that we are more justified in using the megasclera than the microsclera as distinguishing characters. The family *Poecilosclerida* of Topsent, which is chiefly characterized by monactinal megasclera, includes nevertheless the genus *Desmacidon* s. l. with diactinal megasclera, and this genus is chiefly distinguished from *Gelliodes* by its having chelate microsclera; if no regard is paid to the microsclera as a distinguishing character, *Gelliodes* might as well be classed with the *Poecilosclerida*. On the other hand I think with Topsent that *Tedaniinæ* by their spiculation are related to the *Dendoricinæ*, and therefore they have not been included here; at present more genera without chelate microsclera or quite without microsclera are known, which nevertheless no doubt must be classed with the *Desmacidonidæ*.

As I have explained more particularly in the mentioning of the genus *Phlæodictyon* (*Rhizo-*

[1]) I must, however, here notice that O. Schmidt (Spongien d. adriat. Meeres 1862, p. 9—10), although with regard to these spicules supposing a growth like the organic growth, says of «die charakteristischen hakenförmigen Körper der Gattung Esperia»: «In einigen Arten kommen ... kleinere und grössere Formen vor, allein dies sind in einer und derselben Species zwei Arten solcher Körperchen, nicht junge und alte». Thus he has correctly interpreted this phenomenon.

chalina olim) I have thought it correct to break up the group *Phlœodictyinæ*, and classed its two genera, one with *Homorrhaphidæ*, the other with *Heterorrhaphidæ*.

It would seem as if the larvæ in the *Monaxonida* show group characters (Maas, Topsent), and it is not improbable that the systematism will be highly altered, as for inst. Bidder has altered the systematism of the calcareous sponges according to quite new and at all events very interesting views. At present, however, I think the division of the sub-order *Halichondrina* into the families *Homorrhaphidæ*, *Heterorrhaphidæ*, *Desmacidonidæ* and *Axinellidæ* to be the most natural — as also the most practical one.

Order Monaxonida.

Suborder I. *Halichondrina.*

Fam. I. Homorrhaphidæ.

Subfam. 1. Chalininæ.

The subfamily *Chalininæ* the only distinghuishing character of which is the amount of spongin uniting the spicules into fibres, cannot, as has also been generally recognized, be kept sharply distinct from the *Renierinæ*, as the least sponginous forms form a transition to these latter, while on the other hand forms with much spongin and reduced spiculation form a transition to the horny sponges. In the present work I have tried to make the distinction in the following way: to be referred to the *Chalininæ* a species must have at any rate the primary fibres quite sponginous, even if the mass of spongin is small. If this is not the case, I refer the species to the *Reniera*, even if, as is the case in several species of *Reniera*, separate longitudinal fibres with a rather large amount of spongin are to be found; neither do I take into consideration a higher development of spongin in the basal part or stalk of the sponge. When the distinction is established in this way, we shall, in by far the most cases, get an outer characteristic, viz. the consistency; even *Chalininæ* with very little spongin will show an elasticity that is not found in the *Reniera*-species. Thus the distinction seems to me to be in most cases quite natural, although it cannot be said to have solved the question.

While it is thus very difficult to mark off the whole group, it is not much better with regard to the genera. Many of these are based on characters running gradually into each other, as for inst. on the number of spicules in the fibres, by which character it has been tried to distinguish between *Pachychalina* and *Chalina*, although there is no distinct difference; also the outer form has been used as a distinguishing character, by Lendenfeld even to an extreme degree. It is to be supposed that the great number and richness in forms of the *Chalininæ* have led to this condition of things, for it may be said, I think, that this subfamily, a few particular forms excepted, has no more value as a systematic group than the genus *Reniera*; this genus might be divided into genera after the same characters, but the limits between these genera would be doubtful; several of the characters, taken for inst. from the skeleton and the surface, by which genera of the *Chalininæ* are characterized, are in the *Reniera* used as specific characters. There has, however, been no opportunity for a more

thorough study of the *Chalininæ*, as the whole material has only comprised six species belonging to three genera.

The *Chalininæ* are forms generally found in more shallow water, although a few species reach to a depth of ca. 150 fathoms.

A phenomenon frequently seen in the *Chalininæ* and with special distinctness in dried specimens where only the skeleton is left, is a formation like yearly rings. In longer branches they are often seen in great numbers above each other, their form most frequently more or less resembling a conical surface. If a branch is cut through, one or more concentrical rings will be seen. These »yearly rings» are formed by the meshes of the skeletal net being in these places finer than in other places, and especially by the presence of more transversal fibres than in the part just inside of the spot, and in this respect these layers are constructed in the same way as the surface. The phenomenon evidently is one of growth. It has already been mentioned by Bowerbank (Mon. of. Brit. Spong. I, 152) who also thinks it to be a phenomenon of growth.

Pachychalina O. Schmidt.

The form lobose or digitate, branched or unbranched, the sponge solid. The fibres polyspicular with more or less spicules. Spongin differently developed.

1. **P. Schmidtii** n. sp.

Pl. I, Figs. 1, 2. Pl. VIII, Figs. 1, 2, 3.

Club- or fingershaped. The fibres forming a rather regular skeleton of primary longitudinal fibres and secondary transverse fibres, the meshes mostly rectangular. The longitudinal fibres with numerous spicules, the transverse fibres most frequently with fewer spicules; always a distinct spongin-sheath. Oscula spread on the surface, sometimes with a tendency to a marginal position. Spicules 0·178—0·208^{mm}.

The specimens in hand of this species are unbranched, finger- or clubshaped, in the lower part generally narrowed to a short stalk. The specimens are of about the same size, of a length between 80 and 100^{mm}, and a diameter of about 15—30^{mm}. A specimen which I take to be a young one, and which is attached to a shell, is much smaller; it is cushionshaped and has a height of 10^{mm}. The colour (in spirit) is yellowish grey. The consistency, as in most *Chalininæ*, is firm, but very elastic. The *surface* is even, but not quite smooth, the ends of the primary fibres rising a little above the skin. The *dermal membrane* is transparent and very thin, and consequently it is often lost; judging by what I have been able to observe, it has no spicules and rests on the skeleton below, the ends of the primary fibres rising through it. *Oscula* are scattered on the surface, in some places more thickly than in others, and in one specimen that is somewhat compressed, a tendency towards a marginal position of the oscula is to be perceived. The openings of the oscula are almost circular, with a diameter of from a little more than 1^{mm} to 3^{mm}, their edges are often somewhat rising. I have not observed the pores, as the skin was mostly wanting in the specimens.

The *skeleton* consists of stout polyspicular fibres of a thickness of 0·09—0·16^{mm}. There is always a copious and distinct mass of spongin; in some fibres the spicules are very numerous, and then the

spongin is either not seen to surround the fibres at all, or only to surround them to a slight degree, but most frequently the spicules form the middle part of the fibres and are enclosed by a strong sheath of spongin. In the transverse fibres the spicules are fewer and often not so regularly arranged after the longitudinal axis, as they are in the longitudinal fibres, but there is plenty of spongin. In the stalk the spongin is particularly copious, and therefore the consistency is harder than in the other parts of the sponge. The fibres form a rather regular skeleton; from the base and middle of the sponge the longitudinal fibres, the primary ones, spread, in a sheaflike way, on every side upward and bend towards the surface, in some places branching off in acute angles; perpendicularly on those the transverse fibres are found, which only stretch from one longitudinal fibre to the next one without forming longer coherent fibres; neither are they present in any great number, and accordingly in most places they are far from each other, so that the meshes formed get a rectangular shape; only at the surface are the transverse fibres closer together, and here the meshes become quadratic; immediately at the surface the transverse fibres form a dense, but irregular net of meshes on which the dermal membrane is resting. Farther down in the sponge may be found the layers mentioned in the introduction to the *Chalininæ*, running more or less parallel with the surface, and with more closely set transverse fibres, so that these layers remind of the structure of the surface of the skeleton. This peculiarity must be connected with periodicity in the growth. The distance between the longitudinal fibres generally varies from $0{\cdot}3^{mm}$ to $0{\cdot}6^{mm}$. On account of the above mentioned structure of the skeleton it will in the middle part of the more or less cylindric sponge show a rather irregular texture, from which longitudinal fibres radiate on every side running upward and bending outward to the surface. This structure of the skeleton is distinctly seen as well in a transverse section as in a longitudinal one through the middle of the sponge.

Spicula are oxea slightly curved and very gradually tapering; the tapering is so gradual, that the thickness decreases from the very middle of the spicule; but the decreasing in thickness is not great, so that the point proper commonly is not especially long. The length is between $0{\cdot}178^{mm}$ and $0{\cdot}208^{mm}$, and the thickness in the middle varies between ca. $0{\cdot}01^{mm}$ and $0{\cdot}014^{mm}$. Among the oxea some styli are seen which are almost always short, and are to be regarded as monstrous forms. Some needles a little shorter and especially finer, up to very fine ones, are seen, which I take to be developmental forms; they are, however, seen in the fibres, and fibres exclusively filled with such needles may be found.

It has not been possible to refer this species to any one hitherto described; among species that had to be taken into consideration, were especially *Pachychalina compressa* Schmidt and *P. excelsa* Schmidt. Both these species have been mentioned so briefly that it would be impossible to recognize them, but the original specimens of both species are in the museum of Copenhagen. *P. compressa* was founded by Schmidt 1870 (Grundzüge einer Spongienfauna d. atlant. Gebiet p. 37) as occuring at Iceland; an examination of the original specimen, however, has now proved it to be, not a *Pachychalina* but a *Homœodictya*, the chelæ so characteristic for this genus having been found in it, although in small numbers [1]). The other species was founded by Schmidt in the same place as occurring at

[1]) I must here call attention to the fact that the *Chalininæ* and the genus *Homœodictya*, which latter, at all events some of its species, as to skeleton and outer form is very like the former, may easily be confounded when the specimens

the Scaw; it is a digitate, branched species, by the structure of its skeleton and the form of its spicules closely related to the present one, with which, however, it would seem that it cannot be identified.

Locality: Onundafjord in Iceland, depth 10 fathoms, 3 specimens (the author); west of Iceland, depth 22 fathoms, a little fragment (Drechsel); the bank southwest of Sudero, one specimen (Jorgensen); the Faröe Islands, a little specimen (Müller).

2. **P. caulifera** Vosm.

Pl. II, Figs. 1, 2. Pl. VIII, Figs. 4, 5, 6.

1882. *Pachychalina caulifera* Vosmaer, Niederl. Arch. für Zoologie, Supplementsband I, 1881—82, 33, 15, Tab. I, Fig. 14, Tab. III, Figs. 64—66.

1887. *Pachylina caulifera* Levinsen, Dijmphna-Togtets zool.-bot. Udbytte. 1887, 350, 8, Tab. XXIX, Fig. 4, Tab. XXX, Fig. 1.

Stipitate, club- or fingershaped, unbranched (younger specimens) or more or less richly branched (older specimens); the branches cylindrical or somewhat compressed. The fibres form a regular skeleton of longitudinal and transverse fibres, the meshes quadratic or rectangular. The longitudinal fibres with a few spicules, sometimes with only a single series, the transverse fibres formed of single spicules. Only little spongin, forming no distinct sheath, or only a very thin one. The surface quite delicately shaggy from projecting spicules. Oscula spread; sometimes especially found on one side of the branches, sometimes they are placed in rows on the edges of the compressed branches. The spicules oxea, evenly tapering, 0·118—0·148^{mm}.

Pachychalina caulifera was etablished in 1882 by Vosmaer on an unbranched, oarshaped specimen; in 1887 Levinsen referred some unbranched, or at most twobranched cylindrical sponges from the Kara Sea to this species. I have before me two specimens, both richly branched and considerably larger than those described. The larger specimen has a height of 49^{cm}, and is richly branched, the originally few branches dividing into more and more; and the branches, being at the base somewhat compressed, are at the top cylindrical or all but cylindrical, and are here rather thin, their diameter being between 5^{mm} and 10^{mm}. The other specimen is shorter; is has a height of 27^{cm}, but the branches, which are also somewhat compressed, are comparatively thicker, and do not become cylindrical at the top, where the larger diameter is 10—18^{mm}. Both specimens have a distinctly marked stalk being in both full 5^{cm} long. The colour (in spirit) is light brown to light yellow. The stalk is darker brown, so that we have here a colouring similar to that shown in the figure of Vosmaer (l. c.), but not, however, with the sharp boundary shown in that figure. The consistency is spongy and elastic, the stalk is hard. The *surface* of the sponge is even and looks almost smooth, although it is densely, but quite short shaggy, the spicules of the ends of the primary fibres projecting a little. The *dermal membrane* appears as a thin transparent membrane; it rests on the subjacent skeleton, and if

of *Homœodictya* are dried, as is often the case with old specimens in museums. These specimens have perhaps been washed out at the preparation, or, what is also often the case, they have been found dead on the beach, and the soft parts have long ago rotted and been washed away. In such cases the chelæ, which are not connected with the skeleton, would either be quite wanting or only a few be left. It is also to be supposed that such a confounding has taken place more than once.

a piece of the skin is cut off, the meshes of the subjacent skeleton is by the microscope seen through the skin, and the ends of the primary fibres project from the nodes. As the transverse fibres of the skeleton are mostly formed of single needles, this skeleton appears as an irregular, mostly unispicular reticulate work, most frequently only in the nodes united by spongin. Otherwise no spicules are found in the dermal membrane. The *pores* are round or oval openings, and are found, single or two or three together, in the meshes formed by the subjacent skeleton; the size is from 0·03^{mm} to 0·12^{mm}. *Oscula* are round, sometimes a little oval openings of a diameter of 1—4^{mm}, they are found dispersed everywhere on the branches in rather great numbers; when the branches are somewhat compressed, they are often set in rows on the edges, and they may also be more numerously or almost exclusively found on one side of the branch; but upon the whole they are best characterized as dispersed. They are often a little projecting, and these projections may grow into papillæ of a length of 7^{mm} (in which cases we have, perhaps, a beginning branch). On the stalk there are no oscula at all.

The *skeleton* is chiefly of the same structure as in the foregoing species, and built upon the principle which upon the whole is found in the *Chalininæ*. Longitudinal fibres (primary fibres) run longitudinally through the sponge, and spread to all sides like a sheaf, reaching to the surface where they project a little; they are united by transverse fibres (secondary fibres) into a rather regular network. Far the greater part of the longitudinal fibres are polyspicular, but with far fewer spicules than in the foregoing species, and also unispicular fibres are seen; otherwise the fibres are somewhat different with regard to their thickness and the number of spicules, the thickness being about between the thickness of a spicule and 0·09^{mm}, and the distance between the longitudinal fibres is ca. 0·12^{mm}—0·17^{mm}; thus the fibres are considerably thinner and the reticular work finer than in the foregoing species. Neither do the transverse spicules here form coherent fibres, but reach only from one longitudinal fibre to the next, and are for a great part formed of but one spicule; in the inner part of the sponge they are far from each other, so that the meshes are more or less rectangular, but towards the surface they are nearer to each other, and here the meshes are more or less quadratic. The spongin is not by far so strongly developed as in the foregoing species, and most frequently it forms no distinct sheath or only a very thin one round the spicules of the fibres; in the nodes it is distinctly seen; the transverse spicules are not generally quite surrounded by spongin, but only cemented at the ends. Besides the skeletal tissue thus constituted, some fibres are seen here and there running longitudinally along the branches without going to the surface, which fibres may divide and anastomose; they are a little stronger than the regular longitudinal fibres, and have more spongin forming a distinct sheath. Towards the base of the sponge the amount of spongin is greater, and the spicules of the fibres are here surrounded by a distinct spongin-sheath. In the hard, solid stalk the amount of spongin is very considerable, and at the same time it passes from colourless to yellow; the intervals between the fibres are here very small, and the whole mass forms a very solid tissue.

Spicula are straight ore most frequently slightly curved oxea, evenly tapering. The length is between 0·118 and 0·148^{mm}, and the thickness 0·008—0·0114^{mm}. Shorter and finer needles, to quite fine ones, developmental forms, are also found in small numbers, as also a few styli.

Although Vosmaer does not give the length of the needles, the species is so well consistent with his description and pictures that I think the determination to be sure; Vosmaer seems to attach

some importance to the presence of the outermost little, marked off point in the oxea; such a form of the point, however, is frequent in many species of sponges. I have been able to examine the original specimens of Levinsen, and have found them to be quite consistent with my specimens. The specimens both of Vosmaer and Levinsen are presumably younger forms, and therefore unbranched or twobranched, while during growth the species becomes more richly branched.

Gemmulæ. The two specimens in hand have both been attached to the shell of a large *Modiola modiolus* together with a *Homœodictya* and a *Myxilla*; they have both been broken off, but the shell has been kept. The stalk spreads at the base into a little incrusting part with a skeleton of irregularly arranged, very sponginous, polyspicular fibres, and between these a mostly unispicular network. This part was closely filled with the bodies described by Bowerbank under the head of *Diplodemia vescicula* as ovaries (Mon. Brit. Spong. II, 357, III, Pl. LXX, fig. 12); but when *Diplodemia vescicula* by O. Schmidt (Grundzüge einer Spongienfauna d. atlant. Gebiet. 1870) had been declared to be a fragment of a Chalinine, Topsent in 1888 (Compt. rend. CVI, 1299) referred it to *Chalina oculata*, and described the structures, by Bowerbank called ovaries, as gemmulæ. The gemmulæ of the present species are, with regard to their whole structure and the place where they are found, quite consistent with the description given of those in *Chalina oculata*. They are found in the very lowermost part of the stalk adjoining the underlayer, and in the basal spreading of the stalk to a number of about a hundred in one specimen and a little fewer in the other. They are closely crowded together, the form is oval, the length is on an average 1·37^{mm} and the breadth 0·83^{mm}. The colour (in spirit) is yellow. They are situated in the skeleton of the basal spreading closely connected with the fibres. They consist of a capsule of quite the same appearance as the spongin and furnished with rather close-set spicules, running parallel to the surface and of the same kind as the other spicules of the sponges, and also here as in *Ch. oculata* fibres seem to run through the capsule. I have not been able to find any foramen. The contents of these gemmulæ appear under the microscope, but without any more close examination, as a whitish, strongly granulous substance. The specimens are taken towards the end of May.

Besides in *Chalina oculata* Topsent l. c. mentions similar structures in *Ch. gracilenta* Bow.; in this incrusting species they are also found towards the substratum, but they are here smaller, 0·25^{mm}. Thus we know at present three Chalininæ, in which these structures are found. That they are really gemmulæ cannot of course be decided with certainty, until their development has been examined. Their being found, at all events in *Ch. oculata* and in the present species, quite down at the base of the hard, compact and apparently dead stalk would, if they are gemmulæ, seem somewhat particular.

Locality: Vestmanhavnsfjord in the Faröe Islands, depth ca. 70 fathoms, two specimens (Th. Mortensen).

Geogr. distrib.: The species is before known from the Barents Sea (the locality with a query) (Vosmaer) and from the Kara Sea, depth 6 fathoms (Levinsen).

Remarks. The *Pachychalina oblonga* Arm. Hans. enumerated by Vanhöffen (Grönland-Expedition der Gesellsch. für Erdkunde zu Berlin, II, 1, 1897, 248) from Karajak-Fjord in North Greenland, is a *Reniera* (see pag. 51).

Chalina Grant.

Form somewhat varying, often digitate and more or less branched, or leafshaped. Fibres unispicular or at all events with quite few spicules; spongin variously developed, often copious.

1. **Ch. oculata** Pallas.

Pl. VIII, Fig. 7.

1766. *Spongia oculata* Pallas, Elench. zoophyt., 390, 239.
1767. *Spongia dichotoma* Linn., Syst. Nat. Ed. XII, 1299, 14.
1776. — — Müller, Zool. Dan. Prodrom., 256, 3088.
1842. *Halichondria oculata* Johnston, Hist. Brit. Spong., 94, 2, Pl. III, figs. 1 and 2.
1864. *Chalina oculata* Bowerbank, Mon. Brit. Spong. I, 208, Pl. XIII, fig. 262; II, 361; III, 169, Pl. LXVI, figs. 1—3.
1887. *Euchalinopsis oculata* Lendenfeld, Zool. Jahrb., II, 815, 1.
1893. — — Levinsen, Det vidensk. Udbytte af Kanonbaaden Hauchs Togter, 418, 15.
1896. *Chalina oculata* Lambe, Sponges from the Atl. coast of Canada. Transact. Roy. Soc. of Canada, Ser. II, Vol. II, Sect. 4, 184, Tab. I, figs. 2, 2 a.

Of this species I have, from the territory treated of here, only two specimens; one is a little, unbranched, presumably young specimen of a length of 30^{mm}; it has a well marked stalk, 9^{mm} long and very thin; the other specimen is larger, of a height of 85^{mm}; it is branched and is upon the whole of the typical form. The *skeleton*, arranged in the usual way, is chiefly unispicular, but also polyspicular fibres are found towards the middle of the branches; but they contain only few spicules. In specimens from the Danish seas, however, polyspicular fibres may be seen in greater numbers, so that most of the primary fibres are polyspicular; but also here the number of spicules is only small. Thus the species is somewhat varying with regard to this character, and therefore it is on the border between *Chalina* and *Pachychalina*, between which two genera no quite distinct limit can be drawn. The spongin is in the present specimen rather strongly developed, so that most frequently a distinct spongin-sheath is found round the spicules; also the transverse fibres are most frequently quite surrounded by a layer of spongin, however thin. The distance between the fibres is on an average ca. 0·1^{mm}. *Spicula* are slightly curved, more rarely straight oxea, evenly and rather gradually tapering. They are more varying in length than is commonly the case, from 0·12—0·178^{mm}, and the thickness varies from about 0·008—0·013^{mm}; a few of the largest needles are found with a thickness of up to 0·015^{mm}; but the longest needles are not always the thickest ones; an average size of ca. 0·149^{mm} in length and a thickness of 0·011^{mm} is by far the most common. Besides these needles which on account of the proportion between length and thickness convey an impression of being fully developed, some finer and quite fine needles are found measured to a length of from 0·08—0·13^{mm}. Some few styli may be found.

Locality: Vestmanhavnsfjord in the Faröe Islands, depth ca. 70 fathoms, a little unbranched specimen (Th. Mortensen); the Vestman Islands, depth unknown, one specimen (Sæmundsson).

Geogr. distrib. This species seems to be very widely spread, almost cosmopolitan; it is frequent at the coasts of England (Bowerbank), in the English Channel at the French coast and at the southern point of Britany at Croisic (Topsent), as also along the western coast of Jutland (Levinsen); on the

Atlantic coast of America it is found from Florida to Labrador (Carter, Lambe, Verril). It is further enumerated as found in the bay of Bengal, the Mergui archipelago (Carter, var. *fibrosa*, this determination, however, is likely to be doubtful), and finally with regard to Polynesia from the Fidji Islands, New Zealand and the Auckland Islands south of New Zealand (Lendenfeld). Thus the species is spread from 63° 20′ Lat. N. to about 50° Lat. S. Its bathymetrical distribution reaches from shallow water, about 4 fathoms to about 80 fathoms, which seems to be the largest depth, in which it has hitherto been taken.

2. **Ch. spatula** n. sp.

Pl. II, Fig. 3, Pl. VIII, Figs. 8—9.

Leaf-shaped or spatulate, stipitate, the blade oval. The fibres form a regular skeleton of longitudinal fibres and transverse fibres with quadratic meshes. The fibres almost exclusively unispicular. the transverse fibres consisting of single spicules connecting the primary fibres. Only little spongin forming no visible sheath. Irregularly running, polyspicular longitudinal fibres with more spongin are present. The surface finely shaggy from projecting spicules. Oscula have a somewhat projecting edge. they are spread and found on both sides. Spicula oxea 0·19—0·22^{mm}.

This species has a fine and regular form like an erect, oval leaf running below into a stalk passing evenly into the leaf. The height is full 14^{cm}, of which ca. 6^{cm} may be put down as stalk; the largest breadth of the blade is 65^{mm}. Below the stalk is cylindric, and passes by degrees into the flat blade. The thickness of the stalk in the middle is ca. 8^{mm}; the blade is thickest below, and has here a thickness like that of the stalk, 8—9^{mm}, in the middle its thickness is ca. 6^{mm}. The nether half of the margin of the blade where the transition from the stalk is still felt, is rounded, while in the upper half part it is drawn out to a rather sharp edge. The colour (in spirit) is whitish yellow. The consistency is elastic, but the sponge is rather soft. The *surface* is smooth, but finely shaggy from the projecting spicules. The *dermal membrane* is very thin and transparent, and rests on the skeleton below, the ends of the primary fibres projecting through it. When the sponge is seen in spirit the very close-set round subdermal cavities or mouths of the incurrent canals shine through the skin; they have on an average a diameter of 1^{mm}; in some places they are seen to be incompletely separated, so that they run into one another and form irregular lacunæ. *Oscula* are spread on both sides of the sponge, a single one is placed quite at the edge; they are also found on the stalk down to the lower third part of it; they are circular openings with an average diameter of 3^{mm}; their margin is somewhat projecting, so that they have a sharp edge; the canal into which they lead, does not run horizontally inward, but obliquely downward, and therefore oscula do not point horizontally outward, but a little obliquely upward, so that the margin is most projecting at the lower edge of the oscular aperture. The *pores* are situated in the thin dermal membrane; they are round or roundish holes of very varying sizes measured from 0·011—0·27^{mm}. They are found on both sides of the sponge, and continue also down on the stalk. In most places the pores are placed close together; they often reduce the membrane to a network, so that the pores are only separated by thin strings of tissue; in such cases they get an irregular polygonal form, and may get a still greater size than the measures given. When a piece, cut off parallel to the surface, is examined under the microscope, the skeleton

under the skin is seen as a unispicular, irregular net work, from the nodes of which the ends of the primary fibres rise.

The *skeleton* is chiefly constructed according to the principle common in the Chalinines. It consists for the greater part of a rather regular network of more or less quadratic meshes. In the middle of the stalk and the leaf a more open and irregular network is found in which primary and secondary fibres are not to be distinguished; from here fibres issue towards the surface; these primary fibres are directed a little upward on their way to the surface, but they bend a little, so that they meet it at a right angle; especially in the lower part of the sponge the bending upward is quite slight, and the fibres go almost quite horizontally to the surface; in the upper part of the leaf the bending upward is more conspicuous. The secondary fibres consist only of single spicules connecting the primary fibres, and forming together with those the reticular work, but they do not form, or form only to a small degree, coherent fibres. The primary fibres are mostly unispicular; they may, however, especially in the lower part of the sponge, be polyspicular, but only with a few spicules alongside. The distance between the primary fibres is about the length of a spicule, or ca. 0·15—0·18^{mm}. The spongin is only present to a small degree, it is distinctly seen in all the nodes, and under sufficiently magnifying powers it may in most places be seen as an exceedingly thin layer covering the fibres; the elastic consistency of the sponge implies also that the fibres must be richer in spongin than is the case in the *Reniera*-species. In the stalk the spongin is more richly developed than higher up in the sponge. Besides the regular skeleton described above, some more fibres are found, viz. some rather powerful ones, beginning in the stalk and running as longitudinal fibres up through the sponge branching off and anastomosing. Down in the stalk they are polyspicular and surrounded by a strong spongin-sheath, here they may reach a thickness of 0·12^{mm}; in branching off upwards they become thinner, and the number of spicules smaller down to only a couple of spicules, or they become quite unispicular; the spongin also decreases, but may, however, still be seen as a thin, but distinct sheath. Outside the skeletal net some spicules are found dispersed; they are generally shorter and finer than the spicules of the skeleton.

Spicula are slightly curved, sometimes straight or almost straight oxea, evenly and rather gradually tapering; the curve sometimes is quite even, but sometimes it may also be confined more or less distinctly to the middle part. The length is between 0·19—0·22^{mm}, most frequently it is about 0·208^{mm}, the thickness is 0·010—0·012^{mm}. As before mentioned some spicules are found spread in the sponge; they are found in no small numbers, and are shorter and finer, up to quite fine ones; by all transitions in size they are connected with the spicules of the skeleton.

With regard to the outer features this species recalls the description by Fristedt of the *Chalina groenlandica* from the eastern coast of Greenland, mentioned below, but the spicules of this latter species are abruptly pointed and more curved.

Locality. Only one specimen of this beautiful species has been taken, Station 34, the Davis Strait, 65° 17′ Lat. N., 54° 17′ Long. W., depth 55 fathoms; the specimen is attached to a stalk of a hydroid together with two species of calcareous sponges, an ascidian, a couple of hydroids, a bryozoa, and two octactiniæ of the genera *Voeringia* and *Paranephthya*.

3. **Ch. groenlandica** Frstdt.

1887. *Chalina groenlandica* Fristedt, Vega Exp. vetensk. lakttagelser, IV, 417, Pl. 23, fig. 19.

This species I have not seen. It must be closely allied to the preceding one, is leaf-shaped, and has presumably been of a similar form, but among other particulars it differs from it by having the spicules more curved and more abruptly pointed. Fristedt gives the length of the spicules to be 0·2^{mm}. The species is only known in a couple of fragments.

Locality. The eastern coast of Greenland, depth 140 fathoms (Fristedt l. c.).

Siphonochalina O. Schmidt.

Tubular, often somewhat branched forms, the surface of the tubes smooth, both inside and out; each tube with a round opening at the summit. The fibres various, unispicular or polyspicular, and with little or much spongin.

1. **S. pulcherrima** Frstdt.

Pl. I, Figs. 3—4, Pl. VIII, Figs. 10—11.

1885. *Chalina pulcherrima* Fristedt, Bidrag till kännedom. om de vid Sveriges vestra Kust lefvande Spongiæ. Kgl. Sv. Vetensk.-Akad. Handl. 21, Nr. 6, 49, Tab. IV, fig. 3a, 3b.

Tubular, most frequently several tubes issuing from a common base or stalk, sometimes anastomosing, the single tubes with slight, irregular, annular swellings. The fibres form a regular network of longitudinal fibres (running towards the surface) and transverse fibres; the meshes quadratic. The fibres generally unispicular. Only very little spongin. Particular polyspicular fibres running longitudinally, are found, especially in the inner part of the skeleton. The surface is finely shaggy from projecting spicules. Each tube ends with a large osculum. Spicula oxea 0·23—0·29^{mm}.

The specimen in hand of this species agrees in its habitus very well with the figure of Fristedt l. c. It is formed of a short stalk from which issue several tubes, altogether there have been four of them, but one has been torn off. The tubes are coalesced in a part of their length, two of them have a side branch, but this is for some part of the length coalesced with the principal tube. All the tubes end at the summit with an osculum the edge of which is rather sharp, the tubes being conically tapering at the summit. The tubes show some slight irregular, annular swellings. The total height of the sponge is 12·5^{cm}, the tubes have an average diameter of ca. 20^{mm}, the thickness of the wall is 5–6^{mm}, somewhat thicker where the swellings are found. The colour (in spirit) is grayish yellow. The consistency is of a middle firmness, the sponge is rather soft for pressure, but elastic. The *surface* is finely shaggy from projecting spicules. The *dermal membrane* is a thin transparent membrane resting on the skeleton below. Each tube ends, as has been mentioned, in an *osculum* the edge of which is sharp, as the wall, on account of the conical tapering, becomes thinner at the summit. The oscula have a diameter of 5—8^{mm} according to the size of the tube; they are smallest in the two younger branches. The oscula lead into an oscular canal of the same width, which, narrowing only a little, continues quite down to the stalk; the oscular canals of the branches open into those of the principal tubes. Into this canal the excurrent canals open with round apertures of a diameter of

1—2^{mm}, but also smaller openings are found between them, down to a diameter of 0·2^{mm}. The greater openings are partly placed in transverse rows, however with some irregularity. The course of the canals is chiefly very regular; below the skin the openings of the incurrent canals are found as small round subdermal cavities, and the canals stretch almost directly from here, by and by uniting to principal canals, in a curved manner obliquely inward and upward, and open into the oscular tube; accordingly all the openings in this tube are turned somewhat upward. The membrane covering the oscular tube, rests on the skeleton below, which forms an irregular net of meshes, but no spicules project, so that the inside of the oscular tube is not shaggy as the outer surface of the sponge. The *pores* are found rather closely in the dermal membrane, sometimes so closely set, that the membrane forms only thin strings between them; they have been measured to a size of 0·04—0·268^{mm}.

The *skeleton* is chiefly of the common structure, only with the modifications necessitated by the form. Immediately below the skin covering the oscular canal, an irregular network is found, corresponding to the skeletal tissue found in the middle of a cylindric or leaf-shaped Chalinine. From this primary fibres bending upward in a curved manner, run to the surface which they meet at a right angle, and there they are projecting. These fibres are connected to a rather regular net of meshes by spicules that form no coherent fibres, but most frequently are single; the meshes are quadratic or rectangular. The rather regular net formed in this way, gets a less regular appearance on account of the many canals running through it; as these grow in width inwardly, the net appears to be closer towards the surface and more open inwardly, but this appearance is only owing to the lacunæ made by the canals, while the skeletal net itself is of the same width. This skeleton is almost exclusively unispicular, primary fibres with two or three spicules alongside being only found here and there; the distance between the primary fibres is fixed by the length of the spicules and is on an average 0·2^{mm}. Besides the skeleton described some polyspicular longitudinal fibres of different thickness are found; they originate in the stalk, which is almost exclusively formed by such fibres and consequently is very firm and hard, and they run longitudinally through the sponge branching off and also anastomosing. Upwardly they become thinner; they have a thickness of from 0·24^{mm} down to 0·06^{mm}, but at their base in the stalk their thickness may be up to 0·5^{mm}. They run in greatest number in the inner part of the wall of the sponge towards the oscular tube, but they have otherwise no regular course. The spongin is in the skeleton present only to a comparatively small degree, it is seen copiously and distinctly in all the nodes, and it may often under sufficiently magnifying povers be seen stretching down along the spicules or quite surrounding them with an exceedingly thin layer, but in many places it seems to be confined to the nodes. Neither do the polyspicular longitudinal fibres show any spongin-sheath, but they are nevertheless, as is seen by colouring, quite or almost quite surrounded by an exceedingly thin layer of spongin. The spicules are in these fibres rather regularly arranged in bunches, and where the ends of the bunches catch each other the spongin is most distinct and is seen as a slightly yellow-coloured transverse band.

Spicula are oxea, most frequently slightly and evenly curved, rarely straight; they are rather gradually and sharply pointed; the length varies from 0·23—0·29^{mm}, the thickness is between 0·015 and 0·02^{mm}. Shorter and finer spicules up to exceedingly fine ones are found, but in rather small numbers, the finest ones have a length of ca. 0·13^{mm}.

Locality. Jakobshavn in Greenland, one specimen, depth unknown (Pfaff).

Geogr. distrib. Fristedt gives two specimens from Bohuslän, depth ca. 90 fathoms (175 metres).

2. **S. mollicula** n. sp.

Pl. VIII, Figs. 12—14.

Of a somewhat irregular form consisting of a stem, from the ends of which tubes issue. The fibres form a regular skeleton of longitudinal fibres (running towards the surface) and transverse fibres, the meshes are quadratic, rectangular, or polygonal. By far the greatest part of the fibres unispicular, only sometimes with a couple of spicules. Only little spongin. Particular longitudinal fibres wanting. The surface finely shaggy from projecting spicules. Each tube ends with an osculum. Spicula oxea somewhat curved, 0·13—0·178mm.

The only specimen in hand of this species has a somewhat irregular form; it is in two places fastened to pieces of laminarian fronds, and from here originates on one side a cylindric stem, dividing into two branches each ending with an osculum; on the other side of the fastening two shorter tubes issue. The principal stem seems to have been lying more or less horizontally, while the tubes have risen more or less vertically from the stem. The total length of the specimen is ca. 60mm, and the diameter of the stem 10—12mm. The colour (in spirit) is light brown. The consistency is very soft, but elastic. The *surface* is finely shaggy from projecting spicules. The *dermal membrane* is thin and transparent, and rests on the skeleton below. Each tube ends with an *osculum* of a diameter of 2—3mm; the ends of the tubes are rounded, and accordingly the edges of the oscula are not sharp. The osculum leads into an oscular canal of the same diameter, and the oscular canals of the tubes are continuations of the canal of the stem. As far as I have been able to decide, the canals run from the surface obliquely upward and inward as in the preceding species, and the excurrent canals open into the oscular tube. The *pores* are found in great numbers and very close together in the dermal membrane, often reducing this to a reticular work; most frequently they are round; their sizes have been measured to 0·03—0·18mm [1]).

The *skeleton* is of quite the same structure as in the preceding species; accordingly it consists of primary fibres running from the wall of the oscular tube in a curved manner upward and outward to the surface; these fibres are connected by transverse spicules mostly single or only forming incomplete fibres. The net is rather regular, and the meshes quadratic, rectangular, or polygonal. The distance between the primary fibres may be somewhat varying; most frequently it is equal to the length of a spicule, or 0·12mm, but it may be considerably greater, up to 0·23mm, and upon the whole the skeleton is more open than in the preceding species; its regular structure is distinctly seen in the tubes, but is far less marked in the stem. The skeleton is almost exclusively unispicular, some of the primary fibres may, however, be composed of a few spicules in their whole course or part of it; polyspicular longitudinal fibres as in the preceding species, are not found here. In spite of the soft consistency of the sponge the spongin is comparatively more developed than in the preceding species, it is

[1]) This species shows a particular structure, which I have not been able quite to interpret; besides primary fibres projecting through the dermal membrane, there are also here found transverse spicules, so that we get a net of spicules outside of the dermal membrane. This peculiarity may perhaps be due to contraction on account of the sponge having been kept in spirit; it is also possible that the real dermal membrane has been lost.

copious in all the nodes, and in the primary fibres it may frequently be seen to surround the spicules completely, while the transverse spicules most frequently appear to be only cemented at the ends.

Spicula are rather small oxea; they are always more or less curved; sometimes the curve is even, but frequently it is more sharply localized in the middle of the spicule. The pointing varies somewhat, from a fairly long to a quite short, sometimes even rounded point; in the latter case the rounding has a quite small point marked off. The length varies from 0·13—0·178^{mm}, most frequently towards the latter figure, also the thickness is somewhat varying from 0·008—0·011^{mm}. The thickness and length are in no fixed proportion to each other. Shorter and finer needles, up to exceedingly fine ones are found in no small number spread in the tissue, the shortest ones measured had a length of 0·092^{mm}.

Locality. Egedesminde, Greenland, depth unknown, one specimen (Levinsen).

Subfam. 2. **Renierinæ.**

Halichondria Fleming.

Without definite form, forming incrustations, lumpy or more or less erect. The needles without any real order spread in the tissue, sometimes forming fibres, but no regular reticulate skeleton. Spicula oxea, commonly long and slender, rarely strongyla. Spongin wanting (or present only to a scarcely appreciable amount).

The sponges belonging to the genus *Halichondria* are usually of no definite form. They may form incrustations, be formed as thicker or thinner crusts, or be irregularly massive or lumpy, or they may finally be more or less erect and sometimes slightly branched, and it is to be supposed that several species may appear under more or less of these various forms, or at all event vary much in form, and these variations may even to a certain degree influence the other structure (the skin, the skeleton). The recognition of the species must therefore primarily be done by means of the spicules, and the other skeletal structures, the nature of the surface etc. can only be of secondary importance. In spite of the general recognition of the secondary importance of the outer form, not only here, but upon the whole in many Monaxonids[1]), there has not uncommonly been laid too much stress upon this feature. The species of the earlier authors will, when no exact figures and measures of the needles are given, commonly not be identifiable. Bowerbank thus under the genera *Hymeniacidon* and *Halichondria* has twenty and odd species belonging to the genus *Halichondria* in the signification used in this work; this, no doubt, is too large a number, but most of these species will not be identifiable without an examination of the original specimens.

[1]) It is to be supposed, however, that the secondary importance of the outer form applies especially to the genus *Halichondria* (and a few other genera, for inst. *Hymeniacidon*), and is connected with the only little differentiated skeleton of this genus; it is also seen that species of this genus, when they have a skeleton made of fibres, get a more definite form. *Halichondria panicea* is a good type of an especially varying and polymorphous species. The outer form of the sponge species, however, is often little known, because many species have been established on slight material, fragments or more or less damaged specimens. I am inclined to think that it will be seen by and by, when new collections procure well-kept specimens, that the species often, within certain limits, have a rather definite form.

1. **H. panicea** Pall.

Pl. IX, Fig. 1.

1842. *Halichondria panicea* Johnston, Brit. Spong. 114, Pl. X, Pl. XI, fig. 5.
1866. — — Bowerbank, Mon. Brit. Spongiadæ, II, 229, III. Pl. XXXIX and XL.
1870. *Pellina bibula* O. Schmidt, Spongienf. atlant. Gebiet. 42.
1870. *Amorphina panicea* O. Schmidt, l. c. 77.
1881. *Amorphina megalorrhaphis* Carter, Ann. Mag. Nat. Hist. Ser. 5, Vol. VII, 368.
1887. *Halichondria bibula* Levinsen, Dijmphna Togtets zool.-bot. Udbytte, 352, 11, Tab. XXX, fig. 4 a—b.
1887. *Halichondria panicea* Ridley and Dendy, Challeng. Report, Monaxonida, Vol. XX, 2, Pl. II, figs. 2, 3.
1887. *Amorphina panicea* Fristedt, Vega Exp. Vetensk. Iakttag. IV, 421.
1887. *Amorphina grisea* Fristedt, l. c. 425, Pl. 24, fig. 10, Pl. 27, fig. 10.

Of this common species we have a large number of specimens. Itjis most frequently incrusting, especially on algæ, and from this form it grows out into large cushions or lumps, and consequently it is formed as flat cakes, cushions, or roundish or lengthy lumps. Only one specimen, from Reykjavik, has a more definite form, conical, tapering tubes, or cylindrical, at the summit flat tubes rising from a flat spreading; the tubes have at the summit an osculum leading into an oscular canal. This form corresponds with the picture of Bowerbank, Pl. XXXIX, fig. 5 and Pl. XL, fig. 1. In the lumpy forms the oscula are spread and most frequently only present in small numbers. In almost all the specimens the dermal spicules form the well-known regular net of meshes with three, four, or many sides, in which net the pores are lying, often so close that the membrane is reduced to a mere network. Now this net may be rather varying in appearance, and may also be quite wanting, so that the dermal spicules are lying closely packed and in all directions. The character on which the species must chiefly be based, is the form of the spicules; they are very long tapering, always a little curved, and this curve is exceedingly frequently seen as a rather sharp bend in the middle. The size of the spicules is somewhat varying from 0·35—1^{mm}; this latter size is given by Carter for his species *H. megalorrhaphis*, his own opinion of which is that it is only a variety of *panicea*, and Ridley and Dendy give, l. c., several sizes between the measures given above. The largest length of spicules measured by me, is ca. 0·6^{mm}. Among the spicules are also seen styli and monstrous forms, but always only sparingly. The genus *Pellina* of Schmidt, which was based on the presence of a distinct skin with a net of spicules, is, as has been shown by Grentzenberg (Die Spongienfauna d. Ostsee. Inaug. Dissert. Kiel, 1891, 12) and Levinsen (Det vidensk. Udbytte af Kanonbaaden Hauch's Togter, 1893, 415) by an examination of the original specimens of Schmidt, not to be distinguished from the genus *Halichondria*, and the species *Pellina bibula* is identical with *H. panicea*. I have had occasion to examine one of the specimens of Fristedt of *Amorphina grisea*, and have not been able to find any character separating this species from *H. panicea*.

As has already been mentioned, some of Bowerbanks species will, no doubt, prove to be identical with *H. panicea*, what can only be decided with certainty by an examination of original specimens. Levinsen, in the work quoted above, has referred *Spongia coalita* Müller (Zoologia Danica, III, 71, Tab. CXX) to *panicea*, and judging by the figure it can scarcely belong to any other species. Also Johnston's *H. coalita* (Brit. Spong. and Lithophytes 135, Pl. XII, fig. 1) has by Levinsen been referred to this species; the spicules pictured by Johnston, do not, to be sure, resemble

those of *panicea*, but I have had the opportunity to examine a piece sent by the Rev. A. M. Norman under the name of *H. coalita*, and the spicules of this piece agree very well with those of *H. panicea*. Schmidt's *Reniera simitubulosa* (Die Spong. d. adriat. Meeres, 1862, 75) would, according to his expressions in Grundzüge einer Spong. Faun. d. atlant. Gebiet 1870, 42, also seem to belong hither, but this species is otherwise not easily judged. Grentzenberg, l. c. 13, is of opinion that *Amorphina pasiscens* from the North Sea, established, but very incompletely described by Schmidt (Jahresbericht d. Commiss. zur wissensch. Unters. d. deutsch. Meere in Kiel für 1872—73, 115) is also *H. panicea*, what also seems rather likely. Finally Topsent in his account of the species of Bowerbank (Revue biol. du Nord de la Fr. VII, 1894, 14) expresses the opinion that further *Hal. caduca, incerta, ambigua, Hym. Thomasii* and *tegeticula* are synonymous with *panicea*. It must however, be remembered that *Hal. incerta* and *Hym. Thomasii* belong to those species, to which Bowerbank attributes two forms of oxea; if we are to regard it to be correct that they have been referred to *panicea*, it must consequently be supposed, that Bowerbank has interpreted developmental forms of the needles as special forms.

In Johnston l. c. a complete list is found of the earlier, more or less certain synonyms of the species; to this list may thus be added as probable or certain: *Spongia coalita* Müll., *Halichondria coalita* Johnston, *Halichondria scvosa* Johnston (according to Bowerbank), *Pellina semitubulosa* O. S.? *Amorphina pasiscens* O. S.?, as also the species of Bowerbank: *Halichondria caduca*, *incerta* and *ambigua*, *Hymeniacidon Thomasii* and *tegeticula*.

Locality: Halichondria panicea is a very common species in the northern and arctic seas, and we have it from Greenland: Holstensborg, Egedesminde, Godhavn; from Iceland: Reykjavik, Hvamsfjord, Seydisfjord, Faskrudsfjord, Finnefjord, as well as from station 127, north of Iceland, 66° 33′ Lat. N., 20° 05′ Long. W.; from the Faröe Islands: 6 miles to the N.W. of Kalso, Klaksvig, and Ejdesound. The species is found to no great depth; the greatest depth from which we have it, is 60 fathoms, which is also the greatest depth from which it is given with certainty in the literature.

Geogr. distr. The species seems to be completely cosmopolitan; it is found from the arctic seas to the Mediterranean, and is known from Ceylon, Kerguelen Island, the Torres Strait and Japan, and it was taken on the Belgian antarctic expedition between 70° and 71° 18′ Lat. S. (Topsent)[1].

2. **H. genitrix** O. Schmidt.

Pl. IX, Fig. 2 a, b, c.

1870. *Amorphina genitrix* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 41, Tab. V, fig. 9.
1887. *Amorphina nodosa* Fristedt, Vega Exp. vetensk. Iakttag. IV, 423, Pl. 24, figs. 7—8.

The form most frequently roundish, more or less irregular. The surface grooved and ruffled. The dermal membrane with a somewhat irregular reticulation of spicules. Oscula spread. The spicules form no fibres. Spicula oxea falling, as to their sizes, into two rather well bounded groups, the smaller ones 0·10—0·17^{mm}, the larger 0·238—0·67^{mm}.

Under the name of *Amorphina genitrix* Schmidt l. c. established a species on a few specimens from Greenland, and these original specimens of Schmidt I have had before me. The description

[1] Topsent (Arch. de Zool. Expérimentale et Générale. Notes et Revues. 1901. 1) gives the depth on which all the sponges of the expedition were taken, to be 400—569 metres; according to this *H. panicea* seems there to live at a considerable greater depth than hitherto known.

by Schmidt is very incomplete, but in giving a new description of the species I shall have chiefly to restrict myself to the needles and their forms, all the specimens being in a rather bad condition.

We have several specimens of the species. One of them mentioned by Schmidt as having „Die Gestalt eines $1^1/_2$ Zoll dicken, handgrossen Fladens", is a piece of a very compact, almost suberite-like consistency; it has been growing as a plate over a group of Balani. The surface is more even than in the other specimens; the spicules are closely packed in all directions, and no dermal membrane can be separated from the tissue below. We cannot, however, be sure that the specimen has kept its original skin, and consequently, when Schmidt says: „mit zahlreichen, verschieden grossen Osculis", this is not certain, as the openings in the upper surface of the specimen do not appear to be naturally bounded oscula.

The other specimens of the species, of which Schmidt says: „Andre gelbliche, faustgrosse Stücke haben eine krause, wabige Oberfläche, mit Osculis im Grunde der Waben", are roundish pieces of a much looser consistency than the preceding one. The specimens have a highly ruffled *surface*, which is, perhaps, only so conspicuous, because the skin is wanting, or is only left in places; but where it is left, the surface is grooved, and the grooves separated by sinuous swellings; the *dermal membrane* is only found undamaged in a smaller part of one specimen, and here it appears to have a reticulation of spicules about as in *H. panicea*, although coarser and more irregular. *Oscula* are spread and appear, as stated by Schmidt, especially in the grooves of the surface, but as to their number and size nothing can be said on account of the skin being destroyed. In spite of the difference of the specimens as to consistency their relation is seen by the fact, that all the specimens have spicules of the same form and size. In the *skeleton*, as far as I have been able to observe, no fibres are found, but the spicules are lying in the tissue in all directions. *Spicula* are the caracteristic feature of the species; they are oxea, and are exceedingly varying in length, from 0·09—0·67^{mm}. The medium sizes are the scarcest, so that the spicules may also be said to fall into two groups as to size; the smaller ones are most frequently of a length of between ca. 0·10—0·17^{mm}, the larger ones may be of a length between 0·238—0·67^{mm}, but, as has been mentioned, the distinction is not sharp. Although the smaller needles are found throughout the sponge, they seem to be most frequent in the dermal membrane and in the membranes bounding the canals; they are, however, far from exclusively forming the spiculation of these membranes, but are found between the larger needles, and seem always to be arranged more or less perpendicularly on the larger ones. The larger needles are slender, long tapering, and most frequently with a rather sharp bending in the middle; upon the whole they are formed like the needles in *H. panicea*; the smaller needles are more or less curved, and evenly, but not long tapering. That the smaller needles are not developmental forms is seen by the fact, that the thickness is about the same in the smaller and in the larger ones, about 0·01^{mm}; the smaller ones being, however, frequently somewhat thinner. On the other hand finer needles may be found, which by their length are seen to be developmental forms of the large ones. The smaller needles resemble to a certain degree the *Reniera*-needles, and this, I suppose, is the fact that Schmidt thinks of, when he writes: „Die Form ist interessant, weil sie die Uebergänge der Nadeln vom Renierentypus in den der Amorphinengruppe direct zeigt". As has been correctly observed by Schmidt, monstrous forms of the needles are rather frequent in this species; especially frequent is among the smaller needles a form as fig. 2 c. Schmidt's

figures, Pl. V, fig. 9, are altogether monstrous forms, while he gives no figures of the normal needles of the species.

The examination of the spicules in the *Amorphina nodosa* of Fristedt, of which I have had a little piece, has shown this species to be identical with *H. genitrix*. Its outer form, as described by Fristedt, l. c., agrees also very well with this view. In the spiculation only the smaller spicules seem generally to be a little finer than in the specimen of Schmidt, and of monstrous forms I have only seen a few. Otherwise the figure by Fristedt, especially of the smaller spicule, is not correct. It is easily understood that Fristedt has not been able to determine the species according to the description and figure by Schmidt, especially, because Schmidt, as before mentioned, only gives figures of monstrous needles. In Fristedt we get the information that the species can reach the size of a human head.

Locality. We have of this species four specimens and some fragments, all from West-Greenland; only for one specimen a more particular locality, Umanak, is given.

Geogr. distr. West-Greenland and Spitzbergen (Fristedt).

3. **H. fibrosa** Frstdt.

Pl. IX, Figs. 3 a, b, c.

1887. *Amorphina fibrosa* Fristedt, Vega Exp. vetensk. Iakttag. IV 426, Pl. 24, figs. 11—12.

Irregular, more or less roundish or incrusting masses. The dermal membrane in some places with a close reticulation of spicules, in other places the spicules closely packed. Oscula few, spread. The skeleton consists of loose fibres, not distinctly marked. The spicules oxea, falling as to size in two groups; the larger 0·35—0·59^{mm}, the smaller 0·17—0·29^{mm}.

Of this species there are in the collection some more or less roundish pieces, all fragments, and some irregular crusts growing on calcareous algæ. The best conserved specimens are of a rather firm consistency. The *skin* shows in most places a reticulation of spicules, closer, but looking coarser than in *H. panicea*; in other places the spicules are closely packed without forming any reticulation. *Oscula* are few and spread. The *pores* are found in the meshes of the dermal reticulation as in *H. panicea*.

The *skeleton* consists of loose and irregular, not sharply marked fibres, which form, at all events frequently, a very irregular and indistinct network. The skin is not, or is only in the places where a dermal reticulation is found, separable from the body itself as a dermal membrane properly so called; in the other places the outermost layer of the sponge is remarkable by the closely packed spicules; in a section perpendicular on the surface, this part appears distinctly marked off from the tissue below, and this layer, which is developed into a skin, has a thickness of ca. 0·3^{mm}.

Spicula are oxea, falling into two rather well defined groups of size, which are also of different occurrence in the sponge. The larger ones have a length of 0·35—0·59^{mm}, most frequently they are 0·47^{mm} long; they are slightly bent, almost of the same thickness throughout their length, and are evenly, but shortly pointed; their thickness is very varying, but may be rather great, up to 0·017^{mm}; a swelling is not unfrequently found in the middle or nearer to one of the ends. The smaller spicules are finer, more or less curved, and vary in length between 0·17 and 0·29^{mm}. The larger spicules form the skeleton and the dermal reticulation, while the smaller ones are found in the outermost part of

the skin outside the dermal reticulation, and form, especially where no reticulation is found, a dense layer in the outermost part of the skin; they are further found in the membranes that bound the canals and cavities, and these membranes have often chiefly these smaller spicules, while they do not seem to form part of the fibres.

It is with some hesitation that I have determined this species as *H. fibrosa*, although I have had one of the original specimens of Fristedt for comparison. They agree, however, as to form and structure, the fibres have the same degree of development, and the dermal layer shows also in some places reticulation, in others closely packed spicules. The spicules also fall into two groups, but the larger ones are somewhat differing from the spicules of my specimens; they are finer, reaching only a thickness of 0·011^{mm}, by which fact the difference between the smaller and larger spicules becomes less marked; further they are often more strongly and more irregularly curved, and often longer pointed; Fristedt, who does not mention two sizes of the spicules, states their length to be 0·5—0·9^{mm}, and declares the latter length to be the more frequent; it is to be supposed that an error has taken place in the measuring, as the greatest length measured by me in the specimen of Fristedt before me, is 0·59^{mm}; nor does the figure of Fristedt agree with what I have observed; the spicule pictured by him in fig. 11, is far too long tapering and recalls the spicule of *H. panicea*, while the spicules of the specimen sent to me, are almost altogether more shortly pointed; finally must be mentioned that spicules with a swelling are also found in the specimen of Fristedt. The smaller spicules agree in form and structure with those in my specimens. According to this I must regard my specimens as belonging to this species, and especially, as also the thickness of the large spicules appeared rather varying in my specimens.

Locality. West-Greenland; we have two glasses from an earlier time, one without any nearer locality given, the other from Proven. Later the species has been taken on Ikertokfjord, depth 30 fathoms (Th. Holm).

Geogr. distr. Like the preceding species this latter one is only known as arctic; besides in West-Greenland it has been taken in the Behring-Strait, depth 25 fathoms (Fristedt l. c.).

Note. As we have seen, these two species, *H. genitrix* and *fibrosa* belong to the group of *Halichondria*-species having spicules of two sizes; the smaller spicules here correspond to those which Bowerbank calls *tension spicula* , and as species, in which *tension spicula* are different from skeleton spicules, we find in Bowerbank: *Hymeniacidon Thomasii*, *Brettii*, *fragilis*. *lactea*, *Halichondria inconspicua*, *incerta* and *edusa*; it will, however, only by an examination of original specimens be possible to get a sure idea of these species; as has been mentioned under *H. panicea*, *Hymeniacidon Thomasii* and *Halichondria incerta* are perhaps synonymous with this species. Fristedt (op. cit. IV, 424) mentions a species, *Amorphina renieroides*, a piece of which I have had for examination; the spicules of this species, varying from 0·15—0·6^{mm}, remind of the spicules in *genitrix*, but it seems to be distinguished from this species by the fact that the spicules are thicker and not so long tapering, and besides, otherwise contrary to the observations of Fristedt, considerably thicker than the small spicules of the species; it is likewise distinguished from *genitrix* by the fact mentioned by Fristedt, that the outermost spicules are more or less perpendicular on the surface.

4. **H. velamentosa** Arm. Hans.

Pl. I, Fig. 5. Pl. IX, Figs. 4—6.

1885. *Reniera velamentosa* Armauer Hansen, The Norwegian North-Atlantic Expedition XIII, 4, Tab. 1, fig. 10, Tab. VI, fig. 3.

Formed as erect leaves of an irregular shape, most frequently triangular or somewhat cordate, that is to say, narrowing below and with a curved upper edge, sometimes of an irregular, very obliquely cut off and compressed calicular form. The surface rather smooth. The dermal membrane with a spiculation of irregularly spread spicules forming here and there an irregular net. Oscula numerous, small, chiefly confined to one side. The skeleton consists of fibres, forming an irregular network, longitudinal fibres are especially conspicuous. Spicula oxea 0·58—0·8mm.

This sponge is formed as lamellæ of different forms and thicknesses. Most frequently the form is somewhat triangular with a curved upper edge and the sides converging downwards; they seem to have been attached by the lower part, but here they have been broken off. The largest of the specimens, whose form is irregular, has a height of 16cm, a breadth of 14cm, and a thickness of ca. 4cm. Besides the more or less regularly formed lamellæ, there are found in the material some fragments, a few of which seem to suggest that the lamellæ may be drawn out to a stalk downward. Two of the least damaged specimens are of an irregular, very obliquely cut off and compressed calicular form, and have certainly had a short stalk; this form is, perhaps, the normal form of the sponge. These two specimens have a height of 9—10cm, a breadth of 8—9cm, and the wall has a thickness of 1·5—2cm. The *surface* is rather smooth, but has more or less conspicuous, irregular folds and swellings. The colour (in spirit) is dirtily grayish brown or brown. The *dermal membrane* is easily separable from the tissue below, and is provided with a rather close spiculation of irregularly spread spicules forming, however, here and there an irregular net. *Oscula* are present in great numbers, they are small, round or oval, of a size of from ca. 2·2mm down to 0·5mm. Most frequently the dermal membrane surrounds the oscular aperture as a little, higher or lower cone; in some places oscula are close-set in groups, in other places spread. The *pores* are situated in the dermal membrane in the intervals between the spicules, sometimes very close-set; their measured sizes vary between 0·023—0·17mm. As in many leafshaped sponges, oscula seem also here to be found chiefly on one side of the sponge, and the pores on the other, but this feature is, however, far from being strictly carried through; on the side chiefly provided with pores, groups of oscula and spread oscula may be found, and on the other hand a few pores may be seen on the oscular side.

The fibres of the *skeleton* are rather well marked, and form an irregular network; longitudinal fibres are especially marked, and may reach a considerable thickness and firmness.

Spicula are oxea, they are evenly and rather gradually tapering, but not to so high a degree as in *H. panicea*; they are slightly curved or more rarely straight; the length varies between 0·58—0·8mm, but is most frequently ca. 0·75mm with a thickness of 0·017mm. Shorter and finer oxea are only seen singly. A few styli are found, which seem especially to occur in the dermal membrane; in this strongyla may also be found quite singly.

As I have had a piece of one of the specimens of Armauer Hansen, I have been able to

determine the species with certainty; without a comparison with an original specimen an identifying would have been impossible, as the descriptions, as well with regard to this species as to the other species established by Armauer Hansen, are exceedingly short, and the figures of the spicules very incorrect and not to be recognised.

Locality. From stations 53, 95, and 96 we have some rather well preserved specimens; from stations 21, 27, 28, 104, 106, and 128 we have only fragments, and from the three stations last mentioned these fragments are so small and damaged, that the only point of support for the determination is the spicules, which, however, agree completely with those of the other specimens. The depths on which the specimens have been taken, vary between 393 and 1330 fathoms; the whole specimens are from a depth of ca. 700 fathoms. The above mentioned stations are situated: in the Davis Strait (27 and 28), south of Greenland (21), in the Denmark Strait (95 and 96), north of Iceland (128), and east of Iceland (53, 104, 106).

Geogr. distr. The species has been taken, besides by the Ingolf-expedition, at the northern coast of Norway, depth 271 metres (The Norwegian North-Atlantic Expedition).

5. **H. osculum** n. sp.

Pl. III, Figs. 3—7. Pl. IX, Figs. 7—9.

The form somewhat varying, but always erect and more or less compressed. The surface rather smooth. The dermal membrane with an irregular, large-meshed net of spicules. Only one osculum is found, formed like a spout; it may be found near the top or more or less far down the side, and sometimes on a special projection. The skeleton consists of an irregular network of loose fibres and here and there spread needles. Spicula oxea 0·6—0·92^{mm}.

This sponge has an erect, more or less compressed form, which may however be somewhat varying. The height of the specimens in hand is about 35^{mm}. The colour (in spirit) is light brown-gray or yellowish gray. The *surface* is smooth, but on account of the dermal skeleton it has a wrinkled or coarsely reticular appearance. The *dermal membrane* may as a thin, transparent membrane be separated from the tissue below, and is provided with an irregular net of spicules with comparatively large meshes. With regard to *oscula* this species is rather interesting, each specimen having only one osculum, which may be situated in a somewhat different way, close to the summit of the sponge or farther down the side, and sometimes it is found on a special projection, which is in one specimen a side-branch [1]). This osculum has a form about as a conical spout formed by the dermal membrane, and the dermal needles are here arranged in a parallel way with one end towards the oscular opening; from here they radiate into the skin, and pass by degrees into the dermal reticulation. Sometimes the osculum is only found with difficulty, as it is situated in a depression. The oscular opening leads into a kind of oscular tube, stretching as a hollow through the whole sponge or the greater part of it; in this hollow the openings of the canals are found; they are round or oval, and have a diameter of ca. 0·1—1·5^{mm}. Round these openings the spicules of the membrane covering the hollow, are grouped as a coarse network. The inner hollow is often for a longer or shorter way

[1]) In this specimen (Pl. III, fig. 6), the upper end is somewhat damaged: here there might perhaps have been an osculum.

in the region of the osculum lying so near the surface, that the wall is here reduced to a thin, transparent membrane; this is especially the case, when the osculum is situated on the side of the sponge, and then this part is often formed like a groove, and in this groove the osculum may be more or less retired. The *pores* are lying in the meshes of the dermal reticulation; they do not seem to be numerous, and are very small, ca. 0·02^{mm}.

The *skeleton* consists of a rather dense, but irregular network of loose or not sharply marked fibres or bundles of spicules, and in some places it seems to be only formed by irregular spread spicules; most frequently the fibres or bundles contain many spicules. The dermal skeleton, as has been mentioned, consists of an irregular and large-meshed net of spicules, and a similar one is found in the membrane lining the inner hollow.

Spicula are slender oxea, slightly curved in the middle; they decrease in thickness from the middle towards the ends, and are long and finely tapering; thus they, as to their form, resemble the needles of *Halichondria panicea*, but they are longer than is common in this species, and most frequently their curve is hardly so sharp. The length varies from 0·6^{mm} up to 0·92^{mm}, but in by far the most cases it is 0·78^{mm}, the breadth is about 0·017^{mm}; shorter and finer spicules are only very rarely seen.

Locality. Of this interesting species, which, though somewhat varying in form, is well characterized by its single, spout-shaped osculum and the structure of this organ, the Ingolf-expedition has taken ca. 15 specimens, station 27, 64° 54′ Lat. N., 55° 10′ Long. W., depth 393 fathoms; we have further a couple of specimens, taken by the East-Greenland expedition 1891—92 at the south end of Jameson's Land, depth 10—60 fathoms. Thus the species has hitherto been taken in the Davis Strait and at the eastern coast of Greenland.

H. oblonga Arm. Hans.

Pl. II, Fig. 4. Pl. IX, Fig. 10.

1885. *Reniera oblonga* Armauer Hansen, The Norwegian North-Atlantic Expedition XIII, 4, Tab. II, fig. 5 A, Tab. VI, fig. 2.

Erect, more or less cylindrical. The surface grooved on account of the projecting ends of the fibres. Oscula spread. The dermal membrane thin, without spicules, pierced by the ends of the fibres. The skeleton consists of fibres forming an irregular network. A small amount of spongin present. Spicula oxea, rather thick, and shortly and abruptly pointed, the length 0·41—0·447^{mm}.

Of this species we have four specimens, all rather cylindrical, of a length of 3·3—4^{cm} and a diameter of 10 -14^{mm}; they are, however, all broken off at the lower end; one specimen seems to have divided into two branches above; according to this the typical form of the sponge seems to be cylindrical, erect, unbranched or with a few branches. The colour (in spirit) is light yellowish or brownish gray. The *surface* is uneven and grooved, and the ends of the fibres project. The *dermal membrane* that is supported by the ends of the fibres, is exceedingly thin and transparent, and contains no spicules; the examination of it is difficult, as it contracts when torn off. *Oscula* are rather numerous, spread on the surface, of a diameter of ca. 1^{mm}, but somewhat varying in size. On account of the difficulty attending the examination of the dermal membrane, I have not with certainty seen any *pores*.

As mentioned above, no particular dermal skeleton is found, but the dermal membrane is supported by the ends of the fibres. Otherwise the *skeleton* consists of an irregular network of loose fibres; most frequently the fibres have a thickness of 3—5 spicules; sometimes they contain still more spicules. The system of canals is very strongly developed, and therefore the soft tissues are scarce in proportion to the skeleton, and of spread spicules outside the fibres as good as none are found. Here and there the ends of the spicules are seen to be cemented by a very scarce and completely clear mass of spongin, which is, however, only observed with difficulty on account of its clearness and the small amount of it.

Spicula are comparatively thick, somewhat curved oxea; they are almost of equal thickness in their whole length, are abruptly pointed, and the point is bounded by rather straight lines, so that they approach tornotes in form. The bending may be more or less pronounced, but they are rarely straight; most frequently the bending makes an even curve, sometimes, however, it is rather sharp. The size of the spicules is very constant; the length is between 0·41—0·447^{mm}; they may be a little shorter, and may also reach a length of up to 0·52^{mm}, in one specimen especially they often reach a length of 0·5^{mm}. The thickness most frequently is 0·023^{mm}, but may also be a little less. Spicules being to a considerable degree shorter and finer than those mentioned, are very scarce.

As I have had before me one of the specimens of Armauer Hansen, I have been able to determine the species with certainty; the specimens of Armauer Hansen are somewhat larger than those described above; they have a height of 5^{cm}, and a diameter of ca. 2·5^{cm}, as may also be seen from the habit-figure cited (Pl. VI, fig. 2), but otherwise they are of the same form; the specimen I have seen, was likewise broken off at the base.

Locality: Of this species we have three specimens from East-Greenland, obtained by the East-Greenland expedition 1891—92 in the following places: 72° 24′ Lat. N., 19° 42′ Long. W., depth ca. 130 fathoms, two specimens; the south-end of Jameson's Land, depth 10—60 fathoms, one specimen, and further one specimen, taken on 63° 15′ Lat. N., 9° 35′ Long. W., depth 270 fathoms (Wandel).

Geogr. distr. East-Greenland and west of the Faröe Islands; with regard to the specimens of the Norwegian North-Atlantic expedition the station is unknown.

On station 85, 63° 21′ Lat. N., 25° 21′ Long. W., depth 170 fathoms, station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms, and station 97, 65° 28′ Lat. N., 27° 39′ Long. W., depth 450 fathoms, the Ingolf expedition has taken some fragments and a little specimen, which, I think, must be referred to this species. The whole specimen has a height of ca. 20^{mm}, and also the fragments seem to have belonged to small specimens. As to outer form and skeletal structure they agree completely with the typical specimens, and also the form of the spicules is the same; on the other hand the spicules of these specimens are a little smaller, the length varying from 0·36^{mm} quite down to 0·268^{mm}, while the thickness is about 0·014^{mm}. In spite of this rather considerable difference in the size of the spicules, I feel obliged to refer the specimens to this species, as the other structures show no difference, and we also in the typical specimens may find spicules of a length not exceeding 0·36^{mm}.

One specimen has further been taken at station 64, 62° 06′ Lat. N., 19° 00′ Long. W., which I must also refer to this species. It is of a similar size as that of the typical specimens, but is irregularly flattened; in all other respects it is of quite the same structure, only the skin is somewhat incrusted

with sand, but such incrustations may also be found in the other specimens. The dermal membrane is, perhaps on account of the incrustation, better preserved than in the other specimens, and therefore I have been able to observe pores, which were found to be spread and were measured of a diameter of up to 0·087^{mm}. The membrane is otherwise thin, transparent, and contracts when torn off, as in the other specimens. The principal difference is that the spicules have an average length of 0·49^{mm} and a thickness of 0·017^{mm} or a little thinner, and thus they are a little longer and thinner than in the typical form; but as the spicules in other respects are of quite the same form, the specimen most likely is only a variety of the species, the spicules in one of the typical specimens, as we have seen, already showing a tendency to be a little longer and thinner. The specimen is from a considerably greater depth than the others, viz. 1041 fathoms.

This species belongs to those *Halichondria*-species most closely allied to the *Reniera*; the feature of the skeleton that the ends of the fibres project through the dermal membrane, is a particular character of most of the *Reniera*-species, and also the presence of spongin (or a sponginlike substance) as well as the form of the spicules point to the *Reniera*. The species must however, on account of the loose, irregular skeleton, only consisting of polyspicular fibres, be referred to the genus *Halichondria*.

Remarks. In Grönland-Expedition der Gesellsch. für Erdkunde zu Berlin, II, 1, 1897 Vanhöffen mentions a species by the name of *Pachychalina oblonga* Arm. Hans., and thus he is of opinion that the *Reniera oblonga* of Armauer Hansen is a *Pachychalina*; as will have appeared from the preceding description, the *Reniera oblonga* Arm. Hans. is a *Halichondria*, and the species mentioned by Vanhöffen, is not identical with *Halichondria oblonga* A. H., but is a *Reniera* (see pg. 51).

7. **H. tenuiderma** n. sp.

Pl. X, Figs. 1—2.

Cushionshaped, attached, the surface finely spinulous from projecting spicules. The dermal membrane thin, without spicules. the ends of the fibres projecting through it. The skeleton consisting of an open and irregular network of fibres. Spicula oxea 0·33—0·43^{mm}.

We have this species in only one specimen, plate- or cushionshaped and attached to a fragment of a shell of a Buccinide. It has a greatest length of 20^{mm}, and reaches to a thickness of 7^{mm}. The colour (in spirit) is greyish white, the consistency is tolerably firm. The *surface* is finely spinulous on account of the projecting ends of the fibres. The *dermal membrane* is a thin, transparent membrane without spicules; it is supported by the ends of the fibres projecting through it. In this membrane some round or oval holes are found which are no doubt *oscula*; they have a diameter of up to 1^{mm}; pores, on the other hand, have not been observed.

The *skeleton* consists of an open and irregular network; especially it is irregular in the deeper parts of the sponge, but towards the surface it shows distinct primary fibres running more or less perpendicularly on the surface and piercing it; these fibres are polyspicular, but with few spicules, on an average 3—6 spicules alongside; while these fibres are distinct and rather regular, the transverse fibres are only represented by spicules found singly and without any regular position, but irregularly spread, so that the network becomes irregular. No spongin has been observed.

Spicula are slightly curved or, rarely, straight oxea, with very evenly, but not exactly long tapering ends. The length varies from 0·33—0·43^{mm}, but appears to be most frequently towards 0·4^{mm}. The thickness is quite constant 0·013—0·0157^{mm}. Shorter and finer spicules are seen quite singly.

Locality: Station 81, 61° 44′ Lat. N., 27° 00′ Long. W., depth 485 fathoms, one specimen.

On account of its distinct primary fibres that support a dermal membrane without spicules, this species like the preceding one belongs to those species of *Halichondria* approaching the *Reniera*.

8. **H. colossea** n. sp.

Pl. III, Figs. 1—2, Pl. X, Figs. 3—7.

Of an irregular calicular, somewhat compressed form. The surface of the outside of the sponge mostly smooth, but the upper surface and that of the calicular cavity shaggy from projecting spicules. The skin provided with closely packed spicules of the smaller form, running parallel to the surface: where the skin is shaggy, this layer is pierced by projecting large spicules. Oscula are found in the calicular cavity. The skeleton consists of closely packed needles, and is without fibres; consequently the consistency is firm and hard. Spicula oxea varying in length from 0·14^{mm} to about 2^{mm}: they divide into two, not sharply distinct, groups of sizes, of which the smaller are found in the skin and on the membranes of the canals.

The only specimen in hand of this species is very large and of an irregular, somewhat compressed calicular form. To be sure it cannot be decided with certainty, by which part the sponge has been attached; but probably the calicular cavity has been turned upward, and the sponge has been attached by the opposite part. The specimen has a height of 30^{cm}, a length of 50^{cm}, and a breadth of 25^{cm}. The cavity has a depth of about 14^{cm} and a breadth of about 8^{cm}, and, as shown by the picture pl. III, fig. 1, is lying somewhat in one side of the sponge. The *surface* has irregular, flat depressions and folds, but on the outside of the sponge it is otherwise mostly rather smooth; on the upper side and in the calicular hollow, on the other hand, it is provided with projecting spicules, so that here it appears shaggy. The colour (in spirit) is gray-brown. On account of the needles that are closely packed throughout the sponge, the consisteney is firm and hard. The *dermal membrane* is only with difficulty to be separated from the tissue below; it is provided with closelying spicules parallel to the surface. *Oscula* are found in the calicular eavity; they are rather large and very irregular, the larger part of the walls and bottom of the cavity being occupied by oscula and by the folds between them, and they pass so gradually into the wide canals, that no distinct boundary is to be found between osculum and canal; strictly speaking the cavity is a large groove, divided into smaller ones passing at last into the system of canals. Also outside of the calicular cavity smaller depressions with oscula may be found on the upper surface. In spite of an examination of several stained pieces of the dermal membrane, no pores have been found; on account of the dense spiculation of the membrane they are perhaps only found in particular places.

The *skeleton* consists of an exceedingly dense tissue of needles lying without any order among each other in every direction. The dermal membrane is provided with a very dense spiculation; the needles lying side by side in every direction parallel to the surface, but in such a way, that they are situated in groups in which the spicules are parallel to each other (pl. X, fig. 4). These spicules are all

small, up to a length of 0·47^{mm}, and thus they belong to the smaller of the spicules occurring in the sponge. The skeleton consists otherwise of large and small spicules lying without any order among each other in every direction, and very closely packed. No fibres are found. The spicules are most closely packed towards the surface, which is, accordingly, very hard. Where the surface is smooth, the large spicules inside of the dermal membrane are seen, in a section perpendicular on the surface, to be arranged chiefly parallel to this (pl. X, fig. 6); where, on the other hand, the surface is shaggy from the projecting spicules, the section shows these, which are all large, to be arranged more or less perpendicularly on the surface and piercing the dermal layer of small spicules also present here (pl. X, fig. 7). The system of canals is lined by a membrane, provided with spicules of the same size as those of the dermal membrane, but they are not here so closely packed (pl. X, fig. 5). When the dermal membrane is examined over the edges of the oscular openings down into the canals, all degrees between the more or less close packing of the needles are found, the spicules in the membrane becoming more and more spread. The larger canals are comparatively few, and their chief direction seems to be perpendicular through the sponge from the supposed base to the oscular openings of the upper surface.

Spicula are oxea, slightly curved in the middle and exceedingly long and evenly tapering from the very middle to the ends; their sizes are exceedingly varying, from 0·14—2·02^{mm}. The middle sizes are scarce, and thus the spicules convey the impression of occuring in two groups of sizes. In the smaller ones the bending is not so distinctly in the middle as in the larger, but they are more evenly curved.

Thus the way in which the spicules occur in the sponge, is in this species about the same as in *H. genitrix*, the small oxea partly occuring throughout the tissue, partly forming the spiculation of the dermal membrane and the membranes of the canals; but contrary to the case in *H. genitrix*, the spiculation of these membranes is here exclusively formed by the smaller oxea without any admixture of the larger ones.

Topsent (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 66, pl. IX, fig. 3) describes a new species, *H. pachastrelloides*, which, as to the form and varying in length of the spicules as well as the firm consistency, agrees with the present species, but the largest length of the spicules is stated to be 1·4^{mm}, and the common length 0·93^{mm}. The species of which only one specimen is known, grew incrusting on a stone. On account of the stated difference in the size of the spicules and the fact, that Topsent does not at all mention that the smaller spicules form an outermost dermal layer, the present species must be different from *pachastrelloides*, although it is surely nearly allied to it.

Locality: Station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms, only one specimen.

9. **Halichondria? difficilis** n. sp.

Pl. II, Fig. 7, Pl. X, Fig. 8.

Of a very irregular, most frequently tuberous or lobate form. The surface smooth. The outermost layer forming a dermal layer with closely packed spicules more or less parallel to the surface. The skeleton consists of irregularly spread needles, not closely set. Fibres are not formed. In the skeleton is found incrusted a great number of extraneous bodies. Spicula oxea 0·06—0·37^{mm}.

This species is of a very irregularly lumpy or lobate form; deep grooves or furrows may be found, and projecting lobes seem sometimes to coalesce, so that narrow hollows may arise, stretching far into the sponge. The largest specimen has a length of ca. 11^{cm} and a breadth of 8·5^{cm}, the smallest specimen that is of a roundish form, is ca. 4^{cm} long by a breadth of hardly 3^{cm}. Among the smaller specimens one is of a depressed form with irregular deep furrows in the edges, another is formed like a rather long staff, strongly and irregularly curved, of a length of about 7^{cm}. Whether the sponge has been attached or not, is not to be decided with certainty from the specimens in hand; most of them, to be sure, are somewhat damaged, pieces being broken off, and thus they might be supposed to have been broken off at the place of attachment; most things, however, favours the belief that the sponge has not been attached, or only loosely stuck into the bottom; neither is the upper or lower surface to be decided. The colour (in spirit) varies from dirtily dark gray or bluish gray to black violet; in the interior it is dirtily gray. Such is the colour in most specimens, but in a couple of instances it is differing; thus one specimen is grayish white, but has distinct remnants of the violet colour, and another is brown gray. Whether the more or less black violet colour is the original self-colour of the sponge, or it is due to the fact that the colour has altered in the spirit, or the sponge has been discoloured by lying in spirit together with other sponges, is now hardly to be decided. That it is the original colour of the sponge is indicated by the fact that it is most strongly pronounced in all the furrows and grooves, where the surface has not been exposed to being scraped. If in such places we cut off a thin layer of the skin and examine it under the microscope, we shall see, above the dense layer of spicules of the skin, remnants of a violet-coloured, exceedingly thin and transparent membrane, mostly wanting in the places where the colour is less pronounced; these remnants probably are remnants of the epidermis of the sponge. The consistency is rather firm, fleshy and somewhat elastic. The *surface*, as has been mentioned, shows some larger and smaller grooves and folds, but is otherwise smooth. The outermost layer of the sponge is marked off as a *dermal layer* of a thickness of ca. 0·2^{mm}; this layer has its origin from the fact that the spicules here are closely packed; they are lying in all directions, often, however, in such a way, that they are arranged somewhat like bundles, the spicules of which are parallel to each other; in some places this disposition may pass into a partly band-shaped arrangement; the spicules are chiefly arranged parallel to the surface, only a smaller number are placed obliquely or perpendicularly on the surface; sometimes, however, some projecting spicules may be found, but that, perhaps, is due to the contraction of the skin. *Oscula* have not been observed in the specimens in hand. The *pores* seem in most places to be rather scarce, only here and there they are seen more closely gathered in greater numbers; in such places the spicules in the skin may show a coarse, net-like arrangement, which, however, is only seen under the microscope. The sizes of the pores have been measured from 0·03—0·51^{mm}; often they do not go perpendicularly through the skin, but more or less obliquely, and consequently they are easily overlooked, when the skin is examined from above; they continue as fine canals without any formation of larger sub-dermal cavities, but some of them may branch off under the skin as horizontal canals. If a piece of the dermal layer is cut off and examined under the microscope from the inside, a rather large number of canals are seen to be cut through; when in such a case no pores are seen by an examination of the outside of the piece, the fact is, I suppose, that they are closed, or they cannot be seen on account of their oblique direction. The mentioned

canals vary in size up to ca. 0·5^{mm}. As separate oscula are not seen, we have here probably both the incurrent and the excurrent systems of canals, so that the larger canals and pores are the excurrent ones.

The *skeleton*. Besides the above mentioned closely packed layer of spicules found in the dermal layer, the skeleton consists of spicules spread through the tissue in all directions without any order, or sometimes arranged somewhat like bundles; here and there they may be gathered into larger numbers forming something like fibres; where they are spread in the tissue, they are not close packed, for instance not nearly so close as in *H. colossea*. The membranes lining the canals, have no spicules. Besides the skeleton constructed as above described, elements are found, which certainly bear a prominent part as skeleton, the species receiving to a high degree extraneous bodies, chiefly Foraminifera and especially sponge-spicules. Thus I have found needles of Desmacidonids, Suberitids, and of several Tetractinellids, as well as pieces of skeletons of Hexactinellids[1]); they may be present in so great numbers as quite to disguise the real skeleton of the sponge.

Spicula are oxea; they are slightly curved or straight, and long tapering; a few oxea may show a swelling in the middle, and this peculiarity seems to be more frequent in some specimens than in others. The spicules are very much varying in length, from 0·37^{mm} down to 0·06^{mm}, the thickness varies from 0·004^{mm} in the smallest ones to 0·008^{mm}, in a few specimens up to 0·010^{mm}; the thickness is generally proportionate with the length; in the shorter spicules the tapering is comparatively shorter than in the longer ones. Whether the short needles are developmental forms of the long cannot be decided with certainty, but it would seem rather probable with regard to some of them, and the very few spicules that were finer than the given measures, belonged also to the short ones; some of the short spicules, however, and especially the very shortest ones are scarcely developmental forms, to judge by the proportion between length and thickness.

This sponge shows a peculiar tissue of a vesicular structure; it consists of round, more rarely a little oval cells, lying close together with a comparatively slight intercellular substance. The cells have an average size of ca. 0·01^{mm}. They stain rather slightly in fuchsine, and frequently show a little, more strongly stained calotte in one side, where perhaps the nucleus is found. It is no doubt a consequence of this structure of the tissue, that the sponge by drying up contracts very strongly to an unrecognisable mass, almost as hard as bone. Also the specimens kept in spirit convey, especially on account of their dermal layer being in many places wrinkled and folded, an impression of being somewhat contracted.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms, four specimens and some fragments; station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms, two smaller specimens.

Note. I have not thought it justifiable with certainty to refer this species to the genus *Halichondria*, to which genus it would have to be referred by its spiculation and skeletal structure. It is no doubt very closely allied to *Halichondria nigrocutis* Cart. (*Amorphina* Carter, Ann. Mag. Nat. Hist. 1886, Ser. V, vol. XVII, 50, 2. — *Halichondria?* Dendy, Proceed. Roy. Soc. Vict. 1895, vol. VII, 239)

[1]) Both the stations, 78 and 90, on which the species was taken, gave exceedingly rich earnings of sponges, especially many Tetractinellids, among which accordingly the species must have grown.

from South-Australia; the spicules of this species are said by Carter to divide into two groups of a length of respectively 0·1—0·13^{mm} and 0·358^{mm}, and a thickness of 0·006^{mm}; these measures, as we have seen, agree very well with those of the spicules of the present species; the only difference is that the spicules are said to divide into two groups, of which the smaller one should be chiefly found in the skin, while in the present species spicules of all intervening sizes are found, and the smaller ones sure enough may be found in the skin, but are not chiefly found there. Dendy describes the skin as provided with a dense feltwork of .... oxea, that may be arranged in a netlike manner on account of the pores, that is to say, a structure quite resembling that of the present species, with which, moreover, the description agrees exactly. When Dendy l. c. supposes *H. nigrocutis* to be allied with certain of the *Stellettinopsis*-species described by Carter, it seems to me to be quite justified, which is also the case with regard to the present species[1]). On the other hand the species seems to be allied to *Halichondria colossea* and the species most closely allied to this latter one. Therefore the possibility of a relationship between *Halichondria* and the Tetractinellids through *Halichondria-Stellettinopsis* (*Coppatias* Sollas), supposed by Sollas (Challeng. Report, Vol. XXV, Tetractinellida, 208), as also mentioned by Dendy, l. c., might be of some probability.

Eumastia O. Schmidt.

From an attached, thinner or thicker basal part comparatively slender papillæ rise. The skeleton consists of loose, irregular fibres and spread needles. The needles slender, long tapering oxea.

1. **E. sitiens** O. Schmidt.

Pl. IV, Figs. 1—6. Pl. X, Figs. 9—12.

1870. *Eumastia sitiens* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 42, Pl. V, fig. 12.
1887. — — Fristedt, Vega Exp. vetensk. Iakttag. IV, 426, Pl. 24, fig. 13, Pl. 27, fig. 11.
1896. — — Lambe, Sponges from the Atlant. Coast of Canada. Transact. Roy. Soc. Canada, Ser. 2, II, Sect. IV, 182, Pl. I, fig. 1.

The form different, often more or less irregular. From the attached basis rise close-standing, slender, unbranched or slightly branched papillæ, some of which bear oscula. The surface smooth. The dermal membrane is on the papillæ provided with a reticulation of spicules. The skeleton consists of loose fibres and numerous spread spicules. Spicula slender, long tapering oxea ca. 0·36—1^{mm}.

This species has a rather constant form; the nethermost part is expanded on the substratum, and from this part slender, close-standing papillæ rise. In its most regular form it is of almost equal extent in all directions, but it may also be more expanded and become somewhat more irregular, and the comparative development of the lower part and the papillæ may also be somewhat different. The largest specimen has a largest extent of ca. 15^{cm}. The other specimens vary in size from ca. $2^1/_2{}^{cm}$ to ca. 7^{cm}. All the specimens have been attached; the largest one has grown round the stalk and root of a Laminaria; most of the others are either attached to shells of Pecten and living specimens of Pecten (*Pecten islandicus* Müll.) or on Balanoids; a single one is attached to an old anchor. The

[1]) By the boiling of the spicules of this species, I have in several instances found asters; I regard it, however, to be quite sure, that these asters that have only been found quite singly, are extraneous bodies.

papillæ are more or less close-standing, always, however, rather close; they are slender and slightly conical, decreasing in thickness upward, and they are unbranched or slightly branched. They may otherwise be rather different with regard to length and thickness, and there may be some difference in individual specimens. The papillæ are stubby at the summit and apparently closed, or they may be tapering and show an osculum. The colour (in spirit) is white and somewhat transparent, in some specimens with a slight yellowish red tint. In the middle of the transparent papillæ is seen an opaque whitish part. The consistency, especially in the lower part of the sponge, is rather firm. The *surface* is smooth, without projecting spicules. The *dermal membrane* is thin and transparent, but rather solid, and may easily be torn off to some extent; it is provided with spicules forming in the upper part of the sponge and especially in the papillæ a beautiful reticulation of fibres. The reticulation may, with regard to the width of the meshes, be somewhat different in different individuals. Towards the base of the sponge the reticulation disappears most frequently, and passes into another arrangement of the spicules, which are here lying close-packed in all directions in several layers, but parallel to the surface. In the papillæ the meshes are of the largest size, and here some of the fibres of the dermal reticulation have a marked longitudinal direction. The *pores* are found in the meshes of the dermal reticulation, often so close as to reduce the membrane to a network. The sizes of the pores are measured from 0·02—0·1 mm. They are chiefly found on the papillæ, and here very close, but they are also numerous on the other parts of the surface of the sponge, where nets of spicules are found in the skin; on the other hand they are wanting or only found in very small numbers on the lower part of the sponge where the spicules of the skin is close-packed. In the specimens examined they appeared to be largest on the papillæ, and to become smaller lower down, and the few pores found, where no reticulation was present, were very small. *Oscula* are found in the ends of some of the papillæ; then these papillæ are conically tapering, and the spicules are here arranged parallel to the longitudinal axis of the papilla and close together, and thus one of their ends is turned towards the oscular opening.

The structure of the papillæ. The structure of the papillæ of this species has never been exactly examined. Schmidt, however, mentions that they are hollow and thin-walled, and that a fibre goes from the skeleton into each papilla, in which it radiates in an irregular way. Fristedt says that the inner structure is very characteristic, but does not enter into further details as to these characteristic features. — The papillæ are of two different kinds: pore papillæ, and oscular papillæ. Commonly they may already be distinguished by their outer appearance; the pore papillæ, at all events their upper parts, are more slender and rounded at the top. Through their middle stretches a powerful fibre from the skeleton, from which pillars branch off to the network of the skin, supporting the skin; the hollow of these papillæ is a continuation of the subdermal cavities spread over the whole surface, and the papillæ are abundantly provided with pores leading into the hollow. The oscular papillæ most frequently are somewhat thicker than the pore papillæ, and at the top they are, as has been mentioned, conically tapering, and end here with an osculum; and in this tapering part the spicules are lying close together parallel to each other and with one end turned towards the oscular opening. The papilla is hollow and thin-walled; also here a fibre from the skeleton stretches up into it, but this fibre runs along the wall, and most frequently it disappears in the uppermost part of the

papilla. If the wall is examined, it is found to be abundantly provided with pores, and so it would be an obvious conclusion that these pores are leading directly into the oscular canal. A closer examination shows, however, that the oscular papilla is double-walled, or, in other terms, that the subdermal cavities continue over the oscular papillæ. These subdermal cavities are oftenest narrow, so that the wall without any closer examination may convey the impression of being single. Where the fibre passes into the oscular papilla the subdermal cavities are somewhat wider, and the fibre runs in the partition-wall between the oscular canal and the subdermal cavity, so that in a transverse section the large oscular canal is seen with some smaller cavities around it, which are subdermal cavities; sometimes these cavities are so large, that it cannot be seen immediately in the section, which of the cavities is the oscular canal; generally, however, the oscular canal is seen in the transverse section to be lying at one side and the subdermal cavities at the other, and to be arranged in such a way, that the outer wall and the partition-wall form two excentric rings, one within the other (Pl. X, fig. 10). The partition-wall is a thin, transparent membrane, not as the dermal membrane provided with a network, but supported by branches that from the fibre bend regularly into it; besides a few spicules are found spread in it. I have not been able to decide with certainty, whether the oscular papilla is always double-walled through its whole extent, that is to say, whether the subdermal cavities stretch quite round the oscular papilla, and perhaps some difference may be found in different papillæ with regard to this feature; if they go quite round, they are at all events most frequently very narrow on the side of the papilla opposite to the fibre. Besides the structure as here described, which is the plainest form, complications may occur; thus the pore-papilla and the oscular papilla may be united into one papilla, so that one osculum or a couple of oscula may be found more or less far down the side of the pore papilla; this fact alters nothing in the inner structure of the papilla, and otherwise the relation between the oscular canal and the subdermal cavities may be somewhat varying. It would seem that more or less complete partition-walls may also be found in the pore papillæ, and finally the possibility is not excluded that in many of the papillæ appearing as pore papillæ, an excurrent canal may be found, although for the present there is no visible or functionating osculum.

The *skeleton*. Besides the dermal skeleton and the skeleton of the papillæ mentioned above, the other skeleton of the sponge consists of some loose fibres and between these numerous and rather close-set spicules, lying in every direction without any order; the fibres have a somewhat irregular course, but chiefly they run from the base towards the surface; all the larger canals have the same direction. The fibres may in some places be closer than in others, and be gathered almost as bundles; they are rather thin, their thickness not exceeding $0{\cdot}09^{mm}$, while the fibres of the papillæ may have a thickness of up to $1{\cdot}5^{mm}$.

Spicula are oxea; they are very long tapering, almost from the very middle, and most frequently they are slightly curved; the curve may be even, but is often a more or less sharp bend in the middle, so that the spicules are quite like those of *Halichondria panicea*, but they reach a considerably greater length than is common in this species. The length varies from ca. $0{\cdot}36$—$0{\cdot}8^{mm}$, the thickness, which is not always largest in the longest spicules, varies from $0{\cdot}011$—$0{\cdot}018^{mm}$. Otherwise the size may vary somewhat in different individuals; thus in one of the specimens in hand (the largest one) the spicules reach a length of up to $1{\cdot}07^{mm}$, and a largest thickness of $0{\cdot}02^{mm}$. Shorter and finer, to quite fine

spicules, developmental forms, may be found; but it is, on account of the varying of the spicules as to length and thickness, not always possible with certainty to determine the boundary between developmental forms and fully developed oxea.

In an individual of this species, from Egedesminde, were found a rather great number of a little Amphipod (*Aristias tumidus* Kr.) sitting in the oscular papillæ and most frequently at the very point, projecting with half their bodies through the oscular opening.

Locality: Djupivogur at the eastern coast of Iceland, depth 8 fathoms (H. Jónsson); Seydisfjord, depth ca. 30 fathoms (A. C. Johansen); Stykkisholm, depth 20—30 fathoms (H. Jónsson); the Davis Strait, depth 100 fathoms (Holm); Julianehaab, depth 24 fathoms (A. Jessen); Holstensborg (Traustedt); Egedesminde, depth 70—90 fathoms; Umanak, depth 50 fathoms (Moldrup, director of the colony), about 18 specimens in all.

Geogr. distr. West-Greenland (Ingegerd and Gladan , Fristedt l. c.); Gulf of St. Lawrence and the south coast of Nova Scotia, in some places on depths of ca. 48 fathoms (Lambe l. c.); Pitlekai in the Tschuktsch peninsula; the Bering Sea 65° 10′ Lat. N., 169° 50′ Long. W., depth 25 fathoms (Fristedt l. c.). When the localities from which I have had the species, are included, it is seen to be spread from ca. 10° to ca. 180° Long. W., and it proves to be a northern species, as most of the localities are found north of about 64° Lat. N.; about here the southern boundary might be put; but at the eastern coast of America it goes down to ca. 40° 30′ Lat. N.; that it is here found so far southward, I take to be due to the Polar current, which just at this place runs down to the south of Nova Scotia. With regard to the bathymetrical distribution it has been taken on depths from 8—100 fathoms.

Of the genus *Eumastia* only two species have hitherto been described, viz. besides the present species *Eumastia schmidtii* Dendy (Proceed. of the Roy. Soc. Victoria VII, 1895, 240) from Victoria. According to the descriptions it seems to be very nearly allied to *E. sitiens*, from which it is distinguished by having smaller spicules, only 0·4^{mm} long, and by the surface being provided with projecting spicules. — The genus is very nearly allied to *Halichondria*, and is chiefly distinguished from this genus only by the papillæ. Schmidt had also some misgivings with regard to the establishing of the genus, and he says that an examination of a greater material might possibly show it to be identical with *Halichondria* (*Pellina* Schmidt). This conjecture, however, has not been borne out by the facts, and as now, moreover, one more species of the genus is known, it seems, at all events from a practical point of view, at present to be better to keep it. The species of *Halichondria*, to which *Eumastia* is most nearly allied, seems to be the *H. osculum* described above.

Reniera Nardo.

The form may be very much varying; the typical form is crust- or cushion-shaped and provided with more or fewer, higher or lower oscular tubes; but the species may also be tubular, leaf-shaped, or quite irregular. The skeleton consists of a more or less regular, most frequently rectangular, sometimes triangular network. The fibres are typically unispicular, but may also often have a thickness of several spicules, so that the primary ones are polyspicular, the secondary ones unispicular, or they may all be

polyspicular, as the skeleton upon the whole may be more irregular. The ends of the spicules are united by more or less spongin. Spicula are short oxea or more rarely strongyla.

The typical *Reniera*-skeleton, consisting of quadratic or rectangular meshes formed by unispicular fibres, is very characteristic, but in many species the skeleton is more irregular; when this irregularity is more pronounced, the skeletal structure approaches that of some species of *Halichondria*, especially as the amount of spongin may be quite minimal; as a distinguishing character are then only left the short, less slender spicules, but they will also generally be a good criterion with regard to the referring of the species to the genus; the fact is that the *Reniera*-spicules are characteristic by being comparatively short and never so long tapering, as is most frequently the case in the *Halicondria*-species. Also another feature is of importance as a distinguishing character. Most *Reniera*-species have a dermal membrane without spicules, resting on the underlying skeleton and pierced by the ends of the primary fibres, while the *Halichondria*-species have most frequently a dermal membrane with spicules, through which no ends of fibres project; but also here transitions are found, as for instance in the above mentioned species *Halichondria oblonga* and *tenuiderma*, which with regard to this feature approach the *Reniera*. Fristedt (Vega Exp. vetensk. Iakttag. IV, 425) calls attention to a similar fact, and mentions *Halichondria (Amorphina) renieroides* as also approaching the *Reniera* in this respect. In this species, however, it is not the ends of fibres that project, but a dense spiculation is found of spicules a little projecting and perpendicular on the surface; therefore with regard to this feature the species is not especially nearly allied to the *Reniera*. From the reasons given above, species with a less regular skeleton, and with exceedingly little spongin, but with short, never especially long and evenly tapering oxea, have in the present work been referred to *Reniera*.

On the other hand *Reniera*-species, as has been mentioned under the Chalinines, may by a development of spongin approach these latter in skeletal structure, so that no sharp limit can be drawn.

1. **R. urceolus** Rathke et Vahl.

Pl. I, Fig. 6. Pl. XI, Fig. 1.

1806. *Spongia urceolus* Rathke et Vahl, O. F. Müller Zoologia danica IV, 42, Tab. CLVII, fig. 3.

1870. *?Chalinula robustior* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 38.

Oblong-pyriform, stalked, sometimes branched or showing several coalesced tubes. The dermal membrane thin, without spicules; the ends of the fibres projecting and the surface accordingly finely shaggy. In the upper end a large osculum leading into a wide oscular canal running throughout the length. The skeleton a rather regular network of primary and secondary fibres with quadratic meshes: the fibres unispicular. Particular polyspicular fibres are found running from the stalk longitudinally through the sponge. Spicula comparatively thick, slightly curved oxea, ca. 0·208^{mm}.

This sponge of which we have two whole specimens and some more or less damaged fragments, is in its most regular shape oblong-pyriform, and is below produced into a short stalk, by which one specimen is attached to a little stone, while the other is torn off. The larger and more lengthened specimen has a length of 10^{cm}, and a greatest breath in the middle of 3^{cm}. The other specimen is smaller and comparatively less lengthened; it has a length of 7^{cm}, and a greatest breath of 2·4^{cm}. One

of the damaged specimens consists of four coalesced tubes, two of which are of equal length, while the two others are shorter; the height of the specimen is 60^{mm}, but the lower part, probably a rather long piece, is wanting. Whether we have here a ramification, or separate individuals growing near each other and then coalesced, cannot be decided; it is perhaps more probable that it is a ramification as the oscular canal of one of the small tubes runs into that of the large tube. The consistency is soft, but not, however, very fragile. The colour (in spirit) is grayish yellow. The *surface* is finely shaggy from the projecting ends of the fibres protruding to the length of a spicule. The *dermal membrane* is thin and without spicules, it is supported by the underlying skeleton and pierced by the ends of the fibres, and it is not separable. The *pores* are measured of a size of 0·029—0·089^{mm}. On the top of the sponge a circular *osculum* is found, which in one specimen has a slightly prominent margin; it has a diameter of 5—7^{mm}. This osculum leads into an oscular canal continuing through the sponge quite down into the stalk; the canal is through its whole length of about the same width as the osculum, only in the lower end it is somewhat narrowed. On the inside of the oscular canal the excurrent canals open rather close to each other, the size of the openings is about 1—2$^{1}/_{2}$^{mm}; no special arrangement of the openings is to be traced. The system of canals is highly developed, and the sponge very cavernous. The chief canals have otherwise a very regular course, all beginning from the base or from a spot near the outside, and running parallel to each other arcuately upward and inward towards the oscular canal; consequently all the openings in this canal are turned upward, and therefore in a longitudinal section of the sponge a certain concentricity due to the course of the canals, is seen. All over the outside of the sponge below the surface small, roundish subdermal cavities are found, which by being seen through the skin, give the sponge a netlike appearance.

The *skeleton* consists of a rather regular net of fibres forming meshes, most of which are quadratic, but some may also be triangular or pentagonal; by far the greatest part of these fibres are unispicular. Of the fibres those only, running from the middle of the sponge towards the periphery arcuately upwards (the primary ones), are distinct and complete, while the fibres running at a right angle to the former ones, and thus more or less parallel to the surface, are indistinct and incomplete. A certain relation between the canals, at all events the chief canals, and the skeleton cannot here be overlooked; for, the larger canals, as before mentioned, running upward and inward, while the skeletal fibres are running upward and outward towards the periphery, these primary fibres will always be at right angles to the canals, while the spicules of the secondary fibres are partly parallel to the canals. Besides the fibres forming the net of meshes, some comparatively thick, polyspicular fibres are found; they begin in the lower part of the stalk, which is almost exclusively formed by such fibres, and then they radiate up through the sponge branching off. The needles forming the net of meshes, are at the ends united by a distinct mass of spongin. Scattered in the tissue some needles smaller and finer than those forming the skeleton, are found, but only in small numbers.

Spicula are oxea, rather thick and only very slightly curved; their length is rather constant, on an average 0·208^{mm}, but varying a little to both sides, and may go down to 0·178^{mm}, the thickness varies between 0·016 and 0·012^{mm}, the shortest ones being commonly the thickest; as before mentioned a small number of shorter and finer needles are found, but they are by transitional forms evenly connected with the others, and so they may certainly be regarded as developmental forms.

Of the smaller fragments one is a specimen, the lower part of which is wanting; it is much smaller than the specimens mentioned above, the length being 21mm, the breath 13mm; the osculum is 4mm. Further may be noted that the spicules of this fragment are a little smaller than those of the larger specimens, their length being on an average 0·19mm, and their thickness 0·012mm.

The determination of this species as *R. urceolus* may no doubt be regarded as certain; to be sure, the description cited is very short, but as well the description as the picture agrees very well with the present species; the description cited is by Rathke, and the plate by Vahl, and consequently O. F. Müller cannot be cited as the author of the species. Johnston (British Sponges and Lithophytes, 1842, 175) supposes *Spongia urceolus* to be a variety of *Grantia compressa*; but already the size and also the form show that such cannot be the case.

Chalinula robustior which, with a query, I have referred to this species, was established by Schmidt l. c. on two small fragments from Iceland, found in our museum. The examination of these fragments has shown that their spicules agree completely with those of the present species, and I think it rather sure that they are stalk-pieces of *R. urceolus*. The polyspicular longitudinal fibres that are rather well developed in the stalk, have been the cause why Schmidt has thought to have to do with a Chalinine.

Locality: Iceland, two whole specimens (Steincke); Eastern Iceland, depth 38 fathoms, a little specimen (Horring); the northern coast of Iceland, depth 52 fathoms, a fragment (Wandel); the Faröe Islands, 6 miles to the northwest of Kalsö, depth 60 fathoms, one specimen (Th. Mortensen).

From Jacobshavn in Greenland (assistant Olsen) we have three specimens, which I take to belong to this species. They grow on the roots of a Laminaria; with regard to the form and size of the spicules and the structure of the skeleton, they quite agree with *R. urceolus*, but the two specimens have no definite form, and are incrusting; they are rather small, their greatest length being ca. 20mm; the third specimen, on the contrary, forms a pyriform tube like the form of *urceolus*; this specimen has a height of 20mm. Whether these specimens be really *R. urceolus*, I cannot decide with certainty; but if so, the small incrusting specimens are presumably quite young, and the species cannot be supposed to rise to a tubulous form, until it becomes older; in reality the three specimens in hand form a characteristic series: the first specimen is absolutely incrusting, and has a greatest height of 6mm, the second rises from an incrusting plate to a semiglobular cushion, and has a height of 10mm, neither of these specimens show any osculum; the third specimen rises to a short-stalked tube of a height of 20mm with an osculum on the summit.

Geogr. distr. In the place quoted from Zoologia danica, the species is mentioned from northern Norway.

2. **R. parenchyma** n. sp.

Pl. VII, Fig. 1, Pl. XI, Figs. 2—4.

Erect, leafshaped, oblong-oval. The dermal membrane thin, without spicules; the ends of the fibres projecting, and the surface consequently finely shaggy. Oscula small, only occurring on one side? The skeleton a regular network of primary and secondary fibres, the fibres unispicular. Particular polyspicular fibres are found running longitudinally through the sponge from the base. Spicula slightly curved, sharply pointed oxea, ca. 0·238mm.

This species is erect, and forms an oval leaf narrowed below at the place of attachment. The height is 18^{cm}, the breadth has been ca. 10^{cm} (the specimen is somewhat damaged), and the thickness of the leaf is in the middle ca. 4^{cm}, but it becomes somewhat thinner towards the edge which is rounded. The leaf is slightly arcuate from the middle towards the edge, so that one side is somewhat convex, the other somewhat concave. The consistency is soft and flexible. The *surface* is everywhere finely shaggy from the projecting spicules. The *dermal membrane* is thin, transparent, and without spicules, it rests on the skeleton below, and is pierced by the ends of the fibres; accordingly there is no special dermal skeleton. The colour (in spirit) is almost white, and the sponge is rather transparent, only the longitudinal fibres are at the base seen to be yellowish. (The sponge is from a considerable depth, and a large part of the tissue has probably been destroyed or quite washed away by the hauling up). *Pores* are found rather densely on both sides as round openings; they are very much varying in size, from 0.029—0·23^{mm}. With regard to *oscula* it has not been possible with certainty to establish their behaviour, as the skin of the sponge only in few places is undamaged, and I have not been able positively to decide, whether they are to be found on both sides or only on one of them. In the skeletal net cylindric holes or canals of a diameter of 0·5—1^{mm} are seen, lying rather close to each other; they go in a horizontal direction almost through the whole sponge. If the sponge is viewed under a magnifying glass, the oscular canals are seen to shine through on both sides, but they appear on both sides to be closed by the outermost net of spicules; according to this we should have to suppose that the oscular openings are found on both sides either as one or as several pore-like openings for each oscular canal; in this case there would be no difference of size between the largest pores and the oscula. If, however, the layer of the skeleton closest to the surface is cut off on both sides and examined, we shall here find a little difference between the two sides of the sponge, one side showing openings in the net; these openings are situated over the oscular canals; I have not seen them surrounded by the dermal membrane as distinctly limited oscula, but this I take to be due to the fact that the skin of the specimen is not undamaged. In the specimen in hand these openings are situated on the convex side. If they are the oscular openings, these openings are thus exclusively, or at all events almost exclusively, found on one side of the sponge, and considering the fact in the two following species there can scarcely be any doubt that they are oscula.

The *skeleton* forms a rather regular network with more or less rectangular or cubic meshes. It consists chiefly of fibres running from the interior of the sponge arcuately upward and outward towards the surface, which they meet at about a right angle. Accordingly the fibres spread in a fanshaped manner both towards the surfaces and the edges of the sponge. The skeletal tissue forming the inner or middle part of the leaf-shaped sponge, is, on account of this structure, less regular than the part towards the surface. The mentioned fibres are unispicular; they are connected by spicules that are more or less at a right angle to them, and only form incomplete fibres, which accordingly run rather parallel to the surface. The first mentioned fibres pierce the surface to the length of a spicule, and consequently the surface is finely shaggy, and there is, as has been mentioned, no particular dermal skeleton. Besides by this regular skeleton, the sponge is also supported by thicker, polyspicular fibres which from the base, where their thickness is greatest, branch up through the sponge; they run as well in the middle plan of the sponge as towards the surface often crossing each other,

the fibres near one surface having another direction than those near the other surface; upon the whole their course is rather irregular. In the nodes the skeleton is united by a clear, slightly yellowish mass of spongin; in the polyspicular fibres the spicules are arranged in bundles, so that the ends of spicules lying alongside of each other, are in the same place; accordingly the spongin uniting these ends, form yellowish transversal bands across the fibres.

Spicula are oxea, sharply, almost hastately pointed, with a fairly long point; they are slightly and evenly curved or more rarely straight; a characteristic feature is that most frequently they are a little thinner in the middle than towards the ends, by which the pointing becomes more hastate. The length is rather constant ca. 0·238^{mm}, deviating a little to both sides; the thickness varies between 0·009 and 0·012^{mm}.

Locality: Of this beautiful species, so characteristic as well by its exterior as its spicules, we have one specimen, not quite complete, from station 91, 64° 44′ Lat. N., 31° 00′ Long. W., depth 1236 fathoms.

From station 36, 61° 50′ Lat. N., 56°21′ Long. W., depth 1435 fathoms, and station 73, 62°58′ Lat. N., 23°28′ Long. W., depth 486 fathoms, the collection contains some small specimens, which I dare not with certainty refer to the present species; they agree with this with regard to the form and size of the spicules, as also with regard to the main features of the skeletal structure; only the oscular canals seem to be less marked; but as these specimens, which are considerably smaller than the described one, are surely young ones, this difference may perhaps be due to this fact; therefore I think it probable that they belong to this species. — From station 89, 64°45′ Lat. N., 27°20′ Long. W., depth 310 fathoms, and station 105, 65°34′ Lat. N., 7°31′ Long. W., depth 762 fathoms are further found a few small fragments of the same skeletal structure as *parenchyma*, but the spicules have most frequently a length of ca. 0·26^{mm} and a thickness of 0·011^{mm}; thus they are a little longer than in the specimen described, but otherwise they are of the same form, and as the spicules of *parenchyma* may reach the given length, it is rather probable that they may belong to this species; the fragments, which are both basal parts, are too small to admit of a certain derternination.

3. **R. folium** n. sp.

Pl. V, Fig. 5, Pl. XI, Fig. 5.

Erect, irregularly leafshaped, the leaves may be irregularly coalesced. The dermal membrane is thin, without spicules; the ends of the fibres project making the surface finely shaggy. Oscula small, numerous, only found on one side. The skeleton forms a regular network of primary and secondary fibres; the fibres are unispicular. Particular polyspicular fibres running longitudinally, are found. Spicula are slightly curved, rather gradually tapering oxea, 0·19—0·21^{mm}.

Of this species there are in the collection six lamellæ, which, however, are more or less damaged, and they are likely to be fragments of only a couple of specimens. The sponge is formed as erect, irregularly leafshaped lamellæ, which may be irregularly coalesced reciprocally, and, judging by the material, they have been attached with a broad base. The specimens in hand have a height of ca. 100^{mm}, and the thickness of the lamellæ is in the middle up to 5^{mm}, but decreases towards the margin. The consistency is rather soft and flexible. Here and there the *surface* has irregular, slightly projecting

ridges, and is somewhat grooved; it is finely shaggy from the projecting spicules. The *dermal membrane* is thin, transparent, and without spicules; it rests on the skeleton, and is pierced by the ends of the fibres, so that no particular dermal skeleton is found. The colour (in spirit) is dirtily grayish yellow. The whole sponge is filled with sand to a high degree, what has, perhaps, taken place in the trawl. The features of this sponge with regard to *oscula* and *pores* seem to be the same as those, supposed to be found in the preceding species. Pores are found in large numbers on both sides, they have been measured to a size of from ca. 0·05—0·17^{mm}. In the skeleton oscular canals are found, somewhat smaller than in the preceding species, viz. ca. 0·5^{mm}; they are very close to each other, and go horizontally almost quite through the sponge. These oscular canals open on one side of the sponge with apertures that are seen to be rather well bounded in the skeleton; the apertures are of the same diameter as the oscular canals; but as I have seen no osculum distinctly bounded by the dermal membrane, I cannot give the real size of the oscular aperture; the whole structure implies, however, that the osculum formed by the skeleton, is not narrowed by the dermal membrane. The projecting spicules that are situated on the margin of the osculum, project partly over it, in such a way as pictured in the following species. Thus oscula are only found on one side of the sponge; to be sure similar openings may be seen here and there on the other side, but then they seem to be due to a damaging of the surface, so that this has been broken through to the oscular canal.

The *skeleton* of this species is constructed in quite the same way as that of the preceding one, and here are also found irregularly running, polyspicular longitudinal fibres; these may, on their way upward, bend out towards the sides, and thus they may go in directions very different from that of the longitudinal axis. The ends of the spicules are as usual united by spongin.

Spicula are oxea, evenly and rather gradually tapering; they are slightly curved, sometimes almost straight. The length is very constant, between 0·19 og 0·21^{mm}, but is most frequently 0·208^{mm}; also the thickness is constant, 0·013—0·014^{mm}. Shorter and finer spicules are only seen quite singly.

Locality: Station 46, 61° 32′ Lat. N., 11° 36′ Long. W., depth 720 fathoms; station 21, 58° 01′ Lat. N., 44° 45′ Long. W., depth 1330 fathoms, a very small fragment.

4. **R. ventilabrum** Frstdt.

Pl. XI, Figs. 6—7.

1887. *Reniera ventilabrum* Fristedt, Vega Exp. vetensk. Iakttag. IV 420, Pl. 24, fig. 3, Pl. 27, fig. 8.

Erect, leaf- or fan-shaped. The dermal membrane thin, without spicules; the ends of the fibres project, and so the surface is finely shaggy. Oscula numerous, small, only found on one side. The skeleton is a regular network of primary and secondary fibres; the fibres unispicular. Particular polyspicular fibres issuing from the base and running longitudinally, are found in large numbers. Spicula are evenly tapering, slightly curved oxea 0·21—0.25^{mm}.

Of this sponge we have a specimen, which is all but fanshaped, increasing in breadth upward from a base that seems to have been a short stalk. The somewhat damaged specimen has a height of ca. 18^{cm} by a greatest breath of ca. 15^{cm}, the thickness is ca. 4^{mm}. The consistency is rather fragile, only the base is considerably harder on account of the numerous longitudinal fibres. Here and there the *surface* shows slight depressions, but is otherwise even, and everywhere finely shaggy from the

projecting spicules. The *dermal membrane* is thin and without spicules; it is resting on the skeleton below, and is pierced by the ends of the fibres; no particular dermal skeleton is found. The colour (in spirit) is brown. The *pores* and *oscula* are as in the two preceding species, but may here be more distinctly observed; pores are found in large numbers on both sides, they have a size from 0·02—0·23^{mm}. Oscula are only found on one side of the sponge; they are present in large numbers, and are round openings in the skeletal net of a diameter of ca. 0·5^{mm}; of the projecting spicules of the surface those that are situated on the margin of the oscular opening, project obliquely over this opening (Pl. XI, fig. 7). The oscular opening leads into an oscular canal of the same diameter, which in a chiefly horizontal direction stretches almost throughout the sponge.

The *skeleton* is constructed as in the two preceding species, with the only difference that in the present species there are many more and more powerful longitudinal fibres giving the sponge some firmness in spite of the otherwise rather fragile consistency. The base of the sponge consists almost exclusively of these longitudinal fibres that are here more or less coalesced, and consequently the sponge is at the base hard and firm. The spicules of the fibres are as usual cemented by spongin, but not quite imbedded in spongin. From the base the fibres branch up through the sponge, growing thinner in their course, and most frequently several fibres run alongside and intercross in the thickness of the sponge. The other parts of the skeleton have unispicular fibres; only the fibres issuing in a fanshaped way from the middle towards the surface, may sometimes show a couple of spicules alongside in the outermost part.

Spicula are oxea; they are evenly pointed and slightly bent or quite straight. The length varies between 0·214—0·25^{mm}, but appears most frequently to be 0·238^{mm}, the thickness is 0·012—0·014^{mm}.

This species, as will be seen, agrees, as to the length of the spicules, with *R. parenchyma*; but there is, besides the features given in the description, also a difference to be noted in the spicules, these being thinner in *R. parenchyma* than in the present species, neither are they in the latter so hastately pointed nor are they thinner in the middle than towards the ends.

As I have had a piece of Fristedt's original specimen of *R. ventilabrum*, I have been able to decide that the form and size of the spicules, as well as the construction of the skeleton, agree completely with his species, and therefore I regard the identification as sure. The only difference is that in the original specimen the oscula and oscular canals are generally a little larger than in the described specimen. The very short description by Fristedt does not afford much hold for the determination; thus he does not mention that oscula are only found on one side. I do not quite understand his description of the skeleton; he says: »The fibres radiating from the middle of the blade, are arcuated towards the surfaces»; by this it would seem that he can only mean the fibres running from the interior of the sponge arcuately and obliquely upward and outward, and piercing the surface, but he continues: »These fibres are multi-spiculated — —». This, however, is not the case, these fibres are unispicular, only now and then may be found in their outermost part a couple of spicules alongside. On the other hand he does not at all mention the polyspicular longitudinal fibres, for it cannot well be supposed that they are meant in the first quoted sentence, as they have a quite different course.

Locality: The species has only been taken in one specimen, station 28, 65° 14′ Lat. N., 55° 42′ Long. W., depth 420 fathoms.

Geogr. distr. Fristedt has the species from Spitzbergen from a depth of 280 fathoms.

Note. This sponge shows a particular feature, which I have not been able to interpret with complete certainty. On one side, the side on which only the pores are found, a large number of excrescences of a more or less regular subglobular or almost globular form are found, sometimes coalesced, and forming irregular bodies. The size of these excrescences is from that of a pea to that of a hazel nut. They are quite regularly constructed, fibres radiating from the place of attachment in a fanshaped way to all sides and piercing the surface; and then these fibres are connected to a net by incomplete fibres parallel to the surface; thus this skeletal construction is upon quite the same principle as that of the sponge itself, and the skin is also provided with pores. These excrescences appear to be due to a worm (a Syllidian?); at all events one or more of these were found in holes in those excrescences that were cut through.

5. **R. hyalina** n. sp.

Pl. XI, Fig. 8.

Erect, leaf-shaped. The dermal membrane without spicules; the ends of the fibres projecting, and the surface consequently finely shaggy. Oscula? The skeleton a regular network of primary and secondary fibres, the fibres unispicular. Particular polyspicular longitudinal fibres are found. Spicula are sligtly curved, evenly tapering oxea, 0·268—0·31^{mm}.

Of this sponge we have only one specimen, which is, moreover, a fragment; but as it shows characteristic differences from the preceding three lamelliform *Reniera*-species, I have thought it best to describe it. I take the fragment to be the upper part of a specimen, and with regard to the form of this specimen can consequently only be said that it is a thin lamella. The specimen in hand has a height of 27^{mm}, a breadth of 48^{mm}, and a thickness of scarcely 2^{mm}. The consistency is rather firm, but the leaf is flexible. The *surface* is smooth and everywhere finely shaggy from the projecting spicules. The *dermal membrane* is thin and transparent and without spicules; it rests on the skeleton below, and is pierced by the ends of the fibres, so that no dermal skeleton is found. The colour (in spirit) is whitish, and the sponge is hyaline. As to *pores* and *oscula*, this sponge shows other features than the three preceding ones. No ocular canals are found here as those mentioned in the descriptions above; on the contrary roundish openings in the dermal membrane are found in large numbers on both sides of the sponge, varying in size between 0·023^{mm} and ca. 0·298^{mm}. All degrees of intermediate sizes are found, so that it is impossible by means of the size to distinguish between pores and oscula; perhaps the larger ones act as oscula, the smaller as pores [1]).

The *skeleton* is constructed in quite the same way as in the preceding species with the only exception that no ocular canals are found in it; the polyspicular longitudinal fibres are (in the fragment in hand) only little conspicuous. The spicules are in the skeletal net and in the polyspicular longitudinal fibres united in the common way by a clear mass of spongin.

Spicula are oxea; they are evenly pointed and slightly curved, sometimes the curving is somewhat more pronounced, and then it is also sharper; the length is 0·268—0·315^{mm}, but the greatest length

[1]) The fragment being the upper part of a spouge, it may also be possible that the oscula have not reached so far up, and that fact may be the reason why no ocular canals or distinct oscula are found.

is of no frequent occurrence; the length occurring most frequently, is 0·298^{mm}; the thickness varies from 0·01—0·014^{mm}.

Locality: Station 138, 63° 26′ Lat. N., 7° 56′ Long. W., depth 471 fathoms, one fragment. The bottom-temperature on this station was below zero, viz. —0°·6

6. **R. clavata** Levinsen?

Pl. XI, Fig. 9.

1886. *Reniera clavata* Levinsen, Dijmphna Togtets zool. bot. Udbytte 351, 10, Tab. XXIX, fig. 5, Tab. XXX, fig. 3.

There are in the collection two small, lengthily pyriform specimens, one having a length of 27^{mm}, the other of 19^{mm}. With regard to their appearance, outer structure, and skeleton they seem to agree very well with *R. clavata*; I am, however, inclined to regard the determination as doubtful, because the spicules have an average length of 0·29^{mm}, and a thickness of 0·014—0·015^{mm}, while in *clavata* the length of the spicules is most frequently ca. 0·23^{mm}, and rarely reaches 0·26^{mm}; the thickness is the same. Otherwise the skeleton is of the same structure, being regularly unispicular, and consisting of primary fibres, radiating arcuately upward and outward towards the surface, and connected by transverse fibres; besides some thicker, polyspicular fibres are found branching from the stalk up into the sponge.

Locality: East-Greenland, 72° 40′ Lat. N., ca. 20° Long. W., depth 100 fathoms, two specimens (The East-Greenland expedition 1891—92).

Geogr. distr. *Reniera clavata* is known in one specimen from the Kara Sea from a depth of 74 fathoms.

Vanhöffen (Grönl. Exp. d. Gesellsch. für Erdkunde zu Berlin, II, 1. 1897, 248) enumerates *R. clavata* from Karajakfjord, North-Greenland. I have had occasion to examine the spicules of the species; they have an average length of 0·22^{mm}, and the thickness is 0·012—0·014^{mm}; thus the spicules are a little thinner than in the original; the skeleton is a unispicular network. Without a closer examination it is impossible to decide whether the species is really *clavata*, but it seems rather probable. Vanhöffen thinks *R. clavata* and *R. simplex* Arm. Hans. to be identical; this, however, is not the case, as will appear later under *R. voeringii mihi* = *R. simplex* Arm. Hans.

7. **R. cinerea** Grant.

Pl. XI, Fig. 10.

1827. *Spongia cinerea* Grant, Edinb. New Philos. Journ. II, 204.
1842. *Halichondria cinerea* Johnston, Brit. Spong. and Lithophytes 110, Pl. IV, fig. 4.
1866. *Isodictya cinerea* Bowerbank, Mon. Brit. Spongiadæ II, 241, 1, III, Pl. XLVIII, figs. 1—5.
1870. *Reniera cinerea* O. Schmidt, Spongienf. Atlant. Gebiet. 77.
1885. — — Fristedt, Kgl. Svensk. Vet. Akad. Handl. B. 21, Nr. 6, 26.
1887. — — Fristedt, Vega Exp. vetensk. Iakttag. IV, 419.
1887. — — Ridley and Dendy, Challeng. Report, Monaxonida, Vol. XX, 15.

Of this species we have some dried specimens, all growing on a branched *Lithothamnion*; they are cushion-shaped, more or less roundish, and in their dried state of a light yellow colour, a few of

the specimens have a somewhat darker colour. The largest specimen has a greatest extent of ca. 20mm. The spicules are somewhat varying in length, the average length being ca. 0·14mm; they are also rather varying in thickness, the average thickness may be given as 0·006mm, but it may be somewhat greater, and it may go down to 0·003mm.

Locality: All the specimens are from Julianehaab (inspector Ryberg). From the Swedish Riksmuseum we have received a specimen growing on a Balanoid, taken on the expedition of Ingegerd and Gladan 1871 in the Davis Strait 63° 47′ Lat. N., 52° 26′ Long. W., depth 35 fathoms.

Geogr. distr. This species seems to be almost cosmopolitan having been found between 80° and 10° Lat. N.; it is, however, not to be forgotten that the determinations cannot always be regarded as reliable. Besides in the Davis Strait it has been taken at Spitzbergen, depth about 12 fathoms (Fristedt l. c.); it occurs further at the coast of Bohuslän (Fristedt l. c.); it is common on the English coasts and on the French side of the English Channel; by the Challenger Expedition it is mentioned from the Philippine Islands, on a depth of 95 fathoms; finally it is mentioned from British Colombia (Lambe: Sponges from the Pacific Coast of Canada. Transact. Roy. Soc. Canada XI, 1893, sect. IV, 26); this determination, however, is doubtful, as the length of the spicules is given to be 0·111—0·098mm.

8. **R. tubulosa** Frstdt.

Pl. II, Fig. 5, Pl. XI, Fig. 11 a, b, c, Fig. 12.

1887. *Reniera tubulosa* Fristedt, Vega Exp. vetensk. Iakttag. IV, 419, Pl. 24, fig. 1.

The sponge is typically formed as rather thick incrustations, crusts, or cushions, provided with more or fewer, higher or lower, conical oscular tubes; but the form may be quite irregular. The dermal membrane is thin, without spicules, the ends of the fibres project, and therefore the surface is finely shaggy. Oscula are found on the summit of the oscular cones. The skeleton consists of a somewhat irregular network of polyspicular fibres running towards the surface, and transverse spicules standing singly. Spicula are slender, somewhat curved oxea with a tapering of varying length, and they may be rounded; the length is 0·17—0·208mm.

The specimens in hand of this species form more or less irregular incrustations on *Alcyonidium gelatinosum*, shells, Balanoids, and Sabella-tubes; they are provided, at all events the larger specimens, with one or several, rather regular, conical tubes, which, however, are often very low. The largest specimens have a greatest extent of ca. 60mm, and the greatest height of the tubes is ca. 18mm. In one of the specimens on the other hand, which is of a similar size, the tubes have only a height of ca. 6mm. When several tubes are found, there may be great difference with regard to their distance from each other, and they are more or less steep in proportion to this distance being greater or smaller; thus in a specimen with a greatest extent of 33mm, we find seven tubes, and the distance between them is 5—9mm, from one osculum to the other, but generally the distance is greater. The consistency sometimes is rather soft, sometimes more firm. The colour (in spirit) is light grayish-yellow, and the surface has the netlike appearance, characteristic in so many *Reniera*-species, on account of the many small, close-set, round subdermal cavities. The *surface* is finely shaggy from the projecting spicules. The *dermal membrane* is thin, without spicules; no special dermal skeleton is found, but the membrane is supported by the skeleton below, and pierced by the ends of the fibres. The *pores* are small, most

frequently oval openings in the dermal membrane; they are measured to a size of 0·029—0·09^{mm}. *Oscula* are found on the top of the cones, they have a diameter of 2—4^{mm}; each osculum leads into a shorter or longer oscular canal, on the inside of which the excurrent canals open, and which passes below into wide canals. From the oscular opening and downward in the tube the openings of the canals increase in size.

The *skeleton* consists of a network, less regular than in the *Reniera*-species with a typical unispicular skeleton. Polyspicular fibres consisting of about 4—6 spicules alongside run more or less perpendicularly on the surface. These fibres (the primary ones) run in the oscular cones arcuately upward and outward towards the surface which they pierce. The distance between these fibres has about the length of one spicule; the fibres are connected to a rather irregular network by spicules being tolerably perpendicular on the fibres, and consequently chiefly parallel to the surface, but these spicules are most frequently found single, and do not form, or form only slightly marked fibres; they may, however, here and there form coherent, comparatively thick fibres. In the polyspicular fibres the spicules are not lying in such a way as to have their ends in the same place of the fibre, that is to say, they are not arranged in a bundle-like manner. Spongin is only present in a very slight degree, and scarcely to be distinguished.

Spicula are oxea; they are rather slender, and somewhat curved in the middle; a characteristic feature of the species is that the ends are very much varying in form, from long tapering, often with the point marked off, to quite shortly pointed, and even quite rounded; in a few specimens spicules with rounded ends are frequent. The length varies between 0·17—0·208^{mm}; a few still longer spicules may be found; the thickness is also somewhat different, from 0·005—0·008^{mm}. Shorter and finer needles may be found, but in comparatively small numbers; these finer needles are very long tapering, but all transitions to the other needles may be found, and consequently they may be taken to be stages of growth; during the growth the ends will thus increase comparatively more in thickness than the middle part of the needle so that the fully developed spicule becomes less long tapering. Thus this species is rather well characterized by its thin, most frequently rather sharply curved needles, which vary very much with regard to their pointing, and whose ends often show a rounding or a tendency to such a one.

I have had one of Fristedt's original specimens for comparison, and therefore I have been able with certainty to identify the species. Fristedt also gives the size of his largest specimen to be 60^{mm}, but the largest tube of his specimen was 30^{mm} high, and the osculum had a diameter of 6^{mm}. Fristedt says that the spicules appear in two thicknesses in the proportion 1 : 2. The fact, according to my examination, is that the spicules vary evenly from ca. 0·005—0·008^{mm}, and besides some finer spicules are found.

Locality: This species seems to be rather common, and has been taken at West-Greenland: Julianehaab (inspector Ryberg), Holstensborg (Bergendal), Egedesminde (Traustedt), and by the Ingolf expedition at station 33, 67° 57′ Lat. N., 55° 30′ Long. W., depth 35 fathoms; further it has been taken at Iceland: Ofjord, depth 11 fathoms (H. Jónsson), Önundarfjord, depth 10 fathoms (the author), Eydisfjord, depth 14 fathoms (Hörring); finally it has been taken at the Faröe Islands: to the east of Nolsö, depth 30 fathoms, and at Klaksvig, depth 11 fathoms (Th. Mortensen).

Geogr. distr. Fristedt mentions the species from Spitzbergen, on a depth of 15—25 fathoms. The species seems to be found exclusively in more shallow water.

We have a fragment, a tube of a length of 11^{mm} and a breadth of 4^{mm}, from Iceland, Breidasound, depth 30 fathoms (H. Jónsson). It has a polyspicular skeleton constructed as that of *tubulosa*, and the spicules have a similar form, most frequently with a more or less sharp curve, but they are somewhat smaller, the length is ca. 0·15^{mm}, and the average thickness 0·0057^{mm}.

Note. *Reniera tubulosa* Arm. Hans. The Norwegian North-Atlantic Expedition XIII, 4, 1885, will have to be dropped, as it is identical with *Oceanapia robusta* Bow. (see under this species).

9. **R. laxa** n. sp.

Pl. II, Fig. 6, Pl. XI, Fig. 13.

The form is the typical one: from an extended, more or less crust-shaped base more or fewer cylindric or conical, sometimes somewhat compressed oscular tubes rise, which may now and then be coalesced. The dermal membrane is thin, without spicules, the ends of the fibres project, and so the surface is finely shaggy. Oscula are found on the top of the oscular cones. The skeleton is a somewhat irregular network of polyspicular fibres running towards the surface, and single transverse spicules, connecting the former. Spicula are evenly tapering, slightly curved oxea of a length from 0·18—0·208^{mm}.

The specimens in hand of this species grow on Bryozoa, Balanoids, etc. More or fewer cylindric or fusiform tubes rise from the base; they are rather low, and may be more or less coalesced, and sometimes they are a little compressed. The largest specimen has a length of 60^{mm}, and a greatest height of 30^{mm}. The smallest specimen, which is presumably quite young, is of an almost semiglobular form with an osculum on the top of it. It has at the base a diameter of 12^{mm}, and a height of 8^{mm}; its oscular canal is very short, and leads almost directly into the excurrent canals. The consistency is very loose and soft, and the sponge is therefore very fragile and little coherent. The colour (in spirit) is whitish or slightly yellowish, and the surface has the common netlike appearance. The *surface* is finely shaggy from the projecting spicules. The *dermal membrane* is thin, transparent, and without spicules or special dermal skeleton; it rests on the skeleton below, and is pierced by the ends of the fibres. The *pores* are found in the dermal membrane, and especially on the tubes they are exceedingly close-set, so that the skin here becomes a sieve; in the other parts of the surface of the sponge they seem to be much more spread; they are somewhat varying in size, and are measured to 0·017—0·089^{mm}. *Oscula* are found on the summit of the tubes, and have a diameter of ca. 2—4^{mm}; they have a rather sharp edge; from the osculum an oscular canal of the same width leads down through the tube, and the inside of the tube is in the general way provided with openings for the excurrent canals; below it passes into the system of canals.

The *skeleton* is chiefly constructed as in *tubulosa*. Polyspicular fibres run towards the surface and in the oscular tubes upward and arcuately towards the surface; they are somewhat varying in thickness and in the number of spicules, but the number seems most frequently to be about 3—6 spicules alongside. The distance between these primary fibres is generally of the length of a spicule; the spicules running perpendicularly on the former, form no distinct fibres, and they are most frequently

single, only rarely a few alongside. The whole structure forms a somewhat irregular reticular work with more or less quadratic meshes. The ends of the spicules are united by a not copious mass of spongin, exceedingly clear and therefore difficult to observe.

Spicula are oxea; they are evenly tapering, and very evenly and slightly curved; they vary in length from 0·18—0·205^{mm}, the thickness is oftenest 0·011^{mm}, but may decrease to 0·008^{mm}; shorter and much finer spicules occur in small numbers, and are by transitional sizes shown to be developmental forms.

This species, by its skeletal structure, is nearly allied to the preceding one, but is distinguished from this latter as well by its looser consistency as by its thicker, evenly and slightly curved needles. A couple of specimens from the Davis Strait have a still looser construction than the other ones.

Locality: Station 127, north of Iceland, 66°33′ Lat. N., 20°05′ Long. W., depth 44 fathoms; Iceland (Jap. Steenstrup); the Davis Strait, depth ca. 100 fathoms (Holm); nine specimens or fragments in all.

10. **R. heterofibrosa** n. sp.

Pl. II, Fig. 8, Pl. XI, Fig. 14.

The form is the typical one, an irregular cushion with a number of low, very little projecting oscular cones. The dermal membrane thin, without spicules, the ends of the fibres projecting, so that the surface is finely shaggy. Oscula are found on the summit of the oscular tubes. The skeleton is a somewhat irregular network of mostly polyspicular fibres running towards the surface, and these fibres are connected by transverse spicules, single or in bundles. In the deeper parts of the sponge the skeleton is more irregular. The spicules evenly curved oxea of a length of 0·16—0·178^{mm}.

Of this species we have one specimen, forming an irregular, lengthy cushion, which rises into a number of low oscular tubes (in the specimen 8). The length of the specimen is 29^{mm}, and the greatest height 15^{mm}. The colour (in spirit) is yellowish brown. The *surface* is finely shaggy from the projecting spicules. The *dermal membrane* is thin, without spicules, and pierced by the ends of the fibres. The circular *oscula* which are found on the top of the low cones, have a diameter of 1—2^{mm}. The *pores* are oval or round openings in the dermal membrane, they have a diameter of 0·017—0·06^{mm}. The oscula lead into oscular canals of the same width, on the inside of which the excurrent canals open, and which pass below into wide canals.

The *skeleton* consists of a somewhat irregular network of fibres, the structure being mostly as in *tubulosa* and *laxa*. Most of the fibres running towards the surface, are polyspicular; they vary somewhat with regard to the number of spicules of which they are composed, and upon the whole they appear to be thickest and consist of most spicules in the deeper and older parts of the sponge, while towards the surface they are thinner, and often consist of only a single series of spicules. The spicules that are perpendicular on these fibres, do not form, or form only to a small degree coherent fibres; most frequently they are single, but sometimes some may be put together in bundles. In the deeper and older parts of the sponge where the fibres are thicker, the skeleton is more irregular, and the difference between primary and secondary fibres is here effaced, so that the skeleton becomes an irregular net of fibres with a rather large number of spicules alongside. The ends of the spicules are

united by a not copious mass of spongin. Outside the skeleton some finer and shorter needles are found in the tissue.

Spicula are oxea; most frequently they are evenly curved; more rarely the curve may be sharp; the length varies between 0·16—0·178^{mm}, the thickness varies comparatively much, from 0·005—0·010^{mm}. Shorter and finer needles are found in small numbers.

Locality: There is in the collection only one specimen of the species from Seydisfjord in Iceland (H. Jónsson), from a depth of 7—8 fathoms.

11. **R. calamus** n. sp.

Pl. V, Figs. 1—2, Pl. XI, Fig. 15 a, b, Fig. 16.

Erect, tubular, or formed like a thick-walled cylinder. The dermal membrane thin, without spicules; the surface finely shaggy? The skeleton consists of a rather regular network of primary fibres running towards the surface, and mostly single transverse spicules, placed irregularly, connecting the fibres. Spicula oxea, dividing into two different groups of sizes: the larger ones evenly tapering and evenly curved, 0·235—0·268^{mm}; the smaller ones more bent, 0·107 - 0·15^{mm}.

Of this species we have one specimen, formed completely like a cylindric tube. The specimen, however, has been broken in the middle, and both ends are damaged or broken, so that it cannot be decided, in what way the sponge has been attached, or how the upper end has been formed; on the other hand, the sponge, no doubt, has been erect, and the form has probably been as a cylinder with a simply rounded upper end. The length of the specimen in its present state is 55^{mm}, and the breadth 20^{mm}. The colour (in spirit) is light gray-brown. The consistency is comparatively hard and firm. The *surface*, as in most *Reniera*-species, seems to be finely shaggy from the projecting ends of the primary fibres; I have not been able, however, with certainty to decide this feature, as the dermal membrane has only been kept in few places. When the sponge was taken up, it was filled, to an exceedingly high degree, with mud and extraneous sponge spicules[1]). The *dermal membrane*, where it is kept, is thin, transparent, and without spicules. The *pores* are found in the dermal membrane as round or oval openings; they have been measured to a size of from 0·017^{mm} to about 0·3^{mm}, most frequently they are about 0·05^{mm}. Through the middle of the sponge a cylindric canal runs, of equal width in its whole length, which canal must be regarded as an oscular canal; but the upper end being damaged the structure of the mouth of the tube, the osculum, cannot be decided. The canal has a width of 5·5^{mm}, and the thickness of the wall is between 7 and 8^{mm}. The excurrent canals open into the oscular canal; their course through the wall of the sponge is obliquely upward and inward; the openings are varying in size; the largest ones are ca. 1·5^{mm}. The larger openings lie here and there in transverse or oblique series; but otherwise no distinct arrangement is found. From these openings the canals branch off into the wall of the sponge, and end in the many small subdermal cavities, which are found close to each other on the outside of the sponge.

The *skeleton*. From the inside of the oscular tube, fibres run very regularly arcuately upward and outward towards the surface on which they are about perpendicular. These primary fibres are polyspicular, and consist most frequently of 3—6 spicules, and sometimes of still more, alongside.

[1]) This filling, however, had probably taken place in the trawl.

They are on an average placed at a distance of the length of one spicule from each other. They are connected by spicules placed more or less perpendicularly on the fibres, and at such a distance from each other, that the whole thing forms a reticular work with more or less quadratic, often rather irregular meshes. The spicules connecting the primary fibres, are far from being arranged so regularly as those fibres; they form no coherent fibres, and are most frequently found single, but several may also be found together in bundles; far from being always perpendicular on the primary fibres, they are often placed in an oblique direction with regard to those fibres. Spongin has not been observed, and does not appear to be present.

Spicula are Oxea, found in two different sizes, rather distinctly separated; the larger ones are comparatively long oxea; they are evenly, but not long tapering, and generally evenly, but sometimes more sharply, curved, more rarely straight; the length varies between 0·235—0·268^{mm}, or a little longer; a few shorter ones may be found, and they may go down so far in size as to form a transition to the smaller ones. The thickness is only little varying, most frequently it is 0·011^{mm}. The small spicules have a length of 0·107—ca. 0·15^{mm}, and a thickness of ca. 0·007^{mm}; they are comparatively more curved than the large ones, and also sometimes sharply bent. We may, as mentioned, also find spicules occupying, with regard to size, a position between the larger and the smaller ones; but the small spicules cannot be taken to be developmental forms of the large ones, for as such forms the longer, finer needles occurring in small numbers, must be taken. The small spicules are found in far smaller numbers than the large ones, and they do not appear to be restricted to certain parts of the sponge.

This interesting species seems to be allied to *R. subglobosa* Ridley and Dendy (Challeng. Report, Monaxonida, XX, 17, Pl. I, figs. 3, 3 a, Pl. II, fig. 17), but among other things it is distinguished from this species by the spicules, which are in the latter one 0·3^{mm} long. Neither is there any mentioning of the spicules being of two sizes, and the species is stated to be possessed of a particular dermal skeleton.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms, a small fragment; station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms, one specimen. On this latter station the species was taken together with a great many other sponges, especially Tetractinellids.

Besides the mentioned species we have further some fragments of *Reniera*-species, which it has not been possible to determine:

Reniera sp. a.

Pl. XI, Fig. 17.

From Scoresby Sound, from a depth between 10 and 60 fathoms, we have a little specimen, which seems to have been lengthily pyriform; its length is 25^{mm}. The skeleton consists of unispicular fibres. The spicules have a length of 0·20—0·23^{mm}, and oftenest a thickness of 0·010^{mm}. Thus the species, with regard to the skeleton and the spicules, recalls *R. parenchyma*, the spicules, however, being on the whole a little smaller.

With this species may perhaps be classed some more or less cylindrical, partly hollow fragments

from Talknafjord in Iceland, of a length of up to 37^{mm}, and a thickness of ca. 10^{mm}; their skeleton is likewise unispicular, and the spicules are of the same form, but a little shorter, not exceeding 0·20^{mm}, and most frequently a little shorter; they vary a little more in thickness, increasing to 0·0128^{mm}; otherwise they are of the same form, and are also most frequently slightly curved in the middle.

Reniera sp. b.

Pl. XII, fig. 1.

From station 3, 63° 35′ Lat. N., 10° 24′ Long. W., depth 272 fathoms, we have a very small fragment; it is, however, sufficient to show that it has belonged to a flat sponge; the skeleton is regular, formed by unispicular fibres, and the surface is finely shaggy. In the fragment are further seen a few polyspicular longitudinal fibres. According to this the sponge must have had a structure resembling that of the above described species *parenchyma*, *folium*, and *ventilabrum*. The spicules are characteristic by their size, being of a length of 0·3—0·327^{mm}, and a thickness of ca. 0·027^{mm}; they are regularly and evenly tapering, and slightly curved or straight.

Reniera sp. c.

Pl. XII, fig. 2.

From Hekla Harbour we have some fragments brought home by the East Greenland expedition 1891—92; they have a unispicular skeleton, and may, as to their exterior, remind of *R. clavata*, but the spicules are quite different, being very slender and longer tapering; their length is 0·208—0·238^{mm}, but the thickness only 0·008^{mm}. This species might also, with regard to its form and skeletal structure, recall the *R. simplex*, established by Armauer Hansen in the Norwegian North-Atlantic Expedition, which cannot, however, be seen from the description; however, there is the difference that the spicules of the species of Armauer Hansen are somewhat thicker, 0·010^{mm}, and their ends are more stubby.

As I have had before me one of the original specimens of Armauer Hansen, I shall give a short description of the species. It will, however, have to get another name, as Bowerbank in 1866 established a *Reniera (Isodictya) simplex*; I accordingly alter the name to *Voeringii*.

12. **R. Voeringii** Ldbk.

Pl. XII, Fig. 3.

1885. *Reniera simplex* Armauer Hansen (non Bow.), The Norwegian North-Atlantic Expedition XIII, 3, Tab. 6, Fig. 1.

Lengthily pyriform, longstalked. The dermal membrane thin, without spicules; the ends of the fibres projecting, and the surface accordingly finely shaggy. The skeleton an irregular network of primary and secondary fibres. The fibres unispicular. Particular polyspicular longitudinal fibres issuing from the stalk, are present. The spicules are slender, rather sharply curved oxea of a length of 0·22—0·238^{mm}.

The sponge, as pictured l. c., is lengthily pyriform with a rather long stalk; as the upper end has been broken off, it cannot be seen, however, how long the sponge has been, neither can the structure of the upper end be decided. Through the middle of the thick part a cylindric oscular canal runs, which has most likely ended in an osculum on the top. The length of the specimen is ca. 55^{mm},

of which the stalk is 30mm, the greatest breadth is 10mm, and the diameter of the oscular canal is a few millimetres. The consistency is soft; the *surface* is finely shaggy from the projecting spicules, and the colour (in spirit) is light grayish yellow. The *dermal membrane* is thin, transparent, without spicules, and is pierced by the ends of the fibres.

The *skeleton* is unispicular (not formed by bundles of needles, as stated by Armauer Hansen), and consists of primary fibres running regularly upward and arcuately outward towards the surface, and of spicules placed at right angles to these fibres, but forming themselves no distinct fibres; besides some thicker, polyspicular fibres run from the stalk up through the sponge. In the nodes the spicules are united by a clear mass of spongin.

Spicula are slender oxea, rather sharply curved in the middle, of a length of 0·22—0·238mm, and a thickness of 0·009—0·010mm; they are of equal thickness through their whole length, and have a rather short, but very sharp point.

This species, as will be seen, has spicules of a similar size as those in *R. parenchyma*; they may, however, easily be distinguished from the spicules of this latter species, partly by their being more sharply curved, and especially by their ends, the point being bounded by curved lines, while in *parenchyma* it is longer and bounded by straight lines. The species is allied to *clavata*, but may be distinguished from this species by its thinner and more curved spicules.

Locality: The species was taken by the Norwegian North-Atlantic Expedition on station 255, Vestfjord, 68° 12′ Lat. N., 15° 40′ Long. W., depth 341 fathoms; two specimens.

Remarks: This species is the only *Reniera*-species taken by the Norwegian North-Atlantic Expedition, *oblonga* and *velamentosa*, as has been shown above, being *Halichondria*-species, while *tubulosa*, *membranacea*, *nivea*, and *inflata* belong in quite other places, and the rest are Axinellids.

Note. Vanhöffen, in the work quoted before, p. 248, enumerates a *Pachychalina oblonga* Arm. Hans., which, to judge by a preparation sent to me, is no *Pachychalina*, nor *Halichondria oblonga* Arm. Hans., but a *Reniera*-species; it is impossible to determine the species after the preparation in hand, as the skeletal structure cannot be seen. To judge by the spicules the species might possibly be *R. ventilabrum*, but the outer form is by Vanhöffen stated to be quite different from that of this species.

The *Reniera*-species described in the foregoing, divide into two groups: forms with unispicular skeleton, and forms with polyspicular skeleton. All the forms with the regular unispicular skeleton, as far as they are erect forms, have, besides this regular skeleton, a greater or smaller number of polyspicular fibres issuing from the base, where they are thickest and closely gathered, and from where they branch up through the sponge in a more or less regular manner, and without any decided relation to the other skeleton. This reminds of the fact described by Topsent by the establishing of the genus *Cladocroce* with the species *fibrosa* (Résultats des campagnes scientifiques du Prince de Monaco, Fasc. II, 72, Pl. III, Fig. 1—2), and the other description of the structure of this species seems also to agree with the structure of the lamelliform species described in the present work. Topsent,

in the place quoted, also says that the genus is most closely allied to *Reniera*, but later he seems to have changed his opinion, in so far as he in 1894 (Une réforme dans la classific. des Halichondrina, Mém. de la Soc. Zool. de Fr. VII, 9) places it in the subfamily *Gelliodinæ*. I must suppose, however, that *Cladocroce fibrosa* is closely allied to the lamelliform *Reniera*-species treated of here, and I think it doubtful whether this genus can be kept apart from *Reniera*. *Cladocroce fibrosa* has spicules of a length of 0·6^{mm}, which is a considerably greater length than is reached by the spicules of the species described here, but in this respect it is well to notice that in the R. sp. b. mentioned before, the spicules reach a length of 0·327^{mm}.

Metschnikowia Grimm.

The form varying, as thinner or thicker crusts, or erect, more or less regularly cylindric or irregularly lobate. The skeleton forms a similar network as that in Reniera. The ends of the spicules are united by a most frequently very slight mass of spongin. Spicula are oxea or strongyla, everywhere or for the greater part set with small spines.

1. **M. spinispiculum** Cart.

Pl. XII, Fig. 4 a—b.

1876. *Isodictya spinispiculum* Carter, Descript. and Figures of Deep-Sea Sponges etc. on board «Porcupine», Ann. Mag. of Nat. Hist. Ser. IV, Vol. XVIII, 310, Pl. XV, fig. 42.

The form irregularly roundish or lobate, sometimes erect and irregularly cylindric. The surface with small, projecting prominences, caused by the skeleton. The skeleton consists of a chiefly unispicular network of triangular or tetrahedral meshes. Spicula spined strongyla with curved ends, the length 0·208—0·238^{mm}.

Of this species there are in the collection five specimens, none of which are attached, but they appear all to have been broken off. With regard to the three specimens the form is erect and more or less irregularly cylindric; one shows a beginning division into two branches; the fourth specimen forms a little oblong cushion, and the fifth is irregularly lobate. The largest of the erect specimens has a height of 22^{mm}, and the irregular lobate specimen has a greatest extent of 23^{mm}. The consistency is rather firm. The *surface* shows, especially under a magnifying glass, small prominences, but is not shaggy or provided with projecting spicules. The colour (in spirit) is whitish yellow. The *dermal membrane* is thin and transparent, and no particular dermal skeleton is found, but the membrane is resting on the skeleton below; the nodes of this skeleton projecting a little, small prominences are formed. The small, round subdermal cavities shine through the skin. The *pores* are round, and have been measured of sizes from 0·098—0·119^{mm}; the greater part is situated in the meshes made by the skeleton below. With regard to *oscula*, round openings, to be sure, are found here and there; but these openings, at all events the greater part of them, are scarcely anything else than subdermal cavities, over which the skin has been torn off; on the other hand, openings of a diameter of ca. 1^{mm} are found in a few of the specimens, leading into a cavity which continues some way just below the skin and only covered by it; from this cavity canals go down into the sponge.

The *skeleton* consists of a chiefly unispicular network the meshes of which are triangular, or, to put it more exactly, tetrahedral; therefore there is no question of primary or secondary fibres. The form of the ends of the spicules makes them to fit well into each other. In the nodes, in which, according to the construction of the skeleton of tetrahedral meshes, a greater number of spicules meet, these spicules are united by a very small amount of exceedingly clear spongin which is difficult to observe.

Spicula are spined strongyla (acanthostrongyla) of a peculiar form; they are of equal thickness in their whole length, and have rounded ends; the ends are bent rather suddenly to a more or less high degree; they may both be bent in one direction, or in opposite directions in the same plan, and they may finally be bent in different plans. Sometimes the bending is minimal. They are set with small, scattered spines, only the ends are smooth. The length varies between 0·208—0·238^{mm}, which agrees with the measure given by Carter, l. c., viz. about $^{50}/_{6000}$ inch = 0·211^{mm}. The thickness varies between 0·010—0·012^{mm}. Finer spicules, developmental forms, occur in small numbers; these spicules are of interest as furnishing a distinct proof that the spicules are begun in full length; the fact is that the finest are of the same length as the fully developed ones, so that a growth only takes places as to thickness; the finest are of quite the same form as the fully developed ones, but are quite smooth, while the somewhat thicker ones begin to get quite minute spines; accordingly the spines appear first during the growth.

To get a clear understanding of the growth of the spicules, it is of importance here to notice that the spicules of this species, which during the growth only increase in length to a very slight degree, are strongyla; a laying on of new parts parallel to the surface of the spicule will only lengthen such a spicule to an almost imperceptible degree. The fact vill be quite different when the question is of long tapering spicules as oxea; in these spicules a laying on of parallel layers will lengthen the spicule considerably, so that a spicule growing to the double thickness, may also reach about the double length. The annexed sketch illustrates as an example the difference in the increasing of length in strongyla and oxea. Developmental forms of oxea, therefore, are always more or less shorter than the fully developed needles. When, what is often the case, the ends of the spicule during the development become more shortly tapering, than they are in the younger forms, the increasing of length is also comparatively smaller.

Locality: We have five specimens of this characteristic species; east of Iceland, 64° 07′ Lat. N., 11° 41′ Long. W., depth 168 fathoms, two specimens (Wandel); Ingolf, the Denmark Strait, station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms, three specimens.

Geogr. distr. Of this species only one specimen had been taken before by the Porcupine-expedition 1870, station 25, 37° 11′ Lat. N., 9° 07′ Long. W., close to the north of cape St. Vincent, depth 374 fathoms (Carter, l. c.). According to Topsent (Éponges nouvelles des Azores. Mém. de la Soc. Zool. XI, 1898, 226), it was taken during the cruise of Princesse-Alice 1895—97 at the Azores.

The genus *Metschnikowia* now, after the addition of this interesting species, counts, as far as I am able to see, five species in all; of the other four species the three, *tuberculata* Grimm, *intermedia*

Grimm, and *flava* Grimm, have only been found in the Caspian Sea (Dybowski: Studien über Spong. des russ. Reiches, Mém. de l'Acad. imp. des Sciences de St. Pétersb. Sér. 7, Tom. 27, Nr. 6); the fourth, *M. Filholi* Topsent (Résultats des camp. scient. du Prince de Monaco, Fasc. II, 70, Pl. IV, Fig. 7, Pl. IX Fig. 6) is from the Azores.

Petrosia Vosmaer.

(Schmidtia Balsamo Crivelli.)

The form varying. The consistency very hard, almost stony. Generally several, sometimes numerous, circular, sharply defined oscula. The skeleton consisting of a close reticulation of thick fibres or more or less diffuse. Spongin (sometimes) present to a small degree. Spicula oxea or strongyla, most frequently short and thick.

P. crassa Cart.

Pl. IV, Figs. 7—9. Pl. XII, Fig. 5 a, b, c.

1876. *Reniera crassa* Carter, Descript. and Figures of Deep-Sea Sponges etc. on board Porcupine, Ann. Mag. of Nat. Hist. Ser. IV, Vol. XVIII, 132.

The form more or less irregularly roundish, tuberous or lobate. The skin with a dense reticulation of spiculo-fibres. Oscula scattered, circular with a sharp edge. The skeleton consists of a more or less regular network of polyspicular fibres, and besides some scattered spicules. Spongin present to a small degree. Spicula oxea, dividing into two rather well separated groups of size: the length of the larger 0·2—0·35^{mm}, of the smaller ca. 0·08—0·17^{mm}. Further quite short oxea, strongyla, and other forms are found.

This sponge is of an irregularly tuberous or lobate form. Most frequently it is attached to a small stone, from which it spreads, sometimes more in height, sometimes more to the sides, assuming a tuberous or lobate form. The smaller specimens are more roundish, the larger more irregularly lobate. The largest specimens reach a greatest extent of 13^{cm}. The consistency, as in the genus *Petrosia* upon the whole, is hard, almost stony, the tissue, however, being brittle. The colour (in spirit) is whitish or more or less yellowish. The *surface* is smooth. The *skin* scales off easily, and is provided with a close reticulation of spicules, in some places closer than in others. *Oscula* are, in the specimens in hand, found to a number of from two to five. They are very much varying in size, of a diameter of 2—11^{mm}; they are always almost circular, and the skin surrounds them with a sharp edge. Otherwise their structure is very characteristic. They may be deeper or more flattened, and the excurrent canals open into them very close to each other, the openings being rather regularly arranged in a ring-like manner. The arrangement of the system of canals is connected with this feature, as the canals appear to be arranged into two systems, as mentioned by Vosmaer (Porifera 132, Tab. VI, Fig. 9). To be sure, in specimens cut through, the arrangement is not seen so distinctly prominent as in the figure of Vosmaer; but this may probably be owing to the fact that the arrangement is somewhat modified by the irregular form of the present species. It may, however, be seen rather distinctly (Pl. IV, fig. 9) that the excurrent canals meet in the osculum in a radiate way; a system of canals at right angles to the latter, is, on the contrary, only indistinctly seen. Immediately below the skin a great many canals are

seen, which shine through as winding and branching lines, and which I take to belong to the incurrent system. Vosmaer, l. c., takes the regular arrangement of the canals to be characteristic of the genus, which is also rather probable, but, strange to tell, it has not been mentioned by the later authors.

This species not unfrequently shows a tendency to separate into concentric layers, not only the skin, but also a series of layers inside the skin scaling off easily; this feature, perhaps, may be connected with the arrangement of the canals.

The *pores* are found in the meshes of the dermal reticulation, and have a size of 0·08—0·17^{mm}.

The *skeleton* consists of a more or less regular network of fibres; the fibres appear chiefly to have two directions, running towards the surface, and parallel to the surface. Generally the fibres running parallel to the surface, are the more distinct ones. The fibres contain rather many spicules, and have a thickness of about 0·1^{mm}; the meshes may be much varying in size, but most frequently they were measured to a size of 0·45^{mm}. Outside of the fibres spicules occur scattered in every direction, but these spicules are all shorter and finer than those forming the fibres. Spongin is present, but only to a very small amount; it is only seen here and there uniting the ends of the spicules. As before mentioned, a close reticulation of meshes is found in the skin, the meshes of which are on an average considerably smaller than those of the other parts of the skeleton; outside of this network are moreover found scattered smaller and finer spicules of the same size as those occurring in the sponge outside of the fibres.

Spicula are oxea; they are evenly, sometimes somewhat irregularly curved, of equal thickness through their whole length, and rather abruptly pointed. Their length varies between 0·08—0·35^{mm}. Although all transitions between these sizes may be found, the intermediate sizes are so scarce that the spicules may be said to divide into two groups that are also of different occurrence in the sponge. The large spicules have a length of about 0·2—0·35^{mm}, but by far the most frequent size is 0·3^{mm}; the thickness is 0·017^{mm}; these spicules form the skeletal fibres and the dermal reticulation. The small spicules on the other hand, occur scattered in the skin, outside of the reticulation proper, as well as throughout the sponge scattered in the tissue outside the fibres; they reach a length of up to 0·17^{mm}, and they are comparatively finer than the large ones, of an average thickness of 0·007^{mm}, but the two groups, as has been mentioned, are not quite sharply separated. Besides these spicules not a small number of small, short and thick, curved oxea and strongyla may be found, and also other different forms (Pl. VII, fig. 5 c).

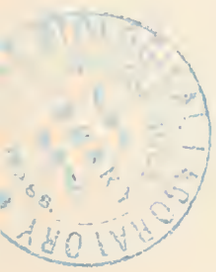
This species seems to be closely allied to *P. dura* Nardo, but it is distinguished from the latter species by its longer spicules (the spicules of a specimen of *P. dura* in the museum of Copenhagen measure 0·26^{mm}); moreover, its fibres are not by far so thick or consist of so many spicules as the fibres of *P. dura*.

Locality: Station 1, 62° 30′ Lat. N., 8° 21′ Long. W., depth 132 fathoms, 16 specimens.

Geogr. distr. Carter, l. c., has the species from about the same locality, that is, a little south of the Faröe Islands, depth 167 fathoms (»Porcupine»). The occurrence of the species on this latitude is rather interesting, the genus not being hitherto known as northern, but only from the Mediterranean and more southern regions.

Phlæodictyon Carter.

The form more or less roundish, sometimes lengthened or becoming quite irregular. The sponge provided with shorter or longer tubular processes, so-called fistulæ. The external layer marked off as a harder bark, highly provided with spicules. The other skeleton may be different, formed of fibres, or of a net of single spicules or of irregularly situated spicules. Spicula are oxea, most frequently shortly pointed, sometimes strongyla: most frequently they are somewhat curved. Spongin (often) present, but not to any considerable degree.



Carter, in 1882 (Ann. and Mag. of Nat. Hist. Ser. V, Vol. 10) established a new group *Phlæodictyina*, which he chiefly characterized by the outer form and the presence of processes (which might, however, also be wanting) as well as by a particular lamellar structure («structure essentially laminated and concentric»); he describes more particularly, how there are two different layers that may alternate with each other several times, but his description of this structure is not quite clear. To this group he refers *Oceanapia robusta* Bow., *Rhizochalina oleracea* and *carotta* Schmidt (1870, Spong. atlant. Gebiet., 35), *Rhizochalina fistulosa* Bow., and some new established species. The group thus established by Carter, has since been kept up as a subfamily to about the same extent given it by Carter, and with slight modifications in the definition. In the meantime a number of new species have been described under the genus *Rhizochalina* — Dendy comprises this genus and *Oceanapia* under the name *Rhizochalina* — but many of these species agree only badly with the definition of the group given by Carter, having of the characters stated by him only the external hard layer, and being more or less provided with fistulæ; among others this restriction holds good with regard to *Rh. elongata* Topsent, *Rh. media* Thiele, and several others. At the same time several authors have called attention to the relationship with *Petrosia*, for instance Ridley (Report on Zool. Coll. Alert 420), and Thiele plainly regards his *Rh. media* as an intermediate form between *Rhizochalina* and *Petrosia* (Stud. über pazif. Spong., Zoologica. X, 1897—99, Heft 24, II, 19, Tab. IV, Fig. 2, Tab. V, Fig. 11). It is also scarcely to be doubted that the genus *Rhizochalina* must be referred to the *Renierinæ* nearest to *Petrosia*, where it has also to be referred according to its spiculation. Also in *Petrosia* a somewhat lamellar structure may be found, as mentioned before under *P. crassa*; but this structure is far from being found in all *Rhizochalina*-species, and moreover it is probably a phenomenon connected with the growth of the sponge.

As mentioned above, *Rhizochalina oleracea* and *carotta* Schmidt are found among the species, referred by Carter to *Phlæodictyina*. The original specimens of both these species are in the museum of Copenhagen, and by the examination of these specimens it has been seen that these two species have to be referred to the *Chalininæ*, as has also been done by Schmidt; the fact is that they have solid spongin-fibres filled with a large number of very small oxea. The concentric structure mentioned by Schmidt, and which has presumably been a chief reason why Carter has referred the species to *Phlæodictyina*, is the same phenomenon, generally found in the *Chalininæ*, and which I take to indicate periods of growth. With regard to the other species, after the exclusion of *oleracea* and *carotta*, for which species Schmidt established the genus *Rhizochalina*, another name must be chosen, and here Carter's name *Phlæodictyon* ought to be used, which I have adopted accordingly.

The other genus of the supposed subfamily *Phlæodictyinæ* is *Occanapia*. When *Phlæodictyinæ* is dissolved, and *Phlæodictyon* is referred to the *Renierinæ*, *Occanapia* will have to pass to *Gelliinæ* where it belongs according to its spiculation, and then it must be nearly allied to *Gelliodes*, from which it is only distinguished by its form and the external layer of bark. The genus must be taken to have its natural place here, and in this respect it is rather characteristic that Topsent has described loose fistulæ of *Occanapia* just as belonging to the genus *Gelliodes* (*G. cavicornis*; see otherwise for further particulars under *Occanapia robusta*).

The result accordingly is that the hitherto admitted subfamily *Phlæodictyinæ*[1]) is dissolved, the genus *Phlæodictyon* (= *Rhizochalina* olim after the exclusion of *oleracea* and *carotta*) is referred to the *Renierinæ* close to *Petrosia*, and the genus *Occanapia* to the *Gelliinæ* close to *Gelliodes*.

It may easily be understood that the subfamily *Phlæodictyinæ* has been kept up for some time, as the forms comprised in it show some congruity. The three *Phlæodictyon*-species enumerated here, the two *Gellius*-species, *luridus* and *microtoxa* to be described hereafter, and *Occanapia robusta* thus correspond in the presence of fistulæ, and of an external, bark-like layer, and some of them have the mentioned lamellar skeletal structure. Moreover these forms show all the so-called Cellules sphéruleuses , even if these cells are somewhat different. I think, however, that we cannot, at all events at the present position of systematism, ascribe any importance to these characters. Thus fistulæ and a hard external layer of skin are also found in the genus *Histoderma*. — Lindgren (Zool. Jahrb. XI, 1898, 297, Tab. 19, Fig. 11 a–b) has also referred a *Histoderma*-species to the genus *Rhizochalina* (the species is wrongly determined as *Rh. singaporensis* Cart.), and if the lamellar skeletal structure is a phenomenon of growth, no importance can be attached to it. Neither can any importance be attached to the occurrence of Cellules sphéruleuses , as long as their physiological significance is not sufficiently known; besides I have found quite similar forms of these cells in a *Histoderma* or a Desmacidonid-species closely allied to *Histoderma*. Strange to say, these cells would thus seem to be especially developed and conspicuous in forms with an external bark-layer. — Altered points of view in systematism may possibly alter the collocation of the forms here mentioned, but at present I think the dissolution of Carter's *Phlæodictyina* that I here have made, to be necessary.

1. **Ph. tuber** n. sp.

Pl. VI, Figs. 11—13, Pl. XII, Fig. 6 a, b, Fig. 7.

The form roundish, more or less irregular; only few fistulæ. The surface somewhat rough from projecting spicules. Outermost a hard layer of skin with irregularly placed spicules parallel to the surface. The inner skeleton is an irregular tissue of spicules without fibres, in this tissue are found concentric layers of close-set spicules parallel to the surface. Spongin present to a small degree. Spicula curved oxea of a length of 0·28—0·35^{mm}.

This species may be of a somewhat varying form; but it is, however, in all the specimens in hand, more or less roundish or tuberous, and the sponge is provided with one or a few fistulæ. The largest specimen is lengthy; it has a greatest length of 28^{mm}, and a greatest breadth of ca. 13^{mm}. It

[1]) Carter for his group used the name of *Phlæodictyina*.

has only one fistula arising from one end, and with a length of 11^{mm} and a thickness of ca. 4^{mm}. The largest one of the roundish specimens has a greatest extent of 24^{mm}; the smallest specimen is scarcely 8^{mm} long. With the exception of the first mentioned specimen, the fistulæ have been broken off in all the others; by far the greatest number have had only one fistula, a single specimen has had two, and one of the smaller specimens, as far as may be judged, has had three fistulæ. Some of the specimens are highly incrusted with sponge-spicules, sand, or fragments of shells. On account of the external bark the sponge is rather hard, but in the interior soft and loose. The colour (in spirit) is white or yellowish white. The *surface* is not quite smooth to the touch, projecting spicules being found sparingly. Externally the sponge is provided with a part marked off as a *dermal layer*, which is, however, most frequently rather thin, ca. 0·1^{mm}; this layer is provided with spicules lying in every direction; by far the greatest number are parallel to the surface, but some are placed obliquely or vertically to the surface, so that they rise over it; these last-mentioned spicules may in different places of the surface of the sponge be present in different numbers. A thin, separable dermal membrane is not found. The *pores* are found in the skin, but I have only seen them in rather small numbers; their sizes are about 0·02—0·03^{mm}. *Oscula:* As the fistulæ are broken off in almost all the specimens, I have not been able to decide the features of this species with regard to oscula and the structure of the fistulæ. The question, whether the fistulæ of these sponges are open or closed at the ends, has been answered in different ways by the authors, and also differently with regard to different species. There is also a possibility that there may be some difference in this respect in the different species; but whatever may be the case with regard to this feature, there can scarcely be any doubt that the canals that always go into the fistulæ, are excurrent canals, and that the fistulæ accordingly act as oscula. The only apparently whole fistula in the specimens of the present species, appeared to be closed at the summit, but then it did not appear to be built normally; possibly it may have been damaged, and have been closed by its later growth. As on the other surface pores are found in the walls of the fistula, but only in small numbers. In the fistula are found, at all events very frequently, two larger canals running alongside of each other; but besides smaller cavities are seen outside of these canals, which latter I take to be subdermal cavities. In one of the smallest specimens that is provided with a rather long fistula, this fistula is thin-walled in the outer end, and here it is quite occupied by the two canals which are separated by a thin partition-wall.

The *skeleton*. Besides the mentioned external part marked off as a dermal layer, highly provided with spicules, the other skeleton that fills up the interior of the sponge, consists of a quite irregular tissue of spicules forming neither fibres nor meshes. But besides the skeleton has a particular, somewhat lamellar structure, being traversed by layers of spicules of a structure quite similar to that of the dermal layer, consisting of close-set spicules parallel to the direction of extent of the layer. The layers are more or less concentric, and parallel to the surface of the sponge. They appear quite or partly to continue all round the sponge, but they may pass into each other, and in some places they are seen to pass into the skin [1]). I am not able to decide, in what manner this structure of the skeleton is to be interpreted, but most likely it is a phenomenon of growth. The spicules of the

[1]) This structure of the skeleton is not directly seen in a specimen in spirit when cut through; but when the specimen is dried it is distinctly conspicuous, and under the microscope it is distinctly seen in sections lying in xylol.

skeleton are united by a clear, not copious, but distinctly observable mass of spongin. In the dermal layer where the spicules are close together, spongin may be observed, not only at the ends of the spicules, but also in other places where they touch each other, but only to a very small amount. With regard to the skeleton it has still to be noticed that the sponge to a high degree incrusts extraneous bodies, large sponge-spicules being especially frequently found.

Spicula are somewhat curved oxea, the curve is most frequently even and round, but may also be more or less sharp, and sometimes it is somewhat irregular; the spicules are evenly, but may best be termed shortly pointed. Their length is between 0·28—0·35^{mm}, the thickness varies from 0·012—0·014^{mm}. Shorter and finer, down to quite fine oxea, developmental forms, are found, but in small numbers; the finest ones have a length of ca. 0·26^{mm}, and thus they are only little shorter than the fully developed ones; they are very long tapering, and consequently the short pointing appears only during the growth.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms, one specimen; station 81, 61° 44′ Lat. N., 27° 00′ Long. W., depth 485 fathoms, two small specimens; station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms, two larger and two smaller specimens. — The stations are all in the Denmark Strait, or somewhat south of it.

2. **Ph. elongatum** Tops.

Pl. VI, Figs. 3—4, Pl. XII, Fig. 8 a, b, c, Fig. 9.

1892. *Rhizochalina elongata* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 75, Pl. IV, figs. 5—6, Pl. IX, fig. 1.

The form irregular, sometimes roundish, or lengthened and somewhat cylindric. The surface with roundish warts. Only few fistulæ. Externally a hard dermal layer, provided with very close-set spicules in several layers parallel to the surface; the dermal layer with certain intervals rises into low, conical prominences, through which a spicule projects, so that the surface is slightly and sparingly spinulous. The interior skeleton consists of irregularly scattered spicules. Spongin present to a small degree, only in the dermal layer. Spicula are comparatively thick and short, somewhat curved oxea with short points 0·16—0·19^{mm}.

Of this species we have two specimens, which I determine as *Ph. elongatum* Tops., as they, partly in form and especially with regard to the spicules, agree completely with this species. Both specimens are of a roundish form, and the surface is warty from larger or smaller roundish prominences, as is also shown in the figure of Topsent l. c. The larger specimen has a length of 20^{mm} and a breadth of 15^{mm}. It is provided with three fistulæ, of which two seems to be whole, while the third is broken off at the base. The two entire ones are of about the same length, ca. 8^{mm}, and have a thickness of scarcely 2^{mm}. This specimen is especially highly incrusted with gravel and sand. The other specimen is a little smaller, it has a greatest extent of 17^{mm}, and is somewhat compressed; it has two fistulæ placed close to each other, but both broken off. On account of the solid bark the sponge is hard and firm, but the consistency of the interior is loose and soft. The colour (in spirit) is white, at most with a slight yellowish tint. The *surface* that is apparently smooth, is nevertheless rough to the touch,

and by a closer examination it is seen to be slightly and sparingly spinulous from singly placed, slightly projecting spicules. On account of the close-set spicules, the external part of the sponge, which is marked off as a *dermal layer*, is very firm and hard. I have not observed *pores* in the exceedingly close-spiculed skin. *Oscula:* In one specimen, in which two fistulæ are found that are likely to be whole, these fistulæ are open at the summit, and the openings must be taken to be oscula. One fistula has the opening at the very top, while in the other the opening is in the side just below the top.

The *skeleton*. As has been mentioned, the species has outermost a part formed as a dermal layer; this dermal layer is very hard, and provided with exeedingly close-set spicules lying in several layers; the dermal layer has a thickness of somewhat more than $0{\cdot}1^{mm}$. The spicules of this layer are parallel to the surface, and their arrangement, as the curved spicules form angles with each other, shows a pattern recalling the kind of engraving frequent on the back of watches, the so-called guilloche. The spicules, to be sure, are chiefly parallel to the surface, but at certain intervals the whole layer of spicules rises into low, conical processes, through the midst of which a spicule projects a little, so that the surface is slightly spinulous. The skeleton in the soft interior of the sponge, as far as I have been able to decide from the material in hand, consists of spicules lying scattered in the tissue without any order, and without forming any reticulation or fibres; neither seem, as in the preceding species, any lamellæ to be found. On the other hand, the membrane lining, at all events the larger canals, is provided with a spiculation of about the same kind as that of the dermal layer, but considerably more open, so that a kind of network is formed. In the inner body no spongin is observed in the skeleton; on the other hand spongin is found uniting the spicules of the dermal layer and of the membranes; the spongin is exceedingly white and clear, and consequently not easily seen. As in the preceding species, and to a still higher degree, a large number of extraneous bodies are also found in the present one; in one specimen externally highly incrusted with sand, the sand is also found in the interior together with sponge-needles; in the other specimen large sponge-needles are almost exclusively found crossing the sponge in every direction.

Spicula are comparatively short and thick oxea, rather highly bent; the bending may be even, but most frequently it is rather sharp; the spicules are shortly pointed with a rather stubby point, under higher magnifying powers the point shows outermost a little apex especially marked off. Sometimes, but rather rarely, the ends are rounded; Topsent mentions this fact to be of frequent occurrence in his specimens. The length of the oxea varies from $0{\cdot}16$—$0{\cdot}19^{mm}$, the thickness from $0{\cdot}012$—$0{\cdot}018^{mm}$. Developmental forms, down to quite fine ones, occur, but in rather small numbers; the finest have a length of $0{\cdot}14^{mm}$. The fine needles are long tapering, and consequently the short point appears only during the growth.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms, one specimen; station 81, 61° 44′ Lat. N., 27° 00′ Long. W., depth 485 fathoms, one specimen. Both stations are situated a little to the south of the Denmark Strait, station 81 on the Reykjanæs-ridge, station 78 on the eastward slope of this ridge.

Geogr. distr. The species has been established on four specimens taken on the expedition of the Prince of Monaco with l'Hirondelle in 1888 at the Azores on a depth of about 138 fathoms (Topsent l. c.).

Remarks. In these two species, but especially pronounced and in large numbers in the latter, some peculiar bodies are found; they are round, of a radiated structure, are refringent, and by a certain adjustment they show a darker part or appear to be possessed of a cavity, which fact, however, I suppose to be due only to the refraction. The radiated structure may be so pronounced as to continue into the periphery, so that they appear to be spined. They may reach a rather considerable size, and vary from 0·014—0·035^{mm}. I take these bodies to be cells storing some substance or other, and to belong to the category, called by Topsent *cellules sphéruleuses* ; I think them so much the more to be such cells, as we find a large number of round cells, filled with refringent granules, which quite certainly correspond to the *cellules sphéruleuses* Tops., and between these latter and the former transitions are found in the form of cells filled with granules, beginning to show the radiated structure; the radiated form then is probably the fully developed phase of the cell.

3. **Ph. irregulare** n. sp.

Pl. VI, Figs. 9—10. Pl. XII, Fig. 10 a, b.

The form irregular, sometimes lengthened and somewhat cylindric, but twisted and nodulous. Only few fistulæ. The surface smooth. Outermost a thin, hard dermal layer with very close-set spicules lying in an irregular way, but parallel to the surface. The interior skeleton formed of irregularly scattered spicules. Spongin present, but only to a small degree. Spicula curved oxea with a short, stubby apex. 0·178—0·24^{mm}.

Of this species we have four very small specimens of a quite irregular form. The largest specimen has a greatest extent of ca. 13^{mm}; it appears to have been attached with one surface; it has a quite irregular, twisted form, and shows marks of three broken off fistulæ. The other specimens are lengthened, somewhat nodulous and bent, of a length of ca. 10^{mm}, and each has had two or three fistulæ. The colour (in spirit) is yellowish white. The consistency is like that of the preceding species, internally the sponge is very cavernous. The *surface* is smooth, setting aside its nodules. *Pores* and *oscula:* I have not observed pores in the dense-spiculed *skin* covering the body. As the fistulæ have been broken off, nothing can be said as to their having been open or closed; only a single fistula appears to be whole, though not quite undamaged; it is quite short, and appears to have been closed at the end, and it shows in its outermost part a particular structure, the close-set spicules of the skin here lying more openly, and passing into a somewhat netlike arrangement, and here pores are found. The course of the canals I have not been able to examine, but I suppose these pores to be excurrent openings.

The *skeleton.* Outermost is found a part formed as a dermal layer, in which the spicules are closely packed, considerably closer than in *Ph. tuber.* The spicules are lying in every direction, parallel to the surface. The dermal layer is thin containing not much more than one layer of spicules, and the very highest thickness to which it reaches, is 0·03^{mm}. As far as I have been able to decide by the material in hand, the inner skeleton, as in the preceding species, consists of irregularly scattered spicules forming no fibres. As well in the skin as in the inner skeleton the spicules are united by a not copious and very clear mass of spongin; in the close-spiculed dermal layer the spongin is found in

all points of contact. Also in this species some extraneous bodies are found incrusted, but to a far slighter degree than in the preceding species.

Spicula are curved oxea, of equal thickness throughout their length; their point is short and stubby, sometimes with a little outermost apex especially marked off. The spicules are rather varying in length, from 0·178—0·24^{mm}, and also the thickness is somewhat varying, from ca. 0·008—0·012^{mm}, the longest ones being far from always the thickest. Developmental forms, down to quite fine ones occur, but in small numbers; the finest have a length of ca. 0·166^{mm}. The developmental forms are long tapering, but by and by, as the thickness increases, the points become shorter.

Locality: Station 97, 65° 28′ Lat. N., 27° 39′ Long. W., depth 450 fathoms, four specimens.

Remarks. In this species cells filled with granules are found, but in smaller numbers and of considerably smaller size than in the preceding ones; forms with radiated structure were not found.

Fam. II. Heterorrhaphidæ.

Subfam. 1. Gelliinæ.

Gellius Gray.

The form exceedingly varying; it may be quite irregular, but it may also be definite and regular, for instance leaf-shaped, calicular, or pyriform. The skeleton is a more or less regular network or quite irregular, of renieroid or halichondroid structure, and long fibres are not found. The mass of spongin is rather small, and does not quite surround the spicules or the fibres. Spicula: Megasclera diactinal, oxea or strongyla: microsclera sigmata, sigmata and toxa, toxa, sigmata and raphides, or raphides alone.

The genus is chiefly distinguished from *Gelliodes* by a more reticular skeleton without long fibres; the relation, therefore, between *Gellius* and *Gelliodes* is about like that between *Biemma* and *Desmacella*.

1. **G. arcoferus** Vosm.

Pl. XII, Fig. 11 a, b, c.

1885. *Gellius arcoferus* Vosmaer, The sponge of the Villem Barents Exp. 1880—81. Bijdragen tot de Dierk., 12te Aflev. 3 Ged. 29, Pl. IV, fig. 18, Pl. V, figs. 87—90.
1887. — — Fristedt, Vega Exp. vetensk. Iakttag. IV, 430, Pl. 24, fig. 29—31, Pl. 28, fig. 16.
1896. — — Lambe, Sponges from the Atlant. Coast of Canada. Transact. Roy. Soc. of Canada, Ser. 2, II. Sect. IV, 184, Pl. I, fig. 3, 3 a—b.

Leaf-shaped? Spicula: Megasclera oxea 0·42^{mm}; microsclera toxa 0·057—0·178^{mm}, sigmata 0·012—0·019^{mm}.

Of this species we have only a little fragment; its form is compressed, and its one undamaged edge is rounded, so that it might be a piece of an erect, flat sponge; its colour (in spirit) is yellowish gray. Although Vosmaer gives no measures of the spicules in *Gellius arcoferus*, there can scarcely

be any doubt that the present species is the same; it agrees also with the description by Fristedt and Lambe of the specimens, by those authors referred to *G. arcoferus*. *Spicula* in my specimen are of the following forms and dimensions: a. *Megasclera* are oxea, straight or slightly bent, and evenly and rather long pointed; their length is rather constant, and on an average 0·42^{mm}, the thickness, on the contrary, is rather varying, 0·015—0·022^{mm} [1]); shorter and finer oxea are found in small numbers, and are certainly developmental forms; b. *Microsclera*: 1) Toxa; these vary much in thickness, and also somewhat in length, but the thinner and shorter ones I suppose to be developmental forms; they seem to be begun in about their full length, and chiefly to grow only in thickness. They are more or less curved in the middle, and just at the point the ends have a little bend the opposite way; in the finest of the bows the bend at the ends is often wanting. The length (which is somewhat dependent on the size of the curve) varies from 0·057—0·178^{mm}, the thickness varies from 0·0014—0·007^{mm}; these are the limits between which the sizes of all the bows are found, but also the bows, the thickness of which in proportion to their length shows them to be quite developed, are somewhat varying, about from 0·119—0·178^{mm}, and the thickness from 0·005—0·007^{mm}. 2) Sigmata; these are small, of a length from 0·012—0·019^{mm}, the thickness is about 0·001^{mm}.

With regard to the skeletal structure it is to be noticed that the ends of the spicules are united by a distinctly observable mass of spongin.

Locality: The only specimen, a little fragment, is from East-Greenland, ca. 72° 40′ Lat. N., 20° 00′ Long. W., depth 100 fathoms. (The East-Greenland expedition 1891—92).

Geogr. distr. Barents Sea, depths 140 and 170 fathoms (Vosmaer); to the north-east of the eastern Taimur peninsula, 76° 52′ Lat. N., 116 00′ Long. E., depth 36 fathoms; Greenland 59° 33′ Lat. N., 43° 25′ Long. W., depth 120 fathoms (Fristedt); the Gulf of St. Lawrence (Lambe). Accordingly the species is widely spread in longitude, from 116 Long. E. to ca. 70° Long. W., but it has not been taken south of ca. 45° Lat. N.

2. **G. angulatus** Bow.?

Pl. XII, Fig. 12 a, b, c, d.

1866. *Halichondria angulata* Bowerbank, Mon. of Brit. Spong. II, 233, III, Tab. XLI, figs. 4—8.
1880. *Desmacodes angulatus* Vosmaer, Notes from Leyden Museum II, 107.
1887. *Gellius angulatus* Ridley and Dendy, Challeng. Report. Monaxonida, Vol. XX, 2, 44.
1892. — — Topsent, Résultats des Campagn. scient. du Prince de Monaco. Fasc. II, 76.

Of this species we have some roundish fragments, the largest of which has a greatest extent of 43^{mm}, but we have no whole specimen. I have not ventured to regard the determination as certain, especially as the species has never been satisfactorily described, and the spicules have not been figured since in Bowerbank, with the exception that Topsent (Contrib. à l'étude des Clionides. Arch. de Zool. expériment. et gén. Sér. 2, Tom. V, bis, Pl. VI, Fig. 15) figures them, but with regard to the bows his figure does not agree well with that of Bowerbank, and the given measures do not agree with

[1]) The spicules may also in different specimens be of different thickness, as already mentioned by Vosmaer; in a specimen before me from Greenland, sent from the Riksmuseum in Stockholm, the greatest thickness of oxea is thus 0,015^{mm}.

those given by Ridley and Dendy for the specimen of Bowerbank; Topsent also states that the spicules project through the skin, while Bowerbank describes the surface as smooth.

The species in hand has a thin *dermal membrane* that cannot, however, be torn off; no particular dermal skeleton is found; but if a thin section is cut off parallel to the surface, this section shows an irregular network, which is polyspicular, but here and there also formed of single spicules. Spicules and bundles of spicules project through the skin, so that the surface is not smooth. The *pores* are round, and are situated in the meshes of the dermal membrane; they are measured of a size of 0·008—0·148^{mm}.

The *skeleton*, as far as I have been able to examine it, has a somewhat halichondroid structure consisting of loose, little marked fibres, among which, however, in many places, a unispicular reticulation is found. The ends of the spicules are united by a distinct, but clear mass of spongin.

Spicula: a. *Megasclera* are oxea, more or less curved in the middle, gradually tapering to the point, which is most frequently somewhat marked off, and the very outermost point is oftenest more or less shortly pointed; this structure, however, is not always pronounced; the length varies between 0·32—0·388^{mm}, and the thickness is 0·009—0·012^{mm}. Shorter and finer oxea are only seen in very small numbers. b. *Microsclera:* 1) Toxa; with regard to form they resemble the bows of the preceding species, but they are smaller and especially thinner; the curve in the middle is sometimes so sharp, that the branches form a right angle; as in *arcoferus* the bending at the ends consists only of a little point inclined backwards. The length of the bows is between 0·12—0·064^{mm}, and the thickness is from 0·002^{mm} down to 0·001^{mm}. 2) Sigmata; these are rather small, of an average length of 0·021^{mm}, and a thickness of 0·001^{mm}. — Besides these sigmata a very few much larger ones are found, of a length of about 0·078^{mm} and a thickness of 0·005^{mm}. These sigmata are often of a somewhat monstrous form, with one or both ends rounded or showing other irregularities. As has been said, they are only found quite singly, but they are constantly found, so that they cannot be taken to be extraneous. They are not seen by transitions in sizes to be connected with the small sigmata. — In a specimen from Egedesminde, the spicules of which were upon the whole of the largest of the sizes given above, the sigmata were a little larger than those mentioned above, of a length of 0·028^{mm} and a thickness of 0·002^{mm}.

Locality: Adelvig on the north-western coast of Iceland, depth 6—15 fathoms, some fragments which have apparently belonged to one specimen (the author); Egedesminde, a few small fragments (Bergendahl).

Geogr. distr. *Gellius angulatus* is common in the English Channel (Topsent), and has further been taken at the Azores (Challenger, Topsent) in the latter place on depths of up to 450 fathoms.

3. **G. luridus** n. sp.

Pl. VI, Figs. 5—8, Pl. XIII, Fig. 1 a—c, Figs. 2—8.

Free; oblong pyriform, more or less irregular, sometimes roundish or lobate. The surface smooth. Outermost a bark consisting of a thinner or thicker layer with close-packed spicules lying in all directions, but parallel to the surface. The skeleton consists of a rather irregular, mostly unispicular network; it is crossed by concentric lamellæ of a similar structure as the dermal layer. Spi-

cula: Megasclera oxea, 0·38—0·47^{mm}; Microsclera toxa, rather small, greatest length 0·06^{mm}. sigmata of a particular form with the shaft bent into an angle 0·014—0·05^{mm}.

This species is lengthily, but oftenest somewhat irregularly pyriform; the smaller specimens are more roundish, a single one somewhat lobate. It must have been growing freely on the bottom, as no place of attachment is found, but the sponge which is narrowing below, is here rounded, and ends often with a larger or smaller knob, especially marked off. The largest specimen has a height of 60^{mm}, and a diameter in the middle of 17^{mm}; then a series of specimens is found decreasing in size; the smallest specimen has a height of 9^{mm}. The colour (in spirit) in most specimens is dirtily yellow, but in a few it passes into a darker colour[1]). On account of the external rind-layer the consistency is rather firm. The *surface* is even and smooth, with here and there flat eminences and depressions. The sponge is surrounded by a hard and firm *dermal layer*, provided with spicules lying in every direction and exceedingly close-packed, but all parallel to the surface; this part that is marked off as a separate layer, may be of a somewhat varying thickness, as will be more particularly mentioned below. Outermost a thin dermal membrane is found, which, however, is not separable, and which I have only observed in a few places, so that it seems for the greater part to be destroyed. In this membrane the *pores* are found in the intervals left between the close-packed spicules; they are small, from 0·007^{mm} up to 0·029^{mm}, or, but rarely, somewhat larger. With regard to *oscula* only one is found, in the upper end of the sponge; but I cannot give its structure and size, as the upper end is damaged in all the specimens. The sponge is probably somewhat tapering above, or rather, as indicated by one of the least damaged specimens shown in the figure Pl. VI, fig. 5, it is here produced into a tube, in the end of which the osculum is then found; the presence of such a thin-walled tube would explain the fact that this fragile part has been broken off in all the specimens. Two oscular canals of equal width, running side by side, and only separated by a thin membrane, lead in all the specimens from the upper end towards the lower end of the sponge (Pl. VI, fig. 8); in the largest specimen they have a width above of 4—5^{mm}. Into these oscular canals the excurrent canals open; they have a rather regular course running from the outside obliquely upward and inward towards the oscular canals and at the same time converging to wider canals.

The *skeleton*. As mentioned the sponge is surrounded by a hard and firm part marked off as a dermal layer. The firmness of this layer is due to very closely packed spicules, lying in all directions in several layers, but parallel to the surface. The thickness may be somewhat varying, but is greatest in the lower part of the sponge, and decreases upward; in the lower part it may be somewhat more than 1^{mm}. Where a knob-like lowermost part is especially marked off, this part consists almost completely of this skeletal tissue, which may here reach a thickness of up to 5^{mm}. When the dermal layer in the lower part of the sponge is rather thick, it consists also of heterogenous layers, layers with close-packed spicules parallel to the surface alternating with layers, in which the spicules are arranged in a more netlike manner, and are not parallel to the surface. The other skeleton has a rather peculiar, lamellar structure, consisting of thin lamellæ, more or less parallel to the surface; these lamellæ consist of close-packed spicules parallel to the surface, as in the dermal layer; between the lamellæ a

1) A couple of the specimens are quite grayish black; this colour I take, however, to be due to colouring by other sponges, together with which they have been lying in spirit.

mostly unispicular network is found. The lamellæ orginate from the dermal layer and continue upward, bending into the sponge (Pl. XIII, fig. 2), and they appear to form continuous layers all round the sponge. They consist of a dense feltwork of spicules lying in all directions parallel to the surface, but the spicules are not quite so close-packed as in the layer of spicules closest to the dermal membrane. The lamellæ are pierced by the canals, and therefore they show a great many round holes. As mentioned, a network is found between the lamellæ. This network is rather irregular, its most regular feature is fibres running vertically on the lamellæ towards the surface; these fibres are most frequently polyspicular; the other network is unispicular und irregular. — This particular lamellar structure, which is found as well in the thicker parts of the dermal layer of the sponge, as also especially marked off in the other skeleton, is not easily explained, but I suppose it to be connected with the way of growth of the sponge.

The spicules of the skeleton are in the points of intersection united by a clear, but distinctly observable mass of spongin; the spongin is developed, not only at the ends of the spicules, but wherever the spicules are in contact with each other; therefore in the outer skin and in the lamellæ, where spicules intercross in all directions, the spongin is present in all the points of contact, and imparts a great firmness to this skeleton. It is therefore frequently seen, when isolated spicules are examined that they are provided with coats of spongin in several places, where they have been in contact with other spicules (Pl. XIII, figs. 7, 8).

Spicula: a. *Microsclera* are evenly curved oxea, only rarely they are a little more sharply bent in the middle; sometimes the curve is a little irregular; they are of greatest thickness in the middle, and taper somewhat towards the ends, the point itself, however, being only of a middle length; the length varies between 0·387—0·476^{mm}; the thickness varies between 0·010—0·0128^{mm}. Shorter and finer oxea are only found in small numbers. b. *Megasclera.* 1. Toxa; these are rather small, obtuse-angled, and the ends are inclined backwards; they are of greatest thickness in the middle, and taper evenly towards the ends. The full-grown and largest forms reach a length of 0·06^{mm}, and a thickness in the middle of ca. 0·0028^{mm}, but from this size downward all sizes and developmental forms are found down to so small a size as hardly to be observed; thus they have been measured down to a length of 0·005^{mm}. According to this these bows appear during the growth not only to increase in thickness, but also to grow very much in length; the small forms, however, are always inscribable in the larger ones, when the angle is the same; and a growth by mere apposition of parallel layers will increase the length of the bows to a rather high degree; a growth in length by apposition, however, must certainly also take place, during which the inclined ends appear; these ends are not found in the smallest forms. 2. Sigmata. They are of a particular form, having in the middle a sharp, but obtuse-angled curve, and the first part from here outward is straight, but then the ends continue arcuately and taper to long points. Thus the middlemost part of this sigma reminds as to its form of a bow; the form may, however, be somewhat varying, and is sometimes rather irregular, which influences the length of the sigma, measured after the greater axis. The length varies from 0·014—0·05^{mm}, the thickness in the middle is ca. 0·001^{mm} in the larger, and a little less in the smaller ones.

Remarks. In this species granulous cells — *cellules sphéruleuses* Topsent[1]) — were found

[1]) These cells, no doubt, correspond to Topsent's »*cellules sphéruleuses*»; but in naming them so, I do not mean to say anything as to their physiological signification. They are well known, and have often been mentioned, and different

in rather large numbers throughout the tissue; they are roundish, of a deep yellow colour (in spirit), filled with granules, and of an average size of 0·011^{mm}.

Embryos. In one of the specimens which was cut through, a cavity of a diameter of 5—6^{mm} was found in the lower third part of the sponge, in the tissue, between the oscular canal and the outer surface. In this cavity also the skeleton, even the skeletal lamellæ were away, and its walls were lined by a thin membrane. In the cavity was found a number (ca. 20?) of roundish embryos of a diameter of about 1^{mm}. They were presumably each surrounded by a thin membrane, as fragments of such a one adhered to them when they were taken out. To judge by an examination of a couple of the embryos, they seemed only to contain bows and sigmata, which were found copiously, and of the same size as in the fullgrown sponge, but no megasclera.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms; station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms, 9 specimens in all. The mentioned stations were both very rich in sponges, station 78 even the richest of all the stations.

4. **G. microtoxa** n. sp.

Pl. XIII, Fig. 9 a—d, Fig. 10.

Oblong-pyriform. Outermost a rind-like, but comparatively thin dermal layer with rather close-packed spicules lying in every direction, but parallel to the surface; here and there this layer rises to small prominences, so that the surface is not smooth. The inner skeleton forms an irregular, polyspicular reticulation (probably with concentric lamellæ). Spicula: Megasclera oxea 0·62—0·68^{mm}; microsclera toxa, very small, 0·01—0·02^{mm}, sigmata of the common form, but sometimes with the shaft somewhat bent so as to form an angle, 0·035—0·078^{mm}.

Of this species we have only a single, highly damaged specimen, mostly consisting of the outer layer of the sponge while the interior is wanting. To judge by this specimen the species has a similar form as that of the preceding one. The species has a length of 35^{mm}, and a greatest breadth in the middle of 15^{mm}. The colour (in spirit) is yellowish white. The *surface* is not quite smooth, as the spicules of the skin parallel to the surface, appear as a slightly conspicuous, irregular reticulation; besides the surface has rather close-set, low, knob-like prominences. As in the preceding species, the sponge is surrounded by a firm *dermal layer* provided with spicules lying in all directions parallel to the surface, but they are not so close-set as in the preceding species; the dermal layer is also much thinner than that of the preceding species. In the membrane the *pores* are scattered in the intervals between the spicules; they are measured of a size from 0·029—0.16^{mm}. As the sponge is so much damaged, and the inner tissue is wanting, nothing can be said with regard to oscula and canals.

The *skeleton.* As stated above, the sponge has outermost a firm dermal layer provided with spicules lying irregularly in all directions, but parallel to the surface; these spicules, however, are not by far so close-packed as in the preceding species, and the dermal layer is much thinner. In certain places some spicules rise pyramidically, their ends meeting, and consequently the skin is raised into

authors ascribe to them different functions; evidently it is also these cells which Ridley and Dendy (Challeng. Report, Monaxonida, XX, p. XXII, pl. XLIX, figs. 1, 1 a, 2 a) interpret as spongoblasts.

the low prominences mentioned above. As to the other skeletal structure, I have not been able to decide with certainty, whether concentric lamellæ are found here as in *G. luridus*; but it would seem so, as a layer, constructed in the same way as the dermal layer, is found a little way within this latter. The other inner skeleton, as far as I have been able to decide, consists of an irregularly polyspicular reticulation. As in *G. luridus*, the spicules of the dermal layer and of the lamellæ inside are, at the points of intersection, and not only at the ends, united by spongin; but in the present species the spongin is only found to a very slight degree; the amount of spongin is also very slight in the other parts of the skeleton.

Spicula: a. *Megasclera* are oxea, slightly, sometimes a little irregularly curved, and rather shortly pointed; the length is very constant, and is between 0·62—0·68^{mm}, the thickness is 0·014—0·017^{mm}, finer, to very fine oxea are found, but only in very small numbers. b. *Microsclera:* 1. Toxa; these are exceedingly small and fine; their form is obtuse-angled to rectangular, and they have, at all events the larger ones, a little recurved point; upon the whole they resemble the small toxa in the preceding species, being only more frequently rectangular or about so. Their length is 0·01—0·02^{mm}, the thickness is less than 0·001^{mm}. 2. Sigmata; while in the present species the toxa are smaller than in *luridus*, the sigmata are larger; they have the common form, but sometimes they have a sharp curve in the middle, and so they resemble the sigmata of *luridus*; upon the whole they are often somewhat irregular and angular in the curve. The length is somewhat varying, from 0·035—0·078^{mm}, and the thickness is in proportion 0·0018—0·003^{mm}. In this species I have found developmental forms of sigmata; as was to be expected beforehand, the sigma is begun in about its full length, and it grows only in thickness and so far in length, as the recurved ends are formed and get their full length. The developmental forms I have found, which are only very few, are characterized as such by being fine, and not, or only to a small degree, having the ends bent in a hook-like manner; the length may be varying, and has, for instance, been measured to 0·05^{mm}. It is accordingly seen that the growth only takes place by apposition, and so it is proved that the small sigmata that are fully developed as to form, are not developmental forms of the larger ones, but are sizes that are present together with the larger ones. As well sigmata as toxa are present in large numbers throughout the sponge; besides sigmata are seen in rather large numbers in the skin, while toxa are not found there.

Remarks: As in *G. luridus* cellules sphérulenses Topsent are found in large numbers in the present species, but here they are only found in the dermal layer — and in the layer inside the skin mentioned in the description —; their occurrence in the dermal layer is rather peculiar; that is to say they are partly found scattered, but partly also closely gathered into bandshaped groups with a direction longitudinally of the sponge. These bands are distinctly visible to the naked eye or through a lens, and they convey an impression of being spiculo-fibres; it is only under the microscope that they are seen to be formed by the close-gathered cells (Pl. XIII, fig. 10). The average breadth of the bands is about 0·11—0·15^{mm}. The cells are roundish, elongated, or fusiform, sometimes produced at both ends to fine processes. Their colour (in spirit) is light yellow; averagely they are larger and with larger, more refringent granules than those of *luridus*. The roundish ones have an average size of 0·008—0·017^{mm}, the elongated ones reach a length of ca. 0·035^{mm}. Those scattered in the skin, are the greatest, and

they are most frequently elongated; those gathered together into bands, are smaller and most frequently round.

Locality: Station 76, 60° 50′ Lat. N., 26° 50′ Long. W., depth 806 fathoms; only one damaged specimen.

Note. The two species now described, *G. luridus* and *microtoxa*, as well by their spiculation as the whole other structure, thus, I suppose, also by their numerous and distinct cellules sphéruleuses, appear to be very nearly related; but on the other hand characteristic differences are found, both in spiculation and other structure; thus with regard to the spiculation, the sizes of the spicules and the reciprocal proportion of their sizes, as also the different structure of sigmata. In the skeletal structure is especially to be noted the difference that the spiculation of the dermal layer — and of the layer inside constructed in a similar manner — is far more dense in one than in the other, and also the amount of spongin is different. Finally is to be noted the difference with regard to cellules sphéruleuses and their occurrence.

On account of the rind-like dermal layer and the lamellar structure of the skeleton, as also on account of both species presumably having been provided with a fistula, these two species might be referred to the genus *Oceanapia*, but then this genus would have to be extended so as also to comprise species with toxa; if with Dendy we should prefer to unite it with *Rhizochalina* (*Phlæodictyon* mihi), it would accordingly contain species without microsclera, species with sigmata, and species with both sigmata and toxa. In the present work, however, I have only kept the genus *Oceanapia* for the species *robusta* (for particulars see under this species and the introduction to the genus *Phlæodictyon*).

5. **G. primitivus** n. sp.

Pl. XIII, Fig. 11 a—b.

Crust-shaped, thinner or thicker. The skeleton is a rather regular network; for a great part it is unspicular, but polyspicular fibres are found, especially running towards the surface. Spicula: Megasclera curved oxea 0·137—0·166^{mm}; microsclera fine toxa 0·028—0·107^{mm}.

We have only this species in more or less damaged specimens, and in dry state, so that the description must chiefly be restricted to the spicules. The species grows incrusting on a branched Lithothamnion, one of the specimens shows a tube. The greatest extension reached by any of the specimens, is ca. 14^{mm}. The colour in the dried state is yellow. As far as I have been able to judge from the specimens in hand, the surface is shaggy, the dermal membrane being pierced by the ends of the spicules.

The *skeleton* consists of a rather regular network, partly unispicular, but also polyspicular fibres are found in it, especially running in the direction towards the surface. The skeletal meshes are more or less rectangular. Especially the fibres running towards the surface (the primary ones) are distinct, while the fibres running vertically on these are less conspicuous. In the nodes of the skeleton the spicules are united by a distinct and rather copious mass of spongin.

Spicula: a. *Megasclera* are oxea; they are more or less, most frequently rather strongly, and

sometimes irregularly curved; they are of about equal thickness in their whole length; the points are somewhat varying in length, but are always rather short. The length of the oxea is between 0·137—0·166^{mm}, and may in a few cases reach 0·178^{mm}. The thickness is rather varying, and the longest ones are not the thickest; it varies between 0·003—0·007^{mm}, the thicker ones being most frequently met with. b. *Microsclera*; only one form of microsclera is found, viz. toxa; they are all fine, but very much varying in length, and also their form is somewhat varying, and rather frequently somewhat irregular; their curve varies very much, so that they may be from almost straight to rectangular; in many of them the ends are a little inclined backwards, while in others this inclining is wanting. They are of equal thickness in their whole length, and upon the whole their appearance is very simple. Their length is from ca. 0·028 up to 0·107^{mm}. The thickness is ca. 0·001^{mm} or somewhat more in proportion to the size[1]).

Locality: Julianehaab (inspector Ryberg). We have in all seven specimens or fragments, all growing on a branched Lithothamnion.

6. **G. proximus** n. sp.

Pl. XIII, Fig. 12 a—b.

Crust-shaped, incrusting. The dermal membrane thin, the nodes of the skeleton below make it slightly granulous, and it is slightly shaggy from projecting spicules. The skeleton (or by far the greatest part of it) is unispicular, and forms triangular or irregular meshes. Spicula: Megasclera oxea 0·149—0·184^{mm}; microsclera fine toxa 0·028—0·107^{mm}.

Of this species we have only two small specimens growing as incrustations on Balanoid shells; the greatest extension is 17^{mm}, but the specimens are scarcely quite whole; the thickness is ca. 4^{mm}. The *surface* is slightly granulous, and spicules project. The colour (in spirit) is a light gray. The *dermal membrane* is thin and transparent, and the spicules below it form a reticulation of mostly triangular meshes; the nodes rise a little which is the cause of the granulous appearance of the surface; besides spicules from the skeleton project through the skin, and so it is slightly shaggy. *Pores* are found in large numbers in the meshes, and are measured of a size from 0·017—0·18^{mm}.

The *skeleton* is unispicular, and consists of triangular or irregular meshes, polyspicular fibres are perhaps also found. The part of the skeleton immediately below the skin forms rather regular, triangular meshes that may be seen through the skin as a reticulation. The ends of the spicules are united by a clear, copious mass of spongin.

Spicula: a. *Megasclera* are oxea; they are slightly curved, sometimes almost straight, of equal thickness in their whole length, and more or less shortly pointed; the points are often rounded, and then sometimes provided with a little mucro. The length is between 0·149—0·184^{mm}; they are rather thick, the thickness varying from ca. 0·006—0·01^{mm}. Finer needles, developmental forms, occur in small numbers. b. *Microsclera:* only one form of microsclera is found, viz. toxa; they are of quite the same form as the bows in the preceding species, and they are also very fine, and vary in size and form;

[1]) As the bows vary very much with regard to the degree of their curving, and as also the megasclera are sometimes rather strongly curved, spicules may be found, with regard to which it cannot be decided, whether they are bows or developmental forms of oxea.

the length is the same as in the preceding species, and is between 0·028—0·107^{mm}. In the largest ones the thickness reaches to 0·002^{mm}; but in the smaller it is somewhat less.

Locality: Egedesminde (Bergendal), depth 15 fathoms, one specimen; the mouth of the Ameralik fjord (Ingolf) one specimen; both specimens grow on Balanoid shells.

Although I have only had so slight a material of these two species I have thought it best to describe them, as their spiculation is interesting, and separates them very well from the other *Gellius*-species. Of the hitherto known *Gellius*-species provided with toxa, *G. angulatus* Bow., *arcoferus* Vosm., and *flabelliformis* Ridley and Dendy, have also sigmata; only *G. pumiceus* Frstdt. (Kgl. Sv. Vetensk. Akad. Handl. Bd. 21, no. 6, p. 29, T. II, fig. 9 a—d), and *G. toxius* Tops. (Rev. Suisse de Zool. IV, 1897, 470) have a spiculation consisting of oxea and toxa without sigmata; but in *pumiceus* oxea have a length of 0.9^{mm}, and toxa have another form; neither seems *G. toxius*, of whose spicules we, unfortunately, have no figures, to agree with any of the species described here.

Note. According to what is stated above, the genus *Gellius* may have the following combinations of spicules: oxea and sigmata (the most common case); oxea, sigmata and toxa; oxea, sigmata and rhaphides, in bundles or scattered (*massa* Cart., *macrosigma* Tops., *G.* sp. *(pyriformis)* Ridley and Dendy, Challeng. Report, Monaxonida, 46, and *phillipensis* Dendy, Proc. Roy. Soc. Victoria VII, 1895, 247); oxea and rhaphides (*Lacazei* Tops., Arch. de Zool. exp. et gén. Ser. I, I, 1893), and finally oxea and toxa. I think it doubtful whether the genus *Rhaphisia* Tops. the spiculation of which consists of oxea and rhaphides or trichodragmata (*anonyma* Cart., *laxa* Tops.), or of oxea, trichodragmata and toxa (*spissa* Tops.), can be kept up, as the character given by Topsent, of the skeleton forming no regular network, is scarcely sufficient to make good the establishing of the genus; and it must therefore, I think, be referred to *Gellius*. The bows figured by Topsent for *Rhaphisia spissa* (Mém. de la Soc. Zool. de Fr. XI, 1898, 232, fig. 2 c) remind of the bows in the two species described above, but they are larger.

7. **G. flagellifer** Ridley and Dendy.

Pl. II, Fig. 9, Pl. XIV, Fig. 1 a—d.

1886. *Gellius flagellifer* Ridley and Dendy, Ann. Mag. Nat. Hist. Ser. 5, XVIII, 333.
1887. — — Ridley and Dendy, Challeng. Report, Monaxonida, XX, 42, Pl. XIII, figs. 5 and 10.

Oblong-cushionshaped. The surface somewhat shaggy. The dermal membrane thin, resting on the subjacent reticulation of polyspicular fibres. The skeleton consists of an irregular network of polyspicular fibres. Spicula: Megasclera oxea 0·417—0·447^{mm}; microsclera common sigmata 0·02—0·07^{mm}, flagellate sigmata 0·078—0·09^{mm}.

Of this species we have one specimen agreeing both in outer form, structure and spiculation very well with the quoted descriptions. The form of the specimen is as an oblong cushion, and it appears to have been attached. It has a length of 34^{mm}, a breadth of 20^{mm}, and a thickness of ca. 13^{mm}. The colour (in spirit) is yellowish white. The *surface* is somewhat shaggy from projecting spicules. The *dermal membrane* is thin and transparent, and rests on the subjacent skeleton which forms, below the skin, a coarse reticulation of polyspicular fibres. From the nodes spicules or bundles of spicules arise,

and give to the surface its shaggy appearance[1]). In the meshes of the reticulation numerous round or most frequently oval *pores* are found, measured to a size of 0·017—0·119^{mm}. In the dermal membrane sigmata of the common form are copiously found.

The *skeleton*, as stated by Ridley and Dendy, consists of an irregular reticulation of polyspicular fibres; especially the fibres running towards the surface (the primary ones) are distinct, while the others are indistinct, lying irregularly, or dissolved into single spicules. The primary fibres have an average reciprocal distance of the length of one spicule. The number of spicules in the primary fibres may be somewhat varying, but most frequently it appears to be 4—6. As mentioned, a coarse and irregular reticulation is seen under the skin, and this reticulation is accordingly formed by secondary fibres, but in the nodes the ends of the primary fibres project making the surface slightly shaggy. Spongin uniting the spicules is found, but to a rather slight degree; besides it is clear, and therefore not easily observable.

Spicula: a. *Megasclera* are oxea, slightly and evenly curved, more rarely with a somewhat sharper curve, with evenly, but not long tapering ends. The length is rather constant 0·416—0·447^{mm}; only rarely it goes down to 0·38^{mm}, or rises to 0·476^{mm}; also the thickness is rather constant, and is between 0·016 and 0·012^{mm}. Shorter and finer spicules are found in very small numbers. b. *Microsclera:* 1. Sigmata of the common form; these sigmata have a regular form, they are rather varying in length, from 0·02—0·07^{mm}; the latter size, however, is only rarely attained, the average size being about 0·04^{mm}; they are rather fine and have an average thickness in the middle of ca. 0·0018^{mm}; the greatest ones may reach a thickness of up to 0·0026^{mm}. These sigmata are frequent throughout the sponge, and occur in especially large numbers in the dermal membrane. 2. Flagellate sigmata; these sigmata are long ones, so highly curved in the middle as to get two more or less parallel arms; the ends are evenly pointed, and are bent inward in an almost rectangular or acute-angled way and with a rather sharp curve; most frequently, but not in all instances, one arm is somewhat longer than the other, and the short arm has the largest hook. With regard to the size, the greater axis of the sigma is 0·078—0·09^{mm}, and the smaller axis about 0·057^{mm}. The thickness is between 0·0028—0·0035^{mm}. These sigmata are rather numerous through the whole sponge, although not so numerous as the small ones, and they are not found in the dermal membrane.

The flagellate sigma of my specimen shows a little difference from the figure in Ridley and Dendy; this difference, however, consists only in the fact that the hook of the short arm has not in the figure of Ridley and Dendy the sharp curve described by me; there is, however, no reason to put any stress upon this fact, as these sigmata upon the whole are somewhat varying in form, and Ridley and Dendy have only figured a single individual. The measures of these authors agree with my measures, when we notice the fact that they give the length from the shortest arm to the curve; a remeasuring of their figure gives the length of 0·08^{mm} for the greater axis.

Of the small sigmata the said authors say: »possibly young forms of the others«; this opinion is a consequence of the way in which they explain the growth of the chelæ, since they, with regard to these spicules, also interpret the small forms as developmental phases of the larger ones. In order

[1]) Ridley and Dendy say: »Surface .... slightly rough, probably owing to the dermal membrane having been in most parts rubbed off«. The surface, however, as will appear from the description above, is also shaggy when undamaged.

to make this fact possible, a growth would have to take place involving a complete transformation of the form of the spicule, because the small sigmata are not inscribable in the flagellate ones; now it has later been proved by Levinsen (Vidensk. Meddel. fra Nat. Foren. i Kobenhavn for 1893, 1) that the growth of the chelæ exclusively takes place by apposition; of course the same fact must be supposed to be the case with regard to the sigmata, so that the small sigmata and the flagellate ones are different bodies without any connection with each other. Neither is any transition found between these two forms, as also flagellate sigmata are found in the following species without being accompanied by common sigmata[1]). I must add, however, that I have found no developmental forms of the flagellate sigmata.

Vosmaer (The sponges of the Villem Barents Exp. 1880—81, Bijdragen tot de Dierkunde, 12. Aflevering, 3. Ged. 29, Pl. IV, figs. 35, 37, 38) mentions as *Gellius vagabundus* var. γ a species with both flagellate sigmata and sigmata of the common form. To judge from the figures of as well oxea as sigmata, and as the species has both kinds of sigmata, it is rather probable that the species is *G. flagellifer*, but as Vosmaer gives no measures it cannot be decided with certainty.

Locality: Station 52, 63° 57′ Lat. N., 13° 32′ Long. W., depth 420 fathoms. Only one specimen.

Geogr. distr. Off Marion Island in the South Sea, depth 50—75 fathoms (Challenger). The form mentioned by Vosmaer is from the Barents Sea. Accordingly the species appears to be very widely spread.

8. **G. porosus** Frstdt.

Pl. XIV, Fig. 2 a—c.

1887. *Desmacella porosa* Fristedt, Vega Exp. vetensk. Iakttag. IV, 440, Pl. 24, figs. 36—37, Pl. 28, fig. 15.

1896. *Gellius flagellifer* Lambe, Sponges from the Atl. Coast of Canada, Transact. of the Roy. Soc. of Canada, Ser. 2, II, Sect. IV, 185, Pl. I, fig. 4—4 d.

1896. ? *Gellius flagellifer* Topsent, Campagne de Caudan dans le Golfe de Gascogne, Annales de l'Univ. de Lyon, XXVI, 280, Pl. VIII, fig. 4.

Tuberous, or rounded, more or less irregular. The surface shaggy: the dermal membrane thin. The skeleton a somewhat irregular network with triangular or quadratic meshes. Spicula: Megasclera oxea 0·25—0·32^{mm}; microsclera (common sigmata?), flagellate sigmata 0·07—0·1^{mm}.

Of this species we have one specimen, of an irregular, roundish form; it is, however, somewhat damaged, and perhaps it is only a fragment; by far the greatest part of the skin is wanting. The greatest extent of the specimen is ca. 30^{mm}. The colour (in spirit) is gray; with regard to consistency the specimen is very brittle; it is perforated by numerous larger and smaller canals. The sponge is throughout highly interwoven with sand and extraneous silicious bodies. The *surface*, as far as I have been able to decide, seems to be slightly shaggy from projecting spicules.

The *skeleton* consists of a rather irregular, unispicular network of triangular and quadratic

[1]) In sigmata of the common form the fact is also that the smaller ones cannot be, while the finer ones may be, developmental phases, as most of the smaller have their final form, and an apposition would only make them thicker; if an apposition worth mentioning took place in the longitudinal direction, deviating forms would appear. For further particulars of the growth of sigmata see under *G. microtoxa*, p. 68.

meshes; here and there polyspicular fibres are found that seem especially to run towards the surface. In the nodes the spicules are united by an only little conspicuous mass of spongin.

Spicula: a. *Megasclera* are oxea, evenly or a little more sharply curved, and evenly tapering; sometimes they are rather long tapering. The length is somewhat varying, in the specimen in hand from 0·25—0·32^{mm}; the thickness is ca. 0·01—0·011^{mm}. b. *Microsclera;* these are flagellate sigmata of a similar form as those of the preceding species, but somewhat varying in form (Pl. XIV, fig. 2 b); in the most typical form one arm is curved, and much shorter than the other; the greater axis measures 0·07—0·1^{mm}, and the smaller axis ca. 0·05—0·057^{mm}; the thickness is about 0·0028^{mm}. Besides the flagellate sigmata, other sigmata are also found singly, of about the common form, but with the ends highly recurved; they are rather large, the length being 0·05—0·08^{mm}; as they only occur in very small numbers, and as the flagellate sigmata are much varying in form, they might be taken to be only a variety of the latter; against this supposition, however, their thickness appears to tell, it being somewhat greater than in the typical flagellate sigmata, viz. ca. 0·004^{mm} (Pl. XIV, fig. 2 c); this fact, however, does not exclude the possibility of their being varieties, perhaps monstrous varieties, of the flagellate sigma, of which irregular, monstrous forms are not rarely found, reaching a colossal thickness, viz. 0·007^{mm}.

This species is distinguished from the preceding one, besides by differences in the length of oxea, chiefly by its unispicular skeleton, and by the want (or the scarcity and form) of common sigmata.

As I have had before me a piece of the original specimen of Fristedt, I have been able with certainty to decide the species, which otherwise agrees very well with his description; Fristedt gives the length of oxea to be constantly 0·35^{mm}; my measurings of his original specimen, however, give the same measures as stated above for my specimen. Neither does Fristedt mention sigmata of the common form, which he is likely to have overlooked on account of their scarcity, but they are to be found in his specimen.

I think the referring to the present species of the *G. flagellifer* mentioned by Lambe l. c. to be rather certain; he also mentions that common sigmata are found in small numbers. On the other hand it is more doubtful, whether the *G. flagellifer* mentioned by Topsent l. c., is the present species. Topsent says that the spicules are the same as those in *G. flagellifer* R. and D., but besides oxea he only mentions and figures flagellate sigmata, and as the measures agree rather well with those of the present species, and the skeleton is described in the term »lignes unispiculées», I must suppose it to be identical with the present species; at all events it seems impossible that it can be *G. flagellifer* R. and D.

Locality: Skagestrand Bay on the northern coast of Iceland, depth 119 fathoms, one specimen; 63° 15′ Lat. N., 9° 35′ Long. W., a little fragment (Wandel).

Geogr. distr. The Davis Strait, depth 70 fathoms (Fristedt); the Gulf of St. Lawrence, depths 37—80 fathoms (Lambe); ?Gascony Bay, depth ca. 200 fathoms (»Caudan»).

Note. Thus it appears that at all events two distinct species with flagellate sigmata are found; these species have been intermingled, the existence of a flagellate sigma obviously having been regarded as a proof of the identity of the species. The first author, who mentions and figures such a sigma, is O. Schmidt (Spongienfauna des atlant. Gebiet. 1870, 53, Tab. V, Fig. 15). He mentions it

under his *Desmacella vagabunda*, which has been the cause that Vosmaer has referred the species before him to *Gellius vagabundus* as a variety. The species of Schmidt is from Florida from a depth of 228 fathoms, but as no nearer description or measures are given it cannot be decided, whether the species is either of the species mentioned here, or perhaps a third species. The flagellate sigma is of a peculiar form, but we cannot lay much stress upon that, especially as we do not know, whether the figured form is the typical one.

Gelliodes Ridley.

The form somewhat varying, sometimes irregular, but often well defined, erectly cylindric, leaf- or funnel-shaped. The skeleton has always well developed, often long fibres, with more or less, but most frequently rather little spongin. The fibres may form a network, or be arranged in a more dendritic manner. Spicula: Megasclera diactinal, oxea; microsclera sigmata or sigmata and toxa.

1. **G. plexa** n. sp.

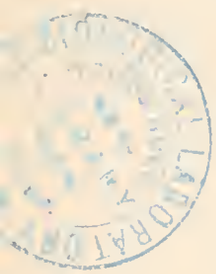
Pl. V, Figs. 3—4, Pl. XIV, Fig. 3 a—d, Figs. 4—5.

Erect, funnel-shaped (probably always so). The dermal membrane thin, resting on the subjacent, irregular network; spicules and bundles of spicules project, and therefore the surface is finely spinulous. Oscula only found on the inside, numerous and small. The skeleton consists of numerous powerful, polyspicular fibres branching from the base, which is almost exclusively formed by these fibres, up through the sponge, and forming a very solid skeleton. Rather little spongin. Spicula: Megasclera oxea 0·417—0·53^{mm}, microsclera toxa 0·11—0·16^{mm}; sigmata 0·0128—0·015^{mm}.

The specimens in hand of this species have been somewhat damaged in the trawl, so that there may be some doubt as to the outer form of the species, at all events with regard to the limits between which it may vary. We have two pieces of a form as erect leaves narrowing below, but here they are broken off. In both pieces one surface is a little convex, the other a little concave. On the other hand a third, somewhat smaller specimen has a calicular form, and narrows also below; but also this specimen is broken off here. According to these facts it is probable that the two first-mentioned pieces are parts of a likewise calicular sponge, and that the form of the species is as a perhaps short-stalked cup with a wide opening. Of the two mentioned pieces one has a greatest height of 130^{mm} and a breadth of ca. 90^{mm}; the thickness in the middle is 10—12^{mm}; it is greatest below, and decreases towards the upper edge; thus where the sponge is broken off, it is ca. 22^{mm}. The calicular specimen which is also much damaged, is somewhat smaller, it has a height of 75^{mm}; the width of the funnel cannot be given with certainty, as the edge is broken off, but may be estimated at ca. 45^{mm}, and the thickness below where the specimen is broken off, is about 18^{mm}. The colour (in spirit) is grayish white or somewhat darker grayish. On account of the many strong longitudinal fibres the consistency is rather firm. The *surface* where it is undamaged, is finely spinulous on account of the projecting spicules and bundles of spicules. The *dermal membrane* is thin, and rests on the subjacent irregular network of fibres. *Oscula* and *pores:* As the skin is only kept to a small extent, the facts with regard

to the situation of oscula and pores have only been discernible in a few places; especially the skin of the outer surface has only been kept in a few spots. As far as I have been able to examine the facts they are as follows: On the inside of the cup distinct, sharply defined circular oscula may be seen with the naked eye in abundant numbers. They are of a somewhat different size, of a diameter from ca. 1—2^{mm}. When a piece of the skin is examined under the microscope many smaller openings are seen decreasing in size quite down to 0·12^{mm}. On the outer side no greater openings visible to the naked eye, are seen, but under a lens or a microscope numerous openings are found, of sizes measured from 0·029—0·3^{mm}. The small openings of a size of about 0·029^{mm} are the most numerous, and are generally gathered into groups. While thus the openings of the inside upon the whole are greater than those of the outside, they are, as is seen from the above, not sharply separated with regard to size, the greatest openings on the outside being greater than the smaller ones on the inside. The openings of the outside, I suppose, act as pores and those of the inside as oscula. Numerous canals of an average diameter of 2—3^{mm} go more or less horizontally through the wall of the sponge; they have the greatest width towards the outside. They are distinctly seen, when the skin and the skeletal tissue supporting it is removed. The oscula of the inside, at all events the larger ones, are direct openings of these canals.

The *skeleton* consists of powerful polyspicular fibres branching up through the sponge from the base where they are so closely pressed together as to form a compact mass. They are thickest below, and may here be coalesced into bundles of a thickness of a few millimetres; upward they become thinner. They branch in a dendritic way up through the sponge frequently anastomosing and coalescing with each other. As the fibres are numerous and placed close together the whole thing forms a very strong skeleton crossed by the horizontal canals mentioned above, which run in the intervals between the fibres; the sponge is otherwise so closely interwoven with these fibres that the soft parts are only little conspicuous. The finest fibres form a close, irregular network filling out the intervals between the principal fibres. On either side of the sponge an irregular network is also found on which the skin is resting; from the nodes of this network the bundles of spicules arise that make the surface finely spinulous. The fibres are firm and solid; their spicules are united by a clear mass of spongin which is not, however, so copious that it may be distinctly seen to coat the whole fibre, even if it is perhaps completely or for the greater part lined with a thin layer.



Spicula: a. *Megasclera* are oxea, very evenly tapering, and evenly and slightly curved, sometimes straight, more rarely they are somewhat sharper curved; the length is between 0·417—0·53^{mm}, most frequently it is 0·44—0·47^{mm}. The thickness is ca. 0·018—0·024^{mm}, the thickest ones being generally not the longest. In a specimen (from East-Greenland) the most frequent length of the needles is 0·417^{mm}, and may be even less, and they do not reach 0·47^{mm}. Shorter and finer needles are found, but only in very small numbers. b. *Microsclera:* 1. Toxa; these are rather large, regularly formed bows forming an obtuse angle; only rarely it is somewhat sharper. The ends form short, recurved points. They are thickest in the middle, and decrease, but only slightly, in thickness outward. Their length is between 0·11 and 0·16^{mm}, and the thickness in the middle is between 0·004—0·007^{mm}. Besides these fully developed bows, some finer, to exceedingly fine ones, are found; these latter are on an average not much shorter than the thicker ones, only the very finest go down to a length of 0·057^{mm}.

These fine bows I suppose to be developmental forms; to be sure, they are possessed of the recurved points, but there seems to be no objection to the supposition that by a growth by mere apposition they may attain the same form and size as the large ones. 2. Sigmata; these are small and of a rather constant size; the length is 0·0128—0·015^{mm}, and may in a few cases reach 0·018^{mm}; the thickness is about 0·001^{mm}. Toxa and sigmata occur throughout the sponge, but are especially abundant in the dermis.

Locality: Station 2, 63° 04′ Lat. N., 9° 22′ Long. W., depth 262 fathoms, a calicular specimen; station 3, 63° 35′ Lat. N., 10° 24′ Long. W., depth 272 fathoms, two leaf-shaped fragments; 63° 15′ Lat. N., 9° 35′ Long. W., depth 270 fathoms, a little fragment (Wandel); 72° 40′ Lat. N., ca. 20° Long. W., depth 100 fathoms, a little fragment (the East-Greenland Expedition 1891—92). Accordingly the species has been taken to the northwest of the Faröe Islands and off the northern East-Greenland.

2. **G. consimilis** n. sp.

Pl. XIV, Fig. 6 a—e.

(Leaf- or funnel-shaped?). The skeleton consisting of numerous solid polyspicular fibres branching through the sponge and forming a solid skeleton. Rather small amount of spongin. Spicula: Megasclera oxea 0·528—0·66^{mm}: microsclera toxa 0·119—0·19^{mm}, sigmata 0·018—0·0268^{mm}.

Of this species we have only a small fragment of a greatest extent of ca. 20^{mm}; the fragment is flat, of a thickness of 5—6^{mm}, and it must have belonged to an erect, flat, i. e. leaf-shaped or calicular sponge. The structure of the fragment, otherwise, is like that of the preceding species; the same solid, branched fibres are found, arranged in the same way, and the sponge is also pierced by horizontal canals of a similar size. The skin is wanting, so that nothing can be said with regard to oscula and pores; on one side, however, one single, naturally bounded osculum is seen, of a diameter something more than 1^{mm}.

The *skeleton*, as has been mentioned, is of quite the same structure as in the preceding species, and consists of solid, branching, and anastomosing fibres, the intervals between which are filled by an irregular polyspicular network. The spicules of the fibres are cemented by a clear mass of spongin which is not seen here neither to form a distinct layer round the spicules.

Spicula: The combination of the spicules is the same as in the preceding species, but the distinguishing character is to be found in the form and sizes of the spicules. a. *Megasclera* are oxea; these are slender, and evenly and long tapering; they are slightly curved, but rather frequently the curving is rather sharp, and then they may in form remind somewhat of the spicules of *Halichondria panicea*. The length is between 0·528—0·66^{mm}, and the thickness 0·012—0·0178^{mm}. A few shorter and finer needles are seen. b. *Microsclera:* 1. Toxa; these are of the same form as in the preceding species; the length varies from ca. 0·119—0·19^{mm}, the thickness from ca. 0·004—0·005^{mm}; fine bows, developmental forms, are also seen, but only in quite small numbers. 2. Sigmata; these are of a length of 0·018—0·0268^{mm}, the thickness is ca. 0·001^{mm}.

Both with regard to structure and spiculation this species appears to be very closely related to the preceding one; but it is very well distinguished from this latter species by the size of the spi-

cules and especially by the form of the oxea, which is quite different from that in *G. plexa*; for the fact that the sizes of all three forms of spicules are above those in *G. plexa*, can scarcely by itself be regarded as a sure mark of separation between the two species.

Locality: Station 113, 69° 31′ Lat. N., 7° 06′ Long. W., depth 1309 fathoms (temperature —1°0 C.), one fragment.

These two *Gelliodes*-species differ from the hitherto known species by being possessed of toxa. Thus they show an approaching to the genus *Toxochalina*, but in this genus no sigmata should be found. Ridley and Dendy (Challeng. Report, Monaxonida, XX, 47) say that *Gelliodes* is only different from *Toxochalina* by the presence of sigmata in stead of toxa, and they continue: «It is perhaps doubtful whether the last character (sigma instead of toxa) is of generic value, and whether *Toxochalina* and *Gelliodes* should not be merged in one genus, but as no species is yet known, whose spicular complement comprises both toxa and sigmata, they may at present be kept apart . Now the two species described here show just this combination of toxa and sigmata, and consequently the genus *Toxochalina*, I suppose, must be merged in *Gelliodes*. I shall, however, call attention to the fact that in the diagnosis of *Toxachalina* the fibres are said to be »rectangularly arranged , while, in the two species described here, they are irregularly branched, what seems upon the whole to be predominant in the *Gelliodes*-species.

Oceanapia Norman.

The sponge consisting of a round body from which more or fewer, branched or unbranched fistulæ arise, which are closed at the ends. Outermost the body is surrounded by a hard, rindlike layer. Spongin present. Spicula: Megasclera diactinal, oxea; microsclera sigmata.

As mentioned under *Phlæodictyon*, I place *Oceanapia* under the *Gelliinæ*, as I regard it to be closely allied to *Gelliodes*. The character that separates it from this genus, would even seem chiefly to be the form only; but nevertheless the genus may, at all events for the present, be kept up.

At present perhaps only the one species is known, as the only one of the three *Oceanapia*-species described by Dendy that is possessed of sigmata (Proc. of the Roy. Soc. Victoria VII, 1895, 248), *O. mollis*, according to its skeletal structure, is more likely to be a *Gellius*, what Dendy himself so far directs the attention to, as he says that it is very closely related to *Gellius*. Of the two species established by Topsent (Rev. Suisse de Zool. IV, 1897, 467, Pl. XIX, fig. 13, Pl. XXI, fig. 29; 469, Pl. XIX, fig. 17), *amboinensis* and *fragilis*, the external form is not known, and both may perhaps be referred to *Gelliodes*. Of the *Rhizochalina fibulata* established by Schmidt (Spong. Meerbus. v. Mexico, 76), nothing can be said on account of the incompleteness of the description[1]).

1. **O. robusta** Bow.

Pl. XV, Fig. 1 a—c, Figs. 2—4.

1866. *Isodictya robusta* Bowerbank, Mon. Brit. Spong. II, 304, 20.

1866. *Desmacidon Jeffreysii* Bowerbank, Mon. Brit. Spong. II, 347, 2.

[1]) On the other hand, as will be seen hereafter, there is a possibility that Ridley and Dendy's *O. robusta* is not identical with the species of Bowerbank. The footnote of these authors under *Rhizochalina fistulosa* might likewise make it possible that here we had still another species of *Oceanapia*.

1869. *Oceanapia Jeffreysii* Norman, Report Brit. Assoc. for 1868, 334.

1874. *Desmacidon Jeffreysii* Bowerbank, Mon. Brit. Spong. III, 157, Pl. LXII.

1882. — — Carter, Ann. Mag. Nat. Hist. Ser. 5, X, 121.

1885. *Reniera tubulosa* Armauer Hansen (non Fristedt), The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 4.

1887. ?*Oceanapia robusta* Ridley and Dendy, Challeng. Report, Monaxonida, XX, 36, Pl. IX, fig. 3.

1887. *Desmacidon Jeffreysii* Fristedt, Vega Exp. vetensk. Iakttag. IV, 442.

1892. *Gelliodes cavicornis* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 78, Pl. III, figs. 4 et 9, Pl. IX, fig. 12.

The sponge consisting of a round body with more or fewer digitate, branched or unbranched fistulæ, which are closed at the ends. The surface slightly shaggy from projecting spicules. Outermost a hard, rindlike layer. The skeleton of the external layer an irregular network, chiefly of thick polyspicular fibres. In the interior the skeleton consists of scattered needles. Spongin is found to a small degree in the fibres of the rind-layer. Spicula: Megasclera oxea 0·20—0·268^{mm}; microsclera sigmata 0·014^{mm}.

This species which, as is well known, is formed as a globular body from the surface of which branched or unbranched fistula arise, is in the collection only found in fragments, partly pieces of the external hard rind of the globular body, partly broken off fistulæ. The largest piece which quite appears to be part of a globular surface, has a greatest extent of ca. 20^{cm}; it is only convex to a slight degree, and must accordingly be a piece of a very large specimen. It has had several fistulæ, but they are broken off; at their base they have had a diameter of 40—50^{mm}. The thickness of the rind-layer is somewhat varying, about 10—15^{mm}. In fragments of smaller specimens the rind is considerably thinner, about 2—3^{mm}. Of the torn off fistulæ (belonging to the large specimen), some are unbranched, while others are divided into at most 4 or 5 digitate branches. The long fistulæ have a length of ca. 13^{cm}; towards the ends they are generally somewhat compressed. The diameters of the unbranched fistulæ are at most ca. 20^{mm}; but the branched ones are considerably thicker at the base. All the undamaged fistulæ are closed as the ends, so that it seems that the fistulæ are always closed. The colour of the sponge (in spirit) is light yellow. In the earlier descriptions the *surface* is stated to be smooth; this, however, is incorrect; it is even, but slightly shaggy from projecting spicules. As the specimens in hand chiefly consist of pieces of the rind-layer, we have only comparatively little of the interior body. This interior consists of a peculiar, loose and pappy substance of a yellowish white colour; when this substance is dried it contracts to a very high degree, becomes dark yellow and semi-transparent, reminding, as stated by Norman l. c., of wax, although not in consistency, as it is very hard.

The *pores* are found copiously as well on the body as on the fistulæ in the intervals between the spicules; they are measured to a size of about 0·014—0·057^{mm}. No *oscula* are found, and it is doubtful how the facts are with regard to the excurrent canals. As mentioned the fistulæ are closed at the ends, but here and in their whole outer part they show a peculiar structure, the dermal membrane wanting or being reduced, so that holes appear of the same size as the meshes in the skeleton below; I am, however, inclined to think that this fact is due only to damaging, and if so, the pores of the skin must act both as incurrent and as excurrent openings. On account of the arrangement of the canal system, I suppose, that it is the pores of the fistulæ that act as excurrent openings.

The *canal system.* In the outermost part of the rind subdermal cavities are found, often as horizontal canals into which the pores lead, and from these cavities canals go in through the rind; they are rather numerous, so that a great many round holes, generally of a diameter of 1—3^{mm}, are seen on the inside of the rind-layer, when this layer is separated from the inner tissue[1]). These canals are lined by a thin membrane the spicules of which are gathered into bands or fibres running parallel with each other, sometimes in the longitudinal direction of the canals, sometimes obliquely on, or across this direction. The canals continue through the interior body, the direction apparently being chiefly towards the centre; in the soft tissue they are surrounded by a membrane, so that, when the tissue is washed away, they appear as membranous tubes. This membrane is provided with a spicula-net of loose fibres, and innermost it is lined with the membrane mentioned above. Other canals, presumably the excurrent ones, come together and open into the fistulæ, in the base of which they converge, and they continue in the inner cavity of the fistulæ. The walls of the fistulæ are provided with a dense plait of fibres; the wall is easily separated into two lamellæ, of which the inner one is provided with the same kind of spicula-net of loose fibres as is found in the membrane surrounding the canals. The fistulæ are inmost lined with the same membrane as that lining the canals, and it is provided with spicules in the same manner.

The *skeleton.* In the rind-layer the skeleton consists of a network of rather thick, polyspicular fibres forming irregular, most frequently polygonal meshes (Pl. XV, fig. 2). The thickness of the fibres is somewhat varying, but generally it is from 0·05—0·1^{mm}. The meshes of this network vary very much in size in different places, and they are smallest inward; in these meshes are seen thinner polyspicular, or quite unispicular fibres with an irregular course, and also forming an irregular network. In the network no distinction can be made between fibres running towards the surface, and fibres running parallel to it; here and there longer and most frequently a little thicker fibres are seen, but they have also a quite irregular course. The spicules of this network are cemented by a clear, not copious mass of spongin; it is especially observable where it unites the ends of the spicules, but in the fibres it unites the spicules in their whole length. Outermost a layer of spicules are found at right angles to the surface, and projecting a little, so that the surface of the sponge becomes slightly shaggy; these spicules frequently show a somewhat faulike arrangement. Between the perpendicular spicules others are interwoven partly oblique to, partly parallel to, the surface; therefore the skin, when seen from the surface, shows a rather dense, irregular network of spicules intercrossing in all directions, and from which needles rise in a vertical direction. The dermal membrane rests on this network; it cannot be separated by itself, but the whole layer with the vertical needles is easily peeled off. This network is also cemented by a mass of spongin, not only found at the ends of the spicules, but in all places where the spicules touch each other. Inwardly the skeleton of the rind is absolutely sharply bounded from the tissue inside of it. In the interior body the skeleton only consists of scattered needles without any visible order; they impart no firmness to this tissue, neither is any spongin found here. As mentioned above, the canals crossing the interior body, are surrounded by a membrane; this membrane has a skeleton of very loose fibres forming a network, the longest fibres of which run in the longitudinal direction of the canal (Pl. XV, fig. 3); also in this network the spicules are united

[1]) It is these holes which are called oscula by Bowerbank l. c. 304, as he had only fragments of the sponge at that time.

by spongin which seems only, however, to unite their ends. The membrane forming the inmost lining of the canals, as before mentioned, has spicules loosely gathered into bands, the direction of which in relation to the canals may be varying (Pl. XV, fig. 4); no spongin is found here. When we have got a clear understanding of the structure of the skeleton of the rind and the walls of the canals, the skeletal structure of the fistulæ is easily understood; the fact is that their external part is formed by the rind, or, to put it more exactly, by the outer layer of the rind which passes into the outer layer of the fistulæ, and their interior layer is formed by the membrane surrounding the canals with its skeletal net of loose fibres. These two parts are comparatively loosely joined, and may easily be separated. The external layer of the fistulæ has a thickness of about 2^{mm}; here the fibres are comparatively powerful, and especially powerful ones appear running longitudinally; the meshes formed by the fibres, are also averagely larger than in the rind-layer of the body, so that fistulæ upon the whole consist of a comparatively open plait of fibres. Outermost the same layer with vertically projecting spicules is found as on the other parts of the body. The inner layer of the fistulæ is constructed in quite the same way as is the case in the canals, and innermost it is lined with the same membrane as these. The fistulæ consist almost exclusively of fibres and membranes without any other tissue. The outer and inner layers are in the upper end more firmly joined, and here the inner membrane shows a great many holes, so that it is reduced to a network; by this feature the pores on the fistulæ are made to lead more or less directly into the inner cavity. It is not difficult to understand that these fistulæ can act as oscula, for the water streaming forth through the excurrent canals, is poured into their inner cavity, and from the upper part of this cavity it is emptied out through a great many pores; thus the whole collection of pores serves to remove the quantity of water which would else have to be removed through a single osculum.

Spicula: a. *Megasclera* are oxea, slightly, not rarely a little irregularly curved, with sharp, not long points, most frequently bounded by straight lines. Their length is generally between $0{\cdot}20$—$0{\cdot}268^{mm}$, but it seems to be somewhat varying, as in a specimen from station 83 the length frequently is $0{\cdot}298^{mm}$, the most common length is $0{\cdot}23$—$0{\cdot}26^{mm}$. Ridley and Dendy, l. c., state the length of oxea in Bowerbank's original specimen to be $0{\cdot}19$—$0{\cdot}25^{mm}$. The thickness is $0{\cdot}008$—$0{\cdot}0128^{mm}$. Shorter and finer needles occur, but only singly; in the interior tissue, however, they are in some places seen in no small numbers. b. *Microsclera:* only one form, viz. sigmata; these are very small and of a rather constant size; the length is averagely $0{\cdot}014^{mm}$, sometimes up to $0{\cdot}017^{mm}$, the thickness in the middle is about $0{\cdot}001^{mm}$. Bowerbank gives the length as $\frac{1}{2143}$ inch $= 0{\cdot}012^{mm}$. Ridley and Dendy, on the other hand, give the length of the sigma to be $0{\cdot}038^{mm}$, and the thickness $0{\cdot}0032^{mm}$; this size of the sigmata would almost seem to make it doubtful, whether Ridley and Dendy's species is *Oceanapia robusta*, or perhaps an allied species. Sigmata are found throughout the sponge, but are especially frequent in the membranes, as well the dermal membrane as the membranes of the canals, and also in the inner tissue.

As Topsent has sent me a piece (fragment and fistulæ) of the *Gelliodes cavicornis* established by him l. c., I have been able with certainly to decide that it is *Oceanapia robusta*. Professor Topsent has also in a letter declared that he thinks the two species to be identical. — As I have had occasion to examine a piece of the specimen mentioned by Fristedt l. c. which, with some misgivings,

he refers here, on account, as it would seem, of his not having seen the spicules, I have been able with certainty to decide that it is *Oceanapia robusta.*

Remarks. In this species we find the so-called «cellules sphéruleuses» to be especially conspicuous, partly because they occur in large numbers, and partly on account of their being rather large. They are especially found in the interior body, and on the membrane that lines the innost part of the canals (Pl. XV, fig. 4). They have an average size of 0·021^{mm}. Their form is most frequently roundish, but they are not rarely produced at one end so as to become pyriform, or at both ends, being then more or less fusiform. They are filled with clear, somewhat refringent granules, and are (in spirit) of a light yellow colour. Most frequently they are very conspicuous, and have therefore also been observed by Bowerbank, who calls them «gemmules», and mentions them l. c. II, 349 and more fully in 1874, l. c. III, 160 where he mentions that they are filled with granules, and gives their size to $\frac{1}{1500}$ inch = 0·017^{mm}.

Locality: Station 1, 62° 30′ Lat. N., 8° 21′ Long. W., depth 132 fathoms (fragments and fistulæ of a very large specimen); station 10, 64° 24′ Lat. N., 28° 50′ Long. W., depth 788 fathoms (fragments of a smaller specimen); station 78, 60° 37′ Lat. N., 27° 52′ Long. W., depth 799 fathoms, and station 83, 62° 25′ Lat. N., 28° 30′ Long. W., depth 912 fathoms (a few torn off fistulæ).

Geogr. distr. Originally this species was only known from the Shetland Islands from a depth of 70—90 fathoms. Later it has been taken in Sognefjord on the western coast of Norway, depth 650 fathoms (The Norwegian North-Atlantic Expedition); the fact is that I have been able, as I have had Armauer Hansen's original specimen, with certainty to refer to the present species the *Reniera tubulosa* mentioned by him l. c. Armauer Hansen perceives the resemblance himself, but says that his species has no sigmata; these however, he must have failed to see, as they are found copiously in his specimen. Further it has been taken at East-Greenland, depth 180 fathoms (Fristedt). — Including the localities in which the species has been taken by the Ingolf, it has now been found across the Atlantic, as we have the places Sognefjord, the Shetland Islands, the Faröe Islands, south and west of Iceland, and at East-Greenland. The species, however, reaches far more to the southward having been taken at the Azores, depth ca. 70 fathoms (*Gelliodes cavicornis* Topsent l. c.).

Ridley and Dendy in Challenger Report mention it from Bermuda or Bahia (the locality is uncertain), but, as before said, there is some doubt of the identity of the species.

Subfam. 2. **Desmacellinæ.**

Biemma Gray.

The form varying, irregular, but often compressed, or more or less leaf-shaped. The skeleton consists of a more or less irregular network of spicules, or of fibres that are most frequently not very marked, and reach no great length. Spongin (most frequently or always) wanting. Spicula: Megasclera monactinal, tylostyli or subtylostyli; microsclera sigmata, or sigmata and toxa.

1. **B. rosea** Frstdt.

Pl. VI, Figs. 1—2, Pl. XV, Fig. 5 a—d, Figs. 6—9.

1887. *Desmacella rosea* Fristedt, Vega Exp. vetensk. Iakttag. IV, 439, Pl. 24, figs. 32—35, Pl. 28, fig. 13.

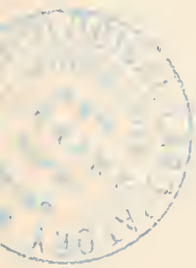
1892. *Biemma Dautzenbergi* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 83, Pl. III, fig. 5, Pl. IX, fig. 16.

More or less irregularly leaf-shaped. The dermal membrane thin, without spicules, resting on spicules spreading in a penicillate way and projecting. The surface accordingly finely shaggy. Oscula numerous, small, only on one side. The skeleton an irregular network of spicules and loose fibres, from which short fibres go vertically to the surface. Spongin wanting. Spicula: Megasclera long, slender tylostyli or subtylostyli, 0·203—0·89^{mm}; microsclera contort sigmata 0·017—0·03^{mm}.

Of this species we have no complete specimen, but a great many larger or smaller fragments which give, however, mainly information as to the external form of the species. By far the greatest number of the fragments are plate- or leaf-shaped, and generally somewhat arcuate, often in an irregular way; only a few are quite irregular, and then they show a concave and a convex side, being of a somewhat calicular form. The largest specimen has an extent of 12^{cm} in one direction by 8—9^{cm} in the other. A comparison of the separate fragments conveys the decided impression that this leaf-shaped sponge has been spread more or less horizontally; the irregular, somewhat calicular pieces are, no doubt, the middle parts, and by these the sponge has been attached; a single one of these pieces even shows a short stalk, which is seen to have been attached. Then from these middle parts the sponge has extended in a disc-like manner, more or less horizontally; thus, perhaps, it has assumed a very flat calicular form. The before mentioned largest piece conveys the impression of being a cut from about the middle to the edge; if so, this specimen would have been of a diameter of about 20^{cm}. The thickness varies between about 10 and 3^{mm}; it is greatest towards the middle, and decreases towards the edge; the irregular middle parts may be somewhat thicker. A little specimen from station 89 has a different form, as a very thin incrustation on a Hexactinellid-skeleton; this specimen the greatest extent of which is ca. 20^{mm}, I take to be a quite young individual. The *surface* is quite finely shaggy from the projecting spicules. The consistency is rather firm. The colour (in spirit) varies between yellow and brown[1]). The *dermal membrane* is thin and transparent, and is supported by spicules spreading in a penicillate way, and piercing it. *Oscula* and *pores*: Where the surface is quite undamaged and the dermal membrane consequently present, close-set, most frequently circular openings may be seen on one side of the sponge with the naked eye, or by means of a magnifying glass; their size is a little varying, generally it is 0·5—1^{mm}. The dermal membrane rises a little round these openings, and shows a circlet of projecting spicules. On the other side of the sponge no openings are seen. The mentioned openings are oscula which accordingly are only found on one side. When this oscular side is examined under the microscope, the openings are seen to be of very different sizes, and they have been measured quite down to 0·029^{mm}; but this fact is obviously only due to a different degree of closing, the fact being that the smaller the opening appears, the broader is the thin membrane that surrounds the osculum and shuts the canal, of which the osculum is the excurrent opening. There is, however, some constant difference in the size of the oscular opening, which difference is dependent on the width of the canal. The

1) All the pieces from station 10, and most of those from station 89 are almost quite black. This fact I suppose to be due to a staining, but as they are not known to have been in spirit together with animals from which they might have got the colour, it would seem that the sponge may sometimes get the black colour in spirit.

other side of the sponge that has no oscula, is the pore-side. The pores are here very close-set, they are more or less circular, and are lying in groups in the fields formed between the bundles of spicules that are spread in a penicillate manner. Their size is between 0·03—0·09^{mm}. In this species pores and oscula are thus exclusively localized each to their own side, and in connection with this fact the two sides show a somewhat different structure of the skeleton. To judge by the specimens in hand it seems to be the more or less convex side that is provided with oscula; it was to be expected that the convex side was the one turned downward or outward, and then oscula would be found on the outside; but whether this be the fact cannot be decided, until a whole specimen is obtained for examination.



The *skeleton* consists of an irregular network of spicules crossing each other in every direction, and between them loose fibres are found. Spongin is not observed. Towards its two surfaces the skeleton, however, has a particular structure, short fibres being found here running more or less vertically on the surface; in the outer end of these fibres the spicules spread in a penicillate or funnel-shaped way, and pierce the dermal membrane. When these fibres are not vertical on the surface, they generally bend a little arcuately outward towards the outer edge of the sponge. As said before, there is some difference between the two sides; on the oscular side these fibres which support the dermal membrane as columns, are shorter and thinner, accordingly they generally consist of fewer spicules, and they are closer together than on the pore-side. On this side where the columns are somewhat longer and farther from each other, we therefore see in a transverse section just below the skin a great many subdermal cavities separated by the columns; in reality they all form presumably one large subdermal cavity. Also on the oscular side the skin is supported by the columns, so that we also here find a cavity, but a much smaller one, below the skin (Pl. XV, figs. 8—9). The skin on the pore side comes off very easily, and when it is off the numerous incurrent canals are seen; they are of the same width as the excurrent canals, and in pieces where the dermal membrane is wanting, we may easily be led to suppose that oscula are found on both sides. The incurrent canals and the excurrent ones go, each from their side of the sponge, through it almost to the opposite side; they are often somewhat bent, and also often branched; they are of the same width, in the principal canals it is ca. 1^{mm}. In the irregular middle parts of the sponge the canals have also a more irregular course.

Spicula: a. *Megasclera.* These are long and slender subtylostyli or tylostyli. Sometimes they are straight, but more frequently slightly curved; the curve may be somewhat varying, and is not rarely found nearest to the head end. The head may be marked off to a different degree from a scarcely perceptible swelling to a fully developed, round head, so that the needle becomes a marked tylostylus; sometimes the swelling is found a little before the end. The other end is evenly produced to a long, rather fine point. The needle is thickest in the middle, also tapering somewhat towards the head end. The size of the needles is very much varying; the most common length seems to lie between 0·65^{mm} and 0·77^{mm}, but it may increase to 0·89^{mm} and go quite down to 0·203^{mm}, which is the smallest size I have measured. Like the length the thickness is also very much varying; the largest spicules have in the middle a thickness of 0·017^{mm}, and the smallest go down to 0·004^{mm}. Upon the whole the thickness is in proportion to the length, but among the longer forms rather thin ones may also be found. Quite fine spicules, developmental forms, are found of different lengths, but in small

numbers. b. *Microsclera.* Only one form, sigmata, is found. These are rather thin and almost always contort, up to a quarter of a turn. Their length is between 0·017—0·028^{mm}, sometimes they may reach 0·03^{mm}; the thickness is 0·001^{mm} in the larger ones, the smaller are a little finer.

As I have had a piece of the original specimen of Fristedt, I have been able to identify the species with certainty. Fristedt gives the length of the tylostyli to 0·5^{mm}, but in the original specimen before me I have measured it to 0·77^{mm}. Fristedt does not mention an oscular side and a pore-side, the reason being, I suppose, that the dermal membrane has been wanting on the pore side of his specimen. With regard to the columns supporting the dermal membrane he says: The dermis is furnished with numerous funnel-like depressions, which by degrees are closed, forming a fibre». From the above description I suppose it will be possible to understand, what is meant by this peculiar, not quite correct mode of expression. — The *Biemma Dautzenbergi* established by Topsent l. c. must, according to the description, be identical with *B. rosea.* Topsent to whom I have sent a piece, declares also in a letter that he supposes them to be identical.

Locality: Of this rather interesting species the Ingolf Expedition has brought home a great many larger and smaller fragments, probably, however, only representing few specimens. Station 9, 64° 18′ Lat. N., 27° 00′ Long. W., depth 295 fathoms; station 10, 64° 24′ Lat. N., 28° 50′ Long. W., depth 788 fathoms; station 73, 62° 58′ Lat. N., 23° 28′ Long. W., depth 486 fathoms; station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms. All these stations are off the southwestern coast of Iceland.

Geogr. distr. Fristedt has the species from East-Greenland, depth 125 fathoms; thus as arctic it has hitherto only been found in the Denmark Strait with a bathymetrical range from 125—788 fathoms, but this species also belongs to those found farther southward, having been taken on the expedition of the Prince of Monaco in 1888 (Topsent l. c. *B. Dautzenbergi*) at the Azores on a depth of ca. 735 fathoms.

2. **B. annexa** O. Schmidt.

Pl. IV, Fig. 14, Pl. XVII, Fig. 3 a—f.

1870. *Desmacella vagabunda* var. *annexa* O. Schmidt, Spongienf. atlant. Gebiet 53.
1874. *Desmacella pumilio* Carter, Ann. Mag. Nat. Hist. Ser. 4, Vol. XIV, 250, Pl. XV, fig. 42 a, b, c.
1875. *Desmacella vagabunda* var. *annexa* O. Schmidt, Jahresber. d. Comm. zur wissenschaftlichen Unters. d. deutschen Meere in Kiel für 1872—73, 1875, 117.
1880. *Desmacodes vagabundus* var. *annexa* Vosmaer, Notes from the Leyden Mus. II, 108, 15.
1887. *Desmacella annexa* Ridley and Dendy, Challeng. Report, Monaxonida, Vol. XX, 59.
1890. *Biemma Chevreuxi* Topsent, Bull. de la Soc. de France, Vol. XV, 32.
1892. *Desmacella annexa* Topsent, Résultats d. Campagn. scient. du Prince de Monaco, Fasc. II, 84, Pl. IX, fig. 18.
1896. *Desmacella annexa* Topsent, Campagne de «Caudan» dans le Golf de Gascogne. Ann. de l'Université de Lyon, XXVI, 281, Pl. 8, figs. 5—6.

Of an irregular form, incrusting, or more or less massive. The dermal membrane thin, without spicules, resting on the projecting spicules that are spread in a penicillate way, the surface accordingly finely shaggy. The skeleton consists of short fibres chiefly running towards the surface, and

scattered spicules. Spongin wanting. Spicula: Megasclera long, slender tylostyli 0·22—1·05^{mm}; microsclera trichoform toxa 0·085—0·114^{mm}, sigmata of two sizes, 0·025—0·028^{mm} and 0·014^{mm}.

Of this species we have a rather whole specimen and two smaller fragments. The whole specimen is all but leaf-shaped, but with irregular smaller folds, and irregularly arcuate, so that one side is somewhat concave. The outline of the specimen is about triangular; one edge has been attached, while the two free edges are somewhat irregularly lobed and bent towards the concave side. The height of the specimen is somewhat more than 50^{mm}, and the thickness that is somewhat varying, reaches to 10^{mm}. The colour (in spirit) is light grayish. As in the preceding species the *dermal membrane* is supported by projecting, penicillate bundles of spicules, and consequently the *surface* is finely shaggy. As the surface is damaged in most places, I can say nothing definite with regard to the distribution of *oscula* and *pores*; the pores seem to be found on both sides, but the specimen shows no oscula.

The *skeleton* is somewhat more richly provided with fibres than in the preceding species; it consists of fibres chiefly running upward and bending towards the surface, so that they never grow long; between the fibres needles are found scattered in all directions. The ends of the fibres spread in a penicillate way, and pierce the dermal membrane which they support, as in the preceding species. Topsent says l. c., 1896, p. 283: ..... membrane spiculeuse réticulée....., but the dermal membrane itself has no spicules (with the exception of microsclera), it is only supported by the above mentioned bundles of spicules. Often these bundles are not situated vertically on the surface, but, as a consequence of the direction of the fibres, they are directed upward towards the upper end of the sponge, so that, when the dermal membrane is viewed from above, fan-shaped, somewhat decumbent bundles are seen. No spongin is observed in the skeleton.

Spicula: a. *Megasclera;* these are long, slender tylostyli, almost always a little curved, especially towards the head end. Generally the head is distinctly marked and rather round; the opposite end tapers to a rather long and fine point. The length of the needles is much varying, the most common length of the longest (fully developed) ones is between 0·83—0·9^{mm}, but the length may increase to 1·05^{mm}. By even transitions the size goes down to 0·22^{mm}, which is the smallest measured size. The thickness of the large needles varies from 0·014—0·011^{mm}, while in the smallest ones it goes down to 0·005^{mm}. Thus the needles are a little finer than in the preceding species; they are almost not fusiform at all, as they do not at all taper, or only taper to a slight degree, towards the head. b. *Microsclera:* 1. Toxa; these are very fine, trichoform, and have a flat curve in the middle, and a similar one a little from each end; all three curves are very flat, and Schmidt therefore mentions these bows as feine umspitzige Nadeln and Vosmaer as ac^2. Otherwise the curve is sometimes a little irregular. The length is between 0·085—0·114^{mm}, and the thickness in the middle is ca. 0·001^{mm}. These bows are exceedingly abundant everywhere in the sponge, and are also found in the dermal membrane. 2. Sigmata; these occur in two different sizes; the ends of the largest are most frequently curved with a more or less sharp bend, they are plane, or more or less contort up to a quarter of a turn; their length is rather constant 0·025—0·028^{mm}, and the thickness is ca. 0·002^{mm}. The small sigmata are always somewhat contort, their length is 0·014^{mm}, and the thickness ca. 0·001^{mm}. As the toxa, both kinds of sigmata are found throughout the sponge, but not in so large numbers.

The measures given here for the spicules of this species, agree with those given by Topsent (l. c. 1896) for specimens taken by Caudan , but, as more particularly mentioned by Topsent in the place cited, the spicules of the species appear to be subject to some variation; thus he mentions specimens in which the tylostyli only reach a length of 0·5^{mm}; also the small sigmata seem sometimes to be quite wanting, or, on the other hand, sometimes to be found in somewhat larger numbers than the large ones; the size of toxa, on the contrary, is constant.

Biemma annexa was first mentioned by Schmidt l. c. as a variety of his *Desmacella vagabunda;* Vosmaer, in 1880 l. c., supposes it to be a separate species, but it was first established as a separate species by Ridley and Dendy in 1887. Topsent who in 1890 l. c., reestablishes Gray's old genus *Biemma* for the forms belonging here, which forms are distinguished from *Desmacella* by the halichondroid structure of the skeleton, first refers the present species (under the name of *Biemma Chevreuxi*, as he took it to be a new species) to the genus *Biemma*, but in 1892 l. c. he says that on account of the presence of toxa it belongs to the genus *Desmacella.* In the occurrence of toxa I cannot, however, see any reason for referring it to *Desmacella*; on account of its skeletal structure, which by the only little marked fibres and by the want of spongin quite agrees with that of the other *Biemma*-species, it has just to be referred to the genus *Biemma.*

Locality: Station 97, 65° 28′ Lat. N., 27° 39′ Long. W., depth 450 fathoms, one specimen and two fragments.

Geogr. distr. This species has a wide range north of the equator having been found from about ca. 18° Lat. N. up to 65° 28′ Lat. N. As to bathymetrical range it has been found on depths from 500 fathoms to ca. 21 fathoms. The Antilles, depth 390 fathoms (Challenger); Florida, depth 195 fathoms (Schmidt); in the Mediterranean in the Gulf of the Lion on depths of ca. 60—ca. 21 fathoms, at the coast of Asturias, depth ca. 66 fathoms; in the Gascony Bay, depths ca. 345 fathoms and 500 fathoms, and southwest of Belle-Isle, depth ca. 60 fathoms (Caudan); in the western entrance of the English Channel, depth 500 fathoms (Carter); at the western coast of Norway southwest of Bukenfjord, depth 106 fathoms; and finally in the Denmark Strait 65° 28′ Lat. N., 27° 39′ Long. W., 450 fathoms (Ingolf).

Note. Topsent, in 1892 enumerates the until then described *Biemma*-species, and mentions four: *B. inornata* Bow., *corrugata* Bow., *Grimaldii* Topsent, and *Dautzenbergi* Topsent. As before said, *Dautzenbergi* is synonymous with *rosea* Frstdt. In the present work I further refer *annexa* Schmidt to this genus. Finally the *Gellius infundibuliformis*, established by Vosmaer (Sponges of Willem Barents , Bijdr. tot de Dierk. 12te Afl., 3^{die} Gedeelte, 29, Pl. I, fig. 13, Pl. IV, figs. 34—37) the spiculation of which is tylostyli and sigmata, will probably have to be referred to this genus. Thus at present the genus *Biemma* appears to comprise the following species:

Biemma inornata Bow.
— *corrugata* Bow.
— *annexa* O. Schmidt.
— *rosea* Frstdt.
— *Grimaldii* Topsent.
— *infundibuliformis* Vosm.?

Desmacella O. Schmidt.

The form varying, massive and irregular, or erect and of a more definite form, leaf-shaped or more or less calicular. The skeleton consists of long, well developed branched fibres, the spicules of which are united by a most frequently slight mass of spongin. Spicula: Megasclera monactinal, styli (sometimes tylostyli); microsclera may be combined in various ways, sigmata alone, or sigmata of two to three sizes, and rhaphides of one to three sizes, and most frequently small comma-shaped styli (commata) (perhaps always found at this combination of spicules) or finally rhaphides alone.

Of this genus we have several species, all, however, nearly related to each other; these species are grouped round *Desmacella Peachii* Bow., and agree in the fact that with regard to microsclera they have sigmata at least of two sizes, rhaphides of one or more sizes, and all, I suppose, small comma-shaped styli. The question whether we have here one varying species or several species, may be rather difficult to decide; the spicules, however, seem here, as in other places, to give rather sure and constant species-characters, even if the differences are small. It may also give rise to some difficulty to decide whether any of the species in hand — and if this is the case, then which of these species — are identical with earlier described species, as the difference of the spiculation and the forms of the spicules are not given with sufficient distinctness in the earlier descriptions. When in the following I have determined one of the species before me as Bowerbank's *D. Peachii*, I have therefore made this determination with some reservation.

1. **D. capillifera** Levinsen.

Pl. XVI, Fig. 1 a—g.

1886. *Gellius capilliferus* Levinsen, Dijmphna Togtets zool.-bot. Udbyttet, 357, Tab. XXX, figs. 7—10.

1896. *Desmacella Peachii* var. *groenlandica* Lambe, Sponges from the Atlant. Coast of Canada, Transact. of the Roy. Soc. of Canada, Ser. 2, II, Sect. IV, 186, Pl. I, figs. 5, 5 a—e.

Form? The dermal membrane thin, only provided with microsclera. The skeleton consists of powerful fibres with little spongin. Spicula: Megasclera styli 0·3—1·8^{mm}; microsclera sigmata of two sizes, the larger 0·04—0·1^{mm}, most frequently in bundles, the smaller 0·019—0·031^{mm}; rhaphides 0·175—0·19^{mm}, most frequently in bundles; commata 0·02^{mm}.

Of this species we have only a little piece attached to a Bryozoa, and presumably this piece is only the nethermost part of a sponge that has been broken off. Thus with regard to outer characteristics I cannot add much to the description given by Levinsen l. c., which is also based on fragments. The *dermal membrane* is thin, and of spicules it has only sigmata and rhaphides; sigmata are very abundant, especially the smaller form, and the rhaphides occur partly scattered, but most frequently in bundles. These bundles seem to form a kind of reticulation. The colour (in spirit) is yellowish gray. Lambe l. c. describes the dermal membrane in the same way, but has also found circular openings in it of an average size of 0·75^{mm}, which he regards as oscula. The *skeleton* has the structure characteristic of the genus consisting of fibres the spicules of which are united by spongin.

Spicula: a. *Megasclera* are long, rather slender styli; more or less curved, almost always nearest to the head end; the other end is evenly and long tapering, the outermost point itself may be shorter or longer. In some of the shorter styli the curve is found quite close to the headend. The length is somewhat varying, and is between 1·8—0·3^{mm}; the shorter ones have all a curve close to the head-end, but are otherwise straight. The most frequent length seems to be 1·7—1·5^{mm}; the thickness at the upper end is 0·03—0·023^{mm}. Finer styli occur, but only in very small numbers. Irregular forms with the thin end rounded may also be found singly. The styli, as shown above, divide into two groups, which are, however, not quite sharply separated: the typical long, more evenly curved styli, and the shorter ones with a somewhat sharper curve close to the upper end. The length of the former may be given to be between 1·7—0·8^{mm}, of the latter between 0·7—0·3^{mm}.

Besides the mentioned styli that form the fibres of the skeleton, some other styli occur, which are short, of an average length of 0·26^{mm}, and irregularly curved or sinuous to a higher or lower degree. These styli, however, occur in a particular way, being only found in the part of the sponge that is attached to the substratum, where they form a thin layer.

b. *Microsclera:* 1. Sigmata of two sizes; the larger ones have a regularly curved shaft, and the recurved ends form a hook that is almost rectangular; generally they are not contort, or only contort to a small degree. They are somewhat varying in size, the length being 0·1^{mm} down to 0·04^{mm}, and the thickness proportionately 0·0047—0·002^{mm}; they are found both singly and in bundles of different sizes. The small sigmata have a form resembling that of the large ones; their length varies from 0·031—0·019^{mm}, the thickness is ca. 0·001^{mm}. Neither are these sigmata contort. They are more numerous than the large, but do not appear to occur in bundles. 2. Rhaphides; these have a length of 0·176—0·19^{mm}, and an average thickness of 0·001^{mm}; they are very long and finely tapering to both ends. Single rhaphides are found scattered, but by far the greatest part occur in loose bundles. 3. Commata; small, comma-shaped, very fine styli of a length of ca. 0·02^{mm}; at the upper end they have a thickness of ca. 0·0007^{mm}, they are evenly curved, and taper to a long, exceedingly fine point. As seen from this description they are very small, and consequently they are easily overlooked. In this sponge they are only found in very small numbers, which is, perhaps, due to the fact that we have only the lower part of the sponge, and therefore I have not been able to observe, whether they occur in any particular way in the sponge. Levinsen l. c. does not mention these spicules, but by an examination of his original specimen I have found them, although also only in small numbers[1]). Besides in the dermal membrane sigmata and rhaphides are also found in the other tissue.

As I have had occasion to make a comparison with the original specimen of Levinsen, I have been able with certainty to identify the species. The spicules agree very well, only are the rhaphides in my specimen upon the whole somewhat shorter, which is, however, scarcely of any importance. With regard to the quoting of Lambe I cannot be so certain, as here some difference is

[1]) These silicious bodies for which I propose the name of commata, on account of their form, have only been mentioned once, viz. by Fristedt (Kgl. Sv. Vet. Akad. Handl. Bd. 21, No. 6, 29, Tab. II, Fig. 10 i) in a *Desmacella*-species which he calls *D. Peachii* Bow. var. *stellifera*. As I have found them, however, in all four species before me, and as on account of their smallness and inconspicuous form, they are easily overlooked, I think myself justified in taking it for granted that they have been overlooked by the authors in the species belonging here. Therefore by the identification I have not taken the fact into consideration that they have not been mentioned in two of the following species.

found, especially consisting in the fact that the large sigmata seem to become somewhat larger, up to 0·16mm, and especially thicker, from 0·006—0·013mm, and that the rhaphides are stated to be of an average length of 0·275mm, but as otherwise the form of sigmata, as also the fact that they are plane, agree well with my species, I suppose the species to be identical with *capillifera*.

Bowerbank's *Desmacella variantia* so far has the same spiculation as *capillifera*, as the microsclera are sigmata of two sizes and only one kind of rhaphides, but the measures given by Bowerbank, make its being referred to this species impossible, the styli being given of a length of only 0·6mm and the rhaphides of 0·05mm.

Locality: Station 94, 64° 56′ Lat. N., 36° 19′ Long. W., depth 204 fathoms, a fragment on a *Retepora Beaniana*.

Geogr. distr. The species seems to be widely spread in longitude: the Atlantic coast of Canada, ca. 50° Lat. N., depth 200 fathoms (Lambe); the Denmark Strait 64° 56′ Lat. N., depth 204 fathoms (Ingolf): the Kara Sea between 70 and 72° Lat. N., depth 78 fathoms (Levinsen). In each of the localities only one specimen has been taken.

2. **D. Peachii** Bow.

Pl. IV, Figs. 10—13, Pl. XVI, Fig. 2, a—l.

1866. *Desmacidon Peachii* Bowerbank, Mon. of Brit. Spong. II, 349, 3, III, Pl. LXIII, figs. 1—7.
1867. *Biemna Peachii* Gray, Proc. Zool. Soc. 1867, 538.
1870. *Desmacella Peachii* O. Schmidt, Spongien d. atlant. Gebiet, 77.
1880. *Desmacodes Peachi* Vosmaer, Notes from the Leyden Museum 104, 2.
1887. *Rhaphiodesma aculeatum* Topsent, Arch. de Zool. exp. et gén. Sér. 2, Tome V bis, supplémentaire, 152, 59, Tab. VII, fig. 14.
1890. *Desmacella Peachi* Topsent, Mem. Soc. Zool. de France, III, 200.

Leaf-shaped or calicular. The surface with small, conical processes formed by the projecting fibres. The dermal membrane thin, only provided with microsclera. Oscula few, scattered. The skeleton consists of powerful polyspicular fibres, branching from the base up through the sponge and anastomosing. The needles are cemented by a small amount of spongin. Spicula: Megasclera styli 0·87—1·5mm; microsclera sigmata of two sizes, large ones 0·092mm, most frequently in bundles, small ones 0.016—0·021mm; rhaphides of two sizes in bundles, long, hairlike ones 0·15—0·17mm, short ones 0·042—0·057mm; commata 0·011—0·014mm.

To this species I refer one of the four species before me that seems to me to agree rather well with Bowerbank's description and figures (fig. 2, where the skeletal spicule is figured as a tylostylus, is evidently erroneous, or a spicule not normal to the species has been figured; in the text tylostyli are not mentioned, and in the systematic synopsis given before the genus, it is just by the Skeleton spicula acuate» that *D. Peachii* is distinguished from *D. agagropila* with the Skeleton spicula spinulate»), and no doubt it is also this species that has first been described by Topsent l. c. as *Rhaphiodesma aculeatum*, but later by him has been referred to *Desmacella Peachii*. The following species is chiefly distinguished from the present one by the form of the large sigma, and here we have by the determination only the figure of Bowerbank to go by, but this figure seems to agree best with the sigma in the present species.

As to the exterior, my specimens of the species agree very well with the figure of Bowerbank. The species may have a very various form which seems, however, to be connected with the age of the individual. It begins as a little cushion which may be higher or lower, and which may, on account of the ends of the fibres that project through the conical processes of the skin, to some degree resemble *Halicnemia verticillata* Bow. We have two specimens of this form, one of which has a breadth of 8^{mm}, and a height of 5^{mm}, the other has a similar breadth, but a height of 12^{mm}. Both these specimens are attached to a *Sipho*. In growing it rises more from the substratum, and assumes a leaf-shaped or calicular form. It is possible that in the grown state it is normally of a calicular form, as the leaf-shaped pieces in hand are fragments; the largest specimen in my possession, which is, however, highly damaged, has an open calicular form; it has a height of 57^{mm}, and the wall has a thickness of about $10-15^{mm}$. It has been attached by a rather small base. Bowerbank's specimen is somewhat larger having a height of about 100^{mm}. The *surface* of the sponge which is only undamaged in the smaller specimens, is characteristic by the fact that it rises into rather close-set, conical processes pierced by the ends of the fibres. On account of the solid skeleton the consistency is rather firm and somewhat elastic. The colour (in spirit) is brown or grayish brown. The *dermal membrane* is very thin, and is supported by the ends of the fibres; it is only provided with microsclera; first rhaphides are found of two different sizes in bundles, they are scattered without any order, and in some places only the long ones are found, in other places only the short ones. Next two kinds of sigmata are found in the skin, of which especially the small ones are found abundantly; finally commata are found in no small number, but on account of their smallness they are only little conspicuous and difficult to observe. *Oscula* and *pores:* I have only with certainty observed pores in the smallest of my specimens where they were found in large numbers in the fields between the projecting ends of the fibres, so that here the skin in several places was reduced to a sieve. Their form varied from round to oval, and the size was measured to $0{\cdot}05-0{\cdot}15^{mm}$. As the skin was wanting in most specimens I have only been able to examine it in a deficient way; I am, however, inclined to think that it will show features similar to those mentioned under the following species. In the specimens in which the skin was tolerably undamaged, a few scattered circular holes were seen of a size of $1{\cdot}5-2{\cdot}5^{mm}$ (they were only seen in the small specimens); these openings I take to be oscula.

The *skeleton* consists of rather powerful polyspicular fibres branching upward from the base of the sponge and anastomosing, so that they form a rather dense reticulation. They are thickest below, and may here reach a thickness of up to $0{\cdot}5^{mm}$, otherwise the average thickness is about $0{\cdot}2^{mm}$. Branches from the fibres bend everywhere outward, and support and pierce the dermal membrane, as before mentioned. The spaces between the fibres are filled by an irregular network of the finer branches and anastomosings. The spicules of the fibres are cemented by spongin which is not, however, seen to coat the whole fibre. The spongin is seen especially distinctly where branches go off from the fibres.

Spicula: a. *Megasclera* are styli, more or less, oftenest slightly curved, and almost always with the curve nearest to the upper end; the other end runs into a long, evenly tapering point, the outermost end of which may be more or less shortly pointed; especially in the shorter and thicker spicules the point is often short. The length is somewhat varying, from about $1{\cdot}5-0{\cdot}87^{mm}$; in this respect some

difference may be found between different individuals. The thickness at the upper end is between 0·029—0·039^{mm}, the longest generally not being the thickest. Considerably finer needles of about the same length, and connected with the others by transitions, may be found, but only in small numbers. Besides normally formed styli forms may rather frequently be found, in which the pointed end is rounded, and then it may be thinner or thicker, so that we get strongyla.

As in the preceding species I have also in the present one down at the place of attachment found irregularly formed, more or less sinuous and curved needles, upon the whole smaller than the normal needles of the species.

b. *Microsclera.* 1. Sigmata of two sizes: the larger ones have a regularly bent shaft, and the ends are recurved with a round bend, and form a rather large hook. These sigmata are always contort, generally about a quarter of a turn. The length is rather constant, and is between 0·09—0·10^{mm}; the thickness is 0·0035—0·004^{mm}. Also finer sigmata, down to quite fine ones, are found, which no doubt are developmental forms; they are of the same length as the fully developed ones. Besides being found single, these sigmata very frequently occur in bundles, sigmadragmata, and presumably they are all developed in this way. As far as I have been able to decide, each bundle contains always eight sigmata; frequently bundles are seen made up of fine sigmata, but generally they have the full thickness, and consequently the bundles are not disunited, until the sigmata are fully developed. The small sigmata have a regular sigma-form; their length varies from 0·016—0·021^{mm}, the thickness is ca. 0·001^{mm}. They are never seen in bundles. 2. Rhaphides of two sizes: longer and shorter; the longer rhaphides are hairlike and finely pointed, of a length of 0·15—0·17^{mm} and a thickness at most of 0·001^{mm}. These rhaphides may be seen singly, but they occur chiefly in bundles, trichodragmata, which seem to be of a very varying thickness. The smaller rhaphides are somewhat thicker than the longer ones, and they are fusiform; sometimes the greatest thickness is nearest to one end. The length varies from 0·042—0·057^{mm}, but most frequently it is 0·05^{mm}, the thickness is 0·0015—0·002^{mm}. These rhaphides also occur in bundles, trichodragmata; the bundles are often seen to contain eight rhaphides, but there seem also to be bundles with more needles. 3. Commata, small, comma-shaped styli of a similar form as in the preceding species; the head end is slightly swollen; the length is 0·011—0·014^{mm}, and the thickness at the upper end ca. 0·001^{mm}. All the microsclera occur as well in the dermal membrane as in the other tissue; of the two forms of sigmata the smaller are everywhere most abundant.

Gemmulæ? Besides the silicious bodies mentioned before we find in this sponge a particular form, viz. small silicious globules. There is, however, the peculiarity of the occurrence of the globules, that they are not found in all individuals, and in the sponges where they are found, they occur only in certain places, so that in many cuttings of the sponge they are not seen at all, while in others they are found in great abundance. There can be no doubt that these globules belong to the same kind of bodies as will be mentioned below under *D. groculandica* Frstdt., and which I take to be gemmulæ; thus the fact that they are not found constantly, may also be understood, as an individual need not at all times have these bodies. In the present species I have not found them to form distinct round capsulæ, but have only found them scattered singly in the tissue, or in irregular loose heaps. These globules vary in diameter from 0·004—0·008^{mm}.

Locality: Station 53, 63 15′ Lat. N., 15° 07′ Long. W., depth 795 fathoms, a couple of small spe-

cimens; station 92, 64° 44′ Lat. N., 32° 52′ Long. W., depth 976 fathoms, fragments of a larger specimen; station 95, 65° 14′ Lat. N., 30° 39′ Long. W., depth 752 fathoms, two quite small specimens and a few fragments; station 96, 65° 24′ Lat. N., 29° 00′ Long. W., depth 735 fathoms, two smaller specimens; it has further been taken on the East-Greenland expedition 1891—92 on 65° 39′ Lat. N., 28° 25′ Long. W., depth 553 fathoms, one specimen. These stations are all situated in the Denmark Strait, excepting station 53 that is off the south coast of Iceland.

Geogr. distr. Of this sponge hitherto only two specimens have been known, one taken at Scotland (the original specimen of Bowerbank) the other in the English Channel at Luc (Topsent). Unfortunately no depth has been given for either of these localities.

3. **D. hamifera** n. sp.

Pl. VII, Figs. 4—6, Pl. XVII, Fig. 1 a—l.

Leaf?- or funnel-shaped. The surface with small conical processes formed by the projecting fibres. The dermal membrane thin, only provided with microsclera. Oscula scattered. The skeleton consists of powerful polyspicular fibres branching from the base up through the sponge, and connected by transverse anastomoses. Spongin is found cementing the spicules, but only to a rather small degree. Spicula: Megasclera styli 0·75—1·56^{mm}; microsclera sigmata of two sizes, large ones of a peculiar form, most frequently as dragmata 0·08—0·107^{mm}, small ones 0·014—0·021^{mm}; rhaphides as trichodragmata of two sizes, long, hair-like ones 0·15—0·16^{mm}, short ones 0·043—0·06^{mm}; commata 0·011—0·014^{mm}.

This species is of a quite similar form and structure as the preceding one. The specimens in hand have an erect, leaf-shaped form; a single one shows a short, thick stalk which has been attached, and which has at the top the remains of an open funnel (Pl. VII, fig. 5). None of the specimens, however, are quite undamaged, so that there may be some doubt whether the species is always funnel-shaped, or perhaps also may be leaf-shaped. The largest specimen, a somewhat concave-convex leaf, has a height of 12^{cm}, and a similar breath; the thickness in the middle of the leaf is about 20^{mm}. The thickness is greatest below where the sponge has been attached, and decreases towards the upper edge. The other specimens are all somewhat smaller, also leaf-shaped, but most of them are a little arcuate, so that the probability is that the sponge is funnel-shaped. A single fragment is attached to a stone. The consistency is rather firm, hard down towards the place of attachment. The colour (in spirit) varies between light yellow and light gray. The *dermal membrane* is also in this species supported by the ends of the fibres, and so the *surface* shows the same kind of small processes as in the preceding species. The dermal membrane is otherwise only kept here and there in a few of the specimens. It shows, at all events in some places, a quite peculiar structure. When viewed under a lens, it shows a network resembling a network of spiculo-fibres, as for instance in *H. panicea*; but under higher magnifying powers it is seen that the network is made by the formation of thicker strings in the skin inwardly; the network incloses roundish or oval thin-skinned fields, and in these fields the pores are lying in different numbers. In the strings of the network some roundish or fusiform cells are seen filled with refringent granules (cellules sphéruleuses Tops.). This structure of the skin, however, is not found everywhere, the skin in other places appearing as a simple thin membrane without any

network [1]). Of spicules the skin has only microsclera, viz. rhaphides of two sizes, especially occurring in bundles, but without any order; in some places especially the long ones are seen, in others the short ones; where pores are seen, the bundles of rhaphides, especially the short ones, seem to be restricted to the strings between the thin-skinned pore fields, while long rhaphides are seen scattered singly also over the pore fields. Further sigmata of two sizes are found in the skin, of which the larger ones are found rather sparingly in most places, while the smaller are everywhere abundant; finally commata are also found abundantly. *Oscula* and *pores:* As before said, the pores are found in the thin-skinned pore fields to a number of about ten in each field; they were measured of a size of 0·029—ca. 0·12^{mm}. Where the skin was kept, here and there some circular openings were found of a diameter of 1·5—2^{mm}, which openings I take to be oscula.

The *skeleton* is constructed in a quite similar way as in the preceding species. It consists of polyspicular fibres issuing at the base, and running up through the sponge. The fibres are thickest at the base, and reach here a thickness of 1—1·5^{mm}; in their branching upward they become somewhat thinner, and at the same time they become more richly branched. In a radial longitudinal section the more or less parallel or somewhat diverging longitudinal fibres are distinctly seen, thus being the principal fibres; they are connected by numerous transverse anastomoses. Outward towards each side the fibres send off branches supporting and piercing the dermal membrane (Pl. VII, fig. 6). In the tangential direction the fibres diverge and branch somewhat more, on account of the fan-shaped or calicular form of the sponge. The spicules of the fibres are cemented by a distinct, but clear mass of spongin, which is most copious towards the base of the sponge, and which seems to coat the fibres entirely, although only with an exceedingly thin layer.

Spicula: a. *Megasclera* are styli, more or less, sometimes somewhat irregularly, curved; they have a long tapering point, of which, however, the outermost end is shortly pointed. The length varies from 0·75—1·56^{mm}; most frequently it is between 1—1·25^{mm}. The thickness is between about 0·024—0·036^{mm}; generally the length and thickness are in proportion to each other, although it is not always the case. Styli with a more or less broadly rounded point are rather frequently seen. Considerably finer needles which may be regarded as developmental forms, occur in small numbers.

Also in this species we find in the layer touching the place of attachment irregularly formed spicules of other dimensions than the other ones.

b. *Microsclera:* 1. Sigmata of two sizes; the large sigmata have a peculiar form, being highly curved, and the curve is most frequently sharpest in the middle of the shaft, while the piece between the curve and the hook-shaped end may be more or less straight; the ends are finely pointed and recurved in a sharply hook-shaped way. These sigmata are almost always contort, most frequently about a quarter of a turn, but as well with regard to this feature, as upon the whole with regard to form, they may be somewhat varying. Their length, which is, of course, somewhat dependent on the degree of curving, is 0·08—0·107^{mm}, the thickness varies from 0·002—0·003^{mm}. Quite fine forms, developmental phases, of the same length as the others, are also found. These sigmata are seen both

[1]) In these latter places no pores have been observed; it is possible that the mentioned structure of the skin is only found in the places provided with pores, and it is also possible that pores are only found in certain places and oscula in others, but the material in hand has not been sufficient to enable me more particularly to elucidate this question.

singly and as sigmadragmata, which latter also in the present species seem always to be composed of eight sigmata. The small sigmata have a regular form, their length varies from 0·014—0·021^{mm}, the thickness is ca. 0·001^{mm}, or still finer. These sigmata are not contort, and they are never seen in bundles. They are present in much larger numbers than the large ones. 2. Rhaphides of two sizes; the long rhaphides are hair-like and finely pointed; they have a length of 0·15—0·16^{mm}, and their thickness is at most 0·001^{mm}. These spicules may be found singly, but they occur chiefly in trichodragmata of varying thickness. The small rhaphides are thicker, fusiform, and of a length of 0·043—0·06^{mm}. The thickness is 0·0014—0·0017^{mm}. These rhaphides are found in bundles, which often seem to contain eight rhaphides, but may also be composed of a greater number. 3. Commata; small, comma-shaped styli with a somewhat swollen head end; sometimes they are a little irregularly curved; their length is 0·011—0·014^{mm}, and the thickness at the head end is 0·0012^{mm}. All the forms of the microsclera are found, besides in the dermal membrane, also in the other tissue of the sponge in great abundance.

Gemmulæ? I have also in individuals of this species found gemmula-like bodies. Most frequently they were here found as roundish loose heaps of silicious globules, but also as distinctly limited, more or less globular or roundish bodies, in which the silicious globules, it would seem, were lying in a membrane or inside of it (Pl. XVII, fig. 1, l). Generally these bodies had a diameter of 0·05—0·07^{mm}. The silicious globules vary from 0·0015—0·0057^{mm}. All the globules in one heap are of about the same size. In a few specimens these bodies were found especially abundantly.

Locality: By the Ingolf expedition this species has been taken on station 1, 62° 30′ Lat. N., 8° 21, Long. W., depth 132 fathoms; station 2, 63° 04′ Lat. N., 9° 22′ Long. W., depth 262 fathoms; station 3, 63° 35′ Lat. N., 10° 24′ Long. W., depth 272 fathoms; station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms; station 97, 65° 28′ Lat. N., 27° 39′ Long. W., depth 450 fathoms. It has further been taken on 66° 20′ Lat. N., 25° 12′ Long. W., depth 96 fathoms; 63° 15′ Lat. N., 9° 35′ Long. W., depth 270 fathoms; 61° 23′ Lat. N., 5° 04′ Long. W., depth 255 fathoms (Wandel); and at the Faröe Islands, a little to the east of Suderö, depth ca. 150 fathoms (Th. Mortensen). In all about ten more or less damaged specimens or fragments have been taken. All the localities are situated at the Faröe Islands, between the Faröe Islands and Iceland, and in the Denmark Strait; and its bathymetrical range is between 96 and 450 fathoms.

4. **D. groenlandica** Frstdt.

Pl. VI, Fig. 14, Pl. VII, Fig. 7, Pl. XVII, Fig. 2 a—h.

1887. *Desmacella Peachii* var. *groenlandica* Fristedt, Vega Exp. vetensk. Iakttagelser IV, 441, Pl. 24, figs. 38—45, Pl. 28, fig. 14.

The form calicular. The surface with small conical processes formed by the ends of the fibres; the dermal membrane thin, only provided with microsclera. Oscula (only on the inside?) small, provided with papilla-like projections. The skeleton consists of fibres, going from the base up through the sponge, richly branching and anastomosing. Spongin is found cementing the needles, but not copiously. Spicula: Megasclera styli 0·94—1·37^{mm}; microsclera sigmata of two sizes, large ones of a peculiar form 0·09—0·10^{mm},

small ones 0·008—0·01mm; rhaphides of two sizes, most frequently in dragmata, the long ones 0·25—0·268mm, the short ones 0·08—0·1mm: commata 0·008mm.

The only specimen in hand of this species has an open, somewhat irregular calicular form, and has been attached without any stalk. Its height is ca. 6cm, and its greatest breadth in the circumference ca. 8·5cm, while the thickness of the wall is scarcely 2cm. The surface is set with small processes due to the ends of the fibres. The colour (in spirit) is pale yellow. The consistency is less firm than in the preceding species. The *dermal membrane* is thin, and is supported by the ends of the fibres; of spicules it has only microsclera, viz. rhaphides of two sizes, partly scattered in the skin, partly occurring in bundles, and small sigmata, present in very large numbers. In some places of the skin was seen a similar structure with thinner fields as in the preceding species. In the present species *oscula* have a quite peculiar structure their edge being provided with papillæ. When the osculum is open, it is a more or less round hole of a diameter of ca. 0·5mm. When this is the case some slightly projecting lobes are seen in the edge, and the ends of rhaphides project into the opening. When the osculum is being shut these lobes grow to longer and longer papillæ, and the projecting rhaphides cross each other; at last the papillæ come together, and the closed osculum forms a little conical process (Pl. VI, fig. 14). Whether the papillæ are free or only papilla-like folds of the skin, I have not been able to see. This way of closing the osculum is quite peculiar, and it is to be supposed that the function of the projecting rhaphides is to bar the entrance when the osculum is not closed. In the present specimen oscula are found abundantly on the inside; but as the skin of the outside is torn off it cannot be decided, whether they have been restricted to the inside, or have been found all over the sponge. *Pores* I have not seen; they must be supposed to be lying in the before mentioned thin-skinned fields.

The *skeleton* is of a quite similar structure as in the two preceding species, and consists of fibres running from the base up through the sponge branching and anastomosing, and giving off branches towards the surface supporting the dermal membrane. The fibres are a little thinner, and seem to be somewhat more richly branched than in the preceding species. A distinct, clear mass of spongin unites the spicules of the fibres, and coats the fibres entirely, though only with a thin, scarcely observable layer.

Spicula: a. *Megasclera;* these are slightly, or at the head end, a little more strongly curved styli with an evenly tapering point the outermost part of which may be a little more or less shortly pointed. The length varies from ca. 0·94—1·37mm, and the thickness at the upper end is 0·025—0·035mm. Styli with more or less broadly rounded points are not scarce.

Also in this species styli are found in the basal layer, smaller than the normal ones, and irregularly bent in different ways.

b. *Microsclera:* 1. Sigmata of two sizes; the larger are of a quite similar form as in the preceding species with a strong curve in the middle of the shaft and a little hook-shaped recurving of the ends; they are also contort. The length from one hook to the other is ca. 0·09—0·10mm, and the thickness is 0·0028mm. These sigmata occur in very small number, and only quite singly, so that there might be some doubt, whether they really belong to the sponge or are extraneous; as, however, they

are found in almost every cutting of the sponge, the probability is that they belong to it. This belief is also favoured by the fact that they are mentioned by Fristedt as found in his specimen, which is, in spite of the scarcely quite correct figure of the large sigma, surely identical with the the species before me[1]). The small sigmata are much smaller than in the preceding species; they are of the common form, and are plane; their length is between 0·008—0·01^{mm}, and the thickness may be given as 0·0007^{mm} or still finer; these sigmata are exceedingly numerous, as well in the dermal membrane as throughout the sponge. 2. Rhaphides of two sizes, both considerably larger than the corresponding rhaphides in the two preceding species. The long rhaphides have a length of 0·25—0·268^{mm}, and a thickness in the middle of ca. 0·002^{mm}. Their ends are produced into long tapering, fine points. They are always straight, and if some are seen to be curved, when a piece of the sponge is examined under the microscope, the cause of this fact cannot be that they have such a form, but it must be due to a force acting on them. These rhaphides occur both scattered and in bundles containing a rather large number of rhaphides. The short rhaphides are fusiform, their length varies from 0·08—0·1^{mm}, and the thickness is about 0·0028^{mm}. These rhaphides are chiefly found in bundles that seem most frequently to contain a rather large number of rhaphides. Both kinds of rhaphides are found abundantly as well in the dermal membrane as through the whole sponge. 3. Commata; these are only found in very small numbers, but like the large sigmata they are found in every cutting; they are small, their length being ca. 0·008^{mm}, and the thickness at the head end about 0·001^{mm}.

Gemmulæ? In this species Fristedt mentions the same bodies as have been mentioned in the two preceding species, and which he takes to be gemmulæ. He figures these bodies Pl. 24, figs. 44—45. In the specimen before me I have only seen the small silicious globules that are found in the wall of the mentioned bodies, singly or in small groups, while the piece of Fristedt's original specimen I have had for examination, shows the gemmulæ-like bodies abundantly; they are most frequently quite globular, of a diameter of about 0·08^{mm}; they are formed of silicious globules imbedded in, or situated inside of, a membrane which is, perhaps, made of spongin; on the other hand I have not been able to find the depression in the wall mentioned by Fristedt (»a small depression like that in the globular spicules of Geodia»), and I suppose that it is not really found, but is only due to the refraction (Pl. XVII, fig. 2 f). In the bodies that seem to be quite finished, the globules have a diameter of ca. 0·007^{mm}, while in others, mostly seen as loose groups of globules, it is considerably smaller, down to 0·002^{mm}, or still smaller. The globules of the same group are always of about the same size, so that all the globules belonging to one of the gemmula-like bodies, appear to be begun and developed contemporaneously.

The reason why these bodies have here been termed gemmulæ, is only that they recall to some degree the gemmulæ of the spongillæ, and presumably serve the propagation of the sponge; it is only little probable that their function should be the same as that of the gemmulæ of the spongillæ, as the question is here of species from rather considerable depths (78—976 fathoms).

Locality: The Denmark Strait 66° 20′ Lat. N., 65° 12′ Long. W., depth 96 fathoms (Wandel), one specimen.

[1]) Fristedt l. c. does not mention that these sigmata are so small in number, and yet they must surely have been so also in his specimen, as I have not even been able to find any large sigma in the little piece of his specimen I have had for examination, but then this piece also consisted almost only of naked fibres.

Geogr. distr. Fristedt has the species (a small fragment) from the east coast of Greenland, depth 130 fathoms.

Note. As before mentioned, the four *Desmacella*-species enumerated here, appear to be nearly related, showing great correspondence as well with regard to their skeletal structure and spiculation, as also their outer form and the structure of their skin seem to be corresponding. We might, perhaps, be justified in establishing a special genus for them, to which genus some more species would then have to be referred, as all species with rhaphides of one or more sizes seem to be nearly related, and must be grouped together. I shall here put together the hitherto described species that are possessed of rhaphides; with regard to the species not described here, I give the measures according to the authors in question:

	Megasclera	Microsclera			
	Styli	Sigmata	Rhaphides	Commata	Gemmulæ?
Desmacella variantia Bow.	0·43—0·63mm	Two sizes: large: 0·064—0·085mm small: 0·012—0·025mm	One size: 0·06mm	not observed	not observed
» *capillifera* Levins.	0·6—1·8mm	Two sizes: large: 0·04—0·1mm small: 0·019—0·031mm	One size: 0·176—0·19mm	0·02mm	not observed
» *fortis* Tops. Amboyna, The Read Sea.	ca. 1mm	Two sizes: large: 0·09—0·105mm small: 0·02mm	One size: 0·14mm	not observed	not observed
» *Peachii* Bow.	0·87—1·5mm	Two sizes: large: 0·09—0·10mm of common form, small: 0·016—0·021mm	Two sizes: long: 0·15—0·17mm short: 0·042—0·057mm	0·011—0·014mm	+
» *Peachii* var. *stellifera* Frstdt. West-coast of Sweden	1mm	Two sizes: large: ca. 0·12mm of common form, small: ca. 0·015mm	Two sizes: long: 0·15mm short: 0·048mm	0·009mm and asters with stubby points: 0·008mm	not observed
» *hamifera* mihi	0·75—1·56mm	Two sizes: large: 0·08—0·107mm of peculiar form, small: 0·014—0·021mm	Two sizes: long: 0·15—0·16mm short: 0·043—0·06mm	0·011—0·014mm	+
» *groenlandica* Frstdt.	0·94—1·37mm	Two sizes: large: 0·09—0·10mm of peculiar form, small: 0·008—0·01mm	Two sizes: long: 0·25—0·268mm short: 0·08—0·1mm	0·008mm	+
» *Peachi* var. *trirhaphis* Tops. Amboyna	0·35mm	Three sizes: largest: 0·08mm middle: 0·045mm smallest: 0·018mm	Three sizes: longest: 0·17mm and 0·005mm middle: 0·15mm, fine short: 0·04mm and 0·003mm	not observed	not observed
» *Peachi* var. *fistulosa* Tops. Amboyna	0·3—0·33mm	0·015—0·058mm	Three sizes: longest: 0·11mm, fine middle: 0·105mm and 0·003mm short: 0·033mm and 0·001mm	not observed	not observed
» *aberrans* Tops.	0·6mm	÷	One size: 0·18mm	÷	÷

On account of the rather considerable differences with regard to the spiculation, I take the two varieties *trirhaphis* and *fistulosa* established by Topsent (Rev. Suisse de Zool. IV, 1897, 461, Pl. XVIII, Fig. 9, Pl. XXI, Fig. 35; 462, Pl. XVIII, Fig. 11), to be independent species, and this opinion may, I suppose, also hold good with regard to Fristedt's variety *stellifera*, the spiculation of which is quite peculiar.

Kieschnick (Semon: Zool. Forschungsreisen in Austr. Band V. Denkschrift. Med. Nat. Gesellsch. Jena, Band 8, 1900, 568, Tab. XLV, Fig. 53—56) establishes a *Desmacella fragilis* from Amboyna, whose spiculation of microsclera is given thus: grosse Doppelhaken, Sigma, zarten Bogen, Trichodragmen, but neither from the very incomplete description nor from the figures (the zarten Bogen are not figured) can anything be seen but the fact that the species belongs to the present group.

I shall further call attention to the fact that the genus *Sigmaxinella* with the species *australiana* Dend., *flabellata* Cart., and *ciocalyptoides* Dend., established by Dendy (Proceed. of the Roy. Soc. of Vict. IX, 1897, 240) and referred to *Axinellidæ*, would, according to the descriptions in hand, scarcely seem to be different from *Desmacella*.

Topsent, in 1892, enumerates the *Desmacella*-species then known to him, and mentions six; of these *Peachii* and *aberrans* are mentioned above; of the other four *annexa* has here been referred to the genus *Biemma*. The other species are: *pumilio* Schm., *vagabunda* Schm., and *cavernula* Bow. With regard to *pumilio* and *vagabunda* it is, on account of the shortness of the description, impossible to form any nearer opinion; with regard to *vagabunda* there may, perhaps, be some probability that it may be a *Desmacella*. Later has, besides the species mentioned above, one more species supervened, viz. the *D. vulgaris*, established by Topsent 1892 (Arch. de zool. exp. et gén. X, 1892, XXI). Besides the ten *Desmacella*-species belonging to one group, which are enumerated above, the genus consequently still comprises the following:

Desmacella pumilio Schm.?
vagabunda Schm.?
cavernula Bow.
vulgaris Tops.

Hamacantha Gray.

The form varying, massive, roundish or quite irregular, sometimes more or less erect, or finally crust-shaped; sometimes provided with papillæ. The skeleton is an irregular network of mostly polyspicular fibres and irregularly scattered spicules and bundles of spicules. Spongin is present to a small degree, or wanting. Spicula: Megasclera styli, sometimes oxea interspersed between the styli, or exclusively oxea. Microsclera; the microsclera characteristic of the genus, are diancistra of one to three different forms, together with which may be found toxa, trichodragmata, or sigmata.

1. **H. Bowerbanki** n. sp.

Pl. VII, Figs. 2—3, Pl. XVIII, Fig. 1 a—k, Figs. 2—3.

1874. ?*Halichondria falcula* Bowerbank, Mon. Brit. Spong. III, 208, Pl. LXXIV, figs. 1—3.
1882. *Hymedesmia Johnsoni* Carter, Ann. Mag. Nat. Hist. Ser. 5, IX, 297, Pl. XI, fig. 20 a—e.

The form irregular, most frequently roundish, tuberous, or lobate. The surface finely shaggy from projecting spicules; the dermal membrane provided with a reticulation of spiculo-fibres. Oscula scattered, formed as low cones. The skeleton an irregular network of polyspicular fibres, between which irregularly placed spicules and bundles of spicules are found. Only very little spongin. Spicula: Megasclera styli 0·38—0·47^{mm}; microsclera diancistra of three forms, large ones 0·137—0·178^{mm}, middle ones 0·045—0·057^{mm}, small ones 0·021—0·028^{mm}; toxa 0·092—0·157^{mm}.

This species is of an irregularly tuberous or round-lobate form; most frequently the specimens are more or less irregularly roundish, they are not rarely somewhat flat, or quite irregularly lobed and folded. They are often with a larger or smaller part of the surface attached to shells of Mollusks, Brachiopods, Bryozoa, etc., but we have also some whole and undamaged specimens that are not seen to have been attached. The largest specimen in hand, which is of a flat form, has a greatest extent of 95^{mm}, and a thickness of ca. 35^{mm}, but the most frequent size of the specimens, measured in the greatest extent, is between 30 and 60^{mm}. The consistency is rather solid. The colour (in spirit) is light yellowish white or yellowish gray, sometimes a little darker passing into brownish. On account of the dermal reticulation the *surface* has a net-shaped sculpture, but is besides finely shaggy from projecting spicules. The *dermal membrane* is provided with a fine reticulation resembling that of *Halichondria panicea*, and the reticulation may, as in the latter species, sometimes be more coarse and irregular, or the spicules may be closer packed without forming what may properly be called a network. Especially in the nodes of the network prominent spicules project through the skin making it shaggy.

Oscula are found in different numbers scattered on the sponge; thus specimens may be found with only one osculum, while most have a larger number; the mentioned largest specimen, for instance, has ca. 10 oscula. They are formed by the thin dermal membrane rising into a broader or more pointed, but always rather low cone with a larger or smaller opening. The oscular cones are not more than a few millimetres in height. The net-shaped arrangement of the spicules in the skin passes in the oscular cone to an arrangement where the spicules are situated parallelly to the longitudinal axis of the cone, and they are lying rather close to each other; at the edge of the oscula, therefore, they project close to each other, forming a circle. The *pores* are found in large numbers in the meshes of the dermal reticulation, most frequently only one or a couple of pores in each mesh; they are circular or oval, and have been measured of a size of 0·07—0·178^{mm}.

Although the form of the species is irregular, its external shape is nevertheless rather characteristic and easily recognizable; especially the frequently found, roundish lobes separated by more or less deep folds, together with the net-like sculpture of the surface, and the form of the oscula are characteristic of the species.

The *skeleton* consists of polyspicular fibres chiefly running longitudinally, but with a somewhat irregular course on account of the form of the sponge; in some places they are vertical on the surface, and in the projecting lobes they run longitudinally, but upon the whole they run from the base of the sponge towards the surface; on a section of the sponge it will therefore generally be possible by

means of the fibres to make out the place of the base. Between these fibres are only found irregularly placed spicules and bundles of spicules, but coherent transversal fibres are not formed. Sometimes the longitudinal fibres are especially found in certain parts of the sponge, while others show a more irregular skeletal structure. The longitudinal fibres have an average thickness of 0·059—0·09^{mm}, and are composed of rather many spicules alongside. From the skeletal tissue formed in this way, short fibres run vertically towards the surface; these fibres spread in a penicillate way, and support the dermal membrane. As before mentioned this membrane is provided with a reticulation of polyspicular fibres; the ends of the supporting fibres, which are spread in a penicillate way, project through the network of the dermal membrane, especially in the nodes of this network, and so the surface is finely shaggy. The fibres supporting the dermal membrane, may in different places be of a somewhat different length, but most frequently it is between 0·5 and 0·9^{mm}. The dermal membrane being thus supported by fibres of the said length, a subdermal cavity is formed under it, into which cavity the pores lead. Only a very slight amount of spongin seems to be found in the skeleton uniting the fibres here and there.

Spicula: a. *Megasclera* are styli, evenly and most frequently slightly, only rarely somewhat more strongly curved; sometimes the curve is in the middle, sometimes nearer to one end, and in this case it is almost always nearer to the rounded end. The styli are fusiform, not only tapering to the point, but also evenly towards the rounded end; the opposite end is evenly tapering, and only in the very outermost part it may be somewhat more abruptly pointed. The thickness at the rounded end is somewhat varying, and sometimes the needles are here very thin, in a few cases they are quite pointed, so that we get oxea. The length is between 0·38 and 0·47^{mm}, most frequently it is 0·45^{mm}; the shortest ones are least frequently met with; in a few specimens the needles may reach a length of 0·51^{mm}. The thickness in the middle is 0·01—0·013^{mm}; often the longest are not the thickest. Finer and shorter needles, developmental phases, are also seen in small numbers; generally they are only very little shorter than the fully developed ones. b. *Microsclera:* 1. Diancistra of three different forms. The large diancistra are of the well known form, called by Oscar Schmidt (Pflugscharspangen), and by Bowerbank (trenchant bihamates). For the sake of description they may be described as sigmata with long ends that are so strongly recurved as to form an only small angle with the shaft; the inside of the recurved end thins into a thin, sharp edge stretching along the whole inside from the point to the curve where it suddenly disappears; on the part of the shaft opposite to the recurved end a quite similar edge of the same length is formed in the same way; this edge ceases also quite suddenly at the curve, and thus the curve forms a circular or oval hole. As the two edges of the shaft do not reach the middle, the cylindric form of the shaft is seen here. The edges are so finely thinned that it may be difficult to see their inner limit. It is only very rarely the fact that both the recurved ends of the diancistra are lying in the same plane, they are almost always more or less contort, often a quarter of a turn, sometimes almost half a turn, so that the recurved ends are turned in opposite directions; and not only the recurved ends are lying in different planes, but this is also the fact with regard to the edges of the shaft, these edges being in the same, or about the same plane as the recurved end. The length of the diancistra is between 0·137—0·178^{mm}, most frequently it seems to be 0·16^{mm}. The thickness in the middle of the shaft is 0·008—0·01^{mm}. Of these diancistra developmental forms are also

found, which have already been figured by O. Schmidt (Spongien des Meerbus. von Mexico 1880, Taf. IX, Fig. 10). The earliest stage I have seen, is a quite thin needle, rather shortly recurved in both ends, and of about the same length as the fully developed diancistron. The development now consists in the needle growing in thickness, the ends increasing in length, and the sharp edges being formed. All phases of this development may be found, as shown in Pl. XVIII, fig. 1 d. It has been a matter of some speculation whether these diancistra were most justly to be termed sigmata or chelæ. O. Schmidt (Spong. d. atlant. Gebiet. 1870, 54, and Spong. d. Meerbus. von Mexico, 1880, 82), declares them to be a modification of sigmata, on account partly of their being developed from a phase that he thinks to be sigma-like, partly of their being contort as many sigmata. Carter (Ann. Mag. Nat. Hist. 5, IX, 298), on the other hand, finds by comparing them with the peculiar, contort chela in *Esperella (Desmacidon) titubans*, that they are chelæ («anchorates»), while Vosmaer (The Spong. of Villem Barents», Bijdr. tot de Dierk., 12te Aflev., 3die Gedelt., 1885, 28) says: «I call special attention to fig. 85, being a trenchant bihamate with two teeth. This may be a proof that they are modified «anchors and not modified bihamates . Such abnormities may be found of the diancistra as well as of other silicious bodies, but they surely prove nothing, neither is anything proved by what has been said by Schmidt or Carter, and with regard to the relation between diancistra and the other meniscoid microscleres nothing can be said. The fact mentioned by Schmidt (l. c. 1870, 54, Taf. V., Fig. 17), that the diancistra and especially the sharp edges are not quite silicified, and are more or less destroyed by being boiled, must, as might be thought beforehand, be founded upon a mistake; the fact is that they will stand boiling in hydrochloric acid or aqua regia long enough. The form given in fig. 17 c, appears rather to be a quite abnormal form, such as may be found. The second kind of diancistra are considerably smaller, but of a similar form, the only differences being that the shaft almost always has a slight curve in the middle, and that the points of the recurved ends come somewhat nearer to each other than in the large ones. The edges are here very difficult to see, so that we may easily get the impression that they are wanting. The length is between 0·045—0·057^{mm}, sometimes they may be a little longer; the thickness in the middle is 0·004—0·007^{mm}. They are developed in the same way as the preceding ones, bus as the edges are only to be seen with difficulty, the developmental phases are far from being conspicuous. Besides the mentioned forms a third form of diancistra is found, which is the smallest of the three; they are highly bent in the middle, and the plane of this curve may be situated differently with regard to the planes through the shaft and the recurved ends. Otherwise the principle of their form is the same as in the two preceding kinds; the edges issuing from the shaft are rather broad, and therefore the notch in the middle of the shaft between the two edges is most frequently distinctly seen; the edges are also in this form only seen with difficulty. The length of these diancistra are between 0·021 and 0·028^{mm}, most frequently nearest to the former figure; the thickness in the middle is ca. 0·0010^{mm}. Of these three different forms of diancistra the largest ones occur in a peculiar way, being attached to the fibres of the skeleton with one end, while the other end projects, and they are collected in bundles situated along the fibres with certain intermediate spaces, in the same way, as Topsent (Résultats des Camp. scient. du Prince de Monaco, Fasc. II, 1892, 87, Pl. VII, Fig. 4) mentions and figures for the species determined by him as *H. Johnsoni*; on the other hand they are not found in the dermal membrane or in the membrane lining

the canals. The two other forms, on the contrary, are found scattered in the tissue of the sponge, in the dermal membrane, and in the membranes lining the canals.

As will be seen, the three mentioned forms of diancistra are well characterized and distinctly separated; this fact, however, has not hitherto been acknowledged, the smaller forms having been regarded as developmental phases of the largest one. Thus Ridley and Dendy (Challeng. Report, XX, Monaxonida 61) say of the small diancistra of the *H. esperioides* established by them that they seem to be young forms of the large diancistra. I have had occasion to examine *H. esperioides*, and it was seen that the small diancistra of this species are forms having great resemblance to the small diancistra of the present species; accordingly they are an independent form without any connection with the large diancistra, neither could they, by a growth by mere apposition, get a form like that of the large ones[1]). Topsent, in the work quoted above p. 87, says of the small diancistra in the species determined by him as *H. Johnsoni* Bow. ... petits diancistres grêles que l'on peut prendre pour des spicules jeunes ou frappés d'un arrêt de développement. Both these interpretations are untenable, as the small diancistra, as is shown in the preceding description, are independent forms without any connection with the development of the large diancistron; as was to be expected, this development takes place in a quite different way, and they grow only by apposition. 2. Toxa; these are comparatively fine; they have a strong curve in the middle, while the ends are long and evenly recurved, and most frequently the outermost piece of the ends forms a point which is slightly recurved with a rather sharp bend. Within the bounds of this description they may be somewhat varying, being higher or flatter, or somewhat irregular, and they are also often somewhat contort. The length, which is, to a certain degree, dependent on the degree of curving, may vary between 0·08 and 0·157^{mm}, and sometimes, in more flat bows, it may be a little greater; the thickness in the middle is 0·0017—0·002^{mm}. The bows are found scattered in the tissue, but are not numerous; they are not found in the dermal membrane.

If I have not thought to be justified in determining the present species as *H. Johnsoni* Bow., the reason is partly that we have no detailed description of this species. Bowerbank, as is well known, in 1864 in the first volume of Mon. of Brit. Sponges, only describes the large diancistron of a species from Madeira without giving this species a name in the text, only mentioning that it is related to the genus *Hymedesmia*; in the explanation of the figures he calls it *Hymedesmia Johnsoni* M. S. He gives two figures of it, from which is seen that it has large diancistra and styli. In 1870 O. Schmidt, in Spong. d. atlant. Gebiet, enumerates a species, which he identifies with that of Bowerbank, and calls *Desmacella Johnsoni*, but he gives no distinct description. Topsent, in the work quoted before, enumerates a species which he determines as *Hamacantha Johnsoni* Bow.; of the microsclera in this species he says that large diancistra are always found, small fine diancistra almost always, sometimes sigmata, sometimes bows, and rarely (in one case) rhaphides. Topsent, however, gives no measurings of the different forms. Now it is rather certain that Topsent has had before

[1]) Ridley and Dendy, Pl. XVII, fig. 2 d, figure one of these small diancistra, and say in the explanation of the plate: young diancistron, showing the hooks still united to the shaft by a thin web , which fact is also shown in the figure; this interpretation, however, is wrong, the structure being the same as in the small diancistra of the present species; the fact is that the edge issuing from the shaft is very broad, and comes close to the recurved end, but it is always distinctly separated from this end. In *H. esperioides* only two forms of diancistra are found, corresponding to the smallest and the largest of the present species.

him more than one species; at least the fact is that the two *Hamacantha*-species I have before me, the present species and the following one, are entirely constant with regard to their spiculation; one has always three forms of diancistra and toxa, the other always only one form of diancistra, and rhaphides, but no toxa. To this constant difference in the spiculation is further, as appears from the descriptions, added other constant characters. To judge by the forms of microsclera mentioned by Topsent, it would appear that he has had three species, viz. the present one (all the specimens with toxa), the following one (the specimen with rhaphides), and a species with sigmata. As has been shown, we do not at present know with certainty, what *H. Johnsoni* is, and therefore I presume it will be best by the determination to leave this species out of consideration.

On the other hand there might be some possibility that *Halichondria falcula* Bow. is identical with the present species, but this fact cannot be decided by Bowerbank's description. Thus he mentions and figures only one form of diancistra; as skeleton-spicule he figures a stylus of common form, but in the description he uses the term »fusiformi-acuate». The description of the external form and the surface agrees well with the present species. Finally the species is obtained at the Shetland Islands, which locality is not very far from several of the stations, on which *H. Bowerbanki* is obtained. The *Hymedesmia Johnsoni* mentioned by Carter l. c., seems, by being possessed of toxa, and also by the description upon the whole, rather certainly to be identical with the present species.

Locality: Station 1, 62° 30′ Lat. N., 8° 21′ Long. W., depth 132 fathoms; station 9, 64° 18′ Lat. N., 27° 00′ Long. W., depth 295 fathoms; station 10, 64° 24′ Lat. N., 28° 50′ Long. W., depth 788 fathoms; station 27, 64° 54′ Lat. N., 55° 10′ Long. W., depth 393 fathoms; station 81, 61° 44′ Lat. N., 27° 00′ Long. W., depth 485 fathoms; station 85, 63° 21′ Lat. N., 25° 21′ Long. W., depth 170 fathoms; station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms; station 90, 64° 45′ Lat. N., 29° 06′ Long. W., depth 568 fathoms; station 94, 64° 56′ Lat. N., 36° 19′ Long. W., depth 204 fathoms; station 97, 65° 28′ Lat. N., 27° 39′ Long. W., depth 450 fathoms; station 98, 65° 38′ Lat. N., 26° 27′ Long. W., depth 138 fathoms; station 112, 67° 57′ Lat. N., 6° 44′ Long. W., depth 1267 fathoms (temperature ÷ 1°1 C.). Finally it has been taken on 64° 42′ Lat. N., 27° 43′ Long. W., depth 426 fathoms (Wandel). All these stations are between ca. 62° and 68° Lat. N., and are dispersed in the sea between the Faröe Islands and Iceland, to the south of Iceland, the Denmark Strait, and the Davis Strait. The depth ranges between 132 and 1267 fathoms. On some of the stations, especially station 89, the species has been taken in very large numbers. On station 112 with the great depth of 1267 fathoms and the negative bottom temperature only a single quite small specimen was taken. On the other hand the largest specimens are from the stations 1 and 98 with depths of respectively 132 and 138 fathoms.

Geogr. distr. Carter l. c. mentions his *Hymedesmia Johnsoni* from between Scotland and the Faröe Islands and from Madeira. According to what is stated above, the species must also be supposed to have been taken on the expedition of the Prince of Monaco 1886—88.

2. **H. implicans** n. sp.

Pl. V, Figs. 6—9, Pl. XIX, Fig. 1 a—e, Figs. 2—6.

1885. ?*Hamacantha papillata* Vosmaer, Sponges of the »Willem Barents», Bijdrag. tot de Dierk., 12te Afl. 3die Gedeelt. 28, Pl. I, fig. 15 a—b, Pl. V, figs. 82—86.

1892. *Hamacantha Johnsoni* var. *complanata, partim. specimen rhaphidibus instructum,* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 87, Pl. VII, fig. 5 b, h.

Formed like a flat cushion, or more or less crust-shaped, provided with more or fewer, round or flattened, conical papillæ. Embodies extraneous bodies copiously, especially in the part turned towards the substratum. Outermost the sponge has a rather firm dermal layer provided with close-lying spicules in several layers parallel to the surface, but otherwise lying in every direction; from these layers close-standing spicules project, and therefore the surface is shaggy. Oscula are found at the summits of the papillæ. The skeleton consists of irregularly running, polyspicular fibres and scattered spicules. Spongin wanting. Spicula: Megasclera styli 0·27—0·68^{mm}; microsclera diancistra of one form 0·19—0·22^{mm}; rhaphides in trichodragmata 0·11^{mm}.

This species has a quite peculiar way of growing; it grows as thinner or thicker incrustations on shells of Mollusks, Bryozoa, worm-tubes, stones etc.; but generally it spreads over the body on which it is growing, grows round it, and embodies it completely; sometimes the substratum has only been small stones and particles of gravel, and even if it grows on a more extended substratum, it always includes extraneous bodies copiously, so that, when a specimen is cut through, the lower half is always found abundantly filled with foreign bodies, especially pebbles and gravel (Pl. V, fig. 9). These particles are kept together and surrounded by sponge-tissue. Besides thus having incrusted foreign bodies, the sponge moreover is most frequently somewhat incrusted on the outside, and on account of its form folds and hollows may be formed, which, as it seems, may be quite closed by coalescings, and be filled with gravel and the like. Thus these cavities belong originally to the surface of the sponge, and by the cutting through of a sponge, in which they are found, cavities will accordingly be found filled with foreign particles, of which cavities some belong to the interior of the sponge, while others belong to the surface; they may, however, be distinguished from each other by the fact that the surface of the sponge is finely shaggy, and therefore the walls of the cavities, which do not belong to the interior of the sponge, but have their origin from coalescings, are shaggy from projecting spicules. The form of the sponge may otherwise be somewhat varying according to the substratum, on which it is growing; when growing on large, flat shells, it forms a regular crust or cushion, while it is oftenest more or less irregular, when growing on smaller bodies. The largest specimen in hand, growing on a *Pecten*-shell, has a greatest extent of ca. 47^{mm} and a thickness of 6—7^{mm}. The other specimens grow especially on bivalves and Brachiopods, and are most frequently growing on, or have incrusted, several shells. The surface is set with a larger or smaller number of conical papillæ, formed by the skin; the papillæ have an average length of 5—7^{mm}; they are either round or flattened. Otherwise the *surface* is shaggy from projecting spicules. The sponge is very cavernous, and especially in the upper part, where no extraneous bodies are embodied, large cavities are found immediately under, the skin; therefore it is of a somewhat vesicular consistency. The colour (in spirit) is grayish white somewhat transparent, but often it appears to be brownish on account of sand and mud covering it. Externally the sponge is provided with a rather firm *dermal layer* furnished with rather close-lying spicules intercrossing in all directions, but parallel to the surface; they are lying in several layers, and the part marked off as skin, has a thickness of ca. 0·10^{mm}. Through the spicules of the skin other

spicules project rather close to each other; they are stuck with one end between the parallel spicules of the skin, while all the other part projects, so that the skin is very distinctly shaggy (Pl. XIX, fig 3).

Oscula and *pores:* In the examined specimens the pores were only found in small numbers; they are small and difficult to observe, not going vertically through the dermal layer, and so their outer opening is only little conspicuous when a piece of stained skin is viewed from above. The size is measured from 0·011—0·028^{mm}. Oscula: as before said the surface has a larger or smaller number of papillæ, up to a score in the largest specimens. These papillæ are formed by the dermal layer; the spicules of the skin are here arranged parallelly to the longitudinal axis of the papilla. On the summit of the papilla the oscular opening is found; these openings, however, are not round, but are made by the skin of the papilla being split into a number of narrow lobes, and according to this arrangement the spicules in the outermost part of the papilla are gathered in a like number of bands (Pl. XIX, fig. 5). The papillæ may have a somewhat different appearance, which would seem to be due to a different degree of contraction. In their most extended form they are thin-skinned and translucent, of a length of 6—7^{mm}, are tapering and often compressed (Pl. V, figs. 7—8). Then they may be shorter and shorter, and at the same time they become round and more compact, and the end becomes stubby, and assumes also a darker colour (Pl. V, fig. 6). They may be so short as only to form a quite flat prominence; at the same time a kind of folding must take place, for when such a papilla is viewed from above under the microscope it is seen that the very close-packed spicules form, as it were, bands or partition walls going from the middle towards the periphery (Pl. XIX, fig. 6).

The *skeleton:* As has been said above, the sponge is very cavernous, and therefore its body consists mostly of more or less membrane-like parts which in the lower part of the sponge surround and keep together an abundant mass of extraneous bodies, while in the upper part of the sponge they surround and bound a number of cavities, into which the pores lead, and from some of which oscula lead out. The skeleton therefore, besides of the mentioned dermal skeleton, consists of some irregular fibres, partly found in the membrane-like parts separating the cavities, partly running freely here and there, especially from the lower part to the dermal layer. The fibres found in the membranes are polyspicular, sometimes distinct and well defined, sometimes more dissolved in the membrane. Besides with these fibres the membrane is also provided with diancistra lying in beautiful rosettes rather close to each other (Pl. XIX, fig. 4). Also the freely running fibres are polyspicular, and have rather many spicula alongside. The thickness of the fibres is generally 0·10—0·17^{mm}. As in the preceding species diancistra are found in rosettes on the fibres. In the lower part of the sponge fibres may be found where there is some interval between the incrusted extraneous bodies; where such is not the case the parts of the tissue between the foreign particles are provided with diancistra placed in rosettes in large numbers, and only a few needles. Spongin is not seen in the skeleton.

Spicula: a. *Megasclera* are styli; they are straight or slightly curved, sometimes a somewhat sharper bend is found at the head end; they are thickest in the middle tapering somewhat to the rounded end, though not so much as in the styli of the preceding species; the smaller needles are least tapering, often quite imperceptibly, and sometimes not at all. The opposite end may be somewhat different; most frequently it has a very stubby point that may end in a quite small, pointed process; in other cases the point is more long and evenly tapering. The length varies very consider-

ably, from 0·27—0·68^{mm}, the thickness is in proportion 0·005—0·0178^{mm}; a few, quite fine needles, developmental forms, are seen; but besides these, part of the needles lying between the said limits, especially the comparatively long and fine ones, are presumably also developmental forms; it is, however, difficult in all instances to decide with certainty which needles are developmental forms, as the fully developed needles surely vary much in size; thus needles are found of a length of 0·298^{mm} and a thickness of 0·011^{mm}; on account of the proportion between length and thickness these needles convey the impression of being fully developed, and when the question is of spicules of this length presumably only the finer ones are developmental forms. b. *Microsclera:* 1. Diancistra; in the present species diancistra are only found of one kind; they are chiefly of the same structure as the large diancistron of the preceding species, but are distinguished from it by being longer and more slender, and generally the shaft is a little bent; the recurved ends generally form a smaller angle with the shaft than in *Bowerbanki*; the edge issuing from the shaft, decreases evenly towards the middle, so that the notch between the two edges is longer and not so highly conspicuous as in the preceding species. Further these diancistra are far less contort, not rarely quite plane. The length is between 0·19 and 0·22^{mm}, most frequently it is 0·208^{mm}. The thickness in the middle is 0·008—0·010^{mm}. The development of the diancistra takes place in the same way as in the preceding species, as shown on Pl. XIX, fig. 1 c—d. The diancistra are found in rosettes on the fibres, but this feature is not so distinctly marked as in the preceding species; further they are, as already mentioned, found in rosettes on the membranes separating the cavities, and they are also seen in the innermost layer of the dermal layer, which is presumably lined by the same membrane, and also here in beautiful rosettes; finally the diancistra are also found abundantly in rosettes in the lower part of the sponge among the extraneous bodies. 2. Rhaphides; these are especially fine, the thickness is about 0·0007^{mm}, and they have an average length of 0·11^{mm}; they occur in bundles, trichodragmata, containing a large number of rhaphides; they are found throughout the sponge, but especially on the membranes and in the innermost part of the dermal layer.

Remarks: In this species cellules sphéruleuses were found in large numbers in the dermal layer and the membranes; they are quite globular or fusiform, densely filled with somewhat refringent granules, and are in spirit of a light yellow colour; the size of the round ones is ca. 0·005—0·008^{mm}, the fusiform ones are somewhat longer.

As has been mentioned under the preceding species I think that Topsent l. c. under his *H. Johnsoni* has comprised more than one species; the specimen of var. *complanata* with rhaphides, mentioned at p. 87, seems undoubtedly to belong to the present species. The *H. papillata* established by Vosmaer l. c., seems by the occurrence of papillæ and upon the whole by its outer characters to agree with the present species, but the exceedingly incomplete and short description (2½ lines) gives no sufficient hold for a determination, and as the mentioned and figured spicules do not agree with the present species, and rhaphides are not mentioned, the referring is doubtful.

Locality: The present species has upon the whole been taken on the same stations as the preceding one, but in smaller numbers. Station 9, 64° 18′ Lat. N., 27° 00′ Long. W., depth 295 fathoms; station 10, 64° 24′ Lat. N., 28° 50′ Long. W., depth 788 fathoms; station 27, 64° 54′ Lat. N., 55° 10′ Long. W., depth 393 fathoms; station 35, 65° 16′ Lat. N., 55° 05′ Long. W., depth 362 fathoms; station 81, 61° 44′

Lat. N., 27° 00′ Long. W„ depth 485 fathoms; station 85, 63° 21′ Lat. N, 25° 21′ Long. W., depth 170 fathoms; station 89, 64° 45′ Lat. N., 27° 20′ Long. W., depth 310 fathoms; station 94, 64° 56′ Lat. N., 36° 19′ Long. W., depth 204 fathoms. Thirty and odd specimens have been taken in all. According to the localities the species is spread in the Davis Strait and the Denmark Strait between ca. 62° and 65° Lat. N., on depths from 170—788 fathoms.

Geogr. distr. Where the specimen mentioned by Topsent, l. c., which I refer to this species, has been taken cannot be stated, but the collections, as well known, were made from the Bay of Gascony over the Azores to New Foundland, and accordingly the species reaches down to ca. 38° Lat. N. The *H. papillata* of Vosmaer is taken south of Spitzbergen on depths of 145 and 180 fathoms.

As correctly stated by Topsent l. c., the genus *Vomerula* established by O. Schmidt in 1880, and kept in 1887 by Ridley and Dendy in Challeng. Monaxonida together with Gray's genus *Hamacantha* established in 1867, will have to be comprised under this genus as a synonym, and thus *Hamacantha* will be the only genus in the subfamily *Hamacanthinæ*. As certainly characterized as is the genus *Hamacantha*, as much incertainty is found with regard to some of its species. Ridley and Dendy are surely right, when they (Challeng. Report, Monaxonida, LXVI) express the opinion that the *H. tibicen* established by O. Schmidt 1880 (Spong. der Meerbus. von Mexiko, II, 83), which is said to have as well diancistra as chelæ (»Doppelankern« Schmidt), is either a Desmacidonid with sigmata of such a form, that they might be misinterpreted as diancistra, or, what is perhaps more possible, with diancistra as foreign bodies.

At present the list of the species belonging to *Hamacantha*, looks as follows:

1864. *Hamacantha (Hymedesmia) Johnsoni* Bow. — Doubtful; the original never described; see before under *H. Bowerbanki*.

1874. *(Halichondria) falcula* Bow. — Perhaps = *H. Bowerbanki* mihi; see this species.

1880. *(Vomerula) tenda* Schmidt. — Stated to have fine oxea (»feine Umspitzen« Schm.) and bows, with transitional links between them.

1880. *(Vomerula) tibicen* Schmidt. — As stated above scarcely a *Hamacantha*.

1882. *(Hymedesmia) Schmidtii* Cart. — Stated by Carter to have oxea, diancistra and genuine sigmata [1]).

1885. *papillata* Vosm. — Perhaps = *H. implicans* mihi; see this species.

1887. *(Vomerula) esperioides* R. and D. — Well characterized species, has of microsclera sigmata and diancistra of two forms.

Bowerbanki mihi.

implicans mihi.

[1]) This species (Ann. Mag. Nat. Hist. Ser. 5, IX, 297, Pl. 11, fig. 21 a—e) might perhaps be identical with *H. esperioides* R. and D., as it appears to have diancistra of two forms and sigmata; Carter, to be sure, states it to be possessed of oxea, but his figure would imply that the question is of styli with highly tapering head ends. When Carter refers Schmidt's *H. Johnsoni* from Florida (Spong. Atl. Gebiet.) to his species, this is surely not correct, as it does not appear from the description of Schmidt that his species has real sigmata.

Plate I.

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Fig. 1. *Pachychalina Schmidtii* n. sp. $^1/_1$ 5

— 2. *Pachychalina Schmidtii* n. sp. $^1/_1$ ..... —

— 3. *Siphonochalina pulcherrima* Frstdt. $^1/_1$ 13

— 4. *Siphonochalina pulcherrima* Frstdt. A tube cut through. $^1/_1$ ..... —

— 5. *Halichondria velamentosa* Arm. Hans. A calicular specimen; the skin wanting in some places. $^1/_1$ 22

— 6. *Reniera urceolus* Rathke et Vahl. $^1/_1$ 35

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Plate II.

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Fig. 1. *Pachychalina caulifera* Vosm. $^1/_3$ 7

— 2. *Pachychalina caulifera* Vosm. Basal part of the individual figured in fig. 1, with gemmulæ, on a fragment of the shell of a *Modiola modiolus*; in the middle where the sponge is broken off, gemmulæ are seen uncovered, above and below they are seen faintly through the tissue. $^1/_1$ . . . . . -

— 3. *Chalina spatula* n. sp., attached to a Hydroid stalk together with calcareous sponges, Ascidians, Hydroids, Bryozoa and Octactinia (*Voeringia* and *Paraneph-thya*). $^1/_1$ 11

— 4. *Halichondria oblonga* Arm. Hans. $^1/_1$ 24

— 5. *Reniera tubulosa* Frstdt., on *Alcyonidium gelatinosum*. $^1/_1$ 44

— 6. *Reniera laxa* n. sp. On the left side of the figure is seen a Balanoid round which the sponge has grown. $^1/_1$ 46

— 7. *Halichondria? difficilis* n. sp. $^1/_1$ 28

— 8. *Reniera heterofibrosa* n. sp. $^1/_1$ 47

— 9. *Gellius flagellifer* R. and D. $^1/_1$ 71

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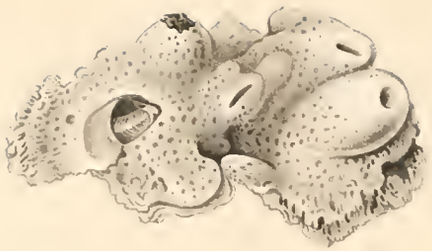
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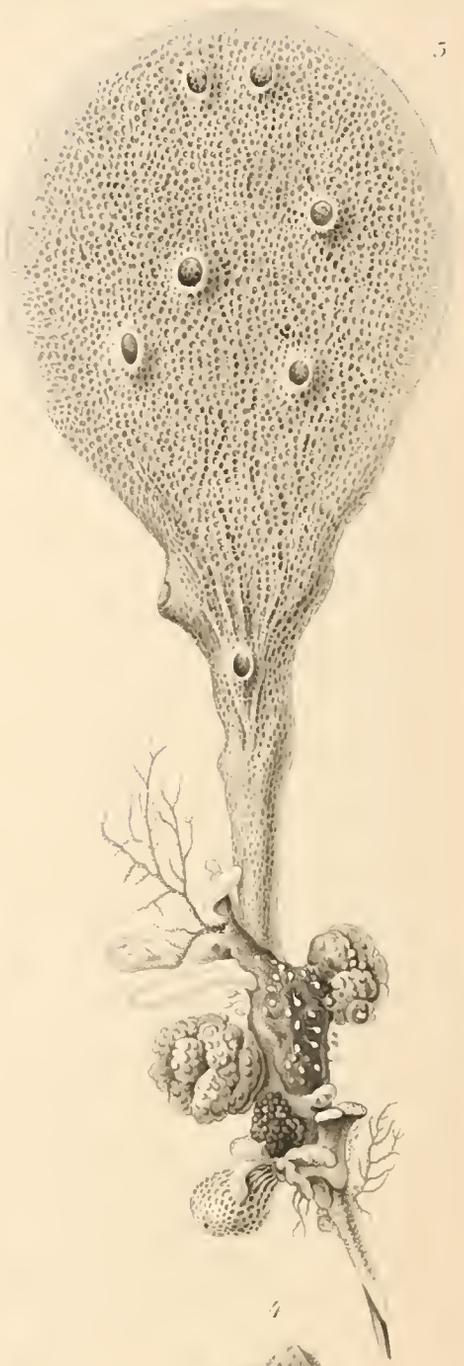
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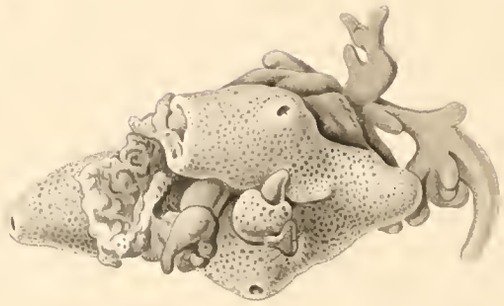
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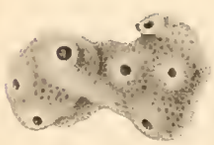
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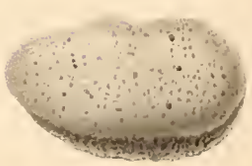
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Plate III.

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Fig. 1. *Halichondria colossea* n. sp., seen from above. $^1/_3$ 27

— 2. *Halichondria colossea* n. sp., side view. $^1/_3$ ..... —

— 3, 4, 5, 6, 7. *Halichondria osculum* n. sp., individuals of different forms. *o* osculum, *a* groove with osculum. $^1/_1$ 23

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Plate IV.

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Fig. 1. *Eumastia sitiens* O. S. A pore papilla. A little more than $^{2}/_{1}$ 31

— 2. *Eumastia sitiens* O. S. An oscular papilla. A little more than $^{2}/_{1}$ ..... —

— 3. *Eumastia sitiens* O. S. A pore- and oscular papilla. A little more than $^{2}/_{1}$ .... —

— 4. *Eumastia sitiens* O. S. A pore papilla cut through, showing the skeleton. A little more than $^{2}/_{1}$ ..... —

— 5. *Eumastia sitiens* O. S. The end of an oscular papilla. ca. $^{16}/_{1}$ ..... —

— 6. *Eumastia sitiens* O. S., attached to a *Pecten islandicus*; in a couple of the papillæ is seen *Aristias tumidus* Kr. $^{1}/_{1}$ ..... —

— 7. *Petrosia crassa* Cart., attached to a little stone together with an Octactinia. At the lowermost part of the sponge the skin is partly wanting. $^{1}/_{1}$ 54

— 8. *Petrosia crassa* Cart. One of the most differentiated oscula. $^{2}/_{1}$ ..... —

— 9. *Petrosia crassa* Cart. Section of the sponge through an osculum, showing especially the radiating canals, and partly those parallel to the surface. $^{1}/_{1}$ ..... —

— 10. *Desmacella Peachii* Bow. A quite young individual on a fragment of a *Sipho*. $^{3}/_{2}$ 90

— 11. *Desmacella Peachii* Bow. A somewhat older individual on a fragment of a *Sipho*. $^{3}/_{2}$ ..... —

— 12. *Desmacella Peachii* Bow. $^{1}/_{1}$ ..... —

— 13. *Desmacella Peachii* Bow. A calicular specimen, the skin is wanting, and the edge is damaged. $^{1}/_{1}$ ..... —

— 14. *Biemna annexa* O. S. *a* the place of attachment. $^{1}/_{1}$ 85

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Plate V.

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Fig. 1. *Reniera calamus* n. sp. Fragment. $^{1}/_{1}$ 48

— 2. *Reniera calamus* n. sp. Cut through. $^{1}/_{1}$ ..... —

— 3. *Gelliodes plexa* n. sp. A leaf-shaped piece viewed from the inside, the skin is only kept in the middle. $^{1}/_{1}$ 75

— 4. *Gelliodes plexa* n. sp. A funnel-shaped specimen, the greater part of the upper edge broken off; the skin wanting on the outside. $^{1}/_{1}$ ..... —

— 5. *Reniera folium* n. sp. $^{1}/_{1}$ 39

— 6. *Hamacantha implicans* n. sp. Most of the papillæ highly contracted. $^{1}/_{1}$ 104

— 7. *Hamacantha implicans* n. sp. The papillæ stretched out. $^{1}/_{1}$ ..... —

— 8. *Hamacantha implicans* n. sp. The papillæ stretched out. $^{1}/_{1}$ ..... —

— 9. *Hamacantha implicans* n. sp. Cut through to show the extraneous bodies embodied in the lower part, and the cavities of the upper part. $^{2}/_{1}$ ..... —

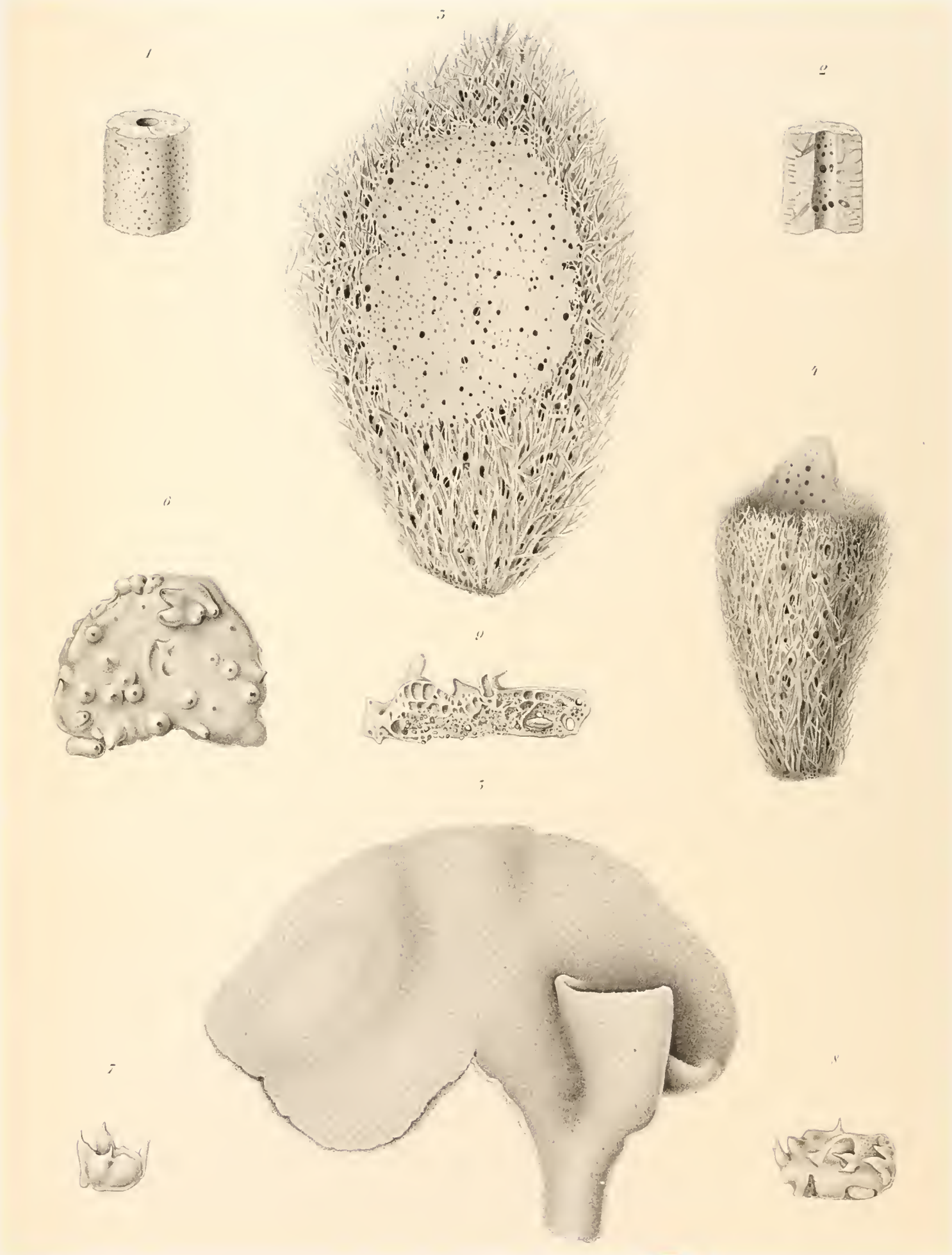

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Plate VI.

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Fig. 1. *Biemma rosea* Frstdt. The largest piece seen from the pore side; the skin wanting in a few places. $^{1}/_{1}$ 82

— 2. *Biemma rosea* Frstdt. A piece probably from the middle of the sponge, seen from the oscular side. $^{1}/_{1}$ ..... —

— 3. *Phlæodictyon elongatum* Tops. $^{1}/_{1}$ 59

— 4. *Phlæodictyon elongatum* Tops., highly incrusted with sand. $^{1}/_{1}$ ..... —

— 5. *Gellius luridus* n. sp. Somewhat damaged above, but less than the two following ones. $^{1}/_{1}$ 64

— 6. *Gellius luridus* n. sp. Broken off above. $^{1}/_{1}$ ..... —

— 7. *Gellius luridus* n. sp. Broken off above. $^{1}/_{1}$ ..... —

— 8. *Gellius luridus* n. sp. The preceding specimen (fig. 7) cut through longitudinally. $^{1}/_{1}$ ..... —

— 9. *Phlæodictyon irregulare* n. sp. $^{1}/_{1}$ 61

— 10. *Phlæodictyon irregulare* n. sp. $^{1}/_{1}$ ..... —

— 11. *Phlæodictyon tuber* n. sp. $^{1}/_{1}$ 57

— 12. *Phlæodictyon tuber* n. sp., incrusted with sand. $^{1}/_{1}$ ..... —

— 13. *Phlæodictyon tuber* n. sp., showing a broken off fistula. $^{1}/_{1}$ ..... —

— 14. *Desmacella groenlandica* Frstdt. Skin with oscula closed in different degrees. Ends of fibres are seen. ca. $^{20}/_{1}$ 95

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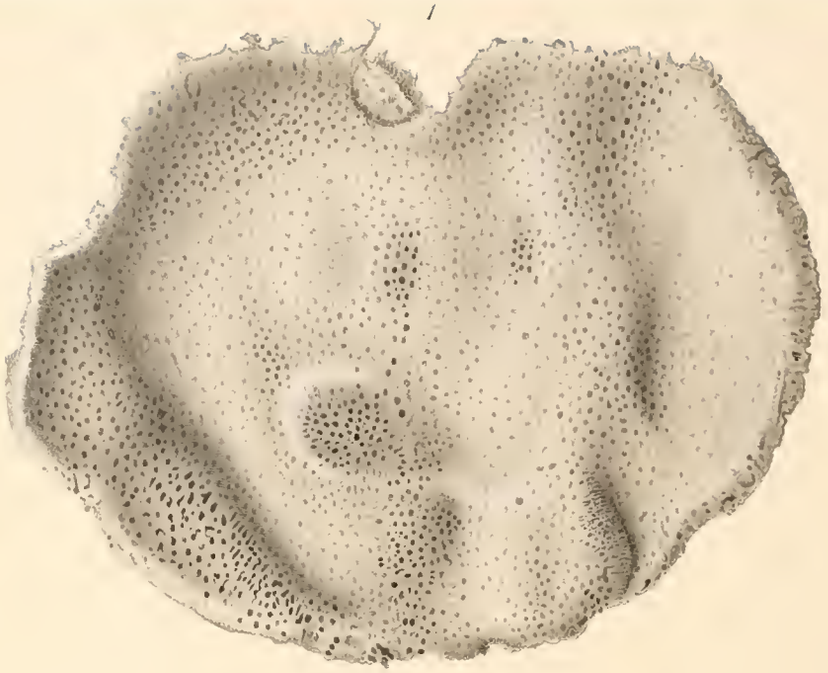

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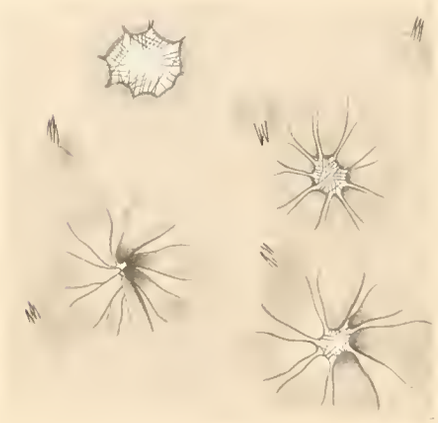

Plate VII.

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Fig. 1. *Reniera parenchyma* n. sp. $^{1}/_{1}$ 37

— 2. *Hamacantha Bowerbanki* n. sp., showing one osculum; the surface damaged in places. $^{1}/_{1}$ 99

— 3. *Hamacantha Bowerbanki* n. sp., showing several oscula. $^{1}/_{1}$ ..... —

— 4. *Desmacella hamifera* n. sp. A leaf-shaped fragment, the skin almost quite wanting. $^{1}/_{1}$ 93

— 5. *Desmacella hamifera* n. sp. The middle part of a short-stalked, calicular specimen. $^{1}/_{1}$ ..... —

— 6. *Desmacella hamifera* n. sp. Radial longitudinal section through the wall, showing the skeleton. $^{3}/_{2}$ ..... —

— 7. *Desmacella groenlandica* Frstdt. The skin wanting on the outside. $^{1}/_{1}$ 95

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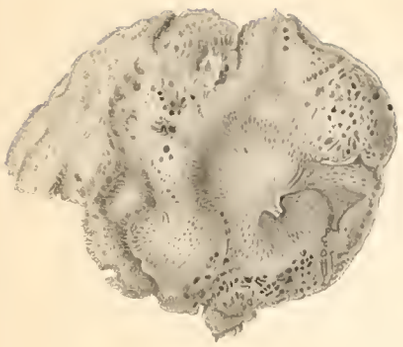

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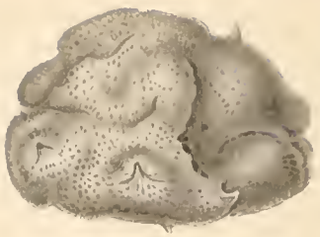

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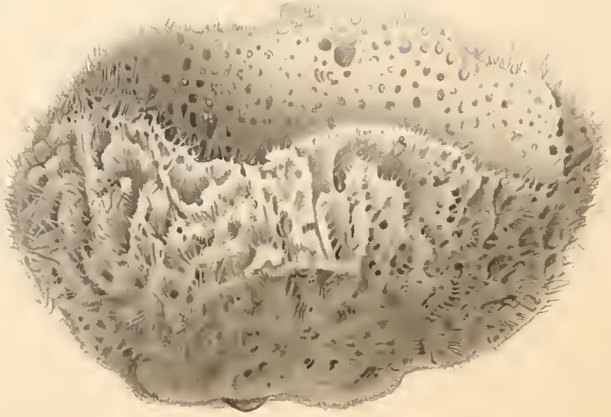

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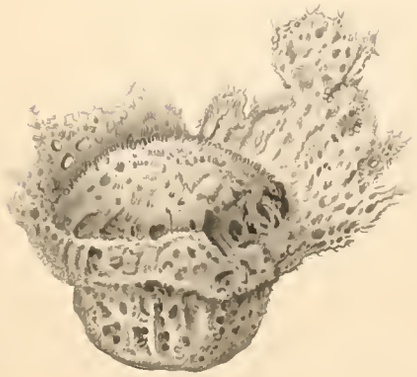

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Plate VIII.

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Fig. 1. *Pachychalina Schmidtii* n. sp. Oxea, *a* fully developed, *b* developmental forms, × 255 5

— 2. *Pachychalina Schmidtii* n. sp. Longitudinal section of the skeleton towards the surface, but not reaching it, × ca. 20. *a* inward, *b* outward ..... —

— 3. *Pachychalina Schmidtii* n. sp. A piece of the skeleton. × 60 ..... —

— 4. *Pachychalina caulifera* Vosm. Oxea, *a* fully developed, *b* developmental forms, × 255 7

— 5. *Pachychalina caulifera* Vosm. Longitudinal section of the skeleton towards the surface, × ca. 20. *a* inward, *b* outward ..... —

— 6. *Pachychalina caulifera* Vosm. A piece of the skeleton, × ca. 100; as it is near the surface the longitudinal fibres are running almost horizontally ..... —

— 7. *Chalina oculata* Pall. Oxea. × 255 10

— 8. *Chalina spatula* n. sp. Oxea, *a* fully developed, *b* developmental forms, × 255 . 11

— 9. *Chalina spatula* n. sp. Section of the skeleton at the edge, × ca. 14. A few of the polyspicular fibres are seen ..... —

— 10. *Siphonochalina pulcherrima* Frstdt. Oxea, *a* fully developed, *b* developmental forms, × 255 13

11. *Siphonochalina pulcherrima* Frstdt. Longitudinal section of the skeleton from the surface some way inward, × ca. 20. A few polyspicular fibres are seen. *a* inward, *b* outward ..... —

— 12. *Siphonochalina mollicula* n. sp. Oxea, *a* fully developed, *b* developmental form, × 255 15

— 13. *Siphonochalina mollicula* n. sp. Longitudinal section of the skeleton from the surface some way inward, × ca. 20. *a* inward, *b* outward ..... —

— 14. *Siphonochalina mollicula* n. sp. Piece of the skeleton. × ca. 100 ..... —

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Plate IX.

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Fig. 1. *Halichondria panicea* Pall. Oxea, × 165 17

— 2. *Halichondria genitrix* O. S. Oxea, *a* of the larger ones, *b* of the smaller ones, *c* monstrous forms, × 165 18

— 3. *Halichondria fibrosa* Frstdt. Oxea, *a* of the larger ones, *b* of the smaller ones, *c* oxeum with a swelling in the middle, × 165 20

— 4. *Halichondria velamentosa* Arm. Hans. Oxea, × 165 22

— 5. *Halichondria velamentosa* Arm. Hans. Dermal membrane from the oscular side, with a few pores, × 54 ..... —

— 6. *Halichondria velamentosa* Arm. Hans. Dermal membrane from the pore side, × 54 ..... —

— 7. *Halichondria osculum* n. sp. Oxea, × 165 23

— 8. *Halichondria osculum* n. sp. Dermal membrane, × 38 ..... —

— 9. *Halichondria osculum* n. sp. Membrane from the oscular cavity, × 33 ..... —

— 10. *Halichondria oblonga* Arm. Hans. Oxea, × 165 24

Plate X.

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Fig. 1. *Halichondria tenuiderma* n. sp. Oxea, *a* fully developed, *b* developmental form, × 165 26

— 2. *Halichondria tenuiderma* n. sp. Section vertical on the surface, showing the skeleton, × 32 ..... —

— 3. *Halichondria colossea* n. sp. Oxea of different sizes, × 58 27

— 4. *Halichondria colossea* n. sp. Dermal membrane with a few incrusted foreign bodies, × 58 ..... —

— 5. *Halichondria colossea* n. sp. Canal membrane, × 58 ..... —

— 6 *Halichondria colossea* n. sp. Section vertical on the surface, from a spot where no projecting spicules are found; *a* the dermal layer of small spicules ..... —

— 7. *Halichondria colossea* n. sp. Section vertical on the surface, from a spot where projecting spicules are found; *a* the dermal layer of small spicules ..... —

— 8. *Halichondria? difficilis* n. sp. Oxea of different sizes, *a* oxeum with a swelling in the middle, × 165 28

— 9. *Eumastia sitiens* O. S. Oxea, *a* fully developed of different sizes, *b* developmental forms, × 165 31

— 10. *Eumastia sitiens* O. S. Transverse section of an oscular papilla, *a* oscular canal, *b* subdermal cavities, *c* the fibre lying in the partition wall, × ca. 12 ..... —

— 11. *Eumastia sitiens* O. S. Transverse section of a pore papilla, in the middle the fibre with radiating branches, × ca. 12 ..... —

— 12. *Eumastia sitiens* O. S. Wall of pore papilla. × 58 ..... —

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Plate XI.

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Fig. 1. *Reniera urceolus* Rathke et Vahl. Oxea, × 255 35

— 2. *Reniera parenchyma* n. sp. Oxea, × 255 37

— 3. *Reniera parenchyma* n. sp. Section through the middle of the skeleton of the sponge, parallel to the surface, showing oscular canals and polyspicular longitudinal fibres, × ca. 20 ..... —

— 4. *Reniera parenchyma* n. sp. Section of the skeleton vertical on the surface, × ca. 20 ..... —

— 5. *Reniera folium* n. sp. Oxea, × 255 39

— 6. *Reniera ventilabrum* Frstdt. Oxea, × 255 40

— 7. *Reniera ventilabrum* Frstdt. Skeleton seen from the surface, showing an osculum and the spicules projecting from the edge of it, × ca. 54 ..... —

— 8. *Reniera hyalina* n. sp. Oxea, × 255 42

— 9. *Reniera clavata* Levins.? Oxea, × 255 43

— 10. *Reniera cinerea* Grant. Oxea, × 255 43

— 11. *Reniera tubulosa* Frstdt. Oxea, *a* fully developed of different sizes, *b* developmental forms, × 255 44

— 11 c. *Reniera tubulosa* Frstdt. The ends of different oxea. × 485 ..... —

— 12. *Reniera tubulosa* Frstdt. Section of the skeleton vertical on the surface, × ca. 60 —

— 13. *Reniera laxa* n. sp. Oxea, × 255 46

— 14. *Reniera heterofibrosa* n. sp. Oxea, × 255 47

— 15. *Reniera calamus* n. sp. Oxea, *a* of the large ones, *b* of the small ones, × 255 .. 48

— 16. *Reniera calamus* n. sp. Radial longitudinal section of the skeleton, × ca. 60 ... —

— 17. *Reniera* sp. a. Oxeum, × 255 49

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Plate XII.

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Fig. 1. *Reniera* sp. b. Oxeum, × 255 50

— 2. *Reniera* sp. c. Oxea, × 255 50

— 3. *Reniera Voeringii* Ldbk. Oxea, × 255 50

— 4. *Metschnikowia spinispiculum* Cart. Spined strongyla, *a* fully developed, *b* an older and a younger developmental form, × 255 52

— 5. *Petrosia crassa* Cart. Oxea, *a* of the larger ones, *b* of the smaller ones, *c* short oxea, strongyla and styli, × 255 54

— 6. *Phlæodictyon tuber* n. sp. Oxea, *a* fully developed, *b* developmental forms, × 255 57

7. *Phlæodictyon tuber* n. sp. Section of the skeleton vertical on the surface, showing lamellæ, *a* the outer surface, × ca. 32 ..... —

— 8. *Phlæodictyon elongatum* Tops. Oxea, *a* fully developed, *b* developmental forms, × 255. *c* end of oxeum, × 485 59

— 9. *Phlæodictyon elongatum* Tops. The dermal layer, seen from the outside, a projecting spiculum is seen, × ca. 100 ..... —

— 10. *Phlæodictyon irregulare* n. sp. Oxea, *a* fully developed, *b* developmental forms, × 255 61

— 11. *Gellius arcoferus* Vosm. *a* oxea, × 165, *b* toxa, fully developed and younger forms, × 380, *c* sigmata, × 485 62

— 12. *Gellius angulatus* Bow.? *a* oxea, × 165, *b* ends of different oxea, × 485, *c* toxa of different sizes, × 485, *d* sigmata, × 485 63

Plate XIII.

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Fig. 1. *Gellius luridus* n. sp. *a* oxea, × 165, *b* toxa of different sizes, × 585, *c* sigmata of different sizes, × 585 64

— 2. *Gellius luridus* n. sp. Longitudinal section, showing the dermal layer, lamellæ and canals, × ca. 2. (After a dried preparation, which makes the skeleton appear distinctly) ..... —

— 3. *Gellius luridus* n. sp. Longitudinal section through the dermal layer in a place where this layer is thick, × ca. 33. *a* the part marked off as special dermal layer ..... —

— 4. *Gellius luridus* n. sp. Dermal membrane with spicules and pores, × 65 ..... —

— 5. *Gellius luridus* n. sp. Piece of skeleton lamella with the holes formed by the passage of the canals, × 2 ..... —

— 6. *Gellius luridus* n. sp. The upper part of fig. 5, × 18 ..... —

— 7. *Gellius luridus* n. sp. Spicules from the dermal membrane, showing the cementing by spongin, × 110 .....

— 8. *Gellius luridus* n. sp. Two single spicules with spongin coats, × 110 ..... —

— 9. *Gellius microtoxa* n. sp. *a* oxea, *b* developmental forms, × 165, *c* toxa of different sizes, × 585, *d* sigmata of different sizes, *e* developmental forms, × 585. 67

— 10. *Gellius microtoxa* n. sp. Dermal membrane with spicules and cellules sphéruleuses , partly scattered, partly forming a band, × ca. 65 ..... —

— 11. *Gellius primitivus* n. sp. *a* oxea of different sizes, × 255, *b* toxa of different sizes, × 485 69

— 12. *Gellius proximus* n. sp. *a* oxea of different sizes, × 255, *b* toxa of different sizes, × 485 70

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Plate XIV.

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Fig. 1. *Gellius flagellifer* R. and D. *a* oxea, *b* developmental form, × 165, *c* flagellate sigmata, *d* common sigmata, × 485 71

— 2. *Gellius porosus* Frstdt. *a* oxea, × 165, *b* flagellate sigmata, *c* one of the thick sigmata, only occurring in small numbers, × 485 73

— 3. *Gelliodes plexa* n. sp. *a* oxea, *b* developmental form, × 165, *c* toxa of different sizes and stages of development, × 380, *d* sigmata, × 485 75

— 4. *Gelliodes plexa* n. sp. Dermal membrane from the oscular side; the subjacent skeleton and projecting spicules are seen, × ca. 18 ..... —

— 5. *Gelliodes plexa* n. sp. Dermal membrane from the pore side, × ca. 18 ..... —

— 6. *Gelliodes consimilis* n. sp. *a* oxea, *b* developmental form, × 165, *c* toxa, *d* a developmental form, × 380, *e* sigmata, × 485 77

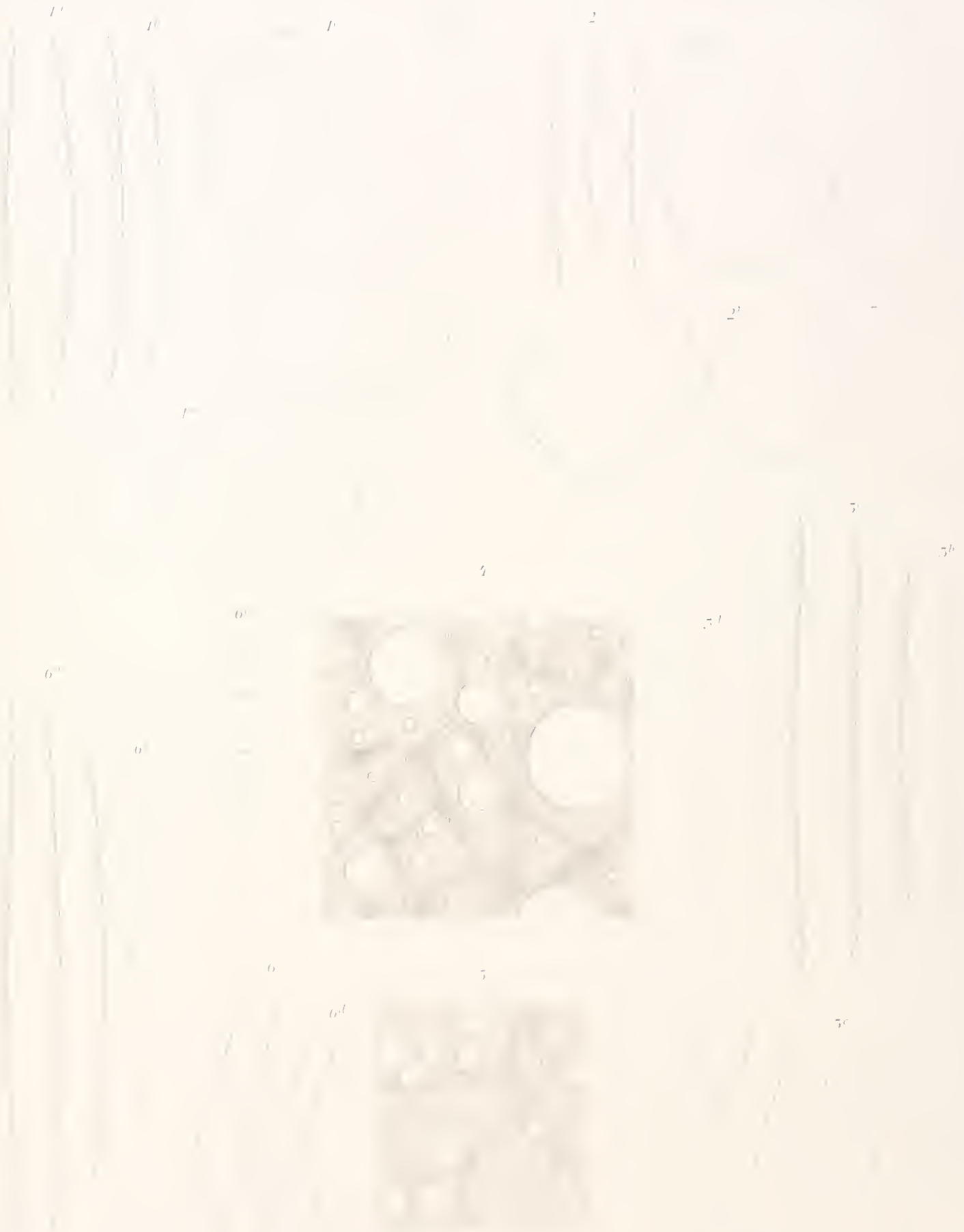

Plate XV.

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Fig. 1. *Oceanapia robusta* Bow. *a* oxea, *b* a developmental form, × 255, *c* sigmata, × 700 78

— 2. *Oceanapia robusta* Bow. Radial section of the outermost part of the rind, × ca. 22; *a* the outermost layer with the projecting spicules ..... —

— 3. *Oceanapia robusta* Bow. Piece of the membrane surrounding the canals, with its skeleton, × ca. 60 ..... —

— 4. *Oceanapia robusta* Bow. The membrane lining the canals inmostly, with its spicules and cellules sphéruleuses , × ca. 60. (A piece from one of the larger canals.) ..... —

— 5. *Biemma rosea* Frstdt. *a* subtylostyli, *b* a developmental form, × 120, *c* head ends of different subtylostyli, × 380, *d* sigmata, more or less contort, × 485... 82

— 6. *Biemma rosea* Frstdt. Dermal membrane from the pore side with projecting spicula-bundles, × ca. 32 ..... —

7. *Biemma rosea* Frstdt. The surface seen from the oscular side with more or less open oscula and projecting spicula-bundles, × ca. 32 ..... —

— 8. *Biemma rosea* Frstdt. Piece of the transverse section from the pore side to about the middle, showing the columns supporting the skin, subdermal cavities, and two large canals; the smaller canals are not given, × ca. 32 ..... —

9. *Biemma rosea* Frstdt. Piece of a transverse section towards the oscular side. × ca. 32 ..... —

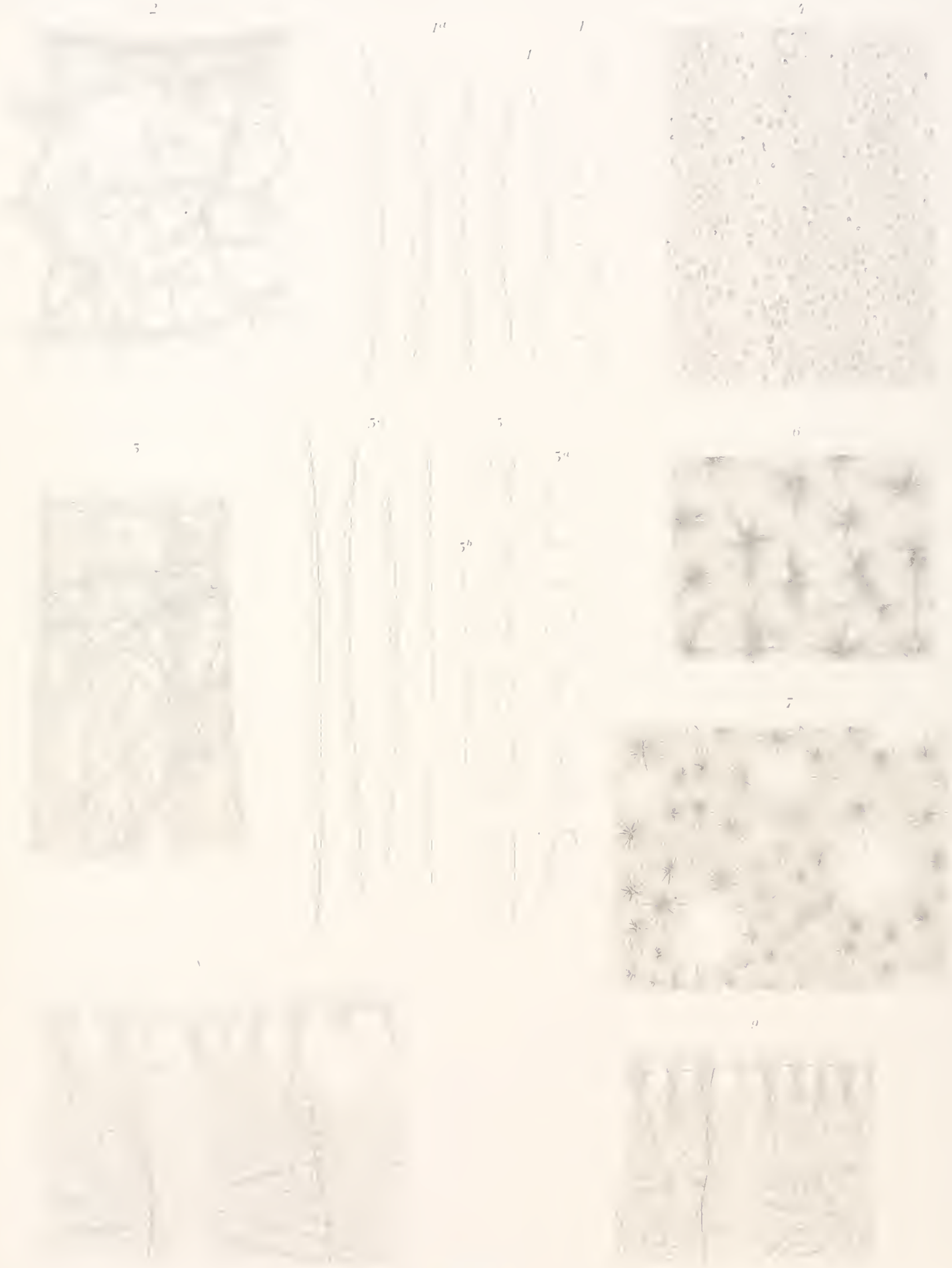

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Plate XVI.

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Fig. 1. *Desmacella capillifera* Levins. *a* styli of common form, *b* styli of the smaller form, straight with a more sharp curve at the head end, *c* irregular styli from the basal layer, × 77, *d* sigmata of the large form, *e* sigmata of the small form, × 485, *f* rhaphides, single and as trichodragmata, × 255, *g* commata, × 700 88

— 2. *Desmacella Peachii* Bow. *a* styli, *b* developmental forms, *c* irregular styli from the basal layer, × 77, *d* sigmata of the large form, *e* sigmadragma, *f* developmental form of the large sigma, *g* sigmata of the small form, × 485, *h* rhaphides of the long form, single and as trichodragmata, *i* rhaphides of the short form, single and as trichodragmata, × 380, *k* commata, × 700, *l* silicious globules, × 485 90

Plate XVII.

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Fig. 1. *Desmacella hamifera* n. sp. *a* styli, *b* developmental forms, *c* irregular styli from the basal layer, × 77, *d* sigmata of the large form, *e* sigmadrama, *f* developmental form of the large sigma, *g* sigmata of the small form, × 485, *h* rhaphides of the long form, single and as trichodragma, *i* rhaphides of the short form, single and as trichodragmata, × 380, *k* commata, × 700, *l* gemmula?, × 255, silicious globules, × 485 93

— 2. *Desmacella groenlandica* Frstdt. *a* styli, *b* irregular styli from the basal layer, × 77, *c* sigmata of the large form, × 485, *d* sigmata of the small form, × 700, *e* rhaphides of the long form, single and as trichodragma, *f* rhaphides of the short form, single and as trichodragma, × 255, *g* commata, × 700, *h* gemmula?, × 255, silicious globules, × 485 (gemmula is drawn from the original specimen of Fristedt) 95

— 3. *Biemma annexa* O. S. *a* tylostyli and subtylostyli, *b* a developmental form, × 120, *c* head ends of different needles, × 380, *d* toxa, × 485, *e* sigmata of the larger form, *f* sigmata of the smaller form, × 485 85

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Plate XVIII.

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Fig. 1. *Hamacantha Bowerbanki* n. sp. *a* styli, *b* developmental forms, × 165, *c* diancistra of the largest form, *d* a series of developmental forms, × 380, *e* diancistra of the middle form, *f* a developmental form, × 700, *g* the same diancistron, × 380 (by this enlargement the edges are not seen), *h* diancistra of the smallest form, × 700, *i* the same diancistron, × 380, the edges are not seen, *k* toxa, × 380 99

— 2. *Hamacantha Bowerbanki* n. sp. Dermal membrane with skeleton and projecting spicules, × 58 ..... —

— 3. *Hamacantha Bowerbanki* n. sp. Radial section of the skeleton from the surface inward, × 32. *a* the skin with spicules ..... —

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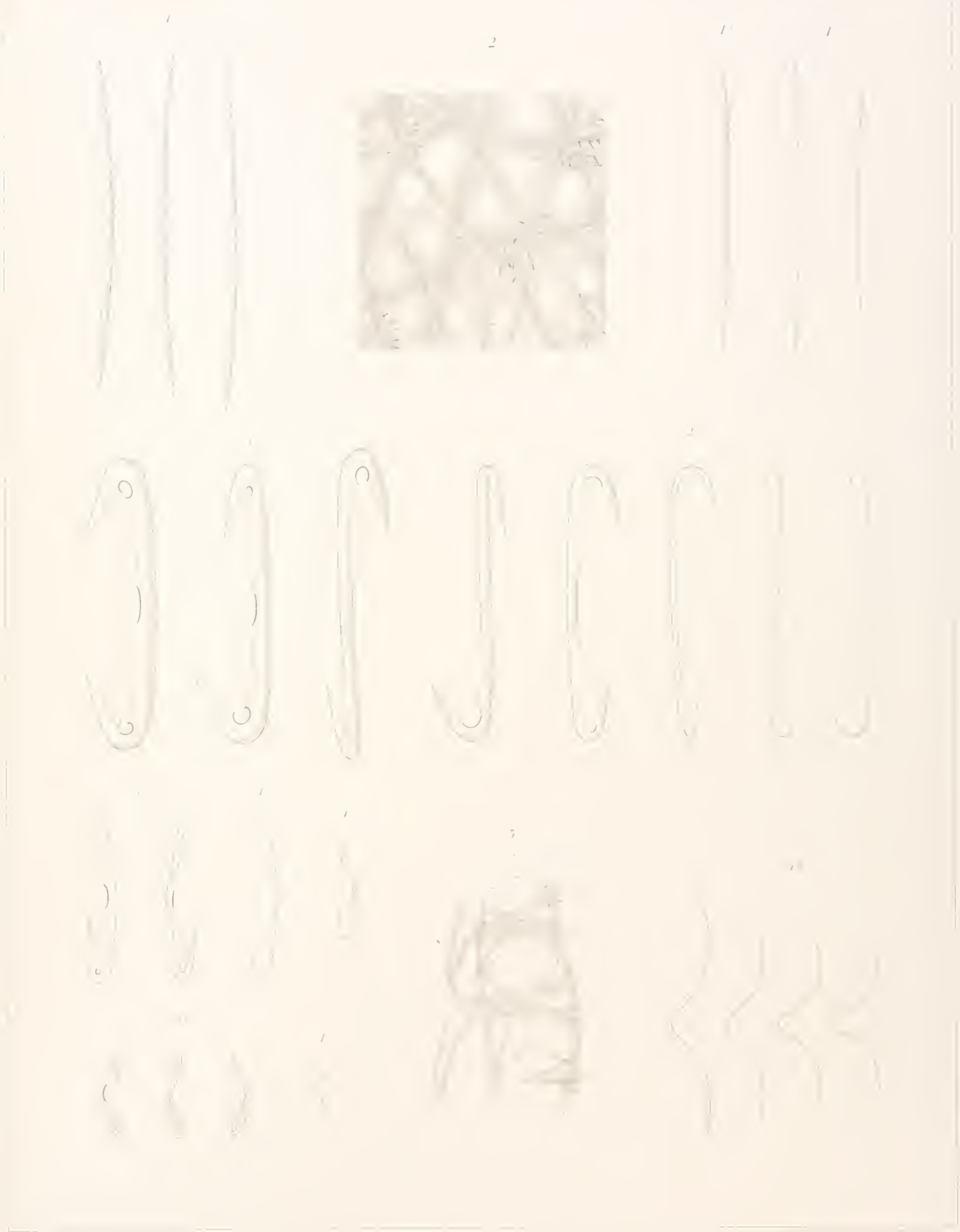

Plate XIX.

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Fig. 1. *Hamacantha implicans* n. sp. *a* styli of different sizes, *b* developmental forms, × 165, *c* diancistra, *d* two developmental forms, × 380, *e* rhaphides, single and as trichodragma, × 380 104

— 2. *Hamacantha implicans* n. sp. Dermal membrane with skeleton, × 58..... —

— 3. *Hamacantha implicans* n. sp. Transverse section of skin with projecting spicules, × ca. 54..... —

— 4. *Hamacantha implicans* n. sp. Piece of a membrane with fibres and diancistra in rosettes, × 32 ..... —

— 5. *Hamacantha implicans* n. sp. An oscular cone stretched out, × ca. 20..... —

— 6. *Hamacantha implicans* n. sp. An oscular cone contracted, seen from above, showing the vertical spicules arranged in a bandlike manner, × ca. 20 ..... —

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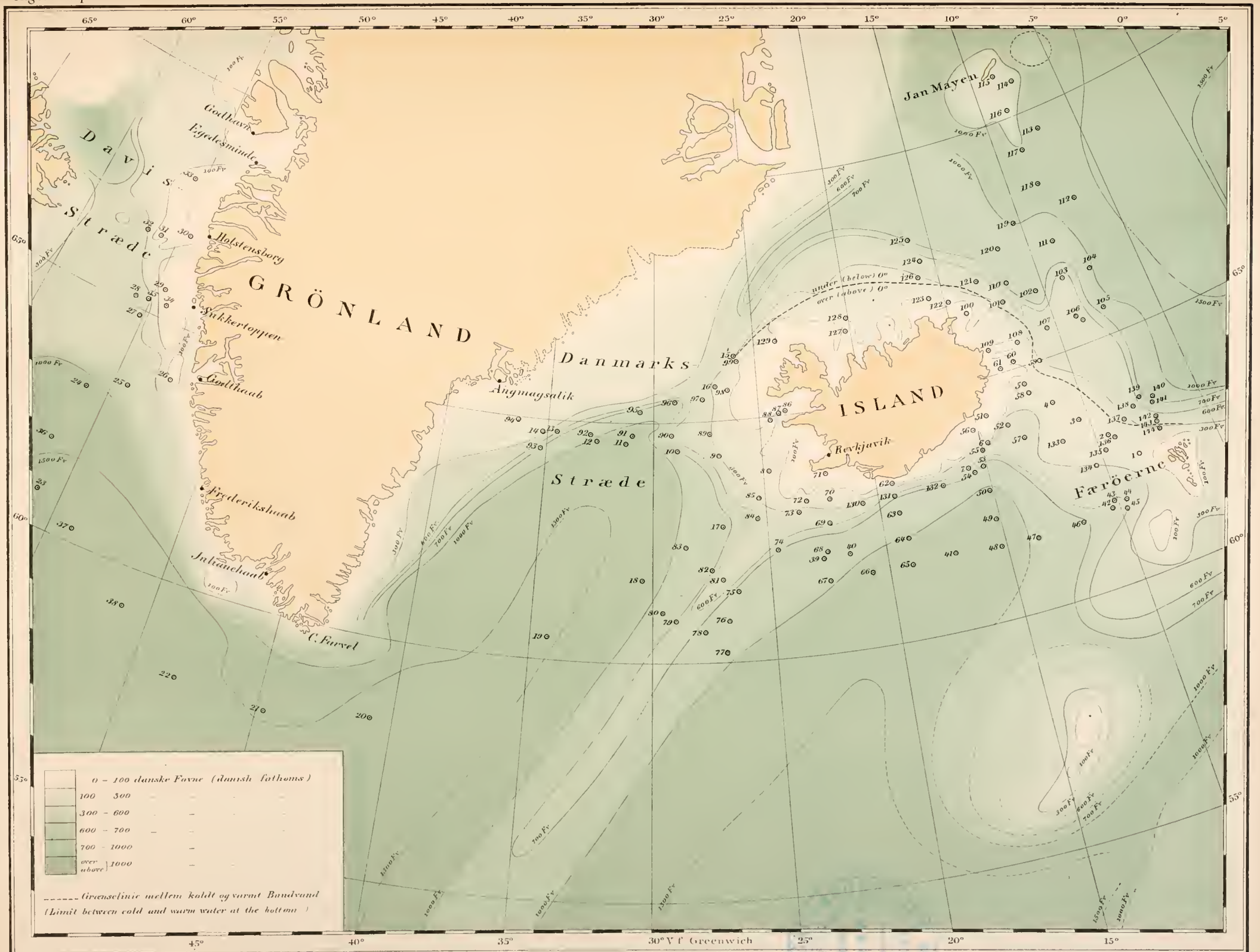
THE INGOLF-EXPEDITION

1895—1896.

THE LOCALITIES, DEPTHS, AND BOTTOMTEMPERATURES OF THE STATIONS.

Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
1	62° 30′	8° 21′	132	7°2	24	63° 06′	56° 00′	1199	2°4	45	61° 32′	9° 43′	643	4°17
2	63° 04′	9° 22′	262	5°3	25	63° 30′	54° 25′	582	3°3	46	61° 32′	11° 36′	720	2°40
3	63° 35′	10° 24′	272	0°5		63° 51′	53° 03′	136		47	61° 32′	13° 40′	950	3°23
4	64° 07′	11° 12′	237	2°5	26	63° 57′	52° 41′	34	0°6	48	61° 32′	15° 11′	1150	3°17
5	64° 40′	12° 09′	155			64° 37′	54° 24′	109		49	62° 07′	15° 07′	1120	2°91
6	63° 43′	14° 34′	90	7°0	27	64° 54′	55° 10′	393	3°8	50	62° 43′	15° 07′	1020	3°13
7	63° 13′	15° 41′	600	4°5	28	65° 14′	55° 42′	420	305	51	64° 15′	14° 22′	68	7°32
8	63° 56′	24° 40′	136	6°0	29	65° 34′	54° 31′	68	0°2	52	63° 57′	13° 32′	420	7°87
9	64° 18′	27° 00′	295	5°8	30	66° 50′	54° 28′	22	1°05	53	63° 15′	15° 07′	795	3°08
10	64° 24′	28° 50′	788	3°5	31	66° 35′	55° 54′	88	1°6	54	63° 08′	15° 40′	691	3°9
11	64° 34′	31° 12′	1300	1°6	32	66° 35′	56° 38′	318	3°9	55	63° 33′	15° 02′	316	5°9
12	64° 38′	32° 37′	1040	0°3	33	67° 57′	55° 30′	35	0°8	56	64° 00′	15° 09′	68	7°57
13	64° 47′	34° 33′	622	3°0	34	65° 17′	54° 17′	55		57	63° 37′	13° 02′	350	3°4
14	64° 45′	35° 05′	176	4°4	35	65° 16′	55° 05′	362	3°6	58	64° 25′	12° 09′	211	0°8
15	66° 18′	25° 59′	330	—0°75	36	61° 50′	56° 21′	1435	1°5	59	65° 00′	11° 16′	310	0°1
16	65° 43′	26° 58′	250	6°1	37	60° 17′	54° 05′	1715	1°4	60	65° 09′	12° 27′	124	0°9
17	62° 49′	26° 55′	745	3°4	38	59° 12′	51° 05′	1870	1°3	61	65° 03′	13° 06′	55	0°4
18	61° 44′	30° 29′	1135	3°0	39	62° 00′	22° 38′	865	2°9	62	63° 18′	19° 12′	72	7°92
19	60° 29′	34° 14′	1566	2°4	40	62° 00′	21° 36′	845	3°3	63	62° 40′	19° 05′	800	4°0
20	58° 20′	40° 48′	1695	1°5	41	61° 39′	17° 10′	1245	2°0	64	62° 06′	19° 00′	1041	3°1
21	58° 01′	44° 45′	1330	2°4	42	61° 41′	10° 17′	625	0°4	65	61° 33′	19° 00′	1089	3°0
22	58° 10′	48° 25′	1845	1°4	43	61° 42′	10° 11′	645	0°05	66	61° 33′	20° 43′	1128	3°3
23	60° 43′	56° 00′	Only the Plankton-Net used		44	61° 42′	9° 36′	545	4°8	67	61° 30′	22° 30′	975	3°0

Station Nr.	Long. W.	Lat. N.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
68	62° 06′	22° 30′	843	3°4	92	64° 44′	32° 52′	976	1°4	118	68° 27′	8° 20′	1060	—1°0
69	62° 40′	22° 17′	589	3°9	93	64° 24′	35° 14′	767	1°46	119	67° 53′	10° 19′	1010	—1°0
70	63° 09′	22° 05′	134	7°0	94	64° 56′	36° 19′	204	4°1	120	67° 29′	11° 32′	885	—1°0
71	63° 46′	22° 03′	46			65° 31′	30° 45′	213		121	66° 59′	13° 11′	529	—0°7
72	63° 12′	23° 04′	197	6°7	95	65° 14′	30° 39′	752	2°1	122	66° 42′	14° 44′	115	1°8
73	62° 58′	23° 28′	486	5°5	96	65° 24′	29° 00′	735	1°2	123	66° 52′	15° 40′	145	2°0
74	62° 17′	24° 36′	695	4°2	97	65° 28′	27° 39′	450	5°5	124	67° 40′	15° 40′	495	—0°6
	61° 57′	25° 35′	761		98	65° 38′	26° 27′	138	5°9	125	68° 08′	16° 02′	729	—0°8
	61° 28′	25° 06′	829		99	66° 13′	25° 53′	187	6°1	126	67° 19′	15° 52′	293	—0°5
75	61° 28′	26° 25′	780	4°3	100	66° 23′	14° 02′	59	0°4	127	66° 33′	20° 05′	44	5°6
76	60° 50′	26° 50′	806	4°1	101	66° 23′	12° 05′	537	—0°7	128	66° 50′	20° 02′	194	0°6
77	60° 10′	26° 59′	951	3°6	102	66° 23′	10° 26′	750	—0°9	129	66° 35′	23° 47′	117	6°5
78	60° 37′	27° 52′	799	4°5	103	66° 23′	8° 52′	579	—0°6	130	63° 00′	20° 40′	338	6°55
79	60° 52′	28° 58′	653	4°4	104	66° 23′	7° 25′	957	—1°1	131	63° 00′	19° 09′	698	4°7
80	61° 02′	29° 32′	935	4°0	105	65° 34′	7° 31′	762	—0°8	132	63° 00′	17° 04′	747	4°6
81	61° 44′	27° 00′	485	6°1	106	65° 34′	8° 54′	447	—0°6	133	63° 14′	11° 24′	230	2°2
82	61° 55′	27° 28′	824	4°1		65° 29′	8° 40′	466		134	62° 34′	10° 26′	299	4°1
83	62° 25′	28° 30′	912	3°5	107	65° 33′	10° 28′	492	—0°3	135	62° 48′	9° 48′	270	0°4
	62° 36′	26° 01′	472		108	65° 30′	12° 00′	97	1°1	136	63° 01′	9° 11′	256	4°8
	62° 36′	25° 30′	401		109	65° 29′	13° 25′	38	1°5	137	63° 14′	8° 31′	297	—0°6
84	62° 58′	25° 24′	633	4°8	110	66° 44′	11° 33′	781	—0°8	138	63° 26′	7° 56′	471	—0°6
85	63° 21′	25° 21′	170		111	67° 14′	8° 48′	860	—0°9	139	63° 36′	7° 30′	702	—0°6
86	65° 03′ 6	23° 47′ 6	76		112	67° 57′	6° 44′	1267	—1°1	140	63° 29′	6° 57′	780	—0°9
87	65° 02′ 3	23° 56′ 2	110		113	69° 31′	7° 06′	1309	—1°0	141	63° 22′	6° 58′	679	—0°6
88	64° 58′	24° 25′	76	6°9	114	70° 36′	7° 29′	773	—1°0	142	63° 07′	7° 05′	587	—0°6
89	64° 45′	27° 20′	310	8°4	115	70° 50′	8° 29′	86	0°1	143	62° 58′	7° 09′	388	—0°4
90	64° 45′	29° 06′	568	4°4	116	70° 05′	8° 26′	371	—0°4	144	62° 49′	7° 12′	276	1°6
91	64° 44′	31° 00′	1236	3°1	117	69° 13′	8° 23′	1003	—1°0					



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