THE DANISH

INGOLF-EXPEDITION.

VOL. VI, PART 2.

CONTENTS:

WILL. LUNDBECK: DESMACIDONIDÆ (PARS.).

PUBLISHED AT THE COST OF THE GOVERNMENT

BY

THE DIRECTION OF THE ZOOLOGICAL MUSEUM OF THE UNIVERSITY.

COPENHAGEN.

H. HAGERUP.

PRINTED BY BIANCO LUNO.

1905.

THE DANISH INGOLF-EXPEDITION.

VOLUME VI.

2.

PORIFERA.

(PART II.)

DESMACIDONIDÆ (PARS.).

BY

WILL. LUNDBECK.

WITH 20 PLATES AND 7 FIGURES IN THE TEXT.

TRANSLATED BY TORBEN LUNDBECK.

COPENHAGEN.

PRINTED BY BIANCO LUNO.

1905.

Ready from the Press October the 5th 1905.

CONTENTS.

Desmacidonidæ.

Porifera.

II.

By

William Lundbeck.

THE present work, as shown by the title, is a direct continuation of my work, »Porifera, Part I, The Danish Ingolf-Expedition, VI, 1«, published in 1902. In the introduction to this first part I rendered an account of the material and of the geographical territory treated in the work. Since that time some new material from the territory has been added, and this material has been included in the work. The new material has especially been gathered by the surveying vessels the »Diana« and »Beskytteren« stationed at Iceland and the Faroe Islands, on the cruise of the »Thor«, the steamer of the international investigation of the sea, in 1903 under the direction of Dr. Joh. Schmidt, and more particularly must be mentioned the very considerable material collected by Dr. A. Appellöf and cand. mag. Ad. Jensen during the cruise of the »Michael Sars« in 1902 under the direction of Dr. Hjort.

In the first part of the work the families *Homorrhaphidæ* and *Heterorrhaphidæ* of the sub-order *Halichondrinæ* were treated. The present part comprises part of the family *Desmacidonidæ*. Partly following Topsent I divide this family into the subfamilies *Mycalinæ (= Esperellinæ olim)* and *Ectyoninæ; Mycalinæ* I divide into two groups *Mycaleæ* and *Myxilleæ* (the latter corresponding to the subfamily *Dendoricinæ* of Topsent). I regard these two divisions as groups of one subfamily, as I think them more closely allied to each other than to *Ectyoninæ*, at all events when the question is of the typical forms of this sub-family. On the other hand, several genera of *Ectyoninæ* are assuredly closely allied to genera of the group *Myxilleæ*. The systematism of the sponges is still in many respects groping its way, and such is also the fact inside the family *Desmacidonidæ*. The separation into the two subfamilies *Mycalinæ* and *Ectyoninæ* is scarcely a quite natural one, in the way in which it is made at present, being chiefly based on the occurrence of special, socalled accessory spicules in the latter subfamily. Thus the dermal spicules with equal ends characteristic of the *Myxilleæ*, occur also in some *Ectyoninæ*-genera; the accessory acanthostyles are often very scarce, or the acanthostyles of the species are so very varying in size, that it is difficult to decide whether two separate groups of sizes are present. The decision is especially difficult in incrusting forms, where the character of the accessory styles jutting out from the fibres is wanting, all the styles being basal. A particular fact is also the occurrence of parallel, corresponding genera in the two subfamilies; thus *Myxilla (=*

Dendoryx olim) corresponds to the *Ectyonin*-genus formerly known by the name of *Myxilla*, *Iophon* to *Pocillon*, *Iotrochota* to *Hymetrochota*, *Grayella* (= *Vesia* Tops.) to *Pytheas*, and *Tedania* to *Acheliderma*; also these facts seem to tell against the naturalness of the system. It is therefore rather probable that the division into *Mycalinæ* and *Ectyoninæ* will have to be abandoned or altered, as has already been advanced by Ridley and Dendy (Challeng. Report, Monaxonidæ, 129), at the same time as they reduce Carter's family *Ectyonidæ* to a subfamily, and as will also be mentioned in several places of the present work. I have, however, not yet ventured to abandon this division, as my investigations have not hitherto shown me a more natural way of grouping. For the present the efforts must be directed towards a thorough examination of genera and species, as this will to a high degree facilitate the natural grouping with regard to the higher divisions.

In the introduction to the first part I have spoken of several descriptive terms and their use, to which I may here refer. The terminology of the spicules is the same with regard to megasclera and to the forms of microsclera occurring in *Heterorrhaphidæ*. In the family *Desmacidonidæ*, however, we meet new forms of microsclera belonging to the socalled chelate type, and it will be necessary to premise some remarks on the two principal forms of this type

Chelæ and Ancoræ.

The spicules belonging to these forms are at this moment by all authors with the exception of Levinsen comprised under the name of chelæ. This name was proposed in 1887 by Ridley and Dendy in Challeng. Rep., and this proposal was of some importance, as up to that time there had been no established term, but terms as »anchorates«, »Haken«, »Anker« a. s. o. had been used by the different authors. While Schmidt and Carter upon the whole have given good figures of these bodies, Bowerbank on the other hand was highly misled with regard to their forms; even Carter has in 1871 (Ann. Mag. Nat. Hist. 4th ser. VII, 277) pointed out this fact, but Levinsen and after him Ridley and Dendy have rendered a more particular account of it. Levinsen especially was he, who first and clearly showed (Dijmphna-Togtets zool.-bot. Udbytte, 1887, 354) that Bowerbank generally figures the chelæ in two positions, from before and from the side, and interprets these figures as two different forms. Another common mistake, that the tooth of the chela has not been seen, may be found in many works down to the present time; when this is the case the chela is figured with a plate in each end, but without a tooth; or only the tuberculum has been seen and interpreted as forming a small short tooth. This mistake is easily accounted for, as the tooth is often so thin, that it can only be seen under high magnifying powers and by proper light. In this respect Ridley and Dendy's Monaxonidæ (Challeng. Rep.) occupies a high position by its excellent figures of the chelæ. Otherwise the mistake is a common one; thus in the works by Vosmaer on the sponges of the »Willem Barent«-Expedition it is found throughout, and this holds also quite good of his work on the sponges in Broun's Klassen und Ordnungen, where almost all the figures of chelæ are erroneous, no corresponding forms being found in nature. In a paper by Vosmaer and Pekelharing from 1898 (Verhandl. der Kon. Akad. van Wetensch. to Amsterdam, 2, IV, no. 3, 32) entitled »On Anisochelæ and Isochelæ», and in which therefore a thorough examination of these features might be expected, we find nevertheless that on Pl. II, fig. 9, and especially fig. 11, which latter represents an almost grown (rather a quite grown) chela, no tooth has been drawn in the smaller end. Also in Topsent's otherwise excellent works too little attention has been paid to the study of the chelæ; in his work from 1892 (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II) the chelæ are shown in very small figures, and most frequently the tooth has not been figured. In the work on the sponges of the Belgic Antarctic Expedition from 1902 (Voyage du S. Y. Belgica, Spongiaires) the case is somewhat similar; thus the tooth is not drawn on the chela seen from the front, Pl. III, fig. 9 b. Even in the fine work from 1904 (Résultats des Campagn. scient. du Prince de Monaco, Fasc. XXV) errors of this kind are found; thus the chelæ on Pl. XIV, fig. 15 e, fig. 18 d, and Pl. XV, fig. 20, are drawn without the tooth, while others, especially the larger ones, are drawn correctly.

As mentioned above, all these forms are generally comprised under the name of chelæ, and are regarded as being principally of the same kind. In contradistinction to this view Levinsen in 1893 (Vidensk. Medd. fra den Nat. For. Kobenhavn 1893, 1) has advanced a new view, dividing these bodies into two principally different forms and giving to these the respective names of chelæ and ancoræ. The difference between these two forms is briefly, that chelæ have only one free tooth and besides more or less broad lateral alæ on the shaft, while ancoræ have more, 3—7 free, uniform teeth besides lateral alæ on the shaft. Levinsen regards the teeth in both forms as bendings of the axis. Carter and Ridley and Dendy regard the lateral teeth in ancoræ and the alæ in chelæ as formations of the same kind, and are most inclined to regard the lateral teeth in ancoræ as developed by the alæ of a chela being split of from the shaft. Vosmaer and Pekelharing in the above quoted paper from 1898 attack the interpretation of Levinsen, and declare that the teeth of the ancoræ cannot be interpreted as bendings of the axis, as long as an axial canal has not been made out in all the teeth of the ancoræ, and if these teeth are formed by the axis being bent and split in several branches, then a sponge with such spicules would not belong to the Monaxonidæ. The authors think it most probable that the ancoræ have arisen by a splitting of the tooth of the chela.

To these different theories it is only to be remarked that it may be regarded as a fact that chelæ and ancoræ are allied bodies, but that it cannot at present be decided, in what way one form may be thought to have arisen from the other. Now it is certain that in a few chelæ we may meet with a feature which is probably a splitting of the tooth, as in some *Asbestopluma*-species in the smaller end of the chela, and in the present work in the genus *Myxilla* instances will be shown of ancoræ with at all events a beginning splitting of teeth; but at present it is impossible to decide how this fact is to be interpreted. On the other hand it is certain that the two forms, as they now occur, are principally different: in one form, chelæ, only one tooth is found and alæ on the shaft, in the other form, ancoræ, several quite homologous teeth are always found as well as alæ on the shaft. Transitional forms have not been found hitherto, and when Ridley and Dendy say (Challeng. Rep. Monaxonida, XIX): «Numberless gradations exist between these two types», this is not correct; their view arises from the fact, that they put ancoræ and chelæ arcuatæ together in one group in contradistinction to chelæ palmatæ, but even from this point of view the statement is not correct. The objection of Vosmaer and Pekelharing, that the ancoræ, if the representation of Levinsen is correct, would be polyaxial spicules, seems to me to be of no importance, as the question might very well be of a secondary splitting of the axis of the original monactinal spicule. Otherwise I shall remark that it may be proved that the tooth of the chela can be traced back to a bent axial part, while the teeth of the ancoræ, in spite of the fact that their form quite corresponds to that of the tooth of the chela, are, perhaps, not axial bendings, but are formations which have, all of them, also the middle tooth, arisen in another way, through growth by apposition. I cannot, however, at present establish this as a sure fact. If it should prove correct, Levinsen of course is not right in designating the teeth of ancoræ as axial bendings, but the principal difference between chelæ and ancoræ will then be still greater. In this connection it may be well to remind of the fact that ancoræ may be found provided with an even number of teeth, without any middle tooth.

Besides the division into chelæ and ancoræ Levinsen, in the paper quoted, subdivides chelæ into two forms, chelæ palmatæ and arcuatæ. The former have a straight, or most frequently only slightly curved shaft, and rather large alæ forming together an almost triangular or oval plate, often with a deep notch below; the tooth is often rather broad. In the other form, chelæ arcuatæ, the shaft is most frequently rather strongly curved, the alæ are highly indented below and only attached to the shaft for a comparatively short way, thereby getting a somewhat tooth-like appearance; the tooth is most frequently rather narrow. To be sure, these two forms are not principally different, but differ only in form, and forms may also be met with that may only with difficulty be referred to either of them; but generally they form two well-marked groups, and are also characteristic for certain genera. Therefore there is every reason to keep this division.

By all the authors who acknowledge only one form, chelæ, these are generally described as «tridentate» or «palmate». This division is a complete mistake; the forms called «palmate» are generally chelæ palmatæ, but in the term «tridentate» are comprised both chelæ arcuatæ and ancoræ. Thus Ridley and Dendy and Topsent use generally these terms; nay, in Topsent's work on the sponges of the Belgic Antarctic expedition we even meet again the old term «bidenté». Under *Desmacidon setifer* it is said in the text of the chelæ «dentés ou palmés», and on Pl. III, fig. 6 a series is figured of which it is said in the explanation of the figures, «a, b, formes rudimentaires»; this is correct, the figures show two developmental forms; then the continuation runs, «c, isochèle palmé, d, isochèle denté, c', d', formes intermédiaires». All the figures belong to one form, a typical palmate chela, c is seen from the front, d from the side, while c' and d' are two a little contort specimens, and one end is therefore seen a little from the front, the other a little from the side.

Besides the division made by Levinsen of the forms belonging here, I further divide ancoræ into two classes which I call ancoræ spatuliferæ and unguiferæ. In the first form the shaft is most frequently straight or slightly curved, and the teeth are comparatively large and broad; their number is very frequently three, but there may be more. In ancoræ unguiferæ the shaft is most frequently more curved, the teeth are comparatively small and pointed, their number is three to nine, generally more than three. These two forms of ancoræ are only different in form, and transitional forms occur, but the two forms are most frequently well-marked and characteristic of particular genera.

In the palmate chelæ the ends may be either like or unlike each other, and according to this they are either isochelæ or anisochelæ; in the arcuate chelæ, the ends, as far as known, are always like, and accordingly they are isochelæ. In ancoræ spatuliferæ the ends, as far as known, are always like, they are isancoræ, while ancoræ unguiferæ may be isancoræ or anisancoræ.

According to the preceding the chelate microsclera may be divided into the following forms:

Chelæ — Ancoræ

palmatæ arenatæ — spatuliferæ (most frequently 3 teeth) unguiferæ (3—9 teeth)

iso- aniso- iso- — iso- iso- aniso-

All forms of microscleres belonging here may always be referred to one of the types chelæ or ancoræ. This does not seem to be generally acknowledged. Thus the small chelæ characteristic of the genus *Asbestopluma* have given rise to different interpretations, but in reality they are constructed on the same principle as the other chelæ. Even so deviating a form as the chela in *Mycale thaumatochela* described below is of the same fundamental structure, and this holds good also with regard to the peculiar wry chela in *M. titubans*; nay, even the bipocilla in the genera *Iophon* and *Pocillon* may be referred to the same form. Topsent (l.c. fasc. XXV, 209) proposes the term »placochèles» for the peculiar palmate isochelæ in *Guitarra* and *Esperiopsis villosa*; I cannot, however, see any reason for a special name for these forms, as they are typical isochelæ palmatæ. A typical chela thus consists of the following parts, which I designate by the following terms, generally in use: a shaft or an axis having in either end a bending, the tooth, and at either end two lateral extensions, the alæ; between the shaft and the tooth, at a right angle to these, is found a plate-shaped part, falx, and the thickened part of this structure shining through the fore side of the tooth, is called tuberculum. In ancoræ quite the same parts are found, the only difference being that in these several teeth are found each with falx and tuberculum.

With regard to the development of these forms many misconceptions have been advanced. As early as in 1857 Bowerbank (Phil. Trans. Roy. Soc. London CXLVIII, 304) and later in the first volume of »Monograph» 1864, 47, Pl. VI, fig. 144—147, has given a description with figures of these forms, which, to be sure, is not correct, but nevertheless rather good and free of the misconceptions arising later, as he has clearly understood that the first beginning was of the same length as the fully developed spicule. Also O. Schmidt in 1862 (Die Spong. des adriat. Meer., 8), although he does not understand the growth of these spicules, has seen that small and large chelæ occurring in the same sponge are not stages of growth of the same form. Later the misconceptions appear. Carter, in 1874 (Ann. Mag. Nat. Hist. 4, XIV, 100), advances the view that the anisochelæ begin as isochelæ; he has been led to this view by the fact that he upon the whole regards small isochelæ, in a species also provided with large chelæ, as younger stages of these, and so he is led to suppose a growth with the most peculiar alterations of form. That Carter has not later been quite sure of the correctness of his theory may be seen from the fact that in 1882 (Ann. Mag. Nat. Hist. 5, IX, 298) where he mentions small isocheles occurring together with large anisocheles, he says: and therefore the inequianchorate may possibly begin its development in this form (i. e. as isochela), and he continues, however it does not occur in the ovular embryo of *Esperia*, while the inequianchorate do.. Ridley and Dendy, in Challeng. Monaxonida, follow Carter completely, though they have followed the development of anisochelæ in *E. mammiformis*. They still regard the small chelæ as developmental forms of the large ones in the same sponge, either the question is of isochelæ or anisochelæ; in several places however, they say possibly young forms . Levinsen, in his paper from 1893, gives an exhaustive description of the growth of the chelæ. In the introduction to part I of the present work I expressed the opinion that in this second part I should be able to corroborate his examinations with regard to a great number of forms, and this is also the case. In the descriptions of the separate species this fact will be more particularly mentioned. Here, as in the other spicules, the growth takes place exclusively by apposition, either simple apposition, or after fixed lines, and the younger forms must always be inscribable in the older ones. The chelæ and ancoræ therefore begin as axes of the full, or about the full length; in the chelæ the beginning is a straight or curved staff with shorter or longer axial bendings in either end, and tooth and alæ arise gradually and grow to their full size. In the ancoræ the growth takes place in a similar way, but their teeth, as before mentioned, are perhaps not axial bendings, but arise in another way. Vosmaer and Pekelharing, in their paper from 1898 quoted several times in the preceding, treat and figure the development of the anisochela in *M. syrinx*, but their discussion contains nothing new. When they conclude, on account of their having found chelæ that were a little contort, we have therefore the right to say that chelæ not only can be derived from spicula which have the shape of C, but indeed from spicula known as sigmata , this conclusion is unwarranted; developmental forms of the chelæ are in no instance sigmata, and may always easily be distinguished from these; the fact that chelæ may be contort, a feature that is much more frequent and may take place to a much higher degree than seems to be known by the authors, proves nothing at all.

Developmental forms of the chelæ have not rarely been misinterpreted. I shall here state the cases I have found. Carter (Ann. Mag. Nat. Hist. 5, IX, Pl. XI, fig. 17 d and h) calls these two figures with a query bihamates ; they are developmental forms of an anisochela. He calls (ibid. 5, XV, Pl. IV) fig. 3 d bihamate-like spicule ; it is the developmental form of an arcuate chela. Fristedt (Kgl. Sv. Vet. Akad. Handl. 21, no. 6, Tab. III) calls fig. 3 h spiculum c-curvato-obtusum , but regards it with a query as an undeveloped chela; it is an undeveloped arcuate chela. Lambe (Trans. of the Roy. Soc. of Canada, XI, sect. IV, Pl. II) calls fig. 4 c a sigma; it is a developmental stage of a palmate anisochela.

Levinsen, in his paper from 1893 several times quoted above, after having established the fundamental difference between chelæ and ancoræ, and rendered an account of the fact that they are never found together, expresses the opinion that this fact must involve the alteration in the system that species with chelæ and species with ancoræ cannot be kept in one genus. I can fully agree with this view, and therefore in the present work I have separated the species according to it. In this respect the question is for the present only of the genera *Myxilla—Lissodendoryx* and *Desmacidon-Homoeodictya*; the particulars will be found under these genera.

With regard to the examination I shall only add the further remarks that the examination of the structure of the skeleton has generally been made on dried preparations placed in xylol in not too thin sections, by which means distinct and complete views of the skeleton are obtained. Care must be taken, of course, that the skeleton is not distorted by the drying. I mention this proceeding, because I think it gives a better and more distinct view than is got when the sponge is cut in a moist state, and by the use of my descriptions of the skeletal structure it must be remembered that they are made from such preparations. For the examination of the structure of the spicules I have generally used Canada balsam-preparations; in a few cases I used Naphtalin-α-monobromatum, which proved to be very good when the question was of very thin silicious plates; also a mixture of Naphtalin-α-monobromatum with Canada balsam was in some cases found to be good. Storax resolved in benzol and alcohol has been used in a few cases; but in by far most cases Canada balsam proved very efficient; when the spicules are completely cleaned, it will in balsam-preparations almost always be possible to study the structure to the finest details.

Fam. III. Desmacidonidæ.

Subfam. 1. Mycalinæ.

Group. 1. Mycaleæ.

According to what has been shown by Thiele (Abhandl. der Senckenberg. nat. Gesellsch. XXV. 949) the name of *Esperella* Vosm. must be altered to *Mycale* Gray, and consequently the name of the subfamily and the group will also have to be altered.

Esperiopsis Carter.

The form varying; incrusting or irregularly solid, but frequently erect and leaf-shaped, or in other ways symmetrical. The skeleton may be constructed in various ways; in the erect forms it may consist of long, well developed and branched fibres, but in the solid forms and in the incrusting ones it gets a halichondroid or renierid structure. Spongin is most frequently present, the amount varying. Spicula: Megasclera monactinal, styli or subtylostyli; microsclera: the characteristic microsclera are isochelæ palmatæ, which may occur in one or several forms; to these may be added isochelæ arcuatæ, sigmata of one or more forms, toxa, or forcipes in different combinations.

The genus *Esperiopsis* was establised by Carter in 1882 (Ann. Mag. Nat. Hist. 5, IX, 296) for the species *villosa*, which he had originally referred to *Esperia*. The distinctive character of the genus is the fact that the characteristic microsclera are isochelæ, which was also the principal reason why Carter separated the species into a particular genus; to be sure he mentions also some other features, but they are of no consequence. Levinsen (Studier over Svampe-Spicula: Cheler og Ankere; Vidensk.

Medd. nat. For. Kobenhavn for 1893.1894, 11) says that there is no reason to keep the genus, as in the old genus *Mycale (Esperella olim)* we have now exclusively anisochelæ, now exclusively isochelæ, and sometimes a mixture of both, and as the difference between an isochela and an anisochela may be very slight. I think, however, that there is good reason for keeping the genus, as the characteristic microsclera in *Mycale* are anisochelæ, and small isochelæ seem to be of very rare occurrence in this genus. Carter (l. c. 298) mentions this fact in a general way as occurring in some *Mycale*-species, among which he only mentions *M. plumosa* Cart., and Ridley and Dendy (Chall. Rep. XX, 65) state it with regard to *M. parishii* Bow. in which species the small isochela is of a particular structure[1].

With regard to the other objection made by Levinsen to the keeping of the genus it is to be said that the anisochelæ, to be sure, may approach isochelæ as to form, but no species is known, however, with regard to which there can be any doubt in this respect. The *Mycale*-species most closely allied to *Esperiopsis*, and more particularly to the *Esperiopsis*-species with renierid skeletal structure, is perhaps *Mycale ovulum* O. S., in which some of the anisochelæ may show only slight difference as to the size of their ends, but the ends however are never of quite the same size.

Another question is whether all the species for the present referred to *Esperiopsis*, are naturally closely allied. The species show great difference, as well with regard to form as to skeletal structure; also the combination of microsclera is varying to some degree, and rather many different forms may occur. To get a general view I shall put together, as far as possible, the described species with a statement of their microsclera; with regard to the species of Bowerbank I follow, with a few exceptions, the interpretations of Topsent (Revue Biol. du Nord de la France, VII).

E. (Isodictya) Edwardii B.	Isochelæ palmatæ.
- (—) *Normani* B.	—
- (—) *fucorum* Johnst.	—
- (—) *Alderi* B.	—
- (—) *scitula* B.	—
- (—) *involuta* B.	—
- (—) *hispida* B.	—
? - *(Halichondria) compressa* B.	—
? - (—) *Thompsoni* B.	—
- *(Amphilectus) hispidula* Ridley	—
- *Challengeri* R. and D.	—
- *profunda* R. and D.	—
- *anomala* R. and D.	—
- *columnata* Tops.	—
- *rigida* Lambe	—

[1]) Carter, as is well known, thought these small isochelæ to be developmental phases of the anisochelæ. He puts forth this theory in 1874 (Ann. Mag. Nat. Hist., 4, XIV, 102), and here he figures for *M. aegagropila* Johnst. the typical anisochela, as also some small bodies situated in cells, which bodies he interprets as isochelate developmental phases of the anisochela. Levinsen (l. c. 9) has been of opinion that the question was here of small arcuate chelæ. As there is, however, every reason to suppose that Carter has really had before him *M. aegagropila* (he mentions one of Johnston's original specimens), and as in this species no small isochelæ are found, it is not possible to decide, what Carter has seen, and his figures are not to be explained. Developmental phases of anisochelæ they cannot be, as those have a quite different appearance.

E. vancouverensis Lambe	Isochelæ palmatæ.	
- *quatsinoensis* Lambe	—	
- *laxa* Lambe	—	
- *rugosa* Thiele	—	
- *pedicellata* mihi...........	—	
- *(Isodictya) collina* B.	—	sigmata.
? - *(Halichondria) rigida* B....	Isochelæ, sigmata.	(If this species proves to be an *Esperiopsis*, *rigida* Lambe will have to change its name).
- *cylindrica* R. and D.	Isochelæ palmatæ, ?toxa.	
- *symmetrica* R. and D.	—	sigmata of two forms.
- *typichela* mihi	—	of two forms.
- *pulchella* R. and D.	—	of two forms, isochelæ arcuatæ.
- *prædita* Tops.	—	isochelæ arcuatæ, sigmata.
- *villosa* Cart.	—	of three forms, sigmata.
- *flagellum* mihi.	—	of two forms, sigmata, sigmata flagellata.
- *decora* Tops.	—	of three forms, — — —
- *forcipula* mihi.	—	isochelæ arcuatæ, sigmata, forcipes.
- *polymorpha* Tops.	Isochelæ arcuatæ, sigmata of two forms, toxa (small, sharply bent).	
- *Schmidtii* Arnesen	—	sigmata.
- *glomeris* Tops.	—	
? - *(Holopsamma) turbo* Cart. .	Isochelæ.	Dendy, after having found isochelæ in this very deviating form, refers it to *Esperiopsis*.

Halichondria foliata Bow., which Topsent, in the mentioned work, refers to *Esperiopsis*, is an *Echinoclathria*; the same holds good of *Esperia foliata* Frstdt.

In the generic diagnosis I have given as characteristic microsclera isochelæ palmatæ; as will be seen, three species deviate from this rule, viz. *polymorpha* Tops., *Schmidtii* Arnesen, and *glomeris* Tops. which have, as to chelæ, only isochelæ arcuatæ, which seem to be of quite typical form. As above mentioned, however, the difference between chelæ palmatæ and arcuatæ is not quite sharp, and perhaps it will be necessary only to say that the characteristic microsclera of the genus are isochelæ.

I shall still add that Kieschnick (Semon: Zool. Forschungsreisen in Austral. Band V, Denkschrift Med. Nat. Gesellsch. Jena, Band 8, 1900, 572, Taf. XLIV, Fig. 12, Taf. XLV, Fig. 51—52) has established a species, *E. viridis*. As the other species mentioned in this quite useless work it is unrecognizable, but it seems most nearly to be a *Chondrocladia*-species. Of microsclera are mentioned isochelæ with six teeth (the very bad figure shows seven), and smaller isochelæ with five teeth (to which a quite useless figure).

1. **E. villosa** Cart.

Pl. I, Fig. 4. Pl. VIII, Fig. 1 a—i.

1874. *Esperia villosa* Carter, Ann. Mag. Nat. Hist. Ser. 4, XIV, 213, Pl. XIII, figs. 13—15, Pl. XV, fig. 36.

1879 Unknown sponge Carter, Journ. of the Roy. Micr. Soc. II, 502, Pl. XVII a, fig. 12 a, b, c.

1882. *Esperiopsis villosa* Carter, Ann. Mag. Nat. Hist. Ser. 5, IX, 296.

1887. *Esperia villosa* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 451, Pl. 25, figs. 33—39, Pl. 29, fig. 19.
1904. *Esperiopsis villosa* Topsent, Résultats des Camp. Scient. du Prince de Monaco, Fasc. XXV, 211, Pl. XVII, fig. 2 a—c.

Erect, more or less irregularly leaf-shaped. The surface finely shaggy from projecting spicules: the dermal membrane thin, with no separate skeleton, resting on spicules that are spread in a penicillate way. Oscula formed as small, conical projections, along the upper edge or a little down on the surface. The skeleton consists of polyspicular fibres branching up through the sponge and anastomosing; from this skeleton shorter fibres go off to the surface. Spicula: Megasclera styli or slightly marked subtylostyli 0·6—0·75^{mm}; microsclera of four forms: isochelæ palmatæ of three forms, large ones of a particular narrow form 0·08—0·12^{mm}, middle ones 0·078—0·092^{mm}, small ones 0·021—0·031^{mm}: sigmata, large 0·045—0·19^{mm}.

This species has been pretty well described by Carter with the only misconception of the mutual relation of the three different chelæ, which is a consequence of his wrong interpretation of the growth and development of these bodies. The species seems most frequently or always to be erect and more or less leaf-shaped, but is otherwise of somewhat varying form and thickness, and frequently of an irregular appearance. With its base it is fastened to stones or some other underlayer, and most frequently its base is widely spread. The largest specimen in hand is of a height of ca. 13^{cm} and a thickness of about 15—20^{mm}. The colour (in spirit) is generally gray, sometimes passing a little into brownish. On account of its skeleton the sponge is rather firm, but may, however, be torn easily, and all the specimens are much damaged. The *surface* is finely shaggy on account of the projecting spicules. The *dermal membrane* is thin, with no skeleton, supported by spicules projecting in a fanshaped way. The *pores* are situated in the dermal membrane between the projecting spicules; sometimes they are very close-set, so that the membrane becomes a network. They are round to oval, and their size is generally between 0·02 and 0·15^{mm}. *Oscula* are constructed in a peculiar way: along the upper edge of the sponge, or sometimes a little down on the surface is found a number of projections quite slightly conical; they are of an average height of a few mm., and have a diameter not exceeding 1^{mm}. They consist of spicules and are apparently solid, but when cut off at the base they leave a hole, and are seen to be hollow in their lower part; in a few of them a little opening is also found in the top. All the oscula (they are only found distinctly in the best preserved specimen) may be supposed to be shut, open oscula were not seen. Further down on the sponge a few round holes are seen, which I take, however, to be due to damaging[1]). From the osculum a canal may generally be traced some way down in the sponge.

The *skeleton* consists of irregularly branched, polyspicular fibres, branching from the base up through the sponge, and frequently anastomosing. They are thickest in the lower part of the sponge; in the middle of the sponge they have an average thickness of ca. 0·35^{mm}; they are polyspicular, and have a great number of spicules side by side. The fibres with their anastomoses form a rather dense and solid skeleton. From this skeleton close-set fibres go off to the surface generally curving somewhat upwards. These fibres divide on the way to the surface, and pierce the dermal membrane as

[1]) When Carter (l. c. 1874) says: »Vents scattered here and there irregularly», it is presumably owing to the fact that his specimen has been damaged, and the real oscula have been wanting or indistinct.

bundles of spicules spread in a more or less fan-like or penicillate way; the fibres are generally of a length of 3—4^{mm}. The dermal membrane is supported by the projecting bundles of spicules, and is provided with no skeleton of its own. The fibres and bundles of spicules that support it, are, however, often far from being perpendicular on the surface, and accordingly, when a piece of the skin is viewed under the microscope, it may appear, as if there was a reticulation in the skin, the fibres under it being also seen. In the fibres of the skeleton some spongin is seen, which, although not abundant, coats the fibres completely. As mentioned above the fibres are thickest at the base of the sponge, and the spongin is also most distinct here. Below the fibres pass into a thin basal membrane formed by spongin, and provided with scattered spicules; it is directly fastened to the substratum, from which it is easily separated, and then it shows a smooth surface.

Spicula: a. *Megasclera* are styli or very slightly marked subtylostyli; most frequently they are straight, sometimes quite slightly curved. They are thickest in the middle, and thus a little fusiform, the greatest thickness being not rarely nearest to the pointed end. The point is evenly tapering, but not long. Most frequently they are slightly restricted a little below the rounded end, and thus approaching to subtylostyli, but the restriction is not rarely imperceptible or wanting. The length is between 0·6—0·75^{mm}, most frequently approaching the latter size; sometimes it may go down to 0·5^{mm}. The thickness is between ca. 0·01—0·02^{mm}. Finer spicules, developmental forms, occur, but in very small number. The specimen described by Topsent l. c. has somewhat larger megasclera; they are stated to be 0·935—0·980^{mm}. b. *Microsclera:* Of these are found isochelæ palmatæ of three different forms, and sigmata. 1. The largest chelæ are of a peculiar shape, Carter calls them »weaver's shuttle-like«; they are narrow, the side-edges of the two alæ are parallel, and the alæ continue far down along the shaft, so that only a short space is left in the middle where the cylindric form of the shaft is seen. The shaft is straight. The side-edges of the tooth are likewise about parallel, or slightly converging towards the end, and the end of the tooth is rounded. When the tooth is seen from the front, it appears to have a thickened edge, but this is owing to the fact that the sides are curved inwards. When the chela is viewed from the side, it is seen that as well the sides of the tooth as the alæ on the shaft are curved inward so as to meet each other at the ends of the chela. Seen from the side the tooth most frequently bends a little outward at the end, while the outermost point is again bent inward in a claw-like way; the latter bend, however, is in so far only apparent, as it is owing to the bending in of the edge. The edge of the tooth being thus bent inward all round the tooth becomes hollow on the inward side. The tooth is generally of about the same length as the alæ, and its position is about parallel to the shaft. At its basal end the axis is seen as a little oval tubercle. These chelæ are sometimes somewhat twisted. The length is rather varying, from 0·08—0·12^{mm}, and the greatest breadth, a little above the middle of the tooth, is ca. 0·013^{mm}. Of these chelæ developmental forms are found; the youngest stage observed was formed as a fine staff having at both ends a large part recurved with a round curve, and the recurved ends were finely tapering (Pl. VIII, fig. 1 d). This staff thus represented the axis of the chela, alæ and tooth having not yet been formed; the development now consists only in the growing forth of the alæ and the tooth. The developmental forms have the full length of the chela, the youngest stage was thus measured to 0·1^{mm}. 2. The middle form of chelæ is somewhat smaller and broader; also in these the shaft is straight or about straight. The alæ do not continue so far down the shaft, so that the free middle part of the shaft is about one third of the whole length or thereabout. The lateral edges of as well the alæ as the tooth diverge towards the middle of the chela, the terminal parts of which thus get a triangular form. The lateral edges of both the alæ and the tooth curve inward, and thus the alæ and the tooth turn concave sides towards each other. The tooth is generally a little narrower than the alæ together, and sometimes of the same length, sometimes a little shorter; it forms an acute angle with the shaft. The tuberculum is longish, and a rather inconsiderable falx is found. This chela may vary somewhat as to form, especially with regard to the breadth of the alæ and the tooth, and the length of the middle part of the shaft; also the end of the tooth may be differently rounded, and the lower edge of the alæ may join the shaft at a right angle or with an even curve. The length is generally between 0·078 and 0·092^{mm}, but a few smaller ones occur, down to 0·05^{mm}. The greatest breadth is most frequently 0·021—0·028^{mm}, but much narrower forms may be found. Also of this chela a few developmental forms were found; they are very like those of the preceding form, from which they may be especially distinguished by the fact that a falx is begun at an early stage. The incipient alæ are as to form somewhat different from the fully developed ones (Pl. VIII, fig. 1 f), but the final form is reached through mere apposition. 3. The third form of chelæ is considerably smaller than the preceding ones; these chelæ are of a form similar to that of the middle ones, but their shaft is somewhat curved; the breadth of the teeth is the same as that of the alæ taken together. The length is between 0·021^{mm} and 0·031^{mm}, only rarely towards the latter length, the breadth is 0·0057—0·007^{mm}. A few chelæ may be found, seeming by their size and by having only a slightly curved shaft to form a transition between the two latter forms. Carter, as may be seen from his description and figures, has seen all three forms of chelæ, but on account of his interpretation of the growth of the chelæ he has taken the smallest and middle forms to be developmental stages of the largest form. What Topsent l. c. says of the largest chelæ: Pour réaliser leur form, ces isochèles subissent une atrophie à peu pres complète de leur dents laterales is not correct; these chelæ, as the other chelæ in the sponge, and as all palmate chelæ, have distinct alæ on the shaft (Topsent's dents latérales), but these are narrow and their lateral edges are parallel. 4. Sigmata; they reach a more considerable size than is commonly the case, and in this respect they are exceedingly varying; they are of the common sigma-form, sometimes a little irregular, and their form may be somewhat varying, they may also be plane or contorted to some extent, mostly only to a slight degree. The length varies from 0·19^{mm} down to 0·045^{mm}, and the thickness varies in proportion from 0·011^{mm} to 0·002^{mm}. Monstrous forms of sigmata may occur, and especially one form is not rarely seen, in which one end is split into two or more points, as figured by Fristedt l. c. fig. 39. Besides sigmata are found quite singly some bodies which I must suppose to be developmental forms of sigmata; they are curved like the axis of a sigma, and the ends are tapering, but they are quite, or to a higher or smaller degree, wanting the recurved ends. They have been measured of lengths from 0·058—0·18^{mm} with thicknesses from 0·001—0·0025^{mm}. Thus this sigma seems to reach a considerable thickness, before its ends are properly developed.

Embryos. In some of the specimens embryos were found scattered in the body of the sponge, sometimes singly, sometimes several ones together. They were roundish, of a diameter of about 1^{mm}. Their spiculation shows some peculiarities. Of megasclera they have very fine styli, generally with a somewhat swollen upper end; they were measured to a length of 0·25—0·30mm and a thickness at the upper end of ca. 0·002mm. Of microsclera they have only the middle form of chelæ, which occur in all stages of development, as also fully developed, but they are considerably smaller than in the fully developed sponge, only reaching a length of 0·03mm [1]. Quite the same observation has been made by Ridley and Dendy with regard to the embryos of *Esperella mammiformis*, where the anisochelæ of the embryos had a length of 0·05mm, while in the grown sponge their length was 0·07mm. In the opinion of these authors this fact, however, has no especial peculiarity, as, according to their view of the growth of the chela, the small chelæ may quite simply grow to their full size. The specimens with embryos were taken during the month of July.

Locality: Station 28, 65° 14' Lat. N., 55° 42' Long. W., depth 420 fathoms; station 73, 62° 58' Lat. N., 23° 28' Long. W., depth 486 fathoms; station 81, 61° 44' Lat. N., 27° 00' Long. W., depth 485 fathoms; station 127, 66° 33' Lat. N., 20° 05' Long. W., depth 44 fathoms. It has further been taken on 65° 39' Lat. N., 28° 25' Long. W., depth 553 fathoms (the East-Greenland expedition 1891—92). Altogether five or six specimens. The mentioned localities are situated to the north and south of Iceland, in the Denmark Strait and in the Davis Strait.

Geogr. distr. Between Scotland and the Faroe Islands, depth 440 fathoms („Porcupine", Carter); the eastern coast of Greenland, depth 140 fathoms (Fristedt); at the Azores, depth 1196 fathoms (Topsent). Carter's „Unknown sponge" is, no doubt, identical with *E. villosa*, it was taken by the „Porcupine", between Scotland and the Faroe Islands, 59° 56' Lat. N., 6° 27' Long. W., depth 363 fathoms; but it is to be noted that the bottom temperature was here — 0·3°, while on all the other localities of the species it has been positive.

2. E. Normani Bow.

Pl. VIII, Fig. 2 a—d.

1866. *Isodictya Normani* Bowerbank, Mon. Brit. Spong. II, 320, 31, III, 141, Pl. LVI, figs. 1—5.

1880. *Amphilectus Normani* Vosmaer, Notes from the Leyden Museum, II, 117, 25.

1885. *Esperia Normani* Fristedt, Kgl. Sv. Akad. Hand., 21, No. 6, 42.

1893. *Esperella Normani* Levinsen, Det vidensk. Udbytte af Kanonbaaden „Hauch"s Togter, 422, 19, Tab. I, figs. 37—49.

Incrusting or more or less massive or cushion-shaped (sometimes somewhat branched). The dermal membrane thin, without spicules, resting on the skeleton below; it is pierced by the ends of the fibres, and the surface therefore is finely shaggy. Oscula scattered, most frequently on the end of slightly marked, conical projections. The skeleton of a renierid structure with polyspicular primary fibres and most frequently single transverse spicules. Spicula: megasclera curved styli 0·16—0·25mm; microsclera of one form, isochelæ palmatæ 0·020—0·021mm.

The typical form of this species is incrusting, especially on Hydroidea and branched Bryozoa; it may be of varying thickness and consequently somewhat varying in form; most frequently it forms larger or smaller covers, or it becomes cushion-shaped or lumpy. It seems, however, also to be

[1] As all spicules are of the same size, or, at all events, of about the same size in small and large specimens of one species, it is to be supposed that very soon after the sponge having fixed itself, chelæ are formed of the size normal to the species.

able partly to assume a free, branched form, as stated by Levinsen l. c. The specimen of Levinsen, however, has incrusted a Hydroid, and presumably its form is partly owing to this fact; but the specimen has also free branches, in which nothing of the Hydroid seems to be found, as also the primary fibres of the branches may be found running longitudinally, while, if the question was of a cover, they would have to be supposed to run from the middle, from the body incrusted, perpendicularly on the surface. The largest specimen in hand has a greatest extent of ca. 75^{mm}. The colour (in spirit) is light yellowish. The consistency is rather loose and soft. The *dermal membrane* is thin and transparent without spicules; it is supported by the skeleton below and pierced by the ends of the fibres, consequently the *surface* is finely shaggy. On account of the apertures of the incurrent canals shining through, the surface gets the netlike appearance, as is found, for instance, in most *Reniera*-species. The *pores* are very close-set in the dermal membrane, so that it is reduced to a network; they are round and of an average size of $0{\cdot}05-0{\cdot}1^{mm}$. *Oscula* are scattered on the surface; they have generally a diameter of from a little more than one to 3^{mm}; they are situated on the top of more or less marked, but always low, flatly conical projections.

The *skeleton* is of a renierid structure. It consists of fibres running from the base towards the surface where they pierce the dermal membrane. These fibres are polyspicular, and they have generally, as stated by Bowerbank and Levinsen, about three spicules in breadth; sometimes also a little more. The transverse fibres are almost always only represented by single spicules, they form no coherent fibres, and they are situated very irregularly. The distance between the primary fibres is on an average ca. $0{\cdot}15^{mm}$. In the deeper layers of the sponge the skeleton is irregular, and here no distinction can be made between primary and secondary fibres. Spongin is found in the skeleton, especially distinctly in the nodes, but it is white and exceedingly clear, and therefore not easily observed.

Spicula: a. *Megasclera* are somewhat curved styli; most frequently the curve is even, only rarely it is a little sharp; it is generally found in the middle, sometimes nearer to the head-end; the opposite end is evenly and rather long tapering. They are somewhat varying in length, partly in one individual, and partly in different individuals; upon the whole the length of the styli in the specimens in hand is between $0{\cdot}16$ and $0{\cdot}25^{mm}$. Also the thickness is varying, and is between ca. $0{\cdot}0057-0{\cdot}0114^{mm}$[1]). Such is the thickness of the spicules that seem to be fullgrown, but developmental forms of every thickness down to quite fine ones are also found; they are only very little shorter than the fullgrown ones. b. *Microsclera;* these are only found of one kind viz. isochelæ palmatæ; they are a little curved, but the middle part of the shaft, between the alæ of the two ends, is straight or sometimes slightly curved inwardly; this middle part is about one third of the length. The tooth is of about the same length as the alæ, and its breadth is like that of the alæ taken together. On the sides the tooth and the alæ bend towards each other, but when the chela is viewed from the side these recurvings, on account of their fineness, are almost not to be distinguished. The length of the chelæ is $0{\cdot}020-0{\cdot}021^{mm}$, and their breadth is ca. $0{\cdot}0057^{mm}$. Of the chelæ developmental forms are found; the youngest one observed appears as a thin staff with rather long recurvings in both ends, without

[1]) In some specimens the needles have an average length of $0{\cdot}23-0{\cdot}25^{mm}$ with an average thickness of $0{\cdot}01^{mm}$; in others the length is on an average $0{\cdot}17-0{\cdot}20^{mm}$ with a thickness of $0{\cdot}007^{mm}$.

or almost without any beginning of the alæ or of the plate of the tooth. The developmental forms have the same length or about the same length as the fullgrown ones. The chelæ are found throughout the sponge, and in no small number in the dermal membrane.

Locality: The Faroe Islands, 9 miles to the east of the Nolsö revolving light, depth ca. 30 fathoms; 6 miles north and to west of Kalsö, depth 60 fathoms (Th. Mortensen); the Westmann Islands (Sæmundsen). Six specimens or fragments in all.

Geogr. distr. The species is hitherto known to the south as far as the Channel, Guernsey (Bowerbank), Luc and Le Portel (Topsent); farther north it has been taken off Bohuslän (Fristedt), and in the Cattegat on depths from 6½ to 10 fathoms (Levinsen).

3. **E. sp.** (?Alderi Bow.)
Pl. VIII, Fig. 3 a—c.

We have a quite small specimen of an *Esperiopsis*-species sitting on a worm-tube, which specimen has a skeletal structure similar to that of the preceding species. The primary fibres have a few more spicules alongside each other, and they also pierce the dermal membrane, so that the surface is shaggy; but the spicules are different. *Megasclera* are styli, most frequently rather strongly curved and with an evenly tapering, rather long point. Their length is between 0·38 and 0·44^{mm}, and the thickness is about 0·01^{mm}. *Microsclera* are isochelæ palmatæ of a similar structure as in the preceding species, but they are straight or almost straight; besides they are a little larger, their length being 0·025—0·028^{mm} and the breadth ca. 0·07^{mm}. Also of these chelæ developmental forms were found of the same appearance as in the preceding species.

The chelæ of this species show a peculiarity, which, however, is not found in all of them, and which may be more or less marked where it is found. It consists in the fact that the recurved final part of the axis, which must be supposed to run along the middle of the tooth, some way down the tooth bends off from it inward, and, when the chela is viewed from the side, appears as a projecting point or knob on the inside of it; when the chela is viewed from the front it appears through the tooth as a little tubercle close to the edge. As mentioned, the feature, hovewer, is far from being a constant one, in some of the chelæ it is not found, and it may also be found singly in other species. — Lambe (Proceed. and Transact. of the Roy. Soc. Canada, X, 1893, Sec. IV, p. 68 seq.) has described four *Esperiopsis*-species, which, to judge from the figures (no mention is made of it in the text), have chelæ, in which the mentioned structure is strongly marked. As is well known, the same structure is again found in the chelæ of the genus *Homocodictya*, and this genus or subgenus has been established just on this structure. The *Esperiopsis*-species showing this structure of the chelæ, to be sure, are closely allied, but as the character does not seem to be a constant one, it can here scarcely be used as a generic mark.

Locality: St. 127, 66° 33' Lat. N., 20° 05' Long. W.; depth 44 fathoms.

Geogr. distr. *E. Alderi* Bow. is from Northumberland.

Note. The *Esperiopsis*-species placed by Bowerbank under the genus *Isodictya*, appear to be closely allied, and there is a great probability that Bowerbank has established too many species, but it will not be possible, without a close examination of the type specimens, to unravel the species;

Vosmaer refers *E. Alderi* as a synonym to *Normani*, and also Topsent has made considerable reductions, and has for instance referred *Alderi* to *fucorum*, but for the present nothing can be said of the correctness of these identifications. When I have thought that the present species might possibly be *Alderi*, the only reason has been the size of the spicules; the peculiarity of the structure of the chelæ would scarcely have been observed by Bowerbank.

4. **E. pedicellata** n. sp.

Pl. I, Fig. 2. Pl. VIII, Fig. 4 a—c.

Erect, stalked, somewhat club-shaped; the upper part lobate or winged. The surface slightly shaggy; the dermal membrane thin. The skeleton an irregular network of polyspicular longitudinal fibres and irregularly scattered spicules. Spicula: Megasclera styli 0·35—0·94^{mm}; microsclera of one form, isochelæ palmatæ 0·013—0·015^{mm}.

The contour of this species, of which we have only one specimen, is most nearly club-shaped; below it passes into a stalk attached to a shell of *Astarte crenata* Gray. The form is otherwise irregular, the upper part being provided with irregular, broad and deep furrows running longitudinally, between which are found lobes that may be so compressed as to form wings. The length of the somewhat damaged specimen is 65^{mm}, and the greatest breadth is 25^{mm}. The consistency is rather firm, almost fleshy. The colour (in spirit) is something between gray and brown, approaching to olive colour. The *surface* of the sponge, in the state of preservation in which we have it, is provided with projecting spicules, but by far the greatest part of the dermal membrane is wanting; to judge from the places where it is preserved, the sponge in its undamaged state is slightly shaggy. The *dermal membrane* is exceedingly thin and transparent. When it is torn off and examined it shows some irregularly scattered spicules, which thus seem to belong to the dermal membrane itself; otherwise it seems to be resting on the irregular skeleton below, and some spicules project through it. Neither *pores* nor *oscula* are seen, I suppose, on account of the membrane only being preserved in so few places.

The *skeleton* consists of a rather irregular network; especially longitudinal fibres are found, the greater part of which are polyspicular and may be of varying thickness; they contain, however, always few spicules, and are not especially strongly marked. In their longitudinal course some of them bend off towards the surface, which they meet at a very acute angle, and which, as far as I have been able to see, they pierce. Between the longitudinal fibres scattered spicules without any regular position are found, and transverse fibres are not formed. While in the upper part of the sponge the longitudinal fibres have a rather irregular course, in the stalk they run perpendicularly; they are here thicker and consist of more spicules, and some of the scattered spicules are placed transversally. Some spongin is found in the skeleton, especially discernible in the nodes, and it seems also sometimes to continue over the fibres; it is white and clear, and consequently only little conspicuous. In the stalk the spongin is more copious, and may be seen quite to wrap the polyspicular fibres.

Spicula: a. *Megasclera* are rather large styli, more or less curved, sometimes almost straight; the place of the curve may be somewhat varying, and it is sometimes a little irregular. The styli are slightly fusiform, tapering somewhat towards the rounded end. The other end is evenly and long tapering. The size of the styli is rather varying, the length thus from 0·36 to 0·94^{mm}, and the thickness in proportion from 0·012 to 0·024^{mm}; the smaller ones are the least frequent. Developmental forms occur in small numbers down to quite fine ones; as the fullgrown needles they are of varying length. b. *Microsclera;* these are only of one kind, isochelæ palmatæ; they are of the common structure, the shaft is slightly curved, but with a straight middle part, and this free middle part is about one third of the length of the chela. The tooth is somewhat narrower than the alæ taken together. When the chela is viewed from the side the recurved lateral edges of the tooth and the alæ are only to be seen with difficulty, and only under very high magnifying powers. These chelæ are very small, their length is 0·014—0·015^{mm}, and the breadth is 0·003^{mm}; sometimes they are a little twisted. They are found copiously throughout the sponge and also in the dermal membrane.

This species is closely allied to the *E. columnata* established by Topsent in 1892 (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 90, Pl. V, fig. 5, Pl. X, fig. 5); it is of a similar form, and also the skeletal structure may be taken to be the same. Further they agree with regard to the size of the spicules and in the fact that the styli are comparatively large, while the chelæ are very small, as also in that of the styli being of the same form. Topsent states the measures of the styli to be 0·75^{mm} with a thickness of 0·016^{mm}, and the length of the chelæ to 0·016^{mm}. On the other hand there is a difference in the structure of the chelæ they being in *E. columnata*, to judge from the figure, considerably broader, as well when seen from the front as in profile. A measuring of the figure of Topsent gives as the greatest breadth, when seen from the front, 0·009^{mm}.

Locality: Only one specimen from the Davis Strait, station 27, 64° 54' Lat. N., 55° 10' Long. W., depth 393 fathoms.

5. **E. forcipula** n. sp.

Pl. I, Fig. 5. Pl. VIII, Fig. 5 a—i.

(Formed as a thick leaf?) The surface smooth, the dermal membrane provided with spicules, on the pore side forming a network, but otherwise placed irregularly. Oscula scattered. The skeleton consists of polyspicular fibres branching up through the sponge, between them an irregular network. Spicula: Megasclera styli 0·54—0·68^{mm}; microsclera of four forms, isochelæ palmatæ 0·011—0·018^{mm}, isochelæ arcuatæ 0·038—0·05^{mm}; sigmata 0·03—0·085^{mm}; forcipes 0·017^{mm}.

Of this species we have only a couple of fragments, the largest of which has an extent in breadth of 40^{mm} and a height of ca. 30^{mm}; the fragments would indicate that they have belonged to a sponge that has been erect and formed as a thick leaf, perhaps about as *E. villosa*, and in this case the fragments among other things show the upper part of the sponge. The colour (in spirit) is whitish yellow. The consistency is rather firm. The *surface* is somewhat wrinkled and folded, but otherwise smooth. The *dermal membrane* is thin, and on one side of the sponge where no pores are found, it is provided with spicules rather close-set, irregularly scattered, but parallel to the surface. On the other side of the sponge where numerous pores are found, the needles, on the other hand, are arranged as an irregular, polyspicular network round the pores. *Oscula* are simple, oval, or somewhat irregular openings of varying size in the dermal membrane. The spicules of the dermal membrane surround the oscular aperture, being arranged in a ring-like way round it, but at some distance from the opening itself, which is thus surrounded by a narrower or broader brim (probably changing according to the degree in which oscula are shut) of the membrane without styli. On the other hand, microsclera, especially the smaller form of chelæ, are found here in large numbers. *Pores* are only found on one side of the sponge where the spicules are arranged in a net-like way; they are round or oval, and have been measured to a size of 0·03—0·238^{mm}. As the pores are thus only found on one side it is possible that oscula are only found on the other, and this, perhaps, is again dependent on the form of the sponge; the fact cannot, however, be decided from the fragments in hand.

The *skeleton* consists of polyspicular fibres branching up through the sponge from the lower part and here and there anastomosing; in the upper part of the sponge they run as more or less parallel fibres. Here they all bend towards one side of the sponge, and run perpendicularly towards the surface. The consequence of this course of the fibres is that they are more or less parallel to the other side of the sponge. The side towards which the fibres bend, is the poreless one; they are here connected with the close-lying spicules of the dermal membrane, and support the membrane, but do not pierce it. The dermal membrane on the other side, which, as mentioned, is provided with pores, and the spicules of which form a reticulation, rests on the fibres running below it. The fibres are polyspicular, and consist of rather many spicules beside each other; they are of an average thickness of 0·09—0·12^{mm}. Between the fibres a quite irregular network is found, partly of fibres with few spicules, but chiefly of single spicules. In the lower parts of the sponge the longitudinal fibres are more close-standing than farther up. The spicules of the fibres are connected by a clear, not copious mass of spongin apparently, however, wrapping the whole fibre; it is especially distinct in the nodes.

Spicula: a. *Megasclera* are styli; they are slightly curved in various ways, and sometimes somewhat irregularly; they may also be almost straight. They taper evenly, but most frequently not much towards the point, and the point itself is therefore most frequently more or less suddenly pointed and may be longer or shorter, down to quite short; it is frequently more or less distinctly marked off, and the marked off point may also be longer or shorter. The needles are often a little thinner below the rounded end than at the end itself, but they cannot, however, be designated as subtylostyli. The length is between 0·54 and 0·68^{mm}, and the thickness is 0·010—0·014^{mm}; the thickest ones are generally not the longest. Finer, down to quite fine developmental forms are found, but only in small numbers; they are only a little shorter than the fullgrown ones, the finest ones have a length of 0·47^{mm}. The developmental forms are all long tapering. b. *Microsclera:* of these are found two forms of isochelæ, smaller isochelæ palmatæ and larger isochelæ arcuatæ, further sigmata and forcipes. 1. The small palmate isochelæ may be somewhat varying in form, the middle part of the shaft between the end parts being straight, or more or less curved; this part is a little more than one third of the length of the chela. When the middle part is curved the whole shaft forms an even curve; when it is straight, the end parts, from which the lateral alæ go off, form obtuse angles with the middle part; the tooth being directed somewhat forward the angle between the tooth and the shaft becomes rather large. The tooth is of about the same length as the alæ, but it is considerably narrower than these taken together, and is ovate; the lateral edges of the alæ are refolded through the whole length, so that the folded part is seen, when the chela is seen from the front. These chelæ are very small, their length is between 0·011—0·018^{mm}, and their greatest breadth is 0·007^{mm}. 2. The arcuate isochelæ have a rather slightly curved shaft, the lateral alæ of which are pointed and tooth-like, and of the same length as, or a little shorter than, the tooth; the tooth may be narrower or broader, but, when viewed just from the front, it is lanceolate and more or less pointed. Tuberculum is oval, most frequently pointed, or lengthily triangular; when the chela is seen a little from the side, the tooth and tuberculum appear more pointed. The length of the chela is somewhat varying, from 0·038mm to 0·05mm; the thickness of the shaft is ca. 0·004mm. Most frequently these chelæ are a little twisted, so that the two teeth are not quite in one plane. Of this chela I have seen a few developmental forms, but only rather grown ones with half-developed tooth and alæ. 3. Sigmata; these are more or less contort; they reach to a rather considerable size, but are very varying in this respect, the length being between 0·03mm and 0·085mm, and the thickness proportionally 0·002—0·006mm. These sigmata show an interesting fact well worth to be noticed. Towards the bendings the shaft generally shows a slight expansion (as seen in Pl. VIII, fig. 5 g); this is not owing to the shaft here being thicker, but to the fact that it is somewhat compressed. When a sigma is seen under the microscope, the hook that on account of the twisting is turned towards the beholder (in the figure the upper one), appears also narrower than the other, and the compression may also be seen on broken sigmata where a transverse section is seen; the transverse section seems to be somewhat triangular with the narrowest edge turned inward. Of these sigmata developmental forms of different thickness are not rarely found; the finer they are, the less developed are the recurved ends; in the very finest ones, of a thickness of scarcely 0·001mm, the recurved ends are not yet formed. The mentioned structure of the end parts of the shaft may already be traced in the developmental forms. 4. Forcipes; these are of the common, more or less hairpin-like, form with a round curve above and two more or less parallel legs; the legs are most frequently slightly diverging, but may also be quite parallel, or slightly converging, the latter, however, being perhaps only apparently the fact and owing to a twisting. They are thorny, which is, however, on account of their smallness, only very little conspicuous; the legs end in a quite small knob-like swelling. When the forcipes are seen under sufficiently great magnifying powers the thorns are seen to be found especially on the inner side of the legs; they are comparatively long, and directed a little upward; also on the upper side of the curve some smaller thorns are found, and there seems likewise most frequently or always to be found a small thorn on the inner side of each knob. A slight granulation may also in most cases be seen on the other parts of the forceps. Sometimes the legs are not of equal length. These forcipes are exceedingly small and may easily be overlooked. Their length is 0·017mm, the thickness at the curve, where it is greatest, is ca. 0·001mm; quite few, somewhat larger forcipes were seen. The microsclera are found as well throughout the tissue as in the dermal membrane; in the tissue sigmata are of most frequent occurrence, while in the dermal membrane the two forms of chelæ seem to be found most frequently.

Locality: The Davis Strait, depth 80—100 fathoms (Th. Holm), a couple of fragments.

Remarks: This species has a quite interesting spiculation, and it is the first *Esperiopsis*-species, in which forcipes have been found. Therefore there might be some doubt with regard to its being referred to this genus, and there might be a possibility of referring it to *Forcepia* Cart. As, however, the species has no special dermal spicules, and thus wants a character very significant to the *Myxilleæ*, and as forcipes also occur outside of the genus *Forcepia*, and the occurrence of these bodies therefore scarcely alone is sufficient for the establishing of a genus, I think it most natural to refer the present species to the genus *Esperiopsis*. Topsent (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 1892, 100, Pl. VI, fig. 5, Pl. X, fig. 9) has established a species *Forcepia versatilis* wanting dermal spicules; but in embryos found in the sponge small diactinal spicules were found which Topsent takes to represent the dermal spicules, but they are not further developed, so that the species later on has none of them. This species, however, is no *Forcepia*, but an *Asbestopluma*, as will be more particularly mentioned under this genus.

6. **E. flagellum** n. sp.

Pl. IX, Fig. 1 a—h.

Incrusting; the surface slightly uneven from projecting bundles of spicules; the dermal membrane thin without spicules. The skeleton irregular consisting of polyspicular fibres and bundles of spicules. No spongin. Spicula: Megasclera styli 0·39—0·44^{mm}; microsclera of four forms, isochelæ palmatæ of two forms, large ones 0·043—0·083^{mm}, small ones 0·018—0·021^{mm}; common sigmata 0·095—0·25^{mm}; flagellate sigmata 0·03—0·13.

This species grows as a quite thin incrustation on a dead branch of *Amphelia oculata* otherwise very much overgrown by Bryozoa. On the branch are further found an *Iophon*, a *Mycale placoides*, and a *Hamacantha Bowerbankii*. With regard to the outer form of the species can only be said that it is a quite thin crust; its contour is irregular, following the form of the substratum, and the limits are otherwise most frequently only seen with much difficulty. Its greatest extent may be given to about 40^{mm}, the thickness is only one or two millimetres. The colour (in spirit) is yellowish or slightly reddish yellow. The consistency is loose. The *surface* has small and scattered projections owing to projecting bundles of spicules, but by examination with a magnifying-glass they are only very little conspicuous. The *dermal membrane* is thin, without any particular skeleton only provided with microsclera. *Oscula* and *pores* have not been found.

The *skeleton* consists chiefly of short fibres or bundles of spicules rising from the base up through the sponge. Sometimes they meet upwards pyramidally, and give rise to the unevennesses of the skin. They may also be longer and run almost parallel to the surface finally bending into it; these longer fibres may also be branching. Here and there scattered bundles of spicules and a few scattered spicules are seen. The fibres are polyspicular, and the average thickness may be given to 0·05^{mm}. Spongin has not been observed and seems not to be found.

Spicula: a. *Megasclera* are slender, straight styli, generally with a very slightly swollen head end, and thus approaching subtylostyli; they are of about equal thickness in their whole length, and the point is short and bounded by rather straight lines. The length is rather constant, varying from 0·39—0·44^{mm}, the thickness is 0·006—0·007^{mm}. Developmental forms of the styli occur singly, down to quite fine ones that are long tapering. b. *Microsclera:* of these four forms are found, two forms of isochelæ palmatæ, larger and smaller ones, common sigmata, and flagellate sigmata. 1. The large isochelæ are straight, the alæ stretch so far down the shaft, that the free middle part is less than one third of the length, the lateral edges diverge towards the middle of the chela, and are rather much refolded; the tooth is a little narrower than the alæ taken together, but of the same or about the same length, and it increases also in breadth towards the end; it is likewise hollow inward. Tuberculum is longish. When the chela is seen obliquely from behind, the axis may be seen to continue as a thickening down the middle of the tooth and stop a little before the end; this point may often, when the chela is seen from the front, appear as a small tuberculum. The size of this chela varies rather much, the length from 0·043—0·083^{mm}, and the breadth proportionally from 0·015—0·024^{mm}. 2. The small isochelæ have a slightly curved shaft, the free middle part of the shaft is less than one third of the length. The tooth is a little narrower than the alæ taken together and of about the same length; the alæ are much refolded. The length of these chelæ is between 0·018^{mm} and 0·021^{mm}, and the breadth is ca. 0·004^{mm}. 3. Sigmata of the common form; these are curved in the common way, and the ends are highly, almost rectangularly recurved. They are larger than is commonly the case, but vary much in size; the length is between 0·095 and 0·25^{mm}, and their thickness is 0·005—0·01^{mm}. Of these sigmata a few developmental forms were found; they are fine and want the recurved ends, they were found of lengths up to the greatest length of the sigma. 4. Flagellate sigmata; these are long sigmata curved in such a way as to get two parallel arms, the ends are pointed and recurved in a hooklike manner almost in a right angle, the recurved parts sometimes reach each other. They are exceedingly varying as to size, the longer axis from 0·03—0·13^{mm}, and the shorter axis from 0·024—0·083^{mm}, the thickness in the middle is 0·0018—0·005^{mm}; otherwise the greatest thickness is not here, but at the ends just before the recurving. These sigmata are plane. Of this form I have seen a single developmental form; it was of the same form as the fullgrown ones, but without the recurved ends. All the forms of microsclera occur both in the dermal membrane and in the other tissue of the sponge; the common sigmata are found in greater numbers than the flagellate ones, and are upon the whole the forms of the microsclera most frequently found.

This interesting species is very closely allied to the *E. decora* described by Topsent (Résultats des Camp. scient. du Prince de Monaco, Fasc. XXV, 212, Pl. XVII, fig. 8); this latter species forms also a quite thin incrustation, and the skeletal structure seems to be the same. Also the spiculation is much the same, as well with regard to the megascleres as to the microscleres, and also in the occurrence of the flagellate sigma, which is formed in quite the same way in both species. But with regard to the spiculation, besides some difference in the size of the spicules, the differences are found, that the chelæ in *decora* seem to be of three forms, and that trichodragmata are found in this species. This latter fact especially forms a distinct character, whereas the two largest forms of chelæ in *decora* are all but equal.

Remarks: The occurrence in this species of the form of sigmata that I have called flagellate sigmata, is very interesting and surprising; this form has hitherto only been known in the two *Gellius*-species *flagellifer* and *porosus*, and in the *Porziella clavisæpta* from the Azores established by Topsent in 1896 (Bull. de la Soc. de France, XXI, 147, fig. a—d), which the author in 1904 in the work quoted above (223, Pl. XVI, fig. 5, Pl. XVIII, fig. 7) refers to *Hamacantha*. The sigma occurring in the present species is of a quite similar form as those of the mentioned two *Gellius*-species, the only difference being that in the latter one arm is generally longer than the other, while in the present species both arms are of equal length, in which feature this sigma quite agrees with those of as well *E. decora* as *H. claviscæpta*. It is also of some importance that the developmental form of this sigma has been found here, as it has not been known before.

Locality: Ingolf, station 55, 63° 33' Lat. N., 15° 02' Long. W., depth 316 fathoms. Only one specimen.

7. **E. typichela** n. sp.

Pl. I, Fig. 3. Pl. IX, Fig. 2 a—e, Figs. 3—4.

Incrusting, the surface with very small, close-set, conical projections, and with scattered long, flagelliform appendices; the dermal membrane thin, without spicules. The skeleton consists of polyspicular fibres, chiefly running from the base to the surface. Spongin wanting. Spicula: Megasclera styli 0·33—0·45 mm; microsclera, isochelæ palmatæ of two forms, larger ones 0·064—0·075 mm, smaller ones 0·021—0·025 mm.

The specimen in hand of this species grows incrusting on a *Hornera lichenoides*, but it grows over more branches, so that it forms a continuous plate, and it grows quite round the *Hornera* so as to show a surface on both sides. The greatest extent of the sponge is 30 mm, and the thickness from surface to surface reaches at most 5 mm. The consistency is soft. The colour (in spirit) is gray. The *surface* is to the naked eye smooth, but under a magnifying glass it is seen to be covered with close-set, conical projections owing to the ends of the fibres. Further it shows the peculiarity that long, fine, flagelliform appendices formed by a spicula-fibre project scattered round on the sponge. In the present state of the sponge these free fibres are lying along the surface and appear to the naked eye as sinuous threads. The *dermal membrane* is exceedingly thin; it contains no skeleton, and rests on the mentioned projecting ends of the fibres. *Pores* are found in the dermal membrane in the areas between the projecting ends of the fibres; they are generally so close-set, that the membrane becomes a network. They are round to oval, and their size was measured to 0·059—0·14 mm. *Oscula* were not found.

The *skeleton*. It is a difficult task to examine the structure of the skeleton continuously on account of the soft consistency of the sponge. It consists chiefly of polyspicular fibres running from the base to the surface where they project and form the conical projections mentioned above. The average thickness of the fibres is ca. 0·03 mm. No transverse fibres are formed between these fibres, but fibres or bundles of spicules are found, especially down towards the base, placed horizontally or irregularly. The mentioned fibres that run from the base to the surface, are only short on account of the small thickness of the sponge; but frequently they are not placed perpendicularly, but more or less obliquely, and often they are very decumbent, and so become considerably longer. The projections caused by the fibres, therefore, are not perpendicular to the surface, but more or less oblique. Now a few of the projecting fibres are prolonged and form the mentioned long, fine appendices scattered on the surface of the sponge. These appendices, which thus seem simply to be prolonged fibres, are at the base a little thicker than the other projections having here a thickness of ca. 0·16 mm, but they taper towards the point. They may reach a length of up to 10 mm. They consist of a fibre surrounded by a thin layer of tissue. At the base of the fibre there are many spicules alongside, but towards the point they grow fewer, and at the very end they are quite few, in quite undamaged appendices perhaps only a single one. In the covering layer of tissue an abundance of microsclera is found; along the fibre, at least to the middle of it, the large chela is arranged in beautiful rosettes, and between these rosettes the little chela is found in dense crowdings (Pl. IX, fig. 4), but forming no rosettes. The sponge is throughout highly intervowen with sand and small silicious particles.

Spicula: a. *Megasclera* are very slender, straight styli; they taper evenly, but not much, towards the pointed end, the point itself is rather short. The length varies from 0·33—0·45^{mm}, and the thickness from 0·004—0·0057^{mm}. Finer developmental forms are found, but only singly. b. *Microsclera* are two forms of isochelæ palmatæ. 1. The large chelæ are of a very regular and beautiful form. The shaft is straight, the free middle part a little curved inward. The alæ reach so far down the shaft, that the free middle part is only about one fourth of the length, and their sides are somewhat refolded. The tooth is of the same length as the alæ and only a little narrower. Its edge is curved a little inward. Tuberculum is longish, broadest below. When the tooth is seen from the inside the axis may be seen some way down it. Not rarely a slight twisting of the chela is observed. The length is 0·064—0·075^{mm}, and the breadth is 0·021^{mm}. A few developmental forms of this chela were seen. 2. The small chela has a quite slightly curved shaft, the end parts are so long, that the free middle part of the shaft is quite short. The lateral edges of the alæ form a far more curved line than in the large chela, and their lower edge is straight. The sides of the alæ are somewhat refolded. The tooth is of the same breadth as the alæ, and the tuberculum is a little longish. The alæ and the tooth form a very small angle with each other. The length is 0·021—0·025^{mm}, quite singly specimens were seen of a length of 0·035^{mm}. The breadth is 0·008^{mm}. The occurrence of the chelæ is quite singular; to be sure they are to be found throughout the tissue, but especially at the surface. The large chela occurs as rosettes which seem to be attached to the fibres, especially at the dermal membrane, but not in this membrane itself. It is seen arranged in rosettes in the layer of tissue on the projecting ends of the fibres. Also the small chelæ are especially seen at the surface; they do not form rosettes but occur in groups or dense crowdings. Both kinds of chelæ occur also, as before mentioned, in the flagelliform appendices. The occurrence of the large chela in typical rosettes is rather interesting, as this fact is otherwise not known in the isochelæ, but has only been observed in anisochelæ. Carter mentions rosettes of chelæ in *Mycale titubans*, and thinks here to have found isochelæ in rosettes; as will be mentioned hereafter, under the species in question, its chelæ, however, are anisochelæ.

This species shows itself to be related to the preceding one; the megasclera are of the same form, and also the large chela is of the same structure. Also the skeletal structure seems to be the same as well with regard to the arrangement as to the fact that spongin is wanting. On the other hand the small chela is of a different structure, and no kind of sigmata is found.

Locality: Forsblads fjord, East Greenland, depth 50—90 fathoms (the Amdrup-Expedition 1900). Only one specimen.

Mycale Gray.

The habitus may pass through the whole series of forms from thinner or thicker incrustations through massive forms to erect, often lobate, or finally branched or more or less irregularly leaf- or cup-shaped *forms that will then be more or less symmetrical. The skeleton consists of polyspicular fibres; in the erect forms it is well developed, often dendritically branched, in the massive and incrusting forms it may be of renierid or more irregular structure, or it may in the incrusting ones consist of slightly branched fibres running from the base to the surface without transverse fibres. Spongin is most frequently found, in varying, frequently only slight amount. Spicula: Megasclera monactinal, styli or subtylostyli; microsclera: the characteristic microsclera are anisochelæ palmatæ of one or more than one form, the largest ones often in rosettes: to these may be added sigmata, trichodragmata, toxa, and, rarely, small isochelæ palmatæ.*

The genus *Mycale*, like *Esperiopsis*, passes through a series of forms from thin incrustations to erect, rather symmetrical forms. The development of the skeleton is connected with this fact. The lowest skeletal structure I take to be the one occurring in some thin, incrusting forms, and consisting of fibres running from the base to the surface and sometimes slightly branching, as has been described and figured by Vosmaer and Pekelharing with regard to *M. aegagropila* (Verhandl. d. Koninkl. Akad, v. Wetensch. te Amsterdam, 1898, 2, VI, No. 3, Pl. I, fig. 3—4). The fibres are here quite free without connecting transverse fibres or transverse spicules. This structure quite without transverse fibres is, perhaps, owing to the fact that these sponges are quite thin crusts. When we get to thicker or massive species, transverse fibres or transverse spicules are found, and the skeleton gets a renierid or more irregular structure which in the erect forms may pass to a dendritic structure.

The typical *Mycale*-anisochela, as it is found for instance in *lingua* and *placoides*, is a very characteristic one distinguished by reaching a rather considerable size. It may vary very much in size without showing distinctly marked, different sizes, but it may also occur in several well-marked sizes or forms; the largest ones very often occur in rosettes, which is not known to be the case with regard to the smaller ones. Small isochelæ may occur, but rarely, for instance in *M. parishii* Bow., where they occur together with anisochelæ, sigmata, and trichodragmata, and in *M. plumosa* Cart., where, according to Carter, they occur together with anisochelæ, sigmata, and toxa. Also sigmata may be found of more than one size, for instance in *M. macrosigma* Lindgren. — The microsclera mentioned in the diagnosis may occur in different combinations. In some species only anisochelæ are found, either of one or more than one form, further chelæ and sigmata, chelæ, sigmata, and trichodragmata, which latter combination is very frequent, then chelæ, sigmata, and toxa, or chelæ and trichodragmata; finally, as mentioned, small isochelæ may in a few instances be added to the combination.

1. **M. placoides** Cart.

Pl. IX, Fig. 5a—l.

1876. *Esperia placoides* Carter, Ann. Mag. Nat. Hist. Ser. 4, XVIII, 316, Pl. XIII, fig. 12, Pl. XV, fig. 32.
1880. — Vosmaer, Notes from the Leyden Museum, II, 147, 32.
1892. *Esperella placoides* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 89, Pl. I, fig. 15.

Erect, somewhat club-shaped, sometimes compressed or more irregular. The dermal membrane thin, without spicules, pierced by projecting spicules, and the surface consequently finely shaggy; it is provided with sinuous or branched pore-furrows. Oscula in the upper part of the sponge on the top of *small oscular cones. The skeleton consists of polyspicular fibres branching up through the sponge. The spicules piercing the dermal membrane are smaller than the other spicules of the skeleton. Spicula: Megasclera styli or subtylostyli, sometimes with the upper end formed like a handle: the styli of the skeleton 0·447—0·715^{mm}, those of the dermal membrane 0·3—0·5^{mm}; microsclera of three forms, anisochelæ palmatæ 0·025—0·092^{mm}, the large ones frequently in rosettes; sigmata 0·017—0·027^{mm}; rhaphides in trichodragmata 0·043—0·085^{mm}.*

Mycale placoides has been rather carefully described by Carter in the place quoted, and he has rendered an account of most of the characteristic structural features. On account of the great resemblance between this species and the following one, it will, however, be of importance that a full description is given of both of them. The form of the sponge seems to be somewhat varying, but is always erect; the hitherto known specimens, mentioned and figured by Carter and Topsent, are erect and more or less cylindrical or club-shaped, being somewhat narrowed below. All the specimens before me are more or less damaged, but with regard to the form it may, however, be decided from them that the sponge, besides the mentioned form of which I have some specimens, may also be more or less compressed, or be drawn out into some broad and irregular lobes reaching through the whole length. The specimens mentioned by Carter and Topsent had a height of 6·5—9^{cm}. Most of the specimens before me are considerably larger, the club-shaped specimens thus up to a height of 17^{cm}. The largest specimen consists of some fragments which were stated by the collector, Dr. Mortensen, to have belonged to one specimen. Its form has been somewhat compressed, presumably as a thick leaf. It has been a very large specimen; but the lower part wanting, and, I suppose, to a rather great extent, the height cannot be given, but the breadth above has been ca. 30^{cm}, and the thickness 5—6^{cm}. The consistency is soft and not elastic, and therefore the sponge, in spite of the thick fibres, is rather fragile. The mentioned largest specimen is stated to have been very slimy, when it was taken up in the trawl. The colour (in spirit) is generally whitish yellow. The *surface*, as is well known, has a characteristic appearance being completely furrowed by a large number of sinuous or branching furrows that may be arranged in very different ways. The parts between the furrows are finely shaggy from projecting spicules, while the furrows are smooth. The *dermal membrane* is thin without any particular skeleton; it is supported by the ends of the fibres, the spicules of which are spread in a penicillate way, and project a little through it, and it is stretched over the furrows of the surface. *Pores* and *oscula*. As has been very well described by Carter, the mentioned furrows in the surface are pore areas. They may show a very different arrangement, being sinuous and branched in many different ways. They may be placed rather near to, or more far from, each other, and consequently the parts between them may be larger or smaller plates, or may be reduced to projecting knobs or rather long keels. Then the furrows may be quite narrow, almost quite closed, or broad and flat; this latter feature is probably mostly caused by the greater or lesser contraction of the skin in the place in question. The pores are found in the membrane that is stretched in the furrow, most frequently very close-set, so that the membrane resembles a sieve. Of the strings of tissue separating the pores, some are generally thicker principal strings, between which the pores are placed more or less arranged in series. These strings, which may be distinctly seen by means of a magnifying glass, pass in the more narrow areas more or less transversely from one side of the furrow to the other. The size of the pores is generally 0·035—0·1^{mm}. The thin pore membrane is not directly supported by the skeleton, and only microsclera are found in it, especially chelæ, partly in beautiful rosettes, partly scattered, but also sigmata and rhaphides, singly and as trichodragmata. As mentioned by Ridley and Dendy under *Esperella murrayi* (l. c. 67), a fine longitudinal striation is also found here in the strings of tissue between the pores, which, as supposed by the mentioned authors, is perhaps owing to muscle-like fibres. Frequently no pores are seen in the membrane of the furrows, but then it is to be supposed that they are closed. Oscula are found in the upper end of the sponge, and sometimes some way down the sides; they are formed like small cones, of a height of only a few millimetres. The oscular aperture is found at their point, and has a diameter of 1—2^{mm}. The wall of the oscular cone has a dense spiculation of needles placed parallel to the longitudinal axis of the cone; these needles are of the same form as those supporting the dermal membrane, that is to say of the smaller form. On the upper part of the sponge, where oscula are especially found, the pore furrows are wanting or are only found to a slight degree.

The *skeleton* is of the dendritic type; from the base fibres issue which anastomose and branch, most frequently more or less irregularly, up through the sponge. The real, single fibres are generally not particularly thick, at most about 0·47^{mm}; but especially in the lower part of the sponge several fibres are often united into strings apparently forming a single fibre, and reaching to a considerable thickness, but under the microscope they are seen to be formed of several close-set fibres. Towards the surface the fibres branch copiously, and run as parallel fibres of a thickness of about 0·06^{mm} and with a distance of 0·25—0·30^{mm} towards the dermal membrane; here the spicules spread in a penicillate way and pierce the membrane. Where the pore furrows are found, the fibres pass off to the sides, so that the membrane in the furrow is not supported or pierced by spicules. No transverse fibres are found, but between the fibres and their finer branchings spicules and bundles of spicules are scattered irregularly and more or less densely. In the outer part of the skeleton, at the surface, it becomes more regular by the fact that the ends of the fibres here run parallelly with fixed intervals; some transversely placed spicules are here found interwoven between the fibres. These transverse spicules, as well here as deeper in the sponge, are generally of a form differing somewhat from that of the spicules forming the fibres; they belong to the shorter and thicker forms, and are always a little curved. The spicules in the outer end of the fibres, which are spread in a penicillate way, consist of styli of a definite kind, smaller than the other styli of the skeleton, as has already been observed by Carter. Spongin is found in the fibres uniting the spicules; but nevertheless the fibres are loose and little capable of resistance; with regard to this fact, however, there is some difference between different individuals.

Spicula: a. *Megasclera* are styli or slightly marked subtylostyli. They are of two forms, as the spicules that support the dermal membrane spread in a penicillate way, as mentioned, are smaller and of a form somewhat different from that of the skeletal spicules. These spicules supporting the dermal membrane may, for the sake of shortness, be called dermal spicules, although they cannot be said to form any particular dermal skeleton. The skeletal styli are straight, or have a larger or smaller curve nearest to the upper end; this end is rounded and sometimes slightly swollen. The upper end of the styli are not rarely formed as stated by Bowerbank with regard to *M. constricta* and *M. lingua*; in this case a kind of handle is found on the spicule, the upper end being narrowed for a shorter or longer way and then passing rather abruptly into the thicker part. This structure of the spicule may be more or less marked, and is frequently almost imperceptible, and it is very often quite wanting. The feature may, moreover, be different in different individuals, so that it is found more frequently and more marked in one individual than in another. The needle is thickest in the middle, and the tapering end runs into a point rather much varying in length as well in one individual as in different individuals. The length of the styli varies from 0·447—0·715^{mm} and the thickness from 0·010—0·016^{mm}; these are the limits within which I have found the needle varying in the species, but there may be some difference in different individuals, and in one individual the needles do not generally show so great a variation. The limits most frequently found may be given as to length 0·5—0·65^{mm}, as to thickness 0·011—0·015^{mm}. As before mentioned, the transverse spicules occurring outside of the fibres are oftenest a little shorter and thicker than those forming the fibres, and they are curved. Finer developmental forms are only seen in small numbers. The dermal spicules are straight; they are of a particular form, their thickest part being found nearest to the pointed end, while they are evenly tapering towards the rounded end, which is often very slightly expanded. Sometimes at the rounded end they may be of the same handle-like form, as is mentioned in the skeletal spicules. While their size and the length of their point, and by these features to some degree also their form, is rather constant in one individual, they vary not a little in different individuals. It is, however, chiefly only the length of the point which is varying, but this fact again influences the form and the length of the whole spicule. In some individuals the point is quite short or even rounded, and then the thicker part of the spicule is found close to the point; in others the point is even and of a middle length, and in others again very long, up to quite exceedingly long and thin; in the latter the thicker part of the spicule is then found about in the middle. That it is really only the point that is of varying length, is also seen by the fact that the longer the point, the longer is the spicule. The length varies altogether in the different individuals from 0·3—0·5^{mm}; in the separate individuals it is, for instance, 0·3—0·38^{mm}, 0·35—0·42^{mm}, 0·42—0·5^{mm}, and these lengths are quite corresponding to the smaller or greater length of the point. The thickness, which is also a little varying, as well in the species as in the separate individual, is 0·007—0·01^{mm}. b. *Microsclera* are anisochelæ palmatæ, sigmata, and rhaphides in trichodragmata. 1. The anisochelæ are of the common *Mycale*-type; the shaft is slightly curved, the alæ of the larger end are broad and diverge towards the middle of the chela, and their sides are much refolded. The tooth is rather narrow, and most frequently somewhat rounded at the end; the tuberculum is long and narrow, and there is a rather broad falx. The alæ of the smaller end are broad, and diverge only a little towards the middle of the chela, and their sides are much refolded; the tooth is rather broad, and the end is straightly cut off, the tuberculum is small and elliptic. Both alæ and tooth here being broad they leave only a narrow slit between them. While the alæ and the tooth of the larger end converge towards the end of the chela, this is only to a slight degree the case with those of the smaller end, and consequently this end gets a peculiar, straightly cut off appearance. Both the alæ and the tooth in the smaller end of the chela are curved about in a circular line, so that a transverse section through the chela would here be almost a circle. These chelæ vary very much in size. Their greatest length is 0·092^{mm}, but there may be a little difference in different individuals, so that in some they reach at most 0·086^{mm}. The thickness of the shaft is ca. 0·005—0·007^{mm}, and the greatest breadth is ca. 0·030—0·035^{mm}. This largest form of the chelæ may vary a little in form in different individuals, especially the upper end may be a little shorter or longer. From the greatest length the chelæ may now vary down to so small a size as 0·025^{mm}; at the same time the dimensions of the several parts of the chela are also altered, the ends, especially the larger one, becoming longer in proportion to the free middle part of the shaft. While thus in the large chelæ the larger end, the free middle part, and the smaller end are in a mutual proportion about as 2 : 2 : 1, these parts are in the smallest chelæ about as 2 : 1 : 1. In the series of variations of the chelæ the forms which would follow nearest to the largest ones, are of very rare occurrence, so that the chelæ would almost seem to fall in two groups, the larger ones only little varying in size, and the smaller ones very varying in size. That such is the fact would also be implied by another thing, viz. that only the large chelæ occur in rosettes, while the small ones are never seen arranged in that manner. This recalls to some degree the feature in several *Desmacella*-species, in which only the larger of the two occurring forms of sigmata are developed in bundles, while the smaller form is never arranged in that way. Developmental forms of the chelæ are also found, but most frequently only in very small numbers; only in a few individuals they were a little more numerous. As the chelæ they are found in all lengths. The youngest developmental form I have seen, is an exceedingly fine staff recurved in both ends, a little more in one end than in the other. During their growth as well the shaft as the recurved parts grow thicker while in the curves the axis remain thin; the alæ and the plate of the tooth is by and by developed, by which fact the parts of the axis situated in them disappears or is effaced, while the free middle part of the axis gets its final thickness. The part of the axis situated in the curve itself, on the other hand, is not thickened, but keeps its original thickness, and from this part inward is developed the thin plate, the socalled falx, connecting tooth and shaft. The falx is already developed at an early stage. The chelæ are found both throughout the sponge and in the dermal membrane, as well singly as in rosettes; as above mentioned only the large ones are found in rosettes; these rosettes are seen especially often in the pore membrane covering the furrows. The large chelæ are also found singly. 2. S i g m a t a; these are of the common form, and are almost always more or less contort. Their length, which may be somewhat dependent on the degree of contortion, is between 0·017—0·027^{mm}; the thickness is between ca. 0·0008—0·0014^{mm}. 3. R h a p h i d e s; these are sometimes seen singly, but most frequently in bundles, t r i c h o d r a g m a t a; the length of the individual rhaphides varies from 0·043—0·085^{mm}; such is the variation in the species, but in the single individuals it is not so great, for instance 0·047—0·067^{mm} and 0·064—0·085^{mm}. In individuals with the shortest styli also the shortest rhaphides are found. The thickness is about 0·001^{mm}. The thickness of the bundles is 0·013—0·018^{mm}. Sigmata and rhaphides occur both in the dermal membrane and throughout the sponge, especially rhaphides in dragmata are of frequent occurrence in all parts of the tissue.

Locality: Station 1, 62° 30′ Lat. N., 8° 21′ Long. W., depth 132 fathoms; station 7, 63° 13′ Lat. N., 15° 41′ Long. W., depth 600 fathoms; station 55, 63° 33′ Lat. N., 15° 02′ Long. W., depth 316 fathoms. Further it has been taken on 65° 39′ Lat. N., 28° 25′ Long. W., depth 553 fathoms (the East-Greenland Expedition 1891—92); 64° 15′ Lat. N., 11° 15′ Long. W., depth 192 fathoms (Wandel); the bay of Skagestrand in Iceland (Wandel); at the north end of Nolsö, depth ca. 100 fathoms (Th. Mortensen); 62° 30' Lat. N., 1° 56' Long. E., depth 275 fathoms (Ad. Jensen, the cruise of the »Michael Sars» 1902); altogether ca. nine more or less damaged specimens. The localities are situated in the Denmark Strait, off the northern coast of Iceland, between Iceland and the Faröe Islands, off the east coast of the Faröe Islands, and to the north east of the Shetland Islands.

Geogr. distr. Besides on the localities mentioned above the species has been taken about 40 miles to the north north west of the Shetland Islands, depth 345 fathoms (the »Porcupine», Carter); further it has been taken farther south, off New Foundland, depth 673 fathoms (Topsent).

2. **M. lingua** Bow.

Pl. IX, Fig. 6 a—f.

1866. *Hymeniacidon lingua* Bowerbank, Mon. of Brit. Sponges, II, 187, 24.

1866. *Desmacidon constrictus* Bowerbank, ibid., II, 350, 4.

1874. *Raphiodesma lingua* Bowerbank. ibid., III, 119, Pl. XLVII, fig. 8, 237, Pl. LXXVII, figs. 1—6.

1874. *Desmacidon constrictus* Bowerbank, ibid., III, 181, Pl. LXXI, figs. 3—10.

1880. *Esperia lingua* Vosmaer, Notes from the Leyden Museum, II, 146, 24.

1886. *Esperella Vosmaeri* Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, 20, 15, Tab. XXX, Fig. 11—14.

1887. *Esperia lingua* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 449.

1892. *Esperella lingua* Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 88.

1896. — — Lambe, Transact. of the Roy. Soc. of Canada, ser. 2, II, sect. IV, 186, Pl. I, figs. 6, 6 a—f.

1904. *Esperella lingua* Topsent, l. c., Fasc. XXV, 200.

Erect and somewhat tongue-shaped, or more irregular. The dermal membrane thin, supported by projecting spicules, the surface consequently finely shaggy; it is provided with sinuous or branched pore-furrows. Oscula in the upper half of the sponge, on the top of small oscular cones. The skeleton consists of polyspicular fibres branching up through the sponge. The spicules piercing the dermal membrane of the same size as the other spicules of the skeleton. Spicula: Megasclera styli or slightly marked subtylostyli, sometimes with the upper end formed like a handle, 0·53—1·15^{mm}; microsclera of three forms, anisochelæ palmatæ 0·028—0·092^{mm}, the larger ones often in rosettes; sigmata 0·021—0·032^{mm}; rhaphides in trichodragmata 0·042—0·078^{mm}.

This species presents many points of resemblance with the preceding one. It is erect, and those of the specimens in hand that are tolerably well preserved, are of a longish, somewhat compressed form, and may, in correspondence with the name, very well be designated as tongue-shaped. The largest specimen, which is much lengthened, is of a length of 23^{cm}, but of a breadth of only 5·5^{cm}, and the thickness is scarcely 3^{cm}. Another specimen is of a height of 10^{cm}, and the smallest specimen, which is more roundish, but also compressed, is of a height of a little more than 2^{cm}. The consistency is rather soft, and the sponge is easily torn. The colour (in spirit) is most frequently whitish yellow or gray. The *surface* resembles that of the preceding species, and furrows of the same kind arranged in different ways are found. These furrows are also here smooth, while the other parts are a little more shaggy than in the preceding species. The *dermal membrane* is thin and has no particular skeleton, but is supported by the ends of the fibres projecting through it, and by the transverse spicules connecting the fibres. *Pores* and *oscula*. As mentioned above we find in this sponge as in the preceding one furrows in the surface that may present a very varying arrangement. These furrows are also here pore areas, the dermal membrane being stretched over them and provided with pores quite as in the preceding species. The pores are placed very close, and most frequently more or less arranged in transverse series separated by thicker principal strings. Also here a fine, muscle-like longitudinal striation is found in the strings of the tissue between the pores, which striation was seen still more distinctly than in the preceding species. The pores are round or oval, and in the examined pore area they had an average diameter of about 0·015—0·02^{mm}. The pore furrows in the specimens in hand are smaller and are present in smaller numbers than in the preceding species; in one of the specimens they are all quite closed, and then they appear as quite narrow keels arranged in a somewhat netlike manner. Pores seem also to be found outside the pore furrows; but it is difficult to decide this fact by material which is not fresh or especially well preserved. Ridley and Dendy state it to be found in *E. murrayi*. Oscula are small, more or less steep cones of a height of 2—3^{mm}. The oscular aperture is found in the end of these cones. The wall of the cones is provided with a very dense spiculation of spicules parallel to the longitudinal axis of the cone, and their ends project round the aperture. In the larger specimens oscula are found in rather large numbers and are restricted to the upper half of the sponge.

The *skeleton* is of a dendritic type, and is constructed as in the preceding species. It consists of fibres branching from the base up through the sponge and anastomosing. Also here the single fibres are closely united into thicker ones that are apparently single ones, and these thicker fibres are often not cylindrical. The single fibres have been measured to a thickness of at most 0·65^{mm}. Towards the surface the skeleton sends forth finer branches running parallelly, and supporting and piercing the dermal membrane; between these fibres some transverse spicules are found. The ends of the fibres which appear as bundles of spicules, are in this species formed of spicules of the same kind as the other spicules of the fibres, so that no specially formed dermal spicules are found. The transverse spicules found between the fibres that are parallel and run towards the surface, are also in this species of a form somewhat different from the form of those forming the fibres, being shorter, thicker, and curved. A slight amount of spongin unites the spicules of the fibres, but is only little conspicuous.

Spicula: The spiculation of this species is upon the whole like that of the preceding one. a. *Megasclera* are styli, or may have a slight tendency towards subtylostyli. Most of them are straight, but some are slightly curved; they are fusiform, tapering towards both ends, which holds good especially with regard to the shorter and thicker ones. The upper end is rounded and sometimes quite slightly swollen; the handle-like form of this end mentioned under the preceding species, is also sometimes found in the present one, and also here developed to very different degrees. The other end of the needles runs into a point, which may, especially in different individuals, be very varying in length, from being quite rounded to a long, fine point. The length of the needles is rather varying, as well in one individual as in different individuals. As mentioned the transverse spicules between the fibres running towards the surface are shorter and thicker than the other spicules, a distinct limit, however, cannot be drawn; these spicules do not vary much in length in the different individuals, and the smallest length of the needles, therefore, is rather constant. The greatest length of the needles, on the other hand, varies much in different individuals, and this length is dependent on the length of the point, so that the longer and finer the point is, the longer is the needle. The boundaries of the length of the styli upon the whole in the species are 0·53—1·15^{mm}, but when given for separate individuals, the length of the point being also taken into consideration, we get for instance 0·56—0·894^{mm} the point more or less rounded; 0·60—0·95^{mm} the point short; 0·65—1^{mm} the point rather long; 0·65 1·15^{mm} the point very long. The thickness of the needles is somewhat varying, and the longest ones are far from being the thickest ones, the mentioned transverse spicules being both the shortest and the thickest; the thickness is between ca. 0·013^{mm} and 0·02^{mm}. Some difference may be found in different individuals, especially with regard to the greatest thickness, which sometimes does not exceed 0·018^{mm}. Finer developmental forms are seen, but only singly. b. *Microsclera:* these are anisochelæ palmatæ, sigmata, and rhaphides in trichodragmata. 1. The anisochelæ are of the common *Mycale*-type and constructed in almost quite the same way as the chelæ of the preceding species, the only difference being that the tooth of the upper end is broader. The greatest length of the chelæ is 0·092^{mm}, but there may be some difference in different individuals. The thickness of the shaft is ca. 0·008^{mm}, and the greatest breadth is 0·028—0·04^{mm}. From the greatest length the chelæ vary in size down to 0·028^{mm}, and at the same time the proportionate dimensions of the different parts are altered in a similar way as in the preceding species. The chelæ are not rarely a little twisted. Also in the present species a break is found between the large chelæ and the largest of the smaller ones, and also here only the large chelæ are found in rosettes. A few developmental forms were found quite corresponding to those in *placoides*. 2. Sigmata of the common form, often somewhat irregular and more or less contort; their length, which is much dependent on the curve, is between 0·021 and 0·032^{mm}, and the thickness varies from 0·0010—0·0015^{mm}. 3. Trichodragmata; the single rhaphides are of a length of 0·042—0·078^{mm}, most frequently about midway between the two sizes; the thickness is 0·0008—0·0014^{mm}. The rhaphides are almost only seen in trichodragmata, of a thickness of 0·011—0·014^{mm}. The microsclera are numerous throughout the sponge, sigmata are of especially frequent occurrence in the dermal membrane. The large chelæ occur in many places, in rosettes in enormous numbers.

Remarks: In the above mentioned largest specimen taken at Upernivik, there are found here and there in the sponge, but in very small numbers, some peculiar spicules that may be designated as tylostrongyla, and whose form may be seen in the annexed figure (fig. 1), which represents three of these spicules and the end of a fourth, and shows different forms of the end-swelling. One end is rounded, while the other is swollen to a more or less pyriform expansion. These spicules always occur in a particular way being only found in the projecting bundles of spicules, always only one or a few spicules in the same bundle, and only here and there, so that many of the projecting bundles may be examined without any being found. In the bundle they are always placed with the swollen end outward, so that it is seen between the points of the other projecting spicules. It is easily seen that these spicules, with the exception of the swelling, are in all other respects of quite the same form as the normal spicules of the species; the not-swollen end is rounded or quite slightly dilated, in other words it has quite the same form as in the normal spicules, and consequently it is the point of the spicule that is transformed. Also its position agrees with this view, it having, like the other projecting spicules, the head-end turned inward. This spicule, which occurs here so scattered and in small numbers, must be regarded as an abnormal form, and in the bundles transitional forms are also found with slightly swollen or only rounded outer end. That the spicule should be of extraneous origin is quite out of the question, as well on account of its form, as its always occurring in the same way. — It would seem that projecting dermal spicules upon the whole are somewhat liable to be influenced with regard to the form, especially of the outer end, of which among others *Mycale placoides* furnishes an instance by its dermal spicules that vary so characteristically in different individuals.

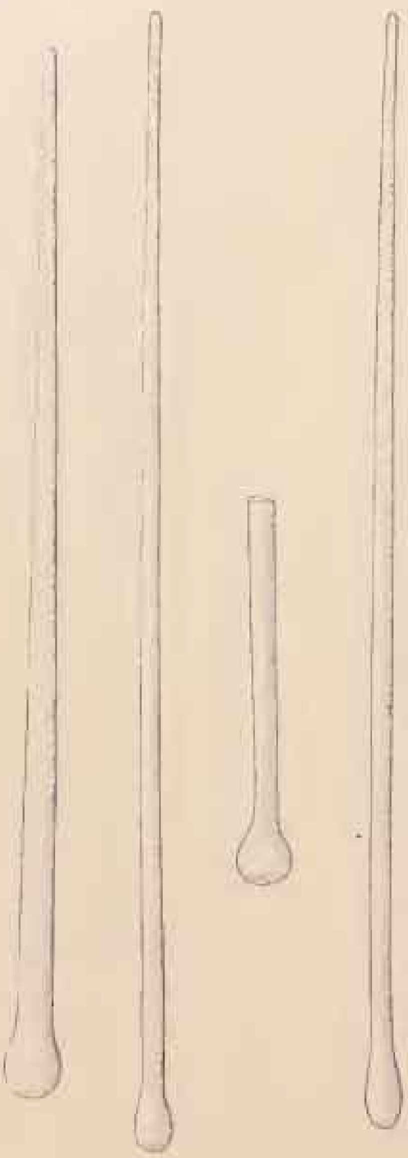


Fig. 1. × 165.

The occurrence of this spicule, however, is not without interest, as it is of a quite similar form and occurrence as the dermal spicules in *Rhaphidotheca Marshall-Hallii* Saville-Kent (Ann. Mag. Nat. Hist. 4. Ser. VI, 219, Pl. XV, figs. 1—7) from the coast of Spain, and *Rhaphidotheca affinis* Carter (Journ. of the Roy. Micr. Soc. II, 497, Pl. XVII, figs. 1 and 3) from a locality between Scotland and the Faröe Islands, which latter species is probably identical with the former [1]). This species has the common *Mycale*-spiculation quite as in *lingua*, but in all, or almost all, the spicules of the projecting bundles the outer end is swollen in a pear-shaped manner. (Saville-Kent says expressly that a few pointed spicules are found in the bundles.) In this species the feature has thus no doubt become normal for all or almost all projecting spicules. The opinions advanced by Carter (Ann. Mag. Nat. Hist. 5, I, 170, Journ. of the Roy. Micr. Soc. l. c., and Ann. Mag. Nat. Hist. 5, IX, 299) that these spicules should be foreign and embodied by the sponge, and that their form should have been altered by the sponge after the embodiment, with reference to which latter fact he, in the place last quoted, even says: «..... has been shown to be adventitious or appropriated, having first belonged to another sponge», are devoid of all foundation, and it is a peculiar thing that Carter has not been able to see, from their form and way of occurrence, that they belonged to the sponge. The whole question debated in the places quoted, whether needles may occur turning the pointed end inward in the sponge and projecting with the head-end, is likewise of no consequence, as it is a fact that the mentioned spicules turn their head-end inward in the sponge.

[1]) Vosmaer (Notes from the Leyden Museum, II, 141, 8) refers, with a query, *Rhaphidotheca Marshall-Hallii*, as a synonym to *Esperella nodosa* O. S. In the description of Schmidt, however, there is no base at all for this referring.

— Saville Kent's species, however, is not the only one with such spicules, and the transformation of the ends of the projecting needles seems in some instances to go still farther. Topsent (Bull. de la Soc. de Fr. XXI, 1896, 149, fig. 2 a—f) has thus established a new genus, *Gomphostegia*[1]) with the species *loricata* that is also a Mycaline with the typical *Mycale*-spiculation, but with projecting spicules the outer ends of which are widened to a slightly crenelated disc and thus form a mail. In these needles, which Topsent calls «Exotyles», the head-end, which is turned inward in the sponge, is formed in quite the same way as in the other styli in the sponge. Thus there seems to be a gradual development in the formation of the ends of the projecting dermal spicules from forms where it only occurs as an abnormal fact, through such where it has become a normal feature, to forms in which it has been developed to an exceedingly high degree.

Locality: Station 3, 63° 35' Lat. N., 70° 24' Long. W., depth 272 fathoms; station 54, 63° 08' Lat. N., 15° 40' Long. W., depth 691 fathoms; further it has been taken at Upernivik (the Reverend Mr. Sorensen); 72° 53' Lat. N., 20° 36' Long. W., depth 96 fathoms (the East-Greenland Expedition 1891—92); 63° 15' Lat. N., 9° 35' Long. W., depth 270 fathoms (Wandel); 62° 30' Lat. N., 1° 56' Long. E., depth 275 fathoms (Ad. Jensen, the cruise of the «Michael Sars», 1902). Altogether six specimens, most of which damaged. The localities are situated in the Davis Strait, off East-Greenland, between Iceland and the Faröe Islands, and to the north east of the Shetland Islands.

Geogr. distr. The species has further been taken off the southern Greenland, 61° 15' Lat. N., 49° 11' Long. W., depth 70 fathoms, and 59° 33' Lat. N., 43° 25' Long. W., depth 120 fathoms (Fristedt); the northern coast of Scotland and the Shetland Islands (Bowerbank); the Kara Sea, depth 65 fathoms (Levinsen); the eastern coast of Canada, depths 75 and 80 fathoms (Lambe); off the north-west coast of Spain, depths 71, 133, and 160 fathoms, off New Foundland, depths 673 and 82 fathoms, and at the Azores, depths 69 and 185 fathoms (Topsent). Thus the species is in the mentioned seas distributed about from 73° to 40° Lat. N., with a bathymetrical distribution from 65—691 fathoms.

Remarks on the species Mycale placoides and lingua. These two species are exceedingly closely related to each other. The external form, the pore furrows, the structure of the skeleton, and, partly, the spiculation show great conformity. Among the distinguishing characters the most important one is the presence of particular dermal spicules (the spicules that are spread in a penicillate way and carry the dermal membrane) in *placoides,* while in *lingua* these spicules are of the same form and size as the other spicules of the skeleton. It is especially this character that is of value as a sure distinctive mark between the two species. Further the tooth in the larger end of the chela is broader in *lingua* than in *placoides*, as is seen from Pl. XI, fig. 5 e compared with fig. 6 e. Then the styli are upon the whole longer and thicker in *lingua* than in *placoides*, and finally the sigmata are also most frequently larger in *lingua* than in *placoides*.

If I have determined the two species as *placoides* and *lingua*, I must remark that Carter

[1]) In the work by Topsent from 1904 (p. 202, Pl. XIV, fig. 15) quoted in the list of synonyms he has acknowledged that *Gomphostegia* is synonymous with *Rhaphidotheca*.

expressly says of *placoides* that the spicules projecting through the dermal membrane are smaller than the others, while his other description agrees very well with the specimens before me. I have then determined the other species as *lingua*, but from the description of Bowerbank it is not to be seen with certainty, whether he has possibly had *placoides* or perhaps both species before him. Topsent, l. c. 1892, enumerates both *lingua* and *placoides*, but gives no description, so that it cannot be seen, which characters he takes to be the distinguishing ones. The peculiar handle-like formation of the upper end of the styli cannot be used, as this formation, as is seen from the preceding descriptions, is found in both species, and may occur very varying with regard to its frequency and degree of marking. Therefore I also follow Topsent in regarding Bowerbank's *lingua* and *constricta* as one species. When Topsent in the place quoted mentions that he has seen specimens of *lingua* with pore furrows, and others without such and with a uniform, slightly shaggy surface, I must suppose that in the latter the pore furrows have been closed, the slight keels then found being often only very little conspicuous.

I have omitted to quote *Esperia constricta* Vosmaer (Niederl. Arch. für Zool. Suppl. Band I, 1881—82, 45), and *Esperia lingua* Vosmaer (Bejdr. tot de Dierk. 12[te] Afl. 3[die] Gedeelte, 1885, 30), as it is impossible to decide, which of the two species mentioned here the author has had before him. The figures in the former place, Pl. III, fig. 99, and in the latter place, Pl. V, fig. 73, might both look like dermal spicules of *M. placoides*, but nothing can be decided with certainty. Neither have I quoted *Esperia constricta* Marenzeller (Die oesterreich. Polarst. Jan Mayen, III, 10), the author's good and rather copious account of the variation of the spicules would seem to indicate that he has had both species before him. Thus with regard to the geographical distribution we can, from these facts, only infer that one or the other, or both species occur in the Barent Sea between 72° and 75° Lat. N., and between 15° and 36° Long. E., on depths between 128 and 175 fathoms, as well as at Jan Mayen on depths from ca. 48—200 fathoms. The *E. Vosmaeri* established by Levinsen l. c. I have, by an examination of the type specimen, found to be identical with *M. lingua;* Levinsen does not mention rhaphides, which, however, are present. The *E. murrayi* established by Ridley and Dendy Challeng. Report, XX, 67, Pl. XIII, figs. 11, 13, 14, 16, 17, 18; Pl. XIV, figs. 1, 1a) is by Topsent l. c. referred to *E. placoides*, and by Lambe l. c. to *E. lingua*. If the chela figured by Ridley and Dendy fig. 17 is correct with regard to the tooth of its smaller end, a specific identity with *placoides* or *lingua* is out of the question, neither does the description of the dermal skeleton or the length 0·053^{mm} given for sigmata agree with any of the two species. The *E. lingua* var. *arctica* established by Fristedt (Vega Exp. vetensk. Iakttag. IV, 449, Pl. 25, figs. 20—24, Pl. 29, fig. 18) cannot be *E. lingua*, only on account of the measures given for the spicules, but must be another, independent species.

3. **M. ovulum** O. Schmidt.

Pl. I, Figs. 6—8, Pl. X, Fig. 1 a—e.

1870. *Chalinula ovulum* O. Schmidt, Grundzüge einer Spongienfauna des atlant. Gebiet, 38, Taf. V, Fig. 1 [1]).
1873. — — O. Schmidt, Jahresber. d. Comm. zur wissensch. Unters. deutsch. Meere in Kiel für 1871, 99.

[1]) In the explanation of the plate the name, presumably by a misprint, is *Chalinula ovum*.

1875. *Esperia lanugo* O. Schmidt, ibid. für 1872—73, 118.

1879. *Esperia stolonifera* Merejkowsky, Mém. de l'Acad. imp. des sc. de St. Petérsb., Sér. 7, XXVI, Nr. 7, 22, Pl. I, figs. 13, 14, Pl. III, figs. 4, 5, 12—19 and 23—29.

1891. *Chalinula ovulum* Grentzenberg, Spongienfauna der Ostsee, Inaug. Dissert., Kiel 1891, 27, Fig. 13, 14.

1891. *Esperella lanugo* Grentzenberg, ibid. 34, Fig. 22—26.

1893. *Esperella ovulum* Levinsen, Det vidensk. Udbytte af Kanonbaaden Hauch's Togter, 423, 20, Tab. I, Fig. 40—41.

1903. *Esperella lanugo* Arnesen, Bergens Mus. Aarb. 1903, Nr. 1, 10, Taf. I, Fig. 6.

1903. *Mycale lanugo* Thiele, Arch. für Naturgesch. 1903, 381, Taf. XXI, Fig. 11.

Egg-shaped, or the larger specimens lengthened or quite irregular. The dermal membrane thin pierced by the projecting spicula-bundles, and the surface therefore finely shaggy. In the regular, egg-shaped specimens one single osculum, in the irregular ones several scattered oscula. The skeleton a rather regular network of polyspicular, primary fibres and singly placed transverse spicules. Spicula: Megasclera rather short, curved styli 0·166—0·31mm; microsclera of one form, anisochelæ palmatæ 0·020—0·045mm, characteristic by their smaller end being comparatively large.

This species grows almost always on Algæ, on Hydroids, or on erect Bryozoa. The specimens in hand are thus growing on *Ptilota pectinata* and on *Odonthalia dentata;* of Hydroids it is found on *Diphasia abietina, Hydrallmania falcata, Grammaria abietina, Sertularella* sp., and *Halecium* sp., and of Bryozoa on *Micropora borealis.* The smaller specimens are formed as regular round or egg-shaped, oftenest flat cushions, and grow most frequently more or less unilaterally on the Alga or the Hydroid; when a little larger they generally grow round it, but often keep a rather regular, somewhat flattened egg-shaped form. In this condition, in which the sponge has a rather characteristic appearance, its longitudinal extent is from 4 to 12—15mm. When it grows larger it loses the regular form; thus it frequently increases in length, and becomes longish incrustations on the branches of the Algæ and Hydroids; it may also grow more roundly and become large lumps spreading over several branches. This form, I suppose, is most frequently formed by a coalescing of more individuals; such a coalescing, at all events, is frequently seen and gives rise to irregular forms. The largest specimen in hand of this form is of a greatest extent of 55mm. The colour (in spirit) is lightly or more darkly yellow. The consistency is swampy and slightly elastic. The *surface* is very finely shaggy from projecting bundles of spicules. The *dermal membrane* is thin, has no skeleton of its own, but is supported by the projecting bundles of spicules. The *pores* are found in the membrane, often close-set and in large numbers; most frequently their form is oval, and they have been measured to sizes from 0·012—0·15mm. *Oscula.* In specimens of the regular, egg-shaped form only one osculum is found situated on one side; it is circular and of a diameter of 1—1·5mm, its edge is most frequently slightly projecting. In the larger, irregular specimens several oscula are found; sometimes each of them is placed on a slight projection, and this, perhaps, is a mark of the original individuals that are coalesced into one specimen.

The *skeleton* is of a quite regular structure consisting of polyspicular fibres. From the innost part of the sponge, that is to say from the part attached to the incrusted foreign body, which body, in the sponges that are growing round it, runs through the middle of the sponge, fibres pass towards the surface.

Nearest to the foreign body the skeleton is least regular, but a little farther out regular fibres occur running parallel to each other, continuing to the surface, and piercing the dermal membrane. These fibres are polyspicular with rather many spicules alongside, most frequently six to eight; with regard to this fact, however, some difference may occur in different individuals, so that the fibres may contain both fewer and more spicules. The distance between the fibres is about $0{\cdot}12^{mm}$, and the average thickness of the fibres may be given as $0{\cdot}035^{mm}$. Coherent transverse fibres are not formed, but between the primary fibres transverse spicules are found, most frequently singly, and without any regularity. Sometimes a tendency towards a more regular net of meshes may appear towards the surface. In many of the individuals the primary fibres do not pass straight towards the surface, but show a tendency to turn upward towards the upturned end of the sponge, so that the fibres in the egg-shaped roundgrowing specimens may radiate to all sides, but at the same time turn upward, so that it may be seen, especially in a longitudinal section, which end of the sponge has been turned up, and which has been turned downwards. Spongin is found in the fibres, but only to a small amount, and it is exceedingly white and clear.

Spicula: a. *Megasclera* are styli; they are more or less, often rather much, curved, and the curve is almost always nearest to the upper end. The other end passes evenly into a point of middle length, the outer end of which is most frequently somewhat shorter pointed. The needles are thickest about the middle, also tapering somewhat towards the rounded end, and being thus a little fusiform. The length is between $0{\cdot}166^{mm}$ and $0{\cdot}31^{mm}$, but in many individuals the needles do not vary so much; thus individuals are found in which they reach no greater length than $0{\cdot}23^{mm}$. Also the thickness is somewhat varying, from $0{\cdot}006$—$0{\cdot}11^{mm}$, and also in this respect some difference is found in different individuals. The thickest spicules are not always the longest ones. Besides the fully developed forms developmental forms of every degree of thickness occur, and in some individuals these forms are found in large numbers scattered in the tissue outside of the skeleton formed by the fibres; they were found down to an exceeding fineness, less than $0{\cdot}001^{mm}$, and developmental forms of this thickness were measured to a length of $0{\cdot}15^{mm}$. The developmental forms, in contradistinction to the fully developed ones, are long pointed. The individuals copiously provided with developmental forms of the styli seemed upon the whole to be in a state of lively formation of spicules, developmental forms of the chelæ being also seen abundantly. b. *Microsclera* are only of one kind, anisochelæ palmatæ. They are characteristic by the smaller end being comparatively large, larger than is common in the *Mycale*-anisochelæ. Their shaft is straight, and they are otherwise of the common type; the alæ of both ends are highly folded round on the side; the tooth of the larger end is narrower than the alæ and rounded at the end; the tooth of the smaller end is of the same breadth as the alæ, and it is somewhat pointed, which seems to be owing to the fact that the axis continues quite to the point of the tooth; the alæ of this end pass to the shaft in such a way as to make their upper or free edge parallel to the upper edge of the tooth. In each end an oblong tuberculum is found. The chelæ vary not a little in size and also in form; thus they may be more broad or more narrow, and the comparative sizes of the ends may be somewhat different; in a few cases there is almost no difference between the two ends, so that the chelæ approaches an isochela in form; generally, however, they are not to be confounded with isochelæ, as it is most frequently only the teeth that are of equal or about equal size, while the alæ of one end continue to be smaller than those of the other, as shown in fig. 1 d, Pl. X. The smaller the chela, the smaller is the free middle part of the shaft in proportion to the ends, which are, accordingly, comparatively longer than in the larger chelæ. The length of the chelæ varies between 0·020—0·045^{mm}, the breadth between 0·007—0·015^{mm}, and the thickness of the shaft between 0·001—0·002^{mm}. In several of the individuals developmental forms are found abundantly, corresponding to all sizes of the chelæ; the youngest forms are so fine as to be observed only with difficulty, of a thickness of ca. 0·0005^{mm}. These fine forms consist only of the axis, which is already of full length. From these youngest forms and to the fully developed chela all transitional forms are found. Of the chelæ the small ones are present in by far the largest number, while the large ones are more scarce, and do not appear to be found in all individuals, some being found, in which the greatest observed length of the chela is ca. 0·028^{mm}. The chelæ are found throughout the sponge; the largest may occur in rosettes, but this fact has only been observed in very few cases; also Merejkowsky mentions rosettes.

Remarks: When Schmidt, in 1870, established this species he referred it to the genus *Chalinula*, overlooking the chelæ, and in 1875 he made the same mistake. Also Grentzenberg l. c. must have failed to see the chelæ, there being no reason to doubt that it has really been the present species he has had before him. Levinsen was the first who, in 1893, when examining the type specimen of Schmidt, which is found in our museum, discovered the chelæ, and referred the species to the proper genus. In 1875 Schmidt l. c. established a species *Mycale (Esperia) lanugo:* the description, as is generally the case, is exceedingly brief, and no figures are given. It is, however, said of the chelæ that they are distinguished by the smaller end being larger than is else the case in *Esperella*, and that in a few chelæ both ends are equal, and just this fact is a very characteristic mark of *M. ovulum*. The terms used of the exterior, correspond also very well, it being said that it is roundish »von weicher, flockiger Beschaffenheit», which latter character Schmidt has even expressed in the name. Now it is a fact that specimens of *ovulum* sometimes, especially when of a whitish colour, may have a peculiar, woolly appearance, about like a little lump of wadding. In 1891 Grentzenberg l. c. enumerates *E. lanugo*, and gives figures of it, and to judge both from the habitus figure and the rather bad figure of the chela, as well as from the whole description, there can be no doubt that the species is identical with *ovulum*[1]). This, again, corroborates the referring of Schmidt's *lanugo* to *ovulum;* for, as far as can be seen, Grentzenberg has of this species only had the material of Schmidt. Thus we find the peculiarity that as well Schmidt as Grentzenberg has, both of them and each in a work of his own, enumerated one species as two different ones, partly as *Chalinula ovulum*, partly as *Esperella lanugo;* this peculiarity, however, may so far be understood, as the reason is that in one case the chelæ have been overlooked.

Under *E. lanugo* Grentzenberg mentions that besides the common skeleton it possesses »ein aus Fasern gebildetes Gerüst, dass Schmidt nicht erwähnt». He describes further that in a transverse section is seen about in the middle of the sponge a circular fibre, inside of which run four or five radiate ones coalescing in the middle. He figures this structure in fig. 24. The author thinks these fibres to be spongin fibres, and he mentions some cells which are said to form those fibres in a

[1]) I have later had the opportunity of examining a type specimen of *M. lanugo*, which proved the species to be identical with *ovulum*.

peculiar way. Now it is not said whether spicules are found in these fibres, but they are figured without such. A spongin skeleton of a so peculiar kind, not seen to be in any way connected with the other skeleton, would be quite unique. By a look at fig. 24 it is obvious that the question cannot be of spongin fibres; through the middle of each of the radiate fibres runs a line which is said to mark the coalescing, but in reality shows that the figured things are evidently vegetable cells. As before mentioned the sponge frequently grows round Algæ, which is also the case with the figure of the exterior given by Grentzenberg, and then the Alga runs about through the middle of the sponge; the author also says that the peculiar circular fibre is found nearly in the middle of the sponge. To be sure there can be no doubt that by the cutting out of the transverse section of the sponge the incrusted Alga — it looks like a *Polysiphonia* — has been cut through, and it is this transverse section which has been interpreted as the peculiar circular fibre with the radiate fibres inside.

The *Esperia stolonifera* established by Merejkowsky l. c. is by Levinsen referred to *ovulum* as a synonym, and to judge from the description and figures they are surely identical. I have, however, in no case observed the net of thin off-shoots mentioned by Merejkowsky for some of his specimens.

Locality: Of this species we have a great number of specimens, all from Greenland, Iceland, and the Faröe Islands. Greenland, without any designation of locality (Schmidt's type specimen); Egedesminde (M. Porsild); the Ingolf, off Bredebugt, on station 87, depth 110 fathoms; Rostin in Bredebugt (H. Jónsson); Önundarfjord, depth 10 fathoms (the author); to the east of Bakkefjord, depth ca. 70 fathoms (Hallas); Skulavig in Seydisfjord, depths 6 fathoms and 30 fathoms; Berufjord, depth 10 fathoms (A. C. Johansen); the Faröe Islands (Müller); at the north point of Nolso, depth ca. 100 fathoms, 6 miles N. to W. of Kalsö, depth 60 fathoms, Sandsbugt (Th. Mortensen).

Geogr. distr. Besides on the above localities the species has been taken in the Cattegat between Samso and Sealand (Levinsen l. c.); in Great Belt, depth 24 fathoms, and in the Baltic at Kiel, depth 3—6 fathoms, Darserort, depth $15^1/_2$ fathoms, Stoller bank, depth 3—5 fathoms (Schmidt, 1873), further at Bergen and Espevær (Arnesen), finally in the White Sea (Merejkowsky).

Note. Three of the *Mycale*-species mentioned in the literature, are with rather great probability to be referred to the present species; I do not, however, venture to decide this question with certainty, or to make any change of names on that account. The first of these species is *M. (Isodictya) lobata* Bow. (Mon. Brit. Spong. II, 326, III, 148, Pl. LVIII, figs. 19—22); Bowerbank, to be sure, mentions »bihamates«, which are not figured; but these needles might very well be developmental forms of the chelæ, and such a fact might also be implied by the observation that they are »exter-umbonates«. The second species is *M. (Isodictya) Clarkei* Bow. (l. c. II, 330, III, 142, Pl. LVI, figs. 11—15); the figure of the exterior of this species, which grows on Hydroids, is quite similar to longish specimens of *M. ovulum.* Topsent, in his list (Rev. biol. du Nord de la Fr. VII, 15 and 20) has taken this species to be an *Esperiopsis*, and has referred it as a synonym to *E. fucorum* Johnst. Bowerbank, however, calls the chela »inequi-anchorate«, and the figure also shows an anisochela, but, to be sure, an anisochela in which there is only little difference between the two ends, such as occur in *M. ovulum.* The third species is the *E. modesta* established by Lambe (Transact. of Roy. Soc. of Canada XII, 1894, Sect. 4, 118, Pl. III, figs. 1, 1 a—d; ibid. Ser. 2, II, 1896, Sect. 4, 188, figs. 7, 7 a—d)[1]); Lambe mentions two kinds of styli, rather thick ones with short point, and thinner ones with long evenly tapering point, but the latter I take to be developmental forms, these having always a longer point than the fully developed ones.

4. M. thaumatochela n. sp.

Pl. X, Fig. 2 a—g.

1897. *Esperella intermedia* Vanhöffen (non Schmidt), Grönland Exp. der Gesellsch. für Erdkunde zu Berlin, II, 1, 248.

Incrusting. The surface shaggy from projecting bundles of spicules; the dermal membrane thin. The skeleton a tolerably regular network of polyspicular fibres. Spicula: Megasclera styli 0·35—0·48mm; microsclera of two forms, anisochelæ palmatæ 0·047—0·06mm, anisochelæ of a very peculiar structure 0·012—0·017mm.

Of this sponge we have only one small specimen growing on a fragment of a shell of *Pecten islandicus*, and a small, inconsiderable, loose fragment. As to the exterior the sponge is very insignificant, and all the interest attaches to the spiculation. The specimen is formed as a very thin incrustation, and its greatest extent is 15mm; but it looks, however, as if the whole specimen is not found on the fragment of the shell. The thickness is at most 1mm. The colour (in spirit) is light grayish-brown The *surface* is shaggy from projecting bundles of spicules. There is a thin *dermal membrane*, without spicules as far as I am able to see. In the dermal membrane circular openings are found, of a diameter of 0·047—0·35mm of which I take the greater ones to be *oscula*, and the smaller ones *pores*.

The *skeleton* consists of polyspicular fibres; as far as I have been able to examine the material, it is formed of fibres running from the base to the surface and projecting through the dermal membrane, and of other fibres perpendicular upon the former ones; it seems to be rather regular. In the nodes a slight amount of spongin is seen.

Spicula: a. *Megasclera* are styli, evenly and most frequently slightly, sometimes a little irregularly curved. They have an even point of middle length, which is often somewhat shorter pointed at the outer end. The size of the styli is rather constant, the length is between 0·35 and 0·48mm, and the thickness is 0·007—0·0115mm. b. *Microsclera*. These are of two kinds, anisochelæ palmatæ, and some small, peculiarly shaped bodies which may also be characterized as anisochelæ. 1. The palmate anisochelæ are of a fine regular form and chiefly of the common type. The alæ of the larger end, which are much refolded on the side, diverge downward with their lateral edges, and then they curve somewhat upward with a round bend going in to the shaft; the tooth is somewhat narrower than the alæ, elliptical, but broadest below and rounded, sometimes with a small pointing. The tooth and alæ of the lower end are of about equal breadth; in the middle of the distal edge of the tooth is generally found a pointing owing to the axis continuing quite to the end, and on either side of the pointing is found a little notch, so that the tooth is tridentate. In each end there is a longish tuberculum. The size of these chelæ is rather constant; the length varies from 0·047—0·06mm being most frequently about

[1]) Lambe, in both places, writes sp. nov., and has no reference in the latter place; but as the descriptions are almost equal, I suppose it to be his opinion that the species is the same. Otherwise Schmidt has already in 1862 (Spong. adriat. Meer) established an *E. modesta*, so that the name of Lambe's species, at all events, must be changed.

0·057^{mm}, the greatest breadth is 0·020—0·022^{mm}, and the thickness of the shaft is 0·002^{mm}. These chelæ are frequently found in rosettes. Quite single chelæ of smaller size are found, down to 0·03^{mm}. 2. The other silicious body found in the sponge is of a peculiar shape, and on account of its smallness and intricate structure it is difficult to get a clear view of it. Its form may be reduced to the anisochelate type. Below it consists apparently of a jar- or slipper-like part and above of four alæ issuing from the upper end, which alæ on four sides extend down over the slipper-like part. The lower part looks somewhat differently, according as the body is seen from one or the other side, and by a preliminary examination only two of the four alæ are seen, one on either side. By a more thorough examination under sufficiently high magnifying powers it is seen that, when the chela is in a certain position, an axis runs along one side, below turning upward to about the middle of the chela; when the chela is placed in such a way as to turn the axis behind, i. e. away from the beholder, the form of the lower part is all but slipper-like; the exact form of this part is only to be seen with difficulty, but it appears to consist, as usual, of lateral alæ issuing from the axis, and of a broad tooth before. Both the alæ and the tooth are on the sides folded towards each other, the interstice between them I have not been able to see with certainty, but it is about as shown on Pl. X, fig. 2 c. On either side the axis of the chela is in its upper part provided with rather narrow alæ separating from the axis about in the middle, and continuing downwards as a single pointed elliptical tooth. Further a free, pointed elliptical ala is found on either side with the flat sides turned laterally, and in the front is found a tooth of the same form. These structures are placed at equal distances from each other, and form the four apparently uniform alæ, which pass from above downwards to about three fourths of the length of the chela. The two lateral alæ together with the alæ of the dorsal side may be regarded as corresponding to the alæ of the axis of a common chela. That the lateral alæ are not teeth may be seen from the fact that above they are provided with an unsymmetrical, translucent part, while in the tooth there is a symmetrical tuberculum; they are likewise above and behind connected with the ala of the dorsal side. The alæ as well as the tooth are best seen when turned to the side so as to be seen from the edge, whereas, when turned towards the beholder, they are only to be seen with much difficulty, on account of their fineness and transparency. A good view of the mutual position of the parts may be got, when the chela is seen from the end in such a way, that the lower end is turned directly towards the beholder, who will then see an optical transverse section as fig. 2 f, Pl. X, where the tooth, the two lateral alæ, and the axis are seen at right angles to each other, and in the middle the lower part in connection with the axis and its alæ. These chelæ are very small, their length varying from 0·012—0·017^{mm}, and the breadth being 0·007—0·008^{mm}. Both the large palmate chelæ and the small peculiar ones occur abundantly.

This species so peculiar and characteristic by its spiculation has by Vanhöffen l. c. been determined as *E. intermedia* O. S. As I have had preparations of the specimens of Vanhöffen, I have been able to decide with certainty thas it is the present species he speaks of. Vanhöffen has, strange to tell, made a mistake with regard to the megascleres, and calls them »beiderseits zugespitzte«, whereas the are distinct styli. Schmidt says of his *Esperia intermedia* that it has »unspitzige Nadeln«, which I take to be a misprint for »umspitzige«, and further his species is provided with two different sorts of chelæ, so that an identification with this species, is, for many reasons, excluded. Vanhöffen has further overlooked the peculiar small chelæ[1].

Locality: The whole specimen has been taken by the Ingolf-Expedition at Holstensborg at a depth of 30 fathoms, and the loose fragment has been taken off Cape Dalton, East-Greenland, depth 9—11 fathoms (the Amdrup-Expedition 1900).

Geogr. distr. Vanhöffen has the species from West-Greenland, Karajak-Fjord, and mentions that it occurs as incrustations on worm tubes and Bryozoa.

5. **M. titubans** O. Schmidt.

Pl. X, Fig. 3a.—h.

1870. *Desmacidon titubans* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet 55, Taf. V, Fig. 18 a—c.

1882. *Desmacidon titubans* Carter, Ann. Mag. Nat. Hist. Ser. 5, IX, 298, Pl. XII, fig. 24 a—h.

Form? The skeleton an irregular network consisting for the greater part of polyspicular fibres. Spongin wanting. Spicula: Megasclera styli of two forms, larger ones 0·59—0·9mm, smaller ones 0·32—0·40mm; microsclera of two forms, anisochelæ of a peculiar, wry form 0·024—0·052mm, sigmata 0·05—0·14mm.

Of this species, so peculiar and characteristic by the form of its chelæ, we have only very little material, so that I can only to a slight degree supplement the description given by Schmidt l. c. as to the exterior and skeletal structure. With regard to the outer form Schmidt only says, »unförmlicher, unregelmässiger Körper«. The fragments in hand are also of a quite irregular form; the largest one is irregularly bifurcate and somewhat flattened; its extent in length is 25mm, but it is probably only a quite ruined fragment. The colour (in spirit) is yellow to olive. I can say nothing of its surface, pores, or oscula.

The *skeleton* appears as a rather irregular network of mostly polyspicular fibres, and longitudinal fibres seem especially to be found, while the other network is quite irregular. Upon the whole the fibres are not strongly marked, and no spongin has been observed. Schmidt says that the small form of styli are found as irregular bundles placed obliquely to the fibres; as far as I have been able to see, however, the fact is not so. The small styli seem to me to occur near the surface and the dermal membrane, and perhaps partly to be lying horizontally in the skin, partly to project as penicillate bundles.

Spicula: a. *Megasclera:* these are styli occurring in two different forms, also of different size. The large styli are evenly curved, the curve being almost always found nearest to the head-end and more or less pronounced; the other end tapers to a middle-long, sometimes rather long point. Their length is 0·59—0·9mm, and the thickness is between 0·015mm and 0·019mm. Finer developmental forms are found, but in rather small numbers. The styli of the other form are smaller; they are straight or almost straight, only rarely slightly curved. The head-end is quite slightly swollen, most frequently,

[1] On the preparations of Vanhöffen determined as *E. intermedia*, which he has lent to me, a query is found by the name, and on one of them is added, »ist nicht *intermedia*«, so that Vanhöffen seems himself to have noticed the erroneous determination.

however, to a quite imperceptible degree. The tapering may be somewhat varying, but the point itself is always rather short. The length is 0·32—0·40^{mm}, and the thickness in the middle is 0·005—0·008^{mm}. As has been mentioned, these styli, as far as I have been able to decide, occur near the skin. b. *Microsclera* are of two forms, chelæ and sigmata. 1. The chelæ are of a quite peculiar structure, but must be characterized as anisochelæ palmatæ. They are of a wry form; the shaft is somewhat curved, and besides being bent from behind to before it is also bent a little to the side. The tooth of one end is larger than that of the other, and otherwise the teeth are differently constructed. To facilitate the understanding of the description I call the end with the smaller tooth the upper end. When the chela is placed on the back with the upper end turned upward, and the upper tooth directly towards the beholder, and in such a way, that the upper part of the axis is turned directly upward, then the lower part of the axis is bent a little to the left. The frontside of the upper tooth is then turned directly upward; it reaches to a little more than half the length of the chela, is of a somewhat wry form, and has only a plate-shaped extension to the right; at the upper end a small, triangular tuberculum is found, and there is a small falx. On the upper part of the shaft an ala is only found on the right side; this ala is of a similar form and size as the tooth. When the chela is seen in the mentioned position, tooth and alæ are accordingly about opposite to each other. In this position the tooth of the lower end is seen on the left side of the chela, and is seen from the edge, as the front of it is turned out towards the side; it reaches to about the middle of the upper tooth, being therefore most frequently somewhat larger than the latter. If now the chela is turned a fourth part of a turning to the right, so that the upper tooth is seen from the side, the lower tooth will be seen as a warped plate somewhat expanded towards the end, reaching up and bending in towards the shaft; at the base there is a roundish tuberculum. On the left side of the lower part of the shaft an ala is found reaching somewhat farther than the lower end of the ala of the right side, but it is rather narrow and bent forward, and is thus rather inconspicuous. Also on the right side of the lower part a small and short ala is found. When the chela is in the position first mentioned, it is seen, that it is especially the lower part of the shaft which is twisted in such a way, that the lower tooth is turned round on the side. In a few of the fragments in hand the chelæ are a little larger than in the others, and in these chelæ the plate-shaped end of the lower tooth is often marked off by an incision, and this part is finely dentate in the edge. As mentioned the chelæ vary somewhat in size, and seem especially to be varying in different individuals. The length is between 0·024^{mm} and 0·052^{mm}, when the chelæ are regarded collectively, but the variation is not so great in the single individual. In one specimen the length was 0·024—0·035^{mm}, in another 0·034—0·052^{mm}.

Schmidt has not quite understood the structure of these chelæ; especially his figures a and b are quite misleading; figure c, however, showing the chela from the front, is somewhat better. Carter l. c., on the other hand, has quite misunderstood them, and it might be doubted whether he has had the same species before him, if he did not mention that he has had a preparation of the type specimen of Schmidt. Carter figures and mentions the chela as an isochela, and he figures uniform alæ on both sides of the shaft and uniform teeth, the only deviation from the normal form thus being that the chela is somewhat twisted. This, as will have been seen, is a quite wrong representation, and when Carter thinks that this chela with regard to its structure recalls the diancistra in *Hamacantha*, and consequently will have these referred to the chelæ, his theory is of no importance. Carter mentions and figures rosettes; I have also seen such, but they were less distinct than elsewhere in *Mycale*-species. In the rosette the chelæ have the end with the larger tooth turned towards the middle of the rosette.

2. Sigmata. They are of a regular sigma-form; the ends are with a round curve bent round to about a right angle. They are plane or slightly contort; especially the smaller forms are contort, while the larger ones are most frequently quite plane. They are very much varying as to size, and may be rather large. The length varies from 0·05—0·14^{mm}, and the thickness proportionally from 0·0018—0·0057^{mm}. The measures given by Schmidt, are, no doubt, due to an error. As well chelæ as sigmata occur everywhere in very large numbers.

In spite of the peculiar chelæ of this species, I have placed it under the genus *Mycale*, because the chelæ must be referred to the type anisochelæ palmatæ, and its skeletal structure being hitherto only imperfectly known, I have thought it most convenient to keep it in this genus.

Locality: Station 78, 60° 37' Lat. N., 27° 52' Long. W., depth 799 fathoms; station 97, 65° 28' Lat. N., 27° 39' Long. W., depth 450 fathoms. The former station is on the eastern slope of the Reykjanæs-ridge, the latter in the Denmark Strait. Altogether we have only four fragments.

Geogr. distr. Florida, depths 174—324 fathoms (Schmidt).

6. **M. intermedia** O. Schmidt.

1874. *Esperia intermedia* O. Schmidt, Die zweite deutsche Nordpolarfahrt, II, 2, 433, Taf. I, Fig. 40.
1903. *Mycale intermedia* Thiele, Arch. für Naturgesch. 1903, 381, Taf. 21, Fig. 12.

This species I have not had before me. It would not be possible to recognize it by Schmidt's description, but Thiele has l. c. given a new description of it. Of *spicules* it has the following forms: a. *Megasclera* oxea, ca. 0·45^{mm} long and 0·010—0·012^{mm} thick; b. *Microsclera* large anisochelæ palmatæ in rosettes, 0·05—0·06^{mm} long, with the smaller end rather large; small anisochelæ palmatæ ca. 0·018^{mm}; the latter do not form rosettes.

This species deviates from all other *Mycale*-species by its diactinal megascleres; Thiele therefore says that there may possibly be some reason for separating it from the genus *Mycale*, but this he will not do, however, as long as only this one species is known, and in this I follow him.

Locality: Northern East-Greenland.

Asbestopluma Norman.

Erect, stalked forms: the upper part penniform, or with side-branches issuing from all sides of an axis or collected at its upper end, or the sponge formed like a long-stalked cup. The skeleton is exactly corresponding to the form, and consists of a spicula-axis often divided into parallel fibres: in this axis is inserted fibres running one through each side-branch. Sometimes a coat with particular, densely interwoven spicules on the stalk. In the skeleton of the axis spongin is found. Spicula: Megasclera monactinal, styli or subtylostyli, and, where a coat is found on the stalk, in this coat minutely spined tylostyli or tylostrongyla; microsclera: the characteristic microsclera are small anisochelæ palmatæ of a peculiar form, with a strongly marked contrast between the two ends; to these may be added larger anisochelæ palmatæ and sigmata, or only sigmata or forcipes.

The generic name *Asbestopluma* was used for the first time in 1882 by Ray Lankester, who, in a paragraph »Dredging in the Norwegian Fjords« (Nature XXVI, 478) under the sponges mentions »*Asbestopluma* (a new genus of Norman)«. As, however, it was nowhere described, nothing was known of it. In 1901 Topsent, however (Résultats du Voy. du S. Y. Belgica, Spongiaires, 23) has rendered an account of the genus and given a description of it on the basis of a preparation from Norman, and then it turned out that Norman had established the genus *Asbestopluma* on the species *Cladorhiza pennatula* of O. Schmidt[1]. Now Topsent thinks, and, no doubt, justly, that sufficient characters are found to justify the keeping of the genus, which will comprise the symmetrical, *Cladorhiza*-like forms which are not, as *Cladorhiza*, provided with ancoræ, but with palmate anisochelæ. Topsent, however, wants the genus to be interpreted as a sub-genus of *Cladorhiza*, only separated from it by the mentioned character. I, on the other hand, regard the genus, exactly on account of its chelæ, as most closely allied to *Mycale*, and therefore I place it just after *Mycale* as an independent genus. It will comprise all the symmetrical forms, hitherto referred to *Esperella*, with small anisochelæ of the characteristic type more thoroughly mentioned under the different species, either alone or together with other forms of microsclera.

Thus the genus is well characterized both with regard to its outer form, its skeletal structure, and its spiculation; but at the same time it, especially with regard to its outer form and spiculation, divides into three groups that seem to me so strongly marked, that I think it most correct to establish three subgenera for these groups.

Asbestopluma Norman s. str.

Penniform, lateral branches issuing biserially from an axis, or with lateral branches all round, often, however, showing a distinct bilaterality. The skeleton a spicula-axis divided into parallel fibres or fibre-like parts, in which axis the fibres supporting the lateral branches are inserted. The stalk is coated with a layer containing particular spicules. Spicula: Megasclera styli and subtylostyli, the former in the axial fibres, the latter in the lateral branches, and further irregularly sinuous, minutely spined tylostyli or tylostrongyla in the coating of the stalk; microsclera: the characteristic anisochelæ palmatæ are small, the alæ of the larger end pass far down towards the opposite end, which is narrow; further always sigmata and often large anisochelæ palmatæ.

1. **A. pennatula** O. Schmidt.

Pl. II, Figs. 1—6. Pl. X, Figs. 4a—o, 5—7.

1875. *Cladorhiza pennatula* O. Schmidt, Jahresber. der Commiss. zur wissensch. Unters. deutsch. Meere in Kiel für 1872—73, 1875, 119, Taf. 1, Fig. 14—16.

1882. *Cladorhiza bihamatifera* Vosmaer, Niederl. Arch. für Zoologie, Suppl. Band I, 47, Pl. I, figs. 105—112.

1885. *Esperia bihamatifera* Armauer Hansen, The Norwegian North-Atlantic-Exp. XIII, Spongiadæ, partim, 15, Pl. III, fig. 7, Pl. IV, fig. 2, Pl. VII, figs. 5 and 14.

[1] Topsent l. c. tells that the preparation of Norman had the inscription »*Asbestopluma pennatula* Schultze«, but he thinks, and, no doubt, justly, that this is a slip of the pen for *pennatula* Schmidt.

1887. *Cladorhiza Nordenskiöldii* Fristedt, Vega-Exp. vetensk. Iaktt. IV, 455, Pl. 25, figs. 56—59, Pl. 31, fig. 25.

1896. *Cladorhiza Nordenskiöldii* Lambe, Proceed. of the Roy. Soc. of Canada, Ser. 2, II, Sect. IV, 189, Pl. I, figs. 9, 9 a—f.

1901. *Asbestopluma pennatula* Topsent, Résultats du Voyage du S. Y. Belgica, Spongiaires, 24 et 28, Pl. III, fig. 9 a—d.

1903. *Cladorhiza pennatula* Thiele, Archiv für Naturgesch. 1903, 385.

1903. *Esperella plumosa* Arnesen, Bergens Museums Aarb. 1903, No. 1, 11, Taf. II, Fig. 1, Taf. IV, Fig. 3, Taf. VI, Fig. 7.

Slender, penniform: the axis a little compressed and the more or less long lateral branches inserted in the narrow sides. The axial skeleton with a rather powerful, close-spiculed exterior layer. Spicula: Megasclera styli in the axis 0·68—1^{mm}, subtylostyli in the branches and in the outer layer of the axis 0·52—0·75^{mm}, irregularly sinuous, minutely spinulous tylostrongyla in the coating of the stalk 0·05—0·137^{mm}; microsclera of three forms, anisochelæ palmatæ of two forms, the characteristic ones 0·010—0·0114^{mm}, the large ones with the lower end polylobate 0·048—0·063^{mm}, sigmata 0·021—0·024^{mm}.

By the description of Schmidt cited above this species would not be recognizable; the recognition has only been possible by the description and figures of Topsent l. c. The species is erect and more or less penniform. It consists of an axis carrying for some way above a row of rather short lateral branches on either side. At the base the axis is somewhat thickened. All the specimens in hand are broken off below, but judging from the best preserved specimens and from stalk-fragments that must be of the lower part of the stalk, the stalk is here provided with more or less numerous, rather short lateral processes placed irregularly so as to form a kind of root. This part is presumably imbedded in the mud, and the consequence is that the sponge is generally broken by the trawling, so that the root-part does not come up. Above the lower part the axis is regularly cylindrical and continues so till the spot where the branches begin. Here it becomes somewhat compressed, in such a way that the lateral branches issue from the two narrow sides. There may be some difference in the length of the part carrying the lateral branches as compared with the total length. The greatest length of the lateral branches is up to 5^{mm}, in one case up to 7^{mm}, but they may decrease in length and be so short as to be almost imperceptible. With regard to this fact the case may be somewhat different: either all the lateral branches may be long, or all short; or as well long as short ones may be found, and then they are generally placed in such a manner, that the short ones are found below, the long ones above. One's first impression is that the lateral branches, when short, are damaged or more or less broken off. The case is, however, that the branches, when long, are quite thin and tapering outward, the thickness is about 0·1—0·2^{mm}. The distance between them, which is, however, far from being equal, may be put down to about 1^{mm}. Now the more the branches are shortened, the thicker they become, and the smaller becomes the distance between them. When shortest they form a series of quite slight, more or less confluent projections along either side, so that the the sides appear slightly indented or sinuous. These quite short lateral branches show no trace of damage or fracture, and the spicules projecting from them are entire. Accordingly the feature cannot be owing to damage.

Neither do I think, however, that the question is of a constant difference as to form; on the contrary the fact of the long lateral branches being always thin and with few spicules, while the short ones are thicker and with more spicules, leads to the supposition that the feature is due to contraction, and I think that it must be explained in this way. An examination of a series of different individuals tends absolutely in this direction, and thereby we get a natural explanation of the always constant relation between the length and thickness of the branches. When the branches are long and thin they are slightly curved upward. As before mentioned they are placed along each of the narrow sides of the axis, but they are not arranged in any certain manner, and the distance between them may be somewhat different. Two branches are often found beside each other on the same side, but then they are generally very close to each other, sometimes more or less coalesced; in other instances, however, the distance between them is somewhat greater. Sometimes the branches are, even pretty distinctly, placed in two rows on either side, and this structure is perhaps, strictly spoken, the most common one; but when the rows are very close to each other and the single branches are not placed directly opposite to each other, the feature is only seen indistinctly. When the branches are short, those that are thus close to each other seem to coalesce to one branch, so that we get only one thick spicula-bundle. At the upper end the branches become short and are turned upward, and they continue in a fan-shaped manner round this end. In the lower part of the sponge, towards or quite up to the spot where the lateral branches begin, the stalk is surrounded by a more or less thick layer densely packed with particular spicules, which layer will be more thoroughly mentioned under the skeleton. This feature contributes to some degree to the thickening of the lower part. The stalk is generally straight, but sometimes it, or especially its lower part, may be irregularly bent and cracked. The largest specimen is of a length of ca. 180^{mm}, but it is broken below; the part of it carrying lateral branches is of a length of a little more than 100^{mm}. The specimen is very slender, the stalk in its broadest part is only of a thickness of $1-1{\cdot}5^{mm}$, at the very base 2^{mm}. Some fragments of another specimen, which I suppose to have been upon the whole a larger one, are more robust, the stalk in its broadest part being 4^{mm}. All the specimens, as mentioned, are broken below, but to judge from stalk-fragments in hand, the sponge may grow to a considerable length. Thus we have stalk-fragments of a length of 110^{mm}, broken in both ends and carrying neither lateral branches nor root-like off-shoots. The thickest stalk-fragments are of a diameter of $5-6^{mm}$. The smallest specimen, which is likewise broken below, is of a length of 20^{mm}, and the stalk is $0{\cdot}3^{mm}$ thick. The colour (in spirit) is white or yellowish white. The consistency is firm on account of the skeleton, but the sponge is fragile. The *surface* of the stalk and the branches is smooth without any projecting spicules; in the lower part of the stalk where the mentioned coating grows thicker, wrinkles and folds may be seen. While the stalk is smooth, also in the places coated with the mentioned layer, the root-part and especially the root-branches are shaggy, owing to the projecting of the needles of the coating layer. No bounded *dermal membrane* is to be observed. Outermost in the axis a dense layer of spicules is found belonging immediately to the skeleton of the axis. On the outside of the spicula-fibre of the lateral branches a thin layer of tissue is found closely filled with microscleres, and the same layer may also be found in the axis between the bases of the branches, as it may also be traced here and there in other places of the axis, but it is not bounded outward as a membrane. Neither *oscula* nor *pores* have been observed. From the arrangement of the skeleton it was to be expected that the pores might be found on the narrow sides of the axis between the branches, but here none were discovered. The possibility is perhaps not to be excluded that the lateral branches may act as oscula, in which case it would have to be supposed that in their most extended state they are hollow and connected with the canals of the stalk mentioned below under the skeleton; such a thing, however, has not been observed[1]).

The *skeleton* consists in the axis of parallel needles, closely connected with each other, and with the points turned toward the upper end of the sponge; accordingly the axis is firm and hard. It is, however, not massive, but pierced, throughout its length, by a number of canals separated by close-spiculed parts, and the whole structure is outmost surrounded by a close-spiculed layer. All the spicules are parallel to the longitudinal axis of the stalk. It is no easy thing to get a clear view of the number and arrangement of the canals, as whole transverse sections of the hard stalk are only to be obtained with great difficulty. There are always two rather large canals, one along the middle of either broad side of the axis; then the rule seems to be that on each side of these canals two small ones are found occupying, accordingly, the corner parts of the stalk; thus we have altogether ten canals, but sometimes there seem to be still more. Down in the stalk the structure is about the same, and the two chief canals may generally be recognized, but most frequently there seem here to be fewer canals and less regularity. In the thickened parts at the base of the stalk many more canals and more irregular ones are seen. To judge from observations on the few root-fragments in hand, the canals would seem also to pass into the root-branches. The stalk is sometimes a little twisted in the lower part, and then the canals follow the winding always following the longitudinal direction of the spicules. The skeleton of the branches consists of an axis, which may be more or less thick in proportion to the length of the branch, and is constructed of parallel spicules with their end turned outward; it is inserted in the narrow sides of the principal axis between the longitudinally running spicules of this axis in such a way, that the spicules of two lateral branches placed opposite to each other meet in the middle, and the spicules inserted in the principal axis are spread in a fan-shaped way in the longitudinal direction of this axis. As more thoroughly mentioned below under the spicules, the skeleton of the axis consists of styli with an admixture of subtylostyli especially in the outer part, while the skeleton of the branches consists of subtylostyli. The outside of the axis is, in its lower part, coated with a layer of varying thickness. It is rather firm and compact, showing a smooth surface with here and there some wrinkles and folds. It reaches towards, or almost quite up to the place where the lateral branches begin. It may be of varying thickness, from a scarcely perceptible crust to a rather considerable layer, the thickness being greatest towards the base, but also

[1]) With regard to all the symmetrical, branched *Mycale*-species — i. e. the genus *Asbestopluma* — it is a fact that neither pores nor oscula have ever been mentioned in the literature. Either they are not mentioned at all, or it is stated that they have not been found. Now several things might indicate that this fact with regard to some species is caused by the dermal membrane generally being absent on the material obtained for examination. The specimens sometimes show ruined remains of a membranous character, especially at the base of the branches. With regard to the present species it is, perhaps, not improbable, that in the undamaged sponge the dermal membrane is, to a higher or smaller degree, suspended over the lateral branches, so that these are only partly free, and then pores and oscula are presumably found in this membrane. It is obvious that such a suspended thin membrane is easily destroyed, as the sponges in question is upon the whole from great depths and may be damaged in the trawl, or to a still higher degree in the swabs, with which instruments most of the individuals of the Ingolf-Expedition have been obtained.

here somewhat varying. The greatest thickness was measured to about 2^{mm}. When the layer is thick it is frequently not of equal thickness all round, but the axis may be placed very eccentrically. In the thickened part of the stalk the thickening is often chiefly due to the outer layer, but the axis itself may also be thickened and the layer comparatively thin. The layer is quite compact showing no canals, and is easily separated from the axis itself. The skeleton of this layer consists of exceedingly densely interwoven, winding and finely spinulous tylostrongyla, which, although the layer contains no spongin, are only to be separated with great difficulty. The spicules of the other parts of the skeleton are united by a mass of spongin, quite clear under the microscope and consequently only to be seen with difficulty. On a transverse section the axis is seen to be slightly yellowish, while the sponginless coating of the stalk is whitish, and, when dried, gets a quite snow-white colour.

Spicula: a. *Megasclera;* these are the spicules, partly of the skeleton proper, partly of the stalk-coating. The spicules of the skeleton are of two forms: styli, chiefly forming the skeleton of the axis, and subtylostyli, forming the skeleton of the branches, but also occurring in the axis. The styli of the axis may again be divided into two groups: long, slender, most frequently straight ones, and short thick, and curved ones; these two groups, however, are not sharply separated, but connected by transitional forms, while there seem to be no transitions between the styli and the subtylostyli. The styli are fusiform and evenly tapering towards both ends; in the rounded end, moreover, a short, rather abrupt tapering is found, by which the styli are still more easily to be distinguished from the subtylostyli; this tapering is most marked in the thick forms. The other end has a short, somewhat stubby point. The length is $0{\cdot}68-1^{mm}$, the thick ones generally not exceeding $0{\cdot}875^{mm}$, and sometimes going down to ca. $0{\cdot}6^{mm}$. The thickness varies altogether from $0{\cdot}015-0{\cdot}032^{mm}$; for the two forms it may be stated to be about $0{\cdot}015-0{\cdot}021^{mm}$, and $0{\cdot}021-0{\cdot}032^{mm}$. Of the styli the thicker ones, to be sure, are found throughout the axis, but they are especially numerous towards the base. The subtylostyli are slender and straight, the head is only little marked and is placed a little below the rounded end. The point is short and often almost stubby. They are fusiform, tapering a little towards either end. The length varies from $0{\cdot}52-0{\cdot}75^{mm}$, and the thickness in the middle is $0{\cdot}009-0{\cdot}017^{mm}$. As mentioned above, the subtylostyli form the skeleton of the branches, and are also found in the stalk, especially in the outer layer. The spicules of the coating of the stalk are tylostrongyla, minutely and densely spinulous; they are sinuous and curved in very different manners. The head is rather distinctly marked, sometimes it is placed a little in on the needle; the other end is broadly rounded, and the needle is of about the same thickness throughout its length; sometimes it tapers a little towards the end. The length is between $0{\cdot}05$ and $0{\cdot}137^{mm}$, the thickness was measured to $0{\cdot}001-0{\cdot}0028^{mm}$. The thinnest forms that have been observed, thinner than $0{\cdot}001^{mm}$, are so finely spinulous, that the spinules are almost not to be observed, and the very finest ones are perhaps quite smooth; I suppose them to be developmental forms. b. *Microsclera:* these are anisochelæ palmatæ of two forms and sigmata. 1. The characteristic anisochelæ are small and of the structure peculiar to the subgenus. The shaft is curved. The two ends are exceedingly different; the upper end is provided with very large alæ folding round on the side, the tooth is considerably shorter and narrower. When the chela is seen from the side, the axis is seen to bend round below like a hook, and alæ and tooth are present in the common way; these parts are very narrow, but they are only to be seen with extreme difficulty, and so it is not possible to state their form exactly. When the chela is viewed with the smaller end turned directly towards the beholder, however, the alæ and the tooth are distinctly seen together with the part of the axis between them (Pl. X, fig. 4 h). These chelæ are very small, their length is 0·010—0·014^{mm}, and the breadth is 0·0057^{mm}. 2. The large anisochelæ are of a peculiar structure not quite easily understood. The shaft is about straight. The two ends are very different; the larger one is of the common *Mycale*-structure, the alæ are much refolded on the side, and the tooth is considerably narrower than the alæ; a rather long tuberculum is found pointed downward. The form of this end is rather constant in one individual, but may be somewhat varying in different individuals. The variation consists in this end becoming longer in proportion to the total length, the lower edge of the alæ bending much downward on their way outward from the shaft so as to form a far out-drawn lower corner, and the tooth becoming longer and at the same time narrower. The alæ and the tooth may get so great a length as to reach the structures from the lower end of the chela. The smaller end of the chela is of a peculiar structure and shows a remarkable irregularity. When the chela is viewed from the front or from the side, some small teeth appear to issue from the lower end. Only when the chela is placed with the small end turned towards the beholder, it is possible to get a clear view of the structure. The shaft is then seen to have a narrow ala on either side; next three laps or teeths are generally seen below, one on either side and one in the middle. The middle one is either undivided or more or less split in two; most frequently it is completely divided, and then we get altogether four laps. This is the construction when it is regular, but frequently it is irregular and unsymmetrical, so that we see two laps on one side and only one on the other, or the two laps of the middle tooth are of unequal size. Also the alæ of the shaft may be unsymmetrical, as upon the whole this end is subject to much variation. The laps or teeth are so thin and transparent, that, when the chela is not seen from the end, they are hardly to be observed. Unfortunately I have found no developmental stages of this chela, and so it is impossible to ascertain how the construction of the smaller end is to be interpreted, whether we have here real teeth, or one tooth divided into laps, or finally the lateral teeth are to be interpreted as belonging to the alæ of the shaft. When two teeth are found in the middle this is surely the result of cleavage, which may also be seen from the fact that in such cases we find a median tuberculum the upper part of which is split. Also the lateral teeth seem to be provided with a tuberculum, but by this fact it is not proved, however, that they are independent teeth. Perhaps the developmental forms may solve this question. The length of the chela is between 0·048 and 0·063^{mm}, the greatest breadth is 0·022—0·027^{mm}, and the thickness of the shaft is ca. 0·004^{mm}. As the length is proportionate to the mentioned variation in the form of the upper part, it is rather constant in one individual. The longer the upper end is in proportion to the total length, the shorter is the chela. 3. Sigmata; they have a comparatively little curved shaft, while the tolerably short ends are strongly bent in a hook-like way. A peculiar feature is that the shaft towards the bendings is compressed, and therefore a little broader, seen from the side. They are contort, most frequently a quarter of a turning, and they may therefore, by a slight glance and under small magnifying powers, recall small tylostyli, as observed by Schmidt l. c. That they may appear as tylostyles arises from the fact that the hook which is turned upward is not seen as a hook, but may give the impression of a swelling. Their length is 0·021—0·024^{mm}, and the thickness about

0·0014^{mm}. All the microsclera occur in great numbers in the tissue coating the branches and the axis of the part carrying branches; especially the small chela is found in enormous numbers.

Embryos: In most individuals of this species embryos were found. They are oval or round, most frequently a little flattened, of a diameter of 0·5—ca. 1^{mm}. They were frequently seen to be surrounded by a quite clear and transparent membrane. They occur in different, sometimes rather great numbers, and are situated in the mentioned axial canals. Most frequently they are placed in a single row in one of the principal canals (Pl. II, fig. 1), but they may also be found in the side canals, and they may be so densely crowded as to cause larger or smaller swellings (Pl. II, fig. 4). With regard to spiculation they show some differences that are rather interesting. They have only sigmata and the small anisochelæ. Sigmata seem to be the form of spicules first occurring, and in some specimens only these occur. In some specimens the sigmata, or most of them, were somewhat smaller than those of the developed individuals. While in the larger embryos sigmata and chelæ were found in very great numbers, they were scarce in others, and in some of the embryos no spicules seemed to be present at all.

Remarks to the synonymy. I have been able by examination of one of the specimens of the Barents-Expedition to identify as *pennatula* the species mentioned by Vosmaer l. c. as *Cladorhiza bihamatifera*. Vosmaer mentions it as a difficult thing to get a clear understanding of the large chelæ and says, — I now believe that they are to be considered as *Esperia*-anchorates, where all the teeth are fully developed, and not two with one rudimentary ‹. What is meant by this phrase is unintelligible, as the larger end of these chelæ is of the same structure as in all common *Mycale*-chelæ. — Of Armauer Hansen's material I have examined a few specimens which proved to be *pennatula*, but under his *bihamatifera* several species are mingled together; from the figures it may however with rather great certainty be decided, which of them belong to the present species. Of Fristedt's *Cladorhiza Nordenskiöldii* I have examined a fragment of the type specimen, which proved it to be *pennatula*; Fristedt must have overlooked the small chelæ. Also Lambe l. c. must have overlooked these chelæ, as the *Cladorhiza Nordenskiöldii* mentioned by him is certainly identical with *pennatula*. It is easily understood that he has overlooked them, as he has had only the lower part, where the small chelæ only occur much scattered. Finally the *E. plumosa* established in 1903 by Arnesen l. c. is identical with *A. pennatula*, which fact I have been able to decide with certainty, as I have examined a fragment of one of the type specimens. In the quite insufficient description no account is rendered of the two forms of chelæ; the length of 2·7^{mm} given for the megascleres must be due to an erroneous measuring; in the specimen examined by me I have found none larger than 0·95^{mm}.

Locality: Of this species the Ingolf-Expedition has obtained a great number of specimens. Station 6, 63° 43' Lat. N., 14° 34' Long. W., depth 90 fathoms; station 39, 62° 00' Lat. N., 22° 38' Long. W., depth 865 fathoms; station 40, 62° 00' Lat. N., 21° 36' Long. W., depth 845 fathoms; station 67, 61° 30' Lat. N., 22° 30' Long. W., depth 975 fathoms; station 68, 62° 06' Lat. N., 22° 30' Long. W., depth 843 fathoms; station 78, 60° 37' Lat. N., 27° 52' Long. W., depth 799 fathoms; station 81, 61° 44' Lat. N., 27° 00' Long. W., depth 485 fathoms; station 94, 64° 56' Lat. N., 36° 19' Long. W., depth 204 fathoms; and station 144, 62° 49' Lat. N., 7° 12' Long. W., depth 276 fathoms. On station 78 the greatest number of specimens were taken. The stations are situated between the Faröe Islands and Iceland, south of Iceland and in the Denmark Strait at the eastern coast of Greenland. The depths vary from 90—975 fathoms; the bottom temperatures on the stations were from 1·6 til 7·0 C. Further I have before me one specimen from the northwestern coast of Norway, Lyngen, depth 160 fathoms (O. Nordgaard).

Geogr. distr. The species is further known from the following localities; off Bukenfjord and Haugesund, depth 106—115 fathoms (Schmidt l. c.); Tronhjem Fjord (Arnesen l. c.); the Barent Sea, depth 220 fathoms (Vosmaer); the east coast of Greenland, depth 130 fathoms (Fristedt); the Gulf of St. Lawrence, depth 200 fathoms (Lambe). Accordingly the species is a northern one, and has hitherto been found from about 23° 20′ Long. E. to about 65° Long. W., and between 50° and 74° 10′ Lat. N. As is commonly the case, it reaches considerably farther south at the American coast than at the European; thus at the coast of Norway it has only been obtained to about 59° Lat. N.

2. **A. bihamatifera** Cart.

Pl. II, Figs. 7—8. Pl. XI, Fig. 1 a—g, Fig. 2.

1876. *Esperia cupressiformis* var. *bihamatifera* Carter, Ann. Mag. Nat. Hist. Ser. 4, XVIII, 318, Pl. XIII, fig. 14, Pl. XV, fig. 34 a—b.

Shorter or longer lateral branches pass off from the axis all round. The axial skeleton is divided into a number of fibres, between which the fibres of the lateral branches are inserted: outmost in the axis a thin layer of spicules is found. Spicula: Megasclera styli in the axis 0·63—1·01^{mm}, subtylostyli in the branches and, in small numbers, in the axis 0·58—0·71^{mm}, irregularly sinuous, finely spinulous tylostyli in the coating of the stalk 0·09—0·19^{mm}; microsclera of three forms, anisochelæ palmatæ of two forms, the characteristic ones 0·010—0·011^{mm}, the large ones with polylobate lower end 0·051—0·061^{mm}, sigmata 0·018—0·021^{mm}.

This species in its outer form is very similar to the preceding one, but it is distinguished from it by the fact that the lateral branches are always placed in several rows, and accordingly they are not arranged along the two sides of the axis, but issue from all sides of it. It consists of an erect axis, which, for a shorter or longer part of the upper end, carries lateral branches going off to all sides. All the specimens are broken below, but a few of them seem to be fairly entire; the latter are on the lower part of the stalk provided with quite short, irregularly placed lateral off-shoots forming a kind of root. As in the preceding species the length of the branches may vary very much, and I suppose that also here a contraction may take place. The greatest length of the branches is ca. 11^{mm}, and then they are very fine, on an average about 0·17^{mm}. They are found in decreasing lengths down to quite short projections, which are then considerably thicker. The branches are directed somewhat obliquely upward; when they are long they are generally directed upward in a curved manner. The branches, as mentioned, pass off to all sides; but when they are of a certain length there is always some difference between them, those along the two sides being somewhat longer than those on the other parts of the axis. At the top the branches continue over the end of the axis, and seem here always to be short. The stalk is all but cylindric; it tapers upward, and in its lower part, towards, or quite up to, the branches it is covered with a layer provided with special spicules; in the specimens in hand this layer is very thin and of a darker colour. The stalk is straight, or more or less curved; in the upper part it is most frequently rather straight, and the part carrying the branches is always straight; while the lower part may be curved or bent angularly in different ways. The longest specimen, which is broken below, but has root-branches, has a length of 100^{mm}, and the part carrying the branches is 13^{mm} long. The smallest specimen is 28^{mm} long, and the part with the branches only 4^{mm} long. The colour (in spirit) is white to yellow, the stalk, on account of the coating, is of a lighter or darker brown. The consistency is firm, but the sponge is fragile. The *surface* is smooth, only on the root-branches the spicules of the coating layer seem to project a little. On the part of the axis carrying branches, between the bases of these, a thin *dermal membrane* is seen, in most specimens highly damaged; it continues on the inner part of the branches, but can be traced no farther. It is supported by the spicules in the outmost part of the axis, and it is abundantly provided with microscleres of all three forms. The *pores* are found in the very thin dermal membrane; they are round and have been measured, as an example, to a size of $0.047-0.119^{mm}$. They were especially seen in the parts of the membrane that are stretched between the inward or upward turned side of the base of the branch and the axis, and therefore they are turned somewhat upward. They are only to be observed with difficulty, and they are most easily seen when the preparation is half-dry. Immediately inside the dermal membrane is found a system of lacunæ, separated by membranes with circular openings. A few larger openings were seen in the dermal membrane, which might possibly be *oscula*; otherwise the possibility is also found here that the branches form oscula; to be sure, their spicules are continued to the very middle of the axis, but this fact does not prevent that they may be hollow and open into the system of canals.

The *skeleton*. The skeleton of the axis consists of a number of fibres running parallel to each other in the longitudinal direction of the axis, and consisting of spicules with the point turned upward. In the interstices between these fibres the lateral branches are inserted. In a transverse section the fibres are seen to be arranged circularly round the middle (Pl. XI, fig. 2). Round the fibres again, in the periphery of the axis, some spicules are found supporting the dermal membrane; these spicules form no conspicuous layer, being often rather much scattered; in a transverse section, however, they are generally seen tolerably distinctly. As they are arranged between the bases of the branches they are not always quite parallel to the longitudinal axis. Some canals running in the longitudinal direction, are seen in the transverse section, between the dermal layer and the fibres. I have not been able to decide whether they continue through the axis as longitudinal canals, or they are only subdermal cavities belonging to the cavities into which the pores open immediately. Down in the stalk no separate fibres are found, but it consists entirely of close-packed spicules, and irregularly arranged canals run through it. Also in this species a twisting of the lower part of the axis was observed in some individuals. The skeleton of the branches, as in the preceding species, consists of bundles or fibres of spicules turning the points outward. They are inserted in the axis between its longitudinal fibres, so that they meet in the middle. The inserted part of the fibres of the branches is compressed in such a way, that in a transverse section it appears to have a thickness of only a few spicules, while in a longitudinal section it has the full thickness, or the spicules are spread in a somewhat fan-shaped manner. The skeleton of the axis consists of styli with a mixture of subtylostyli. As before mentioned, a coating layer of the same nature as in the preceding species is found on the stalk below the part carrying branches. It is most frequently very thin, and at the lowermost part of the stalk it is at most 0·2^{mm} thick. It consists of close-packed, finely spinulous tylostyli, and is otherwise of the same structure as in the preceding species; it becomes also snowy-white when dried. In the stalk the spicules are united by a clear mass of spongin.

Spicula: a. *Megasclera.* The megascleres of the skeleton are partly styli forming the axis, and partly subtylostyli forming the skeleton of the branches and also occurring in the axis. The styli are straight or slightly curved; they have a short, most frequently somewhat stubby point. They are fusiform, also tapering somewhat towards the rounded end, and here they end with a somewhat more abrupt tapering. Also in this species they may be divided into two groups; the longer, slenderer, oftenest straight ones, and the shorter, thicker, and curved ones, but they pass into each other without any marked boundary. The length varies from 0·63—1·01^{mm}, and the thickness from 0·020—0·0357^{mm}; the longer ones did not commonly reach a thickness of 0·030^{mm}. As in the preceding species the shorter and thicker styli become more predominant towards the base of the stalk. The subtylostyli are straight; they are fusiform and taper somewhat towards each end, the point is short, but rather sharp. The head is placed a little below the rounded end and is most frequently a rather slight swelling. The length of the subtylostyli is rather constant and is between 0·58^{mm} and 0·71^{mm}. The thickness is 0·011—0·018^{mm}, most frequently about 0·017^{mm}. The spicules of the coating of the stalk are finely spinulous tylostyli; the head is marked in different degrees, most frequently rather distinctly, sometimes it is placed a little down on the needle; the opposite end is long pointed, but the outmost point is stubby or cut off. The tylostyli are irregularly curved and sinuous. The length is between 0·09^{mm} and 0·19^{mm}, the thickness about 0·001—0·003^{mm}. b. *Microsclera* are anisochelæ palmatæ of two forms and sigmata. 1. The characteristic anisochelæ are those typical for the subgenus, and they are of quite the same form as those in *pennatula*. Their length is 0·010—0·011^{mm}, and their breadth is ca. 0·005^{mm}. 2. The large anisochelæ are also af a similar form as in the preceding species; the shaft is straight; the larger end is not subject to the variations in form and size found in *pennatula*, but makes always about half the length of the chela; the alæ are folded far round on the side, and their lower edge is rather straight without forming a far drawn out lower corner. The tooth is about as long as the alæ and is somewhat narrower than these; at the end it is cut off with rounded corners; a long, downward pointed tuberculum is found. With regard to the smaller end of the chela the description given under *pennatula* will almost entirely hold good; the only difference being that this end in proportion to the size of the chela is smaller than is most frequently the case in *pennatula*; also it is generally less irregular, and the variation consists chiefly in the fact that the middle tooth is either whole or split. The length is 0·051—0·061^{mm}, the breadth 0·020—0·025^{mm}, and the thickness of the shaft is about 0·005^{mm}. 3. Sigmata; these are of the same form as in *pennatula* with only little curved shaft and short ends, bent in a hook-like way. The shaft is likewise compressed or sharpened like an edge inward towards the bendings, and they are contort, most frequently a quarter of a turning. The length is 0·018—0·021^{mm}, the thickness in the middle is ca. 0·001^{mm}. The microscleres occur in large numbers in the dermal membrane and in the tissue of the part carrying the branches.

As will have been seen, this species is very closely allied to the preceding one, and differs from it especially by the facts that the branches are polyserial and the spined tylostyli of the coating layer more pointed, and these two characters are constant and are found together in all the material I have examined. It will also have been seen from the description that the skeleton of the axis is constructed in a somewhat different way. After Carter's descriptions and figures I regard the identification as certain, as both the spicula-figures, especially that of the large chela, agree very well, and also the figure of the exterior of the small fragment Carter had show that the question is of a species with branches arranged polyserially. Of Armauer Hausen's figures of exteriors those on Pl. VII, figs. 2, 3, and 15 might perhaps be *bihamatifera*, but as it is said in the text that only one of all the specimens had sigmata, the question is more likely of the species *lycopodium*. The question cannot be decided with certainty, as the fact that sigmata of two different specimens are figured, both on Pl. III, fig. 5, and Pl. IV, fig. 2, shows that the quoted statement is wrong, and I have also examined two specimens, which were both of them *pennatula* and consequently both provided with sigmata.

Locality: Station 15, 66° 18' Lat. N., 25° 59' Long. W., depth 330 fathoms (bottom temperature ÷ 0°75 C.); station 59, 65° 00' Lat. N., 11° 16' Long. W., depth 310 fathoms (bottom temperature ÷ 0°1 C.); station 126, 67° 19' Lat. N., 15° 52' Long. W., depth 293 fathoms (bottom temperature ÷ 0°5 C.); station 138, 63° 26' Lat. N., 7° 56' Long. W., depth 471 fathoms (bottom temperature ÷ 0°6 C.); altogether eight specimens. The stations are situated in the Denmark Strait, north and East of Iceland, and north of the Faröe-Islands, and they are seen all to belong to the cold area with negative bottom temperature. It is of interest to see that this species, which is so closely allied to the preceding one, from which it differs only by slight, but constant characters, occurs exclusively in localities with negative bottom temperature.

Geogr. distr. With regard to the specimens of the present species from the Norwegian North-Atlantic Expedition the more particular localities are not known; if the species are represented in the material, it must be supposed to have been taken on one of the stations in the cold area. The locality is also wanting for the specimens of Carter, but on account of other sponges in the same jar he thinks that the locality may possibly be in the western entrance of the British Channel. This is probably not the case, however, as the species is a native of colder bottom, and I suppose that Carter's specimens originate from one of the cold stations of the »Porcupine«.

3. **A. furcata** n. sp.

Pl. II, Figs. 9—10. Pl. XI, Fig. 3 a—h.

The axis slender, dichotomously branched once or several times. The lateral branches very short, placed all round, only on the upper ramifications. The axial skeleton divided into fibre-like parts, outmost a thick layer of spicules. Spicula: Megasclera styli in the axis 0·39—0·65^mm, subtylostyli in the branches and outmost in the axis, 0·268—0·36^mm, curved, finely spinulous tylostrongyla in the coating of the stalk 0·068—0·095^mm; microsclera of three forms, anisochelæ palmatæ of two forms, the characteristic ones 0·010—0·014^mm, the large ones with unsplit or split lower tooth 0·044—0·054^mm, sigmata 0·015—0·017^mm.

This species is of a very slender form; it begins below with a stalk that gradually branches dichotomously. The most ramified specimen branches three times, so that the two branches formed in the first instance divide again, and the newformed branches divide also. In one specimen one branch divides into three, sending off two lateral branches while the principal one itself continues in the middle. In another specimen a coalescing of two stalks has taken place; as the lower part of the specimen is wanting it cannot be seen, whether the two branches belong to one individual, or two different individuals are coalesced. The stalk is somewhat widened below and has been attached to some firm object. The stalk may be straight or somewhat curved, and it is about cylindrical. On the ramifications lateral branches are found more or less extensively; they are generally only found on the outmost ramifications, sometimes also some way down the branches below the last division. Thus in the smallest specimen, which has only two branches, they are found some way down the stalk. The lateral branches are small, almost scale-like and most frequently very much directed upwards, sometimes almost quite adpressed. They are arranged in several rows, but very irregularly, so that the rows in some places are close together, while at other places the intervals are greater. The axis is slightly compressed in the parts carrying lateral branches. The branches end with a compressed part forming an extended, and on account of a little notch somewhat heart-shaped, head. Perhaps the question is only of a beginning new cleaving. In a single fragment the last ramifications end without this head, and this is perhaps a specimen in which the growth has ceased. The stalk has a thin coating of the common nature, and this layer generally reaches far up, often to the last, or last but one, division. The largest specimen in hand, the above mentioned most richly branched one has a height of 140^{mm}, the stalk to the first division is 35^{mm} long. The smallest specimen, which is only divided once, is 65^{mm} high. The species, as mentioned, is very slender, the stalk of the largest specimen has only a diameter of 2^{mm}, and farther up the thickness is 1—$1{\cdot}5^{mm}$. The lateral branches do not reach more than 1^{mm} in length. The consistency is of the common firmness. The colour (in spirit) is whitish yellow to light brownish; the coating layer of the stalk is always a little darker. The *surface* is smooth, but on the part with branches it appears under the microscope to be shaggy from the projecting chelæ. No distinct *dermal membrane* was seen; outermost in the skeleton a dense layer of spicules is found, and outside of this a thin layer of tissue, copiously provided with microscleres. *Oscula* and *pores* were not observed.

The *skeleton*. The skeleton of the axis consists of closely united, parallel needles. Through the axis run a number of canals, which in the ramigerous part seem to be arranged in a more or less ringlike way, and are separated by narrow parts of spicules, as also the fibres of the lateral branches, where such are found, pass in between them. Lower down in the stalk the canals are not regularly arranged, so the separating spicula-parts are also here, when seen in transverse sections, irregularly sinuous. Accordingly, the skeleton of the axis is by the canals divided into fibres or narrow, fibrelike parts. Outmost a dense layer of spicules is found, which is most frequently rather easily loosened on the stalk below the ramigerous part, while on this part such is not the case, and here where the lateral branches are inserted, the needles of this layer do not exactly run in the direction of the longitudinal axis. In the lower part of the stalk the axial skeleton is twisted in a spiral manner. The skeleton of the lateral branches consists of bundles of spicules; they are inserted between the spicules of the axis in the common way, and reach to, or about to, the middle. The skeleton of the axis consists of styli, among which in the outer layer of spicules shorter subtylostyli are intermingled; the skeleton of the lateral branches consists of short subtylostyli. The skeleton of the coating layer of the stalk consists of closely interwoven, finely spinulous tylostrongyla. The spicules of the axis are united by a clear mass of spongin.

Spicula: a. *Megasclera;* these are the styli of the axis and the subtylostyli of the lateral branches, besides the spicules of the coating layer of the stalk. The styli in the axis have in this species no abrupt tapering towards the head-end, and as the subtylostyli show most frequently an almost indiscernible swelling, the difference between them is chiefly to be sought in the size. The styli, to be sure, vary somewhat in form and size, but they cannot here be said to be divided into two groups. They are straight, or slightly, only rarely a little more highly, curved; they are slightly fusiform with the greatest thickness in the middle. The point may be a little varying, but is always short or rather short; most frequently it is bounded by straight lines. The length is 0·39—0·65^{mm}, the extreme measures, however, occurring rarely. The thickness, which has no definite proportion to the length, is between 0·010^{mm} and 0·024^{mm}. The subtylostyli are straight, only sometimes quite slightly curved. They are only a trifle thicker in the middle than towards the ends; the head, which is placed a little down on the needle, is generally a scarcely perceivable swelling; the point is short, but bounded by straight lines. The length is 0·268—0·36^{mm}, the thickness is 0·007—0·011^{mm}. The spicules of the coating of the stalk are minutely spinulous tylostrongyla; they are more or less irregularly curved, most frequently to a rather slight degree. The head is round and distinctly developed, they do not taper much towards the opposite end, and this end has a little swelling, so that in form they approach tylotes. They are smaller than in the preceding species, the length is 0·068—0·095^{mm}, and the thickness about 0·001^{mm}, a little more or less. b. *Microsclera* are anisochelæ palmatæ of two sizes and sigmata. 1. The characteristic small anisochelæ are of the type of the subgenus, and are of the same form as in the preceding species; they are, most of them, 0·010^{mm} long and 0·005^{mm} broad, but chelæ may be found reaching to a length of 0·014^{mm}. 2. The large anisochelæ are also of a similar form as in the two preceding species. The shaft is straight; the larger end is about half so long as the whole chelæ; the tooth is considerably narrower than the alæ, it is broadest below, and rather straight cut off with rounded corners or sometimes more rounded; a long, downward pointed tuberculum is found. The smaller end is more regular than in the preceding species, and its form is more like that of the common type. The shaft has a pair of short alæ, rather broad above, and forming together a triangle; then there is a curved tooth of similar size, most frequently, however, a little shorter than the alæ. As the tooth is in a rather oblique position to the shaft, it appears always somewhat shortened, when the chela is seen exactly from the front, and its curved form is also seen. Accordingly, when the tooth has this form, the structure of the smaller end is quite normal; the tooth, however, is often split into two lobes, and the splitting may be more or less pronounced; lateral lobes, however, are never found. Also here the tooth is so thin and transparent, that a clear view of the form can only be got by regarding the chela from the end. The length is 0·044—0·054^{mm}, the breadth about 0·021^{mm}, and the thickness of the shaft is about 0·004^{mm}. 3. Sigmata are of the same form as in the preceding species with the same edge-like expansion of the shaft towards the ends, and they are also contort. The length is 0·015—0·017^{mm}, and the thickness about 0·001^{mm}. All forms of microsclera occur in great numbers in the tissue.

Embryos. In this sponge embryos were most frequently found; they occurred partly in the upper ramifications, partly somewhat lower down. They were, as far as I could see, situated in the canals just inside the outermost layer of spicules, but each embryo appeared to be inclosed in a cavity of its own, and the places in which they occurred were a little swollen and thus fusiform. The embryos are roundish or oval, and have an average diameter of $0{\cdot}3^{mm}$. In contradistinction to the embryos found in *pennatula*, both megascleres and microscleres are found here. The megascleres are all subtylostyli; they are similar to those in the grown individual, but are often a little more curved, and the head may be marked off in different ways; they have also on an average a somewhat longer point. They are smaller than in the grown sponge and have an average length of $0{\cdot}208^{mm}$. Of microscleres only the small chela and sigmata are found; both of them are fully developed, and they show a peculiar and surprising feature, being both a little larger than in the grown sponge. Thus sigmata reach a length of $0{\cdot}021^{mm}$, and the chelæ are $0{\cdot}0114$—$0{\cdot}0143^{mm}$ long. According to this it must be supposed that the first formed of these chelæ and sigmata are a little larger than the final form, which appears later. Chelæ and sigmata are present in great numbers. The embryos seem here to leave the sponge by a bursting of the wall, the outer layer of spicules being in several places swelled out by the embryos underneath, and in a few cases a hole and an empty cavity are seen.

Locality: Station 101, 62° 23' Lat. N., 12° 05' Long. W., depth 537 fathoms (bottom temperature ÷ 0°7 C.), one specimen. Further it has been taken on 62° 53' Lat. N., 4° 14' Long. E., depth 450 fathoms, one specimen, and east of Iceland without any statement of depth, five specimens (Ad. Jensen, the cruise of the »Michael Sars« 1902). The localities are situated east and northeast of Iceland, and at the coast of Norway. With regard to the two last localities no bottom temperature has been given, but they are situated in the cold area, and thus this species is also a native of the cold bottom.

Note. Of Armauer Hansen's figures to *Esperia bihamatifera* (The Norwegian North-Atlantic Exp.) I am inclined to suppose, and I think there is great reason for supposing, Pl. VII, fig. 4, and especially Pl. III, fig. 5 to be the present species.

As will have been seen, the species of this subgenus are distinguished by a peculiar coating layer on the stalk. At first one might be inclined to think that the question was of a separate sponge incrusting the stalk of these sponges, as is also pointed out by Topsent by the mentioning of *pennatula* and *Belgica* l. c.; but the constant occurrence of the layer, and the difference of its spicules in the different species proves it to be a formation belonging to the sponge. Those species of the subgenus of which rather intact specimens have been examined, show a formation of roots. This formation is connected with the fact, that they are no doubt sunk into the bottom of the sea, as it would seem, with a very long part of the stalk. I suppose that this is also the reason why they are provided with the coating layer. The species *furcata*, however, is an exception, as it is not sunk into the bottom, but is attached with its base. Nevertheless it has the coating layer, but it is very thin and shows the peculiarity that it reaches very far up, often to the last ramifications.

Lycopodina n. subg.

Lateral branches issuing all round from an axis, or the branches collected in the upper end of this axis; sometimes the lateral branches are more or less coalesced. The skeleton consists of a spicula-axis, and the branches are supported by fibres inserted in the axis, or in other ways connected with it. Spicula: Megasclera styli or subtylostyli; microsclera: the characteristic anisochelæ palmatæ are small, the alæ of the larger end pass down quite to the opposite end, which is rather broad; to these spicules forcipes are most frequently added.

4. A. cupressiformis Cart.

Pl. II, Figs. 11—14. Pl. XI, Figs. 4a—f, 5.

1874. *Esperia cupressiformis* Carter, Ann. Mag. Nat. Hist. Ser. 4, XIV, 215, partim, specimen in interclusione commemoratum exclusum, Pl. XIV, fig. 16a.—f., figs. 17—18, Pl. XV, fig. 37.

1885.? *Esperia bihamatifera* Armauer Hansen, The Norwegian North-Atlantic Exp., XIII, Spongiadæ, partim Pl. VI, fig. 1, Pl. VII, fig. 1.

1886. *Esperella cupressiformis* var. *robusta* Levinsen, Dijmphna Togtets zool. bot. Udbytte, 364, 18a, Tab. XXIX, Fig. 10—11, Tab. XXXI, Fig. 7—14, 16a, b, c.

1887. *Cladorhiza cupressiformis* Fristedt, Vega-Exp. vetensk. Iakttag., IV, 457, Pl. 25, figs. 66—69, Pl. 31, fig. 27.

1900. *Esperella Fristedtii* Lambe, partim, specimina dua e tribus commemoratis, Transact. of the Royal Soc. of Canada, Ser. 2, VI, Sect. IV, 21, Pl. I, figs. 2, 2a.—e.

Irregularly situated short lateral branches pass off all round from the axis, or the branches coalescing to a curled surface; sometimes all the upper part or only the uppermost portion of it leaf-shaped. The skeleton consists of a spicula-axis, the ramigerous part is supported by an irregular skeleton, from which the fibres of the lateral branches pass off, but they are not inserted in the axis. Spicula: Megasclera subtylostyli or styli 0·35—0·84^{mm}; microsclera of two forms, the characteristic anisochelæ palmatæ 0·023—0·025^{mm}, forcipes 0·038—0·048^{mm}.

This species is of a slender, erect form. Below it consists of a more or less long stalk, all but cylindrical, which is most frequently one fourth of the total length. The upper part is somewhat thicker than the stalk and carries a number of short lateral branches, placed irregularly, and issuing all round. These branches may be very short, so that they almost do not project over the surface, or there may between them, or instead of them, be found low ridges especially running longitudinally, and then the upper part shows only a highly wrinkled, folded, or curled surface; but in most cases the projections are formed as cylindrical, a little conical branches rising with a broad base from the axis. They reach at most a length of about 3^{mm}. Sometimes the sponge is above widened to a small leaf-shaped part (Pl. II, fig. 11), and one specimen consists of a quite short stalk passing into a broad, rather thin leaf with a grooved and wrinkled surface (Pl. II, fig. 12). Below the sponge is attached by a somewhat widened part of the stalk. The specimens in hand from the territory treated here are torn off from the substratum, but specimens from the Kara Sea are attached to shells (*Astarte* sp.), worm-tubes (*Spiochætopterus typicus* and especially *Pectinaria hyperborea*), and to pebbles. The largest specimen (from the Kara Sea) has a length of ca. 135^{mm}, the stalk is 26^{mm} long, the greatest thickness is 7^{mm}, and the stalk is ca. 2^{mm} thick. Then we have specimens of all sizes downward, the smallest specimen is 15^{mm} high. The mentioned leaf-shaped specimen has a height of 77^{mm}, and a breadth of ca. 70^{mm}, its stalk is only 13^{mm} long. The consistency of the upper part of the sponge is softer than in the preceding species, the stalk is hard. The colour (in spirit) is whitish gray to whitish yellow. The *surface*, apart from the nature described above, must be said to be smooth, only in the ends of the lateral branches bundles of spicules project. In the specimens in which no lateral branches properly so called are found, but only longitudinal ridges and irregular projections, spicules project through these, and thus these individuals get a more shaggy appearance. Under the microscope also other parts of the surface may appear shaggy from the projecting chelæ. The upper part of the stalk is smooth, but it becomes shaggy towards the base. A *dermal membrane* may distinctly be observed, and is easily isolated; it is thin and transparent and highly filled with chelæ, on the other hand there is no dermal skeleton proper, but the membrane rests on the skeleton below, and when it is isolated, needles may be seen scattered in it. *Pores* have not been observed in the dermal membrane. *Oscula:* the mentioned lateral branches act, no doubt, as oscula; the fact is, that these branches are not solid, but are chiefly formed by the dermal membrane, which is here supported by spicules parallel to the longitudinal axis of the branches. If a branch is cut off it is seen to be hollow, and leaves a hole; on the other hand, an osculum is not distinctly seen at the point of the branch, as the spicules are here closer joined. As the branches are very numerous, and as pores have not been observed, it might be supposed that also the inhalent system was connected with the branches; it is, however, more probable that the pores are closed.

The *skeleton*. The skeleton of the axis consists of close-lying spicules parallel to the longitudinal direction. The axis, however, is not quite compact, the spicules being collected into close-lying fibres; in the interstices an irregular reticulation of spicules is found, which spicules are placed obliquely to, or across of, the longitudinal direction; sometimes, however, this feature is little prominent, and then the axis is more compact. It continues from the stalk up through the sponge, quite to its uppermost end, and it keeps about the same thickness. The outer skeleton, which supports the upper part, consists of a quite irregular net-work of spicula-bundles and scattered spicules, with short fibres here and there. As mentioned, the lateral branches are supported by spicules apparently forming a fibre, but really only supporting the wall of the branch; these spicules do not reach to the axis, but pass only into the other skeletal net. In the lower part of the stalk, where it is shaggy, spicules are woven into it, projecting more or less horizontally, and over the surface. A coating with special spicules is not found. In the mentioned leaf-shaped specimen the skeletal structure has been modified in an interesting manner; the short stalk continues as such only a short way into the leaf, and then it is lost. It does not cease, however, but is, as it were, spread in the plate, rather close-lying fibres, radiating towards the edge, running through the plate; these fibres correspond to those of the axis, and they are, like those, connected by spicules and spicula-bundles, which are placed transversely or obliquely in the interstices. This whole structure forms a thin skeletal plate in the middle of the leaf-shaped part, and on both sides is found a tissue with a skeleton constructed in the same manner as the skeleton outside the axis in the other individuals. In the axis the spicules are united by a rather copious, but white and clear mass of spongin, which is most developed towards the base; in the skeleton outside of the axis, on the other hand, no spongin seems to be present.

Spicula: a. *Megasclera* are long, slender subtylostyli, sometimes styli. They are straight, or slightly, most frequently somewhat irregularly curved. The head-end is only very slightly swollen, the opposite end tapers evenly to a rather long point which is often somewhat more abruptly pointed at the end. The needles are here of only one kind, and are the same in the stalk and in the other skeleton, the only difference being that in the lower part of the stalk they become gradually shorter, and the needles that here project and make the stalk shaggy are also short. These short needles are generally more highly curved, and are most frequently styli without any head-swelling, but they cannot be separated from the others as a particular kind. The length is between ca. 0·35 and 0·84^{mm}, but in these measures are also included the needles occurring towards the base of the stalk; if the lower part of the stalk is excluded the lower limit of the length may be put to about 0·5^{mm}, and in a spicula-preparation in which no sample from the lower part of the stalk has purposely been added, the length of the needles therefore will be found to be ca. 0·5—0·84^{mm}, and the shorter ones will only occur more rarely. The thickness varies from ca. 0·008—0·014^{mm}; the longest ones are not the thickest. Finer, to quite fine developmental forms are seen in small numbers. b. *Microsclera:* these are of two forms, anisochelæ palmatæ and forcipes. 1. The anisochelæ are of a form characteristic of the subgenus; the larger end is of a similar form as in the preceding subgenus; the alæ are very large and reach far down, quite down to the lower end, and there is a considerably shorter and narrower tooth. The smaller end is of a peculiar structure, not easily understood. When the chela is lying on the side a pair of small points are seen at this end, one at the outer end of the axis, the other a little higher up. The best view is got when the chela is seen in such a way as to turn the smaller end directly towards the beholder (Pl. XI, fig. 4 d), and then it is seen that alæ and tooth are present as usual. The peculiar feature is that the alæ do not run along the shaft in the common way, but are placed almost transversely on it. The axis then continues with a slight bend, and at the end of it the tooth is placed parallel to the alæ; it has a distinct tuberculum. When the alæ and the tooth are seen from the side, they are seen as the mentioned two points. When the chela is viewed from the front under sufficiently high magnifying powers, a pair of refractive ridges are seen about where the alæ of the upper end cease; these ridges are the upper part of the alæ of the lower end where they go off from the axis; they are here the most narrow, but downward they become gradually broader, and fold round on the side; the whole thing might be described by saying that the upper outer corner of the ala had been cut away by a large cutting rounded inward. The tooth, which is also somewhat curved, has a form corresponding to that of the alæ, being also most narrow above, but increasing in breadth downwards, and thus showing the same cutting. The folded sides of the alæ and the tooth meet on the side leaving only a narrow opening between them; as a consequence of the form the lateral edges are here short. The described form of the alæ and the tooth, together with their position with regard to the axis, is the cause why they appear as two points when viewed from the side under small magnifying powers. The anisochelæ are 0·022—0·025^{mm} long[1]) and ca. 0·012^{mm} broad. Developmental stages

[1]) A few chelæ were seen of a length of 0·014^{mm}, but they, no doubt, belong to the embryos present in the sponge, see below under Embryos.

of this chela were found abundantly on all stages from so fine ones, that they are hardly to be seen. Levinsen l. c. has already given an account of the development of this spicule. — The construction of the lower end of this chela has never been correctly understood, and neither Carter's nor Fristedt's figures are correct. Levinsen, on the other hand, has given good figures, l. c.; the lower end on Pl. XXXI, fig. 7, cannot, however, appear as it is figured, when the chela is seen in the stated position, but only, if it is seen considerably more obliquely from one end or the other. Neither has Levinsen clearly understood that the question is of the common parts, alæ and tooth, in a somewhat modified shape. 2. Forcipes. These are of the common form with a round bend above; the legs are parallel or more or less diverging, and end in a small swelling; the upper part between the legs is somewhat thickened, and appears, especially when the forceps is seen from the side, as a tubercle-like swelling. The length is 0·038—0·048^{mm}, and the thickness above is ca. 0·0021^{mm}; the thickness of the middle of the legs does not exceed 0·0014^{mm}. The chelæ occur in enormous numbers; they are partly found in the tissue, but especially in the dermal membrane, in which they are exceedingly close packed, so as to render it quite shaggy; they appear always to be turned with the larger end outward. In contradistinction to the chelæ the forcipes are limited in their occurrence, being only found in the point of the sponge, as has been pointed out by Levinsen; in this respect it is an interesting fact that in the mentioned leaf-shaped specimen the forcipes are found throughout the leaf-shaped part, which fact would seem to prove this whole part to correspond to the point of an individual of the common form.

Embryos. In several individuals of this sponge embryos were found. They are situated in the tissue in very great numbers; they are globular, the larger ones a little oval, and they are rather small; the size is very varying, and was measured from 0·05—0·27^{mm}. They are in the tissue surrounded by a membrane, and they appear each of them to be situated in a little cavity. Their spiculation presents some points of interest. They are provided with both megascleres and microscleres. The megascleres are straight or often rather strongly curved tylostyli and subtylostyli, most frequently with rounded end; they are often more or less irregularly formed, and besides quite irregular forms occur, small short styli, strongyla, and other forms, as also small, more or less irregular siliceous globules. The greatest length measured of the needles was 0·12^{mm}, and they may reach a thickness of ca. 0·007^{mm}, but they occur in all degrees of thinness, down to exceedingly thin ones; in the same embryo, however, they are always of about the same thickness. They are only found in small numbers, 12—16 needles were counted in each embryo. They are always arranged in a particular way in the embryo, viz. as a bundle placed radiately with one end towards the centre and the other towards the periphery; this bundle may perhaps be interpreted as the first indication of the axis. The needles of the bundle are turned in different ways, some of them have the head-end turned inward, others outward. The microsclera are anisochelæ occurring in no small numbers, as well fully developed ones as developmental forms, but they are considerably smaller than the chelæ of the grown individuals, their length being only 0·014^{mm}. In the smallest embryos no spicules were seen.

Observations on the synonymy. In spite of the peculiar and evidently very diagrammatic figure of the exterior found in Carter, it may no doubt be regarded as certain that the question is of his species. If, for instance, his figure is compared with my figure of the exterior Pl. II, fig. 14 it will be seen that this latter, if it were drawn in the same way as Carter's figure, would get a quite similar appearance. The other form mentioned in a parenthesis, to which belong the figures 16, g, h, and 19, a, b, I suppose, on the other hand, to be *A. infundibulum* Levins. Of Armauer Hansen's figures the cited ones may with great probability be referred here. The two varieties enumerated by Levinsen under his *cupressiformis* are certainly two well separated species, and only var. *robusta* belongs to the present species, while var. *lycopodium* is a separate species. Of Fristedt's *Cladorhiza cupressiformis* I have examined a type-specimen; the species is identical with the present one, and when Fristedt says that his species is wanting forcipes, he must have overlooked them, I suppose, on account of their being only found in the upper end; the fact is that they are really found in his specimen. With regard to Lambe's species *Esperella Fristedtii* the facts are rather peculiar: I have examined a fragment of one of his specimens. First this fragment proved to have forcipes, which must accordingly have been overlooked by the author; but then this fragment did not belong to this species, but to the following one, and accordingly it evidently belongs to the specimen that Lambe mentions separately. According to the description and the figures there can now be no doubt that the two other specimens are *A. cupressiformis*. The spicules mentioned by Lambe and figured in fig. 2, d and e, also corroborate this view, as they are exactly the embryonal spicules mentioned above under the embryos. When Lambe says that his species deviates from *cupressiformis* by not having forcipes and by its outer form, the reason of the first fact is that forcipes have been overlooked, and the latter fact cannot well be decided from Carter's diagrammatic figure of the exterior. When he further mentions differences in the form of the chelæ this statement is of no consequence, as neither Carter's figures nor those of Lambe himself are correct; Carter's, however, are far the better ones.

Locality: Ingolf, station 3, between the Faröe Islands and Iceland, 63° 35' Lat. N., 10° 24' Long. W., depth 272 fathoms, and at East-Greenland on the following localities: 72° 40' Lat. N., 20° 00' Long. W., depth 100 fathoms; 72° 27' Lat. N., 19° 50' Long. W., depth 120 fathoms; and at the south coast of Jameson's Land, depth 10—60 fathoms (The East-Greenland Expedition 1891—92); five specimens in all.

Geogr. distr. The species was taken by the «Porcupine» between Scotland and the Faröe Islands, at depths of 384, 363, and 632 fathoms, with the following respective bottom temperatures: ÷ 0°8, ÷ 0°3, and ÷ 0°8 C. Then it has been taken in the Kara Sea, depth 51—81 fathoms (Levinsen); west of Taimur, 76° 18' Lat. N., 92° 20' Long. E., depth 40 fathoms (Fristedt); the Baffin Bay at depths of 200 fathoms and 60—100 fathoms (Lambe). Thus the species is known from a territory between 70° Long. W. and 92° Long. E., and between ca. 60° and 76° Lat. N., with a bathymetrical range from ca. 40—632 fathoms. The species seems chiefly to be a native of the cold bottom, as most of the mentioned localities, or perhaps all of them, have a negative bottom temperature. Only the Ingolf-station 3 is a sure positive locality with a bottom temperature of 0°5 C., but then it is also of some interest to notice the fact that the mentioned deviating leaf-shaped specimen is obtained just on this locality.

5. **A. lycopodium** Levins.

Pl. II, Figs. 15—17. Pl. XI, Figs. 6 a—d, 7.

1885. *Esperia bihamatifera* Armauer Hansen, partim, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, Pl. 3, figs. 3, 4.

1886. *Esperella cupressiformis* var. *Lycopodium* Levinsen, Dijmphna Togtets zool.-bot. Udbytte, 364, 18 b, Tab. XXIX, Fig. 12, 13, Tab. XXX, Fig. 15, 16 d.

1900. *Esperella Fristedtii* Lambe, partim, specimen unum e tribus commemoratis, Transact. of the Roy. Soc. of Canada, Ser. II, VI, sect. IV, 21, Pl. I. fig. 2 f—h.

The axis slender with closely placed lateral branches issuing all round. The skeleton consists of a spicula-axis divided into fibres, between which the fibres of the lateral branches are inserted; outside of the axial fibres only a few scattered spicules. Spicula: Megasclera styli 0·238—1·5^{mm}; *microsclera of two forms, the characteristic anisochelæ palmatæ* 0·014—0·017^{mm}, *forcipes* 0·050—0·056^{mm}.

In outer appearance this species reminds somewhat of *A. bihamatifera.* It is of a slender, erect form; below it has a quite short stalk. The other part is set with thin lateral branches issuing all round. In different individuals the branches may be of different length, which does not, however, exceed 3—3·5^{mm}. The question is also here, I suppose, of contractibility. In a single specimen in which the branches are short, they are, as it were, somewhat coalesced at their bases, so that this specimen, as to its exterior, may somewhat remind of the preceding species. One specimen is of a peculiar appearance, showing no branches, but having all the part that in other specimens carries branches closely set with projecting needles which are, however, collected into bundles on the lower part. In a transverse section it is seen, however, that the projecting spicules, which are apparently evenly distributed over the surface, are bundles, radiating from the middle towards the surface, and spreading to some degree so as to be spread in a penicillate way at the surface. The lateral branches go off horizontally, or are a little directed upwards. The branches are quite short below where they begin, and also at the top they are most frequently shorter than in the middle. The upper end is of a peculiar structure, the branches here coalescing to a different number of longitudinal keels, the edges of which are set with a dense fringe of projecting spicules. This structure may be more or less marked, and seems also sometimes to be wanting, but when this is the case it is difficult to decide whether the sponge may not be damaged. The specimens in hand that are not broken off below are attached to pebbles; from the Kara Sea we have specimens attached to shells and tubes of *Pectinaria hyperborea.* The largest specimen (from the Kara Sea) has a length of 120^{mm}; the stalk is here very short, and its length cannot be given exactly, the projecting spicules of the stalk here, as in many of the specimens, passing by so imperceptible degrees into the lower short branches, that no distinct boundary can be observed. Below the stalk is fully 1^{mm} thick. Then we have individuals of decreasing sizes, the smallest, apparently entire specimen is fully 20^{mm} high. By far the greatest number of the specimens are very slender and of equal thickness throughout their length; a few specimens are somewhat more robust and a little thicker in the middle, so as to be slightly fusiform. The consistency is rather firm, but the sponge is flexible; the stalk is hard. The colour (in spirit) varies from white to light brown. The *surface*, with the exception of the stalk, must be said to be smooth, as spicules only project at the ends of the branches. The stalk, on the other hand, is very shaggy from rather close-set, projecting spicules which pass quite evenly into the lower short branches. The *dermal membrane* is without megascleres, and is distended by the skeleton of the branches; it is closely filled with chelæ. I dare not decide anything as to *pores* and *oscula*. A few, roundish apertures are seen in the skin, most frequently of a size of about 0·09mm; they belong presumably to the incurrent system; the excurrent system opens possibly in the branches, which would then act as oscula.

The *skeleton* is chiefly arranged as in *A. bihamatifera.* It consists of a spicula-axis, which is not compact, but formed by a number of fibres arranged in a circular way round the middle; between these fibres the short fibres or spicula-bundles that form the skeleton of the branches are inserted, so as to meet in the middle. The fibres of the branches may often be seen not to be solid, but their inner part is hollow, so that they do not pass to the middle as solid fibres, but some of their spicules are inserted in one place of the axis, some in another place. In the periphery of the axis no spicules are found here, as was the case in *bihamatifera*, the dermal membrane is supported and distended only by the skeleton of the branches; at most a few scattered spicules are found. In the lower part of the stalk where spicules project all round, no circularly arranged fibres are found, but the spicules of the axis are seen in a transverse section to be more evenly distributed, or irregularly grouped, and the projecting spicules are inserted between them. In the axis a small amount of spongin is found.

Spicula: a. *Megasclera* are styli; most frequently they are straight, more rarely quite slightly curved; only the shorter styli, and especially the quite short ones occurring down in the stalk, are always more highly curved. The long styli most frequently, but to an almost imperceptible degree, become thinner a little below the rounded end. The opposite end tapers gradually to a long point, which is sometimes, especially in the thicker spicules, more abruptly pointed at the extremity. There is no difference between the needles of the axis and those of the branches, but towards the base the needles of the axis get shorter, and here they occur of a particular form as short curved styli to which especially those needles belong that project and make the stalk shaggy. These shorter, curved styli, to be sure, occur here as a particular form, but they are connected with the other styli by a series of transitional forms. If all sizes are included the length varies from 1·5mm quite down to 0·238mm; if the lower part of the stalk is excluded, 0·6mm may be given as about the lower limit, and the upper limit of the basal spicules may be put about at 0·4mm, but, as before mentioned, the two forms pass into each other. If all the forms are included the thickness is between 0·007mm and 0·021mm; it is tolerably proportionate to the length, and with regard to the short curved styli it does not exceed 0·015mm. Some fine to quite fine developmental forms are seen. b. *Microsclera;* these are anisochelæ palmatæ and forcipes. 1. The anisochelæ are of the type of the subgenus and are constructed in quite the same way as those of the preceding species. Their length is 0·014mm, varying very little to both sides; in one large and robust specimen they reach a length of 0·017mm; the breadth is 0·007mm. 2. Forcipes; these are longer and finer than in the preceding species. They are thickest above, and may here, when seen from the side, show a slight, tubercle-shaped swelling. They are of a characteristic form; from the curve the legs continue parallelly or in a slightly diverging manner, then follows a bend in such a manner, that the ends converge (Pl. XI, fig. 6 d)[1]. The legs end in a small, distinct knob; they decrease in thickness outward, and in their outer part they are so fine, as to be only discerned with difficulty. The length is rather constant, and was measured to 0·050—0·056mm. As mentioned, they are very fine, the thickness of the legs does not exceed 0·0010mm above, and towards the point they are much finer.

[1] If specimens are sometimes seen with their legs bent in other ways, this is, no doubt, only owing to the fact that they are under pressure in the preparation.

The chelæ are found in very great numbers, and especially the dermal membrane is closely filled with them; forcipes are few in number, and occur chiefly at the top of the sponge.

Embryos. Also in this sponge embryos are found in most specimens and in very great numbers. They are situated in cavities in the tissue. They are very varying in size, from 0·05—0·23^{mm}. The larger ones are provided with both megascleres and microscleres. The megascleres are styli which are straight or more or less curved. They reach a length of 0·16^{mm}. According to the stage of development of the embryo they are of different thickness, from rather fine ones to ca. 0·007^{mm} at the upper end. The megascleres seem to appear first, as in the smaller embryos with fine styli no chelæ were seen. The styli are collected into a bundle reaching almost quite through the embryo, some of them have the point turned one way, some the other way. When the embryonic styli are somewhat curved, they remind very much of the curved styli occurring in the lower part of the stalk of the sponge, but they do not reach the size of these latter [1]. The chelæ of the embryos are here of the same size as those of the grown sponge, only in a few cases they seemed to be a trifle smaller. In the smallest embryos no spicules were found. Levinsen thinks that in this species a formation of buds takes place in the point of the lateral branches. I am inclined to think that the question is of embryos leaving the sponge through the lateral branches, which, as before mentioned, perhaps act as oscula. I have not seen embryos lying in the branches, but they are often seen lying at their base, and in some cases they were found hanging at the very point of the branches.

This species, which by Levinsen l. c. has been established as a variety, is, besides by other characters, also by its spicules, as well megascleres as both forms of microscleres, separated from the preceding one in a constant and sure way. Levinsen's statement, that the styli are longer and finer than in the preceding species, is not quite correct; they are longer, to be sure, but at the same time they reach a greater thickness. Armauer Hansen's figures quoted above, I suppose to belong to this species. As mentioned under the preceding species I have been able to decide by an examination of a type-specimen that one of the specimens of *Esperella Fristedtii* mentioned by Lambe belongs to this species, viz. the specimen with longer and thicker styli and smaller chelæ. Thus Lambe's species *E. Fristedtii* must be dropped.

Locality: By the Ingolf Expedition the species has been taken on station 44, 61° 42' Lat. N., 9° 36' Long.W., depth 545 fathoms; station 143, 62° 58' Lat. N., 7° 09' Long.W., depth 388 fathoms (bottom temperature ÷ 0·4 C.); we have it further from the following localities: 61° 30' Lat. N., 4° 26' Long.W., depth 505 fathoms (bottom temperature ÷ 0°4 C.) (Wandel); 70° 32' Lat. N., 8° 10' Long. W., depth 470 fathoms (the East Greenland Exp. 1890—91); 62° 40' Lat. N., 1° 56' Long. E., depth 365 fathoms (bottom temperature ÷ 0°3 C.); 60° 09' Lat. N., 5° 22' Long.W., depth 620 fathoms (bottom temperature ÷ 0°15 C.) (Ad. Jensen, the cruise of the »Michael Sars« 1902). Nine specimens have been taken in all. The localities are situated east and west of the Faröe Islands, west of the Shetland Islands, between the Faröe Islands and Norway, and south of Jan Mayen.

Geogr. distr. The Kara Sea, depths 51—81 fathoms (Levinsen), the Baffin Bay, depth 130 fa-

[1] As these sponges are most frequently highly filled with embryos, it will generally be the fact, that embryonic spicules are found in the spicula-preparations, and by judging of the spiculation attention must be paid to this fact.

thoms (Lambe). Also this species seems to be a native of the cold bottom: to be sure, a bottom temperature of 4°8 C. is stated for station 44; but in its immediate neighbourhood, on station 43, so low a positive temperature as 0°5 C. is found.

It is worthy of notice that in the three species of the subgenus *Asbestopluma* and the two *Lycopodina*-species now treated, which are in all principal respects of the same outer form, the skeleton of the axis is formed in a somewhat different way. In *pennatula* only few spicules are found in the middle of the axis, and also between the canals only narrow spicula-parts occur; outermost, on the other hand, there is a powerful spicula-layer, to which the firmness of the axis is especially owing. In *bihamatifera* a circle of powerful fibres is found, and outermost only a thin spicula-layer. In *furcata* the axial skeleton is divided into more or less narrow spicula-parts, and outermost is found a rather powerful spicula-layer. In *cupressiformis* we find a strong skeletal axis situated in the middle, the spicules of which may be more or less gathered into fibres, which are then connected by a network of not parallel spicules. In *lycopodium*, finally, there is a circle of separate fibres, and here no spicula-layer is found outermost.

6. **A. hydra** n. sp.

Pl. II, Figs. 18, 19. Pl. XI, Fig. 8 a—f.

Formed like a tree with branches issuing from the upper end of a stalk. The skeleton consists in the stalk of a spicula axis, in the upper end of which the fibres of the branches are inserted. Spicula: Megasclera subtylostyli, in the axis 0·47—0·8^{mm}, in the branches 0·35—0·60^{mm}; microsclera of one form, anisochelæ palmatæ of the characteristic type 0·012—0·014^{mm}.

This small *Lycopodina*-species is of an exceedingly beautiful and elegant form. It consists of a stalk ending in a swelling above, from which issues a number of thin, undivided branches. Below it is by an expanded basal part attached to a small stone, a lump of sand, or the like. The stalk is cylindric and straight. The sponge is of small size, the largest specimen is 12^{mm} high, and the greatest length of the branches is 4—5^{mm}. The stalk is only ca. 0·15^{mm} thick, and the branches ca. 0·05^{mm}. The smallest specimen is 5^{mm} high. The branches may be of somewhat varying length, and in a few cases they are quite short or almost wanting. In the latter case the upper side of the swelling is densely shaggy from projecting spicules, which, as far as I have been able to decide, belong to the thinner form, occurring in the branches. The swelling, from which the branches issue, seems also to be always larger and more compact, when the branches are quite short or wanting, than when they are present in their full length; therefore I am also here inclined to think that the branches are able to contract. The consistency is firm, as the greater part of the sponge consists of spicules with comparatively little soft tissue, but the sponge is flexible and elastic. The colour (in spirit) is white or slightly whitish yellow. The *surface* is smooth on the upper part of the stalk and the branches, only in the ends of the branches the spicules project. The lower part of the stalk and the basal expansion are shaggy from projecting spicules. On the stalk and the branches only a very thin layer of tissue is seen; on the thickened part between the bases of the branches, on the other hand, there is a thicker layer of tissue, which is bounded outwardly by a *dermal membrane*, supported by no particular skeleton, but provided only with microscleres. *Pores* and *oscula* were not seen.

The *skeleton*. In the stalk the skeleton consists of needles closely united and parallel to the longitudinal axis. The spicula-axis formed in this way divides above into a number of more or less distinctly separated fibres bending a little outward, and between these fibres those of the branches are inserted. These latter fibres also consist of closely united, parallel spicules. As will be more particularly mentioned below, the spicules of the stalk are thicker and more fusiform, those of the branches more slender and less fusiform. In the stalk a rather slight amount of very clear spongin is found.

Spicula: a. *Megasclera* are subtylostyli of two forms, those of the stalk and those of the branches. The subtylostyli of the stalk are straight, rather thick, and highly fusiform, tapering much towards the head-end; the tapering may otherwise be somewhat varying. They have a head-swelling which is most frequently inconsiderable, and almost always placed a little below the end. The opposite end tapers from the middle evenly towards the point, but the end itself is somewhat more abruptly pointed, especially in the thicker ones. The length is rather varying, from 0·47—0·8^{mm}, and the thickness from 0·017—0·028^{mm}, the thickest ones being far from always the longest ones. The spicules of the branches are likewise straight, or very slightly curved, fusiform subtylostyli, but they are somewhat slenderer than those of the stalk, and so they are not so markedly fusiform as those. The swelling of the head-end is a little more pronounced, and is also here placed a little below the end. The opposite end is long and evenly tapering. Their length varies between 0·35—0·6^{mm}, and the thickness varies proportionately between 0·006—0·014^{mm}. As mentioned above the larger spicules form the skeleton of the stalk, and the smaller ones that of the branches, which is formed exclusively by these latter, but they may also be found in small number in the periphery of the stalk, and the spicules projecting in the lower part of the stalk are of this form. Thus the two forms of spicules have each of them a special place of occurrence, and they show also so much difference as to form, that they may generally be referred at once to their separate group. It is, however, scarcely to be supposed that they form two fundamentally different forms, as transitions are found between them, and these transitional forms occur exactly at the place where the stalk and the branches pass into each other. Here, in the thickened part, from which the branches issue, transitional forms are found that may be referred to one form as well as to the other. The basal expansion is formed by both kinds of spicules, the prominent ones seem chiefly to belong to the smaller form; but here again the two forms are not sharply separated, but transitional forms occur. b. *Microsclera:* these are of one kind only, anisochelæ palmatæ of the *Lycopodina*-type; they have a form quite similar to that of the chelæ in the two preceding species, but they are a little smaller, the length is 0·012—0·014^{mm}, most frequently, however, the latter length; the breadth is 0·005^{mm}. The chelæ, as usual, occur throughout the tissue, but are especially numerous in the dermal membrane.

Locality: Of this small, interesting, and beautiful species, which is easily recognizable by its outer form alone, the Ingolf-Expedition has obtained fifteen specimens in all; most of them were not found till after the return of the Expedition, when they were discovered in the bottom specimens growing on pebbles and particles of gravel. Station 113, 69° 31' Lat. N., 7° 06' Long. W., depth 1309 fathoms (bottom temperature ÷ 1°0 C.), thirteen specimens; station 119, 67° 53' Lat. N., 10° 19' Long. W., depth 1010 fathoms (bottom temperature ÷ 1°0 C.), two specimens. Thus also this species is a native of the cold bottom, and it is only known from great depths. Both the stations are situated between Iceland and Jan Mayen.

Cotylina n. subg.

Formed like a calyx (or head) on a rather long stalk. The skeleton consists in the stalk of a spicula-axis, in the calyx-wall of more irregular arranged spicules. Spicula: Megasclera styli or subtylostyli, often divided into several forms occurring in fixed places in the sponge; microsclera: the characteristic anisochelæ palmatæ have the alæ of the larger end reaching to about the middle of the shaft, the smaller end is somewhat longer than in Lycopodina, of a similar structure, but elliptical in a transverse section; to the chelæ may be added forcipes.

7. A. infundibulum Levins.

Pl. II, Figs. 20—21. Pl. XI, Fig. 9 a—m.

1874. *Esperia cupressiformis* Carter, partim, specimen in interclusione commemoratum, Ann. Mag. Nat. Hist. Ser. 4, XIV, 215, Pl. XIV, fig. 19 a, b.

1885. *Esperia bihamatifera* Armauer Hansen, partim, the Norwegian North-Atlantic Exp. XIII, Spongiadæ, Pl. III, fig. 6.

1887. *Esperella infundibulum* Levinsen, Dijmphna Togtets zool.-bot. Udbytte 366, 19, Tab. XXIX, Fig. 14, Tab. XXXI, Fig. 17—19.

Formed like a calyx on a long stalk. The skeleton consists in the stalk of a spicula-axis, in the calyx-wall of less regularly arranged spicules; on the outside of the calyx spicules project. Spicula: Megasclera of three forms, styli or subtylostyli in the axis and the calyx-wall 0·17—0·83^{mm}, styli with a very long, fine point, projecting on the outside of the calyx 0·44—0·6^{mm}, subtylostyli in the refolded edge of the calyx 0·149—0·22^{mm}; microsclera of two forms, the characteristic anisochelæ palmatæ 0·018—0·027^{mm}, forcipes 0·075^{mm}.

This species is formed like a calyx placed on a long, thin stalk. The calyx may be somewhat differently shaped; most frequently it has a regular form as a short funnel and with a wide round opening, but sometimes it is highly compressed, so that the two sides are closely joined, and the opening becomes a narrow slit. Of the specimens from the Ingolf-Expedition one is torn off, the other is attached to some sponge-spicules. From the Kara Sea we have it attached to tubes of *Pectinaria hyperborea*. The largest specimen in hand (from the Kara Sea) is 50^{mm} high, of which the stalk makes 42^{mm}; the compressed calyx is ca. 10^{mm} in diameter. The stalk is very thin, 0·5—1^{mm}, a little thicker below than above. The smallest specimen is 14^{mm} high, and has a very small calyx of a diameter of only 1·5^{mm}. The edge of the calyx looks as if it was thickened, but this is owing to the fact that the edge is refolded, and the fold fits closely to the inside. The calyx is of a rather soft consistency, the stalk firm, but flexible. The colour (in spirit) is a dirty cream-colour. The surface, both of the stalk and of the outside of the calyx, is shaggy from projecting spicules. There is a thin *dermal membrane*, which on the outside of the calyx is pierced by the projecting spicules. *Pores* and *oscula* have not been seen with certainty; on the outside were seen scattered openings of different sizes, and in one specimen there were a few openings in the bottom of the calyx; but in both cases the question is possibly only of damagings of the soft tissue.

The *skeleton*. The skeleton of the stalk consists of an axis of closely united needles parallel to each other, between which are interwoven other needles which jut out horizontally. Above the axis is divided more or less distinctly into fibres that pass into the skeleton of the calyx. In the calyx-wall the skeleton consists of needles which are not united into fibres, and a great part of which are placed chiefly in the longitudinal direction; they are not, however, parallel to each other, but intercross irregularly, and some are also found placed in other directions. Between these needles spicules and spicula-bundles are inserted on the outside, projecting through the surface and directed somewhat upwards; the inside of the calyx, on the other hand, is smooth without projecting spicules. In the upper part of the calyx-wall the spicules are closely packed and parallel to each other; in the refolded edge spicules are found of a special size, as will be more particularly mentioned below; moreover, this edge is highly filled with chelæ. Spongin is found, at all events in the stalk.

Spicula: a. *Megasclera.* These are styli or subtylostyli; they fall under several forms which also occur in different places of the sponge, but on account of the slight material, I have had some difficulty in examining this fact. The skeleton of the stalk and the greater part of that of the calyx consists of long, slender styli, which have sometimes a small head-swelling. They are fusiform, tapering a little towards the head-end, and they have an evenly tapering, middle-long point. Downward in the stalk they become shorter and also somewhat curved, and the spicules that are horizontally interwoven in the stalk and projecting are all short and curved. In most individuals these projecting, shorter, and a little curved needles deviate further by having a more or less distinct head, so that they become tylostyli. Taken as a whole these styli vary from ca. 0·17—0·83^{mm}, but in the calyx and the upper part of the stalk they do not generally go below ca. 0·3^{mm}; the thickness is 0·0057—0·011^{mm}. Besides these styli, which form, accordingly, the principal part of the skeleton, still two other forms are found; the first of these are very slender styli, showing sometimes an almost imperceptible head-swelling; they are considerably finer than the preceding ones, and they have a very long, fine point, almost always with an even curve; their length is between 0·44—0·6^{mm}; in their lower part they are slightly fusiform, and their thickness in the thickest part is at most 0·007^{mm}. These spicules are found outermost in the calyx-wall and project from it; they seem mostly, but not exclusively, to form the projecting spicules. The third form of megascleres are short, straight tylostyli or subtylostyli; the head is tolerably well marked and placed a little below the rounded end, the point is short. Their length is 0·149—0·22^{mm}, and the thickness is 0·006^{mm}. These spicules are found in the refolded edge, and they form the spiculation of this edge. These three forms of spicules, of which only the first-mentioned form is very varying, while the two other forms are rather constant as to form and size, do not appear to be connected by transitional forms. b. *Microsclera.* These are anisochelæ palmatæ and forcipes. 1. The anisochelæ are *Asbestopluma*-chelæ of a structure characteristic of the subgenus. The alæ of the larger end do not reach so far down along the shaft as in the chelæ of the two other subgenera, only to about the middle of the shaft; they bend somewhat forward towards the tooth; together they form almost a triangle, and they go in to the shaft with a somewhat indented lower edge. The tooth is elliptical, of about the same length as the alæ, but much narrower; it has a long, narrow, downward pointed tuberculum. It is very difficult to get a clear view of the structure of the smaller end on account of the fineness and transparency of the parts. The structure of this end may best be compared with that in *A. cupressiformis*, but it is comparatively larger, and the parts are of a somewhat different form. When the chela is viewed from the side, two long, narrow, ridge-shaped bodies that are parallel to each other and run close together are seen at the lower end of the axis. If the chela is turned with the lower end directly towards the beholder, it is seen that the question, as usual, is of alæ and tooth, but the optical transverse section does not, as in *cupressiformis*, form a circle, but on the contrary an ellipsis placed transversely, alæ and tooth being nearer to each other and therefore less refolded on the side, where they are separated by a quite narrow slit (Pl. XI, fig. 9 h). When the chela is viewed from the front under sufficient magnifying powers, it is seen that the alæ form together an almost quadrangular plate, the upper corners are somewhat drawn out, and there is a round incision about to the middle of the ala, which gives to the plate formed by the alæ a shield-shaped appearance. The upper edges of the alæ continue inward to about the median line of the shaft and form two projections separated from the outdrawn corners by a curve. The tooth is of a similar form as the plate formed by the alæ, the upper edge has three teeth, and the upper half of the lateral edges is cut off obliquely. Thus, as in *cupressiformis*, only the lower half of the lateral edges of the alæ and tooth is refolded and meets on the side. The drawn-out upper corners of the alæ and the mentioned middle projections are directed forward, and when the chela is viewed from the side, they form the forward directed upper part of the hindmost of the two parallel ridges. The tooth has an oblong, somewhat club-shaped tuberculum which is broadest upward. The chela varies somewhat in size, not so much in one individual, but rather considerably in different individuals. Together with the variation as to size we find some variation as to form, as the dimensions of the different parts of the chela may change somewhat. Especially in the smaller chelæ the smaller end is comparatively longer and the middle part of the shaft a little shorter. The upper corners of the alæ are often more drawn out and together with the middle projections directed more forward. The whole smaller end is at the same time more narrow, and the larger chelæ are upon the whole comparatively more robust than the smaller ones. The chelæ occurring in the embryos show new differences, the larger end and especially the tooth being longer, so that the two ends of the chela almost meet. The length of the chelæ varies from 0·018—0·027^{mm} [1], the greatest breadth varies proportionately from 0·010—0·014^{mm}, and the thickness of the shaft from ca. 0·001—0·004^{mm}. Developmental forms of the chela are found rather abundantly, in all stages, from quite fine ones to the fully developed ones. 2. Forcipes; these seem always to have the form figured by Levinsen l. c., with one leg crossing the other; they are a little thickened above in the curve, the legs are exceedingly fine, and end in a little knob. The length is about 0·075^{mm}, and the thickness of the legs in the middle is less than

[1]) When in one individual both large chelæ and quite small ones are found, and when chelæ are found considerably smaller than the given measures, this is owing to the fact that these chelæ belong to the embryos; see below under Embryos.

$0{\cdot}001^{mm}$. The chelæ occur in large quantities, especially in the skin and also down on the stalk; they are found in enormous numbers in the refolded edge the spiculation of which they form together with the mentioned short tylostyli. Forcipes are very few.

Embryos. In most specimens of this sponge embryos were found; they are situated in the calyx-wall, rather close-lying, and in rather large numbers. They are globular, of somewhat different size up to $0{\cdot}18^{mm}$ in diameter. Their spiculation is somewhat interesting. They have both megasclera and microsclera; the microsclera are chelæ of the same form as in the grown ones, but they are smaller, they were thus measured to $0{\cdot}014^{mm}$. That some difference is also seen in the dimensions of the single parts has already been mentioned under the chelæ. The megasclera show no likeness at all with those of the grown sponge; they are more or less irregularly, often highly curved, and they may be of different forms as strongyla, styli, or oxea, and they have swellings in different places; most frequently they are strongyla. In the largest of the embryos they were measured of a length of about $0{\cdot}1^{mm}$ and a thickness of $0{\cdot}007$—$0{\cdot}008^{mm}$, but in the smaller embryos they are considerably finer. In the examined embryos they were only present in small numbers, about ten needles in each embryo.

Remarks: After Carter's mentioning and figure l. c., there can scarcely be any doubt that the form mentioned there in the parenthesis is *infundibulum*; in the specimen before him the calyx must then have been in a compressed state. Also Armauer Hansen's figures cited above are surely *infundibulum*. As I have had Levinsen's type specimens from the Kara Sea for examination, I have been able to determine the species with certainty. Levinsen, by his mentioning of the chelæ, states that in a specimen of *cupressiformis* he has found the same chela as that occurring in *infundibulum*, only, however, to a number of five; therefore he thinks that this chela is identical with the one figured by Vosmaer (Niederl. Arch. für Zool. Suppl. Band I, Pl. I, figs. 109—110) as belonging to the species enumerated as *Cladorhiza bihamatifera*, as he supposes *cupressiformis* and *bihamatifera* to be one species. As will have been seen before under *bihamatifera*, this, however, is not the fact; Vosmaer's species is *pennatula*, and the large chela in this species as well as in *bihamatifera* is of a quite different type, and the five chelæ found by Levinsen in *cupressiformis* must have been extraneous bodies; extraneous microsclera are frequently found, especially microsclera from sponges growing in the same place. With regard to the description of the smaller part of the chela Levinsen has not interpreted the form of this part correctly. His figures are good, and show the occurring variations in an excellent manner; but by the magnifying powers he has used, he has not been able to get a view of the fact that the smaller end consists in the common way of alæ and tooth, but interprets this end as forming a cup, at the bottom of which the tuberculum is placed.

Locality: Station 116, 70° 05' Lat. N., 8° 26' Long. W., depth 371 fathoms (bottom temperature ÷ 0°4 C.); station 126, 67° 19' Lat. N., 15° 52' Long. W., depth 293 fathoms (bottom temperature ÷ 0°5 C.); station 143, 62° 58' Lat. N., 7° 09' Long. W., depth 388 fathoms (bottom temperature ÷ 0°4 C.). These three stations are situated north of the Faröe Islands, north of Iceland, and south of Jan Mayen, and they are all in the cold area.

Geogr. distr. With regard to the specimens of the Norwegian North Atlantic Expedition, the particular locality is not known; Carter's specimen was taken by the »Porcupine» south of the

Faröe Islands, depths 363 fathoms and bottom temperature ÷ 0°3 C. Levinsen's specimens are from the Kara Sea, depths 50—70 fathoms, the bottom temperature is also here negative. From these facts it is seen that the species is a native of a bottom with negative temperature.

8. **A. comata** n. sp.

Pl. II, Figs. 22—23. Pl. XII, Fig. 1 a—f.

Formed as a compressed calyx on a stalk; the upper end of the calyx with a fringe of exceedingly fine spicules. The skeleton consists in the stalk of a spicula axis, in the calyx-wall of needles, partly placed in the longitudinal direction; from stalk and calyx spicules project. Spicula: Megasclera of four forms, styli in the axis 0·44—0·51mm, subtylostyli in the calyx-wall 0·238—0·476mm, subtylostyli in the refolded calyx-edge 0·149—0·23mm, and styli with a long, curved, very fine point, projecting from the stalk and the calyx and forming the upper fringe 0·7—1·4mm, between them pearl-string-formed styli: microsclera of one form, anisochelæ palmatæ of the characteristic type 0·017—0·019mm.

Of this species we have only one specimen, and the fact of this species being of a very slight size has somewhat hindered the examination. As to the exterior it is somewhat similar to *infundibulum*, and is formed as a calyx on a thin stalk; the calyx is highly compressed, and consequently flat. From the stalk and the calyx long, hair-like needles project and form round the edge of the calyx a fringe which is, however, little conspicuous to the naked eye. The stalk is below for some way attached to a sponge-spicule, which accordingly serves as a substratum for the sponge. The total height of the sponge is 10mm, of which the stalk is fully 7mm. The breadth of the calyx is 2mm, and the thickness of the stalk only 0·10mm The colour (in spirit) is whitish The *surface*, as before mentioned, is shaggy from long, hair-like spicules. With regard to *dermal membrane, pores* and *oscula* I can say nothing.

The *skeleton*. In the stalk the skeleton consists of an axis of closely united parallel spicules. From this axis fine, long-pointed spicules issue; with their head-end they are interwoven between the spicules of the axis, or otherwise attached to the axis, and they are very projecting; in the lower part of the stalk they project almost horizontally, but they become the more upwardly directed, the farther up the stalk we go. The stalk passes gradually into the calyx; in the lower part of the calyx-wall the spicules are not arranged in any observable order; some are lying in the longitudinal direction, but otherwise they are lying in all directions parallel to that in which the wall extends. In the upper half of the calyx-wall the spicules are arranged in such a manner as to be lying chiefly or exclusively in the longitudinal direction parallel to each other, and from here issue the spicules that form the mentioned fringe along the edge of the calyx. In the upper edge of the calyx, which is also refolded in this species, shorter spicules of a particular form are found. In the stalk spongin was observed.

Spicula: Megasclera; these are styli or subtylostyli, and they occur in several forms. The axis of the stalk is formed by styli which are straight or most frequently slightly curved; they are fusiform, tapering somewhat towards the head-end, the opposite end grows evenly thinner to a long point. Their size seems to be rather constant, their length was measured to 0·44—0·51mm, the thickness is

0·011—0·012mm. The needles chiefly forming the skeleton of the calyx-wall are of a somewhat different form; they are straight or, more rarely, a little curved subtylostyli with a rather distinct, but small head-swelling, placed a little below the end; they are only a little thicker in the middle than at the upper end; the point is even, but not long. The length was measured from ca. 0·238—0·475mm, and the thickness is 0·007—0·008mm. Besides these two forms short subtylostyli occur abundantly in the mentioned refolded edge; they are of quite the same form as the preceding ones, the length is from 0·149mm to about 0·23mm, and the thickness is 0·005—0·007mm; as mentioned, they occur only in the refolded edge, but their size, which passes into the size of the other subtylostyli, seems to make it doubtful whether these two kinds of subtylostyli are really different. The fourth form of megasclera is the one most characteristic of the species; it is the long spicules projecting from stalk and calyx and forming the crown at the top. They are long, thin styli running out into a very long and very fine point. They are almost always evenly curved in the outer part; sometimes the curving is a little irregular. Their length is very varying, it may be given to between 0·7 and 1·4mm [1]). The thickness at the head-end is ca. 0·005mm. Down at the base of the stalk they seem to be shorter, and these short needles often have a head-swelling. Among the projecting needles some are found of a very characteristic appearance; in a shorter or longer portion of their outer part they have a series of ring-like swellings, so that they get an appearance like a string of pearls; together with this feature they have often a somewhat shorter point, and their length may then go down to 0·65mm, and they are likewise often somewhat more robust, of a thickness of up to 0·01mm. As these needles have otherwise the same form and occurrence as the other projecting ones, they are scarcely anything else than a variation of the same type. The needles projecting from the axis are partly interwoven between the parallel spicules of the axis, partly they are, a great deal of them, attached to its outside. b. *Microsclera:* these are only of one kind, anisochelæ palmatæ, and they are of quite the same structure as the chelæ in *infundibulum;* their length is 0·017—0·019mm and the breadth 0·008mm. They are present in great numbers and occur especially abundantly in the refolded edge of the calyx.

This species seems to be closely allied to *A. infundibulum*, both on account of the outer form and of the projecting, long pointed styli, but it differs from it among other things by other sizes of the different forms of needles, and by the occurrence of peculiar, pearl-string-shaped needles. These spicules recall to some degree those in *Meliiderma stipitata* described and figured by Ridley and Dendy, but these latter are much shorter and shorter pointed.

Locality: Station 78, 60° 37' Lat. N., 27° 52' Long. W., depth 799 fathoms; the station is situated on the eastern slope of the Reykjanes-ridge.

The genus *Asbestopluma* forms a well characterized genus, the species of which are also characteristic in their exterior by being all of erect and symmetrical form, and also the skeletal structure shows great conformity. Outside this genus a similar form occurs in *Cladorhiza*, and among the

[1]) Exact limits for the length of these spicules cannot be given, as the outermost point is wanting in almost all of them.

Esperiopsis-species one species is found, *E. symmetrica* R. and D. (Chall. Report. XX, 77, Pl. XXVI, figs. 4, 4 a), which shows, in its outer form and skeletal structure, very great conformity to several of the *Asbestopluma*-species. A conspicuous peculiarity common to the *Asbestopluma*-species is the fact, that embryos are so often found. Also in the mentioned *Esperiopsis*-species embryos were found occurring in the same way as in the *Asbestopluma*-species. The embryos, otherwise, show some difference in the different species with regard to the spicules occurring in them. Embryos were found in the species *pennatula*, *furcata*, *cupressiformis*, *lycopodium*, and *infundibulum*. The difference in their spiculation may be seen in the following table:

	Size of the embryo	Spiculation
pennatula	0·5—1mm	No megasclera, only sigmata and the small chela. Sigmata seem to appear first.
furcata	0·3mm	Megasclera small subtylostyli of an average length of 0·208mm; microsclera sigmata and the small chela, both a little larger than in the grown sponge.
cupressiformis	0·05—0·27mm	Megasclera small subtylostyli, often irregularly formed, and styli, strongyla, etc., arranged in a bundle. The length up to 0·12mm; microsclera chelæ a little smaller than in the grown sponge.
lycopodium	0·05—0·23mm	Megasclera small, straight or curved, styli arranged in a bundle, the length up to 0·16mm; microsclera chelæ of the same size as in the grown sponge. Megasclera appear first.
infundibulum	up to 0·18mm	Megasclera quite irregular styli, strongyla or oxea, the length up to 0·1mm. Microsclera chelæ a little smaller than in the grown sponge.

Among the earlier described *Asbestopluma*-species embryos are mentioned in two, viz. in *biserialis* R. and D., in which, as in *pennatula* and *furcata*, they are found in the axis; the only thing said of them is that they have numerous spicules; further in *versatilis* Tops., of which it is stated that they have of megasclera oxea and strongyla, and of microsclera chelæ[1]).

Topsent, who, in 1901 (Résultats du Voy. du S. Y. Belgica, 23), takes up and diagnosticates the genus *Asbestopluma*, enumerates at the same time the six species which, in his opinion, belong to it, viz. *cupressiformis* Cart., *bihamatifera* Cart., *pennatula* Schmidt, *biserialis* R. and D., *Nordenskiöldii* Frstdt., and the new-established species *Belgica*. Of these species *Nordenskiöldii*, as above mentioned, is synonymous with *pennatula*. Some more species have been described, however, which Topsent has not noticed, but which belong here, viz. besides the already described *infundibulum* Levins., the species *versatilis*, established by Topsent himself in 1892 (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 100, Pl. VI, fig. 5, Pl. X, fig. 9), and by him referred to the genus *Forcepia*, as well as the *Esperella occidentalis* established in 1893 by Lambe (Transact. of the Roy. Soc. of Canada XI, Sect. IV, 28, Pl. II, figs. 6, 6 a—e), and the *E. minuta* established by Lambe in 1900 (ibid. Ser. 2, VI, Sect. IV, 23, Pl. I, figs. 3, 3 a—c). Thus besides the eight species taken by the Ingolf, the following ones belong to this genus: *biserialis* R. and D., *Belgica* Tops., *occidentalis* Lambe, *versatilis* Tops, and *minuta* Lambe.

[1]) According to the statement of Topsent, it was to be supposed that the embryos had the microsclera occurring in the species, viz. chelæ and forcipes; but to judge from the figure they have only chelæ, and this, I suppose, is the correct thing.

A. biserialis R. and D. is a penniform species provided with axial styli, reaching a length of 2^{mm}, and subtylostyli in the branches $0{\cdot}44^{mm}$ long. Of microsclera are found palmate anisochelæ $0{\cdot}012^{mm}$ long, and sigmata $0{\cdot}025^{mm}$ long. Unfortunately no anisochelæ are figured, but they may certainly be taken to belong to the form peculiar to the subgenus *Asbestopluma*. Its combination of spicules places it nearest to *Belgica*, as sigmata and only one form of chelæ are found in it, but the arrangement of the lateral branches separates the two species sharply. Ridley and Dendy do not mention any stalk-coating, but there is some reason for believing that such a one is found; it may either have been overlooked or wanting in their two specimens both of which were broken off below.

A. Belgica Tops., as to its exterior, recalls *bihamatifera*; accordingly it has branches issuing all round, but the branches are arranged in groups of circles, and the groups are separated by naked intervals. The number of circles in the group varies from five to ten, but the number of branches in the circle is always six, and the branches are placed just over each other. The spiculation shows of megasclera axial styli $1{\cdot}4^{mm}$ long, with a little tapering upper end, and in the branches tylostyli ca. $0{\cdot}8^{mm}$ long, further in the stalk-coating curved, finely spinulous tylostrongyla of an average length of $0{\cdot}2^{mm}$. The microsclera are anisochelæ $0{\cdot}012^{mm}$ long and sigmata $0{\cdot}033^{mm}$ long. Topsent's figure shows that the anisochelæ are of the type characteristic of the subgenus *Asbestopluma*. This species, which is so interesting with regard to its exterior, is by the spicula-combination sharply separated from the other species, with the exception of *biserialis*, to which in this respect it is closely allied.

A. occidentalis Lambe is a species closely allied to *cupressiformis* and *lycopodium*, but separated from these not only by the sizes of the spicules, but also by the skeletal structure, as it has, besides a hollow middle axis of spicules, also an outer circle of spicula-fibres, while *lycopodium*, to which it is most closely allied, has no such outer circle. Megasclera are styli growing to a length of $1{\cdot}39^{mm}$; those found in the part of the branches inserted in the axis are given to a length of $0{\cdot}41$—$0{\cdot}68^{mm}$; microsclera are anisochelæ $0{\cdot}013^{mm}$ long, and forcipes $0{\cdot}032^{mm}$ long. From Lambe's figure of the chela it cannot be decided with certainty that it is of the form typical of the subgenus *Lycopodina*, but this will certainly prove to be the fact. To judge from the figure, forcipes have a particular form.

A. versatilis Tops. Topsent referred this species to the genus *Forcepia*, partly on account of the fact that forcipes are found in it, and partly because he found embryos, in which he found diactinal spicules which he took to be the dermal spicules of the species, which did not later develop further, so that they were wanting in the grown sponge. The species is, however, surely an *Asbestopluma* of the subgenus *Cotylina*, and seems to be closely allied to *infundibulum*, with which species it shows some conformity both in its exterior and its spiculation. That it is an *Asbestopluma* is seen from its chelæ, which, as far as can be seen from Topsent's figure, seem to belong to the *Cotylina*-type, and as forcipes are also found in this genus, their occurring here cannot solely justify the referring to *Forcepia*. Also its anisochelæ tell against referring it to this genus, as all the other *Forcepia*-species have isochelæ. With regard, finally, to the embryonic spicules, I do not think that the forms figured by Topsent recall the dermal spicules of the *Myxillinæ*. Quite similar spicules, as will have been seen, are found in the embryos of *infundibulum*, they are only more irregular, and also monactinal spicules are found between them. To be sure, the question is here of embryonic spicules that cannot be interpreted as special dermal spicules. The species has of megasclera styli 0·58^{mm} long, of microsclera anisochelæ 0·027^{mm} long, and forcipes 0·076^{mm} long [1]).

A. minuta Lambe might, as to its exterior, remind of *infundibulum*, but its spiculation is different. According to Lambe the megasclera are of two kinds, styli or subtylostyli 0·327—0·543^{mm} long and 0·006—0·008^{mm} thick which form the principal part of the skeleton, and small tylostyli 0·196—0·294^{mm} long and 0·005—0·006^{mm} thick which project from the surface. The microsclera are anisochelæ 0·018—0·019^{mm} long, which, to judge from the figure, may be said with certainty to belong to the *Cotylina*-type.

The genus *Asbestopluma*, consequently, is chiefly characterized by its erect symmetrical form with the skeletal structure contingent upon this form, and by the occurrence of a small chela of peculiar type. As will have been seen in the preceding, it is, however, with regard to both these features, divided into three groups, and to this division contributes further the occurrence in one of these groups of sigmata and of a stalk-coating with special spicules. The subgenus *Asbestopluma* s. str., formed for the first of these three groups, is accordingly characterized as to its form by distinct, often rather long, well separated lateral branches, by a small chela, the larger alæ of which reach far down towards the smaller end, which latter is narrow, and by the occurrence of sigmata and of a stalk-coating with a spiculation of finely spinulous tylostyli or tylostrongyla. On the other hand, the occurrence of the large chela cannot be used, as this chela is wanting in two of the species. The second subgenus, *Lycopodina*, is characterized by its often shorter, sometimes less well separated branches, which also sometimes all issue from the top of the stalk, and by a small chela, the larger alæ of which pass quite down to the opposite end of the chela, which end is broad and of a peculiar form. Sigmata and stalk-coating are not found. The occurrence of forcipes cannot be used, as these spicules partly are wanting in one species, and partly may be found in the third subgenus. This third subgenus, *Cotylina*, is well characterized by its form, which is as a calyx (or a head) on a stalk; it has a small chela, the larger alæ of which pass to about the middle of the shaft, the smaller end of the chela is constructed about as in the preceding subgenus, showing, however, characteristic differences, and a transverse section of it shows an elliptic contour. Sigmata and stalk-coating are not found, but forcipes occur in two of the species. Thus the two first subgenera are especially separated by the form of the chela, and by having or wanting sigmata and stalk-coating, the two last genera by the form of the chela and by the outer form of the sponge. Whether the peculiar, long pointed, projecting spicules occurring in two of the described species of the subgenus *Cotylina* may possibly prove to be characteristic of the genus, cannot yet be decided.

According to the account rendered in the preceding of the species that have not been fully treated here, all the known *Asbestopluma*-species may, as far as the fact can be decided from the literature, be grouped in the following way in the established three subgenera:

[1]) In Topsent's work from 1904, which I have received later, the author himself draws the attention to the fact that *versatilis* is to be referred here.

Asbestopluma s. str.

pennatula O. S. *biserialis* R. and D.
bihamatifera Cart. *Belgica* Tops.
furcata mihi.

Lycopodina n.

cupressiformis Cart. *occidentalis* Lambe
lycopodium Levins. *hydra* mihi.

Cotylina n.

infundibulum Levins. *comata* mihi
versatilis Tops. *minuta* Lambe.

A systematic survey of all *Asbestopluma*-species may be given as follows:

a. Sigmata are found; stalk-coating also *(biserialis?)*:
- *b.* Two forms of chelæ; besides the *Asbestopluma*-chela a larger chela of a different type:
  - *c.* The lateral branches arranged biserially; the spicules of the stalk-coating tylostrongyla .... *pennatula* O. S.
  - *c.c.* The lateral branches arranged pluriserially:
    - *d.* The spicules of the stalk-coating tylostyli .... *bihamatifera* Cart.
    - *d.d.* The spicules of the stalk-coating tylostrongyla; the lateral branches very small .... *furcata* n. sp.
- *b.b.* Only one form of chelæ:
  - *c.* The lateral branches arranged pluriserially .... *Belgica* Tops.
  - *c.c.* The lateral branches arranged biserially .... *biserialis* R. and D.

a.a. No sigmata; no stalk-coating:
- *b.* More or less marked lateral branches, or the branches all issuing from the top of the stalk. (Sometimes leaf-shaped without lateral branches):
  - *c.* Forcipes are found; the branches are lateral:
    - *d.* The fibres of the lateral branches do not go to the middle of the axis, chelæ 0·023—0·025^{mm}, forcipes 0·038—0·048^{mm} .... *cupressiformis* Cart.
    - *d.d.* The fibres of the lateral branches are going to the middle of the axis:
      - *e.* No spicula-fibres outside the axis; chelæ 0·014—0·017^{mm}, forcipes 0·050—0·056^{mm} .... *lycopodium* Levins.
      - *e.e.* Spicula-fibres outside the axis; chelæ 0·013^{mm}, forcipes 0·032^{mm} *occidentalis* Lambe.
  - *c.c.* No forcipes; the branches issuing from the top of the stalk; chelæ 0·012—0·014^{mm} .... *hydra* n. sp.

b.b. Formed as an open or compressed calyx (or head) on a stalk:

c. Forcipes are found:

d. Calyx-shaped; several forms of megasclera, among which projecting, long and finely pointed styli; chelæ 0·018—0·027^{mm}, forcipes 0·075^{mm} .... *infundibulum* Levins.

d.d. Not calyx-shaped; only one form of megasclera; chelæ 0·027^{mm}, forcipes 0·076^{mm} .... *versatilis* Tops.

c.c. No forcipes:

d. A fringe of spicules round the edge of the calyx; projecting spicules very long and fine styli, some of them pearl-string-shaped; chelæ 0·017—0·019^{mm} .... *comata* n. sp.

d.d. No fringe of spicules; projecting spicules short subtylostyli; chelæ 0·018—0·019^{mm} .... *minuta* Lambe.

Cladorhiza M. Sars.

Erect sponges of definite form; branched in different ways or unbranched; often consisting of a middle axis sending off branches to two sides or all round, more or less regularly, or branched from the base. Below the axis most frequently divides into a more or less richly branched root. The middle axis and the branches carry short branchlets issuing all round and close-set, or these branchlets are gathered at the top as a circle or a head, and then they are considerably longer. The skeleton is closely dependent on the form: it consists in axes and branches of a powerful, polyspicular fibre, often of great thickness; in this fibre are inserted the fibres supporting the branchlets. In the axial fibres spongin is found. Spicula: megasclera are oftenest styli, sometimes oxea; subtylostyli may occur; microsclera: the characteristic microsclera are anisancoræ unguiferæ with three to five teeth in either end, sometimes up to nine teeth in the larger end; the ancoræ may be found alone or together with sigmata of one or two forms.

With regard to the external form, as I have described it in the diagnosis, I shall remark that I entirely follow the opinion put forth by Topsent (Sur l'orientation des Crinorhiza, Compt. Rend. Acad. des Sc. 1902), and accordingly I am of opinion that Ridley and Dendy in Challeng. Report have turned their *C. longipinna, similis,* and *inversa,* as also their *Axoniderma mirabile* and *Chondrocladia crinita* upside down. There can scarcely be any doubt that what they have had before them is nothing but torn off upper parts of sponges.

The *Cladorhiza*-species seem, according to their form, to fall under two groups; one consists of slender, unbranched or, most frequently, branched forms the axes and branches of which carry everywhere short branchlets; the other group consists of forms with an unbranched stalk or axis carrying above branches gathered in a circle or a head. These branches reach a considerably greater length than the branchlets of the other group, but they are, however, surely to be regarded as formations of the same kind, and do not correspond to the branchings of the axis. The fact is that the branches of *C. morula* must be supposed to completely correspond to the branches in *longipinna, similis,* and *inversa*, and the figure of the skeletal structure in *morula* (l. c. 91) shows that the fibres of the branches are inserted in the same way as those of the branchlets of the species of the other group. The same fact is otherwise shown by the figure of the skeleton in *Axoniderma mirabile* (l. c. 97). The branchlets in the *Cladorhiza*-species must be regarded as corresponding to what I have called the lateral branches in the *Asbestopluma*-species, as they are inserted in the axis in a quite similar way. Also in the genus *Asbestopluma*, subgenus *Lycopodina*, a species is found, *A. hydra*, which, instead of having lateral branches along the axis, has the branches collected at the top.

1. C. abyssicola M. Sars.

Pl. XII, Fig. 2 a—f.

1872. *Cladorhiza abyssicola* M. Sars, On some remarkable forms of animal life I (by G. O. Sars), 65, Pl. VI, figs. 16—34.

1875. *Cladorhiza abyssicola* O. Schmidt, Jahresber. d. Comm. zur wissenschaftl. Unters. der deutsch. Meere in Kiel für 1872—73, 119, Taf. I, Fig. 13.

1878. *Cladorhiza abyssicola* v. Marenzeller, Coelent. etc. d. österreich-ungar. Nordpol-Exp., Denkschrift. d. Kais. Akad. d. Wissenschaft. Math. Nat. Cl. XXXV, 371.

1896. *Cladorhiza abyssicola* Lambe, Proc. of the Roy. Soc. of Canada, Ser. 2, II, Sect. IV, 188, Pl. I, figs. 8, 8 a—e.

Slender, unbranched (young specimens), or with rather long branches issuing from a central axis; below a richly branched root. The skeleton arranged in the way characteristic of the genus. Spicula: Megasclera styli 0·39—0·73^{mm}; microsclera of three forms, anisancoræ unguiferæ with five teeth 0·021—0·025^{mm}, sigmata of two forms, large ones 0·078—0·10^{mm}, small ones with compressed end parts 0·040—0·042^{mm}.

Of this species I have had only a slight material, and I therefore am only able to add little new to the very good and exhaustive description given by Sars. Of the specimens in hand the largest ones agree, as to their external form, with the description of Sars. They consist of a stalk, divided below into a great number of branches or fibres, so that a richly branched root is formed; to this root some bottom-material is still attached, among other things tubes of *Rhabdammina*. The stalk is straight and from it go off lateral branches issuing at about right angles, only directed a little upwards. The lateral branches may be of different lengths, but generally they are longest below. The distance between them is different. The branches may be directed to different sides, but upon the whole a certain bilaterality is prevailing. Besides the branched specimens we have a couple of smaller ones consisting only of a central stem without branches, but otherwise of the same structure. From the stalk and branches branchlets or filiform appendages issue everywhere and on all sides. They are thin, thickest at the base, and tapering a little outward; they may be of somewhat varying length, but reach at most a length of ca. 5^{mm}. The branchlets are directed upwards in a somewhat arcuate way. At the point of the stalk and the branches they become short, and at the outermost end they are placed close together as quite small projections, whereby the stalk and branches here show a little swelling, as described and figured by Sars. Sars says that the branchlets are generally arranged in a circular way, my material is too much damaged to enable me to decide this fact with certainty. The largest of my specimens is, inclusive of the root, 75^{mm} high, but the specimen is not quite entire above; the longest branch is 25^{mm}, and the thickness of the stalk is fully 2^{mm}. The small unbranched specimens are 33^{mm} high. Thus this species would seem not to reach any considerable size; Sars gives the height of his specimen to 60^{mm}, and the specimens from the North Sea and the Gulf of St. Lawrence, mentioned by Schmidt and Lambe l. c., were smaller[1]. The colour of the sponge (in spirit) is white or slightly yellowish, often a little transparent; Sars states the colour in fresh specimens to be transparently yellow. On account of the axial skeleton the sponge is rather stiff and not very flexible; the outer layer of tissue is soft, and the branchlets are flexible. The *surface* is smooth, and only at the end of the branchlets projects the supporting fibre. No distinct *dermal membrane* was seen. *Pores* were not observed with certainty; here and there on the surface small circular openings were seen, but on account of the bad state of the material I dare not with certainty regard them as pores. *Oscula* were not found either. Nor have, as it is well known, pores and oscula been mentioned before in this sponge[2].

The *skeleton* consists, in the stalk and the branches, of a compact, polyspicular axis, the needles of which are parallel to each other and to the longitudinal direction; the axis of the stalk, however, is in the lower part somewhat spirally twisted. Below, the stalk, as mentioned, ends in a highly branched root, the branches of which taper more and more, till they end almost with only one spicule, or with a couple of spicules alongside each other. The branches on the stem are not inserted in the axis in the same way, as are the branchlets; it may rather be said that a cleaving takes place, some spicules by degrees bending to the side and forming the branch; in the angle between the stalk and the branches some spicules are found running evenly arcuately between the stalk and the branch, so that the angle is not seen sharply, but as a rounded curve. The skeleton of the branchlets is formed by a fibre passing through the branchlet to its end. It decreases in thickness outward, and accordingly it has here fewer spicules than farther in, most frequently it has here only a couple of spicules alongside. The fibres of the branchlets are inserted in the spicula-axis of the stalk or the branches, between the spicules of these axes, and they pass in to the centre, where, when several branchlets are placed at the same height, they meet. The part of the fibres of the branchlets that is inserted in the axis, is in

[1] Wyville Thomson states (The Depths of the Sea, 112), in a general and, otherwise, somewhat vague mention of *Cladorhiza*-species or *Cladorhiza*-like forms, that they may reach to an extent of $50-80^{cm}$. He says that at least three species occurred. It is not possible to decide, which species his statement refers to, but I suppose it is to the following ones. *C. abyssicola* is surely not among them, and we see also that the stations mentioned by Carter (Ann. Mag. Nat. Hist. Ser. 4, XVIII, 319), at which *Cladorhiza*-forms were taken, have, all of them, negative bottom temperatures, while *abyssicola* occurs on bottoms with positive temperatures.

[2] Ridley and Dendy (Challeng. Report, 87) say, under the species mentioned by them as *C. abyssicola* var. *rectangularis*: »The anatomy of the soft parts of this remarkable species has always been a mystery«. I do not see that this is to be said especially of this species. That pores, oscula, and canal-system have not been described is a fact that holds good of many sponge-species, and especially with regard to this sponge Sars has given several details beyond what is known of many other species. When he says that in the layer of tissue »absolutely no canals or cavities can be discerned«, this of course, is only the expression of the fact that he has not seen them; in the comparatively thin layer of tissue, the canals, no doubt, are small, and scarcely to be observed without special preparation. Ridley and Dendy have not been able to examine their specimen (which otherwise assuredly does not belong to this species) anatomically, as their material was dried, but they have not taken the opportunity either of examining anatomically any of the other *Cladorhiza*-species they have described.

the common way spread in a fan-shaped manner in the longitudinal direction, so that in a transverse section it appears to have only the thickness of a couple of spicules. Accordingly the fibres pass from the middle of the axis through the layer of tissue surrounding the axis, and through the branchlet to its point. In the layer of tissue coating the stalk and the branches, as far as I have been able to see, only rather few, scattered spicules are found. In the stalk and the branches the spicules are cemented by a clear mass of spongin; it coats, no doubt, the whole fibre with a thin layer of spongin, but forms no visible sheath. In the lower part of the stalk it may become somewhat more copious, and then the otherwise white, transparent axis becomes here a little yellowish. In the branchlets no spongin was observed.

Spicula: a. *Megasclera* are styli; they are straight or quite slightly curved: they are fusiform, tapering more or less towards the head-end; not rarely their outer part has a special, but slight tapering. The opposite end tapers evenly; the point proper may be somewhat varying, but is always short or rather short, not rarely quite blunt or rounded. The spicules of the axis and the branchlets are of the same form and cannot be said to fall under two distinct groups, but upon the whole there is, however, some difference as to size between them, so that the axial spicules are averagely larger than those of the branchlets. The length of the axial spicules is about 0·5—0·73^{mm}, and the thickness from 0·013—0·019^{mm}. The spicules of the branchlets are generally 0·39—0·47^{mm} long and 0·007—ca. 0·013^{mm} thick. All kinds of transitional forms occur however. Thus upon the whole a variation is found in the spicules as to length from 0·39—0·73^{mm} and as to thickness from 0·007—0·019^{mm}. Besides by their size the styli of the branchlets deviate also from those of the axis by having a longer point, and moreover they show also a little curve at the head-end, about as figured and described by Sars. Sars says that such spicules only occur at the point of the branches; the fact is, however, that they form the fibres of the branchlets, and accordingly they are also found in the points of the branches, where the branchlets are close together; the mentioned curve may otherwise also be found in axial styli. b. *Microsclera;* three forms occur, anisancoræ unguiferæ and sigmata of two forms and sizes. 1. The ancoræ are of the structure typical of *Cladorhiza* with a regularly curved shaft and five distinct, narrow, lanceolate teeth in either end; a considerable difference is found between the sizes of the two ends. The larger end has on either side of the shaft a narrow ala somewhat longer than the teeth. A sure view of the number and form of the teeth is only to be obtained by regarding the ancoræ from the end. Sars, in the work quoted, says that the ancoræ have three teeth, but that some have five, and continues: Whether this applies to all or only to some the position of which happened to be more favorable, I am not able with certainty to decide [1]. The real fact is that the ancoræ have always five teeth in either end. The size of the ancoræ is only little varying, their length from 0·021—0·025^{mm}, and the thickness of the shaft is ca. 0·002^{mm}. A few developmental forms of the ancoræ were also seen, in the finest ones the ends are as yet only little developed, and they are equal or about so, but a difference in size appears very soon. 2. The large sigmata have a regular sigma-form; they are always plane or about plane. Their length is between

[1] It is evident that the opinion of Sars is that the ancoræ, what he has not been able to decide with certainty, may possibly always have five teeth, but that this fact is only to be seen, when the ancoræ are favourably situated, but his expression, to be sure, says really something different.

0·078mm and 0·10mm, and the thickness is proportionately 0·005—0·006mm. 3. The small sigmata are of a peculiar form not mentioned by Sars, about as the form known from sigmata in some of the *Asbestopluma*-species, but here much more sharply marked. Either end of the sigma from the middle and to the point of the recurved part is highly compressed and inwardly sharpened in an edge-like manner. The sigma is contort, and almost always rather exactly one fourth of a turning. The length is 0·040—0·042mm and the thickness in the middle ca. 0·0015mm. The small sigmata, as stated by Sars, occur in the points of the branches in somewhat greater numbers, but besides they occur also in other places of the tissue, but only in very small numbers. The large sigma is stated by Sars to occur scattered in the tissue, and in greater numbers in the points of the branches; this statement I have not found corroborated, but have found this sigma occurring equally frequently everywhere in the tissue, but not especially copiously. The ancoræ are present in great abundance, partly throughout the tissue, and especially in the skin or the outer layer; thus they are seen very abundantly in the thin layer of tissue on the branchlets.

Embryos. Embryos were found scattered in the tissue in rather great numbers. They are globular and reach a size of ca. 0·35mm in diameter. They contain no spicules. According to Sars the embryos seem to be developed in the ends of the branches; this fact I did not find corroborated by my material; later, at all events, they are found everywhere in the tissue in great numbers, as has also been observed by Sars. They were also found in the small, unbranched specimens.

Remarks: A sure determination of this species is no easy thing, as it is very closely allied to the succeeding ones, and has also constantly been confounded with them. I was long in doubt whether the present species and the following one were specifically different; there are, however, constant characters, especially in the size of the spicules, and it was found, moreover, that *C. abyssicola* occurs only on bottom with positive temperature, while the following species is a native of the cold area. I have not seen Sars's type specimen, but a specimen sent by Dr. Nordgaard, obtained on Sars's old locality, Skraaven, agreed exactly as well with the description by Sars as with my specimens. The species mentioned by Wyville Thomson in »The Depths of the Sea«, and by Carter in his work on the »Porcupine«-sponges as *C. abyssicola* belong surely, as already mentioned, to some of the succeeding species. With regard to the *C. abyssicola* mentioned by Armauer Hansen in The Norwegian North-Atlantic Exp. XIII, the fact is most probably that he has not had this species before him at all; all the figures of the exterior show on the contrary that he has had the four following species, *gelida*, *tenuisigma*, *corticocancellata*, and *oxeata*, and those of the spicula-figures that can be interpreted at all show also that the question is not of *abyssicola*. I have examined two of his specimens which belonged respectively to the two following species, *gelida* and *oxeata*. All the enumerated localities are also seen to be situated in the cold area, with only one exception, and this one is found at the very border of this area. Of the *C. abyssicola* mentioned by Fristedt (Vega-Exp. vetensk. Iaktt. IV, 455) I have examined one specimen which proved to be *C. oxeata*. The specimen mentioned by Lambe l. c., on the other hand, is no doubt *C. abyssicola*, as is obvious from the description; when Lambe says that the ancoræ seem only to have three teeth in either end, this is no doubt only owing to the fact that he has not seen them from the end. Finally it must be noted that the two forms mentioned by Ridley and Dendy, *C. abyssicola* var. *rectangularis* with styli up to 2mm long, and *C. abyssicola* var. *linearis* with three-toothed ancoræ 0·032^{mm} long, may be said with certainty not to belong here, but they must be independent species.

Locality: The Ingolf-Expedition has only obtained a slight material of this species; station 32, the Davis Strait, 66° 35' Lat. N., 56° 38' Long. W., depth 318 fathoms (bottom temperature 3°9 C.), the two largest specimens; station 40, south of Iceland, 62° 00' Lat. N., 21° 36' Long. W., depth 845 fathoms (bottom temperature 3°3 C.), two small, unbranched specimens.

Geogr. distr. Skraaven at the Lofoten, depth 300 fathoms (Sars), and depth ca. 200 fathoms (one specimen sent by Dr. Nordgaard); the Saltenfjord, depth ca. 185 fathoms (Dr. Nordgaard); the Skager Rack, depth 294 fathoms (O. Schmidt l. c.); between Franz-Josef Land and Nova Zembla 79° 15' Lat. N., 59° 14' Long. E., depth ca. 130 fathoms (v. Marenzeller l. c.); the Gulf of St. Lawrence, depth 200 fathoms (Lambe l. c.). Thus the species is known distributed from ca. 60° Long. W. to ca. 60° Long. E., and between 60° and 80° Lat. N. It does not go to specially great depths, the bathymetrical range being between 130 and 845 fathoms, and it is exclusively a native of a bottom with positive temperature. On all the localities the species was taken on muddy bottom, and its richly branched root agrees also with this fact.

2. **C. gelida** n. sp.

Pl. III, Fig. 1. Pl. XII, Fig. 3 a—h.

1885. ?*Cladorhiza abyssicola* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, partim, Pl. VII, figs. 7 b, 10, 12.

Slender, with branches issuing from a central axis; the branches arranged more or less distinctly in a plan or issuing quite irregularly; often very long and subdivided. The stem ending below either in a root or a little basal expansion. The skeleton of the type of the genus. Spicula: Megasclera styli 0·40—0·77^{mm}; microsclera of three forms, anisancoræ unguiferæ with five teeth 0·028—0·034^{mm}, sigmata of two forms, large ones 0·12—0·16^{mm}, small ones, with compressed terminal parts 0·044—0·051^{mm}.

Of this species we have a rather considerable material, but most of the specimens are rather much damaged. The species is chiefly of the same form and structure as *C. abyssicola*, but it grows to a considerably greater size, and is more irregular. It consists of a stem, from which lateral branches of varying length issue. The original principle seems to be that the branches issue in one plan to two opposite sides; but this principle is not carried through, and so the branches are frequently arranged irregularly and issue to more sides; the arrangement in one plan, however, is most frequently recognizable. The distance between the branches may be somewhat varying. They issue generally at about right angles, only a little directed upwards. Sometimes the branches are a little swollen towards the end, but often, however, such a swelling is not found. To judge from the material in hand, the stem may end below in different ways, either in the same way as in *abyssicola* with a branched root, or with a little expansion which then has been attached; this feature is probably to some degree dependent on the bottom. While in the form now described the sponge is tolerably regular, a high degree of irregularity is very frequent. This irregularity may be owing to several causes. Thus the stem, which in the more regular forms is tolerably erect, may become sometimes irregularly curved, sometimes twisted in such a way, that the branches are lying in all plans. Then the branches may also be bent in many different ways and be of very different lengths, and while in the more regular forms they are most frequently unbranched, they may here be subdivided. Finally anastomoses and coalescences may take place between the branches in the most irregular way, so that the whole thing gets a quite confused appearance; nay, even branches from different individuals seem to be able to coalesce. When such anastomoses takes place, it is always the spicula-axes of the stem and the branches, which touch each other and are coalesced, and the fact is evidently owing to the presence of spongin[1]. The stem and the branches are set with branchlets or filiform appendages. They issue rather closely to all sides, and no definite arrangement is to be seen. They are frequently directed somewhat upward or on the branches somewhat towards the point, and in different individuals they may be of somewhat different length. With regard to the size to which the sponge may grow it is impossible to say anything definite on the basis of the material in hand, as all the specimens are fragments more or less. In one of the largest fragments the stem has a height of ca. 110^{mm}; another specimen measures, on account of the very long branches, ca. 150^{mm}; one of the most irregular fragments, in which stem and branches could no longer be distinguished, has a greatest extent of 230^{mm}. The length of the branches, as mentioned, may vary very much. The stems and branches are of about equal thickness, the maximum of which may be given to ca. 5^{mm}, but it may be somewhat less. The branchlets or the filiform appendages are thin, filiform, and a little tapering outward; their length may be somewhat varying, the maximum is 5—6^{mm}, and the thickness at the base does not exceed 0·5^{mm}. In a few cases branchlets may be found as only exceedingly short, conical projections. On account of the firm axial skeleton the consistency of the sponge is hard, but, especially in the upper parts, somewhat flexible; the outer layer is soft, and the branchlets, in spite of the fibre in them, are soft and flexible. The colour (in spirit) is white to yellowish white. The *surface* is smooth, spicules project only at the ends of the branchlets. An inwardly distinctly bounded and consequently easily separable *dermal membrane* is not found; on the other hand the whole layer of tissue is easily separated from the axis. *Oscula* and *pores* I have not been able to find, and therefore I take them to be closed. In the layer of tissue nothing is seen of the canal system under slight magnifying powers, but the tissue is apparently of uniform structure, the canals being very small. It is only in thin sections and under higher magnifying powers, that the canals are seen.

The *skeleton* is constructed as in the preceding species, and consists in the stems and branches of a very strong polyspicular axis; the needles of this axis are closely united and connected by spongin. They are chiefly parallel to each other and to the longitudinal axis, the axis, however, is most frequently more or less spirally twisted, often so much, that the direction of the needles deviates considerably from the longitudinal one. Also in the superficial part of the axis the needles are often not quite parallelly arranged, but may intercross, owing to the fibres of the branchlets being inserted between them. The needles of the axis are turned in different ways, now the point is turned upward, now downward. As in the preceding species the branches are formed by a number of spicules bending to the side, and, at all events, only the middlemost spicules of the branches reach in towards the middle

[1]) Such irregular anastomoses (at all events in the same individual) seem to be frequent in the *Cladorhiza*-species, and they will thus be mentioned again in the following species. It seems also to be this same feature, which is found in the specimen of the socalled *C. abyssicola* var. *linearis*, figured by Ridley and Dendy (Challeng. Report, Monaxonida, Pl. XX, fig. 6).

of the axis. The central part of the axis may be somewhat looser, or a little cavity may be found here. The skeleton of the branchlets is formed by a fibre running through the middle of the branchlet; the fibre tapers outward, and has fewest spicules at the outer end. When the branchlets are short, the fibre seems to become thicker and have more spicules. The fibres of the branchlets are in the common way inserted in the spicula-axes of the stem and the branches, between the spicules of these axes; they reach to the middle of the axis, and are spread in the longitudinal direction in a fan-shaped way. In the layer of tissue, which coats the axis, and may be of somewhat varying thickness, only rather few, scattered spicules are found. In the stems and branches the needles are connected by a mass of spongin forming, however, no sheath; under the microscope it appears white and clear, but yet it gives to the axis a yellowish, hyaline appearance. The stem has most spongin and is, consequently, most yellowish at the base. In the fibres of the branchlets spongin was not observed.

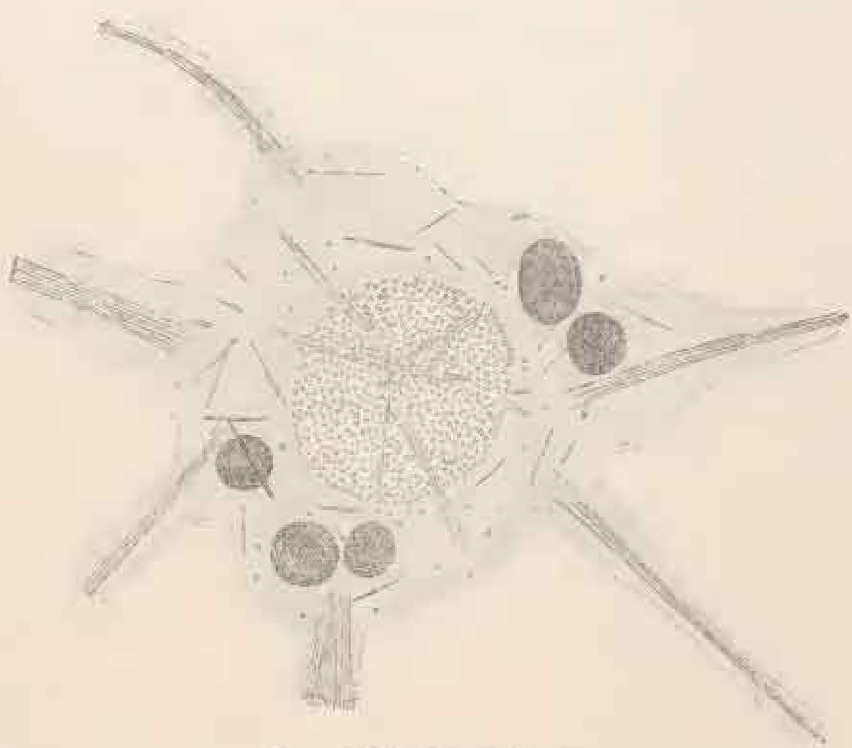


Fig. 2. *Cladorhiza gelida* n. sp.
Transverse section. The branchlets being directed a little upward, the fibres issuing from the centre are only seen a little way out in the tissue, where they are then cut away, while the fibres seen in the branchlets issue more downward, so that their bases are not seen. In the tissue embryos are seen. × ca. 32.

Spicula: a. *Megasclera* are styli, straight or quite slightly curved; they are more or less fusiform, but most frequently slightly so, only tapering a little towards the head-end; the point is somewhat varying, from short, sometimes somewhat blunt, to middle long. Their length varies from 0·40–0·77^{mm} and the thickness about from 0·022^{mm} down to 0·011^{mm}. The spicules are upon the whole larger and specially thicker in the axis than in the branchlets, but they cannot be said to form two groups. The styli of the branchlets have also a somewhat longer point. Otherwise the length and thickness are in no proportion to each other, and styli are rather frequently found in the axis of the smallest length, but of the greatest, or about the greatest thickness, while on the other hand long styli may be considerably fine. In the branchlets and the layer of tissue spicules may be found that are considerably finer than the others and must be developmental forms, they are long pointed. Among the styli, especially in the branchlets, irregular forms are often seen; thus, but more rarely, oxea; more frequently forms are seen with one or more swellings. b. *Microsclera:* three forms are found, anisancoræ unguiferæ and sigmata of two forms and sizes. 1. The ancoræ are of the typical *Cladorhiza*-structure, and have five distinct, lanceolate teeth in either end; one end is considerably larger than the other. The larger end has on either side of the shaft a narrow ala a little longer than the teeth, but comparatively somewhat shorter than in *abyssicola*. The size of the ancoræ varies between 0·028—0·034^{mm}, by far the most frequent size is 0·031^{mm}, the thickness in the middle of the shaft is ca. 0·003^{mm}. Developmental forms of the ancoræ occur frequently in all stages, down to extremely fine ones, which are of about the same length as the fully developed ones; in the very youngest stages both ends are as yet equal[1]). These youngest stages show in either end apparently only a hook-like recurving (Pl. XII, fig. 3 d) which must, accordingly, be taken to correspond to the median tooth; but they are so fine and transparent, that the real form of the end cannot be seen with certainty; in the stages a little older the teeth are seen. 2. The large sigmata are of a regular sigma-shape, they are plane, or only slightly contort. Their outer part, the recurving and the hook, is not quite cylindrical, but somewhat compressed. They vary in length from 0·12—0·16^{mm}, and in thickness from 0·006—0·009^{mm}. Developmental forms in different stages of these sigmata were not rarely seen: the younger of these are more or less fine, evenly curved, and long pointed staves without recurved ends; the ends are only developed by and by. Also the developmental stages show the compression of the ends, and these are sharp inward. 3. The small sigmata are of the same peculiar form as in *abyssicola*, with compressed ends, inwardly sharpened as edges. They are likewise always contort to one fourth of a turning. Their length is 0·044—0·051^{mm}, and the thickness in the middle is ca. 0·0015^{mm}. The occurrence of this sigma is peculiar. It occurs always only very sparsely, so that pieces of the sponge may be examined without any being found; but sometimes this form of sigma seems to be quite wanting; thus in some specimens I have examined a great number of pieces without being able to find it. Otherwise it is found sparsely in the tissue without any such definite occurrence as in *abyssicola*. Neither does the large sigma occur in great numbers, but considerably more copiously than the small one; it occurs in the layer of tissue and especially in the skin. The ancoræ are present in exceedingly great numbers, partly throughout the layer of tissue, but especially in the skin or the outermost layer; they are especially closely packed in the thin layer of tissue on the branchlets.

Embryos. Round in the tissue embryos were found; they lie singly in the layer of tissue between the axis and the surface. They are all but globular and of an average size of ca. 0·3^{mm}. No spicules were found in the specimens examined.

This species, as will have been seen, is very closely allied to *abyssicola*, and it is mainly separated from it by the constant difference in size of the three forms of microsclera. As mentioned under the preceding species, I have seen a specimen from the material of The Norwegian North-Atlantic Expedition of the species mentioned there by Armauer Hansen as *C. abyssicola*. It was a small fragment, very much damaged, but it seems doubtless to belong to the present species. The size of the ancoræ is generally 0·028^{mm}, and that of the small sigmata 0·044^{mm}. The specimen was from station 31 with a bottom temperature of ÷ 1°0 C. Of the figures of the exterior in The Norwegian North-Atlantic Expedition Pl. VII, figs. 7 b, 10, and 12 would seem to belong to the present species. An

[1]) Carter, as is well known, advanced the theory that the anisocheiæ in their development pass through an isochelate stage, because in a few species he had found large anisochelæ and small isochelæ together. He got this view on account of his erroneous interpretation of the growth of the chelæ. The fact that forms as the anisancoræ of the *Cladorhiza* begin with a stage where both ends are equal cannot, of course, corroborate Carter's theory, as his opinion was that an isochelate stage fully developed as to form preceded the final, anisochelate one.

attempt to interpret the given spicula-figures, would, I suppose, show figs. 3, 7, 8, 9, 11, and 12 on Pl. IV to belong to the present species, but the interpretation is doubtful.

Locality: The Ingolf, station 112, 67° 57' Lat. N., 6° 44' Long. W., depth 1267 fathoms (bottom temperature ÷ 1°1 C.); station 113, 69° 31' Lat. N., 7° 06' Long. W., depth 1309 fathoms (bottom temperature ÷ 1°0 C.); and at 60° 19' Lat. N., 5° 39' Long. E., depth 620 fathoms (bottom temperature ca. ÷ 0°15 C.) (Ad. Jensen, the cruise of the "Michael Sars" 1902). The two first localities are situated in the Norwegian Sea about between Jan Mayen and Iceland, the last one in the Faröe Channel.

Geogr. distr. Besides on the mentioned localities, the species, as before mentioned, has been taken by the Norwegian North-Atlantic Expedition at station 31, 63° 10' Lat. N., 5° 00' Long. E., depth 417 fathoms. Presumably it has been taken at more places by this expedition, but, at all events, always in the cold area. Accordingly the species is known from the Norwegian Sea and from the Faröe Channel with a bathymetrical range from 417—1309 fathoms, and it occurs only on cold bottom. I suppose that the species is also found among the *Cladorhiza*-forms from the Faröe Channel mentioned by Wyville Thomson in the Depths of the Sea 112—113.

3. **C. tenuisigma** n. sp.

Pl. III, Figs. 2—5. Pl. XII, Fig. 4 a—e.

1885. ? *Cladorhiza abyssicola* Armauer Hansen, The Norwegian North-Atlantic Exp., XIII, Spongiadæ, partim, Pl. IV, fig. 14, Pl. VII, fig. 11.

Slender, with branches issuing from a central stem, the branches oftenest distinctly in one plan to two sides, most frequently long and ending in a swelling. The branchlets more or less distinctly arranged in a ring-like manner. The stem ending below in a richly branched root. The skeleton of the generic type. Spicula: Megasclera styli 0·58—1·01mm; microsclera of three forms, anisancoræ unguiferæ with five teeth 0·024—0·028mm, sigmata of two forms, fine ones of the common form 0·038—0·048mm, sigmata with compressed terminal parts 0·048—0·056mm.

In the exterior and skeletal structure this species is very similar to the preceding one, but it is distinguished by characteristic differences as well in the exterior as in the spiculation. It is formed of an erect stem ending below in a densely and richly branched root. In the specimens in hand that are possessed of the root it is formed in such a way, that the stem continues quite down to the lower part of the root, and only here is divided into branches, while from the lower part of the stem thicker close-set branches continually pass of, and again subdivide to a high degree. The finest branches end with the thickness of one spicule. In the specimens in hand the radical branches issue only to one side, so that the whole radical tuft is turned to that side (Pl. III, fig. 3). To the radical branches, especially to their outer part, some bottom material, as pebbles and especially Foraminifera in great numbers, is attached. These bodies stick rather firmly, and seem to be kept by the spongin present in the root. Lateral branches issue in the common way from the stem. These branches issue with varying intervals, and may in this respect issue in a rather irregular manner; sometimes, however, they are placed in a tolerably regular way. They go off at about a right angle or are a little directed upward. The branches may be of varying length, but generally they are very long. In a few cases the branches may again carry some short branches, and irregularities caused by anastomoses and coalescing of branches may occur, but both these features seem to be found only rarely. The branches are generally arranged in a distinctly bilateral way, but here and there a branch may be placed in a different plan. The bilaterality is effaced in only one specimen, in which the branches are very close-set, but this specimen is upon the whole somewhat irregular. As in the preceding species, stems and branches carry branchlets. These branchlets are in this species more close-set than in the preceding one, and besides they are here arranged more or less distinctly in a ring-like way. This arrangement is not always marked, but is in all cases recognizable; sometimes the circles pass into each other, and then there is a beginning spiral arrangement. The number of the branchlets in the circle is generally some half-score. The branchlets pass off at right angles, or are, especially in the outer part of the branch, directed towards the point of the branch. Their length may be somewhat varying, from rather long, outwardly threadfine ones, and to quite short, comparatively thick projections. The branchlets of the same circle are more or less coalesced at the base, and when they are quite short the branches get a peculiar jointed appearance, and may to some degree remind of the arm of an Ophiurid. In a few places of the stem or the branches the branchlets may be quite wanting, and these parts are then slightly shaggy. The branches end at the point in a globular or ovate swelling, below which the branches are a little constricted, by which means the swelling becomes more sharply marked off. The last branchlets before the swelling decrease a little in length. One of the tolerably whole specimens, which is, however, not quite undamaged above, has a height of ca. 170^{mm}, and most of the other specimens seem to have been of a somewhat similar height. The specimen which seems to have been the largest one is only a little higher, but it is broken off below, and a rather large piece is no doubt wanting. The length of the branches may, as mentioned, be somewhat varying, the greatest length measured was $80-90^{mm}$. The stem and the branches may be of somewhat varying thickness, but they are generally comparatively thin in proportion to their length, and so the species gets a more slender appearance than the preceding one; the thickness, which is about equal in stem and branches, or only a little greater in the stem, may be given to $2-5^{mm}$. The branchlets vary from quite short projections to 8^{mm} long, threadfine appendages. The consistency is as in the preceding species. The colour (in spirit) is whitish to whitish yellow. The *surface* is upon the whole smooth; at the points of the branchlets the fibres project, and the terminal swelling of the branches as well as the parts of the branches that show no branchlets are slightly shaggy. Outermost a very thin *dermal membrane* is found, only distinct in the parts between the branchlets; it is supported by spicules underneath, but cannot be separated alone. *Pores* are found in the dermal membrane, especially in the parts between the branchlets; they are often very close-set. They were measured from quite fine openings to a diameter of ca. $0{\cdot}06^{mm}$. Pores are also found in the swollen terminal part of the branches[1]. *Oscula* have not been observed. In transverse sections of the sponge canals are seen in the layer of tissue between the fibres of the branchlets; these canals run chiefly as longitudinal ones, and being the widest canals seen it is an

[1] If pores have not hitherto been mentioned in the *Cladorhiza*-species, I suppose that it is only owing to the fact that they are only to be seen with difficulty. The fact is that the outermost layer consists of close-lying membrane-like parts separated by narrow cavities; the outermost membrane forms the dermal membrane. The pores in this membrane, accordingly, lead into a cavity inside, and the cavities are connected with each other by pores in the membranes. Now the dermal membrane proper cannot be separated except by special preparation, and if we cut off a piece of skin-layer ever so thin, we shall nevertheless get more than the outermost membrane, and so the pores are not seen by transmitted light.

obvious conclusion that they are excurrent canals; if so, we should expect to find oscula at the points of the branches. It may, however, also be possible that among the mentioned pores some may act as incurring openings, others as excurrent ones.

The *skeleton* is chiefly constructed as in the preceding species. It consists in stem and branches of a powerful axis which is also here somewhat spirally twisted, especially in its lower part. The lateral branches are formed in the common way. The skeleton of the branchlets is formed by a fibre more or less long according to the length of the branchlets; in the long branchlets the fibres are outwardly very fine, and outermost they have only quite few spicules. The fibres of the branchlets are inserted in the axis in the common way. As the branchlets are arranged more or less circularly, their fibres, in a transverse section passing through a circle of branchlets, are all seen to go to the middle of the axis like the spokes of a wheel. When the layer of tissue with the branchlets and their fibres is removed, so that only the axis is left, this is seen to be transversely striated on account of the circular arrangement of the branchlets, the part of their fibres that is inserted in the axis appearing as darker circles when the other part is removed. The axes of the branches continue through the middle of the swollen terminal part, and at the outer end they spread in a somewhat penicillate way. From the part of the axis running through the terminal knob rather regular, thin fibres issue to the surface, through which their outer ends project quite slightly (Woodcut fig. 3). Thus the whole terminal knob may be regarded as a collection of coalesced branchlets. Between the mentioned fibres in the terminal knob are moreover found some scattered spicules. In the above mentioned places of the stem and the branches where no branchlets are found, fibres are nevertheless found as in the other places, inserted in the axis in the same way, and these fibres continue into the layer of tissue, which is, besides, highly filled with spicules some of which are running chiefly longitudinally, while most of them are situated irregularly. Some of these spicules project a little through the surface. In these places the layer coating the axis is of greater thickness, so that it may more likely be regarded, as if the branchlets were coalesced to one layer. In the layer of tissue which coats the other part of the axis, spicules are found rather copiously of which some are running longitudinally, while a great part are irregularly scattered; the dermal membrane is supported by the outermost ones of these spicules. Where the branchlets are long there are the fewest spicules in the layer of tissue; the shorter the branchlets are, the more spicules are found in the layer of tissue, and the greatest number of spicules are found where the branchlets are quite wanting. In the stems and branches the needles of the axes are cemented by a clear mass of spongin, giving to the axes a slightly yellowish colour.

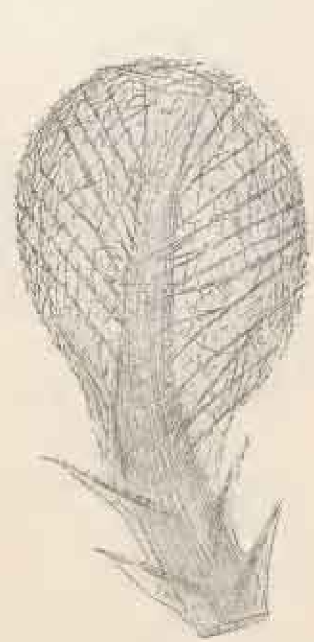


Fig. 3. *Cladorhiza tenuisigma* n. sp.
Longitudinal section through the end-swelling of a branch showing the skeleton. $\times$ 10.

Spicula: a. *Megasclera* are styli, straight or almost straight; they are fusiform, tapering evenly towards the rounded end, and towards the point to about the same degree; therefore the point itself is short, but it may be more or less blunt and is sometimes rounded. There is no distinct difference between the styli of the axis and those of the branchlets and the layer of tissue, the styli of the axis being only upon the whole a little longer and especially a little thicker. With regard to the length styli may be found in the branchlets as long as the longest ones in the axis, but upon the whole they are shorter, and styli may be found here considerably shorter than are generally found in the axis; also are the styli of the branchlets almost always longer pointed. The length varies at most from ca. 0·58—1·01^{mm}, and the thickness from ca. 0·014—0·0257^{mm}. With regard to the axial styli the length rarely goes below 0·70^{mm}, and the greatest thickness attained by the styli of the branchlets is ca. 0·021^{mm}. In the branchlets long, fine styli with long points occur rather frequently, which are, no doubt, developmental forms. b. *Microsclera* are anisancoræ unguiferæ with five teeth and sigmata of two forms. 1. The ancoræ are of the common *Cladorhiza*-type, and are constructed quite as in the preceding species. Their length is 0·024—0·028^{mm}, and the thickness of the shaft in the middle 0·0028^{mm} or a little less. Developmental forms in different stages are rather frequent. 2. Sigmata of the first form are fine, of the common sigma-form; they have a somewhat curved shaft and regularly round-curved ends; they are contort up to the fourth part of a turning, most frequently, however, somewhat less. They have not the edge-like expansion occurring in the other form of sigma, but are not, otherwise, quite cylindric, but seem to be somewhat compressed through their whole length. Their length is 0·038—0·048^{mm}, and the thickness about 0·0014^{mm}. 3. Sigmata of the second form have a similar form as, and correspond to, the smaller sigmata of the two preceding species; they have an almost straight shaft, and their ends are somewhat compressed, but to a far smaller degree than in the preceding species. They are contort and always one fourth, or about one fourth, part of a turning. Their length is 0·048—0·056^{mm}, most frequently nearest to the smaller size. The thickness is about 0·0025^{mm}. The two forms of sigmata are easily distinguished; the former is especially distinguished from the latter by being finer and having no expansions towards the ends, by its curved shaft, and by its being generally twisted less than one fourth of a turning. It can only be confounded with developmental forms of the second kind. The two forms occur in distinctly limited parts of the sponge; sigmata of the first form occur in the tissue of the whole sponge, except in the end-knobs; in these, on the other hand, sigmata of the second form are exclusively found, and in copious numbers; but none of the sigma-forms occur in anything like the number of the ancoræ, which are present in great abundance throughout the tissue, especially in the dermal layer.

Embryos. Embryos were found in most specimens of this sponge. They are lying in the tissue outside the axis, often rather closely, but each in a cavity of its own, and each embryo is surrounded by a membrane. They are globular or somewhat oval, and of a diameter of up to 0·5^{mm}. The spiculation is different in the different stages; some have no spicules, others only ancoræ, and others again have both ancoræ and styli. The ancoræ are smaller than in the developed sponge, most frequently of a length of 0·017—0·021^{mm}, and also rather fine. The styli are likewise small and very fine. The styli are arranged in a bundle about in the middle of the embryo, while most of the ancoræ seem to be chiefly placed in the circumference. None of the two forms of sigmata were seen in the embryos.

This species is very similar and closely allied to the preceding one; in its outer form it is especially distinguished from the former by the more or less marked circular arrangement of the branchlets. With regard to the spiculation sure distinguishing characters are found in the sigmata, especially in the presence of the fine, contort sigma, and in the size of the ancoræ. Among the figures of the exterior, given in the Norwegian North-Atlantic Expedition, those quoted above may with great probability be referred here, especially on account of the distinctly figured end-knobs. Of the figures of spicula, fig. 6 on Pl. IV may with some probability be referred to the present species. Among the *Cladorhiza*-forms taken by the »Porcupine«-Expedition, I suppose that the »peculiar form in jar 65« mentioned by Carter (Ann. Mag. Nat. Hist. Ser. 4, XVIII, 320) belongs here; according to the description it might very well be a specimen with small or wanting branchlets.

Locality: Ingolf station 105, 65° 34' Lat. N., 7° 31' Long. W., depth 762 fathoms (bottom temperature ÷ 0°8 C.); station 117, 69° 13' Lat. N., 8° 23' Long. W., depth 1003 fathoms (bottom temperature ÷ 1°0 C.), seven more or less damaged specimens in all. Station 105 is situated to the east of Iceland, and station 117 south of Jan Mayen.

Geogr. distr. The species is hitherto with certainty only known from the Norwegian Sea, where, besides by the »Ingolf«, it has been taken by the Norwegian North-Atlantic Expedition. If the form mentioned by Carter l. c. belongs here, it has also been taken in the Faröe-Channel at a depth of 345 fathoms with a bottom temperature of ÷ 1°1 C. Accordingly, the species is, at all events, a native of the cold bottom.

4. **C. iniquidentata** n. sp.

Pl. III, Fig. 6. Pl. XII, Fig. 5 a—e.

Slender, with branches issuing from a central axis; the branches rather long, not arranged in one plan, swollen in the ends in a somewhat club-shaped way. The skeleton of the generic type. Spicula: Megasclera styli 0·50—0·68mm; microsclera of only one form, anisancoræ unguiferæ with six to nine teeth in the larger end, five teeth in the smaller end, 0·022—0·024mm.

In the exterior this species is very similar to *C. abyssicola*. We have only one specimen consisting of a slender stem carrying a number of thin lateral branches issuing irregularly with different intervals. The specimen is broken as well above as below, so that nothing can be said of its mode of attachment. The stem and branches carry in the common way close-set branchlets issuing all round. These branchlets are a little directed upward, but in contradistinction to those of the preceding species they are quite straight. They are thickest at the base and become quite thin outward. A distinct circular arrangement was not to be observed; but they are to some degree arranged in groups, and this arrangement gets more marked by the fact that the branchlets are often coalesced at the base, so that irregular circular thickenings are found, from which the branchlets issue. Towards the point of the lateral branches the branchlets become shorter, and the points of the branches are slightly swollen in a club-shaped way. The specimen in its damaged stage has a height of 50mm, the only entire lateral branch measures 27mm, and the branchlets, which may be of somewhat different lengths, are at most 3·5mm long. The stem is fully 1mm thick, the lateral branches are a little thinner. The colour (in spirit) is whitish, somewhat transparent. The sponge is rather stiff, and the branchlets scarcely so flexible as in the preceding species. The *surface* is smooth, spicules are only projecting in the points of the branchlets. A thin *dermal membrane* may be observed. *Pores* are seen in the dermal membrane in the intervals between the branchlets[1]; they were measured to a size of at most 0·1^{mm}; the largest ones seemed especially to occur in the parts of the skin that cover the upward turned parts of the coalesced bases of the branchlets. *Oscula* have not been seen, but the larger of the mentioned pores may possibly be excurrent openings.

The *skeleton* is constructed as in the preceding species; it consists in the stem and branches of rather strong, polyspicular axes. The fibres of the branchlets are in the common way inserted in the axes, and continue to the middle; they grow thinner and have fewer spicules outward, and they end, when the branchlet is long and thin, with a few spicules or a single one. In the layer of tissue coating the axis only a few, scattered spicules are found partly lying in the longitudinal direction, by which spicules the dermal membrane is supported. In the axis the spicules are cemented by a distinct mass of spongin.

Fig. 4. *Cladorhiza unguidentata* n. sp. One of the branchlets with three embryos. × 20.

Spicula: a. *Megasclera* are straight, or quite slightly, sometimes a little irregularly curved styli; they are markedly fusiform, tapering somewhat, not only towards the point, but also towards the rounded end. The point itself is short and bounded by straight lines; it may be of somewhat varying length, and in a few cases it is rounded. There is no difference between the styli of the branchlets and those of the axes, only may the latter as a whole be a trifle thicker, that is to say: some of them may be a little thicker, and there are between them scarcely so thin styli as outside the axes. Their length is from ca. 0·50—0·68^{mm}, and the thickness varies from 0·014—0·026^{mm}. Finer to quite fine developmental forms occur in small numbers. b. *Microsclera* are only of one form, anisancoræ unguiferæ; they are typical *Cladorhiza*-ancoræ of the common form with a regularly curved shaft and a narrow ala on either side of the shaft at the upper end. They are, however, peculiar by their number of teeth. In the large end the number of teeth is not constant; most frequently the number is seven, not rarely, however, eight; in a few cases it was six, in some others nine. The teeth are close-set and narrow. The small end, on the other hand, has only five very small teeth. With regard to both ends it is impossible to decide the number of teeth, unless the ancoræ are seen from the ends. The length of the ancoræ is 0·022—0·024^{mm}, and the thickness of the shaft is ca. 0·002^{mm}. Developmental forms of the ancoræ occurred in different stages. The ancoræ occur in the tissue and in the skin; as usual they are especially copious in the branchlets.

Embryos. Embryos were found scattered in the sponge; they are roundish or oval, and averagely of a diameter of ca. 0·24^{mm}. They occur both in the stem and branches in the tissue outside the axis. They were often seen at the base of the branchlets or even a little way out in the branchlets (Woodcut fig. 4). If the larger of the pores mentioned before act as excurrent openings, it may easily be understood that the embryos are found near them[2]. The spiculation of the embryos is very interesting. They were either

[1] They were only seen in dried preparations.

[2] When the embryos are found in the lower part of the branchlets themselves, it is seen that this part is hollow, and the spicules of its fibre surround the embryos on all sides; farther out the spicules unite and form a fibre in the common way. According to this the fact is not precluded that the embryos leave the sponge through the branchlets, and by this

without spicules, or they had microscleres, or else both microscleres and megascleres. The megascleres are small, rather fine and straight styli, arranged like a bundle through the middle of the embryo along its longer axis. The microscleres are very peculiar: they are ancoræ, but of a type different from that of the grown sponge. They are smaller and finer, and their teeth are considerably longer than is commonly the case in the *Cladorhiza*-ancoræ; these teeth, which are very narrow, reach to about the middle of the ancora, or at all events, more than a third of the length. At the larger end there is on either side of the shaft a narrow ala of about the same length as the teeth. Nor is the number of teeth in the larger end constant in these ancoræ, but it may be five or six, while in the smaller end the number is always five. The length of these ancoræ varies from 0·017—0·021^{mm}, the thickness of the shaft is ca. 0·0011^{mm}. I do not venture to decide, whether the final form of ancoræ is formed, while the embryo is still in the sponge; ancoræ of the final form and size were certainly found in a single case; but as the embryos are only isolated with difficulty they may have belonged to the surrounding membrane. — That embryonic microscleres of a special type occur is a quite peculiar fact, and has not hitherto been observed; the microscleres of the embryos, as has repeatedly been pointed out in the preceding descriptions, are often smaller than in the grown sponge, but they are generally of quite the same form.

This species is easily recognizable from the other *Cladorhiza*-species by its ancoræ. Hitherto no *Cladorhiza*-species has been described with ancoræ with more than five teeth, while here seven or eight teeth are found. A peculiar fact is also that the number of teeth is not constant. When seven teeth are found, one is consequently the median one, but when eight teeth are present, the feature seems to be different, as also then one tooth may be the median one, and then there are consequently four teeth on one side, of which a pair then seems to be a little smaller than the others, as if a cleaving had taken place. In other cases no median tooth is found, but there are four teeth on each side of the median line. In the embryonic ancora there seems always to be a pair in the middle when six teeth are found. A remarkable fact is finally the different number of teeth in either end, as it would seem that the smaller end, without regard to the greater number of teeth in the larger end, has constantly five teeth; while, on the other hand, to judge from the species with three-toothed ancoræ described by Ridley and Dendy, it has only three teeth, when the large end has this number.

Locality: 63° 13′ Lat. N., 6° 32′ Long. W., depth 975 fathoms (bottom temperature ÷ 0°51 C.) (Ad. Jensen, the cruise of the "Michael Sars" 1902). According to this the species is a native of the cold area.

5. C. corticocancellata Cart.

Pl. III, Figs. 7—9. Pl. XII, Fig. 6 a—f.

1876. *Cladorhiza abyssicola* var. *corticocancellata* Carter, Ann. Mag. Nat. Hist. ser. 4, XVIII, 319, Pl. XIII, figs. 16, 16 a.

1885. *Cladorhiza abyssicola* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, partim, Pl. IV, fig. 10, Pl. VII, fig. 7 a.

Erect, set with a number of short, almost wart-like projections or branches; otherwise unbranched, or divided into branches from the base. The surface is of a peculiar, reticulate-grooved structure, and no

possibility we are again led to reflect on a connection between oscula and branchlets, as has been hinted at before under *Asbestopluma pennatula* and the following *Asbestopluma*-species.

branchlets are found. The skeleton is of the typical Cladorhiza-structure, and consists of a central axis with lateral axes and fibres for branchlets; but all these features are covered by the tissue, which thus forms a coating layer, from which only the short wart-like ends of the branches project. Spicula: Megasclera styli 0·56—0·71^{mm}; microsclera of three forms, anisancoræ unguiferæ with five teeth 0·033—0·037^{mm}, sigmata of two forms, large ones with slightly curved shaft and the ends prolonged in a flagelliform manner 0·15—0·18^{mm}, small ones with compressed terminal parts 0·057—0·074^{mm}.

This species has a peculiar appearance, quite deviating from the other *Cladorhiza*-species. It is of erect form; whether it is fixed below by an expansion or attached by a root is not known, as my specimens are broken below, and Carter's description is based on fragments. The species may be described as a stem, set closely and all round with short, thick, more or less coalescing branches. Most frequently the branches are so short, that they may better be described as wart-like projections, only rarely they are a litte longer. As they are placed closely and irregularly, the sponge gets a more or less tuberous or round-lobed surface. The specimens in hand have, otherwise, an erect form, and are straight or a little curved, and besides the mentioned branches they have no ramifications; some skeletal parts, however, indicate that the sponge may also divide into larger branches each of which is then of the described form. The largest specimen has a height of ca. 280^{mm}, and the others are a little smaller. The thickness, which, on account of the close-set, round-lobed projections, can only be given approximately, is 10—20^{mm}. The length of the branches is at most 13^{mm}, and their thickness at the base up to 9^{mm}. On account of the powerful axes the sponge is stiff, also the consistency of the tissue is rather firm, but brittle. The colour (in spirit) is yellowish white. The *surface* is of a peculiar structure; as ends of fibres are projecting everywhere it is shaggy or prickly. Deep grooves or canal-shaped cavities going into the sponge are found between the ends of the fibres, so that the surface gets a reticulate-grooved appearance, what has been expressed by Carter in the name *corticocancellata*. The points of the branches are generally rounded, and they have no grooves, but show an even surface, shaggy from slightly projecting spicules. All the part of the sponge that coats the axes is penetrated by a system of canals and cavities connected with each other, but separated by parts and beams of tissue, and these canals and cavities must be supposed not to belong to the canal system proper. As this structure is closely connected with the skeletal structure, a more particular account of it will be rendered under the description of the skeleton. The *dermal membrane* is a thin film covering the parts of tissue that separate the mentioned cavities, and supported by some spicules. *Pores* and *oscula:* As the mentioned canals and cavities must be supposed not to belong to the canal system, their outer openings cannot be oscula. Pores are found everywhere in the dermal membrane in the mentioned cavities; they seem to be small, as I have not with certainty measured any of them to a greater size than 0·065^{mm}; I suppose that these openings act both as incurrent and excurrent ones. Of course, it is possible that some of the openings on the surface may be openings of real, excurrent canals; but this fact is scarcely to be decided by an anatomical examination only.

The *skeleton.* In spite of the deviating exterior form, the skeleton is constructed after quite the same principle as in the other *Cladorhiza*-species. A thick, powerful, polyspicular axis of closely united, parallel needles stretches through the middle of the sponge. This axis has below a thickness of 4^{mm}. It is more or less spirally twisted, especially in its lower part. Lateral axes a little upward directed issue from this axis in the same way as in the preceding species. These axes run through the middle of the short lateral branches before mentioned, and accordingly they attain only a rather small length. Fibres issue from the axes of the stem and the branches, quite corresponding to the fibres of the branchlets in the preceding species. They issue all round, and most frequently they are arranged in a more or less circular way, and they are inserted in the axes in the common manner, so that in a transverse section they are seen to meet in the middle (Woodcut fig. 5). The circular arrangement cannot be seen in the exterior, but when the layer of tissue is separated from the axes, a ringlike structure is seen in these, owing to the basal parts of the small axes, which are inserted into the axis (Pl. III, fig. 8). Now the only difference between this species and the preceding ones is that while in these the fibres inserted in the axes support free branchlets, they support in the present species the coherent part of tissue on the stems and branches, continuing from the axis out through this tissue, and their ends projecting a little. These fibres are in this species of about the same thickness throughout their length; sometimes they are a little curved. They may be somewhat branched, especially in their outer part, so that the number of projecting ends is greater than the number of fibres inserted in the axis. The part of the sponge coating the stem and the lateral branches and supported by the mentioned small fibres is not solid, but is, as before mentioned, pierced by a coherent system of cavities. A row of cavities is especially found inmost, round the axis, arranged like stories above each other, separated by the almost plate-shaped parts of tissue in which the small fibres run, but still connected with each other. Accordingly, a longitudinal section of the sponge reminds strikingly of the chambered root-stock of *Cicuta virosa* (Pl. III, fig. 9). In the outer part of the layer of tissue the cavities are more canal-shaped, and they open everywhere on the outside with round or roundish openings between the projecting ends of the fibres; their being at the same time connected with each other gives rise to the mentioned netlike structure. A comparison with the other species of the genus and especially the correspondence in the skeletal structure imparts the impression that the sponge-body coating the axes must be regarded as having arisen by a coalescing of branchlets, or must, at all events, be corresponding to coalesced branchlets, and that the mentioned system of cavities and canals, therefore, does not belong to the canal system proper, but is a secondary formation. This is also indicated by the fact that the cavities are abundantly connected with each other, so that one cavity in the sponge opens on the surface by several ways and to different sides. Whether free branchlets are found at any time during the growth of the sponge, and whether a real coalescing takes place, or the mentioned structure appears from the beginning, I am not able to decide, as I have had no young individuals[1]. The described regular

Fig. 5. *Cladorhiza corticocancellata* Cart.

A piece of a transverse section showing the axis and the small fibres. In the tissue embryos are seen. × 7.

[1]) I have later seen a specimen which was surely a rather young one, and as it showed partly free branchlets, which were chiefly connected only near the axis, this seems to indicate that the above described condition develops during the growth of the individual.

formation and arrangement of the skeletal axes may in certain places be somewhat modified by coalescings between the axes and the small fibres of the stem and the branches in near the axis of the stem, so that in these places a quite irregular network of fibres is formed (Pl. III, fig. 8). These coalescings, which are evidently secondary ones, seem to me to corroborate the view advanced above by showing that coalescings easily take place. Outside the axes and the small fibres a great number of scattered spicules is found in the tissue; they may here and there gather into bundles or short fibres, and they support also the dermal membrane as a rather dense, but irregular network of scattered needles. In the axes a tolerably copious, slightly yellowish mass of spongin is found imparting to the axes a yellowish, hyaline appearance.

Spicula: a. *Megasclera* are styli, almost always quite straight; they taper somewhat towards either end, and are therefore markedly fusiform; the rounded end may be more or less thin, sometimes it shows outmost a more abrupt tapering. The point may vary somewhat in length, but is always short or rather short, a more abrupt, distinct point being found besides the even decreasing in thickness from the middle; sometimes the outermost point is especially marked off. There is no difference between the styli of the axis and those of the other parts of the body. The length is rather constant and varies from ca. 0·56–0·71^{mm}, and the thickness from ca. 0·015—0·024^{mm}. Finer developmental forms are only seen quite singly. b. *Microsclera* are of three forms, anisancoræ unguiferæ and sigmata of two forms, larger and smaller ones. 1. The ancoræ are of the common *Cladorhiza*-form and have five teeth at either end; at the larger end rather broad alæ are found somewhat longer than the teeth. Sometimes six teeth are found at the larger end. The length varies from 0·033—0·037^{mm}, and the thickness of the shaft is about 0·0028^{mm}. Developmental forms in different stages are also found. 2. The large sigmata are of a quite peculiar form, the shaft is only slightly curved, the recurved ends are prolonged in a flagelliform way to a fine point. The surface of the sigma is a little uneven, so that the contour appears somewhat undulated, especially in the middle. The ends are not cylindric, but a little compressed. The sigma is contort to a somewhat different degree, most frequently up to about one fourth of a turning. The length is between 0·15 and 0·18^{mm}, and the thickness in the middle of the shaft is ca. 0·007^{mm}. Of this sigma a few developmental forms were seen, the youngest ones only representing the shaft without curves, those a little older having short curves; in the latter the compressed form of the ends is distinctly seen. 3. The small sigma occurs only in the ends of the branches, and has from this fact, I think, been overlooked by Carter. It is of a quite similar form as the sigma occurring in the same way in the preceding species, for instance *tenuisigma*, and evidently corresponds to this sigma. The shaft is about straight, the ends are recurved and a trifle compressed about from the middle of the sigma. The sigma is contort, most frequently one fourth of a turning. The length is 0·057—0·074^{mm}, and the thickness in the middle is ca. 0·002^{mm}. The ancoræ and the large sigma occur everywhere in the sponge, especially in the dermal membrane everywhere in the cavities; the small sigma, as mentioned, occurs only in the points of the branches and in rather small numbers.

Embryos. Embryos are found in great numbers everywhere in the sponge. They are more or less oval and a little flattened. Their longest diameter is on an average ca. 0·42^{mm}. They were found partly without spicules, partly with microscleres. These were ancoræ, and as in the preceding species we have again here the peculiar fact that these ancoræ are of a different type from those of the grown sponge. They are very small and fine, with five teeth in either end; those of the larger end are narrow and long, they are thus more than one third of the length of the shaft, while in the ancoræ of the grown sponge the teeth are only about one fifth of the whole length. At the larger end a narrow ala is found on either side. This ancora is very small, of a length of only about 0·018^mm^. In the embryos where it is found, it occurs abundantly.

This species agrees so exactly with Carter's description and figures, that there can be no doubt of the identity. The figure of the characteristic sigma agrees completely, and the measure given by Carter »39 by 1—6000th. inch«, which is about corresponding to the length 0·164^mm^ and the thickness 0·004^mm^, corresponds also. Finally, the locality is the same. As before mentioned, it may easily be explained that Carter has not found the small sigma, as it occurs only in the points of the branches. Two of Carter's statements do not agree with what I have found; in the first place he states that the styli are larger in the fibres of the stems than in the small fibres, while I have found no difference in size; this fact, however, is scarcely of any importance; but then he gives the size of the styli as »100 by 1—1800th inch«, which is about corresponding to a length of 1·4^mm^ and a thickness of 0·014^mm^; this is a little thinner than, and twice the length of, the measures I have found. I cannot but think, however, that an error has slipped in in the measuring; the mentioned styli would also be uncommonly long and thin. Carter established the species as *abyssicola* var. *corticocancellata*; it is, however, a very distinct species; Ridley and Dendy, in Chall. Monaxonida, also call the attention to the fact that it must surely be an independent species.

The figures by Armauer Hansen quoted above may surely be referred to this species.

Locality: The Ingolf, station 143, 62° 58' Lat. N., 7° 09' Long. W., depth 388 fathoms (bottom temperature ÷ 0°4 C.); 60° 19' Lat. N., 5° 39' Long. W., depth 620 fathoms (bottom temperature ÷ 0°15 C.) (Ad. Jensen, the cruise of the »Michael Sars«, 1902). Of the stations the former is situated a little to the north, the latter a little to the south, of the Faröe Islands.

Geogr. distr. The specimen described by Carter from the »Porcupine« has also been taken near the Faröe Islands, at 60° 14' Lat. N., 6° 17' Long. W., depth 632 fathoms (bottom temperature ÷ 0°8 C.). The species is thus only known with certainty from this limited locality. As mentioned above, it has also been taken by the Norwegian North-Atlantic Expedition; as among the enumerated stations one is also found situated north of the Faröe Islands, it may possibly have been taken there. The bathymetrical range is 388—632 fathoms, and the species is only known from the cold area.

6. **C. oxeata** n. sp.

Pl. I, Fig. 1. Pl. III, Fig. 10. Pl. XIII, Fig. 1 a—f.

1885. *Cladorhiza abyssicola* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, partim, Pl. VII, Fig. 9.

1887. *Cladorhiza abyssicola* Fristedt, Vega Exp. vetensk. Iaktt. IV, 455.

Irregularly dendritically branched from the base; the branchlets, especially on the principal axes, sometimes coalesced to more or less wing-shaped parts. The sponge attached below. The skeleton is of *the common structure, in the principal axes it is enormously powerful. Specula: Megasclera oxea* 0·417—0·80^{mm}; *microsclera of three forms, anisancoræ unguiferæ with five teeth, sometimes with six teeth in the larger end,* 0·026—0·034^{mm}, *sigmata of two forms, large ones* 0·09—0·12^{mm}, *small ones, with compressed terminal parts,* 0·047—0·054^{mm}.

This species is more robust than the other *Cladorhiza*-species, and it seems also to be the one that may grow to the largest size. It may be described as a bush with few stems. To judge from a basal part in hand it is attached below to a hard substratum with an irregular base formed by more stems. From this base thicker stems arise, dividing immediately and continuing upward with irregular ramifications, growing thinner as they rise. From the principal stems and their ramifications thinner, often branched lateral branches issue again, but there is otherwise no definite difference between stems and lateral branches. In a couple of fragments in hand a tendency to a bilateral arrangement of the branches is seen in the outermost ramifications. Branchlets issue in the common way from stems and branches; they issue all round and are close-set, but they show no circular arrangement. They are broadest at the base, and are slightly conical outward. The stems and branches are less cylindrical than in the preceding species, as the branchlets are somewhat coalesced at their base, which is most frequently somewhat compressed, and branchlets that are placed above each other are then connected by low keels. In the stems this feature may be very prominent, so that the branchlets are arranged more or less in rows on keel-shaped parts, while the intervening parts are smooth without branchlets; by this means the stems get an angular or winged appearance. At the ends of the branches the branchlets often become short and close-set, and the ends of the branches are rounded and sometimes slightly swollen. The layer of tissue on the axes is down on the stems rather thin, but becomes thicker in the outer ramifications. The largest specimen in hand, which is broken both above and below and only consists of the skeleton, has a height of 260^{mm} and a breadth at the base of 30^{mm}, and divides here into two principal stems which immediately subdivide. The mentioned basal part, which consists below of several interwoven stems, has in this place a breadth of 50^{mm}. As before mentioned the stems taper evenly upwards in the ramifications. The branchlets have an average length of towards 5^{mm}, they are a little more robust than in the preceding species, and have in the middle a thickness of ca. 0·5^{mm}. The colour (in spirit) is yellow or yellowish white. The consistency is firm on account of the strong skeleton; but in the upper branchings the sponge is rather flexible, and the branchlets are very flexible. The layer of tissue coating the axes is soft and brittle. The *surface* is smooth, and slightly projecting spicules are found only at the ends of the branchlets. The outermost layer of the tissue is not differentiated as a distinct or removable *dermal membrane*. *Oscula* and *pores* were not observed. In one of the specimens in hand of this sponge worm-tubes and Bryozoa are sitting on branches that are denuded of tissue; as the other branches of the specimen are sound, the branches in question must accordingly have been denuded of the tissue while the sponge was living.

The *skeleton* consists in the stems and branches of strong polyspicular fibres. These fibres compose by far the greatest part of the mass of the sponge, and attain an enormous thickness. At the lower end of the mentioned largest specimen, which is probably broken off a little above the base, the axis is 30^{mm} thick, a little up on the thickest stem the thickness was measured to 18^{mm}, and farther up on one of the branches it was still 10mm. In the outermost ramifications the axes grow thinner, and are here 1mm thick or a little less. The fibres consist of closely united spicules, but they are not here all of them parallel to the longitudinal direction, a great part being arranged in other ways. If we regard a transverse section of a stem a rather marked stratification is seen; this stratification arises from the fact that layers in which the spicules are more or less parallel to the longitudinal direction, and which are, therefore, in the transverse section seen to be cut, alternate with layers in which the spicules are scattered but parallel to the surface. In the layers in which the spicules are placed in the longitudinal direction, they are to some degree arranged in bundles. The described construction of the axial skeleton is also distinctly seen in a longitudinal section. In the thinner branches no stratification is seen. The axes most frequently show a slight spiral twisting, which is, however, often very indistinct, or has quite disappeared, the spicules of the outer layer being scattered. In this species the axes are most frequently not cylindrical, but of an irregular contour, often with edges and keels; and irregular coalescings of various kinds may take place. The skeleton of the branchlets consists, as usually, of a fibre which is inserted in the axis and continues to the middle of the axis where most frequently several fibres meet. In this species these fibres have rather many spicules alongside; to be sure, they become a little thinner towards the point, but even there they consist of several spicules. The spicules of the part of these fibres that is inserted in the axis, are as usually spread in a fan-shaped way in the longitudinal direction; in the thinner branches the inserted part of the fibres of the branchlets is of about the length of a spicule, but in the thicker branches and stems also the branchlets continue to the middle, and then the part inserted in the axis gets a considerable length. In this case only the innermost part of the fibres of the branchlets, about to the length of one spicule, is spread in a fan-shaped way. It must also be supposed that the spicula-layers of the thicker axes mentioned before are layers of growth, and that the inserted fibres of the branchlets, with the exception of the innermost part, were at an earlier time outside the axis. In the layer of tissue outside the axes some scattered spicules are found, some of which are situated just under the skin, partly between the branchlets, partly reaching a little into their basal parts. In the axes spongin is found cementing the spicules; it is most abundant downwards, and therefore the yellowish colour of the axes deepens downward, and at the base it becomes brownish. The axes have the common, somewhat hyaline appearance.

Spicula: a. *Megasclera:* these, as already indicated in the name of the species, are diactinal; they are typical oxea with equal ends, without any discernible tendency towards styli. They are straight or slightly, often a little irregularly, curved, or they have in the middle a sharp, but slight bend. From the middle they taper a little towards the ends, but the point itself is rather short, or at most of middle length; an especially marked off outermost point is often found. They have not rarely a swelling in the middle. These oxea, as mentioned, show no tendency to become styli; on the other hand, forms are found with one rounded end, but only singly; forms with both ends more or less rounded are, however, also seen, and I am, in both cases, most inclined to regard these forms as secondary or irregular ones. Between the needles in the axes and those in the branchlets the only difference is that the former are generally shorter and thicker than the latter; besides, needles with the mentioned sharp bend occur far more frequently in the tissue and branchlets than in the axes.

When all sizes are included, the length is between 0·417—0·80^{mm}, and the thickness is 0·014—0·025^{mm} For the needles of the axes the length may be given as being generally 0·417—0·6^{mm}, and for the needles in tissue and branchlets ca. 0·55—0·80^{mm}, and the thickness is rarely more than 0·021^{mm}. Sometimes this difference is less marked, and it is especially found in the upper and outer ramifications, while down in the sponge and in the stems and the thicker branches it is more effaced. In the tissue fine, long pointed developmental forms are seen singly. b. *Microsclera;* these are anisancoræ unguiferæ and sigmata of two forms, larger ones and smaller ones. 1. The ancoræ are of the common *Cladorhiza*-form; they have a curved shaft and rather broad alæ at the larger end. They have five teeth at either end, but forms with six teeth at the larger end are also found. The length varies from 0·026—0·034^{mm}, and the thickness of the shaft from 0·0028—0·0035^{mm}. Developmental forms of the ancoræ are found in small numbers. 2. The large sigma has a regular sigma-form; these sigmata are plane or almost plane; the length is 0·09—0·12^{mm}, in by far most cases nearest to the latter length, the thickness is 0·0057—0·007^{mm}. Developmental forms in different stages were seen in no small numbers. These developmental forms are distinctly seen not to be cylindrical, but sharpened inward from a little over the middle and to the ends; this feature, on the other hand, is not to be seen in the fully developed sigmata. 3. The small sigma is only found in the end of the branches, and is of the same form, with inwardly sharpened terminal parts, as the sigma occurring in the same way in the preceding species. It is likewise contort, almost always a fourth part of a turning. The length is 0·047—0·054^{mm}, and the thickness in the middle of the shaft about 0·002^{mm}. The ancoræ and the large sigma occur partly throughout the tissue and partly in the dermal layer, especially the ancoræ are abundantly present in the outermost layer of the branchlets. The small sigma only occurs in the point of the branches and not in all of them, but only in those that are distinctly swollen; here it is found abundantly. On the other hand, the large sigma is here only seen quite singly.

Embryos. Embryos were also in this species found rather copiously in the tissue. They are roundish or most frequently oval, and they are surrounded by a thin membrane. Their size is about 1^{mm}. By the examination they proved to be either without spicules, or only provided with developmental forms of the ancoræ, but these were found rather copiously. The developmental forms were mostly rather young stages, they had a length of 0·024—0·027^{mm}, or about the same length as the ancoræ of the grown sponge. The embryos are situated in the tissue outside the axes, they are frequently found at the base of the branchlets, or in this base itself; in a few cases they are seen out in the middle of the branchlets (Woodcut, Fig. 6). According to this I suppose that they leave the sponge by this way, and so we are again led to regard the branchlets as oscula. I have, however, not been able to find any canal, and accordingly, if such a one is found, it must be supposed to be closed. The fibre of the branchlet is almost always found in one side, and the canal must be supposed to run alongside of it. Also the embryo is placed in one side of the branchlet beside the fibre; it distends the branchlets in the middle, and on the sides where the fibre is not found, it is surrounded by a thin membrane only filled with microsclera. It is to be remembered, however, that the occurrence of the embryos in the branchlets may also be supposed to be owing to the fact that they develop here as in other places in the sponge.

The figure presented by a branchlet with an embryo in it, involuntarily directs the thought to the figure given by Wyville Thomson, in The Depths of the Sea 187, of *Chondrocladia virgata*. In this sponge all the branchlets show a swelling in the middle mentioned by the author as a dark greenish oval mass of granular sponge matter , a description that might very wel be used of an embryo situated in the branchlet. Wyville Thomson says that the branchlets end with a very narrow osculum. Carter also mentions the swelling, but has found no osculum; it may perhaps have been distinct, when the sponge in its fresh state was examined by Wyville Thomson, and have been closed later. If the mentioned swellings in the branchlets are owing to embryos, there is the curious peculiarity that an embryo is found in each branchlet.

The quoted one of Armauer Hansen's figures of the exterior may with certainty be referred to this species; also one of the specimens of his *C. abyssicola* which I have examined proved to be the present species. Of the spicula-figures those on Pl. IV, figs. 4—5 belong with some probability to this species. Also Fristedt's *C. abyssicola* proved, by my examining a fragment sent to me, to be the present species.

Fig. 6. *Cladorhiza oxeata* n. sp.
Branchlet with embryo. The fibre is running in the right side. × 20.

Locality: Station 15, 66° 18' Lat. N., 25° 29' Long. W., depth 330 fathoms (bottom temperature ÷ 0°75 C.), station 143, 62° 58' Lat. N., 7° 09' Long. W., depth 388 fathoms (bottom temperature ÷ 0°4 C.); further 65° 57' Lat. N., 27° 00' Long. W., depth 336 fathoms (bottom temperature 0°) (Wandel). The mentioned stations are situated in the Denmark Strait and north of the Faröe Islands. The species appears to be a native of the cold bottom, or the border of it. From station 3 with a bottom temperature of 0°5 C. we have a fragment consisting of denuded skeletal parts. This fragment has surely been dead long, as a Suberitid, and other forms are growing on it, and it has moreover lost something of its original firmness. Therefore it must be supposed to have been removed from its native place.

Geogr. distr. As mentioned the species has been taken by the Norwegian North-Atlantic Expedition and in the Baffin Bay, depth 116—215 fathoms (Fristedt l. c.).

The *Cladorhiza*-species are forms all of which are natives of rather deep or very deep water. The bathymetrical range of the genus is from 116 to 3000 fathoms. The genus is widely distributed, from ca. 80° Lat. N. to ca. 54° Lat. S. The arctic species live generally at considerably smaller depths than those of the Mediterranean and the Pacific. The species treated here, which represent all the arctic species, thus have a bathymetrical range from 116 to 1309 fathoms; with the exception of *abyssicola* they are all of them natives of cold water. The species from the Atlantic and the Pacific have a bathymetrical range from 700—3000 fathoms; with regard to these species the bottom temperature of the localities at which they have been obtained varies from ca. 0° to 4°4 C. (32°1—40° Fahrenheit). The bottom temperature 0° C. (32°1 Fahrenheit) applies to the southernmost species *C. moruliformis* R. and D. obtained at 53° 55' Lat. S., 138° 35' Long. E. at a depth of 1950 fathoms.

The *Cladorhiza*-species described at present are the following ones:

1872. *C. abyssicola* O. Sars.
1876. - *corticocancellata* Cart. (as a variety of *abyssicola*).
1887. - *abyssicola* var. *rectangularis* R. and D. The Pacific.
1887. - — - *linearis* R. and D. The southern Pacific.
1887. - *moruliformis* R. and D. Southwest of Australia.
1887. - *longipinna* R. and D. The northern Pacific.
1887. - *similis* R. and D. The southern Pacific.
1887. - *tridentata* R. and D. Between Prince Edward Island and Crozet Island.
1887. - *pentacrinus* Dendy. Northeast of New Zealand.
1902. - *flos abyssi* Tops. Off the Cape Verde Islands.
- *gelida* mihi.
- *tenuisigma* mihi.
- *iniquidentata* mihi.
- *oxeata* mihi.

The two varieties *rectangularis* and *linearis* established by Ridley and Dendy are surely independent species.

In Zool. Anzeig. XIX. 532, Kieschnick has established a species *C. depressa*. As it is from a littoral locality it is scarcely a *Cladorhiza*, and as Thiele, in his account of Kieschnick's species (Abhandl. Senckenberg. Nat. Gesell. XXV, 1903) has been unable to find anything whatever that might correspond to it, the species must be regarded as non-existing.

With regard to the *Asbestopluma*-species described under the generic name of *Cladorhiza* see under the genus *Asbestopluma*.

Chondrocladia Wyv. Thomson.

Erect, branched in different ways; often a central axis with lateral branches which may be papillose, or the branches gathered at the top; sometimes branched like a tree, or finally of a more irregular form. The skeleton is in close accordance with the form, and consists in the axis or axes of powerful spicula-fibres, and of similar, but thinner ones in the branches. Spongin is found in the fibres. Spicula: Megasclera styli, and sometimes finely spinulous styli in a special layer coating the stalk; microsclera: the characteristic microsclera are isancoræ unguiferæ of one, two, or three sizes with from three to nine teeth at either end, to which forms sigmata are (always) joined.

1. **C. gigantea** Arm. Hans.

Pl. IV, Fig. 1. Pl. XIII, Fig. 2 a—l.

1880? *Cladorhiza grandis* Verrill, Proceed. of the U. S. Nat. Mus. II, 1879, 204.
1885. *Desmacidon clavatum* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 14, Pl. II, fig. 11.

1885. *Desmacidon nucleus* Armauer Hansen, ibid. Pl. III, fig. 1, Pl. VI, fig. 17.

1885. *Desmacidon giganteum* Armauer Hansen, ibid. Pl. II, figs. 12, 13, Pl. VII, fig. 8.

1885. *Desmacidon arcticum* Armauer Hansen, ibid. 15, Pl. VI, fig. 16.

1887. *Cladorhiza nobilis* Fristedt, Vega-Exp. vetensk. Iakttag. IV, 456, Pl. 25, figs. 60—65, Pl. 31, fig. 26.

Erect, club-shaped, on the upper part with a number of short, papillose branches swollen towards the point; below the axis is dissolved to a branched root. A layer coating the stalk and root and provided with special spicules present. The skeleton of the generic type, consisting of a powerful, below spirally twisted spicula-axis through the middle of the sponge, and thin spicula-axes in the papillæ. Spicula: Megasclera styli of two sizes, long ones in the axes, 1·2—2^mm, shorter ones in the other parts of the body 0·56—1·2^mm; finely spinulous styli in the layer coating the stalk 0·118—0·34^mm; microsclera of three forms, isancoræ unguiferæ of two forms, large ones with six teeth 0·057—0·077^mm, small ones with six to nine teeth 0·018—0·03^mm, sigmata with compressed terminal parts 0·037—0·045^mm.

This beautiful and interesting species reaches a considerable size, as has already been expressed by Armauer Hansen in the specific name, although his specimen had only half the length of the largest specimen before me. The species consists of a stem, dividing below, first into rather thick branches, then by and by into thinner ones, so that a rather richly branched root is formed. The stem continues upwards, and increases in thickness in its upper half, so that the sponge becomes about club-shaped. The upper, thicker part is set with a great number of papillæ, not regularly arranged. The papillæ have a broadly conical base passing into a thinner stalk which again ends in a more or less swollen head. The papillæ may otherwise be somewhat different in length and form, the length of the stalk may be different, and the end may have a more or less marked head-like swelling. The papillæ may also be somewhat differently directed; in the specimens in hand most of them are more or less turned downwards, only the uppermost ones are directed upwards. Up to where the lowermost papillæ begin, the root and stalk is coated with a layer provided with special spicules and of the same character as that found in several *Asbestopluma*-species; the layer is here very thin, and it is highly filled with mud, so that it must be supposed that the sponge has been sunk in the bottom so far as the layer reaches. The largest specimen in hand has a height of 43^cm, of which the stalk and root make about the half part; the stalk is ca. 21^mm thick, and the greatest thickness above is 55^mm. The length of the papillæ inclusive of the conical base cannot be given exactly, but it does not exceed 25^mm, and in their thinnest stalk-shaped part they have a thickness of 3—5^mm. Armauer Hansen's specimen was 22^cm high, and two smaller specimens before me are ca. 15^cm high, the other measures being in proportion to this. The colour (in spirit) is yellowish white; the lower part, which is covered by the coating layer, is, on account of the mud in it, dark gray, which colour ceases with a sharp boundary line. On account of the axial skeleton the sponge is firm and stiff, and the layer has outermost a rather hard, crusty consistency, but it is inelastic and somewhat brittle. The outer crusty tissue is not sharply bounded inward, but passes more or less evenly into the inner, softer tissue. The *surface* is apparently smooth, but under a magnifying glass it is seen to be finely shaggy. The outer crusty layer may rather easily be peeled off, while the outermost membrane, the *dermal membrane* proper, may be distinguished, but cannot, or only with difficulty, be isolated. *Pores* may be seen in the dermal membrane, and were measured to a size of ca. 0·02^{mm}. They are only observed with difficulty, the outer layer of tissue having the character of very small subdermal cavities situated within each other and separated by membranes, and the pores piercing only the very outermost membrane. From the subdermal cavities cylindric canals continue inward which canals may be observed, when a piece cut off parallel to the surface is regarded from the inside. *Oscula:* Separate great oscular apertures are not to be found, but it is likely that the papillæ carry the excurrent openings, as the inner tissue between the central axis and the outer layer is lacunous, and canals are running longitudinally in the papillæ, partly in the tissue between the axis and the outer layer, partly as sharply and distinctly bounded canals in the outer layer. Outermost in the terminal part of the papilla a cavity is found, or the middle part of the head of the papilla consists of a somewhat lacunous tissue without spicules. Now the end of the papilla is copiously provided with poreshaped openings, and as I suppose the said canals, at all events those running in the inner tissue, to be excurrent canals, I suppose the openings in the terminal part of the papilla to be excurrent ones.

The *skeleton* consists of a strong axis running through the middle of the sponge, and also continuing into the branches of the root. The axis is not quite compact, but is composed of a number of close-lying, strong fibres. In its lower part the axis is spirally twisted; this twisting is here very distinct to the naked eye, as it is not the spicules of the single fibres which are spirally arranged, but it is the whole, of fibres composed stalk that is twisted, so that it gets some resemblance to a rope. In the single fibres, on the contrary, the spicules are placed in the longitudinal direction of the fibres without any twisting. The twisting is most marked in the lower part of the stalk, but upward it becomes less marked, and at last it is lost; it disappears also in the root-branches. In the largest specimen the thickness of the spicula-axis is ca. 14^{mm}. Through the middle of each papilla runs a fibre, which is formed by one of the fibres composing the axis bending off and passing through the papilla. Where the fibre bends off from the stem it is supported by some spicules placed in the angle and reaching to the middle of the stem. The papillæ evidently correspond to the branches of the *Cladorhiza*-species. The skeleton of the other parts of the sponge supports the layer of tissue that coats the axis and its branches, i. e the papillæ. In the crusty outer layer this skeleton consists of a very dense layer of needles lying irregularly in all directions. Part of the spicules project through the surface and makes it shaggy. Down on the stalk the layer of tissue consists only of this outer, firm part, and it is easily separated from the stalk. In the thicker part of the body, on the other hand, the crusty layer passes inwardly, with a more or less indistinct bordering, into the soft, more lacunous layer of tissue nearest the axis which layer is provided with fewer spicules, partly scattered, partly gathered in bundles or shorter fibres. Also here the whole layer may be easily separated from the axis. Down on the stalk the crusty layer is about 2^{mm} thick, higher up in the expanded part it reaches a thickness of 3—5^{mm}. In the papillæ the construction of the skeleton is the same; in a transverse or longitudinal section the fibre is seen in the middle, then a soft layer with fewer spicules, and outermost the crusty layer (Woodcut fig. 7). The soft tissue between the crust and the fibre is here rather thin. The fibre continues to the point of the papilla, where it ends at the outer end of the cavity there; it has an average thickness of about 1^{mm}. The coating layer of the stalk and root is thin, and does not exceed 1^{mm} in thickness. It is of a character somewhat different from what it is in the *Asbestopluma*-species, consisting of closely and irregularly arranged spicules of a special form, besides being interwoven with the common axial styli. It might be said that it was the outer part of the crusty layer, which was interwoven with the special spicules, but then it must be remembered that the coating layer may easily be removed as a separate layer. In the axis a rather copious, yellowish mass of spongin is found cementing the needles of the single fibres and coating these fibres with a thin layer; on the other hand, the fibres are not, or only to a slight degree, united by spongin, and they seem chiefly to be held together by anastomoses passing very obliquely from one fibre to another. In the skeleton outside the axes no spongin was observed.

Spicula: a. *Megasclera* are styli, dividing into two forms, which, however, are not sharply separated: long, straight styli chiefly forming the axes, both the central one and those of the papillæ, and shorter, most frequently evenly curved styli found in the other parts of the body. The long styli are straight or sometimes slightly and a little irregularly curved; they taper a trifle from the middle outward: at the rounded end there is a more sudden tapering, the point is short and oftenest stubby. The length reaches 2^{mm}, and may go down to ca. $1{\cdot}2^{mm}$, and the thickness is 0·03 down to ca. $0{\cdot}017^{mm}$. The short styli are almost always slightly and regularly curved; they have likewise a sudden tapering at the upper end; the point is somewhat longer than in the long ones, and it is generally sharp. The length is $0{\cdot}56^{mm}$ up to ca. $1{\cdot}2^{mm}$, and the thickness is in proportion $0{\cdot}011$—$0{\cdot}024^{mm}$. Thus the short styli, while having a length like the shortest ones of the long styli, are of greater thickness; as before mentioned, however, the two groups are not sharply separated; neither are they so with regard to their occurrence, some of the shorter needles being found in the axis, while long needles may be found in the other parts of the body, only, however, in rather small numbers. Of both forms quite fine developmental forms are found, but only in small numbers. The spicules of the coating layer of the stalk are curved, often somewhat irregularly curved, styli; the head-end shows often an inconsiderable, scarcely perceptible swelling which is often placed a little below the end; they taper more or less towards the opposite end, which is more or less broadly rounded. They are finely spinulous, so finely that it is seen at most as a slight granulation, when the needle is not seen under very high magnifying powers. The length varies from $0{\cdot}118$—$0{\cdot}34^{mm}$, and the thickness at the upper end is about $0{\cdot}0015$—$0{\cdot}004^{mm}$; there is no fixed proportion between the length and thickness. b. *Microsclera:* these are isancoræ unguiferæ of two forms and sigmata. 1. The ancoræ of the large form have an evenly curved shaft and six lanceolate teeth at either end. At either end are also found two narrow

Fig. 7. *Chondrocladia gigantea* Arm. Hans. Longitudinal section through the end of a papilla with a cavity in the outer end. Outermost the crusty layer is found, then the softer tissue with fewer spicules and in the middle the axis. A few canals are seen. × 10.

alæ continuing down along the shaft and being a little longer than the teeth. The length of this ancora varies from 0·057—0·077^{mm}, and the thickness of the shaft is about 0·004^{mm}. Younger forms in different degrees of development are also found. 2. The small ancoræ have a rather highly curved shaft, but there may be some difference in the degree of curving; the number of teeth may be different, from six to nine, it seems most frequently to be seven or eight. Some irregularity is not rarely seen, so that some teeth are larger than others, or that more teeth are found on one side of the median line than on the other. Some instances are also found, in which the number of teeth at each end is different, for instance six and seven. At either end of the shaft two small alæ are found. The direction of the teeth is somewhat varying in this ancora, so that they are either directed almost horizontally outward, or more or less downward, i. e. towards the middle. The length is rather varying and is between 0·018 and 0·03^{mm}, and the thickness of the shaft is ca. 0·0028^{mm}. Developmental forms of this ancora were seen quite singly. 3. Sigmata; these are of a form quite similar to those occurring in most *Cladorhiza*-species, with compressed, inwardly edged terminal parts; they are also contort, almost always one fourth of a turning. Their length varies from 0·037—0·045^{mm}, and the thickness in the middle is ca. 0·002^{mm}. The ancoræ occur everywhere in the sponge in tissue and in dermal layer; they occur also in the axis in the tissue between the single fibres of which it consists; at the point of the papillæ the small ancora is wanting, or is only present in small numbers. Sigmata occur only in the papillæ, especially at the point, and they are not of equally frequent occurrence, being more scarce at the point of some papillæ, while in others they are found more copiously.

Embryos. Embryos were found in one of the two smaller specimens; they were rather conspicuous, as they are very large, and shine through the surface on account of their deeper yellow colour. They are uncommonly large, reaching a diameter of 5^{mm}; they are round, most frequently much flattened so as to become almost discoid or lenticular. They are placed in the body of the sponge between the skin and the axis, often in such a way as to be lying partly in the soft tissue, partly in the hard outer layer, sometimes also entirely in the outer layer in lenticular cavities; in the latter case the surface may be bulged out by them, and the layer separating them from the surface may be rather thin. Of spicules they have both megascleres and microscleres. The megascleres are thin and fine styli, quite reminding of developmental forms of the styli of the grown sponge; their greatest measured length was 0·89^{mm}. Of microscleres the large ancora occurred rather abundantly, and a few developmental forms of this ancora. These ancoræ are somewhat deviating from those of the grown sponge, their shaft being thinner and their teeth somewhat longer. Also the small ancora occurs, but only in very small numbers. Then forms occur, also in very slight number, that are, as to size, transitions between the two kind of ancoræ, so that we must suppose the possibility that the cells forming the ancoræ are not from the beginning distinctly separated into two kinds; it is, to be sure, to be supposed that later, when the ancoræ are found as two distinctly separated forms, each of these is formed by a distinct kind of cell. The large ancoræ in the embryos are of full length, they were even measured to be a little longer than has been observed in the grown sponge, viz. to 0·084^{mm}.

As I have had type specimens of all the four species established by Armauer Hansen, I have been able to decide with certainty that they belong all to one species. Three of the species, *clavata*, *nucleus*, and *arctica*, are only loose papillæ of *gigantea*, and it is a singular thing that

Armauer Hansen has not recognized this fact, as their exterior shows it plainly enough, and the spicules are the same. In *arctica* he has found sigmata, which shows that he has examined a piece of the terminal part of the papilla. When he also mentions »anc.² 3« for this species it is not correct, such ancoræ are not found. Armauer Hansen does not in any of his descriptions render any account of the fact that there are two forms of ancoræ. Although *clavata* is the one first described I have thought it correct to use the name *gigantea*, as this name has been given to a whole specimen of the sponge, and to this belongs also a recognizable figure, while the other species have been established on small fragments. I have likewise examined the type specimen of Fristedt's *Cladorhiza nobilis*, so that the identification is sure; otherwise his description and figures show plainly enough that the question is of the present species. Fristedt draws himself the attention to the resemblance, and the only distinguishing character he mentions is that his species, in contradistinction to that of Armauer Hansen, is hollow; the case is, as might be supposed, that the body is torn from the axis, the consequence of which is that the species apparently is hollow; as the body and the axis are easily separated, a tearing out of the axis is an easy thing. Fristedt gives the greatest length of the needles to 0·9^{mm}; that he has not found any longer needles corresponds with the fact that he has not had the axis, in which the longest needles occur; otherwise I have in his specimen found needles up to 1·7^{mm} long. In contradistinction to Armauer Hansen, Fristedt has found the spicules of the coating of the stalk; he does not mention, however, in what manner they occur. As to the occurrence of the skeletal spicules he expresses himself in a very obscure way saying: »These spicules are placed both in the body and in the arms nearest the central cavities«. As he does not mention the way of occurrence of the spicules of the stalk-coating, I suppose it to be this expression that has led Topsent to suppose (Résultats du Voyage du S. Y. Belgica, Spongiaires, 26) that these spicules occur through the whole height of the sponge. That they only form a stalk-coating also in Fristedt's specimen is seen from the figure, which shows a dark-coloured layer on the small part of the stalk that is present, and also the examination proved it to be the fact. As mentioned by Fristedt, some of the papillæ anastomose; it is an interesting fact that this feature is also found here as in several *Cladorhiza*-species; it has not been observed in the specimens before me. Fristedt says that the large ancoræ have more teeth than the small ones; this statement must be due to an error, neither is it seen in the figure; otherwise he does not mention the number of teeth. — The *Cladorhiza grandis* established by Verrill would seem, according to the description of its outer form, to be identical with *gigantea*, but this fact cannot be decided, as Verrill does not mention the spicules at all; if they prove to be identical Verrill's name has the priority.

The species *Cladorhiza concrescens* from the West Indies established by Schmidt (Spong. des Meerbusen von Mexiko, II, 1880, 83, Tab. X, Fig. 8, 9) must be a very closely allied species. Its form is quite similar, and it has also two forms of ancora; the large ancora has six teeth, but of the small ancora it is said that its teeth are so long as almost to touch each other in the middle. Schmidt's expression »..... den Schlammbeleg des Stieles ....« shows with rather great certainty that this species has a layer coating the stalk, which fact is not known to be found in other *Chondrocladia*-species than *gigantea*.

Locality: Station 4, 64° 07' Lat. N., 11° 12' Long. W., depth 237 fathoms (bottom temperature

2°5 C.); station 64, 62° 06' Lat. N., 19° 00' Long. W., depth 1041 fathoms (bottom temperature 3°1 C.); station 101, 66° 23' Lat. N., 12° 05' Long. W., depth 537 fathoms (bottom temperature ÷ 0°7 C.); station 138, 63° 26' Lat. N., 7° 56' Long. W., depth 471 fathoms (bottom temperature ÷ 0°6 C.); further it has been taken at 62° 53' Lat. N., 4° 14' Long. E., depth 450 fathoms (bottom temperature negative), and 62° 38' Lat. N., 4° 40' Long. E., depth 350 fathoms (bottom temperature ÷ 0°5 C.) (Ad. Jensen, the cruise of the »Michael Sars« 1902). The first four localities are situated between Iceland and the Faröe Islands, with the exception of station 64, which is situated south of Iceland; the two localities from the cruise of the »Michael Sars« are in the Faröe-channel. At the first four localities only fragments and loose papillæ were obtained, at the last ones on the other hand three specimens. As appears from the above the bottom temperature is negative at most localities, and only positive at stations 4 and 64. From station 64 we have only a quite damaged fragment, which may very well have been dragged in the trawl from an earlier station. From station 4, on the other hand, we have a fresh fragment; this station with a depth of 237 fathoms, is situated on the ridge between the northern, cold depth and the southern depth, so it may well be understood that the species may occur here. I suppose that the specimen in question is a fragment, but it might also be a quite young individual, in which latter case there might be the possibility that the specimen would not have attained its full development on this locality.

Geogr. distr. The species has been taken by the Norwegian North-Atlantic Expedition, partly between Iceland and the Faröe Islands or a little farther north, partly off the Norwegian coast, at the two first places at depths of 299 and 1163 fathoms, at the latter place at a depth of 452 fathoms; the bottom temperatures were ÷ 0°3, ÷ 1°1, and ÷ 1°0 C. (Armauer Hansen mentions further station 58, but this station being no zoological one, the statement is presumably erroneous). It has further been taken at East-Greenland, depth 130 fathoms (Fristedt). If *C. grandis* Verrill proves to be identical with the present species, it has accordingly also been taken off Nova Scotia, among other localities at 43° 17' Lat. N., 60° 58' Long. W., depth 180 fathoms. The species is now known with certainty from different localities in the whole northern depth between Greenland and Norway with a bathymetrical range from 130—1163 fathoms. The species seems chiefly to be a native of the cold bottom, although it scarcely exclusively belongs to the cold area; the fact proves to be that almost all the localities, to be sure, are negative, but they are situated at the very border of the cold area, and the Ingolf-station 4 forms an exception being situated quite up on the ridge between the cold area and the warm depth and having a bottom temperature of 2°5 C. An exception to the other side is formed by station 51 of the Norwegian North-Atlantic Expedition, which is situated in the cold area proper with a depth of 1163 fathoms and a bottom temperature of ÷ 1°1 C. The fragment from Ingolf-station 64 must be regarded as uncertain. If *C. grandis* Verrill proves to be identical with the present species, it accordingly occurs at the eastern coast of America much farther south and at localities with positive bottom temperature, and this does not seem to be improbable.

Note. Carter, in the »Porcupine«-sponges (Ann. Mag. Nat. Hist. 1874, 4, XIV, 218), mentions a *Chondrocladia*-species, *C. virgata*, from station 52, 1869, a locality south of the Faröe Islands with cold bottom. According to Wyville Thomson (The Depths of the Sea, 188), however, this species has not been taken here, but at the entrance to the Strait of Gibraltar. According to these facts Carter has surely been mistaken, and the species belongs to the latter locality. The branched forms of sponges, which are mentioned by Wyville Thomson (Proceed. of the Roy. Soc. XVIII, 443) from station 52, 1869, and which led Carter to refer *C. virgata*, for which he found no locality, to this locality, are surely the *Cladorhiza*-forms taken here.

The genera *Chondrocladia* and *Cladorhiza* are closely allied to each other, and the distinction between them is exclusively founded on the difference between the inequi-ended ancoræ and the equi-ended ones. As in the *Asbestopluma*-species, embryos are, as will have been seen, almost always found in the species of these two genera. Of *C. abyssicola* Sars has stated that the embryos are formed in the point of the branches, and in *C. tenuisigma* I have found that the spermatozoids are formed in the swollen ends of the branches. My examinations, however, are too insufficient to decide whether the sexual products are always and exclusively formed in the ends of the branches, but it seems probable. In this connection it is to be remembered that in almost all the species a particular sigma occurs, exclusively or chiefly belonging to the swollen ends of the branches. Whether there is any connection between these two things, whether this sigma here may possibly have a special function, I dare not, however, to decide, but it seems only to be formed in the swollen ends of the branches, that is to say, in the place where also the sexual products are formed. In *C. iniquidentata* no such sigma was found. — That embryos are always found in these forms, which all are deep-sea species, may perhaps be accounted for by the fact that the embryos are not developed during any definite time of the year, but all the year round.

The *Chondrocladia*-species, like the *Cladorhiza*-species, are forms that live in rather deep water, but upon the whole they do not seem to reach so great a depth as the *Cladorhizæ*. The vertical distribution of the species reaches from 130 fathoms, at East-Greenland, to 2900 fathoms, in the northern Pacific, but of the nine known species only three live in depths of 200 fathoms or more. The genus is distributed from about 66° Lat. N. to 19° 06. Lat. S.

The species of the genus are the following:

1873. *C. virgata* Wyv. Thoms. The Strait of Gibraltar.
1880. - *(Cladorhiza) concrescens* O. S. The West Indies.
1880. - *(Crinorhiza) amphiactis* O. S. Barbados.
1885. - *(Desmacidon) gigantea* Arm. Hans.
1887. - *concrescens?* O. S., R. and D. The northern Pacific.
1887. - *clavata* R. and D. The Fiji Islands.
1887. - *crinata* R. and D. North of Guinea.

1894. *C. alaskensis* Lambe. The Bering Strait, The northern Pacific.
1894. - *pulchra* Lambe. The Aleutian Islands.
1903. - *Guiteli* Tops. North-west of Cape Finisterre.

The *C. concrescens* O. S.? enumerated by R. and D., which has only one form of ancoræ and is taken at a depth of 2900 fathoms, is, no doubt, an independent species.

Kieschnick (Zool. Anz. XIX, 526) has established a *C. ramosa*, which Thiele (Abhandl. der Senckenberg. nat. Gesellsch. XXV, 947) states to be an *Iotrochota*-species. In Semon: Zool. Forschungsreise in Austr. V, 571, Taf. XLIV, Fig. 11, the same author has again a *C. ramosa*, also here designated as n. sp., and *C. dura* and *sessilis*. Thiele, however, has informed me in a letter that all three species belong to *Iotrochota*.

The two species established by Lambe, *alaskensis* and *pulchra*, are somewhat deviating, partly in their outer form, and to no slight degree in the skeletal structure, which shows longitudinal and transverse fibres; besides they have a dermal skeleton of projecting bundles of spicules, and further the spicules of these bundles are smaller than those of the skeleton. Therefore I think it to be doubtful whether these two species belong to *Chondrocladia* sens. strict.

Two more species may possibly belong to *Chondrocladia* viz. the *Monanchora clathrata* established by Carter (Ann. Mag. Nat. Hist. Ser. 5, XI, 369, Pl. XV, fig. 10 a—e), which seems to have had a massive form, and the spiculation of which consists of subtylostyli and ancoræ with five teeth; and the *Esperiopsis viridis* established by Kieschnick in the work quoted above (V, 572, Taf. XLIV, Fig. 12, Taf. XLV, Fig. 51—52), which is erect, somewhat finger-shaped, and has a spiculation of tylostyli and, according to statement, ancoræ of two kinds, with six and with five teeth. — It is possible that these two species together with the two above mentioned *Chondrocladia*-species established by Lambe will form a separate genus.

Artemisina Vosmaer.

The form as a flat cushion, or higher and more massive or roundish, or, finally, erect, stalked, cylindrical or branched. The skeleton of irregular, halichondroid structure, consisting chiefly of scattered spicules, between which irregular, polyspicular fibres may be found; regular fibres passing to the surface occur most frequently towards the periphery. The dermal skeleton consists either of erect, projecting bundles, or of a reticulation of more or less horizontal spicules. Spongin present or wanting. Spicula: Megasclera styli or subtylostyli, most frequently of two forms, one forming the main skeleton, the other the dermal skeleton; the styli all quite smooth, or all slightly spinulous at the head-end, or only the dermal spicules spinulous in this way. Microsclera small isochelæ palmatæ and toxa smooth or somewhat spinulous; to these forms may be added sigmata.

1. **A. arcigera** O. Schmidt.

Pl. I, Figs. 9—11. Pl. XIII, Fig. 3 a—f.

1870. *Suberites arciger* O. Schmidt, Grundzüge einer Spongienfauna des atlant. Gebiet., 47, Taf. V, Fig. 6.

1885. *Artemisina suberitoides* Vosmaer, Bijdrag. tot de Dierk., 12. Aflev., 3. Gedeelte, 25, Pl. I, fig. 16, Pl. V, figs. 51—55.

1887. *Artemisina suberitoides* Fristedt, Vega Exp. vetensk. Iakttag. IV, 430, Pl. 24, figs. 15—17.

1887. — — Ridley and Dendy, Chall. Rep. XX, Monaxonida, 112.

Cushion-shaped, roundish, or higher, so that the form becomes irregular, often somewhat compressed cylindrical. The consistency like that of a Suberites. The surface very finely and densely shaggy. The dermal membrane a thin film supported by close-set, somewhat penicillate bundles of dermal-spicules. Oscula a little spout-shaped, placed especially on the upper surface, but also scattered singly round on the sponge. The skeleton in the interior of irregular halichondroid structure, at the surface forming fibres that pass towards the surface and end in the penicillate, projecting bundles of dermal spicules. Spicula: Megasclera subtylostyli of two forms, larger ones 0·45—0·65mm in the main skeleton, smaller fusiform ones 0·29—0·4 in the dermal bundles; microsclera of two forms, isochelæ palmatæ 0·007—0·0128mm, toxa with spined ends 0·07—0·32mm.

This species, which in its exterior form reminds somewhat of a *Suberites*, is formed as a more or less high cushion, and has a roundish, more or less oblong contour. One specimen in hand is rather high in proportion to its size, and therefore somewhat irregularly cylindrical. The sponge seems always to grow on a firm underlayer, and we have specimens growing on stones, on Brachiopoda, on shells of muscles and snails, and on *Hornera lichenoides*. The largest specimen, which is longish, is 55mm long and about 25mm high; other more roundish specimens are of a similar or smaller size, but often of the same height, so that they become more globular. The smallest specimen has at the base an extent of 11mm and is ca. 8mm high; the mentioned, somewhat cylindrical specimen has a breadth of 12mm and a height of 17mm. The consistency is firm, about as in *Suberites*. The colour (in spirit) is yellowish white to gray. The *surface* is very finely and densely shaggy, almost velvety, from projecting spicules. Seen under a magnifying glass the surface presents a finely reticulate appearance on account of the many small close-set subdermal cavities, which shine through and are separated by the projecting spicula-bundles. The *dermal membrane* is a thin film; it has no special skeleton, but is supported by the close-standing spicula-bundles, which are spread in a somewhat penicillate way and it is pierced by these bundles. It is not, therefore, to be separated by itself. *Oscula* are circular or somewhat irregular openings surrounded by a more or less projecting, spout-shaped margin formed by the skin. It is not, however, the thin film that has been designated as dermal membrane, which forms this spout by itself alone, but the skin is here thicker, and the fibres supporting the dermal membrane bend into the oscular rim and form a close spiculation of parallel spicules, all with their point towards the oscular aperture. The greatest oscular diameter may be 3mm; the oscula are generally found about at the top or middle of the sponge in a number of ca. three to seven, but besides these some, often smaller ones, are frequently found scattered round on the sponge; sometimes also a few groups of oscula may be found; in one of the largest individuals thus eleven oscula are found altogether; on the smallest specimen only one osculum is found. The *pores* are found in the areas of the skin; they are circular and small; they were measured to a diameter of 0·017—0·048mm.

The *skeleton*. In the inner part of the sponge the skeleton has an irregular, somewhat halichondroid structure; some polyspicular fibres are found, running without any regularity, and otherwise the tissue is filled with irregularly scattered spicules. At a little distance from the surface the skeleton by degrees gets a different character, fibres occurring here that run more or less perpendicularly to the surface; in their outer part these fibres divide, and the outermost fibres formed in that way pierce the surface in bundles spread in a somewhat penicillate way, and support the skin like pillars. Below the skin, therefore, is found a great number of small subdermal cavities, or more exactly, one large such cavity. The height of the pillars, which is the same as that of the subdermal cavity, is on an average 0·4^{mm}. Between the fibres no transversal fibres or transversal spicules are found. The mentioned pillars are by no means always perpendicular on the surface; they may be placed more or less obliquely on it, and thus be somewhat recumbent. When the surface of the sponge is seen under a magnifying glass, this fact is distinctly seen, as also, that in one part of the sponge the pillars are all directed to one side, in another part to another side, and in other places again they are directed perpendicularly upward; by this means a certain configuration of the many small areas in the skin may appear, only, however, to be seen by means of a magnifying glass. The outermost spicula-bundles of the pillars, which pierce the dermal membrane, consist entirely or to some degree of spicules shorter and thicker than the other spicules of the skeleton. These dermal spicules may occur somewhat differently in different individuals. In some individuals the projecting spicula-bundles consist almost exclusively of these shorter needles, in others, on the other hand, they are found in smaller numbers, and many of the long spicules are found in the projecting bundles. According to this it would seem, as if in this feature some difference was found between different individuals. If, however, thin sections perpendicular on the surface are examined, the fact seems to be that when an abundance of the long spicules is found in the projecting bundles, many of the shorter dermal spicules are also found, and the bundles are larger, while they are smaller, when consisting almost exclusively of dermal spicules. It may be possible, therefore, that the mentioned difference is owing to a contraction, by which the dermal spicules are drawn back between the spicules inside. With this view agrees the fact that those of the specimens in hand in which the dermal spicules are less prominent and mingled with the longer ones, are low and very densely shaggy, while the higher individuals are less densely shaggy, and in them the projecting bundles consist almost entirely of dermal spicules. Vosmaer says l. c.: The spicules are kept together by a very slightly developed keratode or pseudokeratode ; I have not been able to find spongin in the skeleton, and I suppose that none is present.

Spicula: a. *Megasclera* are subtylostyli; they are divided into two forms, not, however, sharply separated from each other; one form, as before mentioned, forms the whole skeleton and is also found, in larger or smaller numbers, between the spicules piercing the dermal membrane; the other form, more or less mingled with the preceding one, forms these projecting spicula-bundles. The skeletal spicules proper are slender, straight, or slightly, somewhat irregularly curved; they taper evenly to a long point that may be a little shorter pointed at the extremity. The opposite end is slightly swollen to a head passing evenly, without any marking, into the shaft of the needle. They are quite slightly fusiform, being a little thinner below the head-end than in the middle. The length varies from about 0·45—0·65^{mm}, and the thickness is 0·006—0·009^{mm}. The shorter and thicker spicules in the projecting bundles are somewhat fusiform, being thickest in the middle, and the point is not so long. Their length is generally 0·29—0·4^{mm}, but, as before mentioned, transitions to the skeletal spicules are found, especially among the spicules that are placed immediately below the dermal bundles. The thickness is 0·009—0·018^{mm}, but in some individuals it does not exceed 0·014^{mm}. Of the skeletal spicules developmental forms were seen, down to quite fine ones, but in very small numbers. b. *Microsclera:* these are of two forms, isochelæ palmatæ and toxa with spined ends. 1. The chelæ are of the common form; their shaft is about straight or quite slightly curved, the middle part between the two terminal parts is straight or a little curved inward; the length of this middle part is generally somewhat less than one third of the whole length. The tooth is about as long and broad as the alæ. The chelæ vary somewhat as to size, and this may again to some degree influence the dimensions of the different parts. The length is 0·007—0·0128^{mm}, most frequently near the latter size; the breadth is ca. 0·002^{mm}. Developmental forms were seen singly as quite thin, recurved staves. 2. Toxa. The general form of these is one that has in the middle a strong curve while the ends are evenly curved to the opposite side, and their outer part is most frequently straight. They are generally more or less twisted in the middle, and most so, it would seem, in the smallest bows. From the mentioned and by far most common form they may vary in different ways, especially so, that the curve in the middle becomes more open and the legs more straight, so that we may get a bow with a very great angle and only one curve. The outer ends of the bow are spined for a quite short way; the spinosity may be a little varying, but generally there are comparatively few, rather coarse spines. These bows are exceedingly varying as to size; thus the length, which is somewhat dependent on the curve, varies from 0·07^{mm} quite up to 0·32^{mm}; the thickness, which is the same through almost the whole length of the bow, varies in proportion to the size from about 0·001—0·004^{mm}. All these sizes must be regarded as fully developed bows; neither would the small ones by a continued apposition grow to the form of the large ones, and they have likewise all, also the smallest ones, spined ends. On the other hand small bows occur, thinner than the fully developed ones of the same size, and almost not at all spined, or only with small spines; these, no doubt, are developmental forms. Thus the spines are not found from the beginning, but only formed by and by. Of the microsclera the chelæ are found in exceedingly large numbers both in the dermal membrane and throughout the tissue, the bows are found in the tissue in somewhat smaller numbers.

As I have examined the type-specimen described by Schmidt l. c., I have been able with certainty to establish the specific identity between Schmidt's *Suberites arciger* and Vosmaer's *Artemisina suberitoides*. Already Fristedt l. c. draws the attention to the probability of the identity. It may easily be understood that Schmidt has overlooked the chelæ, as they are exceedingly small, their smallest size being perhaps the smallest chelæ occurring at all. Schmidt further states that besides the common needles a form occurs which „variirt von der Kugelform bis zur Gestalt einer kurzen, an beiden Enden stumpfen Nadel", and he figures two such bodies; this fact, together with the chelæ, has for Vosmaer been the reason why he has not united the two species. The bodies mentioned by Schmidt are, however, only monstrosities of the kind that is upon the whole not rarely found in sponges. It seems especially to be the dermal spicules, which are sometimes transformed in a monstrous manner.

Locality: Station 28, 65° 14' Lat. N., 55° 42' Long. W., depth 420 fathoms; Station 127, 66° 33'

Lat. N., 20° 05' Long. W., depth 44 fathoms; Greenland, Pröven (Bolbroe, Schmidt's type specimen); the Davis Strait 65° 27' Lat. N., 54° 45' Long. W. (Wandel); East-Greenland (the East-Greenland Expedition 1891—92); Forsblad's Fjord, depth 50—90 fathoms, Hurry Inlet depth 50 fathoms (the Amdrup Expedition 1900); twenty miles east of Seydisfjord, depth 135 fathoms (Wandel); 64° 27' Lat. N., 13° 27' Long. W., depth 84 fathoms, 64° 58' Lat. N., 11° 12' Long. W., depth 300 fathoms (Ad. Jensen, the cruise of the »Michael Sars» 1902). The mentioned localities are situated in the Davis Strait, off East-Greenland, North and East of Iceland, and between the Faröe Islands and Iceland.

Geogr. distr. Besides at the localities mentioned above, the species has been taken between Norway and Spitzbergen, 72° 36·5' Lat. N., 24° 57·5' Long. E., depth 140 fathoms (»Willem Barents»); Spitzbergen, depth 40 fathoms, Kola Bay depth 95—100 fathoms (Fristedt); Nova Scotia, 43° 03' Lat. N., 63° 39' Long. W., depth 85 fathoms (Challenger). Thus the species is exclusively a northern one, its southernmost boundary being 43° 03' Lat. N., and, as usual, it goes only so far south at the eastern coast of America. Its longitudinal distribution is from the Davis Strait to Spitzbergen. It has been taken at depths from 40 fathoms (Spitzbergen) to 420 fathoms (the Davis Strait, 65° 14' Lat. N.).

2. **A. apollinis** Ridley and Dendy.
Pl. XIII, Fig. 4 a—g.

1887. *Amphilectus apollinis* Ridley and Dendy, Challenger Report, Monaxonida, XX, 124, Pl. XIX, figs. 3, 3 a—c.

Formed as a thick incrustation or flat cushion. The dermal membrane a thin film with a reticulation of spicules. The skeleton a halichondroid reticulation of polyspicular fibres, spicula-bundles and single spicules. Spicula: Megasclera styli of two forms, larger ones, smooth, or with a slight crenulation at the head-end, 0·53—0·8^{mm}, in the main skeleton; smaller ones, with very slightly spined head-end, 0·29—0·39^{mm}, in the dermal skeleton; microsclera of two forms, small isochelæ palmatæ 0·014—0·018^{mm}, toxa, large, spined ones 0·40^{mm}, smaller, smooth ones 0·085—0·28^{mm}.

Of this species we have only two fragments with a greatest extent of 35^{mm}. Ridley and Dendy describe their species as »massive, amorphous, cavernous. The largest specimen is oval, cake-shaped; about 50^{mm} long by 38^{mm} wide and 19^{mm} thick». The fragments in hand agree entirely with this description and convey also the impression of having belonged to a flat, thick crust-shaped sponge. The colour (in spirit) is light yellowish gray. The consistency is loose and soft. As the fragments in hand are much damaged, the original *surface* has only been preserved to a slight degree; I take it, however, to be certain that it is sparingly shaggy from projecting spicules. The *dermal membrane* is a thin film pierced by the mentioned spicules, and it seems to be provided with a somewhat irregular reticulation of styli of the smaller form. Of *pores* a few were seen in the undamaged parts of the dermal membrane; *oscula*, on the contrary, were not found. Ridley and Dendy describe the dermal membrane in a similar way, nor have they seen any oscula.

The *skeleton* is an irregular and somewhat halichondroid reticulation of polyspicular, but loose and little marked fibres, spicula-bundles, and scattered spicules. In the nodes a very distinct, clear, and white mass of spongin is found.

Spicula: a. *Megasclera* are styli of two forms, larger ones forming the skeleton, and smaller ones forming the dermal reticulation. The skeletal styli are more or less curved, often a little irregularly, the curve is generally found nearest to the rounded end; the opposite end tapers to a point of middle length the outer end of which may be a little shorter pointed. The upper end of the styli is either quite smooth, or they have, on the very uppermost surface only, a few exceedingly small spines appearing as a slight crenulation. The length varies from 0·53—0·8^{mm}, and the thickness is 0·013—0·020^{mm}; the longest ones are far from being always the thickest ones; finer developmental forms occur, but in small numbers. The dermal styli are straight, the head-end is often quite slightly swollen, so that they approach subtylostyli, but they cannot, however, be designated as such; the opposite end tapers more or less, but always rather little, and therefore the point is short. The most particular fact about them is that the head-end is generally or always slightly spined; some difference may be found in the spinosity, but it is only the very uppermost part that is provided with more or fewer slight spines. The length of these needles is between 0·29 and 0·39^{mm}, the thickness is 0·005—0·008^{mm}; the shortest ones are often the thickest ones. b. *Microsclera.* These are of two forms, isochelæ palmatæ and toxa. 1. The isochelæ are of a quite similar form as those of the preceding species; the shaft is quite slightly curved, the middle part, making about one third, is straight, the tooth is a little narrower but of the same length as the alæ, the tuberculum is rather long and most distinctly conspicuous in its lower end. The length of the chela is 0·014—0·018^{mm}, and the breadth about 0·004^{mm}. 2. Toxa; the largest of the bows have a similar form as in the preceding species, only the spinosity is, perhaps, a little finer, and it reaches a little farther up the legs, and the outer part of the legs is generally not straight. The bows have a length of up to 0·40^{mm} with a thickness of 0·004^{mm}. Of the bows thinner forms with slighter spinosity may be found, but I have seen no younger developmental forms. There is almost no variation in the form of these bows. On the other hand smaller and finer bows occur in rather large numbers; some of them are of a similar form, but the greater part have a considerably flatter curve; and rather frequently a form is seen having a rather strong bend in the middle, but a little way from the bend their legs turn horizontally and become straight or almost straight. The length of these bows was measured to 0·085—0·28^{mm}, and the thickness is in proportion from exceedingly fine, ca. 0·0007^{mm}, to 0·002^{mm}. None of all these bows are spined; to judge from their form, they do not appear to be developmental forms of the bows before mentioned; the largest of them, which are of a similar form as the preceding ones, may, however, be developmental forms of these. All the bows are frequently somewhat twisted.

Of the bows a few specimens were seen of a quite colossal size, viz. 0·56^{mm} long, and 0·014^{mm} thick. These bows had no spines or only a few quite rudimentary ones. The question is here evidently of monstrous forms arisen by a continued, abnormal silicious deposition, and by this continued deposition the thorns have by and by become effaced. The same feature may be found in other forms; thus in *Cladorhiza*-species I have found abnormal silicious deposition in the ancoræ, so that they became exceedingly thick, and the teeth were partly or almost entirely effaced.

Of the microsclera the chelæ occur very abundantly both in the dermal membrane and in the body itself; the bows are not numerous, and were not seen in the dermal membrane.

Remarks: On account of the localities from which Ridley and Dendy and I have the species, respectively East-Greenland and Kerguelen, some suspicions might be aroused with regard to the certainty of the identification. I have had, however, a fragment of the type specimen for examination, and I regard the identification as quite sure. First also the type specimen shows that a slight crenulation of the upper end of the skeletal styli is most frequently found. Next the type specimen, besides the spined bows, has also smooth ones, as mentioned in my description. Ridley and Dendy do not mention any smooth bows; but when giving the size of the bows they say: »size of full-grown spicule«, accordingly they must have seen some bodies which they have taken to be younger forms, and these bodies have, no doubt, been the smooth bows. A little difference is found between the type specimen and my specimen, but it is only a slight difference of size in the spicules, which is of no importance and would, no doubt, be effaced, if a richer material was at hand. Thus the styli of the type specimen do not exceed 0·536^{mm}, and this is about the lower limit for the styli of my specimen; and the toxa attain only a length of 0·3^{mm}, while in my specimen they may be 0·4^{mm} long; also the dermal styli are upon the whole a little smaller, whereas the chelæ are of equal size.

Locality: East-Greenland, the depth not stated (The East-Greenland Expedition 1891—92). Two fragments.

Geogr. distr. The species was before only known from Kerguelen, depth 20—60 fathoms (Challenger). The distribution of the species is accordingly very peculiar, as it seems to be bipolar; it is, however, to be remembered that we have hitherto so slight a material of this species, only two specimens having been obtained by the Challenger Expedition.

The genus *Artemisina* was established in 1885 by Vosmaer with the species *suberitoides*, which has now proved to be identical with the *Suberites arciger* established by O. Schmidt in 1870. When the quite heterogenous genus *Amphilectus* is dissolved, the species *apollinis* established under this genus by Ridley and Dendy in 1887 must be referred to the genus *Artemisina*, as has been done by Topsent. Then in 1892 Topsent has established a third species, *A. transiens*, and in 1904 a fourth species, *A. erecta*. A fifth *Artemisina*-species seems to be found in the *Desmacidon rimosa* established by Ridley (Zool. Collec. of the »Alert«, 609, Pl. LIII, fig. F., Pl. LIV, fig. mm); it is provided with larger and smaller styli, the latter often with spined head-end, and it has of microsclera small isochelæ palmatæ and smooth bows. Thus at present these five species make up the genus. By the establishing of the genus some stress was laid upon the suberites-like consistency; this character, however, is not found in the species *apollinis* and *erecta*, whose consistency is different from that of the other species. With regard to the spiculation the species agree in having small palmate isochelæ and toxa. In the megascleres, on the other hand, some difference is found; thus *arcigera* has subtylostyli, of which those piercing the dermal membrane are of a special form, *apollinis*, *erecta*, and *rimosa* have styli and as dermal spicules a special form of styli with slightly spined head-end[1]), *transiens* finally has only one form of styli, all with spined head-ends. Of bows *arcigera* and *erecta* have spined bows,

[1]) The description of the distribution of the two forms of styli in *rimosa* is somewhat obscure, but it is at all event stated that the small ones occur in the dermis.

transiens and *rimosa* smooth ones, and in *apollinis* both kinds seem to be found. Therefore it is perhaps doubtful whether the genus in future will prove to be a natural one; but at present it must be maintained. If it were to be dissolved, the species, on account of their spiculation, might best be referred to *Esperiopsis*, in which genus we have already species with the same combination of microscleres, but not, however, with spined bows. — What is also to be noticed is the great resemblance with regard to spiculation which most species of the genus show with *Hymeraphia* and *Rhaphidophlus*, of which genera styli, dermal styli with slightly spined head-end, isochelæ palmatæ of quite the same form as in *Artemisina*, and toxa are characteristic.

Homœodictya Ehlers (emend.).

The form very varying, from thick incrustations through more massive sponges to erect ones of various forms, sometimes plate-shaped, or digitately branched of a Chalina-like appearance. The skeleton also very variously developed, diffuse, irregularly polyspicular, or forming a regular reticulation with primary fibres bending towards the surface in a fan-shaped way, and secondary fibres. Spongin present in varying degree, sometimes, in the most Chalina-like species, in rather great amount, forming sheaths round the fibres. Spicula: Megasclera diactinal, oxea or strongyla; microsclera isochelæ palmatæ or arcuatæ, to which may be added rhaphides (and perhaps sigmata).

Ehlers, who recognized that Bowerbank's genus *Isodictya*, in which the species *palmata* was found, was too heterogeneous, established for *palmata* the genus *Homœodictya* (Die Esperschen Spong. Program zum Eintritt in dem Senat...., Erlangen 1870, 17 et 32), attaching special importance to the equi-ended chelæ[1]. On the other hand he laid no stress on the special form of the chela, which he described, however, in the specific description. Ridley and Dendy, in Challeng. Report, regard *Homœodictya* as a subgenus of *Desmacidon*, but they use as a diagnostic character the peculiar bending in of the axis in the chela, and they refer to the subgenus only three species all of which show this character. As mentioned in the introduction, such genera containing species with ancoræ and species with chelæ must be divided, and this is exactly the case with the genus *Desmacidon*. The species of this genus must be divided in two groups, one with ancoræ, the other with chelæ. As the type of the genus *Desmacidon*, *D. fruticosus* Bow. has ancoræ, the generic name of *Desmacidon* must be kept for the species with ancoræ. The question might then be of forming a new genus for the other group. I think, however, that it will be more correct, at all events at present, not to understand *Homœodictya* in the restricted sense in which it was understood by Ridley and Dendy, but to enlarge it to comprise all species of the old genus *Desmacidon* with chelæ. I think that these species are naturally connected; to be sure there is, as shown by the diagnosis, some difference as to form and skeletal structure, but the species seem here, as in several other genera, to form a continuous series; *H. conulosa* R. and D. occupies, as already stated by the authors, an intermediate position. As to the microsclera, the genus will comprise forms with arcuate chelæ, with common palmate chelæ,

[1] Ridley and Dendy say that Ehlers established the genus without giving any diagnosis; this, however, is not the case, as Ehlers, on p. 32, gives a diagnosis of the genus rather good for its time.

and with the peculiar palmate chelæ that were characteristic of *Homœodictya* in the sense of Ridley and Dendy. Thus the genus is divided in three groups, which groups, however, can scarcely be of generic importance, as arcuate and palmate chelæ may occur in the same species (for inst. *Esperiopsis forcipula* Ldbk.), and the peculiarity of the *Homœodictya*-chela is also found elsewhere, for instance in several *Esperiopsis*-species (see p. 15).

At present it is not possible to decide, which of the described species are to be referred to *Desmacidon*, and which to *Homœodictya*. The case is that when no figures are given, it cannot be seen from the commonly used expression tridentate isochelæ whether the question is of arcuate chelæ or ancoræ; and even if figures are given, they must be good ones to give sure information. I shall here therefore only enumerate some species, which with certainty belong to *Homœodictya*:

		Microsclera.
	H. palmata Johnst.	Homœodictya-chelæ.
1885.	- *(Myxilla) flabelliformis* Arm. Hans.	Chelæ arcuatæ.
1887.	- *(Desmacidon) conulosa* R. and D.	Chelæ palmatæ.
1887.	- *(—) ramosa* R. and D.	Chelæ arcuatæ.
1887.	- *kerguelenensis* R. and D.	Homœodictya-chelæ.
1887.	- *grandis* R. and D.	Homœodictya-chelæ.
1889.	- *(Fibularia) raphidifera* Tops.	Chelæ arcuatæ, rhaphides.
1903.	- *(Desmacidon) setifera* Tops.	Chelæ palmatæ.
1904.	- *(—) peltata* Tops.	Chelæ arcuatæ, rhaphides.

None of these species have sigmata, and it may be doubtful, whether such are found in the genus.

1. **H. flabelliformis** Arm. Hans.

Pl. IV, Figs. 2—3. Pl. XIII, Fig. 5a—c.

1885. *Myxilla flabelliformis* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 12, Pl. II, fig. 14, Pl. VI, fig. 6.

1903. *Desmacidon clavellata* Arnesen, Bergens Mus. Aarsberet. 1903, Nr. 1, 13, Taf. II, Fig. 2, Taf. IV, Fig. 4.

Erect, stalked, broadly leaf-shaped (grown specimens) or club-shaped (young specimens). The dermal membrane a thin film with scattered spicules. The skeleton consists of polyspicular primary fibres passing from the stalk into the leaf and bending in a sheaf-like way to all sides towards the surface: they are connected by transverse spicules most frequently placed singly. Spicula: Megasclera oxea of two sizes, large ones in the skeleton, 0·41—0·55^{mm}, smaller ones in the skin, 0·268—0·35^{mm}; microsclera chelæ arcuatæ, highly curved, 0·030—0·04^{mm}.

Of this species we have two larger, somewhat damaged specimens, and two small ones. The species has below a stalk attached by a somewhat expanded basal part, but the specimens in hand are torn off, with the exception of the smallest one, which is attached to a stone. Arnesen l. c.

says that it sits on serpula-tubes, muscles, stones etc. The stalk passes into a rather thick, more or less fan-shaped leaf; this leaf is thickest in the middle, but becomes thinner towards the edge. The largest specimen has a height of ca. 90^{mm}, and the leaf has a similar breadth. The greatest thickness of the leaf in the middle is ca. 17^{mm}, the stalk has a height of 20^{mm} and a thickness of fully 10^{mm}. The other specimen is a little smaller, and the leaf especially is less broad. Of the small specimens one has a height of 24^{mm}, half of which is a stalk scarcely 2^{mm} thick; this specimen may more properly be called club-shaped than leaf-shaped, its upper part having a breadth of 9^{mm} and a thickness of 6^{mm}. The smallest specimen is only 12^{mm} high, of which the stalk makes about the half. This specimen is quite club-shaped and has a greatest breadth of 3^{mm}. The consistency is rather loose, but the stalk is considerably harder. The colour (in spirit) may be given as light brownish gray. Of the *surface* I dare, on account of the condition of the specimens, say nothing with certainty, but doubtless the ends of the fibres project making it sparingly shaggy. The *dermal membrane*, to judge from the few places of the sponge where it is kept, is a thin film provided with scattered oxea and with very close-lying chelæ. *Oscula* and *pores* I have not been able to observe on my specimens, but on a young club-shaped specimen, kindly sent me by Miss E. Arnesen, an osculum was found at the top, as has been figured by the authoress l. c. Rather close-standing canals run through the sponge continuing from the surface horizontally inward or somewhat downward; these canals convey an impression of being larger on one side than on the other, and perhaps therefore, in the grown, leaf-shaped sponge pores and oscula have been localized each on their side of the sponge.

The *skeleton* consists in the stalk of close-lying, strong, polyspicular fibres connected by powerful spicula-bundles, so that a solid network is formed. This skeleton forms the greater part of the stalk, only a little network of thinner fibres being found on the outside. From the stalk the fibres continue into the leaf and bend to the sides in a fan-shaped way, branching and by degrees becoming thinner; thus the outer branchings form the edge of the sponge. The fibres, however, bend also and ramify in a fan-shaped manner towards the two surfaces of the sponge, where accordingly their outer ends projects everywhere. Thus these primary fibres have a rather regular course, and the distance between them is also rather equal, ca. $0{\cdot}29-0{\cdot}4^{mm}$. The fibres are thickest in the middle of the sponge and may here reach a thickness of $0{\cdot}2^{mm}$; then they consist of many spicules alongside, but through their outward course they become thinner and go down to a thickness of only a few spicules, in a few places even they consist of only two spicules alongside. In the stalk the fibres may reach a thickness of $0{\cdot}27^{mm}$. The primary fibres are connected by transverse spicules most frequently single, only sometimes two or three together; the transverse spicules are placed perpendicularly on the primary fibres, but otherwise without regular intervals, they do not form continuous fibres. In the skeleton a distinct but clear and white mass of spongin is found, especially distinct in the nodes. It may in some places be rather copious and entirely coat the fibres, but this does not seem to be the common case. In the stalk it is more copious, here it coats the fibres entirely, and is of a yellowish colour.

Spicula: a. *Megasclera* are oxea, divided in two rather distinctly separated sizes, of which the larger ones form the main skeleton, while the smaller ones are found in the dermal membrane. The larger oxea are evenly curved, sometimes the bend is somewhat sharper and localized to the middle of the spicule. The points are evenly pointed and of middle length. The length varies from ca. $0{\cdot}41-0{\cdot}55^{mm}$, and the thickness is ca. 0·017—0·025$^{\mathrm{mm}}$. Besides a great many much finer, very long pointed forms are found, which pass evenly into the thicker ones, and are, no doubt, developmental forms. The smaller oxea are of a quite similar form as the large ones, they are evenly, rather slightly curved, and have also evenly tapering points of middle length. Their length varies from 0·268—0·35$^{\mathrm{mm}}$, and the thickness from 0·013—0·018$^{\mathrm{mm}}$. A few intermediate sizes between the two groups may be found. Fine developmental forms are also found of the small oxea.[1]) b. *Microsclera:* these are of only one form, isochelæ arcuatæ; they are of a quite characteristic form, the shaft is highly bent, but the curve may otherwise be somewhat varying; the tooth forms such an angle with the shaft, that a straight line drawn from one end of the shaft to the other will pass through or along the teeth. The tooth is narrowly elliptical, and there is a longish tuberculum broadest downward; the alæ are of the same length as the tooth or reach a little farther down, and when the chela is viewed from the side, they end in a round lobe. Sometimes the chela is so highly bent, that the teeth and alæ of the two ends meet, and the bend may be so strong, that the teeth and alæ overlap each other. This fact leads then to some irregularity, the teeth are bent each to its own side, and they get a more or less wry form; on the other hand I have seen no coalescing, neither between alæ nor teeth; a coalescing may often appear to have taken place, but by a sufficiently exact examination it is seen that the parts only pass over each other, but are not coalesced. Together with the strong bend an alteration of the dimensions of the single parts of the chela takes place; both alæ and tooth become longer, and from the tuberculum a continuation reaches farther down the tooth. This irregularity of the chelæ may in some individuals be of frequent occurrence, so that by far most of the chelæ are irregular, while in other individuals it is far more scarce. The length, which is a little dependent on the curve, varies between 0·030 and 0·04$^{\mathrm{mm}}$, and the thickness of the shaft is 0·0033—0·004$^{\mathrm{mm}}$. Developmental forms of the chelæ are rather frequently found, the youngest forms are fine and have rather short recurved ends; at this stage they may to some degree remind of sigmata; by and by tooth and alæ are developed. The chelæ are found throughout the tissue, but are specially numerous and very close-lying in the dermal membrane.

Embryos. In one of the specimens embryos were found abundantly. They are scattered in the tissue, and each of them is surrounded by a thin membrane. They are about globular, and have an average diameter of about 0·47$^{\mathrm{mm}}$. The examined ones showed no spicules.

As I have had one of Armauer Hansen's type specimens, I have been able to identify the species with certainty; otherwise the determination would have been impossible. The *D. clavellata* established by Arnesen l. c. I have, likewise by examination of a type specimen, been able with certainty to identify as *flabelliformis*. Arnesen evidently has only had young specimens; to be sure she states the size to be 25$^{\mathrm{cm}}$, but the specimen sent to me is only 25$^{\mathrm{mm}}$, and the figure of the stalk on Taf. IV, Fig. 4 shows that it is at most a few millimetres thick, so that there can scarcely be any doubt that 25$^{\mathrm{cm}}$ is a misprint for 25$^{\mathrm{mm}}$.

Locality: The Ingolf, station 7, southeast of Iceland, 63° 13' Lat. N., 15° 41' Long. W., depth 600 fathoms, two large specimens; station 85, southwest of Iceland, 63° 21' Lat. N., 25° 21' Long. W., depth

[1]) In the mentioned smallest specimen the spicules were a little smaller, the skeletal spicules measuring at most 0·41$^{\mathrm{mm}}$, and the length of the dermal spicules keeping near the lower limit. The microsclera, on the other hand, were of full size.

170 fathoms, the smallest specimen; it was attached to a stone together with a great many sponges of the genera *Myxilla*, *Hymedesmia*, *Grayella*, *Hymeraphia*, *Plocamia*, *Bubaris*, and *Latrunculia*. It has further been taken northeast of the Faröe Islands, 62° 29' Lat. N., 5° 17' Long. W., depth 160 fathoms, a small specimen (Ad. Jensen, the cruise of the "Michael Sars" 1902).

Geogr. distr. By the Norwegian North-Atlantic Expedition the species was taken west of Spitzbergen, depth 416 fathoms. Arnesen l. c. mentions it from Bergen, at depths of 50—60 fathoms.

2. **H. palmata** Johnst.

Pl. XIII, Fig. 6 a—c.

? 1767. *Spongia bacillaris* Linné, Syst. Nat. Ed. XII, I, 1299, 13.

? 1776. — — Müller, Zool. Dan. Prodr. 256, 3086.

? 1786. *Spongia palmata* Ellis and Solander, Nat. Hist. of many cur. and uncom. Zoophytes, 189, Pl. 58, fig. 6.

1797. *Spongia digitata* Esper, Fortsetz. der Pflanzenthiere I, 190, Spong. Tab. L.

1842. *Halichondria palmata* Johnston, A History of Br. Spong. and Lithophyt. 92, 1, Pl. II, figs. 1—5.

1866. *Isodictya palmata* Bowerbank, Mon. Brit. Spong. II, 311, 25.

1870. *Pachychalina compressa* O. Schmidt, Grundzüge einer Spongienf. des atlant. Gebiet. 37.

1870. *Homœodictya digitata* Ehlers, Die Esperschen Spongien, Erlangen, 16, 32.

1874. *Isodictya palmata* Bowerbank, l. c., III, 133, Pl. LII, figs. 1—7.

1879. — — Verrill, Preliminary check-List of the Marine Invert. of the atl. Coast fr. Cape Cod to the Gulf of St. Lawrence, 31.

1882. *Chalina palmata* Carter, Ann. Mag. Nat. Hist. Ser. 5, X, 109, fig. 1, a, b.

1896. *Homœodictya palmata* Lambe, Trans. of the Roy. Soc. of Canada, Ser. 2, II, Sect. 4, 190, Pl. II, figs. 1, 1 a—f.

Of Chalina-like appearance: erect, more or less regularly digitately branched, the branches more or less, often highly, compressed, frequently to a larger or smaller extent coalesced to plate-shaped parts. The surface finely and densely shaggy from the projecting ends of the fibres. The dermal membrane a thin film resting on the skeleton below and pierced by the ends of the fibres. Oscula partly scattered, partly placed along the edges of the compressed branches or chiefly on one side of them. The skeleton constructed as in Chalinins, forming a regular reticulation of polyspicular primary fibres bending towards the surface in a sheaf-like way, and secondary fibres perpendicular on the primary ones, the meshes quadratic or rectangular. The fibres provided with a distinct sheath of spongin. Spicula: Megasclera oxea 0·15—0·220mm; microsclera of one form, isochelæ palmatæ with the axis bending out as a projection from the inside of the tooth 0·024—0·03mm.

The common exterior form of this species is well known, and it has often been figured, especially, however, in earlier works. It has attracted the attention at an early period, and its exterior has given rise to the name of "Mermaid's glove", by which it is said to be designated by the fishermen of the Orkneys and the Shetland Islands; however, it certainly shares this name with the digitately branched forms of *Pachychalina*. In its exterior and otherwise also in its skeletal structure it shows great resemblance to *Chalininæ*, especially to such forms of *Pachychalina* as the mentioned ones. This resemblance is very great and is also found in the form of the megascleres, so that, properly speaking, it is only by the occurrence of the characteristic chela that it can be decided, whether a specimen belongs to a *Homœodictya*-species, and confoundings have certainly now and then taken place. In the form a frequent feature seems to be that a compression of the branches takes place, and that larger or smaller portions of the lower part of the sponge form flat parts only branching above or in the edge. This form seems to be rather constant in the species, and to stand somewhat opposed to the common form of the *Pachychalina*-species most resembling it. This difference is especially found as a rule, but not always, between the present species and the *Pachychalina*-species (*P. excelsa* Schmidt) most common in the North-Sea. Of the species we have a rather considerable material showing the variations of the form. A few specimens have a regular digitate form with only a slight compression of the branches, especially in their lower part, while their upper end is cylindric or almost cylindric. Several other specimens are less regular, with more compressed branches and more expanded parts below, or the expanded parts become larger, and prevail almost over the in this case shorter branches; finally we have one specimen, the branches of which are exceedingly flattened and are lying in one plane, so that this specimen gets a very great breadth. The smallest and youngest specimens are quite unbranched; and these small specimens are most frequently formed as a single compressed branch or about oar-shaped, but irregularities may also occur at an early stage, so that the smaller specimens form broad, flat, somewhat lobate bodies. The smallest one of all the specimens, which is attached to a stalk of a Hydroid, is almost globular. Sometimes the lower part is more or less marked off as a stalk, but the branching may also begin directly at the base. Most of the specimens are torn off from the underlayer, of the others one is attached to the shell of a *Modiola modiolus*, a few others partly to worm-tubes, partly to stalks of Laminaria. The number of branches is very varying; the most richly branched specimen is above divided into about a dozen branches, but generally the number is smaller. The largest specimens are 34^{cm} high, and the regular, digitate branches have an average breadth of about 25^{mm}; then follows a series of specimens of decreasing sizes. The largest of the smaller, unbranched specimens has a height of 13^{cm}, and the smallest one is $7{\cdot}5^{cm}$ high. The mentioned, still smaller, globular specimen has an extent of only 8^{mm}. The consistency is very elastic, quite as in the *Chalinæ*. The colour (in spirit) is generally light yellowish gray. The *surface* is finely and densely, but quite short shaggy from the projecting ends of the fibres. The *dermal membrane* is a thin and transparent film; it has no spicules, but rests on the skeleton beneath and is pierced by the ends of the fibres. The *pores* are found in the dermal membrane, often so closely placed that the membrane is reduced to a network; they are round or a little irregular and were measured to a diameter of $0{\cdot}03$—$0{\cdot}12^{mm}$. *Oscula* are circular or, more rarely, somewhat oval openings; they are surrounded by a projecting, more or less pronounced, conical edge. They are directed somewhat upward, and consequently the projecting edge is higher on the lower side of the osculum. The principal canal runs obliquely downward, but larger canals may frequently be seen to lead into the principal one from different sides. Oscula vary in size from 6^{mm} quite down to 1^{mm}. They occur in rather large numbers and are found from the very base of the sponge to the top of the branches. Sometimes they may be said to be scattered, but most frequently their occurrence is limited to definite places. Thus they are often found on the edges of the compressed branches, but most frequently some of them are then found scattered on the surfaces. In the highly flattened specimen mentioned before they are found, partly on the edges, partly rather abundantly scattered over one surface, while on the other surface only quite few are found; and they may, in the regularly digitate specimens, be found almost exclusively on one surface.

The *skeleton* is constructed quite as in a *Pachychalina*. It consists of polyspicular fibres passing upward from the base and the middle, branching and bending to all sides in a sheaf-like way, and going to the surface. These primary fibres are connected by transverse fibres that are placed perpendicularly on them but form no coherent fibres. Thus a regular net of meshes is formed, which is only less regular in the middle part of the body. The meshes formed by the fibres are quadratic or rectangular; towards the surface the transverse fibres are placed considerably more closely than farther in. The distance between the primary fibres may be somewhat varying, and was measured to ca. 0·18—0·4^{mm}. The thickness of the primary fibres is generally about 0·09^{mm}. A distinct and most frequently rather thick sheath of spongin is always found round the needles both in the primary fibres and in the transverse ones. In the points of the fibres the mass of spongin is slight, and forms no sheath; this fact is especially distinct in the points of the branches, where the growth more particularly takes place. Quite as in the *Chalininæ*, layers are also here found in the branches, which layers are more or less parallel to the surface, and quite recall the structure of the outer skeletal layer, and these layers have presumably during the growth of the sponge marked the close of a period of growth. The layer arises by the fact that transverse fibres are here placed opposite to each other through the whole extent of the layer, while these fibres on both sides of the layer, as well outside it as inside it, are placed more scattered, often with rather long intervals. Then small short, primary fibres are found reaching from the layer of transverse fibres a little outward between the primary ones, but continuing no farther. Thus it looks, as if, by the beginning of a new period of growth, only some of the primary fibres that project through the surface continue the growth. Both the mentioned structural features cause the mentioned layers to appear as layers of more dense consistency, when a dried specimen of the sponge is seen towards the light. Already Bowerbank mentions this feature, l. c. II, 312. Scattered spicules are found rather copiously outside the fibres.

Spicula: a. *Megasclera* are oxea; they are straight or slightly curved, and evenly, middle long or rather long pointed. The spicules are very varying, both in length and thickness; the length varies from about 0·15—0·229^{mm}, and the thickness from about 0·008—0·017^{mm}. The largest spicules are of most frequent occurrence. It is, however, difficult to give the lower limit of the thickness, as some developmental forms are found passing evenly into the fully developed needles. With regard to the size of the needles, especially the thickness, some slight difference may be found between different individuals. Styli are not rarely found between the needles; they are always shorter than oxea, and they must surely be regarded as monstrous forms; in some individuals they are found more frequently than in others. b. *Microsclera*; these are only of one form, isochelæ palmatæ of the peculiar type before mentioned. When the chela is seen in profile, it looks as if the end of the tooth was split into two branches, one of which continues towards the axis. The inner branch is the end of the axis of the chela, which bends out from the tooth and in towards the axis. When the chela is seen from the front, therefore, a little below the oblong tuberculum proper another oblong, tubercle-shaped body is seen, which is the translucent, recurved end of the axis. The alæ form together an oval plate, and their edges are a little refolded. The plates formed by the alæ of both ends continue along the axis as a most frequently quite narrow ridge, and this part arches somewhat out from the axis behind, so that the back side of the chela is somewhat curved, although the axis is straight. When the chela is seen in profile under strong light, the axis may distinctly be followed, as it is more transparent than the tooth and alæ, which are seen from the edge. Then, in the first place, the inward-turned terminal part of the axis is distinctly seen, next a part appearing as a hump on the outside of the tooth, and finally the middle, straight part of the axis (Pl. XIII Fig. 6 b). These features are not always easily seen in the fully developed chela, especially as the different parts of the axis are differently developed; thus the falx is rather broad, and the inward-turned terminal part grows often very thick. Otherwise, with regard to length and form of this part, the chela may be rather varying; sometimes, also, the axis, and consequently the whole chela, is somewhat curved. The thin ridge in the middle of the chela may vary to some degree in breadth. The length of the chela varies from 0·024—0·03^{mm}, and its greatest breadth is ca. 0·007—0·008^{mm}. Developmental forms of the chela in all stages occur rather frequently; the finest ones consist only of the axis, which, according to what has been stated above, is straight and recurved at either end in such a way as to form an eye turning to one side; then the alæ and the plate of the tooth are formed by and by. The chelæ occur both scattered in the tissue of the sponge and in the dermal membrane, but upon the whole in no large numbers.

Bowerbank's description and figures of this chela are quite incomplete; thus his figure of the profile does not show the peculiar continuation of the axis, but the chela is, however, tolerably recognisable, especially from the figure showing it from the front. His description, on the other hand, is quite erroneous. Carter l. c. gives a good figure of the chela seen as well from the side as from the front, but in his description there are several misconceptions. Ridley and Dendy (Challeng. Report, 108) say, in their description of the chela in the generic diagnosis, »from the median line of the posterior surface of each anterior palm there projects backwards, i. e. towards the shaft, a delicate, flat fimbria»; according to this expression these authors do not seem to have seen that the question is of the axis of the chela; neither is it correct, when they term the inwardly-directed process »delicate, flat», although, to be sure, it is frequently somewhat compressed. Also their figures of the chela, especially in the species *grandis*, show that the process is here quite cylindrical.

Locality: From Iceland and the Faröe Islands we have a rather considerable material. From Iceland: Skagen (Grönlund), off Rödsands Bay (Hj. Jensen), Önundarfjord, depth 10 fathoms (the author); Iceland, no more particular locality stated (Jap. Steenstrup, Halberg). From the Faröe Islands: 6 miles N.W. of Kalsö, depth 60 fathoms, Vestmansund, depth ca. 70 fathoms, 9 miles east of Nolsö, depth 30 fathoms (Th. Mortensen); the Faröe Islands, no more particular locality stated (Nees, Rostrup, Müller). Seventeen larger and smaller specimens in all.

Geogr. distr. North-England, Scotland, the Shetland Islands and the Orkneys (Johnston, Bowerbank); Norway (Esper, Ehlers l. c.); New Scotland, Sable Island, and the Bay of Fundy (Lambe); between Cape Cod and the Gulf of St. Lawrence (Verrill). Thus the species is distributed between ca. 66° and

44° Lat. N., but on the eastern side of the ocean it is known no farther south than to the coasts of England. It is not found in deep water, the greatest depth known being ca. 70 fathoms.

Remarks to the synonymy. This species is generally enumerated as *palmata* Johnst., and Carter (l. c.) having examined Johnston's type specimen and found the characteristic chela, the identification may also be regarded as sure. The species may, however, with certainty be traced farther back, Ehlers (l. c.) having shown by examination of Esper's type specimen of *Spongia digitata* that this species is identical with Johnston's *palmata*, what was also indicated by Esper's figure. Therefore there might be some reason for taking up Esper's name of *digitata*, which dates from 1797. I have not done so, however, as there is great probability that *Spongia palmata* Ellis and Solander, 1786, is the same species. The description, to be sure, gives no hold, but the figure of the exterior, showing the characteristic compression, seems to show, even if not quite certainly, that the question is of the present species. Linné's name of *Spongia bacillaris*, on the other hand, cannot be taken up, as it is impossible to decide, whether he has had before him the present species or some *Pachychalina*-form. — By the examination of Schmidt's type specimen of *Pachychalina compressa* I have been able to decide that this species is identical with *H. palmata*, as already mentioned in part I of the Porifera of the Ingolf-Expedition, p. 6.

Group 2. Myxilleæ.

Megasclera generally divided into two forms, those forming the dermal skeleton, and those forming the main-skeleton. Typically the skeletal spicules are monactinal and the dermal spicules diactinal, but exceptions from this rule occur.

It seems to be a rather important character of the group *Myxilleæ* that the skeletal spicules are of one form and almost always monactinal, the dermal spicules of a different form and most frequently diactinal. The reach of this character, however, cannot yet be decided. In the group *Mycaleæ*, to be sure, instances may be found where the spicules that in some way or other belong to the dermal membrane are smaller or of a form somewhat different from those of the principal skeleton, for instance *M. placoides*, some *Esperiopsis*-species, *Artemisina*, *Homœodictya flabelliformis*, but they are generally of the same type. In the following subfamily, *Ectyoninæ*, which is closely allied to *Myxilleæ*, on the other hand, some genera are still found showing the difference, characteristic of *Myxilleæ*, between the dermal spicules and the skeletal ones, and still here the system is scarcely a natural one.

The dermal spicules in *Myxilleæ* are generally briefly stated to be diactinal; this statement, however, is not quite correct. As will be mentioned in the following under the single species the equi-ended dermal spicules, whether they be strongyla, tornota, or tylota, are only secondarily diactinal, but really monactinal, as they are begun as monactinal and grow as such to about their full length, and then the final form only occurs by degrees, contemporaneously with the growth in thickness. In the not quite developed spicules this development may still be traced, the ends being not quite equal, and it is no rare fact that the ends upon the whole never become quite equal, but it may still be decided in the fully developed spicules, which end has been the original point. The general fact is, accordingly, that the finer, i. e. the younger, the dermal spicules are, the greater is the difference between their ends, and the more they approach the monactinal form. This rule seems to be a general one; it is to be noted, however, that in the new genus *Dendoricella* established below, the dermal spicules are really diactinal. I have not yet been able to decide, whether these features may get any systematic importance.

It is, accordingly, to be remembered that when in the following the dermal spicules in diagnosis and description are called diactinal, this term is a purely descriptive one and means only that in their final form the spicules are more or less equi-ended.

Dendoricella n. g.
(Damiria Topsent).

The form massive, lobate or erect, club-shaped. The skeleton polyspicular, irregular or dendritic; the dermal skeleton consists of more or less erect bundles of dermal spicules. Spongin present or wanting. Spicula: Megasclera: the skeletal spicules diactinal, oxea (or strongyla), the dermal spicules oxea, tornota, or tylota; microsclera chelæ arcuatæ solely, or chelæ arcuatæ and sigmata.

Topsent (Archiv de Zool. exp. et gén. Sér. 2, X, XXI) mentions the genus *Damiria* Keller, and characterizes it as being distinguished from *Dendoryx* (in Topsent's sense) by its diactinal skeletal spicules. Later has for instance Lindgren followed Topsent in this view. Weltner, however, (Zool. Anzeig. XXI, 1898, 429) has shown that *Damiria* Keller has by its author been correctly referred to the Renierids, and has nothing to do with the Myxillæ, and after having examined a fragment of the type specimen kindly sent me by Dr. Weltner I can only corroborate this view. For the generic conception which Topsent in the quoted place calls *Damiria* we must thus have a new name. Ridley has referred a species belonging here to the genus *Crella* Gray (*Cribrella* O. S.), but Thiele (Kieselschwämme v. Ternate II, Abhandl. d. Senckenberg. nat. Gesell. XXV, 953) has correctly rendered an account of the fact that the type of this genus, *C. elegans* O. S., is a quite different sponge. Thiele means, in the place quoted, that the species belonging here may be kept in the genus *Myxilla*, whereas my opinion is that it is necessary to place them in a separate genus with the diagnosis given above, and I call this genus *Dendoricella*. Its most important character is that the skeletal spicules are plainly and really diactinal.

The eldest species of the genus is *D. Schmidtii* Ridley (Zool. Coll. of Alert, 432, Pl. XLI, fig. aa). Dendy has later (Proc. of the Royal Soc. of Vict. VIII, 28) established a species, *D. australiensis*, which is, however, according to Topsent (Rev. Suis. de Zool. IV, 455) identical with *Schmidtii*. Topsent, in 1892, (Archiv de zool. exp. et gén. 2, X, XXII) has established two species (under *Damiria*), *cavernosa* and *Pronhoi*; of these species the latter has certainly not really diactinal spicules, but is, no doubt, a *Myxilla* (see below under *M. brunnea*); the former species, *cavernosa*, I think to be a *Dendoricella*. Finally Topsent (Résultats de Campagn. scient. du Prince de Monaco, Fasc. XXV, 240, Pl. III, fig. 3, Pl. XIV, fig. 12) has established a species, *abyssi*, which, remarkably enough, he refers to *Desmacidon*, although it is a sure *Dendoricella*. Of Carter's *Halichondria infrequens* (Ann. Mag. Nat. Hist.

Ser. 5, VII, 309, Pl. XVIII, fig. 9 a—d) nothing can be said at present, and it is very doubtful whether it belongs here.

Thus the species of the genus *Dendoricella* will be as follows:

1884. *D. (Crella) Schmidtii* Ridley, with oxea, tylota, chelæ, and sigmata.
1892. - *(Damiria) cavernosa* Tops. with strongyla, tylota, chelæ. (Of what kind these chelæ are cannot be decided from the description, in which it is said „à bouts pectinés".)
1903. - *(Desmacidon) abyssi* Tops. with oxea, tornota, chelæ.
- *rhopalum* n. sp. with oxea, tornota, chelæ.
- *obesichela* n. sp. with oxea, oxea, chelæ, and sigmata.

The *Myxilla grata* established by Thiele l. c. has evidently, to judge from the figure, not really diactinal skeletal spicules, but styli with rounded end, and is either a *Myxilla* or perhaps a *Lissodendoryx* in the sense in which I take this genus; the fact is that it cannot be seen from the figure, whether the species has chelæ or ancoræ.

When Ridley referred the species *Schmidtii* to *Cribrella* = *Crella*, the more particular reason was, I suppose, the arrangement of the pores in sieves. Characteristic as this feature may be, it is a character that is found in many sponges, and cannot be used for an establishing of genera; it is only a further development of the feature found in a great many sponges in which the pores are especially placed over the subdermal cavities. Of Schmidt's four *Cribrella*-species *hamigera* is now the type of the genus *Hamigera*; *elegans*, which has smooth oxea in the principal skeleton, spined oxea in the dermal membrane, and further spined styli, I suppose to be identical with Topsent's genus *Pytheas*, in which case this genus may be called *Crella*; *hospitalis* and *papillosa*, as mentioned by Topsent, belong to the genus *Yvesia* Tops., which genus, what Thiele has drawn my attention to, must be called *Grayella* Cart. with the typical species *cyatophora* Cart. — Of the *Dendoricella*-species *rhopalum* shows the mentioned character of sharply limited pore-grooves to a strongly marked degree; the structure seems to be rather similar in *abyssi* and *Schmidtii*, but it is not mentioned with regard to *cavernosa*.

The two species described here, and *abyssi* are natives of deep waters, from 799—2596 fathoms; *Schmidtii* and *cavernosa*, on the other hand, are from shallow water.

The genus *Dendoricella* must among *Myxilleæ* be the one most closely allied to the preceding group, as it approaches *Homœodictya*; among the *Homœodictya*-species a few are found, in which the spicules of the dermal membrane are smaller than those of the skeleton, but they are of one form; in *Dendoricella*, on the other hand, two forms are found.

1. **D. rhopalum** n. sp.

Pl. IV, Figs. 4—5. Pl. XIV, Fig. 1 a—e.

Club-shaped, often somewhat compressed, sometimes a little lobate above. The surface with close-set, more or less deep grooves, separated by ridges arranged in a net-like way, slightly shaggy. The dermal membrane a thin film, supported by bundles of dermal spicules. Oscula more or less spout-shaped, one or several, on the upper part of the sponge. The skeleton dendritic, polyspicular. Spicula: Mega-

sclera: the skeletal spicules oxea 0·68—0·98^{mm}, the dermal spicules tornota approaching oxea 0·45—0·65^{mm}; microsclera of one form, isochelæ arcuatæ 0·034—0·0420^{mm}.

This species is most frequently markedly club-shaped. The specimens in hand that are not torn off from the under-layer are attached to larger or smaller stones. At the place of attachment they have a quite slight basal expansion, from which they rise increasing more or less evenly in thickness; thus no real stalk is formed, but the thinnest part is always found just above the basal expansion. Sometimes the upper part is more or less regularly cylindric like the lower part, but most frequently it is more or less compressed, sometimes in such a way that one side is convex, the other flat or concave. Most frequently the club-shape is rather slender, but it may be shorter and thicker. In a few cases the form is a little modified, the upper part being a little lobate; thus we have one specimen, which is, almost through its whole length, divided into three wing-like lobes. In one case the club is divided above into four quite short processes provided with oscula. The largest specimen is ca. 90^{mm} high; it is compressed, and has a breadth of ca. 50^{mm}, and a thickness of ca. 12^{mm}, just above the basal expansion the thickness is ca. 10^{mm}. The smallest specimen, which is more cylindrical, is 24^{mm} high and 7^{mm} thick. The consistency is rather firm and, on account of the skeleton, rather solid, and it is also somewhat elastic. The degree of contraction of the sponge causes, however, a considerable difference with regard to the consistency, the most contracted ones being considerably harder than those not contracted. The colour (in spirit) is in most specimens light gray (stations 20 and 36); in some specimens it is a little darker with a brownish tint, so that it becomes light grayish brown (station 18). The *surface* is very characteristic, but it has a rather different appearance, according as the sponge is contracted or not. Its appearance is most characteristic in the highly contracted individuals; in these it is closely set with rather deep grooves separated by narrow, ridge-shaped walls; these walls form a peculiar net all over the sponge, imparting to it an appearance highly recalling that of *Nardoa reticulum*. The less contracted the sponge is, the flatter these grooves become, and they may also quite disappear. The grooves are nothing else than those occurring in so many sponges, for instance in *M. incrustans*, which are formed by the dermal membrane being sunk between the parts of tissue separating the subdermal cavities, but they are here more regular and always sharply bounded from each other. The less contracted the sponge is, the larger and more shallow are the grooves, while they become smaller and deeper in the contracted sponge, and in this latter they are often oval. Their size is between about 0·4 and 3^{mm}. The grooves, especially in the contracted sponge, have a rather sharp edge. The surface is so far shaggy, as the dermal spicules project a little everywhere between the grooves. The *dermal membrane* is an exceedingly thin, transparent film, resting on the bundles of dermal spicules projecting from the ridge-shaped walls, and stretched over the interjacent subdermal cavities. The *pores* are situated in the parts of the membrane stretched over the subdermal cavities, and these parts are accordingly pore areas; in these areas they are found in large numbers and very close-set, so that the membrane becomes a sieve. Their size was measured to 0·03—0·40^{mm}. *Oscula* are found to a number of from one to ca. ten, evidently in proportion to the size of the sponge. They are found on the top of the sponge or a little down on the side; the largest specimen shows ten oscula, but it is somewhat damaged, and has perhaps had more than ten; they are all placed rather close together along the upper edge. In the above mentioned specimen which divides above into four processes, three of these processes have each an osculum, while the fourth one has two oscula. Oscula are spout-shaped, a pointed, conical spout rising to a greater or smaller height round the opening, which spout is formed by the dermal membrane; it is most frequently somewhat twisted. In the membrane forming the spout dermal spicules are found, arranged parallelly to the longitudinal axis of the spout, more or less gathered into fibres; these fibres arise from the fibres supporting the dermal membrane, which continue into the membrane forming the spout. From the oscular opening a rather wide canal continues far down in the sponge, running chiefly in the longitudinal direction, but frequently irregularly curved.

The *skeleton*. The *dermal skeleton*. The outermost branchings of the main skeleton towards the surface are continued by short fibres of dermal spicules. The outermost spicula-bundles of these fibres are spread in a penicillate or fan-shaped way, and they extend everywhere into the ridges between the pore grooves, and project a little over the surface; horizontal spicules are not found, and the fibres are arranged in such a way as only to be found in the ridges. In different places of the sponge these fibres may be differently directed, perpendicular to the surface or more or less recumbent; thus they are frequently directed towards the upper end of the sponge, and accordingly recumbent, when a piece of the membrane is seen from above. The fibres formed by the dermal spicules are most frequently about 1^{mm} long. The arrangement of the dermal skeleton reminds much of the structure in *Artemisina arcigera*. The *main skeleton* is of dendritic type. From the base a few thick fibres rise, branching gradually up through the sponge, frequently coalescing and connected by more or less strong anastomoses in different ways, so that a chiefly dendritic, tolerably regular and rather densely branched skeleton is formed. The outermost ramifications of the skeleton bend towards the surface at right or more or less acute angles. Then these outermost ramifications of the skeleton, as mentioned above, continue to the surface as fibres formed by dermal spicules. All the fibres are polyspicular, towards the base they may be very thick, up to $0{\cdot}5^{mm}$, and they are here interwoven with a network of more or less strong anastomoses. The outermost ramifications, just before the beginning of the dermal spicules, have a thickness of ca. $0{\cdot}09^{mm}$. Spongin is found in the fibres, which are, therefore, very solid, but the spongin is white and clear, and so it is only to be observed with difficulty. In the lower part of the sponge it coats the fibres entirely, but only with a very thin layer; farther up the spongin is more scarce, and it is not seen in the dermal fibres.

Spicula: a. *Megasclera.* 1. The skeletal spicules are long oxea; they are slightly, rarely a little more, curved; the curve is most frequently even, sometimes it is a sharper bend and localized in the middle. The spicules are of about equal thickness throughout the length, and the point is middle-long, frequently bounded by straight lines. The length is $0{\cdot}68$—$0{\cdot}98^{mm}$, most frequently nearer to the latter limit than to the former; the thickness is $0{\cdot}014$—$0{\cdot}022^{mm}$. A few developmental forms are seen, all of which are long pointed. 2. The dermal spicules may be best described as tornota, but they approach the form of oxea; they taper a little from the middle outward, the point may be somewhat varying, but most frequently it is short. They are generally straight, sometimes a little curved. Their length is $0{\cdot}45$—$0{\cdot}65^{mm}$, their thickness ca. $0{\cdot}007$—$0{\cdot}011^{mm}$. Of this spicule very few developmental forms were seen, and no quite young ones. But to judge, both from the quite equally formed ends of the fully developed forms and from the few developmental forms, this spicule seems to be really diactinal b. *Microsclera;* these are only of one form, isochelæ arcuatæ. The chelæ are elegantly formed, the shaft is evenly and rather highly curved, the terminal parts are comparatively small in proportion to the length of the chela. The alæ are drawn out to a pointed corner, and are somewhat tooth-like; the tooth is narrowly lanceolate, pointed downwards, and there is a small, oblong tuberculum. The shaft is not quite cylindrical, but a little compressed; this compression may be more or less pronounced, and the dorsal side of the shaft may thin to a more or less broad brim. In this respect there may be great difference in different individuals. In some individuals the shaft is only little compressed, and only very few chelæ show a slight brim; in others chelæ with brim and without brim are about equally frequent, and in one specimen almost all the chelæ have a brim, and only few are found without brim. The more frequent the chelæ with brim are, the broader is the brim. In the specimen in which almost all the chelæ are provided with a brim, this brim has frequently one or two incisions, so that it is divided into two or three lobes. In by far most individuals the brim is narrow, and in most of the chelæ it is wanting, so that it seems as if its higher development is to be regarded as a monstrosity. The length of the chelæ is 0·034—0·0429^{mm}, and the thickness of the shaft is between 0·0014 and 0·0029^{mm}, according as it is seen from the front or from the side; in chelæ with large brim the breadth of the shaft may reach 0·0050^{mm}. A few developmental forms were seen; the fine ones had a recurving at either end, but did not yet show any traces of alæ. The chelæ are found throughout the sponge, and they are abundantly present everywhere in the dermal membrane, besides in other places they are close-lying in the pore sieves in the strings of tissue between the pores.

Locality: Station 11, 64° 34' Lat. N., 31° 12' Long. W., depth 1300 fathoms, one specimen; station 18, 61° 44' Lat. N., 30° 29' Long. W., depth 1135 fathoms, three specimens; station 20, 58° 20' Lat. N., 40° 48' Long. W., depth 1695 fathoms, six specimens; station 36, 61° 50' Lat. N., 56° 21 Long. W., depth 1435 fathoms, ca. ten specimens. The stations are situated in the Denmark Strait, south of Greenland, and in the southern part of the Davis Strait. The species is evidently a deep-water species, 1135 fathoms being the smallest depth, at which it has been taken. All the specimens are more or less, some to a very high degree, filled with the light-gray mud of which the bottom at the mentioned localities consisted; in it is found a great many Foraminifera and Coccoliths. This filling may, however, at all events partly, have taken place in the trawl.

Remarks: This species seems to be rather closely allied to the above mentioned *D. abyssi* Tops. whose chelæ, to judge from the figure, have a somewhat similar form, and whose dermal spicules are tornota. Also this species is a native of considerable depths, between ca. 2000 and 2500 fathoms. Topsent mentions that it, like *rhopalum*, contained much bottom material.

2. **D. obesichela** n. sp.

Pl. XIV, Fig. 2 a—d.

Form? The dermal membrane thin, supported by bundles of dermal spicules. Spicula: Megasclera: the skeletal spicules oxea 0·54—0·75^{mm}, the dermal spicules oxea 0·32—0·44^{mm}; microsclera of two forms, chelæ arcuatæ 0·026—0·0429^{mm}, sigmata 0·021—0·064^{mm}.

Of this species we have only a small, poor fragment, so that the description must chiefly be restricted to the spicules. As to the form of the sponge nothing can be said; the fragment is longish and has a greatest extent of 14^{mm}. The consistency is of a middle firmness. The colour (in spirit) is yellowish. The *dermal membrane* is mostly destroyed; it seems to have been a thin film, supported in the common way by dermal spicules. *Pores* and *oscula* were not seen.

The *skeleton.* The *dermal skeleton* consists of dermal spicules, and, in spite of the destroyed dermal membrane, it may be seen to have been arranged in the common way as more or less erect, penicillate bundles. As to the *main skeleton*, on the other hand, I can say nothing definite, as the fragment in hand may perhaps have been highly squeezed and pressed; in its present state the skeleton appears partly as irregularly arranged spicules and partly as spicula-bundles. No spongin was to be seen in the skeleton.

Spicula: a. *Megasclera.* 1. The skeletal spicules are oxea; they are slightly curved, evenly tapering, and the point is rather long. Their length is 0·54—0·75^{mm}, the thickness is ca. 0·011—0·017^{mm}. 2. The dermal spicules are also oxea, but by the form of their ends they approach somewhat to tornota; they are straight or quite slightly curved, and they taper a little towards the ends, the point is even, but short. Their length is 0·32—0·44^{mm}, and the thickness in the middle is 0·006—0·010^{mm}. b. *Microsclera:* these are of two forms, chelæ arcuatæ and sigmata. 1. The chelæ arcuatæ are of a rather broad and compact form, the shaft is rather highly curved, the tooth is elliptical, more or less rounded, sometimes a little cut off at the end; there is a tuberculum, pointed downward; the alæ are of the same length as the tooth, and are more rounded. In contradistinction to the chela of the preceding species the shaft is here highly flattened. Their length varies from 0·026—0·0429^{mm} and the thickness of the shaft from 0·0025—0·0085^{mm}, according as it is seen from the side or from the front. Very few developmental forms were seen; they are already highly flattened at an early stage. 2. Sigmata; these are of the common form and more or less contort; their length may upon the whole vary from 0·021—0·064^{mm}, but it is rarely less than 0·043^{mm}, so that the small forms are rarely seen. The thickness is upon the whole 0·0014—0·0028^{mm}. Both forms of microsclera occur in very large numbers, and through the whole sponge; the chelæ are seen in enormous numbers closely packed in the dermal membrane.

Locality: Station 78, 60° 37′ Lat. N., 27° 52′ Long. W., on the eastern slope of the Reykjanæs-ridge, depth 799 fathoms.

Myxilla O. Schmidt.

(Dendoryx Gray 1867).

The form varying, from incrusting to lumpily massive, cushion-shaped, or forming more or less round masses, sometimes somewhat lobate; then more or less irregularly leaf-shaped, or finally club-shaped, stalked. The skeleton a polyspicular reticulation, which may be more or less irregular, sometimes rather diffuse. In the erect forms longer, primary fibres are found. It is no rare form that the reticulation consists of triangular meshes, which may be more or less regular. The dermal skeleton consists chiefly of erect bundles of dermal spicules, sometimes also horizontal spicules are found. Spongin is found, but almost always *to a very slight amount. Spicula: Megasclera: the skeletal spicules styli, most frequently spined, sometimes smooth, the dermal spicules diactinal, strongyla, tornota, tylota, or similar forms, the ends may be variously formed, and spined or smooth; microsclera, ancoræ spatuliferæ, sometimes of two forms, most frequently three-toothed, sometimes with more teeth; further sigmata may be added.*

In 1862 O. Schmidt established the genus *Myxilla* with the species *rosacea* Lieberkühn. In 1867 Gray established the genus *Dendoryx*, and as the first species under it he mentioned *incrustans* Johnst. In 1887 Vosmaer, in Porifera, Bronn's Klassen und Ordnungen, has the families *Desmacidonidæ* and *Ectyonidæ*, and he places *Myxilla* to the former family, and has *Dendoryx* with a query as a synonym to *Hastatus*, which, as is well known, is identical with *Myxilla*. In the same year Ridley and Dendy in Challeng. Report, under the family *Desmacidonidæ*, have the subfamilies *Esperellinæ* and *Ectyoninæ*, and here they place the genus *Myxilla* to the latter subfamily. They render a detailed account of the fact that the genus comprises as well species with accessory spicules as species without such spicules, but they have not wished to divide the genus. In 1888 Topsent (Arch. de. Zool. exp. et gén. Sér. 2, V, bis, 114) revives Gray's *Dendoryx*, and in 1892 he places the species without accessory spicules in *Dendoryx*, while he places the species with such spicules in *Myxilla*. Then *Dendoryx* is placed under *Esperellinæ* and *Myxilla* under *Ectyoninæ*. Thiele, however, in 1903 (Kieselschwämme von Ternate, II, Abhandl. der Senckenberg. nat. Gesell. XXV, 953) renders an account of the fact that the genus *Dendoryx*, as Topsent understands it, ought to be called *Myxilla*, as the typical species of *Myxilla*, *rosacea* Lieberk., according to Topsent (Mém. de la Soc. zool. de Fr. VII, 15, footnote 4) is identical with *incrustans* Johnst. Even if this view, as will be seen below, is not correct, the name of *Myxilla* will have to be used, as *rosacea* is, at all events, a species without accessory spicules.

1. **M. incrustans** Johnst.

Pl. IV, Figs. 6, 7. Pl. XIV, Fig. 3 a—b.

1842. *Halichondria incrustans* Johnston, A History of Brit. Spong. and Lithophytes, 122, Pl. XII, fig. 3, Pl. XIII, fig. 5.

1842. *Halichondria saburrata* Johnston, ibid. 120, Pl. XI, fig. 3.

1866. *Halichondria incrustans* Bowerbank, Mon. Brit. Spong. II, 249, 14.

1870. *Isodictya fimbriata* O. Schmidt (non Bow.), Grundzüge einer Spongienf. des atlant. Gebiet. 56.

1874. *Halichondria incrustans* Bowerbank, l. c. III, 108, Pl. XLIV, figs. 7—12.

1885. *Myxilla barentsi* Vosmaer, Bijdr. tot de Dierk. 12te Aflev., 3die Gedelt., 27, Pl. IV, figs. 15—16, Pl. V, figs. 56—59.

1885? *Hastatus Robertsoni* Fristedt, Kgl. Sv. Vet. Akad. Handl. 21, Nr. 6, 34, Tab. III, Fig. 4 a—b.

1886. *Desmacidon incrustans* Marenzeller, Die österreich. Polarstat. Jan Mayen, III, 10, Tab. I, Fig. 2.

1887? *Hastatus Robertsoni* Fristedt, Vega-Exp. Vetensk. Iakkt. IV, 442.

1888. *Dendoryx incrustans* var. *typica* Topsent, Arch. de zool. exp. et gén. Sér. 2, V, bis suppl. 118, Pl. VI, fig. 16 a.

1890. *Dendoryx incrustans* Topsent, Mém. de la Soc. zool. de Fr., 201.

1893. *Myxilla incrustans* Levinsen, Det vidensk. Udbytte af »Hauch's« Togter, 419, 17, Tab. I, Fig. 31—34.

1896. *Dendoryx incrustans* Topsent, Résultats scient. de la Campagne du »Caudan«, 274, 15.

1896. *Myxilla incrustans* Lambe, Transact. of the Royal Soc. of Canada, Ser. 2, II, Sect. IV, 191, Pl. I, figs. 10, 10 a—d.

Incrusting, forming irregular, massive masses, or being more roundish lumpy. The surface with sinuous grooves, more rarely even, not shaggy. The dermal membrane a thin film supported by penicillate bundles of dermal spicules. Oscula scattered, sometimes on the top of low cones. The skeleton chiefly a polyspicular reticulation of triangular meshes, sometimes more irregular. Spicula: Megasclera: the skeletal spicules acanthostyli with scattered spines 0·19—0·35^{mm}*, the dermal spicules tornota with slightly spined, rarely smooth ends 0·17—0·26*^{mm}*; microsclera of three forms, ancoræ spatuliferæ of two sizes, large ones 0·038—0·071*^{mm}*, small ones 0·017—0·028, sigmata 0·024—0·075*^{mm}*.*

This species may vary rather much in appearance, and in this respect it recalls *Halichondria panicea*. As in this species, however, the form is highly dependent on the substratum on which the sponge is growing. The most frequent forms are more or less extended, incrusting masses that may be thinner or thicker; then it may rise to cushion-shaped bodies or to irregular, roundish lumps. When growing on Algæ, roots of Algæ or similar bodies, it may have a quite irregular form, but then it is most frequently only incrusting. Oscula may sometimes be found on more or less distinct, conical projections on the cushion-shaped or lump-shaped sponge. The species seems sometimes to be growing directly on the sea-bottom; a few of the specimens in hand are not attached, but their basal surfaces are filled with sand and gravel. According to Johnston and Bowerbank, it is also frequently found on rocky bottom, growing on the rock. It is very often growing on *Pecten*-species, and then it is most frequently rather regularly cushion-shaped or flatly semiglobular. In the Ingolf-material we have it on *Pecten islandicus*; Bowerbank mentions it on *Pecten opercularis*, and Lambe has it from the American coast on *Pecten tenuicostatus*. Levinsen mentions it from Denmark on *Mytilus modiolus* and *Cyprina islandica*. As rather thin, irregular incrustations it is found on barnacles, Bryozoa, worm-tubes, and *Laminaria*-roots. The largest specimen in hand, which is not attached, has a greatest breadth of 115^{mm} and a height of 90^{mm}; most of the specimens are not so large and especially not so high; a middle-large one, growing on a *Pecten*, is 75^{mm} broad and ca. 25^{mm} high. The smallest specimen in hand forms a small crust on a barnacle, it has a greatest extent of 9^{mm} and is only 0·5^{mm} thick. The consistency is of middle hardness, it is only little elastic and rather fragile. The colour (in spirit) is most frequently light yellowish; in the fresh specimens it is described as yellow to orange. The *surface* may be somewhat varying; it may sometimes be quite even and smooth, but most frequently it is more or less, often highly grooved, and the grooves are separated by winding and wrinkling walls. These walls are formed by the parts of tissue separating the canals; these canals are present in large numbers, they run very close to each other, and are most frequently directed towards the surface. Although the dermal membrane, as will be mentioned later on, is supported by the projecting spicula-bundles, the surface is nevertheless almost smooth, the spicules projecting so little, that they are only to be observed by means of a highly magnifying lens. When the walls are more compressed and have sharp edges, these edges, however, are most frequently finely spined, which is owing to the skeleton below. The *dermal membrane* is a rather thin, transparent film. It is supported by bundles of dermal spicules projecting in a fan-shaped way. These spicula bundles, however, are frequently not perpendicularly erect, but more or less, often highly recumbent. Of spicules the membrane otherwise has only microscleres. In different individuals, or in different places of one individual, it may have a somewhat different appearance; in more compact individuals with not especially large canals (perhaps more contracted individuals), or in places of the individual showing such a condition, the skin is rather smooth, and the projecting spicula-bundles are here close-set and rather perpendicular. Where the surface is more grooved and the membrane stretched over the grooves, the structure is somewhat different, as there are here large parts of the membrane with no skeleton immediately below them, from which the bundles may arise. Then the bundles issuing in a fan-shaped way from the edge reach into the membrane, and are quite, or almost quite recumbent in it, and in the middle part of it, where the bundles do not reach, scattered horizontal spicules are further found. In other places the structure is again somewhat different, fibres running from the skeleton under the parts of the membrane stretched over the grooves, from which fibres fan-shaped bundles project and pass into the membrane where they are more or less horizontal. This latter structure gives to the dermal membrane a peculiar appearance, as the parts of the membrane that are stretched over the canals or the subdermal cavities and, on account of the cavities below, appear as dark areas, are again subdivided by the mentioned fibres, which form a reticulation, in the meshes of which the pores are then situated. The *pores* are found in the dermal skeleton in the areas formed by the skeleton; they may be present everywhere, but are seen especially numerous and close-lying in the parts of the dermal membrane situated over the subdermal cavities, which parts are here often reduced to a sieve. They are round or oval and of sizes from quite small ones to 0·15^{mm}. *Oscula* are found scattered in rather slight numbers; as mentioned above, they are sometimes found on the top of conical projections, but these projections are often quite low or quite wanting. In a few cases the conical projections are not separated, but form a continuous wall with several oscula placed in the edge. This structure is illustrated by Bowerbank's figure Pl. XLIV, 7. In the largest specimen in hand eleven oscula are found. The appearance of the oscula may be somewhat varying; in the more compact forms with even surface the osculum is a regular round or oval aperture definitely bounded by the skin, which rises sometimes to a sharp edge round the aperture. Here the oscula are most frequently small, and were measured down to 1^{mm} or less. In individuals with highly grooved surface, on the other hand, the edge of the oscula becomes often irregularly indented, so that the aperture is somewhat lobed. It is this structure which causes Johnston to use the expression: «oscula obscure, substellated», presumably the dermal membrane has also been wanting to a great extent, and then oscula are little marked compared to the openings of the inhalent canals. When oscula are of the last-mentioned structure, they are generally rather large, and they were measured up to a diameter of 10^{mm}.

The *skeleton*. The *dermal skeleton* consists, as already mentioned, of perpendicular or more or less recumbent bundles of dermal spicules, which pass off from the main skeleton and support the dermal membrane, and bend as fibres under and into the parts of the membrane stretched over the subdermal cavities. Generally the question is only of bundles; but sometimes, in certain places of the sponge, they are lengthened more inward, so as to become short fibres passing out and ending in the dermal membrane. In the ridges of the surface that are more compressed and sharp-edged, the dermal skeleton is often much suppressed, and the main skeleton may continue quite out and give rise to the mentioned small spines. The *main skeleton* consists typically of triangular or, more properly, tetrahedral meshes, the sides of which have the length of a spicule and are formed of from one to five or six spicules. It may, however, be somewhat differently constructed in different individuals. Thus more or less marked fibres occur not rarely in larger or smaller numbers; they run especially in the direction towards the surface. When these fibres occur in larger numbers, some quadrangular meshes may be formed here and there, but a regular, quadrangular net of meshes is not formed. The longer fibres are generally a little thicker than the others. In other individuals the skeleton is much less regular and is not formed of so distinct triangular meshes, and then it is upon the whole of a more diffuse character. In the membrane coating the canals only microscleres are found. Spongin is found in the nodes of the skeleton, but it is only to be observed with much difficulty, as it is quite white and clear, and only a minimal amount is present.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli, straight or slightly curved, most frequently with the curve near the upper end; the point is middle long or rather short. The spinulation may be somewhat varying, but is generally rather scattered; the spines are not rarely gathered a little more densely at the upper end; only a short part of the point shows no spines. The styli vary rather much in size, not, however, in one individual, but in different individuals, whereas the variation in one individual is most frequently only slight. The length varies altogether from 0·19—0·35^{mm}; in the single individuals may be found for instance: 0·19—0·22^{mm}, 0·21—0·268^{mm}, 0·238—0·298^{mm}, and 0·28—0·35^{mm}. The thickness, which is only partly proportionate to the length, varies altogether between 0·008 and 0·015^{mm}. Finer, down to quite fine styli which are certainly developmental forms, occur in most individuals scattered in the tissue. They have about the full length, and their point is long and fine. Among the finest of them some were smooth, but otherwise traces of spinulation occur early. In the fine forms the spines are small and especially low, so that these forms may get an irregular, knotty appearance. In an individual with needles of the greatest lengths given above, the fine developmental forms were measured, for instance, to 0·29^{mm} with a thickness of 0·0028^{mm}; the very finest one observed was 0·0010^{mm} thick, and ca. 0·17^{mm} long; in this needle no trace of spinulation was seen. From the finest stages all transitional forms are found to the fully developed needles. 2. The dermal spicules are tornota; they are straight, or at most quite slightly, irregularly curved. They are cylindrical and most frequently slightly fusiform. The ends are short pointed; often a slight constriction is found below the end; the ends are slightly spinulous, only in a few cases smooth or almost smooth. It is to be remarked that the ends of the tornota are not always quite equal, but one end is frequently a little thinner than the other. Their length varies in a similar way as that of the styli, altogether it is between 0·17 and 0·26^{mm}, but in individual specimens it was measured, for instance, to 0·17—0·20^{mm}, 0·19—0·22^{mm}, and 0·21—0·26^{mm}. The thickness is 0·0057—0·01^{mm}. Only very few finer forms were seen, and none very fine. *Microsclera;* these are of three forms, three-toothed isancoræ spatuliferæ of two forms, and sigmata. 1. The large ancoræ have a slightly curved shaft, and in either end three lanceolate teeth; in both ends a rather narrow ala is found on either side of the shaft; the alæ are most frequently a little longer than the teeth. The teeth are directed slightly outward. The length varies altogether between ca. 0·038 and 0·071mm; it may vary somewhat in the single individual, not, however, so much. Thus in a specimen with the smallest ancoræ the greatest length was 0·043mm, and in a specimen with large ancoræ the smallest form was 0·059mm long. The greatest breadth of the ancoræ from one lateral tooth to the other is about 0·014—0·025mm. Besides the length also the dimensions of the different parts may vary; thus alæ and tooth may be comparatively longer or shorter, and the free middle part of the shaft may, according to this variation, be from one third to one fifth of the whole length. Of this ancora a few half-developed stages were seen, in which only beginnings of the teeth and falces were present. — This ancora showed frequently, at all events in many individuals, many different deformities. It has been mentioned that the ancoræ may vary somewhat with regard to the length of the teeth; also the breadth of the teeth may vary, and they may be very narrow. Then they may be straight cut off at the end, and here they have very often an incision, so that they become more or less deeply split. Further the alæ may separate more or less from the shaft, and each form a tooth, or they may coalesce so as to form one tooth, so that we get four or five teeth, each directed its own way. The teeth or tooth-like structures which in the mentioned cases replace the alæ, appear, as far as I have been able to observe, when they are quite separated from the shaft, to be upon the whole of the same construction as the genuine teeth, but this is only rarely the case, as most frequently they are only partly separated from the shaft. All these deformities, for as such they must be regarded, show the peculiarity that they are always symmetrical, occurring in quite the same way in both ends. Finally the ancoræ are often somewhat twisted. 2. The small ancoræ have a comparatively more curved shaft than the large ones, and further the teeth are less directed forward, so that a line through the two middle teeth would be straight or almost straight. In either end there are three leaf-shaped teeth, which are most narrow at the base, and an ala on either side of the shaft. Teeth and alæ are comparatively long, so that the ends of the teeth approach each other, and the free middle part of the shaft is quite short, only ca. one eighth of the whole length, so that there is often only seen an incision between the alæ. The length of these ancoræ varies from 0·017—0·028mm, but the dimensions of the different parts remain about the same. The breadth is ca. 0·0057—0·0085mm. Also of this ancora a few developmental forms were seen. The two forms of ancoræ are sharply separated, both by their sizes and by the characteristic form of the small ancora. A few ancoræ may be found, however, that seem with regard to form and size to be intermediate between the two groups, yet with regard to form they approach always more nearly to the large ones. 3. Sigmata are more or less contort, up to one fourth of a turning. They are exceedingly varying in length, from 0·024—0·075mm. The variation, however, is not so great in all individuals; thus the upper limit was measured in some specimens to 0·064mm, and in others to only 0·04mm, the lower limit, on the other hand, seems to be about the same. The thickness varies altogether from 0·001—0·005mm, according to the size. The middle sizes of the sigmata occur very sparingly, and therefore the impression is frequently imparted that sigmata form two groups; this fact is especially conspicuous in the individuals in which sigmata reach the largest size, while the difference is smaller in individuals in which sigmata do not reach any considerable size. When they are divided in two groups, the fact is that the small sigmata may only vary a little in size, while the large ones vary somewhat more. All forms of microsclera occur throughout the sponge; they are also found in the skin, and especially in large numbers in the membranes of the canals.

Embryos. In most individuals embryos were found; they were present in large numbers and were lying rather close in the tissue. The embryos are globular, and their average size is 0·3—0·5mm Of spicules only megasclera were found in almost all the examined specimens. These megasclera are finely knotty, straight tylostyli; in the fine ones the head is most frequently found a little below the end, while in the thicker ones the end itself is swollen. Their length was measured from 0·045 up to 0·13mm by a thickness of 0·001—0·005mm. Thus these needles are skeletal spicules, which accordingly are the earliest occurring ones, whereas no dermal spicules were found. In a few embryos, in which the styli were of the largest sizes, also microscleres were found, that is to say developmental forms of the ancoræ; these forms were measured to a greatest length of 0·028mm, but their form indicated that they belonged to the large form. Spicules were already present in all the examined embryos.

Locality: We have a rather copious material of the species. Station 31, 66° 35' Lat. N., 55° 54' Long. W., depth 88 fathoms; station 34, 65° 17' Lat. N., 54° 17' Long. W., depth 55 fathoms; station 127, 66° 33' Lat. N., 20° 05' Long. W., depth 44 fathoms; Holstensborg (Bergendal); Egedesminde (Traustedt); Jakobshavn (assistant Olsen); Jan Mayen, depth 55 fathoms (the Amdrup Expedition 1900); the Bay of Skagestrand, depth 33 fathoms (Ditlevsen); east of Nolso, depth ca. 30 fathoms, at the northern end of Nolso, depth ca. 100 fathoms (Th. Mortensen). The localities are situated off West-Greenland, north of Iceland, off Jan Mayen, and off the Faröe Islands.

Geogr. distr. The species is hitherto known from the coast of Jan Mayen (Marenzeller); from the Orkneys, the Shetland Islands, the Hebrides, and the coasts of Great Britain and Ireland (Bowerbank); the Sound (Levinsen); the coasts of France, at the Channel and at the Atlantic, for instance the Bay of Biscay, at depths of ca. 96, 133, and 206 fathoms (the »Caudan«, Topsent), and finally from the Gulf of St. Lawrence (Lambe). In the seas in question it is thus distributed from 71° to 45° Lat. N. It is chiefly a shallow water- and shore-species, and the greatest depth, from which it is known, I suppose to be stations 19 and 32 of the »Caudan« in the Bay of Biscay with a depth of ca. 206 fathoms (400 metres).

Remarks: I have been able to determine this species with certainty, as I have examined a specimen sent by the Rev. Mr. Norman; this specimen showed distinctly the spined ends of the tornota. As will have been seen from the description, the species may be somewhat varying, especially with regard to the size of the spicules, and it seems even to be able to vary still more than shown by my material; thus Lambe l. c. gives the lower limit of the styli to 0·12mm and of the tornota to 0·14mm, but here, perhaps, developmental forms are included. The species has surely often been described under different names. As mentioned by Levinsen l. c., it is thus this species O. Schmidt has determined as *fimbriata* Bow., and, in Spong. des atlant Gebiet. l. c., quoted from Denmark and Greenland, which fact is shown by the specimens in the museum at Copenhagen. I suppose that it may also be regarded as a certain fact that *M. barentsi* Vosm. l. c. is identical with the present species, and this seems also to hold good with regard to the *M. barentsi* mentioned by Lambe (Trans. of the Roy. Soc. of Canada, 1894, XII, Sect. IV, 121, Pl. II, figs. 9, 9 a—c). I also think that *Hastatus Robertsoni* Frstdt., l. c., is the same species. With regard to both species the descriptions agree exactly with *incrustans*. Of the two varieties of *incrustans*, *typica* and *viscosa*, mentioned by Topsent (Arch. de zool. exp. et gén.

Sér. 2, V. bis, suppl. 118), on the other hand, at all events only the former is *incrustans;* the tornote figured by Topsent has smooth ends, but perhaps the spines, which may be very fine, have been overlooked; the tornote with cleft ends figured for var. *viscosa*, on the contrary, belongs, no doubt, to the following species. Finally Topsent (Résultats du Voyage du S. Y. Belgica, 17) describes a *Dendoryx incrustans* var. *australis;* on account of the sizes of the megascleres, the styli are 0·5—0·6^{mm}, and the tornotes 0·32^{mm}, I think it more probable that it is an independent species. — The *Halichondria incrustans* var. with angulated anchorate and smooth acuate from the west coast of Florida mentioned by Carter (Proceed. of the Acad. of nat. Sc. of Philadelphia 1884, 205) cannot be the present species, but must belong somewhere else.

2. **M. rosacea** Lieberk.

Pl. IV, Fig. 8. Pl. XIV, Fig. 4 a—h.

1859. *Halichondria rosacea* Lieberkühn, Arch. für Anat. 521, Tab. XI, Fig. 2.
1862. *Myxilla rosacea* O. Schmidt, Spong. des adriat. Meer. 71.
1864. *Myxilla tridens* O. Schmidt, ibid., Suppl. I, 36, Tab. IV, Fig. 5 a—d.
1864. *Myxilla Esperii* O. Schmidt, ibid., 36, foot-note.
1880. *Myxilla rosacea* Vosmaer, Notes from the Leyden Mus. II, 123, 1.
1882. — — Graeffe, Uebers. d. Seethierf. des. Golf. von Triest, Arbeiten aus dem zool. Inst. Wien IV, 6.
1888. *Dendoryx incrustans* var. *viscosa* Topsent, Arch. de Zool. exp. et gén. Sér. 2, V, bis, suppl. 119, Pl. VI, fig. 16, b.
1890. *Dendoryx incrustans* var. *viscosa* Topsent, Mém. de la Soc. zool. de Fr. 201.
1892. — — - — Topsent, Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 98.

Incrusting (sometimes forming free branches). The surface grooved, slightly shaggy. The dermal membrane thin, supported by penicillate bundles of dermal spicules. The skeleton a polyspicular reticulation, forming partly triangular meshes, partly quadrangular, or irregular ones. Spicula: megasclera: the skeletal spicules acanthostyli, dispersedly spined 0·178—0·24^{mm}, the dermal spicules tornota, most frequently with three-pointed ends 0·178—0·22^{mm}; microsclera of two forms, ancoræ spatuliferæ 0·0157—0·05^{mm}, sigmata 0·018—0·032^{mm}.

The specimens in hand of this species occur as thicker or thinner incrustations, especially on Hydroids, and a few ones on erect Bryozoa. In the material it is found growing on *Diphasia abietina*, *Halecium* sp., and *Lafoea* sp., and of Bryozoa on *Cellaria fistulosa* and *Bugula murrayana*. As the form of the sponge chiefly follows the substratum, it becomes most frequently longish and rather irregular. It always grows all round the Hydroid. Independent free branches seem, however, also to be found, as the material includes some such branches, but they are torn off. The largest specimen in hand has a greatest extent of ca. 57^{mm} and a breadth of about 25^{mm}; the thickness of the incrustation is scarcely more than 5^{mm}. The mentioned free branches are more or less compressed, and have a greatest breadth of 14^{mm}, the longest one is 40^{mm} long. The consistency is rather firm and somewhat elastic. The colour (in spirit) is in some specimens whitish yellow to grayish yellow, but not rarely it is light brown or reddish brown. Lieberkühn states that the fresh sponge is of a dirty rose-red colour, and Schmidt says that it is yellowish or dirtily rose-red. The *surface* is much and irregularly grooved, being, as in the preceding species, provided with knobs or sinuous ridges separating intercjacent grooves; otherwise it is quite slightly shaggy from projecting spicules. The *dermal membrane* is a thin film supported by projecting bundles of dermal spicules spread in a penicillate way; otherwise it has no skeleton. The *pores* are situated in the areas formed by the dermal skeleton; they are especially close-lying over the larger subdermal cavities, where they most frequently reduce the membrane to a network. They are round or oval, and their size is 0·018—0·11^{mm}. Distinct *oscula* were not seen.

The *skeleton*. The *dermal skeleton* consists, as in the preceding species, of bundles of tornota which project from the main skeleton, being spread in a penicillate way, and support and pierce the dermal membrane. The bundles have generally a length of only about one spicule; only where large subdermal cavities are found, short fibres are formed of the tornota, which fibres pass into the membrane stretched over the cavity, and branch, continually sending fan-shaped bundles up through the membrane. The bundles are most frequently rather erect, but may in places be more or less recumbent. Besides in the dermal skeleton tornota are also found in the membranes of, at all events, the larger canals. The *main skeleton* is a rather irregular, polyspicular network. It forms partly tetrahedral, partly more or less cubic or quite irregular meshes. Some longer fibres are found, especially running towards the surface. In the mentioned free branches rather long fibres are formed running lengthways of the branches. The fibres or spicula-bundles may have up to ca. six spicules alongside. As in the preceding species spongin is found in the nodes of the skeleton, but it is only to be observed with difficulty, as it is only present in small amount, and is quite white and clear.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli, they are most frequently slightly and evenly curved throughout their length, only more rarely they are straight; the point is even and middle long, but may vary a little in length. The spines are much scattered and rather small; only at the upper end they are a little more close-set, and are also here a little larger; the point is smooth for a longer or shorter space. The length varies from 0·178—0·24^{mm}, and the thickness from 0·008—0·011^{mm}. Some developmental forms were found, they were of different thickness, the finest ones were measured to ca. 0·0007^{mm}, and had a length of about 0·14^{mm}. Forms of a thickness of about 0·001^{mm} were slightly knotty or almost smooth, whereas forms a little thicker were distinctly spined. The developmental forms show a little distinct head-swelling, which is more distinct, the finer the needle is. 2. The dermal spicules are tornota; they are straight or slightly curved in different ways and slightly fusiform. Their ends are peculiarly formed; they taper only a little, and then they are abruptly cut off, the edge of the end thus cut off carries some small points, most frequently, as far as was to be seen, to a number of three. Sometimes the outer part of the tornote is quite slightly swollen. Most frequently their ends are not quite equal, one being a little thinner than the other. Their length varies from 0·178—0·22^{mm}, and the thickness from 0·004—0·008^{mm}. Developmental forms were seen in small numbers; in conformity to the development they show the greater difference between the two ends, the younger they are. b. *Microsclera* are of two forms, tridentate isancoræ unguiferæ and sigmata. 1. The ancoræ have an evenly curved shaft; at either end they have three teeth, and on either side a narrow ala. The alæ continue along the shaft, and in the middle they are connected by a quite narrow rim; thus there is no free middle part of the shaft, but only an incision in the rim running on either side. The ancoræ are very varying in size, their length is between 0·0157 and 0·05^{mm}, and the breadth is proportionately 0·004—0·018^{mm}. The larger ancoræ are most predominant. Developmental forms in different stages were seen. 2. Sigmata are of the common form and contort in different degrees; their size is rather varying, the length from 0·018—0·032^{mm}, and the thickness from ca. 0·0011—0·002^{mm}. Both forms of microsclera occur through the whole sponge and in no small numbers in the dermal membrane.

Remarks: Of this species I have for comparison had a fragment of one of Schmidt's type specimens sent to me by Dr. Marktanner-Turneretscher, and so I have been able to identify my species with certainty. It is also quite in conformity to Lieberkühn's description and figures l. c.; especially the figure of the acanthostyli is exceedingly characteristic. On the other hand neither Lieberkühn nor Schmidt mentions the pluripointed ends of the tornotes, but they must also be seen under very high magnifying powers to be made out distinctly. In Schmidt's type specimen the megasclera are a little smaller than in my specimens; thus the styli have an average length of 0·16^{mm}, and do not exceed 0·178^{mm}, and the average length of the tornotes is 0·15^{mm}, and they do not exceed 0·178^{mm}. Schmidt describes later, under the *M. tridens* established by him in 1864 l. c., the three-pointed tornotes very minutely, and compares very appropriately the form of their ends to the head of an *Ascaris*. In 1868 he (Die Spong. der Küst. von Algier, 27) joins, and, no doubt, correctly, this species to *M. rosacea*. When Vosmaer l. c. further refers Schmidt's *M. fasciculata* here, and says that this species is different from *fasciculata* Lieberk., I take this statement to be owing to a mistake. An original preparation here in our museum of *fasciculata*, labelled with Schmidt's own hand, shows that this is a quite different species, even a species with chelæ arcuatæ, and a specimen of *M. fasciculata* Lieberk. sent by Prof. v. Marenzeller, is quite agreeing with it as to spiculation. — Topsent maintains (Mém. de la Soc. zool. de Fr. VII, 1894, 16, the foot-note) that *M. rosacea* and *M. incrustans* are identical. This, as will have been seen, is not the case; but it will appear from the following how Topsent has arrived at this conclusion. The fact is that Topsent (Arch. de Zool. exp. et gén. Sér. 2, V bis, suppl. 118), as before mentioned, under *incrustans* mentions two varieties of this species, *typica* and *viscosa*, and while only var. *typica* can be identical with *incrustans*, var. *viscosa*, according to Topsent's description, proves to be identical with *rosacea*. Topsent's description leaves no doubt of the identity; he points out the pluripointed (Topsent says two-pointed) ends of the tornotes, he mentions the red colour, and finally he says that var. *viscosa* differs from var. *typica* by the presence of cellules sphéruleuses with large grains. Now the fact is that *rosacea* really has these cells in exceedingly large numbers, they are seen in enormous quantities in the tissue, especially in the membranes; they have a diameter of ca. 0·014^{mm}, and are filled with few, large, somewhat refractive grains. — The *M. rosacea* var. *japonica* enumerated by Ridley and Dendy (Challeng. Report, XX, 130, Pl. XXVI, fig. 3, Pl. XXVII, figs. 8, 8 a—c, Pl. XLVII, fig. 3) must, according to the description, be a different species, and this holds also good of the *M. rosacea* var. mentioned by Lambe (Trans. of the Roy. Soc. of Canada, X, sect. IV, 71, Pl. II, fig. 6, Pl. V, figs. 6, 6 a—f), which has higly spined styli 0·24—0·28^{mm} long and simply pointed tornota 0·22^{mm} long.

Locality: The Faröe Islands, 6 miles north to west of Kalsö, depth 60 fathoms, 2 miles off Börövig, depth 20—30 fathoms, at the north end of Nolsö, depth ca. 100 fathoms (Th. Mortensen); northwest of Strömö, depth 60 fathoms (Ad. Jensen, the cruise of the »Michael Sars« 1902).

Geogr. distr. This species, which was originally only known from the Mediterranean, seems to be rather widely spread. Triest (Lieberkühn); the canals of Venice (Schmidt); Algeria (Schmidt); at the Azores, depth 69 fathoms, off the northern coast of Spain, depth 72 fathoms, 45° 48' Lat. N., 5° 58' Long. W., depth 85 fathoms (»l'Hirondelle«, Topsent); at the French coast in the Channel at Luc and Roscoff (Topsent). The species is thus at present known from the Azores to the Faröe Islands. Its bathymetrical range is from ca. 5 fathoms (in the Channel) to ca. 100 fathoms (at the Faröe Islands).

3. **M. fimbriata** Bow.

Pl. IV, Figs. 9—10. Pl. XIV, Fig. 5a—i.

1864. *Isodictya fimbriata* Bowerbank, Mon. of Brit. Spong. II, 337, 43.
1874. — — Bowerbank, ibid. III, 147, Pl. LVIII, figs. 7—14.
1880. *Amphilectus fimbriatus* Vosmaer, Notes from the Leyden Mus. II, 116, 20.

Cushion-shaped or formed as a round lump, sometimes slightly lobed. The surface even, very slightly shaggy. The dermal membrane solid, supported by penicillate bundles of dermal spicules. Oscula scattered on the surface. The skeleton a polyspicular, most frequently irregular network of triangular or quadrangular meshes. Spicula: Megasclera: the skeletal spicules acanthostyli, rather densely spined, 0·26—0·43^{mm}*, the dermal spicules tornota 0·23—0·32*^{mm}*; microsclera two forms of ancoræ spatuliferæ, large ones 0·064—0·09*^{mm}*, small ones 0·022—0·035*^{mm}*.*

This species has a more or less lumpy, sometimes somewhat lobed form. It may be attached to different things; when growing on a rather extended substratum, as shells, it has often a flat, cushion-like form, but when it grows on worm-tubes, Hydroids, Bryozoa or the like, it becomes more roundish and lumpy. The smaller specimens seem to be the more regular ones, while the larger ones most frequently show the lobed or more irregular form. The specimens figured by Bowerbank l. c., which are all small, are thus rather regularly roundish, and he describes also the form as »nearly globular, or more or less roundish«. The largest specimens mentioned by Bowerbank were of the size of a walnut, whereas I have before me considerably larger specimens; the largest one, which is of an irregular, longish form, has a greatest extent of about 80^{mm}, and then we have a series of specimens in evenly decreasing sizes, the smallest one has a greatest extent of 12^{mm}. The colour (in spirit) is most frequently more or less dark-brown, to almost black, a few specimens are of a lighter tawny colour. I suppose that the fresh sponge after its death becomes dark by the influence of the light or in spirit, as the dark specimens, when cut through, are seen to be lighter inside, and the light colour begins just under the surface. As stated by Bowerbank, the sponge also becomes dark when dried. The consistency is somewhat elastic, and the sponge may be rather hard and firm, or softer and looser. The *surface* is even and apparently smooth, but under the magnifying glass it is seen to be slightly shaggy from projecting spicules. The *dermal membrane* is a rather solid and not especially thin film, which may very easily be isolated; it is supported by projecting bundles of dermal spicules spread in a penicillate way. These bundles are most frequently very close-set; they may be erect or more or less recumbent; when bending over large subdermal cavities they are always recumbent. Sometimes the dermal spicules are quite recumbent and scattered in the membrane, and then it rests on the main skeleton, from which spicules may project through it. The *pores* are partly lying singly, scattered among the projecting spicula-bundles, partly they are closely gathered over the subdermal cavities where they form sieves. Their size was measured from 0·018—0·12^{mm}. *Oscula* may occur in very varying numbers; most frequently they are rather few and scattered, but in a few cases they are numerous, and may then in places be close-standing. Bowerbank says: »Oscula simple, dispersed, numerous«. They are round, with a sharp, sometimes a little raised edge. Their size was measured from 0·5—4^{mm}.

The *skeleton*. The *dermal skeleton*, as mentioned above, is formed of close-set penicillate, more or less erect bundles of dermal spicules. They may sometimes be quite horizontal and scattered in the membrane. The *main skeleton* consists of polyspicular fibres with up to six spicules alongside; it forms a rather irregular network of triangular and quadrangular meshes. Some longer fibres are found running towards the surface, and they may be connected by transverse bundles, so as to form more regular, quadrangular meshes; these fibres may in places be rather numerous. A rather slight amount of spongin is found in the nodes of the skeleton.

Spicula: a. *Megasclera.* 1. The skeletal spicules are straight or slightly curved acanthostyli; the curve is most frequently nearest to the rounded end. The point may be somewhat varying, from rather short to middle long or rather long, in the latter case it is bounded by straight lines; in a few cases the point is rounded. The spinulation is rather dense, but the spines are small; they are often somewhat scattered in dots; most frequently the spines are a little closer gathered and also a little larger at the head-end and near the point, while they are smaller in the middle. Bowerbank designs this feature as »incipiently spined«. The spinulation may be more or less marked, and when it is slight, the spicule may be almost smooth in the middle. The point is most frequently without spines, but sometimes they continue to the very end. The length varies from ca. 0·26—0·43^{mm}, and the thickness from ca. 0·01—0·024^{mm}. The small sizes are not frequently found. As well with regard to length as to thickness a little difference may be found in different individuals. Developmental forms of different sizes were found in small numbers; the young ones have a slight head-swelling and a rather closely, but finely spined or knotty surface. 2. The dermal spicules are tornota; they are straight, only sometimes a little sinuous. The points are short and bounded by curved lines, but end with a little mucro. The tornotes are sometimes quite slightly constricted inside the points. The two ends are almost never quite equal, but one is a little thinner and a little longer pointed than the other. Their length is between 0·23 and 0·32^{mm}, and the thickness in the middle is 0·005—0·012^{mm}. Developmental forms, of which the young ones are styli, occurred, but in no great numbers. — In this species it is almost always distinctly to be seen, which end of the tornotes is the original point, as it is always thinner and longer pointed, while the other end is broader pointed and has most frequently a more distinct constriction below the point (Pl. XIV, fig. 5 e). These spicules also generally grow rather thick, while one end still continues to appear as a distinct apex; this fact is, I suppose, what leads Bowerbank to speak of »acuate tension spicula«; otherwise he is somewhat obscure, and in his diagnosis he calls the spicules of the dermal membrane »acerate«, but further says: »Interstitial membranes.

Tension spicula acuate", whereas, in the description and in the third volume under the explanation of the figures, he speaks of the spicules of the dermal membrane as monactinal ones. b. *Microsclera:* these are tridentate isancoræ spatuliferæ of two sizes. 1. The large ancoræ have a somewhat curved shaft, the teeth are oval and more or less broadly rounded at the end, sometimes pointed. The shaft has distinct alæ, a trifle longer than the teeth. The free part of the shaft between the alæ is about one fifth of the length. The ancora may vary somewhat in form, be more slender or more robust, and the tooth may vary a little in breadth. The length varies from 0·064—0·09^{mm}, in by far most cases it is midway between the two sizes; the thickness of the shaft is 0·0057—0·008^{mm}. 2. The small ancoræ have a similar form as that of the larger ones, the only difference being that the teeth of the two ends approach considerably in the middle. Their length varies from 0·022—0·035^{mm}, and the thickness of the shaft is 0·0021—0·0028. Developmental forms in different stages are found of both forms of ancoræ, from exceedingly fine ones with only slight traces of teeth. Transitional forms between the two forms of ancoræ have not been observed in this species. Both forms occur in the dermal membrane and in the membrane-like parts of the sponge, often in large numbers; the small ancora is the more frequent one.

Embryos. In some of the individuals embryos were found copiously in the tissue. They are globular, the largest ones of a diameter of ca. 0·3^{mm}. The smaller ones had no spicules, then megasclera occurred, and the larger ones showed both megasclera and developmental forms of the small ancora. The megasclera are spined tylostyli reaching a length of up to 0·14^{mm} and a thickness below the head of up to 0·004^{mm}. The developmental forms of the ancora were of the same length as in the grown sponge. At first the megasclera occur in small numbers and scattered; later, at the same time as they grow larger, they are numerous and closely gathered in a bundle; they are, especially at the head-end, far more coarsely spined than in the developed sponge. In the largest embryos the small ancora was fully or almost fully developed. The specimens in question were obtained in the months of May and July.

By comparison with a specimen of *M. fimbriata* Bow. sent me by the Rev. Mr. Norman I have been able to identify the species with certainty. From *incrustans* it is separated, besides by other characters, by the absence of sigmata; otherwise it is well characterized by its round or round-lobed form, its even surface, and the solid, not thin dermal membrane.

Locality: The species has been taken by the Ingolf, station 32, 66° 35' Lat. N., 56° 38' Long. W. depth 318 fathoms; station 85, 63° 21' Lat. N., 25° 11' Long. W., depth 170 fathoms; station 89, 64° 45' Lat. N., 27° 20' Long. W., depth 310 fathoms; station 98, 65° 38' Lat. N., 26° 27' Long. W., depth 138 fathoms; station 127, 66° 33' Lat. N., 20° 05' Long. W., depth 44 fathoms. It has further been taken at the following localities: Iceland, Cape North, depth ca. 37 fathoms (Ditlevsen); 64° 27 Lat. N., 13° 27' Long. W., depth 84 fathoms, 60° 55' Lat. N., 8° 56' Long. W., depth 69 fathoms, 62° 23' Lat. N., 2° 35' Long. E., depth 217 fathoms (Ad. Jensen, the cruise of the "Michael Sars" 1902); the Faröe Islands, at the south end of Nolso, depth ca. 80 fathoms, at the north end of Nolso, depth ca. 100 fathoms, 9 miles east of Nolso, depth ca. 30 fathoms, 6 miles north to west of Kalso, depth 60 fathoms, 8 miles south-east of Miavenæs, depth 40 fathoms, off the mouth of Borovig, depth ca. 30 fathoms (Th. Mortensen); southwest of Myggenæs, depth 135 fathoms (Ditlevsen). Altogether about twenty larger and smaller specimens. The localities are situated in the Davis Strait (station 32), in the Denmark Strait (stations 85, 89, and 98), north of Iceland, round the Faröe Islands and off the coast of Norway. The depths are from 30—318 fathoms.

Geogr. distr. The species was hitherto only known from the Shetland Islands (Bowerbank).

4. **M. brunnea** Arm. Hans.

Pl. IV, Fig. 11. Pl. XIV, Fig. 6 a—h.

1885. *Myxilla brunnea* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 12, Pl. III, fig. 1 d, Pl. VI, fig. 5.

Erect, more or less irregularly leaf-shaped, sometimes lobed or in other ways irregular. The surface grooved or curly, not shaggy, or only imperceptibly so. The dermal membrane a rather thin film, supported by penicillate bundles of dermal spicules, and in some places with horizontal spicules. The skeleton a somewhat irregular, chiefly polyspicular network with quadrangular or irregular meshes; primary longitudinal fibres are found running up through the sponge and bending towards the surface. Spicula: Megasclera: the skeletal spicules acanthostyli and acanthostrongyla 0·238—0·38^{mm}, the dermal spicules tornota with two- to four-pointed ends 0·20—0·29^{mm}; microsclera two forms of ancoræ spatuliferæ, large ones 0·053—0·064^{mm}, small ones 0·027—0·034^{mm}.

This species is erect, and is more or less, but often very indistinctly leaf-shaped. It is attached below; the specimens that have not been torn off from the underlayer, are attached to shells, Balanæ or stones. The most regular specimens are quite leaf-shaped, and are at the base narrowed to a quite short stalk. Of this form we have one specimen, 95^{mm} high, 65^{mm} broad, and ca. 5^{mm} thick. Then we have some specimens that are more irregular, the leaf being thicker and more irregularly lobed, and the form of a leaf may be quite effaced. These specimens, which appear to have been attached with a broad base, are 40—75^{mm} high and of similar breadths. A few smaller specimens are more ramiform. Finally we have a specimen attached to a stone, which from a lower lobed part passes above into two lobes forming together an open, bilobate calyx. The consistency is little elastic and rather brittle; the thin leaves are more flexible. For some of the specimens taken by the Ingolf, the colour of the fresh sponge is stated to have been dark orange; in spirit all the specimens have a dark brown to almost quite black colour; only very few ones are of a lighter shade. When cut through they show a lighter colour inside. The *surface* is highly grooved or curly; for, the sponge being traversed by a number of horizontal canals, the dermal membrane forms over their mouths sunk grooves, separated by curly or sinuous ridges. The surface is otherwise smooth, or finely, almost imperceptibly shaggy from projecting dermal spicules. The *dermal membrane* is a rather thin, but tolerably solid and easily separable film, partly supported by penicillate bundles of spicules, partly provided with scattered spicules. The *pores* are, as usual, lying in the dermal membrane, sometimes scattered, sometimes very close-set; they are round or oval, but in places where they are close-lying often of an irregular form. They were measured to about 0·029—0·23^{mm}. The question as to the *oscula* is not easily decided. A great number of canal-mouths are seen in the surface, but many of these apertures have evidently their origin from the fact that the dermal membrane is damaged, either torn over the canals, or quite wanting, and it is impossible in each single case to decide, whether damaging has taken place. Where, however, the membrane is preserved to any greater extent, circular openings of a diameter of about $0{\cdot}5^{\mathrm{mm}}$ are found in it, also a few smaller ones, and these openings must be regarded as oscula. In the thicker, irregularly leaf-shaped specimens a few wide perpendicular canals are also often found, opening in the edge; but I am not quite sure, whether the question is here of real oscular canals, or they are secondary canals arisen by coalescing. In the membrane coating these canals, dermal spicules are found and also pore-shaped openings; this, however, does not exclude the fact that they may belong to the original canal system, and, on the other hand, in undamaged specimens their mouths are surrounded by the dermal membrane as a round, sharply bounded opening. I therefore regard it as probable that the question is of oscula, and the fact is then that the small oscula on the surfaces lead to the smaller, horizontal canals, while the oscula found in the edge are larger and lead to longer perpendicular canals which pass down through the thicker parts of the irregularly leaf-shaped sponge.

The *skeleton*. The *dermal skeleton*, as mentioned above, consists chiefly of bundles of dermal spicules, which are spread in a somewhat penicillate way and support the dermal membrane, and, but only to a slight degree, pierce it. This skeleton is otherwise little regular, the bundles are most frequently more or less recumbent, often quite so, and scattered spicules may also be found in the membrane; in some places the skeleton may be formed entirely of horizontal, scattered spicules, which seems especially to be the case in places where no pores are found. The ridges of the surface are often seen to be more spined, which is then owing to the fact that the spicules of the skeleton itself here project through the dermal membrane; I suppose, however, that this feature is often due to damaging. Tornotes are not found in the membranes of the canals, except in those of the above mentioned larger longitudinal canals. The *main skeleton* is a somewhat irregular, mostly polyspicular network. The meshes are mainly quadrangular or rectangular, but may also be more irregular. The skeleton has otherwise a similar structure as in many leaf-shaped Renieræ and Chalininæ, longitudinal fibres being found running from the base up through the sponge, and bending to all sides towards the surface, accordingly as well towards the two sides as towards the edges. Where the skeleton is most regular, these fibres are running parallelly with a distance between them of about one spicule; the connecting transverse spicules may be placed perpendicularly on the longitudinal fibres or more or less irregularly, and with greater or smaller distance between them, but long secondary fibres are not found. The longitudinal fibres may reach a thickness of up to $0{\cdot}15^{\mathrm{mm}}$, and have a considerable number of spicules alongside; the transverse fibres, on the other hand, are single spicules or bundles of only few spicules. Often the skeleton seems to be somewhat less regular. Spongin is distinctly present in the nodes of the skeleton, but it is very clear; also in the longitudinal fibres it is found rather copiously.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli and acanthostrongyla mixed in about equal numbers; they are straight or most frequently slightly curved with the curve nearest to the basal end. The spinulation may be somewhat varying, sometimes it is rather dense, sometimes more scattered, and almost quite smooth needles may be found singly. The spines are most frequently rather coarse; at the upper end they are a little more close-set and generally somewhat larger. The styli have a sharp, middle long to rather long, point, which is oftenest smooth through its whole extent. The strongyla are distinctly seen to be monactinal, being always broader at one end than at the other, so that a distinction is always found between a basal end and an apical end corresponding to the point; they are otherwise of the same form as the styli, but are spined throughout their length, and the spines are generally more close-set, not only at the basal end, but also at the apical one. Although styli and strongyla are certainly nothing but modifications of the same form of spicule, which is also seen by the fact that the strongyla seem upon the whole to be a little shorter than the styli, no transitional forms, or, at all events, only very few ones, are found between them. The length, which may be given collectively for styli and strongyla, varies from 0·238—0·38^{mm}, and the thickness from ca. 0·012—0·021^{mm}, the longest ones being far from always the thickest ones. Developmental forms were found, but only in very slight numbers; these forms were always long pointed, and consequently I suppose the strongyla to begin as styli. The developmental forms are finely, a little ruggedly spined, and they show not rarely a head-swelling. 2. The dermal spicules are tornota; they are straight, cylindrical, often quite slightly fusiform. Their ends are slightly swollen, about pear-shaped, with the end turned outwards; they have a similar structure as in *rosaceæ*, being cut off and having, as far as could be discerned, two to four small points. This form of the ends is, however, much less conspicuous here than in *rosacea*, and it is only to be seen distinctly under high magnifying powers. The two ends of the tornotes are not equal, one being a little thicker than the other. Their length is 0·20—0·29^{mm}, and the thickness is 0·004—0·007^{mm}. Developmental forms were seen in small numbers, the finest ones are styli with one end pointed; by and by they get their final form. b. *Microsclera* are isancoræ spatuliferæ of two forms, larger and smaller ones. 1. The large ancoræ are mainly similar to the ancoræ in *fimbriata*; they have an evenly curved shaft and distinct, rather broad alæ a little longer than the teeth. The alæ approach each other closely and are very often connected by a narrow rim along the middle of the shaft as in *rosacea*. The ancoræ may be somewhat varying in form especially with regard to the length of the terminal parts in proportion to the total length, and accordingly with regard to the length of the teeth, the ends of which may thus approach each other more or less. Their length is 0·053—0·064^{mm}, and the thickness of the shaft 0·005—0·007^{mm}. 2. The small ancoræ are more slender, the shaft may be a little more or less curved, the terminal parts are comparatively longer, so that the teeth approach rather closely in the middle; the teeth are leaf-shaped and most narrow at the place of attachment. Also in this ancora the alæ approach closely or are connected in the middle by a rim. Their length is 0·027—0·034^{mm}, and the thickness of the shaft is about 0·0014—0·002^{mm}. Developmental forms of both ancoræ occur at all stages. The ancoræ are found throughout the sponge and especially in the dermal membrane, often very abundantly; the small ancoræ are far more numerous than the large ones. — Some difference as to the size of the spicules may be found in different individuals; a specimen from the Davis Strait had spicules still a little larger than the given measures, its skeletal spicules reaching 0·44^{mm}, the dermal spicules 0·35^{mm}, and the large ancoræ 0·069^{mm}, while, on the other hand, the small ancoræ did not exceed the given measures.

Embryos. In some individuals embryos were found; they are scattered in the tissue, are globular, and of an average diameter of 0·3^{mm}. Of spicules the examined specimens had both megascleres and microscleres. The megascleres are straight, rather coarsely spined subtylostyli of an average length of 0·11^{mm} and a thickness of 0·0057^{mm}. Of microscleres only the small ancora was found, it was of normal size. The megascleres were lying in a bundle, all with the head-end turned the same way towards the periphery. The specimens in question had been obtained in the beginning of August.

As I have had one of Armauer Hansen's type specimens for examination, I have been able to identify the species with certainty. The species is rather interesting, and it seems to be closely allied to the *Damiria Prouhoi* established by Topsent (Arch. de zool. exp. et gén. 1892, Sér. 2, X, XXII); the exterior form of this latter species is a similar one, it has also a mixture of styli and strongyla, and its colour, finally, is also orange and gets black in spirit.

Locality: 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 89, 64° 45' Lat. N., 27° 20 Long. W., depth 310 fathoms; station 127, 66° 33' Lat. N., 20° 05' Long. W., depth 44 fathoms; it has further been taken at 65° 27' Lat. N., 54° 45' Long. W., depth 67 fathoms (Wandel), and 64° 27' Lat. N., 13° 27' Long. W., depth 84 fathoms (Ad. Jensen, the cruise of the »Michael Sars» 1902). Altogether ca. 12 specimens and some fragments. The mentioned localities are situated in the Davis Strait, the Denmark Strait, and north and east of Iceland.

Geogr. distr. The species has hitherto only been taken by the Norwegian North-Atlantic Expedition, station 275, 74° 08' Lat. N., 31° 12' Long. E., depth 147 fathoms. For this locality is stated a bottom temperature of ÷ 0°4 C., whereas all the other localities from which I have it are positive ones with bottom temperatures from 3°5—8°4 C. The locality of the Norwegian North-Atlantic Expedition, however, is situated at the very border between the cold and the warm area, and its depth is rather small, so that the species surely does not belong to the cold water, but is a native of the warm area.

5. **M. perspinosa** n. sp.

Pl. V, Fig. 1. Pl. XIV, Fig. 7 a—e.

The form lumpy, slightly lobed. The surface folded, not shaggy. The dermal membrane thin, supported by recumbent bundles of dermal spicules, in places with horizontal spicules. The skeleton a diffuse network of spicules and spicula-bundles, a few longer fibres are found. Spicula: Megasclera: the skeletal spicules strongly spined acanthostyli 0·14—0·208^{mm}, the dermal spicules tornota with slightly spined, sometimes smooth ends 0·13—0·178^{mm}; microsclera of two forms, ancoræ spatulifera 0·018—0·030^{mm}, sigmata 0·018—0·024^{mm}.

This species is of an irregularly lumpy, slightly lobate form; the two specimens in hand are attached to Hydroids, one of them together with a small specimen of *Halichondria panicea* of a similar form. One specimen has a greatest extent of 35^{mm}, the other of hardly 20^{mm}. The colour (in spirit) is a dirty gray. The consistency is slightly elastic. The *surface* has more or less deep, irregular grooves or folds, otherwise it is apparently smooth. The *dermal membrane* is a very thin film, partly supported by somewhat projecting, but highly recumbent fibres and bundles of dermal spicules, partly in places provided with horizontal, scattered spicules. *Pores* are found in some places of the surface in dense groups, they were measured to a diameter of up to 0·06^{mm}. *Oscula* were not found.

The *skeleton*. The *dermal skeleton* consists in most places of bundles of tornotes, which support the membrane, but are generally more or less recumbent, most frequently highly so. In other places the tornotes seem to be quite horizontal and often scattered in the membrane. The *main skeleton* of this species, as far as I have been able to decide from the slight material, is only little differentiated. It consists of a rather dense, but diffuse framework of spicula-bundles and spicules, and no real network, or, at all events, only a quite irregular one is formed. In the skeleton rather long and thick, but loose fibres occur, but they have also a quite irregular course; these fibres, in which many spicules are found alongside, reach a thickness of up to $0{\cdot}12^{mm}$. Spongin, no doubt, is present, but only to a very slight degree.

Spicula: a. *Megasclera.* 1. The skeletal spicules are straight or slightly curved acanthostyli with an even and rather long point; the spinulation is powerful, the length of the spines being generally more than half the diameter of the needle. Generally they are gathered closely at the head-end and continue over the tapering almost to the very point. Their length varies from $0{\cdot}14$—$0{\cdot}208^{mm}$, and the thickness from $0{\cdot}004$—$0{\cdot}007^{mm}$. Quite few fine developmental forms were seen. 2. The dermal spicules are tornota; they are straight or a little irregularly curved; they are otherwise of a similar form as in *incrustans*, but the ends are sharper and more lanceolately pointed; a slight narrowing is almost always found below the end. The points are exceedingly slightly and finely spined, sometimes smooth. In the fully developed tornotes the ends are equal or about equal. Their length is $0{\cdot}13$—$0{\cdot}178^{mm}$, and the thickness varies from ca. $0{\cdot}0035$—$0{\cdot}005^{mm}$. b. *Microsclera:* these are of two forms, three-toothed isancoræ spatuliferæ and sigmata. 1. The ancoræ are of the same type and of a similar form as the small ancoræ of the preceding species; they have an evenly curved shaft, and three leaf-shaped teeth and a narrow ala at either end. Their length varies from $0{\cdot}018$—$0{\cdot}030^{mm}$, and the thickness of the shaft is $0{\cdot}0014$—$0{\cdot}002^{mm}$. 2. Sigmata are small, of the common form, and more or less contort; they are characteristic by their highly recurved ends. Their length is $0{\cdot}018$—$0{\cdot}024^{mm}$, and the thickness is $0{\cdot}0007$—$0{\cdot}0014^{mm}$. The ancoræ are especially found in the dermal membrane, but they are otherwise only present in small numbers, sigmata occur far more frequently.

Locality: Faskrudsfjord in Iceland, depth between 20 and 50 fathoms (Hörring), one specimen; Jan Mayen, depth 50—60 fathoms (The Amdrup-Expedition), one specimen.

6. **M. pedunculata** n. sp.

Pl. V, Fig. 2. Pl. XV, Fig. 1 a—d.

Club-shaped, stalked. The surface slightly shaggy. The dermal membrane thin, supported by bundles of dermal spicules, and in places with horizontal spicules. The skeleton consists of polyspicular primary longitudinal fibres connected by irregular transverse spicula-bundles and spicules. Spicula: Megasclera: the skeletal spicules smooth styli $0{\cdot}36$—$0{\cdot}50^{mm}$, the dermal spicules tornota $0{\cdot}238$—$0{\cdot}34^{mm}$; microsclera of one form, ancoræ spatuliferæ $0{\cdot}054$—$0{\cdot}066^{mm}$.

This species is of a somewhat club-shaped form; below it has a rather short stalk attached by a small basal expansion; above it passes into a thicker part which in the best preserved specimen is somewhat triangular and slightly compressed. This specimen has a height of 22^{mm}, and a thickness above of 10^{mm}, the stalk is about 5^{mm} long and 1^{mm} thick. The smallest specimen is about 10^{mm} high; it is more evenly club-shaped without any marked stalk. Of the specimens one is attached to a stone, the two others to living specimens of an *Iren*-species. The colour (in spirit) is light brownish. The consistency is rather soft, but somewhat elastic. The *surface*, as far as I have been able to observe, is slightly shaggy when undamaged; in many places in the specimens in hand it is more shaggy, the ends of primary fibres projecting, but this, I think, is only due to damaging. The *dermal membrane* is a thin film, mostly supported by bundles of dermal spicules. *Pores* and *oscula* were not observed.

The *skeleton*. The *dermal skeleton*, as far as I have been able to see, consists of bundles or short fibres of dermal spicules, issuing from the skeleton and supporting the dermal membrane; this membrane, however, has also in places horizontal, scattered spicules, and, besides, it is highly filled with microscleres. The primary fibres of the skeleton pass perhaps also in places quite to the surface. The *main skeleton* consists of primary longitudinal fibres, passing from the stalk up through the sponge, branching and bending to all sides towards the surface. These fibres are polyspicular and powerful, and in the lower part of the sponge, above the stalk, they may be 0·25^{mm} thick; upward and outward they become thinner. Regular secondary fibres are not formed, but between the longitudinal fibres are found partly transverse spicula-bundles, partly single transverse spicules, placed more or less irregularly. A distinct, but clear and little conspicuous mass of spongin is found. It is especially visible in the nodes, but it may also often be seen to coat the longitudinal fibres with a very thin layer. Down in the stalk the spongin is more copious and of a yellowish colour.

Spicula: a. *Megasclera*. 1. The skeletal spicules are smooth styli; they are somewhat curved, most frequently nearest to the head-end, more rarely they are straight. They taper evenly to an about middle long point. Their length varies from 0·36—0·50^{mm}, and the thickness is in proportion 0·014—0·021^{mm}. Quite few finer developmental forms were seen. 2. The dermal spicules are tornota: they are cylindric and straight, or more rarely quite slightly curved. In the form of their ends they are most similar to the tornota in *M. fimbriata*, the ends being rather stubby, but with a little mucro at the apex. Generally one end is a little thicker than the other. Their length is 0·238—0·34^{mm}, and the thickness is 0·007—0·008^{mm}. Developmental forms with one end quite pointed were found quite singly. b. *Microsclera*: these are of only one form, three-toothed isancoræ spatuliferæ. These ancoræ are of a similar form as the large ancoræ in the preceding species; the teeth are most frequently broadly rounded at the end, and narrow alæ are found of the same length as the teeth. The length of the ancoræ is between 0·054 and 0·066^{mm}, and the thickness of the shaft is ca. 0·005—0·007^{mm}. The ancoræ occur throughout the tissue, but are especially numerous in the dermal membrane.

Embryos. In one specimen embryos were found; they were scattered in the tissue and were easily distinguished by their dark, yellowish red colour. They are globular, of an average diameter of 0·26^{mm}. Most of the specimens examined showed no spicules, or only a few small styli which would thus seem to be first appearing. One of the embryos, on the other hand, had both megascleres and microscleres. The megascleres are small subtylostyli, they are not smooth, but spined or rugged. The microscleres were developmental forms of the ancora, they were smaller than in the developed sponge, only ca. 0·035^{mm} long. The specimen in question was obtained towards the close of July.

Locality: Station 2, 63° 04' Lat. N., 8° 21' Long. W., depth 262 fathoms, one fragment; station 116, 70° 05' Lat. N., 8° 26' Long. W., depth 371 fathoms (bottom temperature ÷ 0°4 C.), two specimens. Of the localities one is situated south of Jan Mayen, the other between Iceland and the Faröe Islands.

I suppose that the species must be regarded as a native of the cold bottom; station 2, to be sure, shows a temperature of 5°3 C., but this station is situated on the Iceland-Faröe ridge, and here, I think, the circumstances may be changing.

Note. Topsent, in 1904 (Résultats des Campagn. sc. du Prince de Monaco, Fasc. XXV, 174, Pl. III, fig. 5, Pl. XIV, fig. 17, Pl. XVIII, fig. 2), has established a genus, *Stelodoryx* with the species *procera*; this species has an exterior and a skeletal structure quite similar to that of *pedunculata*, its microsclera are ancoræ with five teeth at either end. Topsent says that it is related to *Lissodendoryx* by its smooth skeletal spicules, but deviates by its skeletal structure, which latter fact is his principal character for the establishing of the genus. On this character, however, the genus surely cannot be maintained, and as the species has ancoræ, it belongs to *Myxilla*. It seems, by its five-toothed ancoræ, to be closely allied to the following two species, *diversiancorata* and *pluridentata*, of which *diversiancorata* seems to be closely allied to it also by its form and skeletal structure.

7. **M. diversiancorata** n. sp.

Pl. V, Fig. 3. Pl. XV, Fig. 2 a—i.

(Erect, stalked?). The surface slightly shaggy. The dermal membrane thin, supported by bundles of dermal spicules. The skeleton an irregular reticulation of polyspicular longitudinal fibres connected by scattered spicules and spicula-bundles. Spicula: Megasclera: the skeletal spicules smooth styli 0·38—0·62^{mm}, the dermal spicules tornota 0·327—0·458^{mm}; microsclera two forms of pluridentate ancoræ spatuliferæ, large ones with five, sometimes six to seven teeth 0·071—0·090^{mm}, small ones with seven to eight teeth 0·0357—0·048^{mm}.

Of this species we have only a very scanty material, viz. two specimens, both more or less damaged. The largest specimen has a somewhat irregular ovate form, and looks as having belonged to an erect sponge. It is broken below, and perhaps it has had a stalk. It has a height of 17^{mm} and a greatest breadth of 11^{mm}. The other specimen is a very small one, attached to the shell of a Brachiopod, and it is assuredly only a fragment. The colour (in spirit) is light brown. The consistency is rather soft and somewhat elastic. The *surface*, where it is undamaged, seems to be slightly shaggy. The *dermal membrane* is a thin film, which, as far as I have been able to see, is supported by more or less projecting bundles of dermal spicules. It is filled with microscleres to an exceedingly high degree. *Pores* and *oscula* were not seen.

The *skeleton*. The *dermal skeleton*, as before mentioned, seems to consist of spicula-bundles issuing from the skeleton and supporting the dermal membrane. The *main skeleton* consists of a rather irregular reticulation of polyspicular, but rather loose fibres. Longitudinal fibres occur, especially running up through the sponge and sending branches to the surface or bending out to the surface, but their course does not seem to be regular, as it is, for instance, in the preceding species. Transverse fibres are not formed, but bundles of spicules or single spicules are irregularly scattered between the longitudinal fibres. Spongin is found in the fibres, but being little copious and exceedingly white and clear it is only to be observed with difficulty; it is most distinctly seen in the nodes.

Spicula: a. *Megasclera*. 1. The skeletal spicules are smooth styli, somewhat curved, almost always nearest to the rounded end; the point may be somewhat varying, but is upon the whole middle long or rather long; sometimes it is abruptly more shortly pointed at the very point itself. Their length is 0·38—0·62^{mm}, and the thickness is proportionately 0·012—0·021^{mm}. The smaller sizes are little frequent. Developmental forms occurred in small numbers, the finer ones were slightly rugged. 2. The dermal spicules are tornota; they are cylindric and straight, or slightly, not rarely somewhat irregularly, curved; the ends are shortly and bluntly pointed with a little outer point marked off especially. One end is always a little thicker than the other, and this latter is generally a little longer pointed. Their length varies from 0·327—0·458^{mm}, and the thickness is ca. 0·006—0·01^{mm}. Very few finer forms occurred, the thin ends of which were quite pointed, and accordingly they were styli. b. *Microsclera:* these are two forms of pluridentate isancoræ spatuliferæ, larger and smaller ones. 1. The large ancoræ are of a very beautiful form; the shaft is slightly curved, and they have at either end five lanceolate teeth and a pair of narrow alæ of about the same length as the teeth. The teeth are placed in such a way, that a transverse section of the ancora through the teeth is about circular. Ancoræ with six or seven teeth, or with six or seven teeth at one end and five at the other end occur singly. Not rarely the ancoræ are a little twisted, so that the teeth of one end are situated opposite to the intervals at the other end. Their length is 0·071—0·099^{mm}, and the thickness of the shaft is 0·0057—0·0080^{mm}. Developmental forms of this ancora at all stages occurred frequently. The youngest ones are quite fine, and look as if they had at either end a single, median, hook-like recurving, so that it might be supposed that the median tooth was the one first formed. By a closer examination, however, a couple of ridges are seen at the end of the shaft, which are surely beginning teeth, but on account of the smallness and fineness of the parts it is a very difficult thing to get a clear view of the exact structure of the end of the finest stages; soon after, in stages a little older, all five teeth are seen as thin, plate-shaped outgrowths, so that it may more nearly be said that falxes are first formed. 2. The small ancoræ are also of a highly beautiful form; they have an almost straight shaft, and seven to eight teeth and narrow alæ at either end. The alæ most frequently continue along the middle of the shaft as a narrow rim. The teeth are about parallel to each other and to the shaft, and they are very close-standing; they are so long as to be only little removed from each other in the middle. Most frequently the teeth are slightly curved, so that the ends are directed a little inward. The length is 0·0357—0·048^{mm}, and the thickness of the shaft is 0·0028—0·0035^{mm}. The large ancora occurs numerously, and in especially large numbers in the dermal membrane; the small ancora, on the other hand, is far less abundantly present.

Embryos. Some embryos were found scattered in the tissue; they are globular and of a size of up to 0·3^{mm}. In the specimens examined no spicules were found.

Locality: 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. Both stations are situated in the Denmark Strait.

8. **M. pluridentata** n. sp.

Pl. V, Fig. 4. Pl. XV, Fig. 3 a—e.

Cushion-shaped. The surface slightly shaggy. The dermal membrane thin, with penicillate bundles of dermal spicules. The skeleton an irregular, polyspicular reticulation. Spicula: Megasclera: the skeletal *spicules smooth styli 0·32—0·50mm, the dermal spicules strongyla or subtylota, most frequently with slight spines at the ends, 0·226—0·32mm; microsclera of one form, ancoræ spatuliferæ with five to seven teeth 0·071—0·097mm.*

Of this species we have no great material either, only three specimens; two of them are entire ones; they are cushion-shaped and are attached with a broad base. One of these specimens, however, is torn off, the other is attached to a calcareous alga. One specimen has an extent of 20mm, and a thickness of 9mm, the other is a trifle smaller. The third specimen is the largest one; it is a much damaged fragment and consists chiefly of the part that has been nearest the underlayer; it has an extent of 25mm, its form would also indicate that the whole sponge has been cushion-shaped. Also this specimen is torn off from the underlayer, but both the torn off specimens show on their basal surfaces pebbles and remnants of Bryozoa. The colour (in spirit) is brown. The consistency is rather firm. The *surface* seems in undamaged places to be slightly shaggy. The *dermal membrane* is a very thin film. *Pores* are found in the membrane, in places very close; they vary in size from quite fine apertures to a diameter of ca. 0·21mm. *Oscula* were not seen.

The *skeleton*. The *dermal skeleton*, as far as I have been able to decide from the slight material, consists of bundles of dermal spicules spread in a more or less penicillate way; they project from the skeleton below and are erect or more or less recumbent, and spicules are also seen in small numbers lying horizontally in the membrane. In places the dermal skeleton seems to be less developed, and here the fibres of the main skeleton seem to project, but this feature is perhaps due to damaging or contraction. The *main skeleton* is a rather dense, but irregular reticulation of polyspicular fibres. Most markedly occur fibres that have a tolerably distinct course towards the surface, and these fibres are the thickest ones with many spicules alongside, but they have no regular course. Between them short fibres and spicula bundles are found placed quite irregularly, so that a network is formed, irregular in most places, and in it, moreover, many single spicules are found. A distinct mass of spongin is found in the fibres, and in the nodes it becomes rather copious.

Spicula: a. *Megasclera.* 1. The skeletal spicules are smooth styli somewhat curved, most frequently nearest to the head-end; sometimes they are a little irregularly curved. The point is rather short, at most middle long; it may, otherwise, be somewhat varying, sometimes the style tapers evenly and the outermost point is short, sometimes, on the other hand, the point may be of a rather considerable length, and in both cases it may be bounded by straight lines; in other cases the shorter or longer point may be distinctly marked off. The length of the styli is 0·32—0·50mm, and the thickness is ca. 0·009—0·019mm. Length and thickness are often in no absolute proportion to each other, long, but rather thin styli being especially often seen. Developmental forms occur in small numbers, they are not rugged. 2. The dermal spicules vary between strongyla and subtylota. They are cylindric and straight or slightly curved. The form of the ends is somewhat varying; sometimes they are simply rounded or bluntly pointed and not swollen or only slightly so; they may be smooth, but they have most frequently a few fine spines. Frequently, however, they are somewhat swollen, from almost imperceptibly to very distinctly so, and with broadly rounded or almost cut off ends, where they have more or less distinct spines; frequently the swelling is also slightly ribbed. Generally one end is distinctly thicker than the other, and the finer they are, the more conspicuous is this feature. Monstrous forms with several swellings are not unfrequently found. Their length varies from 0·226—0·32mm, and the thickness from 0·005—0·010mm. b. *Microsclera;* these are of one form, pluridentate isancoræ spatuliferæ; they remind of the ancoræ of the preceding species, but are more slender; the shaft is somewhat curved, either evenly, or, what is frequently the case, with a somewhat sharper bend in the middle. At either end is found a number of teeth which seems most frequently to be five, but may also be six or seven, and the number may be different at each end; otherwise some irregularity is found in the construction, the teeth may be of different length, often in such a way, that the lateral teeth are the longest, but also often in a quite irregular way. A narrow ala is found at each end, also often showing some irregularity; it continues generally as a quite narrow rim along the middle of the shaft. The length of the ancoræ varies from 0·071—0·097mm, and the thickness of the shaft is 0·0042—0·0057mm. The ancoræ are found throughout the sponge, but are not especially seen in the dermal membrane.

Locality: The Ingolf, station 127, north of Iceland, 66° 33' Lat. N., 20° 05' Long. W., depth 44 fathoms; the Bay of Skagestrand in Iceland, depth 33 fathoms (Ditlevsen); Axarfjord, depth 20 fathoms (H. M. S. «Beskytteren» Otterstrom). Three specimens in all.

Note. The present species and the preceding one are closely allied to each other, and at first I was inclined to regard them as one species; it is, however, chiefly the occurrence of the peculiar pluridentate ancoræ, by which they become so closely allied, while other characters, which are quite constant in the material in hand, separate them from each other. These characters are especially the occurrence of the two different ancoræ in one species, while in the other only one form occurs, the marked difference in the form of the dermal spicules, and the difference in the skeletal structure.

Of *Myxilla*-species with pluridentate ancoræ two have hitherto been described, viz. the *Stelodoryx procera* Tops. with five-toothed ancoræ[1]) mentioned before under *pedunculata*, and the *Dendoryx dentata* described in the same place (172, Pl. XIV, fig. 19) with ancoræ with five to six teeth at either end; both species are *Myxilla*-species.

Of the *Dendoryx pectinata* with peculiar ten-toothed ancoræ established by Topsent in 1892, on the other hand, I dare say nothing with certainty; the species might perhaps be an *Iotrochota*-species without birotulæ.

Lissodendoryx Tops. (emend.).

The exterior passes through all forms, from incrustations through massive, often more or less lobed forms, to erect, club-shaped, or finally digitate or richly branched forms. The skeleton is somewhat dependent on the form; it may be a diffuse and quite irregular polyspicular reticulation, in the massive forms longer fibres may be found, in the branched forms distinct primary longitudinal fibres may occur, and it may finally be of dendritic type. Spongin is present more or less copiously. Spicula: Megasclera: the skeletal spicules are smooth or spined styli, the dermal spicules are diactinal, tornota, tylota, strongyla,

[1]) Perhaps two species may be hidden under this one, Topsent mentioning a specimen with considerably larger megascleres and with ancoræ with five to six teeth.

or similar forms, sometimes with spined ends; microsclera are chelæ arcuatæ of one or more forms, and often sigmata.

The genus *Lissodendoryx* was established by Topsent, first in 1892 (Résultats des campagn. scient. du Prince de Monaco, Fasc. II, 97), as a subgenus of *Dendoryx (= Myxilla)*, and later, in 1894 (Mém. de la Soc. zool. de Fr. VII, 35) raised to an independent genus. The typical species was *L. leptoderma* Tops. The species first described among those belonging to *Lissodendoryx* seems, as stated by Topsent, to be *L. isodictyalis* Cart., described by the author under *Halichondria*. Later, Topsent (Rev. Suisse de Zool. IV, 1897, 457) has described a species from Amboina, which he identifies with *isodictyalis* Cart., and at the same time he identifies his own *leptoderma* with this species; according to this, *isodictyalis* Cart. would become the type. Thiele (Studien über pazif. Spong., Zoologica, Heft 24, II, 1899, 18, Taf. V, Fig. 10) thinks, however, that Topsent's species from Amboina is not identical with *isodictyalis* Cart., and gives it the name of *similis;* at the same time he says that he cannot decide with which of the two species *leptoderma* may possibly be identical. Accordingly *leptoderma* must still for the present be regarded as the type of the genus.

The character by which Topsent distinguished the genus from his *Dendoryx*, was exclusively the smooth styli in contradistinction to the spined ones in *Dendoryx*. This character is a very untenable one, as species are found with scarcely perceptible spinulation, and Topsent himself admits also this fact. Instances of such species are *firma* Lambe, with styli with scarcely perceptible spinulation, and the species *fragilis* Frstdt. and *indistincta* Frstdt., to be treated hereafter, which have slightly spinulous to quite smooth styli. An even transition is in reality found from species with strongly spined styli to such ones where the styli are quite smooth. According to this the genus therefore would scarcely be maintainable. There is, however, another character which sharply separates the species of the genus *Dendoryx* (or *Myxilla*, as it ought now to be called) into two groups, whether they have smooth or spined styli; the fact being that in some species ancoræ occur, in others chelæ arcuatæ (see the account of these spicules in the introduction). This character is a quite sharp one without transitions of any kind, and in my opinion great stress may be laid on it for systematic purposes. As *L. leptoderma* Tops. is a species with arcuate chelæ, the genus containing species with these chelæ will accordingly get the name *Lissodendoryx*, while in the genus *Myxilla*, with the typical species *rosacea* Lieberk. only species with ancoræ remain.

The name of *Lissodendoryx* is not exactly a good one by the new limitation of the genus, but it cannot be rejected. Otherwise the fact seems to be that most *Myxilla*-species have spined styli, and most *Lissodendoryx*-species smooth ones.

1. **L. lobosa** n. sp.

Pl. V, Fig. 5. Pl. XV, Fig. 4 a—c.

Erect, irregularly lobed-branched. The dermal membrane very thin. The skeleton a somewhat diffuse and irregular reticulation, chiefly of polyspicular fibres with single transverse spicules between them. Spicula: Megasclera: the skeletal spicules acanthostyli with rather dense spinulation 0·31—0·369^{mm}, the dermal spicules tylota 0·25—0·29^{mm}; microsclera of one form, chelæ arcuatæ 0·038—0·044^{mm}.

The two specimens in hand of this species have an erect, lobed-branched form. Below they are attached to shells of arenose Foraminifera. The few stubby and irregular lobes or branches issue from about the upper half. The height is 32^{mm}. The consistency is very soft and loose. The colour (in spirit) is a dirty grayish yellow. The *surface*, in the present state of the sponge, is shaggy from projecting spicules, but this seems partly to be owing to damaging; in the undamaged sponge I suppose it to be finely shaggy. The *dermal membrane* is a transparent and very thin film, but it is wanting to a great extent. *Pores* are found in the dermal membrane in the common way; they were seen from quite small ones to a diameter of 0·22^{mm}. *Oscula* were not observed, which was perhaps due to the loose consistency and collapsed state of the sponge; as far as I was able to see, some large canals were running longitudinally through the branches and lobes, which canals probably run to the top, where the oscula should accordingly be found.

The *skeleton*. The *dermal skeleton* is formed by dermal spicules supporting the membrane. When a piece of the dermal membrane is seen from above, the spicules are seen to lie horizontally in it, partly scattered singly, partly in bundles here and there, but on account of the state of the material, I have not been able to observe the relation between the dermal skeleton and the main skeleton. I suppose that in the undamaged sponge more or less projecting bundles of dermal spicules are found. The *main skeleton* is a somewhat diffuse and irregular reticulation. Long polyspicular fibres are found, especially in the branches; they run longitudinally through the branches in a tolerably regular way, but are loose and not very conspicuous. Transverse fibres are not found between them, but only quite irregularly placed spicules, almost all of which are placed singly. Regular meshes, therefore, are not formed, and the whole skeletal net gives a rather irregular picture. The ends of the fibres bend towards the surface, or they give off short branches passing to the surface. Spongin is found in the nodes of the skeleton, but only to a very slight amount.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli; they have often a small head-swelling, so as to approach subtylostyli. They are evenly curved, often a little irregularly. They are evenly and middle long or rather long pointed, but the outermost point itself is most frequently short pointed. The spinulation may be somewhat varying, but is most frequently rather dense, and the spines are fine; they continue to the very point. The length is rather constant, from 0·31—0·369^{mm}, and the thickness is ca. 0·008—0·012^{mm}. Very few developmental forms were seen, the finest ones were already somewhat spined. 2. The dermal spicules are tylota; they are straight and have at either end a longish, rather slight swelling. Their size is rather constant, the length 0·25—0·29^{mm} and the thickness about 0·005^{mm}. The two ends of the tylota are not quite equal, one end having a more distinct and more marked swelling than the other; this is owing to the fact that the shaft is not of equal thickness throughout the length, but tapers somewhat towards one end, and so the swelling of this end becomes more marked; this again is connected with the fact that the tylota are secondarily diactinal. b. *Microsclera:* these are of only one form, chelæ arcuatæ. The chelæ have a curved shaft, the curve of which is strongest in the middle, while the ends, on the other hand, are a little recurved. The tooth is elliptical and rather narrow, and of the same length as the alæ; the lower edge of the alæ is rather much indented, so that, when seen from the side, they have a somewhat tooth-like form. When the chela is seen from the side in a certain position, we shall often get a quite wrong impression of the alæ, as well in this as in many other arcuate chelæ, if it is not sufficiently magnified; the fact is that only the foremost, refolded edge is seen distinctly, and the ala seems to be more or less claw-shaped. When, on the other hand, the magnifying powers are sufficiently high, the contour of the ala is seen distinctly, as given in Fig. 4 c, Pl. XV. The length of the chela is 0·038—0·044^{mm}, and the thickness of the shaft is 0·0024—0·0050^{mm}; this variation of the thickness of the shaft is most dependent on the way in which the chela is seen, from the front or from the side, as the shaft is not cylindric, but rather much compressed. Developmental forms in different stages were seen in small numbers.

Locality: Station 10, 64° 24' Lat. N., 28° 50' Long. W., depth 788 fathoms, a fragment; station 27, 64° 54' Lat. N., 55° 10' Long. W., depth 393 fathoms, two specimens and a fragment. The stations are situated in the Denmark Strait and in the Davis Strait.

2. **L. Sophia** Frstdt.

Pl. V, Fig. 6. Pl. XV, Fig. 5.

1887. *Esperia Sophia* Fristedt, Vega Exp. vetensk. Iakttag. IV, 451, Pl. 25, figs. 30—32.

Erect, leaf-shaped. The surface smooth. The dermal membrane a thin film, on the pore side supported by pillars of dermal spicules, but here without horizontal spicules, while on the oscular side it has only horizontal spicules. Oscula and pores each on their own side. The skeleton diffuse and quite irregular, formed by single spicules and loose bundles. Spicula: Megasclera: the skeletal spicules acanthostyli 0·44—0·518^{mm}, the dermal spicules strongyla with finely spined, sometimes smooth ends, 0·27—0·34^{mm}; microsclera of one form, chelæ arcuatæ 0·028—0·034^{mm}.

We have two somewhat damaged specimens of this species; both of them are erect and leaf-shaped; one specimen is seen to have been attached by its lower edge, which shows a surface of attachment; this surface occupies almost the whole breadth of the leaf, so that the sponge has not been narrowed to a stalk. Fristedt says of the species that it is »massive, probably thickly incrusting hard objects». Whether the question is here of the sponge forming below a basal expansion, or Fristedt has made a mistake in his interpretation, I am not able to decide. The largest of my specimens is 50^{mm} high, 80^{mm} broad, and ca. 11^{mm} thick. The consistency is middle hard and little elastic. The colour (in spirit) is dirtily brown. The *surface* is smooth, without projecting spicules. The *dermal membrane* is a thin, transparent film, supported by pillars of dermal spicules which do not project through it, or only to a very slight degree; on the pore side it is otherwise without spicules, while on the oscular side it has horizontal spicules. *Pores* and *oscula* belong each to their own side; the pores are closely gathered, so that the membrane gets a sieve-like appearance; they are generally of a circular form, and were measured of sizes from 0·035—0·15^{mm}. Pores may also be found on the oscular side. Oscula are found scattered and in rather small numbers on the opposite surface; they are only to be seen with difficulty, as the opening itself is not seen; the fact is that the membrane forms a quite low and almost not at all projecting spout or cone, at the top of which the lobate aperture is found. While the horizontal spicules of the membrane otherwise are scattered on the oscular side, they are here gathered to bands running to the top of the cone, and the cone being, as it were, a little twisted, the mentioned bands get a somewhat spiral course.

The *skeleton*. The *dermal skeleton*. In the dermal membrane of the pore side no horizontal spicules are found; the membrane of the oscular side, on the other hand, is provided with horizontal, scattered, rather close-lying dermal spicules: on the pore side the membrane is supported by more or less perpendicular pillars of dermal spicules; they spread in a penicillate way and support the membrane, but they do not pierce it, or almost not at all. These spicules support the membrane between the pores, and sometimes a few quite horizontal spicules may reach from them into the membrane. On the oscular side no pillars of dermal spicules are seen, but the membrane is resting on the main skeleton below, the styli of which may project a little here and there. When on the oscular side here and there a group of pores is found, the membrane is in this place constructed quite as on the pore side and is supported by pillars. The *main skeleton* is quite irregular; longer fibres are not found, and meshes are scarcely to be spoken of, as the spicules more particularly convey the impression of being irregularly scattered, their ends, however, are generally seen to meet. They are partly lying singly, partly in loose bundles of few spicules. In the nodes of the skeleton a distinct mass of spongin is found.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli; they are generally somewhat curved, and the curve is almost always situated near the head-end; they are evenly and rather long and finely pointed. The spinulation may be somewhat varying, but is generally rather scattered, and the spines are fine; they continue to the very point. At the head-end a few spines are placed more close together. It is especially in the upper two thirds of the style, below the closer placed spines of the head-end, that the spines are highly scattered, in the lower part they are generally again closer together. The spines of the lower part are frequently directed somewhat backwards. Their length is rather constant and is between 0·44 and 0·518^{mm}, and the thickness is 0·010—0·0128^{mm}. 2. The dermal spicules are strongyla; they are more or less curved, more rarely straight. Their ends, which may sometimes be very slightly swollen, are generally finely spined, but the spinulation may become almost indiscernible, and they may also be quite smooth. They are somewhat fusiform, being thickest in the middle. The two ends are not equal, one being always a little thicker than the other. Their length is 0·27—0·34^{mm}, the thickness is 0·007—0·010^{mm}. Quite few developmental forms were seen, they were distinctly monactinal and showed no spines. b. *Microsclera:* these are of only one form, chelæ arcuatæ; they resemble the chelæ of the preceding species, but are finer, and their terminal parts are not recurved. The tooth is elliptical, broadest below and of the same length as the alæ; the lower edge of the alæ is not much indented, and therefore they have no tooth-like appearance, in this respect the chelæ approach the palmate chelæ. The length is 0·028—0·034^{mm}, and the thickness of the shaft is ca. 0·002^{mm}. The chelæ are found throughout the sponge, but especially in the dermal membrane.

As I have examined a piece of Fristedt's type specimen, I have been able to identify the species with certainty. It seems to be closely allied to the preceding one, but all three forms of spicules show distinguishing characters.

Locality: 62° 11' Lat. N., 19° 36' Long. W., depth 1142 fathoms. (The cruise of the fishery investigation steamer »Thor», 1903).

Geogr. distr. Fristedt has the species from East Greenland, 65° 30' Lat. N., depth 130 fathoms.

3. L. fragilis Frstdt.

Pl. V, Figs. 7—8. Pl. XVI, Fig. 1 a—g.

1885. *Hastatus fragilis* Fristedt, Kgl. Sv. Vet. Akad. Handl. Bd. 21, Nr. 6, 35, Taf. III, Fig. 6 a—h.

The form somewhat varying, forming thick incrustations, or the sponge irregularly massive or erect, formed like an irregular, thick leaf. The surface grooved and finely shaggy. The dermal membrane a very thin film, in some places with erect bundles of dermal spicules, in other places with spicules horizontally in the membrane. Oscula scattered, or found only on one side. The skeleton an irregular, polyspicular reticulation of triangular, quadrangular, or polygonal meshes; in the leaf-shaped specimens longer fibres may be found. Spicula: Megasclera: the skeletal spicules very finely spined or smooth styli 0·29—0·40^{mm}, the dermal spicules tornota 0·20—0·268^{mm}; microsclera of two forms, chelæ arcuatæ 0·037—0·060^{mm}, sigmata 0·018—0·025^{mm}.

Of this species we have a rather large material, but it consists mostly of fragments or much damaged specimens. To judge from this material the species may vary somewhat with regard to its outer form. Sometimes it forms only an irregular, thick incrustation, but the larger specimens seem always to rise from the underlayer, growing upwards and assuming a more or less irregular leaf-shape. These leaf-shaped specimens are always rather thick. The specimens are attached to plate-shaped Bryozoa or have their bases expanded over bottom material of different sorts. The largest specimen which seems to be the lower part of a leaf-shaped individual, has a greatest extent of ca. 45^{mm}, and a thickness of ca. 10^{mm}; a rather regularly leaf-shaped fragment is of similar dimensions. Entire specimens of the sponge are evidently much larger. The massive specimens are smaller. The colour (in spirit) is a lighter or darker grayish yellow. The consistency is rather firm, but brittle and fragile, and this is surely the reason, why the specimens are in a so highly damaged condition. The *surface* is grooved, about as in *M. incrustans*, and it is finely shaggy from projecting spicules. The *dermal membrane* is a very thin and transparent film; it rests on the skeleton below, and is partly supported by this skeleton, partly by special dermal spicules. *Pores* are found in the membrane, often closely gathered, so that pore-sieves are formed. Their size was measured to 0·047—0·29^{mm}. In the markedly leaf-shaped specimens the pores seem only to occur on one side, while oscula belong to the other side; in the irregular specimens, on the other hand, there is no definite localisation of oscula and pores. *Oscula* are seen as circular openings scattered on the side that has no pores; they are of an average size of 1—2^{mm}. The sponge is set through very closely with canals running from one side to the other, not, however, running straight across, but sinuous and branched in different ways. Some of the largest of these canals open on the oscular side as oscula, and in the oscular canal a great many smaller canals are seen to open. When the dermal membrane is removed from the opposite side, a great many close-standing incurrent canals are here seen.

The *skeleton.* The *dermal skeleton* may be somewhat different in different places of the sponge;

in many places, especially, perhaps, where pore-sieves are found, there are penicillate bundles of dermal spicules supporting the dermal membrane. Along the edge of the pore areas they may become short fibres branching into the area among the pores, and then they are more or less, often quite recumbent in the membrane. They do not reach quite into the middle part of the area, and here the membrane is consequently without spicules. In other places dermal spicules are only found scattered in the skin, both singly and in bundles. In these last places the membrane is resting on the main skeleton below, the spicules of which project, and also where projecting bundles of dermal spicules are found, projecting skeletal spicules are seen in them The *main skeleton*, by far the greatest part of it, is a polyspicular, irregular, and rather close network. No distinction can be made between primary fibres and secondary ones; the meshes are triangular or quadrangular or quite irregular. The fibres, as mentioned, are most frequently polyspicular, but the meshes are also here and there bounded by single spicules. In the leaf-shaped specimens longer fibres may be found running in the longitudinal direction of the leaf, but else without any regularity. Otherwise, longer fibres are not found in the skeleton, and in the leaf-shaped specimens no fibres are found passing perpendicularly to the surface or spreading towards the surface in a penicillate way. Spongin is found in the nodes of the skeleton, but to a very slight amount; moreover, it is white and clear, and consequently only to be seen with difficulty.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they have a curve, most frequently a rather slight one, nearest to the rounded end, while the other part of the needle is straight or almost straight; more rarely the curve is more even through the whole length of the spicule, or it is irregular. The point is even and middle long. The styli may be slightly spined or smooth. In the spined ones the spines are only found in a short part at the upper end, and the spines are so small as only to make the surface finely gritty; a few scattered, also very small spines are often found farther down the styli. This slight spinulation may become quite minimal, and it may entirely disappear, so that the style becomes smooth. In the material in hand there are no instances of smooth and spined styli occurring in equal numbers; either all the styli are spined, and smooth ones occur only as exceptions, or the case is the reverse. The length varies from 0·29—0·40^{mm}, the smallest length occurring more rarely, and the thickness is ca. 0·011—0·017^{mm}, the longest ones being far from always the thickest ones. Some finer to quite fine developmental forms occur; they seem to be finely and dispersedly gritty from spines almost through their whole length, and this not only in the specimens that have almost no smooth styli, but also in those with almost exclusively smooth styli. The finest stages observed had a length of 0·26^{mm} with a thickness of only 0·0014^{mm}. 2. The dermal spicules are tornota; they are straight, only rarely a little irregularly curved. Their two ends are not equal, one is a little thicker, and it is rounded with a quite slight mucro, the other, on the other hand, forms a rather short point, so that the needle might be interpreted as a short-pointed style[1]). The length is 0·20—0·268^{mm}, and the thickness 0·003—0·005^{mm}. The finer these spicules are, the more marked is the difference between their two ends, and I have seen quite few fine developmental forms with the thin end rather long pointed. b. *Microsclera;* these are of two forms, chelæ arcuatæ and sigmata. 1. The chelæ have a curved shaft with the strongest curve in the middle;

[1]) The several compound terms (tornostrongyla etc.), which may often be used advantageously, are here, as often else, not sufficiently characteristic; the name that would best describe the present form should, I suppose, be »oxytornote«.

the tooth is most frequently elliptical, but may vary rather much in form, be more narrow or broader, and rounded or straight cut off at the end; it is of the same length as the alæ; the lower edge of these is somewhat indented, so that they get a tooth-like form, but they may be somewhat varying in form, as upon the whole the chela may vary rather much in appearance. In a few individuals peculiar deformities occurred rather frequently. The size of the chela is somewhat varying, the length is between 0·037—0·060^{mm}, the smallest ones occurring most rarely; the thickness of the shaft is ca. 0·005—0·007^{mm}, it is not cylindrical, but somewhat compressed. Developmental forms at different stages, the youngest ones quite fine, were seen in rather small numbers. 2. Sigmata are distinguished by being very fine; they are otherwise of the common form and more or less contort. Their length is 0·018—0·025^{mm}, they are so fine, that their thickness is only ca. 0·0007^{mm}. Both forms of the microsclera occur through the whole sponge and are rather frequent in the dermal membrane.

Remarks: Although I have not examined Fristedt's type specimen, I take the determination to be quite sure, as description, measures, and figures agree very well, thus especially the figure of the fine sigma. Fristedt does not mention that the styli may be finely spined, but this feature is easily overlooked, or he may have had a specimen with almost exclusively smooth styli. The specimen figured by Fristedt I suppose to be the lower part of a larger individual. The name *fragilis* is well adapted to the brittle consistency.

Locality: Station 85, 63° 21' Lat. N., 25° 21' Long. W., depth 170 fathoms; 66° 20' Lat. N., 25° 12' Long. W., depth 96 fathoms (Wandel); 62° 53' Lat. N., 9° 06' Long. W., depth 245 fathoms, 62° 26' Lat. N., 4° 49' Long. W., depth 228 fathoms, 62° 36' Lat. N., 3° 21' Long. E., depth 198 fathoms (Ad. Jensen, the cruise of the »Michael Sars« 1902); at the northern end of Nolso, depth ca. 100 fathoms (Th. Mortensen). The localities are situated in the Denmark Strait, round the Faröe Islands, and at the western coast of Norway.

Geogr. distr. The species is hitherto known from the Koster Islands at the coast of Bohuslän, depth 95 fathoms. It is thus distributed from the Denmark Strait to the coast of Bohuslän, and its bathymetrical range is from 95 to 245 fathoms.

4. **L. diversichela** n. sp.

Pl. V, Fig. 9. Pl. XVI, Fig. 2 a—h.

More or less irregularly thick leaf-shaped? The surface almost smooth. The dermal membrane a thin film supported by penicillate bundles of dermal spicules. The skeleton a polyspicular, irregular reticulation, forming triangular to quadrangular or irregular meshes, here and there longitudinal fibres. Spicula: Megasclera: the skeletal spicules rather densely spined acanthostyli 0·34—0·429^{mm}, the dermal spicules tornota 0·238—0·28^{mm}: microsclera of four forms, chelæ arcuatæ of three forms, large ones 0·047—0·071^{mm}, middle ones 0·018—0·028^{mm}, small ones of peculiar form, highly curved, 0·010—0·015^{mm}, sigmata 0·023—0·085^{mm}.

Of this species, which is interesting on account of its chelæ, we have only fragments, so that nothing definite can be said of its form. The largest specimen is of an erect, compressed, but somewhat irregular form (Pl. V, Fig. 9); a smaller fragment is likewise compressed. The form may, according to this, be taken to be more or less leaf-shaped, presumably with a broad base. The largest fragment has a height of 45mm and a thickness in the leaf-shaped part of 8mm. The colour (in spirit) is light yellowish. The consistency is rather firm, but brittle. The *surface* is almost smooth or only very slightly shaggy, and the shagginess is chiefly due to the large chelæ, lying closely in the membrane. The *dermal membrane* is a thin film, supported by bundles of dermal spicules. The *pores* are closely gathered in sieve-like areas, often so close as to be separated only by thin strings; their size was measured to 0·09—0·70mm. *Oscula* are circular openings of a diameter of ca. 2mm. To judge from the material, the pores are situated on one side, and oscula on the other.

The *skeleton*. The *dermal skeleton* consists of bundles or short fibres of dermal spicules spread in a penicillate way; they issue from the skeleton below and reach mostly horizontally into the membrane. When a piece of skin is cut off and seen from above, the fibres are seen especially to issue from the edge of the subdermal cavities or the incurrent canals, over which the pore areas are ound then they pass into the area and send off branches into the strings between the pores. Also on the oscular side the construction of the dermal skeleton is similar, the skin over the numerous canals that pass the sponge about transversely being also supported by short fibres. The membrane is, moreover, filled with chelæ, especially of the largest form. The *main skeleton* is chiefly constructed as in *fragilis*, and forms an irregular network of triangular, quadrangular, or polygonal irregular meshes. It is generally polyspicular with rather many (4—8) spicules alongside. No distinction can be made between primary and secondary fibres; here and there a little longer fibres may be found running in the longitudinal direction, but continuous fibres are otherwise not formed. When a section placed in xylole is examined, all the canals are distinctly seen, as the membranes coating these canals are highly filled with chelæ. Spongin is found in the skeleton, but it is white and clear, and only a very small amount is present.

Spicula: a. *Megasclera*. 1. The skeletal spicules are acanthostyli with rather dense spinulation. They are evenly and slightly curved, and have a middle long point, which is, for a greater or smaller part, without spines. Their length varies from 0·34—0·429mm, the shortest ones being rather rare; the thickness is ca. 0·0128—0·021mm. A few developmental forms were found, the finest ones, of a thickness of ca. 0·002mm, were seen to be finely spined. 2. The dermal spicules are tornota; they are straight or, more rarely, a little irregularly curved. They resemble the tornota in *L. fragilis*, and one end is a little thicker than the other, which is somewhat longer pointed; in the finer forms this feature is most marked. Their length is 0·238—0·28mm, and the thickness 0·0047—0·0060mm. b. *Microsclera*. These are chelæ arcuatæ of three forms and sizes, and sigmata. 1. The large chelæ are very characteristic; their shaft is strongly curved, almost to a semicircle, and the terminal parts are relatively small; the tooth is short and stubby, and the likewise stubby alæ are of the same length as the tooth. Their size is somewhat varying, the length from 0·047—0·071mm, most frequently it is nearest the latter size; the thickness of the shaft is 0·0057—0·014mm; this variation in thickness is due to the fact that the shaft is not cylindrical, but somewhat flattened, and therefore a transverse section of it is elliptical. Of this chela some developmental forms were found; the younger these forms are, the more flattened is the shaft, so that it may be quite thin, almost band-shaped. A transverse section shows, however, that a thicker part is running through the middle of it, while the lateral parts are quite thin; then it becomes by degrees elliptical during the growth. In the youngest forms the alæ are only seen as a little more marked expansions at either end of the thin lateral parts. The very finest forms are cylindrical. 2. The chelæ of the middle form are considerably smaller; they have a rather highly curved shaft; the terminal parts are considerably larger than in the large ones, so that the free part of the shaft is only about one third or a little more. The tooth is rather narrow, the alæ are of the same length as the tooth, and their lower edge is indented, so that they have a somewhat tooth-like form when seen from the side. Their length is 0·018—0·028^{mm}, and the thickness of the shaft is ca. 0·0021—0·0028^{mm}. Quite singly chelæ are seen that seem to occupy a position midway between these chelæ and the preceding form. 3. The smallest chela is of a peculiar and very characteristic form. It is highly curved, and the terminal parts are so large, that the free middle part of the shaft is less than a third of the whole length; but when the chela is seen from the front, the terminal parts are, on account of the curving, seen a little from the end and therefore shortened, so that in a frontal figure the terminal parts and the free part of the shaft will be of about equal length. The tooth is narrow and shorter than the alæ, and their lower edge is almost not indented. The chela is very small, its length is 0·010—0·015^{mm}, and the thickness of the shaft is ca. 0·0010^{mm}. On account of the form of the alæ this chela approaches the palmate chelæ, but on account of its strong curving and the narrow teeth it is more properly referred to the arcuate chelæ. 4. Sigmata are of the common form, and are more or less contort, up to one fourth of a turning. They are very varying in size, the length from 0·023—0·085^{mm}, and the thickness proportionally from 0·001—0·003^{mm}. The microscleres occur throughout the sponge, especially in all membranes; the large chela, as mentioned, is particularly conspicuous both in the dermal membrane and in the membranes of the canals.

Locality: Station 10, 64° 24' Lat. N., 28° 50' Long.W., depth 788 fathoms; station 85, 63° 21' Lat. N., 25° 21' Long. W., depth 170 fathoms; 62° 36' Lat. N., 3° 21' Long. E., depth 198 fathoms (Ad. Jensen, the cruise of the «Michael Sars» 1902). Four fragments in all. The localities are situated in the Denmark Strait and off the western coast of Norway.

5. **L. indistincta** Frstdt.

Pl. V, Fig. 10. Pl. XVI, Fig. 3 a—h.

1887. *Hastatus indistinctus* Fristedt, Vega Exp. vetensk. Iakttag. IV, 444, Pl. 25, figs. 13—19.

Massive, more or less lobate. The surface slightly grooved or smooth, very finely shaggy. The dermal membrane not especially thin, supported by erect or more or less recumbent bundles of dermal spicules. Oscula scattered, few. The skeleton an irregular, mostly polyspicular reticulation; longer fibres passing towards the surface may be found; sometimes the reticulation is more diffuse and unispicular. Spicula: Megasclera: the skeletal spicules slightly and dispersedly spined, sometimes smooth, styli 0·35—0·50^{mm}, the dermal spicules tornota or tornostrongyla 0·20—0·29^{mm}; microsclera of three forms, chelæ arcuatæ of two forms, large ones 0·018—0·044^{mm}, small peculiar ones 0·008—0·015^{mm}, sigmata 0·026—0·05^{mm}.

This species has chiefly a massive, more or less lobate form. It may grow expanded on the substratum, and from the expanded part, which grows to a considerable thickness, round projections or lobes may rise; but most frequently it seems, when rising, to assume a somewhat compressed form, always, however, forming some stubby lobes. Thus the roundlobed form is the most marked character of its exterior. The specimens in hand, none of which are quite entire, reach a rather considerable size; a specimen of a massive and more expanded form has a greatest extent of ca. 100^{mm}, and a greatest height of ca. 90^{mm}, the thickness of the expanded part is ca. 30^{mm}. The largest of the more erect and compressed specimens has a breadth of 125^{mm}, a thickness of ca. 40^{mm}, and a height of ca. 80^{mm}. Thus these specimens are considerably larger than that of Fristedt, which had a length of 40^{mm}, a breadth of 15^{mm}, and a thickness of 20^{mm}; according to these measures his specimen must have been of massive form. The colour (in spirit) is whitish yellow. The consistency is rather brittle and only little elastic. The *surface* is very slightly grooved; only here and there the grooves were a little deeper, in other places the surface is quite smooth. We have here in reality the same structure as in several *Myxilla*- and *Lissodendoryx*-species with grooves separated by ridges, only that here the grooves are very shallow or disappearing and the ridges little conspicuous[1]). The surface gets, however, a somewhat netlike appearance, the subdermal cavities situated under the grooves shining through with a darker colour. The surface is in most places very finely shaggy from projecting spicules. The *dermal membrane* is a somewhat transparent, not especially thin film. It is supported by bundles of dermal spicules, which may be highly recumbent. In most places, especially where pores are found, the membrane gets a peculiar appearance, about as mentioned under *M. incrustans*. The subdermal cavities, which shine darkly through the membrane, are here distinctly seen; sometimes they are somewhat roundish, sometimes more irregularly sinuous, and separated by the parts of tissue between the canals, which appear whitish. The darker areas over the subdermal cavities, however, are subdivided into smaller areas, fibres or parts of tissue stretching from the edges of the subdermal cavities below the suspended membrane. The pores are then situated in the areas that arise in this way. Therefore the sponge, as to its surface, is very similar to such specimens of *M. incrustans* as have a tolerably smooth surface. The *pores* are lying in groups in the mentioned areas of the dermal membrane, and thereby these areas become pore-sieves. The pores are round, or, when placed close together, irregularly polygonal; their size was measured to 0·03—0·23^{mm}, sometimes they were still larger. *Oscula* are scattered and only few in number; they are round or sometimes more irregular openings, surrounded by the dermal membrane with a sharp edge. They are very varying in size and reach at most a diameter of ca. 4^{mm}.

The *skeleton*. The *dermal skeleton* consists of penicillate bundles of dermal spicules, which pass out from the skeleton below and support the dermal membrane, piercing it. Where the membrane is lying over the parts of tissue separating the subdermal cavities, the question is only of bundles, which are perpendicular or more or less recumbent. From the edges of the subdermal cavities shorter, a little branched fibres run into the suspended membrane, where they end, spread in a penicillate way, and finally fibres run under the suspended membrane, or more loosely lying dermal spicules are found in the strings of tissue that pass under it, and in both cases more or less erect, penicillate bundles project from here through the membrane. Moreover, the membrane is highly filled with microscleres.

[1]) I suppose the structure of the surface in these species to be owing to the strength of the dermal membrane; thus *M. incrustans* has a thin dermal membrane and deeper grooves, *M. fimbriata* a thick dermal membrane and a smooth surface, and in both respects the present species occupies a position about midway between these two species.

The dermal spicules project only very little through the membrane, so that the surface is only very slightly shaggy. The *main skeleton* is a rather close, but irregular reticulation. It is mostly polyspicular; fibres may be found running chiefly upwards or towards the surface. They may be somewhat different with regard to their number of spicules alongside, but most frequently they have but few spicules, and they are rather loose. Coherent transverse fibres are not formed, but are only represented by single spicules or spicula-bundles. These transverse spicules are placed rather irregularly, and so the net of meshes is upon the whole irregular. Frequently longer fibres are not found, but the skeleton forms a quite irregular network of a somewhat diffuse character. The meshes are then irregular, also often triangular; in this case the network is often more unispicular, so that the whole may convey an impression of being quite diffuse with scattered, mostly single spicules without any formation of a distinct network. A distinctly observable, but rather slight amount of spongin is found in the nodes of the skeleton.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are slightly and dispersedly spined, sometimes quite smooth. They are most frequently slightly curved, sometimes a little more or irregularly so; the point is rather short. The spinulation may be very varying: at most the styli are dispersedly spined, and then all transitions are found to quite smooth ones. Then differences in this respect may be found in different individuals; in some spined styli are almost exclusively found, and of these most belong to the most highly spined ones, while quite smooth ones are only rarely seen; in other individuals the smooth styli are predominant, and the spined ones are then very slightly spined. Their length varies from 0·35—0·50^{mm} and the thickness from 0·008—0·014^{mm}. There may be some difference with regard to the length in different individuals; in the material in hand the fact seems to be that in individuals where the spined styli are predominant, they attain a little greater length than in individuals with predominant smooth styli. Also the thickness may show a little difference in the different individuals, a few ones especially having frequently thinner styli than the others. 2. The dermal spicules are tornota or tornostrongyla; sometimes one or both ends are a little swollen, so that they approach tylota or tylotornota. They are straight, more rarely they may be somewhat irregularly curved. Their length varies from 0·20—0·29^{mm} and the thickness from ca. 0·0035—0·0057^{mm}. Some difference may be found in different individuals, so that in some the dermal spicules are upon the whole a little longer than in others. As mentioned, there is most frequently a little difference between the two ends, one being a little more swollen and especially a little more rounded than the other. A few developmental forms were seen, which were quite monactinal with the thin end pointed. In a single individual almost all the dermal spicules had ends a little swollen, and these subtylota had not rarely uniform or almost uniform ends. b. *Microsclera.* These are chelæ arcuatæ, some peculiar, very small chelæ, and sigmata. 1. The chelæ arcuatæ have a regularly curved shaft; the tooth is elliptical and rather long, and the alæ, of the same length as the tooth, are rather narrow and therefore tooth-like; the chelæ, therefore, are very similar to ancoræ, and by a superficial examination they may be confounded with ancoræ, but by a closer examination they are seen to be chelæ. This chela varies much in size, its length is 0·018—0·044^{mm}, and the thickness of the shaft is 0·0018—0·004^{mm}. The largest sizes are less frequent. 2. The small peculiar chelæ are, on account of their smallness, only to be examined with difficulty. They consist of a curved shaft, which has, at either end, a number of teeth or tooth-like processes. Their number seems, at all events most frequently, to be about ten. The shaft is not smooth, but looks, as if it were rather highly rugged. By sufficient high magnifying powers it is seen, however, that the shaft may better be called lobate, as it has on either side a row of lobes, and these give to it its rugged appearance. The lobes are placed in such a way, that in the middle of the shaft they are nearest to the dorsal side, and when the chela is seen in a lateral position, the lobes in the middle are turned a little backward; farther out on the shaft the lobes by degrees turn to the opposite side, and they seem to pass evenly into the tooth-like processes of the ends, becoming at the same time longer. The terminal parts of the shaft, from which the teeth issue, are a little expanded. The teeth may be somewhat varying in size, often the middle tooth or the middle teeth may be longest. The chela varies somewhat in form, the shaft especially may be more or less curved. The described construction is only to be distinguished under high magnifying powers. As mentioned, these chelæ are very small, their length is ca. 0·008—0·015^{mm}, and the thickness is ca. 0·001^{mm}. — I have placed this peculiar spicule to the chelæ; I suppose that the rows of lobes of the shaft correspond to the alæ, and then the recurving part must correspond to a tooth, but nothing can otherwise be said as to the relations of this spicule to the other chelæ. 3. Sigmata are of the common form and more or less contort; their length varies from 0·026—0·05^{mm}, and the thickness about from 0·0018—0·0030^{mm}. By far most frequently the size is near to the larger limit. All the microscleres are frequent in the membranes through the whole sponge and also present in large numbers in the dermal membrane.

Remarks: As I have examined Fristedt's type specimen, the identification is sure. Fristedt has not seen the construction of the small chela, which he therefore mentions as the small sigma, and so he gets of microscleres one chela and two forms of sigmata, while in reality there are two forms of chelæ and only one form of sigmata. It is easily understood, on account of the smallness of this chela, that he has not interpreted it correctly. His name *indistincta* shows that he has found nothing characteristic in the species; but now this name is rather unhappy, as the species, on account of the small chela, is especially distinct. When he says of the dermal spicules: »They are often curved», this expression is quite correct, as in his type specimen these spicules especially frequently occur as curved; on the other hand, the figure of this spicule is quite a mistake with regard to one end. Fristedt gives the length of the styli to 0·35^{mm}; his type specimen belongs to those where the smooth styli are predominant, and the styli are also, in conformity to what has been said above, comparatively short; I have measured them, however, of lengths of up to 0·417^{mm}.

Locality: Station 34, the Davis Strait, 65° 17′ Lat. N., 54° 17′ Long. W., depth 55 fathoms; the Davis Strait, 65° 22′ Lat. N., 54° 02′ Long. W., depth 60 fathoms (Wandel); the Davis Strait, depth 100 fathoms (Th. Holm); Hekla Harbour, depth 5—12 fathoms (the East-Greenland Expedition 1891—92). About ten specimens or fragments in all.

Geogr. distr. Fristedt has the species in one specimen from Spitzbergen, depth 60 fathoms. The species seems to be a native of more shallow water, as it is only known from depths of 5—100 fathoms.

6. **L. complicata** Arm. Hans.
Pl. V, Fig. 11. Pl. XVI, Fig. 4 a—g.

1885. *Reniera complicata* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 7, Pl. I, fig. 8, Pl. VI, fig. 8.

1885. *Myxilla grisea* Armauer Hansen, ibid. 12, Pl. I, fig. 3, Pl. VI, fig. 9.

1887. *Clathria corallorhizoides* Fristedt, Vega Exp. vetensk. Iaktt. IV, 460, Pl. 25, figs. 73—77, Pl. 29, fig. 23.

Erect, bush-shaped, with more or less, often highly anastomosing branches. The surface shaggy. The dermal membrane a very thin film with partly projecting, partly horizontal dermal spicules. The skeleton a somewhat irregular network; primary, polyspicular longitudinal fibres are found, bending gradually towards the surface; they are connected by irregularly placed, mostly single transverse spicules. Spicula: Megasclera: the skeletal spicules smooth styli 0·42—0·68^{mm}, the dermal spicules strongyla to subtylota 0·22—0·40^{mm}; microsclera of three forms, chelæ arcuatæ 0·04—0·058^{mm}, sigmata of two forms, small ones 0·017—0·023^{mm}, large ones 0·042—0·055^{mm}.

This species has a beautiful and characteristic outer form, and in this respect it recalls the Clathriæ. It is markedly bush-shaped; from a small base of attachment a number of branches issue, rising and ramifying and anastomosing copiously. Especially the anastomoses are numerous and lead to the forming of plate-shaped parts pierced by larger or smaller holes, so that only the outermost short branches are free. The tendency to plate-shaped coalescing is also seen by the fact that the branches are not cylindrical, but more or less compressed. The species may in this respect be somewhat varying, the branches in some individuals being comparatively free, while in others they are quite coalesced, so that the question is really not of branches, but of anastomosing curled lamellæ. As mentioned above, the base of the sponge is comparatively small, and sometimes a short stalk is formed. The largest specimen in hand has a height of 85^{mm}, a greatest breadth of ca. 100^{mm}, and a breadth at the base of 30^{mm}. The outermost, free parts of the branches have a thickness of ca. 4—8^{mm}. Then we have specimens in decreasing sizes, the smallest one, which seems to be entire, has a height of ca. 25^{mm}. None of the specimens are attached, but in several of them loose bottom material is found on the basal surface, so that the sponge seems to have grown directly on the bottom. The colour (in spirit) is light yellow or whitish yellow, sometimes more gray, which latter I take to be due to the sponge containing sand. The sponge has a characteristic, net-like appearance, such as is found in many *Reniera*-species, which is due to the fact that the mouths of the close-set canals under the dermal membrane are seen shining through the membrane as dark spots. The consistency is firm and elastic. The *surface* is very shaggy from projecting spicules; some individuals may be more shaggy than others. The *dermal membrane* is an exceedingly thin and transparent film resting on the skeleton below and supported by dermal spicules. *Pores* and *oscula:* the pores are found in the dermal membrane, frequently gathered in sieve-like areas, but also in other places singly and much scattered; they are circular or oval. Their size was measured to ca. 0·012—0·3^{mm}. Then some larger, round or oval openings are found, sometimes closely gathered, sometimes more scattered. Their size may vary from ca. 0·2^{mm} up to ca. 1^{mm}. These openings lead into canals passing horizontally inward and losing themselves in a net of smaller canals. These larger openings are surely oscula; but as it is seen, all the openings pass evenly into each other with regard to size, and so it is often not to be decided whether an opening is incurrent or excurrent.

The *skeleton*. The *dermal skeleton*. As mentioned above, the dermal membrane rests on the skeleton below, and the fibres of the skeleton project through it, by which means the surface of the sponge is made shaggy. Otherwise the dermal skeleton is formed by dermal spicules in the common way; partly these spicules form bundles projecting from the main skeleton, often in connection with the projecting ends of the fibres, but mostly they are lying horizontally in the dermal membrane, partly scattered singly, partly in bundles, and in the pore areas they are often seen branching in between the pores; upon the whole, however, the dermal skeleton must be said to be little developed. The *main skeleton* is a somewhat irregular, mostly polyspicular network. Longitudinal fibres are found, running in the longitudinal direction of the branches, and by degrees bending out and piercing the dermal membrane, or giving off branches that bend out in this way; these primary fibres are all polyspicular and have an average thickness of 0·07—0·12^{mm}, and their course is rather regular. By far the greatest part of the transverse fibres is only represented by single spicules, only here and there a few are seen alongside each other; these spicules are placed quite irregularly, and coherent fibres are not formed. In a longitudinal section the skeleton so far conveys the impression of some regularity, as the longitudinal fibres are running rather parallelly, and the same is the case in a transverse section, the ends of the fibres bending towards the surface being here seen, especially in the circumference of the section, as rather regularly radiating radii. In the skeleton a rather copious, slightly yellowish mass of spongin is found, wrapping the fibres completely. Down towards the base, and especially in the stalk of the individuals provided with a stalk, the spongin is very abundant and forms a thick sheath round the fibres; consequently the sponge is here firm and hard.

Spicula: a. *Megasclera.* 1. The skeletal spicules are smooth styli; they are slightly curved, and the curve is most frequently found nearest to the upper end; they are evenly and middle long or rather long pointed. No head-swelling is found, but the greatest thickness is generally situated at the very head-end, and here the axial canal shows a small, but distinct widening, not situated just at the end of the canal, but a little below it. Their length is somewhat varying, from 0·42—0·68^{mm}, and the thickness from 0·016—0·025^{mm}. A few developmental forms were seen; they show especially distinctly that the head-end is a little thickened, and in the finest ones a swelling is found, often placed a little below the end. 2. The dermal spicules are strongyla with transitions to tylota; a discernible swelling of the ends are almost always found, but it is always slight, so that the needles may perhaps be best characterized as subtylota. They are straight, more rarely slightly curved. As is generally the case, the two ends are not quite equal, one being a little thicker than the other, and a few, quite fine developmental forms showed the thinner end quite pointed. They are somewhat varying in size, the length from 0·22—0·40^{mm}, and the thickness from 0·0035—0·007^{mm}. The variation is not found in its whole extent in one and the same individual, thus there are individuals in which the dermal spicules do not exceed 0·33^{mm}, and others in which they do not go below 0·28^{mm}. b. *Microsclera:* these are of three forms, chelæ arcuatæ and sigmata of two sizes. 1. The chelæ arcuatæ have chiefly the same form as the large chelæ in *L. diversichela:* they have a highly curved shaft, scarcely, however, so highly curved as in the mentioned chela, the terminal parts are small in proportion to the length of the shaft, tooth and alæ are stubby. Their length is 0·04—0·058^{mm}, the smallest lengths being rare, and the thickness of the shaft is 0·005—0·012^{mm}. Also in this chela the shaft is broadly elliptical in section, and this is the cause of the variation in thickness. Developmental forms at different stages were seen, the development is as mentioned under the large chelæ in *diversichela.* 2. Sigmata of the small form; these are rather characteristic; they are highly curved, often almost in a circular manner, the points, however, being generally curved a little more inward; they are plane. The sigmata are rather small, but their size is tolerably constant, the length is 0·017—0·023^{mm} and the thickness about 0·001^{mm}. 3. Sigmata of the large form; besides the small sigmata, which occur in great numbers, a larger form is found only occurring very sparsely; they have the common sigmaform, the ends are rather highly curved in a somewhat hook-like manner, and they are more or less contort. Their length is 0·042—0·055^{mm}, and the thickness is ca. 0·002^{mm}. As mentioned, they occur in very slight number, so that they might be supposed to be extraneous bodies; but as they show a distinct form and may be found in any specimen by a closer examination, they belong doubtless to the species. They must not be confounded with the youngest developmental forms of the chela, to which they bear a superficial resemblance. They seem to occur especially in the dermal membrane. The other microscleres occur through the whole sponge and especially in the dermal membrane, where in some places the chelæ occur rather closely.

Remarks: As I have examined type specimens of the quoted species, established by Armauer Hansen and Fristedt, I have been able to make a sure identification. As the original name, under which it has been established, is *complicata,* this name must be used. Armauer Hansen's description and figures of *complicata* might raise a doubt as to the specific identity; as, however, the type specimen I have examined is the present species, and as Armauer Hansen's figure of the exterior also absolutely belongs to this species, I have thought it best to take up the name; most of the spicules described and figured by Armauer Hansen do not agree, and either he must have confounded them with the spicules of an Axinellid, as might well be done, as the species has some outer resemblance to an Axinellid, or else there must have been an abundance of extraneous spicules in his preparation.

Locality: Station 141, 63° 22′ Lat. N., 6° 58′ Long. W., depth 679 fathoms, (bottom temperature ÷ 0°6 C.); station 143, 62° 58′ Lat. N., 7° 09′ Long. W., depth 388 fathoms, (bottom temperature ÷ 0°4 C.); 70° 32′ Lat. N., 8° 10′ Long. W., depth 470 fathoms (The East-Greenland Expedition 1891—92); ca. fourteen specimens in all. The localities are situated north of the Faröe Islands and south of Jan Mayen.

Geogr. distr. The species has been taken before by the Norwegian North-Atlantic Expedition, and, according to the statement, at its station 84. For this station is stated a bottom temperature of 6°5 C. As now the two Ingolf-stations from which we have the species show negative temperatures, and as also the locality south of Jan Mayen, according to the investigations of the »Ingolf», must be a negative one, it is not probable that the species occurs at a bottom with a temperature of 6°5 C. To be sure, station 84 is situated at the very border between the warm and cold area, and so the species might possibly be found there; but station 84, according to the list of the zoological stations, is no zoological one; on the other hand, station 87 is a zoological one, and its temperature is ÷ 1°1 C.; a confounding of these stations may therefore possibly have taken place. Fristedt has the species from the Baffin Bay, 68° 08' Lat. N., 58° 17' Long. W., depth 169 fathoms. Accordingly the species is known from the Baffin Bay and the North-Atlantic south of Jan Mayen and north of the Faröe Islands, with a bathymetrical range from 169—673 fathoms, and it must be supposed to be a native of the cold area.

7. **L. vicina** n. sp.

Pl. V, Fig. 12. Pl. XVII, Fig. 1 a—f.

Bush-shaped? with anastomosing branches. The surface shaggy. The dermal membrane very thin, partly with projecting bundles of dermal spicules, partly with horizontal ones. The skeleton an irregular, mostly polyspicular network; longitudinal fibres are found, connected by irregularly placed spicules and spicula-bundles. Spicula: Megasclera: the skeletal spicules smooth styli 0·71—0·86mm, the dermal spicules tylota 0·32—0·38mm; microsclera of three forms, chelæ arcuatæ 0·034—0·057mm, sigmata of two forms, small ones 0·017—0·023mm, larger ones 0·028—0·033mm.

Of this species we have only two fragments; they show, however, that the species has an exterior, quite similar to that of *L. complicata*, as they consist of some anastomosing, flattened branches. The larger fragment has a longitudinal extent of 60mm. The colour (in spirit) is yellowish white, and the sponge has the same net-like appearance as the preceding species. The consistency is rather firm and somewhat elastic. The *surface* is very distinctly, but somewhat dispersedly, shaggy from projecting spicules. The *dermal membrane* is a very thin film, partly resting on the skeleton below, partly supported by dermal spicules. With regard to *oscula* and *pores* the facts are as in the preceding species. The pores are for a great part situated in sieve-like areas; they were measured from quite small ones up to 0·47mm. Oscula are round openings of sizes from 0·6mm to ca. 1·5mm; but also in this species pores and oscula may pass into each other with regard to size.

The *skeleton* is in every respect constructed in a similar way as in *L. complicata*. The *dermal skeleton* consists of dermal spicules, partly forming bundles or short fibres that may project a little or lie horizontally in the membrane, partly being found singly scattered in the membrane, but upon the whole the dermal skeleton is little developed; further spicules from the main skeleton project. The *main skeleton* is an irregular, mostly polyspicular network; fibres are found, running chiefly in the longitudinal direction, but branching irregularly, and being upon the whole rather irregular. Between them spicules and spicula-bundles are found irregularly placed, and bundles issue to the surface. The longitudinal fibres do not bend towards the surface in any regular way, and as well in longitudinal sections as in transverse ones the skeleton conveys an impression of greater irregularity than in *complicata*. This may, however, be owing to the fact that we have only irregular fragments with copious anastomoses, a thing that influences the regularity of the skeleton. Spongin is found in the fibres.

Spicula: a. *Megasclera*. 1. The skeletal spicules are smooth styli; they are somewhat curved, almost always nearest to the head-end, and the curve may be more or less strong, sometimes it is a little irregular. They have an evenly tapering, rather long point. Their length is 0·71—0·86mm, most frequently midway between these limits, the thickness is 0·018—0·025^{mm}. Also in these styli a widening of the axial canal is seen at the upper end, and this widening is generally found a little below the end of this canal. 2. The dermal spicules are tylota; they are comparatively long and thin with well-developed end-swellings, and they are straight, sometimes slightly curved. Their length is 0·32—0·38^{mm}, and the thickness 0·0028—0·0035^{mm}. The two ends of the tylota are not quite equal, the shaft is in one end a little thicker, while the swelling is here comparatively smaller, whereas in the other end it is a little thinner, and the swelling is larger, often almost globular. To judge from a few developmental forms, it is, however, this end which is originally pointed. b. *Microsclera;* these are of three forms, chelæ arcuatæ and sigmata of two sizes. 1. Chelæ arcuatæ are of the same form as the chelæ in *L. complicata;* the shaft is rather highly curved, the ends are relatively small, and tooth and alæ are stubby. The length is 0·034—0·057^{mm}. The shaft is somewhat flattened, and in section flatly elliptical, its thickness, from the side and from the front, is ca. 0·0028—0·008^{mm}. A few developmental forms were seen. 2. Sigmata of the small form have most frequently a more common sigma-form as in the preceding species, they are comparatively small and fine, and they are plane. Their length is 0·017—0·023^{mm} and the thickness at most 0·0010^{mm}. 3. Sigmata of the large form; also in this species a larger sigma occurs, but in rather small numbers; it is of the common type, more or less contort, 0·028—0·033^{mm} long and ca. 0·0014^{mm} thick. The microscleres are found throughout the sponge and in the dermal membrane, where the large chela is especially frequent.

As is shown by the description, this species is very closely allied to the preceding one, but is distinguished from it by sure characters; these distinguishig characters are especially the longer styli, a different form of sigmata, and, above all, a different form of the tylota.

Locality: Station 19, 60° 29' Lat. N., 34° 14' Long.W., depth 1566 fathoms. The bottom temperature was here 2°4 C. It is an interesting fact to notice that while the preceding species is a native of the cold bottom, the present species, which is so closely allied to it, but is surely distinguished, belongs to a bottom with positive temperature. The locality is situated in the southern Denmark Strait.

8. **L. stipitata** n. sp.

Pl. V, Fig. 13. Pl. XVII, Fig. 2 a—e.

Erect, stalked, club-shaped, somewhat compressed. The dermal membrane not especially thin, supported by bundles of dermal spicules and also provided with horizontal spicules. The skeleton dendritic; from the stalk polyspicular fibres pass up through the sponge, branching and anastomosing. Spicula: Megasclera: the skeletal spicules smooth styli 0·39—0·63^{mm}, the dermal spicules tornota 0·31—0·488^{mm}; microsclera of one form, chelæ arcuatæ 0·032—0·045^{mm}.

This species is markedly club-shaped; it consists of a rather thin, cylindric stalk, which is below attached to the substratum by a small basal expansion. The stalk is of equal thickness throughout its length, and above it carries a head which is somewhat compressed and may best be described as irregularly cordate. This part is compressed in such a way, that one side is convex and the other flat or a little concave. The edge is rather sharp. The smallest specimens are only little or not at all compressed. The largest specimen is 45^{mm} high, of which the stalk makes ca. 15^{mm} and the upper part ca. 30^{mm}; the breadth of the leaf-shaped part is 24^{mm}, and the thickness ca. 10^{mm}; the thickness of the stalk is only $1{\cdot}5^{mm}$. Then we have specimens of decreasing sizes, the smallest one with a height of 9^{mm}, of which the stalk makes $2{\cdot}5^{mm}$, and the thickness of the upper part is 2^{mm}. All the specimens are attached to larger or smaller stones. The colour (in spirit) is dirtily brownish gray. The consistency of the tissue itself is soft, but the skeleton makes the sponge rather firm and elastic. On account of the peculiar softness of the tissue, the sponge contracts much in drying, and also in spirit it seems to be highly contracted. The *surface* is damaged in most specimens, so that its character cannot be decided from these specimens. To judge from tolerably entire individuals, ends of fibres project, and in the protuberances formed in this way spicules project; also the longitudinal fibres lying under the skin give rise to keel-shaped ridges separated by grooves, so that the surface gets upon the whole a slightly grooved appearance. In undamaged specimens a *dermal membrane* may be separated as a not especially thin, intransparent film. *Pores* were not seen. *Oscula:* here and there, to be sure, a few scattered openings are seen, but these, I think, are only due to damaging. In the best preserved specimen, on the other hand, a spout-shaped osculum is found on the top of the sponge. It consists of a small, somewhat conical spout formed by the dermal membrane; it has a height of $1{\cdot}5^{mm}$ and a somewhat similar breadth. In the spout, formed by the dermal membrane, the dermal spicules are lying very close, parallel to the longitudinal axis. In the other, less well preserved specimens, this osculum is not found, but everything indicates that it has been present, some perpendicular canals being found in the upper part of the sponge, and some thin-skinned parts with openings being seen in the uppermost edge. The mentioned specimen shows only one osculum, but in other specimens several oscula seem to have been found.

The *skeleton*. The *dermal skeleton*. The fibres running from the main skeleton to the surface end in bundles of dermal spicules spread in a more or less penicillate way, which bundles cause the projections of the surface and rise through them. As the fibres are not perpendicular on the surface, but directed upwards, the projecting bundles are recumbent, when the dermal membrane is seen from above. The dermal membrane, which is suspended between the projections, has, moreover, horizontal dermal spicules, partly singly scattered, partly here and there in bundles. Besides, the membrane is copiously provided with chelæ. The *main skeleton* is of dendritic type. In the basal expansion spicules are found closely packed without any order, but chiefly parallel to the underlayer. Towards the middle they rise upward, and the expansion passes into the stalk. Neither are the spicules in the stalk arranged quite as in a fibre, some of them being placed more or less obliquely; chiefly, however, they are placed in the longitudinal direction. Especially in the central part of the stalk they are directed longitudinally, while the more scattered arrangement is found in the peripheral layer; outermost a looser layer is found with spicules turned in all directions, and from this layer spicules project, so that also the stalk becomes shaggy. Dermal spicules were not seen, either in the stalk or in the basal expansion. Not till the stalk passes into the upper body, the spicules are arranged so as to lie quite parallelly in the fibres. In the basal expansion and the stalk the spicules are shorter than in the other parts of the body; upward in the stalk they become gradually longer. Where the stalk passes into the upper body, it begins to divide, and the fibres continue up through the sponge, copiously branching in a dendritic manner and also frequently anastomosing. Branches continually bend out towards the surface, and end in the bundles of dermal spicules of the skin. All the fibres are polyspicular, and the thicker ones have many spicules alongside. The first and thickest fibres issuing from the stalk have an average thickness of 0·6^{mm}, and the thinnest branches going to the surface are ca. 0·05^{mm} thick. Spongin is found in the fibres through their whole length, coating them, perhaps, with an exceedingly fine layer, but it is white and clear and not easily observed; it is most copious in the stalk.

Spicula: a. *Megasclera.* 1. The skeletal spicules are smooth styli; they are slightly curved, and the curve is generally situated nearest to the head-end. They taper quite imperceptibly towards the head-end; towards the point they are somewhat tapering, but the point itself is short. Their length is between 0·39 and 0·63^{mm}, and the thickness is 0·012—0·016^{mm}; the longest ones are not always the thickest ones. In the basal expansion and in the stalk the styli, as mentioned, are considerably shorter, only 0·208—0·35^{mm}; upward in the stalk they become gradually longer, and in the upper part of the stalk they reach 0·47^{mm}. 2. The dermal spicules are tornota; they are straight, or slightly, and then frequently a little irregularly, curved. Their ends are most frequently slightly swollen, they are about rounded and end with a little mucro. The ends are not quite equal, one being a little thinner than the other and generally a little more pointed. Their length is 0·31—0·488^{mm}, and the thickness 0·0067—0·010^{mm}. b. *Microsclera:* these are only of one form, chelæ arcuatæ. They have a somewhat curved shaft, the lower edge of the alæ are only little indented, and therefore the ala is not much tooth-shaped; the tooth is narrowly elliptical, of the same length as the alæ, and there is a small tuberculum broadest downward. The chela must be called arcuate, but it forms a transition to the palmate ones. The length is 0·032—0·045^{mm}, the thickness of the shaft is ca. 0·003—0·005^{mm}; the shaft is not cylindrical, but more or less compressed. A few developmental forms were seen as thin staves recurved at both ends. The chelæ occur through the whole sponge, but they are especially numerous in the dermal membrane.

Embryos. In most specimens embryos were found copiously scattered in the tissue. They are globular or a little flattened, of a diameter of up to 0·48^{mm}; on account of their white colour they were easily discerned in the tissue. No spicules were found in them.

Locality: Station 10, 64° 24′ Lat. N., 28° 50′ Long. W., depth 788 fathoms (bottom temperature 3°5 C.), two, mostly denuded, skeletons; station 104, 66° 23′ Lat. N., 7° 25′ Long. W., depth 975 fathoms (bottom temperature ÷ 1°1 C.), one large and two small specimens; station 105, 65° 34′ Lat. N., 7° 31′ Long. W., depth 762 fathoms (bottom temperature ÷ 0°8 C.), four specimens; 62° 30′ Lat. N., 1° 56′ Long. E., depth 275 fathoms (bottom temperature negative), a small specimen (Ad. Jensen, the cruise of the »Michael Sars« 1902). As is seen from the list, the three localities are from the cold bottom, and according to this the species must be supposed to be a native of the cold area; the fourth locality, station 10, on the contrary, is situated on the south side of the ridge between Iceland and Greenland, and it is positive. Now it is to be remarked, however, that from this locality we have only two almost quite denuded skeletons, and so there is a possibility that these specimens have been dead, and have been carried to this locality as dead. This is also indicated by another fact; all the other specimens with the exception of a few ones that have been broken off, are attached to the stone which serves for their attachment, whereas the two specimens from station 10, although they have the basal expansion of the stalk undamaged, are loosened from their substrata.

Note. This species has a skeletal structure similar to that of the species *ternatensis* established by Thiele (Abhandl. d. Senckenberg. nat. Gesellsch. XXV, Heft IV, 953), and by him referred to the genus *Hamigera*. The genus *Hamigera* with the typical species *hamigera* O. Schmidt was by Topsent (Résultats des Campagn. scient. du Prince de Monaco, Fasc. II, 102) referred to the *Ectyoninæ* on account of its skeletal structure. Thiele l. c. says that, after having examined sections of Schmidt's type specimen, he cannot follow Topsent in this, as he finds styli and strongyla to be intermingled. I have also examined a piece of Schmidt's type specimen, kindly sent me by Dr. Marktanner, and although the examination of a small, dried fragment must necessarily be somewhat deficient, as, on account of contraction, it gives only a rather indistinct idea of the skeleton, I must nevertheless admit Topsent to be right. The fibres consist almost exclusively of strongyla, only a few subtylostyli being found here and there in them; on the other hand subtylostyli are seen to project from the fibres. When upon the whole a group *Ectyoninæ* is admitted, *Hamigera*, according to my examinations, must doubtless be referred to it. Thiele's species *ternatensis*, of which it is expressly said that the fibres almost exclusively consist of styli, while at the surface radiating bundles of dermal spicules are found, is surely not to be referred to *Hamigera*, but must be a *Lissodendoryx*. When Thiele as the principal difference between *Dendoryx* (= *Myxilla*) and *Hamigera* mentions the want of a regular choanosomal skeleton in the latter, this character cannot be used as a generic distinction, as reticular and dendritic skeletons may be found in the different species of as well *Lissodendoryx* as other genera. When Thiele says, in a foot-note: «Vermutlich werden noch mehrere «*Lissodendoryx*»-Arten in die Gattung *Hamigera* gehören», this is quite correct according to his view, but according to what has been propounded here, such species will just have to be kept in the genus *Lissodendoryx*.

Iophon Gray.

The form somewhat varying, incrusting or massive, but not rarely erect, cylindrical or branched, or, finally, more or less regularly leaf-shaped. The skeleton a most frequently irregular, mostly polyspicular reticulation, without any distinction between primary and secondary fibres; sometimes longer fibres are present. The dermal skeleton well developed, consisting of bundles of dermal spicules, partly lying horizontally in the membrane, partly erect and penicillate. A rather slight amount of spongin is found. Spicula: Megasclera: the skeletal spicules styli, most frequently more or less spined, sometimes smooth, the dermal spicules diactinal, strongyla or most frequently tylota, oftenest with slightly spined ends; microsclera anisochelæ palmatæ of a characteristic form with the smaller end provided with a spur, and almost always bipocilla, which may be somewhat varying in form.

The genus *Iophon* is an especially distinctly characterized genus, and the distinct characters are found in the microsclera. To be sure, chelæ of the same form as in *Iophon* and bipocilla are again found in *Pocillon*, which is the pendant of *Iophon* among the *Ectyoninæ*, but surely these two genera are also, in spite of the grouping, very closely allied to each other. The peculiar chela is always present in *Iophon*, while bipocilla may be wanting in a few cases, and therefore the chela is the form of microsclera most characteristic of the genus. This chela is never found in any other genus, with the only exception of the above mentioned *Pocillon*[1]. The chela is a palmate anisochela, whose smaller end is considerably smaller than the larger one; from the axial recurving of the smaller end a sharp spine or spur issues. The chelæ may in some species occur in two different sizes. In a few species they may also form rosettes, and then, as is generally the case, only the large chelæ form rosettes, while the small ones, when such are found, are never gathered in rosettes. Neither are bipocilla known outside the genera *Iophon* and *Pocillon*[2]. The author who first mentions these bodies is Bowerbank; his description of them, like his descriptions of the chelæ upon the whole, is deficient, and he calls them in different places and according to the different positions in which he finds them »unipocillated» and »bipocillated bihamates» or »bipocillated anchorates». Gray calls them »bipolicated anchorates», I suppose on account of a misreading of Bowerbank. Vosmaer (Niederl. Arch. für Zoologie, Suppl. Band I, 1881, 82) says that they are probably a modification of sigmata. Ridley and Dendy calls them »bipocillate spicules» or »bipocilli»[3], and of the peculiar bipocillum in *Iophon chelifer* they say that they are inclined to regard it as a much modified anisochela. Topsent says also in 1901 (Résultats du Voyage du S. Y. Belgica, Spongiaires), under *Iophon radiatus* that the bipocilla must be regarded as modified anisochelæ, but his reason for this opinion, that their smaller end shows a fine dentation, is scarcely of any importance. Thiele, finally, in 1903 (Arch. für Naturgesch. 1903, I, 389) calls the bipocilla anisochelæ without any further explanation. — The common form of the bipocilla had never been correctly described till the appearance of Wilson's work, mentioned below. Generally, as by Ridley and Dendy, they are described as consisting of a shaft with a cup-like expansion at each end. Wilson in 1904 (Mem. of the Mus. of comparative Zoology at Harvard College. XXX, Nr. 1, 143—154, Pl. 19, fig. 6 b—e, Pl. 20, fig. 6 a et c, fig. 15 a, c—f) gives for the first time a thorough description of the construction of the bipocilla in the species treated by him; here for the first time a correct and exact description is given, together with good figures. The author does not say that the bipocilla are to be regarded as chelæ, but he calls the peculiar bipocilla in *I. chelifer* and *lamellata* »chelate bipocillus». — The bipocilla are in reality somewhat modified anisochelæ, and the principal modification is that a tooth only is developed in one end, which may be designated as the upper end. The bipocillum, in its common and typical form, consists of a curved shaft, which has always an exceedingly fine brim on either side. At the lower end the shaft is so much recurved, as to form about a right angle with the middle part of the shaft, but the curve is round and even; in this recurved part the lateral brim of the shaft is broader, and therefore this part has a somewhat spoon-like form. At the upper end the lateral brim is also a little widened and forms a pair of small alæ; then follows, as usually, a thin connection with the tooth, formed by the shaft alone; the tooth is a comparatively

[1]) Carter (Ann. Mag. Nat. Hist., Ser. 5, IX, 291, Pl. XI, fig. 16 e, f) mentions and figures a very small chela occurring in his *Esperia lævis*, which might seem to be of the *Iophon*-type, as Carter also remarks. *Esperia lævis* is evidently a *Mycale*, and it has a typical *Mycale*-anisochela; how the fact really is with regard to the small chela, whether it is an extraneous *Iophon*-chela or a peculiar chela belonging to the species, cannot be decided.

[2]) In a work by Swartschewsky (Beitrag zur Kenntniss der Schwamm-Fauna des Schwarz. Meer., Kiew Naturforsch. Gesellsch. Schrift. XX, 27, 51, Taf. 5, Fig. 5 a—d) published in 1905, the author establishes a species *Esperella Iophon*; it seems to be a *Mycale*, and it has typical *Mycale*-anisochelæ gathered in rosettes, but besides it has smaller chelæ, which may be more or less, and often highly, curved; in the latter case, the author says, they assume the form peculiar to the bipocilla. To judge from the figures, some of these chelæ may seem to be bipocilla, but perhaps the question is only of peculiarly formed anisochelæ, and they seem also by transitions to be connected with the common chelæ.

[3]) As pocillum is a neuter noun, I use the plural form bipocilla.

large, about circular, arched plate, and it forms about a right angle with the shaft. No falx is developed. When the bipocillum is viewed from the front, it conveys the impression of consisting of two cup-shaped plates connected by a shaft, which has given rise to the common description of it. The lower, spoon-shaped end of the bipocillum is most frequently or always finely indented in the edge, which is best seen in the largest specimens. From this typical form of the bipocillum deviations may be found. Thus in species where the bipocilla are otherwise of the typical form, forms may occur with the tooth split to two or three teeth, as for instance in the *I. piceus* treated below; the splitting is often irregular, and also other deviations in the form may occur. Then the bipocillum may constantly be of a different form, as in *I. chelifer*, where the tooth is always split to three or sometimes two lobes, and the lower end is prolonged to two points. — Both forms of microscleres seem to be rather varying in the same species with regard to their frequency; in some individuals they are found in great numbers, in others they are scarce, and sometimes one form, sometimes the other is the most frequent one. This variation seems to be most marked with regard to the bipocilla, which may sometimes be seen only quite singly.

The *Iophon*-species have always, whether they are preserved in spirit or dried, a very dark, sometimes quite black colour, and this feature has sometimes been used as a character of the genus. This colour, however, as has especially been pointed out by Topsent, is not original, but they are in the fresh state of the common colour, yellow to lightly brown. In the air or in spirit they assume, however, the dark colour. Sometimes specimens may keep the original colour more or less markedly. This feature of the colour getting dark after death is also found in *Pocillon*.

While *Iophon* is distinctly characterized as genus, the same cannot be said to hold good with regard to its species. Ridley and Dendy have determined part of the Challenger-material as *Iophon Pattersoni*, and in this species united several of Bowerbank's species, of which, however, *Hyndmanni* and *scandens* in reality belong to *Pocillon*. Topsent is more inclined to embrace the contrary opinion that the question is of several species. The fact is that the *Iophon*-species, or, at all events, some of them, may evidently be somewhat polymorphous. The microscleres yield no good specific characters, both the chelæ and the bipocilla in their typical form being exceedingly uniform in the different species. The styli may in the same species vary very much with regard to spinulation, from about quite smooth needles to highly spined ones. All these features make it a difficult thing to separate the different species. A sure distinction will, however, generally be obtained, when characters are drawn as well from the spiculation, the skeletal structure, and the exterior, as from the structure of the dermal membrane. Thus among the species described below, *I. piceus* is somewhat polymorphous both with regard to form and spiculation, but nevertheless it is a well characterized species, and the same holds good of *I. dubius*, which is, however, somewhat less polymorphous.

1. I. piceus Vosm.

Pl. VI, Figs. 1—2. Pl. XVII, Fig. 3 a—b.

1881. *Alebion piceum* Vosmaer, Niederl. Arch. für Zool. Suppl. Band I, 42, Pl. I, fig. 19, Pl. III, figs. 75—78 et 81—82.

1885. *Alebion piceum* Vosmaer, Bijdr. tot de Dierk. 12te Afl., 3die Gedeelt. 31, Pl. V, fig. 50.
1887. *Esperia nigricans* Fristedt (non Bow.), Vega Exp. vetensk. Iakttag. IV, 448.

Erect, leaf-shaped, or more irregular, lobate with smaller or larger lobes. One surface generally with more or less shallow grooves, separated by ridges. The surface smooth. The dermal membrane a distinct, but thin film, with a skeleton of horizontal dermal spicules forming on the pore side a reticulation, and being scattered on the oscular side; it is supported by penicillate bundles of dermal spicules. Oscula numerous, scattered on the even surface, pores in grooves on the opposite surface. The skeleton a rather close, irregular, polyspicular reticulation. Spicula: Megasclera: the skeletal spicules more or less spined acanthostyli 0·26—0·45$^{\text{mm}}$*, the dermal spicules tylota with spined ends 0·238—0·298*$^{\text{mm}}$*; microsclera of two forms, anisochelæ palmatæ of the Iophon type 0·016—0·036*$^{\text{mm}}$*, bipocilla 0·008—0·014*$^{\text{mm}}$*.*

This species may have a somewhat varying appearance, but typical and well developed specimens have a quite characteristic form. The species is always erect and more or less leaf-shaped, but sometimes somewhat irregularly folded or curved, so that various, but then always irregular, sometimes somewhat cup-shaped forms arise, or the form becomes still more irregular, more or less lobate. It is attached with the base to the sea-bottom, or to things on the bottom, and the most regular specimens form a rather thick, oval leaf, which is broadest below, not being restricted here. What gives to the species its characteristic appearance, however, is its two surfaces. They differ from each other first in the fact that one is the oscular side, the other the pore side, but other differences are also found. The oscular surface is most frequently tolerably smooth, or shows only a few irregular and oftenest shallow grooves. The pore surface, on the other hand, has a number of more or less deep grooves of varying sizes, separated by walls of varying breadths. The grooves are of an irregular form, and the walls between them may be undulating or sinuous. These grooves are distinctly present in far the greater number of specimens and give to these a characteristic appearance. They may, however, be conspicuous in different degrees, especially they may be fewer, and then they are larger and more shallow, and consequently less characteristic. The described form of the sponge is the one most frequent and characteristic; but it may also by transitions pass into a thinner leaf-shaped form, especially as to the upper part of the sponge. It is especially in such forms that the grooves of the pore side become large and shallow, and they may quite disappear, so that the leaf-shaped sponge shows more or less even surfaces. Thus the extremities with regard to form seem on one side to be the quite irregular, more or less lobed forms, on the other side the quite leaf-shaped ones, and the middle form between these extremities is found in the regular, grooved specimens of the first described form, which seems to be the most frequent and most normal form of the sponge. Unfortunately, only few tolerably entire specimens are found in the material in hand, but a great many fragments; therefore I am not able to speak of the variation in form with absolute certainty. The largest typical specimen is ca. 165$^{\text{mm}}$ high, ca. 125$^{\text{mm}}$ broad, and ca. 35$^{\text{mm}}$ thick. The smallest specimen among the tolerably entire ones has a height of 35$^{\text{mm}}$, a similar breadth, and is rather thin. The largest quite leaf-shaped specimen has a height of ca. 140$^{\text{mm}}$, a breadth of 215$^{\text{mm}}$, and a thickness in the middle of ca. 10$^{\text{mm}}$; thus it is considerably thinner than the typical specimens. The consistency is brittle and little elastic, and the specimens are therefore easily broken; the thin, leaf-shaped specimens are more flexible. The colour (in spirit) is more or less dark brown, often quite black; a few pieces have kept their original lighter colour. The *surface* is smooth, without projecting spicules. The *dermal membrane* is very distinct and may easily be removed. It is a thin and transparent film with a special skeleton of dermal spicules lying horizontally in it, and it is supported by more or less perpendicular pillars of dermal spicules. *Pores* and *oscula:* As mentioned above, pores are found on one side and oscula on the other. On the pore side the spicules form a network, and the pores are here very close-standing, especially in the grooves, while they are few or wanting on the walls separating the grooves. Several pores are lying together in the meshes of the network, they are round or oval and of a diameter from 0·024—0·17^{mm}. On the opposite, more even side oscula are found, they are present in large numbers and rather close-lying. They are circular or oval, their edge is most frequently slightly rising, and generally somewhat fringed. Their size was measured from 2·5 down to 0·5^{mm}. The close-lying spicules of the skin reach into the fringes of the oscular edge.

The *skeleton*. The *dermal skeleton*. A genuine dermal skeleton, lying in the membrane itself, is found here, besides the skeleton that supports the membrane and also consists of dermal spicules. The skeleton of the membrane itself is differently arranged on the two sides of the sponge. On the pore side and especially in the grooves of this side a beautiful reticulation is found, recalling the reticulation in *Halichondria panicea*. The reticulation is polyspicular and forms triangular or polygonal meshes. It may have a somewhat different appearance, and the fibres may have more or fewer spicules alongside, and also single spicules may be found subdividing the larger meshes by running from the fibres in between the pores. Sometimes the dermal spicules form longer, thicker fibres running irregularly, and the spaces bounded by these fibres are again subdivided by thinner fibres or single spicules. On the walls between the grooves the reticulation may be more irregular, or the spicules may be quite scattered. On the oscular side the spicules are not arranged in a network; they are here scattered, or only gathered in a somewhat bundle-like way, and they are rather close-lying. The dermal membrane thus equipped is on both sides of the sponge supported by pillars of dermal spicules; these pillars issue from the skeleton below and pass to the dermal membrane, but they do not pierce it. Generally the pillars spread a little in a penicillate way towards the ends. Most frequently these pillars are short, only a little longer than one spicule, but under the grooves of the pore side they may get a greater length. In these latter places large subdermal cavities are then formed, and the cavities under the membrane seem upon the whole to be larger on the pore side than on the oscular side. The *main skeleton* is a rather close, irregular, polyspicular reticulation; the meshes are triangular or irregular, and no distinction can be made between primary fibres and secondary ones. The number of spicules in the fibre may be varying, generally it seems to be two to six. In conformity to the construction no longer fibres are found in the irregular net of meshes formed in this way. Sometimes, however, longer fibres may be found, running chiefly in the longitudinal direction up through the sponge, and especially to be seen in longitudinal sections parallel to the surfaces; but they are thin, little conspicuous, and only to be seen when sections of the skeleton are viewed under the microscope. Down towards the base the sponge is most frequently rather hard and solid; the skeletal net is here still more close than farther up, and the fibres are thicker and consist of more spicules; in other respects, however, it has the same appearance as farther up, and has no longitudinal fibres; moreover, it is often more irregular and somewhat diffuse. The skeletal net, when seen in larger sections, is of a peculiar appearance on account of the many canals running through it. They are present in very large numbers, and run chiefly, at all events the larger ones, more or less horizontally through the sponge from the subdermal cavities of the pore side to the oscula. In a transverse section, therefore, they are seen as straight or somewhat curved, sometimes branched canals passing from one side to the other, while in a section parallel to the surface they are seen as close-set round holes. A white and little conspicuous mass of spongin is found in the nodes of the skeleton; in the more solid basal parts the spongin is a little more copious and more extended in the network than farther up. In the dermal network no spongin is found.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli; they are straight or, most frequently, curved in different degrees, often nearest to the head-end. The point may be somewhat varying in different individuals, from rather short to middle long. The spinulation may vary much in different individuals; in some it is very dense in the whole extent of the spiculum, and then all transitions are found to almost quite smooth spicules. Also the size of the spines is varying, from rather coarse to very fine; the coarse spines are especially found in the highly spined needles. Sometimes the spines are more closely gathered round the head-end of the style, and they are also often closely gathered near the point. In some needles the spinulation continues out on the very point, in others the point is smooth. The mentioned variation takes place especially from one individual to another, but some variation may also be found in one individual. When all the examined individuals are included, the length of the styli varies from $0{\cdot}26$—$0{\cdot}45^{mm}$, these being thus the extreme limits found, but it does not vary very much in the single individuals; as instances may be given, $0{\cdot}26$—$0{\cdot}31^{mm}$, $0{\cdot}29$—$0{\cdot}37^{mm}$, $0{\cdot}35$—$0{\cdot}42^{mm}$, $0{\cdot}38$—$0{\cdot}45^{mm}$. The thickness varies between about $0{\cdot}010$—$0{\cdot}020^{mm}$; it is otherwise also somewhat varying in the individuals, those with the longest needles having not always the thickest ones. A few finer, slightly spined developmental forms were seen. 2. The dermal spicules are tylota with spined ends; they may be straight or more or less curved, most frequently they are evenly and slightly curved; they may be of about equal thickness throughout, but they are oftenest thickest in the middle and accordingly fusiform. Generally the two ends are not equal, one being a little thicker and with a roundish swelling, the other a little thinner with a more longish swelling, which is most frequently less marked; the difference, however, is often slight or quite imperceptible. These spicules are much less varying than the skeletal ones; their common length is $0{\cdot}238$—$0{\cdot}298^{mm}$, sometimes up to $0{\cdot}31^{mm}$; in individuals in which the skeletal spicules are of the greatest length, the dermal spicules may also be of the longest, for instance $0{\cdot}28$—$0{\cdot}3^{mm}$ long. The thickness is ca. $0{\cdot}005$—$0{\cdot}011^{mm}$, most frequently about $0{\cdot}008^{mm}$. Of the dermal spicules a few developmental forms were seen showing that they are begun as monactinal needles. b. *Microsclera.* These are anisochelæ palmatæ of the *Iophon*-type and bipocilla. 1. The chelæ are of the form common in the genus; the tooth is of the same or about the same breadth as the alæ, and of the same length or a little shorter; at the smaller end the tooth and the alæ are of equal size, and here the axis in the common way sends off from the curve a short spur. At the larger end a longish tuberculum is found; at the lower end the tuberculum appears together with the spur as a pear-shaped body. The chelæ vary much in size, and at the same time the dimensions are a little altered, the larger end of the smaller chelæ

being comparatively larger than that of the larger chelæ. The chelæ may also vary somewhat in form in different individuals, thus sometimes the alæ of the larger end may continue far down towards the other end, and may even be united with the alæ of this end, which feature, however, must be regarded as a monstrosity; in such cases also the tooth passes far down towards the tooth of the lower end. The length of the chelæ is between 0·016 and 0·036^{mm}, and the breadth is 0·0057—0·011^{mm}.
2. The bipocilla are of the common form described in the preliminary remarks of the genus; the slight indentation of the edge of the lower end is rather distinct under high magnifying powers. The shaft is somewhat expanded through its whole length, and above it forms a narrow ala on either side. The bipocilla are somewhat varying in size, as well in one individual as in different individuals; in the larger ones the indentation of the edge of the lower end is distinctly discernible; the indentation often continues rather far up. Sometimes, especially in some individuals, monstrous forms of the bipocilla occur, the most common monstrosity being that the tooth of the upper end is split, often quite irregularly, and also the alæ may be separated from the shaft and assume peculiar forms. The length of the bipocilla varies from 0·008—0·014^{mm}, but sometimes it does not exceed 0·011^{mm}. The microscleres are found both in the tissue and in the dermal membrane, perhaps in larger numbers at the latter place. Sometimes the chelæ seem to be present in larger numbers than the bipocilla, sometimes the reverse is the case.

Embryos. In some individuals embryos were found lying in the tissue in large numbers. They are globular, and their diameter is ca. 0·30^{mm}. Of spicules the examined specimens showed only chelæ, which are thus the first occurring spicules. In the spicula-preparations, however, just from specimens with embryos, some needles are found gathered in a bundle-like manner, which have surely belonged to the embryos. These spicules are straight or slightly curved; they are highly thickened at the head-end, thus approaching subtylostyli, and they are comparatively strongly spined; they were measured to a length of 0·12—0·14^{mm}.

This species is characteristic and well bounded, when both the outer form, the spicules, and the structure of the dermal skeleton is considered. — I regard the determination as sure. Vosmaer's specimen evidently is not regularly cup-shaped, what is seen partly from the figure, partly from the expression «a cup-shaped great mass». It is also to be noticed that his figures 79 and 80 evidently represent spicules not belonging to the sponge; fig. 80 looks as a *Mycale*-anisochela. — The species mentioned by Levinsen (Dijmphna-Togtets zool.-bot. Udbytte, 360, 16) as *Esperella picea*, according to my examinations, is not this species, but a new one, see under *I. frigidus* p. 183. The species mentioned by Fristedt l. c. as *Esperia nigricans*, to judge from a fragment examined by me, is identical with the present species, as is also shown by his remark that the sponge may be leaf-shaped; when he says that it is generally an amorphous mass, it is, I suppose, on account of his having had only fragments before him.

Locality: This species has been obtained in a great many specimens, mostly, however, only fragments. Station 1, 62° 30' Lat. N., 8° 21' Long. W., depth 132 fathoms; station 3, 63° 35' Lat. N., 10° 24' Long. W., depth 272 fathoms; station 4, 64° 07' Lat. N., 11° 12' Long. W., depth 237 fathoms; station 7, 63° 13' Lat. N., 15° 41' Long. W., depth 600 fathoms; station 27, 64° 54' Lat. N., 55° 10' Long. W., depth 393 fathoms; station 32, 66° 35' Lat. N., 56° 38' Long. W., depth 318 fathoms; station 43, 61° 42' Lat. N., 10° 11' Long. W., depth 645 fathoms; station 53, 63° 15' Lat. N., 15 07' Long. W., depth 795 fathoms; station 54, 63° 08' Lat. N., 15° 40' Long. W., depth 691 fathoms; station 55, 63° 33' Lat. N., 15° 02' Long. W., depth 316 fathoms; station 73, 62° 58' Lat. N., 23° 28' Long. W., depth 486 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 92, 64° 44' Lat. N., 32° 52' Long. W., depth 976 fathoms; station 93, 64° 24' Lat. N., 35° 14' Long. W., depth 767 fathoms; station 95, 65° 14' Lat. N., 30° 39' Long. W., depth 752 fathoms; station 96, 65° 24' Lat. N., 29° 00' Long. W., depth 735 fathoms; station 98, 65° 38' Lat. N., 26° 27' Long. W., depth 138 fathoms; station 115, 70° 50' Lat. N., 8° 29' Long. W., depth 86 fathoms; station 143, 62 58' Lat. N., 7° 09' Long. W., depth 388 fathoms (bottom temperature ÷ 0°4 C.). It has further been taken in the Denmark Strait at 65° 29 Lat. N., 28° 25' Long. W., depth 553 fathoms (Ryder), and at 63° 15' Lat. N., 9° 35' Long. W., depth 270 fathoms (Wandel). Finally it has been taken at 64° 56' Lat. N., 11° 48' Long. W., depth 115 fathoms, and 62° 30 Lat. N., 1° 56' Long. E., depth 275 fathoms (Ad. Jensen, the cruise of the "Michael Sars" 1902). The greatest number of specimens were taken at station 95. The localities are situated over about the whole Ingolf-territory, in the Davis Strait, the Denmark Strait, south of Iceland, at Jan Mayen, between Iceland and the Faröe Islands, and at the coast of Norway.

Geogr. distr. The Barent Sea, at depths of 145, 170, 192, and 220 fathoms (Vosmaer l. c.); Fristedt l. c. has it from north of Spitzbergen, 79° 47' Lat. N., 11° 15' Long. E., depth 100 fathoms, and at South-Greenland, 59° 33' Lat. N., 43° 25' Long. W., depth 120 fathoms. The species is, accordingly, widely distributed between ca. 50° Long. W. and 50° Long. E. and between ca. 59° and 80° Lat. N. Its bathymetrical range is from 86 fathoms (at Jan Mayen) to 976 fathoms (the northern Denmark Strait). The species seem to be a native on bottom with positive temperature; it was taken, however, at station 143 with a temperature of ÷ 0°4 C.

2. **I. dubius** Arm. Hans.

Pl. VI, Figs. 2—5. Pl. XVII, Fig. 4 a—e.

1885. *Reniera dubia* Armauer Hansen, The Norwegian North-Atlantic Exp. XIII, Spongiadæ, 6, Pl. II, fig. 1, Pl. VI, fig. 7.

1887. *Esperia Pattersoni* Fristedt (non Bow.), Vega-Exp. vetensk. Iakttag. IV, 448.

The form most frequently branched, more or less free or somewhat coalesced, cylindric or flattened branches issuing from a base; sometimes the sponge is more irregularly lobate or forms incrustations. The surface smooth or very slightly shaggy. The dermal membrane an easily separable, thin film, provided with a reticulation of dermal spicules, and supported by penicillate bundles of such spicules. Oscula scattered. The skeleton a close, irregular, partly polyspicular, partly unispicular reticulation. Spicula: Megasclera: the skeletal spicules acanthostyli 0·208—0·274^{mm}, the dermal spicules tylota to strongyla with spined ends 0·19—0·25^{mm}; microsclera of two forms, anisochelæ palmatæ of the Iophon-type 0·017—0·031^{mm}, bipocilla 0·007—0·010^{mm}.

This species may, according to its mode of growth, have a somewhat varying appearance. It grows especially on Hydroids, and is found on many different species, and on erect Bryozoa. It may then form common, more or less thick incrustations, the thicker ones may be irregularly cushion-shaped, or they send off more or less stubby lobes. By far most frequently, however, it forms more or less free branches that may here and there be attached to the branches of the Hydroid, but may also be quite free; thus, as to its mode of growth, it reminds of *Esperiopsis Normanni*, and the branched form is the one that is typical and most characteristic of the species. The branches may be variously formed, thicker and more irregular and flattened, or thinner and cylindric. They may branch in different ways, and they may be more or less coalesced, sometimes in such a way as to form plate-shaped parts. When the species is growing on a different substratum, it may form a common incrustation, but this seems to be a rare case; we have only one specimen of this form, growing on a large shell of *Modiola modiolus*. The largest specimens in hand, which may be described as irregular, longish cushions, have a greatest extent of 75^{mm}. The most frequent length of the more or less branched specimens is ca. $25-55^{mm}$. The consistency is of middle firmness and somewhat elastic, the free branches are soft and flexible. The colour (in spirit) is a lighter or darker brown to grayish black or almost quite black; in some of the jars the sponge has kept its original grayish yellow colour, or has only turned a little darker. The *surface*, when undamaged, is smooth or at most very slightly shaggy. The *dermal membrane* is a thin and transparent film, but it is distinct and separable; it has a special skeleton of horizontal dermal spicules, and it is supported by more or less perpendicular pillars of dermal spicules; these spicules may be a trifle projecting. The *pores* are round; in most places they are lying close together in the meshes of the dermal reticulation, several pores in each mesh. They are rather small, their size being measured to between $0{\cdot}023-0{\cdot}083^{mm}$. *Oscula* are little conspicuous, but they may almost always be found by a closer examination. Most frequently they are more or less hidden at the base of the branches or in the clefts between these, or at other places in folds of the surface. They form most frequently irregular openings, the thin membrane round them being split into lobes; in these lobes the dermal spicules are closely gathered parallel to the longitudinal axis of the lobe, that is to say, with the ends towards the opening. Most frequently the oscular aperture leads into a larger or smaller cavity just under the membrane. Oscula are present in only rather small numbers.

The *skeleton*. The *dermal skeleton* is of a similar structure as in *I. piceus*, and forms a beautiful, in most places rather close, reticulation of polyspicular fibres. The meshes are triangular, quadrangular, or polygonal. The fibres have rather many spicules alongside, but in this respect they are varying, and accordingly of varying thickness; generally thicker fibres are found having a sinuous course, chiefly in the longitudinal direction of the sponge; between these fibres then thinner ones are found, and sometimes only a few spicules are seen together, or the meshes are divided by single spicules. As in the preceding species the fibres are almost always of some length so as to contribute to the formation of several meshes, more rarely they are so short that they only reach from one fibre to the next; the thickest fibres are generally the longest. This structure gives to the dermal reticulation a peculiar, characteristic appearance; the appearance may otherwise be somewhat varying, especially with regard to the closeness of the net of meshes and the thickness of the fibres. The dermal membrane is supported by perpendicular or more or less recumbent pillars of dermal spicules, spread in a penicillate way; these spicules may project quite slightly through the membrane, so that the surface becomes very slightly shaggy. The pillars are generally only of the length of one spicule. The *main skeleton* is a close, quite irregular reticulation, in which there is no distinction between primary and secondary fibres. The network is partly polyspicular, partly unispicular, from one to four or five spicules being found alongside. Some long fibres are found, especially distinct in the branches, in which they run longitudinally; they are not thick, however, scarcely above 0·03^{mm}. In the nodes of the skeleton a little copious, white, and clear mass of spongin is found, but no spongin is seen in the dermal skeleton.

Spicula: a. *Megasclera.* 1. The skeletal spicules are acanthostyli; they are either quite straight or slightly curved. The point is rather short, at most middle long. The spinulation may be somewhat varying, the spines being more or less powerful, but they are most frequently rather scattered; also in this feature, however, some variation is found. Next the spinulation is remarkable by the fact that the spines are almost always a little closer gathered at the upper end, and that here most frequently a few larger spines are found; especially in the thinner styli the spines are distinctly more closely gathered at the upper end. The length varies from 0·208—0·274^{mm}. The thickness is very varying, from 0·0057—0·0128^{mm}; this variation in thickness is in no proportion to the length; the thinner ones being fully as long as the thick ones. Developmental forms of the styli, down to exceedingly fine ones, are rather frequent; they are of about the full length; the finer ones are quite slightly spined, they resemble most frequently subtylostyli, a little swelling being seen just below the upper end, presumably corresponding to the closely gathered spines later found here. 2. The dermal spicules are tylota or strongyla with spined ends and of a similar form as in the preceding species; they are slightly and evenly curved; they may be about equally thick through their whole length, but most frequently they are thickest in the middle; there may be a little difference between the two ends, but most frequently they are almost quite equal. Their length is 0·19—0·25^{mm}, and the thickness 0·005—0·007^{mm}. Developmental forms were rather frequent, in which one end was always thinner than the other. b. *Microsclera* are anisochelæ palmatæ of the *Iophon*-type and bipocilla. 1. The anisochelæ are of the common form, the tooth is of about the same breadth as the alæ and most frequently a little shorter; the larger end has a long, narrow tuberculum, at the smaller end a shorter tuberculum is found joining the spur. The chelæ may be somewhat varying with regard to the length of the free part of the shaft. Their total length varies from 0·017—0·031^{mm}, the breadth is proportionally 0·006—0·0128^{mm}. Some developmental forms at different stages were seen; the youngest ones are fine staves recurved at the ends; the spur of the smaller end, which in reality is only a peculiar development of the tuberculum, is already begun at an early stage. 2. The bipocilla are of the common form, the indentation of the edge of the lower end is only seen with difficulty; their length is 0·007—0·010^{mm}. The microscleres are found throughout the tissue and especially in the dermal membrane.

With regard to the spicules this species is chiefly distinguished from *I. piceus* by having upon the whole smaller spicules, and by some difference in the spinulation of the acanthostyli; when this fact is regarded in connection with the exteriors and modes of growth of the two species and with the feature of their oscula and pores, the species are with certainty to be distinguished from each other. — As I have had a type specimen of Armauer Hansen's *Reniera dubia* for examination, I have been able to identify the species with certainty. Armauer Hansen has not seen the microscleres at all, and without an examination of the type specimen a determination would have been quite impossible, as I think that Armauer Hansen's always bad drawings of spicula may be said to reach their climax in the figures of the spicula of this species. Also of Fristedt's *Esperia Pattersoni* I have examined one of the author's specimens, and have found his species to be identical with *dubius*, only the spicules are a little more spined than in my specimens. How the relation is between this species and those of Bowerbank, I cannot say with certainty; the question can only be of the two species *nigricans* and *Pattersoni*. Of *Pattersoni* I have examined a specimen sent me by the Rev. Mr. Norman; according to this specimen, this species seems to have thinner styli, they did not exceed 0·008mm in thickness Bowerbank figures the dermal spicules as spined all over, but in the description he says terminally spined ; in the specimen I have examined only the ends were spined. *I. nigricans* I have not seen; the style figured by Bowerbank does not show the spines more closely gathered at the upper end, but this feature is not always distinctly marked in *dubius* either. None of the two species, on the other hand, seems to have the characteristic exterior so frequent in *dubius*. Topsent (Rev. biol. du Nord de la Fr. VII, 19) unites Bowerbank's two species, which is perhaps correct; neither is it precluded that the present species may prove to be identical with them; this question can only be decided by a close examination of all Bowerbank's specimens, and for the present *dubius* must be kept up.

Locality: We have a very great number of the species, but only from the sea round the Faröe Islands, where it must be very commonly found, and southeast of Iceland. At the north end of Nolsö, depth ca. 100 fathoms; six miles northwest of Kalsö, depth 60 fathoms; thirteen miles northwest of Borönæs, depth 30 fathoms (Th. Mortensen); 64° 27' Lat. N., 13° 27' Long.W., depth 84 fathoms (Ad. Jensen, the cruise of the »Michael Sars» 1902).

Geogr. distr. Between Spitzbergen and Norway, at 72° 27' Lat. N., 35° 01' Long. E., depth 136 fathoms (The Norwegian North-Atlantic Exp.); the Vaigat Islands at Spitzbergen, depth 60 fathoms (Fristedt l. c.). The species seems to be a native of rather shallow water, its bathymetrical range being 30—136 fathoms. For the locality from the Norwegian North-Atlantic Expedition is stated a bottom temperature of 0° C.

3. **I. frigidus** n. sp.

Pl. XVII, Fig. 5 a—f.

1886. *Esperella picea* Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, 360, Tab. XXXI, figs. 1, 2 a—d.

Form? The dermal membrane a thin film with a reticulation of dermal spicules. The skeleton an irregular, for a great part unispicular, network. Spicula: Megasclera: the skeletal spicules acanthostyli with some close-set, large spines at the head-end, 0·298—0·387mm; the dermal spicules tylota with spined ends 0·25—0·32mm; microsclera of one form, anisochelæ palmata of the Iophon-type 0·017—0·044mm.

Of this species we have from the Ingolf-territory only one very small fragment, and so I am obliged to use Levinsen's specimen for the description; also this specimen, however, is so badly preserved, that the description must chiefly be restricted to the spicules. From the Kara Sea we have some fragments (Levinsen's specimen), which have presumably belonged to one sponge. The largest one of these fragments has a greatest extent of 70mm. The consistency in the present state is loose and soft, and the colour (in spirit) is brown, not especially dark. A thin *dermal membrane* is found with horizontal spicules, forming a net, but it has not been possible to examine the structure more particularly, as the dermal membrane is mostly wanting. *Oscula* and *pores* were not seen; the largest fragment, which is of a longish form, may perhaps have had an osculum in one end, which then must have been the upper end, an opening being found here leading into a long canal, but nothing can be said with certainty as to this fact.

The *skeleton*. The *dermal skeleton*, as mentioned, consists of dermal spicules lying horizontally in the dermal membrane, and the membrane is presumably supported in the common way by perpendicular spicules. The *main skeleton*, as far as I have been able to examine it, consists of an irregular network, partly polyspicular, partly, and for the greater part, unispicular; as in the two preceding species, some longitudinal fibres are found here and there. In the nodes of the skeleton a very slight, white, and clear mass of spongin is found.

Spicula: a. *Megasclera*. 1. The skeletal spicules are acanthostyli; they are comparatively long and slender, somewhat curved, sometimes straight; the curve is most frequently nearest to the upper end. The point is middle long or rather long. The spinulation may be somewhat varying, from tolerably close to rather scattered, and there may also be some difference in the sizes of the spines; the point is generally smooth for a shorter or longer space. A very characteristic feature of the needle is that at its upper end some closer standing, larger spines may be found; this feature may be more or less marked, but is almost never quite wanting. The length is 0·298—0·387^{mm}, the shortest forms are not frequent; the thickness is 0·0071—0·0128^{mm}. The specimen from the Kara Sea has comparatively shorter and thicker styli than that obtained by the Ingolf. 2. The dermal spicules are tylota with rather slightly swollen, spined ends; they are straight or very slightly curved, and cylindrical or slightly fusiform. As usual, there is a little difference between the two ends, one being a little thicker, the other a little thinner with a longer swelling; in the thicker end the spines are most frequently only found at the very end, which is somewhat abruptly cut off; the same feature may be seen in the thinner end, but here they extend most frequently all over the swelling. The length is 0·25—0·32^{mm} and the thickness 0·0055—0·0085^{mm}. b. *Microsclera;* these are of only one form, anisochelæ palmatæ, bipocilla not being found. The chelæ are of the common type, the free part of the shaft is comparatively long, the tooth is of the same breadth and the same, or about the same, length as the alæ. They vary somewhat in size, the length is 0·017—0·044^{mm} and the breadth 0·005—0·015^{mm}.

This species is especially characterized by its rather long, slender styli with a few larger spines at the head-end, and by the form of one or both ends of the tylota. The want of bipocilla is rather interesting, and may also be regarded as a character of importance; but this fact alone would not be sufficient for a characterization of the species, as the bipocilla seem to be present in very different numbers in different individuals of the same *Iophon*-species, and they may sometimes be found in very slight numbers. Levinsen l. c. says that two sizes of the chela occur, but in reality all transitions as to size are found.

Locality: From the Ingolf territory we have only a small fragment obtained at East-Greenland, at 72° 25' Lat. N., 19° 33' Long. W., depth 140 fathoms (The East-Greenland Expedition 1891—92).

Geogr. distr. Levinsen's specimen is from the Kara Sea, depth 73 fathoms. To judge from these two localities, there is some reason to suppose the species to be a native of the cold bottom.

It was said in the preliminary remarks of the genus that a close relation, no doubt, existed between the genera *Iophon* and *Pocillon*. The two last described species, *I. dubius* and *frigidus*, also show some features indicating such a relation. Thus both of them, and especially the latter, show a little larger spines at the head-end of the acanthostyli, which is a feature common in *Ectyoninæ*. In *I. dubius* some thinner acanthostyli are further found which have as a marked feature larger spines at the head-end, but are connected with the thicker styli by all transitions, and considerably shorter acanthostyli are found quite singly. In *I. frigidus*, as mentioned, the larger spines at the head-end of the styli are still more marked than in *dubius*, and also here a few shorter acanthostyli are found, reminding of the accessory styli of the *Ectyoninæ*. It is absolutely impossible to refer the two species to the *Ectyoninæ*, as no spicules are found at all projecting from the fibres, and perhaps, as has often been hinted at before, it is not improbable that the division into *Mycalinæ* and *Ectyoninæ* is no natural one, and will have to be abandoned.

Iotrochota Ridley.

The form varying, incrusting, thick cushion-shaped or irregularly massive, erect, more or less leaf-shaped, or frequently more or less cylindric, unbranched or with few branches. The skeleton also developed very variously, in the incrusting forms quite irregular and diffuse, consisting of spicules and spicula-bundles; in the massive ones it becomes an irregular, polyspicular network, and in the erect ones it passes into a more regular arrangement, which may become quite regular with primary and secondary fibres. Spongin generally or always present to a higher or, most frequently, smaller degree. Spicula: Megasclera: the skeletal spicules styli, sometimes with a tendency towards a rounding of the point, or a mixture of styli and oxea, or exclusively oxea, oftenest smooth, sometimes (I. spinosa) spined, the dermal spicules tylota or strongyla, in a few cases with so different ends as to become tornostrongyla or styli; microsclera pluridentate isancoræ unguiferæ and birotulæ, or only birotulæ of one or two forms.

1. **I. varidens** n. sp.

Pl. XVIII, Fig. 1 a—e.

Incrusting. The surface smooth. The dermal membrane rather thin, supported by erect or more or less recumbent bundles of dermal spicules. The skeleton a diffuse network of spicula-bundles and single spicules. Spicula: Megasclera: the skeletal spicules styli 0·51—0·608^{mm}, the dermal spicules tylota 0·298—0·38^{mm}; microsclera of two forms, isancoræ unguiferæ with five to eight free teeth 0·054—0·0657^{mm}, birotulæ with nine to fourteen teeth 0·015—0·018^{mm}.

Of this species we have one entire specimen and a small fragment. The species seems to be incrusting, the entire specimen forming an irregular incrustation growing on pebbles and other bottom material. The specimen has a greatest extent of 25^{mm}, and the thickness is about 10^{mm}. The colour (in spirit) is grayish yellow. The consistency is rather firm. The *surface* is about smooth. The *dermal membrane* is a rather thin film, supported by bundles of dermal spicules most frequently highly recumbent. *Pores* and *oscula* were not seen on the specimen.

The *skeleton.* The *dermal skeleton*, as far as I have been able to judge from the material, consists of bundles of dermal spicules more or less erect, but most frequently so highly recumbent as to be lying almost or quite horizontally in the membrane. In places they may become short fibres. The *main skeleton* is quite irregular and consists of a diffuse network of loose spicula-bundles and single spicules, but fibres are not formed, at most loose, band-like strings. Spongin is found in the skeleton, chiefly cementing the ends of the spicula-bundles, but it is only present to a very slight amount, and is only to be observed with difficulty.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli, more or less curved, only rarely straight, they are evenly and middle long to rather long pointed; generally they are a little tapering towards the rounded end. Their length is rather constant and is between 0·51 and 0·608^{mm}, most frequently nearer to the latter size, the thickness is 0·013—0·019^{mm}. Developmental forms, down to quite fine ones, were seen singly. 2. The dermal spicules are tylota, they are almost always straight, at most quite slightly curved, and they are a little thicker in the middle than towards the ends. Their length is somewhat varying, from 0·298—0·38^{mm}, and the thickness is 0·005—0·009^{mm}. A few developmental forms were seen, of which the finer ones have one end distinctly thinner than the other. b. *Microsclera;* these are of two forms, isancoræ unguiferæ and birotulæ. 1. The ancoræ have an evenly curved shaft and a number of from five to eight teeth at either end. Alæ are not found, but besides the mentioned number of teeth that are free, one or two teeth are found running down the dorsal side of the shaft and coalesced with it. The one or two teeth thus connected with the shaft grow considerably longer than the free teeth; their form and the way in which they are connected with the shaft are quite irregular, sometimes one is situated just at the dorsal side, sometimes they are found one at either side, or one more at the side, the other more behind. Also the free teeth show some irregularity, some being broader than others, which is dependent on their number. The number of teeth may also be different at either end. The length is 0·054—0·0657^{mm}, and the thickness of the shaft is 0·0050—0·0057^{mm}. A few developmental forms were seen, the youngest ones showed only a knob-shaped expansion at either end. 2. Birotulæ have a straight shaft, and at either end a circle of nine to fourteen narrow, inwardly curved teeth. As the number of teeth is upon the whole varying, it may also be different at the two ends. Some irregularity may also here be found in the form, as some teeth may be broader than others. The length is 0·015—0·018^{mm}, sometimes up to 0·021^{mm}, the breadth across the teeth is 0·004—0·006^{mm}, and the thickness of the shaft ca. 0·001^{mm}. The microsclera are found throughout the sponge, but are especially seen in the dermal membrane; birotulæ are the most numerous ones.

Locality: Station 89, 64° 45' Lat. N., 27° 20' Long. W., depth 310 fathoms, a small fragment; 61° 09' Lat. N., 7° 54' Long. W., depth 180 fathoms, one specimen (Ad. Jensen, the cruise of the Michael Sars 1902). The two localities are situated in the Denmark Strait and south of the Faröe Islands.

2. **I. oxeata** n. sp.

Pl. VI, Fig. 6. Pl. XVIII, Fig. 2 a—f.

Thickly incrusting, massive or irregularly lump-shaped or roundish. The surface almost smooth. The dermal membrane a thin film, supported by penicillate, erect, or more or less recumbent bundles of *dermal spicules. Oscula scattered. The skeleton an irregular reticulation of spicula-bundles and single spicules. Spicula: Megasclera: the skeletal spicules oxea 0·56—0·68mm; the dermal spicules tylota 0·32—0·42mm; microsclera of two forms, isancoræ unguiferæ with nine to thirteen free teeth 0·048—0·065mm, birotulæ with thirteen to ca. twenty teeth 0·015—0·020mm.*

This species is of a quite irregular, most frequently tuberous or lumpy form; one specimen is more regularly roundish. Sometimes it forms thick incrustations, and one individual, presumably a very young one, forms a small, thin incrustation. The typical form evidently is from a tolerably thick incrustation to a more or less irregular lump. The largest specimen has a greatest extent of fully 40mm, but I think it may grow larger, as we have specimens of similar sizes, which are not entire ones. It grows on shells of mollusca, on other sponges, and frequently on loose bottom material, as small shells or pebbles and gravel. The colour (in spirit) is a dirty brown of a lighter or darker shade. The consistency, as it seems, may be a little varying, from middle firm to somewhat firmer, most frequently, however, it is rather brittle. The *surface*, where it is undamaged, seems to be about smooth, or at most slightly shaggy. The *dermal membrane* is a thin, transparent film, which, when detached, has a tendency to contract. It is supported by bundles of dermal spicules. *Pores* were only seen here and there on the surface, gathered into pore-sieves, in which the single pores are only separated by thin strings of tissue. Their size was measured to 0·07—0·24mm. *Oscula* are found scattered as circular apertures, sometimes the dermal membrane rises a little round them like a spout.

The *skeleton*. The *dermal skeleton* consists of more or less penicillate bundles of dermal spicules, which may be erect or more or less recumbent. The dermal skeleton is often very little developed, the bundles being placed with great intervals, and then the membrane seems to be resting on the skeleton below, the spicules of which may project; this feature, however, is perhaps due to contraction, but as the dermal membrane is highly damaged in all the specimens in hand, it cannot be decided with certainty. The *main skeleton* is an irregular reticulation of spicula-bundles and partly single spicules, forming quite irregular meshes. Fibres are not formed. The sponge is most frequently rather lacunous, on account of the many canals, chiefly running towards the surface. Spongin is found where the spicula join in the skeleton, but only to a rather slight amount. The sponge frequently embodies foreign bodies copiously, as foraminifera, gravel and the like.

Spicula: a. Megasclera. 1. The skeletal spicules are oxea, they are slightly curved, sometimes with a somewhat sharper bend in the middle, and then they show some resemblance to the oxea in *H. panicea*. They taper only very little from the middle outward, the point itself is middle long. Their length is 0·56—0·68mm, and the thickness in the middle is 0·014—0·020mm. Developmental forms, down to quite fine ones, occurred in small numbers. 2. The dermal spicules are tylota with tolerably well developed end-swellings; they are most frequently straight; sometimes they may be quite slightly curved; they are about cylindrical. Their length varies from 0·32—0·42mm, in a few cases they may be still a little longer, but most frequently the length is about midway between the two sizes given, ca. 0·37mm. The thickness is 0·006—0·0085mm. In the fully developed tylota no difference or only a slight one is found between the two ends, but such a difference is found in the developmental forms; the finer they are, the thinner is one end, and its swelling is more longish than that of the other end; in the very finest developmental forms one end is pointed. b. *Microsclera;* these are of two forms, isancoræ unguiferæ and birotulæ. 1. The ancoræ are constructed quite as those of the preceding species, but they have from nine to thirteen free teeth at either end. Also here one or two teeth are found which are connected behind with the shaft; sometimes these teeth coalesce so completely with the shaft, that they are almost not to be traced, and otherwise there is the same irregularity as in the preceding species. In a few cases the shaft is attached in the middle, and the teeth are free all round, but the shaft is also then curved. The length of the ancora is 0·048—0·065^{mm}, in a few cases up to 0·074^{mm}, the thickness of the shaft is 0·004—0·0058^{mm}. Some developmental forms were seen, showing only a slight swelling at either end, even when the shaft has reached a rather considerable thickness; later slight ribs are formed, which develop into the teeth. 2. Birotulæ are of the same structure as in the preceding species, but they have more teeth, from thirteen to ca. twenty; how great the number may be, I cannot decide, as I have not been able to count them with certainty. The length is 0·015—0·020^{mm}, the breadth across the circle of teeth ca. 0·005^{mm}, and the thickness of the shaft 0·0010^{mm}. The microscleres are found throughout the sponge and especially in the dermal membrane, in which the ancoræ seem more particularly to occur; the birotulæ, otherwise, are present in far greater numbers than the ancoræ.

This species is peculiar by the fact that its skeletal spicules are oxea; another *Iotrochota*-species, *I. birotulata* Higgin, is stated to have diactinal skeletal spicules, which are not, however, oxea, but strongyla; and the fact seems to be that these spicules are really styli with rounded points. In the present species, on the other hand, the question is of real oxea with quite equal ends, neither show their developmental forms any trace of a monactinal origin.

Locality: We have a rather copious material of the species, but most specimens are damaged. 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 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; 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; further it has been taken at 62° 29' Lat. N., 50° 17' Long. W., depth 160 fathoms, 61° 10' Lat. N., 5° 46' Long. W., depth 160 fathoms (Ad. Jensen, the cruise of the »Michael Sars» 1902). The localities are situated in the Denmark Strait and east of the Faröe Islands. The depths are 138—788 fathoms.

3. **I. abyssi** Cart.

Pl. XVIII, Fig. 3 a—d.

1874. *Halichondria abyssi* Carter, Ann. Mag. Nat. Hist., Ser. 4, XIV, 245, Pl. XIV, figs. 26—28, Pl. XV, fig. 40 a—c.

We have not this species in the Ingolf-material, but I have examined a preparation of Carter's type specimen kindly sent me by Dr. Kirckpatrick. Carter's description of the spiculation is chiefly correct. The megasclera are oxea and styli, and the dermal spicules are tylota. The oxea are curved, almost always with a rather sharp bend in the middle, sometimes irregularly; the points are rather long. The oxea have a length of 0·6—0·67^{mm} and a thickness of 0·010—0·014^{mm}. The styli are evenly curved, sometimes straight, with shorter points than the oxea; they are 0·408—0·49mm long and ca. 0·014—0·016mm thick, and are thus thicker than the oxea. To judge from the preparation there is no reason to doubt that both forms belong to the species. The dermal spicule has been figured incorrectly by Carter; it is a tylote, most frequently quite straight, about equally thick through its whole length, with a distinct swelling at either end. Its length is 0·298—0·357mm, and the thickness is ca. 0·007mm. The length of the ancoræ is 0·055—0·06mm and the length of birotulæ 0·015—0·018mm. On the other hand, I am not able to see from the preparation, how many teeth the ancoræ and birotulæ have; but it may be decided that Carter's statement of the ancora having six teeth is not correct; perhaps it may have six, but most frequently it has more, and, as usual, the number is not constant. Birotulæ, according to what I have been able to count when they were seen from the side have most frequently twelve to fourteen teeth. Both ancoræ and birotulæ are very similar to the same bodies in *oxeata*. The bows mentioned by Carter, which were only found in one of his specimens, are quite surely foreign bodies, neither are they found in the preparation I have examined.

This species is closely allied to *oxeata*, and it shows also conformity to *varidens*, but it is separated from both these species by the occurrence of both styli and oxea.

Locality: 61° 10' Lat. N., 2° 21' Long. W., depth 345 fathoms (bottom temperature ÷ 1°1 C.) (The »Porcupine«-Expedition).

4. I. **dubia** n. sp.
Pl. XVIII, Fig. 4 a—f.

Incrusting. The dermal membrane supported by recumbent bundles of dermal spicules. The skeleton consisting of irregularly situated single spicules, spicula-bundles, and here and there fibre-like parts. Spicula: Megasclera: the skeletal spicules styli 0·46—0·536mm, the dermal spicules tylota 0·34—0·38mm; microsclera of two forms, isancoræ unguiferæ with seven to nine free teeth 0·038—0·050mm, birotulæ with eleven to fourteen teeth 0·018—0·021mm.

Of this species we have only one specimen, a quite small incrustation, placed on a dead balanoid shell. The greatest extent of the incrustation is 14mm, the thickness does not exceed 1mm. The colour (in spirit) is somewhat dark brown. The *surface* seems to be smooth. *Oscula* and *pores* were not seen.

The *skeleton*. The *dermal skeleton*. In the dermal membrane recumbent bundles of dermal spicules are seen, supporting the membrane and forming the dermal skeleton. The *main skeleton:* As far as I have been able to examine from the slight material, the main skeleton consists of quite irregularly lying spicules, mostly single, and here and there bundles, which may form fibre-like parts, but meshes are not formed. A slight amount of spongin is found where the spicules are united.

Spicula: a. *Megasclera*. 1. The skeletal spicules are styli; they are slightly curved, and the curve is most frequently found nearest to the head-end; sometimes it is more even through its whole length, or a little irregular. They are evenly and middle long or rather long pointed. They show the peculiarity that they have almost always some slight spines or rather are slightly uneven at the upper end; this feature is exceedingly slight, often almost imperceptible, but only rarely quite wanting.

It may, in a few cases, continue far down the style. The length of the styli is 0·46—0·536^{mm}, and the thickness 0·0078—0·011^{mm}. 2. The dermal spicules are straight or somewhat curved tylota; their length is 0·34—0·38^{mm} and the thickness ca. 0·0044^{mm}; one end is always somewhat thinner than the other, and the swelling of this thinner end is more distinctly marked, being as large as that of the opposite end. b. *Microsclera;* these are isancoræ unguiferæ and birotulæ. 1. The ancoræ are of a similar form as in the preceding species, but the teeth are comparatively longer; they have seven to nine free teeth, and one or two teeth united with the shaft. Their length is 0·038—0·050^{mm}, and the thickness of the shaft is 0·0037—0·0050^{mm}. 2. Birotulæ have eleven to fourteen teeth at either end; their length is 0·018—0·021^{mm}, quite few reached a length of 0·028^{mm}, the thickness of the shaft is ca. 0·0013^{mm}, the breadth across the circle of teeth is 0·0057—0·007^{mm}. The microscleres occur throughout the sponge, the ancoræ are numerous in the dermal membrane; birotulæ are found in predominant numbers.

Locality: Station 93, the Denmark Strait, 64°24' Lat. N., 35° 14 Long. W., depth 767 fathoms.

5. I. intermedia n. sp.

Pl. XVIII, Fig. 5 a—d.

Incrusting. The surface smooth. The dermal membrane a thin film, supported by recumbent bundles of dermal spicules. The skeleton chiefly consisting of irregularly placed spicules and spicula-bundles. Spicula: Megasclera: the skeletal spicules styli 0·357—0·48^{mm}, the dermal spicules tylota 0·26—0·34^{mm}; microsclera of two forms, isancoræ unguiferæ with nine to eleven free teeth 0·040—0·050^{mm}, birotulæ with fourteen to fifteen teeth 0·018—0·021^{mm}.

We have only one specimen, forming a longish, irregular incrustation on a *Hornera lichenoides:* the length of the sponge is 17^{mm}, and the thickness does not exceed 2^{mm}. The colour (in spirit) is a dark grayish brown. The *surface* seems to be smooth. The *dermal membrane* is a thin film, supported by bundles of dermal spicules. *Pores* and *oscula* were not seen.

The *skeleton.* The *dermal skeleton* consists of penicillate bundles of dermal spicules, projecting and supporting the dermal membrane. The bundles seem always to be highly recumbent. The *main skeleton,* as far as I have been able to examine it, consists of irregularly placed spicules and spicula-bundles. It appears that short, loose fibres may be formed, but a net of meshes is not formed. A slight amount of spongin is found where the spicules are united.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they have a slight curve at the upper end, else they are straight; they are almost not tapering, and the point is short or rather short. The upper end is very frequently distinctly the thickest part of the style. Their length is 0·357—0·48^{mm} and the thickness 0·010—0·013^{mm}. 2. The dermal spicules are tylota; they are straight and are not thicker in the middle. Their length is 0·26—0·34^{mm} and the thickness 0·0050—0·0064^{mm}. One end is always a little thinner than the other. b. *Microsclera;* these are isancoræ unguiferæ and birotulæ. 1. The ancoræ are of about the same form as in *dubia;* they have nine to eleven free teeth, and one or two teeth united with the shaft; their length is 0·040—0·050^{mm}, and the thickness of the shaft is 0·004^{mm}. 2. Birotulæ; their number of teeth seems to be more constant than in the preceding species, varying only between fourteen and fifteen, and the number was almost always fourteen, only once fifteen teeth were counted. The length of birotulæ is 0·018—0·021^{mm}, the thickness of the shaft is ca. 0·0014^{mm}, and the breadth across the circle of teeth is ca. 0·006^{mm}. The microscleres are found throughout the sponge, the ancoræ are especially numerous in the dermal membrane. Birotulæ, as usual, are by far the most numerous.

Locality: Between Iceland and the Faröe Islands, 64° 56' Lat. N., 11° 48' Long. W., depth 115 fathoms (Ad. Jensen, the cruise of the »Michael Sars« 1902). One specimen.

6. I. rotulancora n. sp.
Pl. XVIII, Fig. 6 a—g.

Form? The surface smooth or slightly shaggy. The dermal membrane a thin film, supported by highly recumbent, often quite horizontal, bundles of dermal spicules. The skeleton consisting of spicules and a few spicula-bundles, placed irregularly. Spicula: Megasclera: the skeletal spicules styli 0·40—0·55^{mm}, the dermal spicules tylota 0·30—0·41^{mm}; microsclera of two forms, isancoræ unguiferæ with twelve to seventeen teeth, of which either all are free, or one or two are united with the shaft, 0·030—0·040^{mm}, birotulæ with nine to twelve teeth 0·018—0·032^{mm}.

We have only one specimen, which is, moreover, a fragment, or, at all events, torn off from the underlayer; the sponge, I suppose, has formed a cushion-shaped incrustation, but its form cannot be decided with certainty, and the question might perhaps be of a fragment of a more or less leaf-shaped sponge. The specimen has a greatest extent of 22^{mm}, and the thickness is ca. 4^{mm}. The colour (in spirit) is light brown. The consistency is middle firm. The *surface* is smooth or at most slightly shaggy. The *dermal membrane* is a thin film, contracting when detached; it is supported by bundles of dermal spicules. *Pores* and *oscula* were not seen.

The *skeleton.* The slight material in hand has rendered it impossible to examine the skeletal structure as thoroughly as was to be wished. The *dermal skeleton* consists of bundles of dermal spicules, highly recumbent, often quite horizontal. The *main skeleton* seems to consist of spicules and, here and there, of spicula-bundles, placed irregularly, and forming neither meshes nor fibres, at most here and there arranged a little loosely in a band-like way. A distinct, but little copious amount of spongin is found where the spicules are united.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they have a curve near the head-end, and are evenly and long tapering, the outermost point itself is often somewhat stubby. Their length is 0·40—0·55^{mm}, the thickness is ca. 0·010—0·0128^{mm}. The longest ones are not the thickest ones. 2. The dermal spicules are tylota; they are straight, only rarely a little curved, and of about equal thickness throughout the length; they are somewhat varying in length, from 0·30—0·41^{mm}, most frequently the length is midway between the given measures; the thickness is 0·004—0·007^{mm}. The tylota taper a little towards one end, and this end, therefore, has a more distinctly marked swelling. b. *Microsclera;* these are isancoræ unguiferæ and birotulæ. 1. The ancoræ of this species are interesting by forming a distinct transition to birotulæ. They have many teeth, twelve to seventeen, when they are counted all round. When the ancora is seen from the end, the circle of teeth is quite, or almost quite, symmetrical with uniform teeth all round, and the shaft is frequently attached inside the circle of teeth, so that all the teeth are free, and then we have really a birotula with curved shaft; one or two teeth, however, are also often here prolonged and more or less united with the dorsal side of the shaft. Their length is 0·030—0·040^{mm}, and the thickness of the shaft is 0·0021—0·0035^{mm}. A few developmental forms were seen; the beginning teeth are seen in these, while the shaft is still rather thin. 2. Birotulæ; they have nine to twelve teeth at either end, the length is 0·018—0·032^{mm}, the latter length, however, is only rarely found, the thickness of the shaft is 0·0011—0·0014^{mm}, and the breadth of the circle of teeth is 0·0057—0·007^{mm}. The largest birotulæ may have up to thirteen teeth, also thereby showing that they form a transition to the ancoræ. A few developmental forms of birotulæ were seen; like those of the ancoræ they consist of a shaft with a knob at either end, and the knobs showed slight ribs as a beginning of the teeth. The microsclera occur throughout the sponge, the ancoræ are frequent in the dermal membrane; birotulæ are most numerous.

Locality: Rathbone Island off the Liverpool-Coast on the eastern coast of Greenland, ca. 70° 40' Lat. N., depth 94 fathoms (the Amdrup-Expedition).

7. **I. polydentata** n. sp.

Pl. VI, Fig. 7. Pl. XVIII, Fig. 7 a—e.

Erect, more or less irregularly leaf-shaped, or the leaf-shape effaced, passing into a more massive form. The surface somewhat grooved, not shaggy. The dermal membrane not especially thin, on the pore side supported by recumbent bundles or short fibres of dermal spicules, and also provided with scattered, horizontal spicules; on the opposite side only horizontal, scattered spicules are found. Oscula scattered on both surfaces. The skeleton an irregular, mostly polyspicular reticulation, with loose fibres running in the longitudinal direction. Spicula: Megasclera: the skeletal spicules styli 0·42—0·57^{mm}, the dermal spicules tylota 0·25—0·34^{mm}; microsclera two forms of birotulæ, large ones with twelve to twenty teeth 0·020—0·028^{mm}, small ones with nine to fourteen teeth 0·0128—0·018^{mm}.

The largest and finest developed specimen of this species is formed like an erect, rather thick leaf, another, smaller specimen is of a similar form, while a third, also smaller specimen is thicker and more irregular, still, however, with a tendency towards the leaf-shape. According to this, the typical form of the species must be supposed to be as an erect, more or less irregular leaf. The largest specimen has a height of 70^{mm}, a similar breadth, and a thickness of ca. 20^{mm}. The colour (in spirit) is grayish brown. The consistency is somewhat elastic, but the sponge is rather brittle. The *surface* is somewhat grooved, but otherwise smooth; the grooves arise in the common way by the dermal membrane being sunk over the subdermal cavities, which shine through as dark areas. This construction is distinctly seen in one specimen, but not in the two others, which are more compact, presumably highly contracted. The *dermal membrane* is not especially thin, and in places where the sponge is contracted it becomes still a little thicker; it is supported by dermal spicules, partly in bundles, partly scattered. The *pores* are seen in sieve-like gatherings in the skin above the subdermal cavities, they are really found over the whole surface, but are not conspicuous where the membrane passes the parts of tissue separating the subdermal cavities; they are only found on one surface of the sponge. Their common size was measured to between 0·06 and 0·18mm, and they may be still larger. The pores, as mentioned, are confined to one surface of the sponge, but this is not the case with *oscula*; these are found scattered on both sides, they form almost circular openings, and the largest ones were measured to 2·5mm, these being found in the upper edge of the sponge. On the pore side several openings are seen, from whose sizes it cannot be decided whether they are pores or oscula; but, generally speaking, oscula and pores are separated by the size.

The *skeleton*. The *dermal skeleton* consists in the common way of dermal spicules. On the pore side they form bundles or short fibres reaching from the edge of the subdermal cavities into the membrane, and sometimes branching in between the pores. They are generally highly recumbent, often quite horizontal, and spicules are also found scattered and lying horizontally in the membrane. On the side that has no pores the dermal skeleton is less developed, and here horizontal spicules are especially seen scattered in the membrane, which, to a great extent, is resting on the skeleton below. The *main skeleton* is a quite irregular, mostly polyspicular reticulation, in which, however, also single spicules are seen. Fibres are found running chiefly in the longitudinal direction of the sponge; they may divide and unite again; they are polyspicular, but loose and little marked. Thus this species, the form of which is more marked than that of the other species, also shows a tendency towards a somewhat more differentiated skeletal structure. The fibres that are present represent primary fibres, while the scattered spicula-bundles and single spicules may be regarded as representing the secondary fibres. A distinct, but white and clear mass of spongin is found in the places where the spicules are united; in places it may be seen entirely to coat the fibres with a quite thin layer. The sponge frequently embodies sand and other bottom material.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are somewhat curved, and the curve is most frequently nearest the upper end; the point is short or rather short, sometimes a little longer; it is often distinctly marked off and bounded by straight lines. Their length is 0·42—0·57mm and the thickness ca. 0·010—0·013mm. Developmental forms, down to quite fine ones, were seen singly. 2. The dermal spicules are tylota with well developed ends; they are most frequently straight and about cylindric; their length is 0·25—0·34mm, the thickness varies from ca. 0·0028—0·0045mm. While the fully developed tylota are of equal or about equal thickness in both ends, the singly occurring developmental forms have one end a little thinner than the other and with a more marked swelling. b. *Microsclera:* these are birotulæ of two sizes. 1. The large birotulæ have at either end a number of from twelve to twenty teeth; their length is 0·020—0·028mm, the thickness of the shaft is 0·0014—0·002mm, and the breadth across the circle of teeth is ca. 0·0057—0·009mm. According to what is stated above, the number of teeth is rather varying, but some difference may be found in different individuals; thus in one specimen the number is more frequently near or at the highest number, while in the two others it only rarely reaches the highest figure. 2. The small birotulæ have at either end nine to fourteen teeth; their length is 0·0128—0·018mm, the thickness of the shaft is ca. 0·0007mm, and the breadth across the circle of teeth is ca. 0·0042mm. As is seen, the two sizes of birotulæ approach each other very closely, and quite singly forms are seen of a size midway between the two forms. The microscleres are found as well in the dermal membrane as throughout the sponge; the small birotulæ are everywhere numerous, the large ones scarce.

Locality: The Ingolf, station 1, 62° 30' Lat. N., 8° 21' Long. W., depth 132 fathoms, two specimens; 62° 29' Lat. N., 5° 17' Long. W., depth 160 fathoms (Ad. Jensen, the cruise of the "Michael Sars" 1902), one specimen; 66° 54' Lat. N., 15° 35' Long. W., depth 58 fathoms (H. M. S. "Beskytteren": Gemzoe), one specimen. The localities are situated at the Faröe Islands and north of Iceland.

8. **I. affinis** n. sp.

Pl. XVIII, Fig. 8 a—e.

The form massive, somewhat erect? The dermal membrane a thin film, supported by bundles and short fibres of dermal spicules. The skeleton an irregular, polyspicular reticulation. Spicula: Megasclera: the skeletal spicules styli 0·47—0·57^{mm}, the dermal spicules tylota 0·35—0·44^{mm}; microsclera two forms of birotulæ, large ones with nine to thirteen teeth 0·037—0·051^{mm}, small ones with eleven to fifteen teeth 0·018—0·025^{mm}.

Of this species we have one highly damaged specimen. To judge from this, the sponge seems to have been erect, I suppose, of about a thick, irregular cylindric form. The height is ca. 70^{mm} and the thickness ca. 50^{mm}. The colour (in spirit) is grayish brown. The consistency is exceedingly loose and brittle, to which the bad state of preservation may partly be owing. Of the *dermal membrane* only a few fragments on the upper surface of the sponge are preserved; it is a rather thin film, showing here *pores* and *oscula*. The pores are gathered in groups; they are about circular, their size was measured to between 0·03 and 0·24^{mm}. Oscula are scattered between the pores; they are also circular, of a size of ca. 0·5^{mm}.

The *skeleton*. The *dermal skeleton* is formed in the usual way by dermal spicules partly forming erect bundles, partly passing under the membrane as fibres from which spicules project. The *main skeleton* is a chiefly polyspicular, quite irregular reticulation; meshes are formed, but they are quite irregular; longer fibres do not seem to be formed, or are only formed to a small degree; in sections, however, a tendency is seen towards fibres passing in the longitudinal direction, but they are generally rather short. In a few places the skeleton appears to be a little more regular. A distinct, but clear and white mass of spongin is found where the spicules are united. The sponge embodies sand and gravel to a rather high degree. The skeletal structure in this species seems, with regard to development, to occupy a position between the incrusting or massive species and a leaf-shaped species as the *polydentata* described above.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are somewhat curved, not rarely a little irregularly; the curve is most frequently situated nearest to the head-end. They are only little tapering outward, and the point itself is rather short. Their length is 0·47—0·57^{mm}, and the thickness is ca. 0·011—0·015^{mm}. A few developmental forms were seen. 2. The dermal spicules are tylota; their ends are more or less, most frequently rather slightly, swollen; the tylota are straight or quite slightly curved. Their length is 0·35—0·44^{mm}, and the thickness is ca. 0·0035—0·0057^{mm}. There is, as usual, a little difference between the two ends of the tylota, the shaft being somewhat thinner in one end than in the other, and this feature is the more marked, the younger the spicule is. b. *Microsclera;* these are birotulæ of two sizes. 1. The large birotulæ have at either end nine to thirteen teeth, comparatively long and directed much downward, so as to form a small angle with the shaft. Their lenght is 0·037—0·051^{mm}, the thickness of the shaft is ca. 0·002—0·0028^{mm}, and the breadth across the circle of teeth is about 0·010—0·0128^{mm}. A few smaller specimens are seen, down to a length of 0·030^{mm}. Not rarely the shaft is slightly rugged or spined, a feature that recalls the similar one in the amphidisci of the Hexactinellida. 2. The small birotulæ have at either end eleven to fifteen teeth. Their length is 0·018—0·025^{mm}, the thickness of the shaft is ca. 0·0011^{mm}, and the breadth across the circle of teeth ca. 0·0057^{mm}. The small birotulæ differ from those of *polydentata* not only by the size, but also by the fact that the thickening of the end of the shaft from which the teeth issue, is flatter and more disc-shaped in *affinis* than in *polydentata*. Both forms of microsclera occur throughout the tissue, the small ones being more numerous than the large ones; in the dermal membrane the large ones seem especially to occur.

Locality: Cape Tobin on the eastern coast of Greenland, 70° 23' Lat. N., 22° 00' Long. W., depth 57 fathoms, one specimen. (The Amdrup-Expedition 1900).

9. **I. spinosa** n. sp.

Pl. VI, Fig. 8. Pl. XIX, Fig. 1 a—e.

Erect, irregularly cylindric? The surface smooth or very slightly shaggy. The dermal membrane a thin film, supported by erect or recumbent bundles of dermal spicules. The skeleton an irregular, polyspicular reticulation. Spicula: Megasclera: the skeletal spicules acanthostyli with scattered spinulation 0·40—0·52^{mm}, the dermal spicules tylota 0·24—0·34^{mm}; microsclera two forms of birotulæ, large ones with eight to twelve teeth 0·031—0·045^{mm}, small ones with nine to thirteen teeth 0·018—0·024^{mm}.

Of this species, which is especially interesting on account of its spicules, we have only a fragment, no doubt the upper part of the sponge. Below, from the place where it has been broken off, and some way up, the sponge is a little compressed, but then it becomes about cylindric with a rounded upper end. According to this, the form might be supposed to have been erect and more or less irregularly cylindric. The height of the specimen is 27^{mm}, and the thickness above is 8^{mm}. The colour (in spirit) is yellowish gray. The consistency is rather brittle. The *surface*, in undamaged places, is smooth or very sligthly shaggy. The *dermal membrane* is a thin film, supported by dermal spicules. *Pores* are seen here and there on the surface in groups, they are rather large, up to 0·4^{mm}. *Oscula* were not seen.

The *skeleton*. The *dermal skeleton* consists of erect or more or less recumbent bundles of dermal spicules. The *main skeleton* is a quite irregular, polyspicular network; tolerably distinct fibres are formed, but they have an irregular course, some of them, however, seem to be running towards the surface. A distinct and fairly copious mass of spongin is found in the skeleton, in many places coating the fibres entirely with a thin layer.

Spicula. a. *Megasclera*. 1. The skeletal spicules are acanthostyli with a rather scattered spinulation; they are straight or, most frequently, slightly, not rarely irregularly curved. The point is a little varying, between rather short and middle long. Their length is 0·40—0·52^{mm} and the thickness ca. 0·011—0·014^{mm}. A few developmental forms were seen, the finest ones are about smooth. 2. The dermal spicules are tylota with rather slightly swollen ends; they are about cylindric and straight or quite slightly curved. Their length is 0·24—0·34^{mm} and the thickness ca. 0·0053—0·0085^{mm}. b. *Microsclera*; these are birotulæ of two sizes. 1. The large birotulæ have at either end eight to twelve teeth, their length is 0·031—0·045^{mm}, the thickness of the shaft is ca. 0·0018—0·0028^{mm}, and the breadth across the circle of teeth 0·008—0·011^{mm}. A few developmental forms were seen; they consist of a shaft with a pyramidal swelling at either end, and on these swellings slight ribs are seen. 2. The small birotulæ have nine to thirteen teeth at either end, their length is 0·018—0·024^{mm}, the thickness of the shaft is ca. 0·001^{mm}, and the breadth across the circle of teeth 0·0057^{mm}. Both forms of microscleres occur throughout the sponge, the small ones are somewhat more numerous than the large ones.

Locality: Station 113, 69° 31' Lat. N., 7° 06' Long. W., depth 1309 fathoms (bottom temperature ÷ 1° C.), one specimen. While the preceding species were obtained on bottom with positive temperature, the present one is from the cold area. Among the hitherto described *Iotrochota*-species *I. abyssi* Cart. is the only one from cold bottom, having been obtained at 61° 10' Lat. N., 2° 21' Long. W., at a depth of 345 fathoms with a bottom temperature of ÷ 1°1 C.

I have here established eight new species of the genus *Iotrochota*, as it has been impossible to identify any of the species before me with any of the hitherto described ones, all of which, with the exception of *abyssi* Cart. and *magna* Lambe, are also exotic species. As will have been seen from the descriptions, several of the species are chiefly separated by characters found in the microscleres, especially the number of teeth in ancoræ and birotulæ. Now this feature is no constant one, but varies within certain limits; therefore the numbers of teeth of the different species may pass into each other, so that, for instance, the highest number in one species may be equal to, or a little higher than, the lowest number in another species. Nevertheless I think that the number gives a good specific character, and it is in my material always supported by other characters. Unfortunately, we have only a single specimen of most of the species; perhaps a richer material may somewhat alter the interpretation of the species I have established here, but at present the absolutely most correct thing is to keep the species here established distinct, and I am also inclined to believe that new and richer material will prove them to be constant. The view advanced by Dendy (Proceed. of the Roy. Soc. of Victoria, VIII, 1896, 23) under the mentioning of *I. coccinea* Cart., that the *Iotrochota*-species may all be mere local varieties of Bowerbank's *I. purpurea*, will, no doubt, prove to be erroneous, and the author himself so far contradicts it, as in the very place mentioned he establishes a new species.

To facilitate the general view of the species established or treated here, I give a table of the difference in the spiculation.

	Megasclera		Microsclera	
	Skeletal spicules	Dermal spicules		
			ancoræ	birotulæ, small
varideus	styli 0·51–0·608mm	tylota 0·298–0·38mm	5–8 free teeth 0·054–0·0657mm	9–14 teeth 0·015–0·018mm
oxeata	oxea 0·56–0·68mm	0·32–0·42mm	9–13 free teeth. 0·048–0·065mm	13–ca. 20 teeth 0·015–0·020mm
abyssi Cart.	oxea and styli 0·6–0·67mm 0·408–0·49mm	0·298–0·357mm	more than 6 teeth. 0·055–0·06mm	ca. 12–14 teeth 0·015–0·018mm
dubia	styli 0·46–0·536mm	0·34–0·38mm	7–9 free teeth 0·038–0·050mm	11–14 teeth 0·018–0·021mm
intermedia	most frequently slight spines at the head-end. 0·357–0·48mm	0·26–0·34mm	9–11 free teeth 0·040–0·050mm	14–15 teeth 0·018–0·021mm
rotulancora	0·40–0·55mm	0·30–0·41mm	12–17 teeth 0·030–0·040mm	9–12 teeth 0·018–0·032mm
			birotulæ, large	
polydentata	0·42–0·57mm	0·25–0·34mm	12–20 teeth 0·020–0·028mm	9–14 teeth 0·0128–0·018mm
affinis	0·47–0·57mm	0·35–0·44mm	9–13 teeth 0·037–0·051mm	11–15 teeth 0·018–0·025mm
spinosa	0·40–0·52mm spined.	0·24–0·34mm	8–12 teeth 0·031–0·045mm	9–13 teeth 0·018–0·024mm

The ancoræ occurring in species of this genus form quite evidently a transition to birotulæ, what is seen especially distinctly in the species *rotulancora*. On the other hand, these ancoræ are evidently allied to such forms as those found in *Chondrocladia* and *Cladorhiza*, and these forms lead again, I suppose, to the other existing forms of ancoræ. Lindgreen (Zoologisch. Jahrbüch. XI, 1898, 355) says that the birotulæ occuring in *Iotrochota* must either be supposed to be only analogous to the ancoræ of the other Desmacidonidæ, or else to represent a more original form. I think the latter supposition the more correct one. Birotulæ have also in their structure so great resemblance to the amphidisci of the Hexactinellida, that it is difficult to divest one's mind of the idea of a relation between these bodies.

The *Iotrochota*-species may show some difference with regard to the spicules. As will have been seen, the species described here are separated into two groups, those having ancoræ and birotulæ, and those having only birotulæ; the separation is of no greater systematic importance, on account of the transition between ancoræ and birotulæ. Also with regard to the megascleres some difference may be found. The skeletal spicules are typically smooth styli; they may be spined *(spinosa)*, sometimes they may be rounded at the pointed end *(birotulata)*, further they may be oxea *(oxeata)*, and finally they may be a mixture of styli and oxea *(abyssi, acerata)*. The dermal spicules are typically tylota, but may be monactinal *(purpurea, birotulata, magna, coccinea)*; this fact, however, is of no real importance, as the dermal spicules are upon the whole only secondarily diactinal.

As far as I know, the following *Iotrochota*-species have hitherto been described:

	Megasclera		Microsclera
	Skeletal spicules	**Dermal spicules**	
Iotrochota (Halichondria) abyssi Cart. ... (Between the Faröe Islands and Scotland)	Styli and oxea	Tylota	Ancoræ and birotulæ
— *(Halichondria) purpurea* Bow. ...... (Australia, Strait of Malacca)	Styli	Styli	Birotulæ
— *(Halichondria) birotulata* Higg..... (Jamaica)	Styli to strongyla	Styli	Birotulæ
— *baccelifera* Ridley .... (Australia, Amboina, Cochin China, Seychelles, Mascarene Isles, Madras)	Styli	Tylota	Birotulæ
— *(Phlœodictyon) birotulifera* Cart. .... (South-Australia	Two forms of tylota (The place of the species is doubtful[1]).		Birotulæ
— *(Axinella) coccinea* Cart........... (South-Australia)	Styli	Styli	Birotulæ
— *magna* Lambe. .... (Northern west-coast of America)	Styli	Styli	Birotulæ
— *acerata* Dendy..................... (Australia)	Styli and oxea	Tylota	Birotulæ

Forcepia Cart.

The exterior varying, as a thick incrustation or thicker and more massive, or erect and formed as a thick, more or less irregular leaf. The skeleton a mostly polyspicular reticulation, in the incrusting or massive forms quite irregular, in the erect ones more differentiated with more or less distinct primary longitudinal fibres, between which transverse spicules most frequently single, irregularly placed. The dermal skeleton consisting of erect or recumbent bundles of dermal spicules, sometimes, moreover, scattered horizontal spicules. More or less spongin present. Spiculæ: Megasclera: the skeletal spicules smooth or spined styli, the dermal spicules tylota, sometimes strongyla; microsclera: the characteristic microsclera are spined forcipes of one or two sizes, to which almost always are added isochelæ arcuatæ of one or two sizes and often sigmata.

1. F. forcipis Bow.

Pl. XIX, Fig. 2 a—h.

1866. *Halichondria forcipis* Bowerbank, Mon. Brit. Spong. II, 244, 11.

1874. — — Boverbank, ibid, III, 105, Pl. XLIII, figs. 7—13.

1874. — — Carter, Ann. Mag. Nat. Hist. Ser. 4, XIV, 246, Pl. XIV, figs. 29—32, Pl. XV, fig. 41 a—b.

1880. *Myxilla forcipis* Vosmaer, Notes from the Leyden Mus. II, 127, 12.

[1] Dendy has established for it the genus *Amphiastrella*.

Thickly incrusting or more massive. The surface slightly grooved. The dermal membrane a thin film supported by most frequently highly recumbent bundles of dermal spicules. The skeleton a quite irregular, polyspicular reticulation. Spicula: Megasclera: the skeletal spicules styli 0·488—0·62mm, the dermal spicules tylota 0·238—0·309mm; microsclera of four forms, isochelæ arcuatæ of two sizes, large ones 0·043—0·067mm, small ones 0·021—0·028mm, forcipes of two sizes, large ones 0·44—0·52mm, small ones 0·028—0·036mm.

Of this species we have only one, highly damaged specimen, growing as a thick incrustation on the carapace of a *Hyas coarctatus*, and a quite insignificant fragment. The specimen has a greatest extent of 36mm and a greatest thickness of 5mm. . The specimens described by Bowerbank and Carter were of a similar form, but a little larger, having a greatest extent of respectively ca. 80 and 45mm, and Carter's specimen having a thickness of fully 12mm. The colour (in spirit) is gray. The consistency is rather firm, but somewhat brittle and little elastic. The *surface* is slightly grooved, the skeleton below causing small protuberances; otherwise it seems to be smooth. The *dermal membrane* is a thin, transparent film, supported by bundles of dermal spicules. *Pores* were not seen on my specimen. A few circular openings in the membrane I take to be *oscula*. Carter describes the surface and the dermal membrane in the same way, but his specimen showed also the pores gathered in sieves over the subdermal cavities. Also Bowerbank mentions pores gathered into a group.

The *skeleton*. The *dermal skeleton* consists of bundles of dermal spicules, issuing from the skeleton below and supporting the dermal membrane; they are, however, very little projecting, but highly, almost horizontally, recumbent; also scattered spicules are found here and there in the membrane. The *main skeleton* is a polyspicular, but quite irregular network; meshes are formed, but they have no definite form, and longer fibres are not formed. Here and there in the network single spicules are found, but otherwise it is polyspicular. The number of spicules alongside may vary rather much, most frequently it seems to be four to five, but it may also be greater, up to about ten. Spongin is found in the nodes of the skeleton, but it is very white and clear.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are evenly and slightly curved, the curve being most frequently found nearest to the rounded end; they are of about equal thickness troughout the length, and the point is rather short, it is most frequently distinctly limited and bounded by straight or almost straight lines. Their length is between 0·488 and 0·62mm, rarely at the lower limit. The thickness is from ca. 0·0128—0·021mm. Developmental forms at different stages, down to exceedingly fine ones, occurred rather frequently; the finest ones were long pointed. One of the finest forms was 0·47mm long. 2. The dermal spicules are tylota with slightly swollen ends; sometimes the ends are so little developed, that the spicules approach strongyla; they are cylindric and most frequently straight. Their length is 0·238—0·309mm, and the thickness is ca. 0·004—0·0057mm. In the fully developed spicule the two ends are about equal, the shaft being at most a little thinner in one end, and the swelling therefore a little more marked; the younger and finer the spicules are, the greater is the difference between the ends, and the finest developmental forms seemed to have one end pointed. Then the developmental forms show the peculiarity of being almost always polytylote with a series of swellings along the shaft, which swellings dissappear by degrees, as the spicule grows thicker. b. *Microsclera;* these are of four forms, two forms of isochelæ arcuatæ, large and small ones, and two forms of forcipes, also large and small ones. 1. The large chelæ have an evenly, but slightly curved shaft, the tooth is narrowly elliptical with a longish tuberculum, from which a continuation may be traced about to the end of the tooth; the alæ are of the same length as the tooth and are somewhat tooth-like, when viewed from the side. Their length varies from $0.043-0.067^{mm}$, most frequently it is midway between these sizes; the thickness of the shaft is $0.004-0.007^{mm}$. A few monstrosities with split tooth were seen. 2. The small chelæ are of a similar form, the only difference being that the tooth and the alæ are comparatively longer, and the tooth is broader; their length is $0.021-0.028^{mm}$, and the thickness of the shaft is $0.0014-0.0021^{mm}$. Developmental forms were found of both chelæ at different stages, but only sparingly. Quite singly chelæ were seen occupying, as to size, a middle place between the two forms. 3. The large forcipes are peculiar and beautiful spicules. They have a round curve above, and continue in two very long, more or less parallel, legs, one of which is always a little longer than the other; the legs may be a little diverging or converging, but always only to a slight degree; when converging they often touch each other. The forcipes are most frequently a little twisted, so that the legs intercross. They are spined, and the spines are all turned upwards towards the curve, and formed in such a way, that the legs may more properly be called serrated. The spines are almost exclusively found on the in- and outward turned sides of the legs only, that is to say, in the plane which includes both legs; they are generally more close-standing on the inward side of the leg than on the outward side, and on the inward side they are especially close-standing in the middle part of the leg. At the curve the spinulation becomes more rugged, and here some spines may be found all round. The length, measured from the curve to the point of the longer leg, is $0.44-0.52^{mm}$, the thickness at the curve is 0.0058^{mm} and about the middle of the legs it is 0.0028^{mm}. An interesting thing it was to find the developmental forms of this spicule, and they are not especially rare; they are of the same, or about the same, length as the fully developed spicule, but they are finer, down to very fine; then they are quite smooth, only the more developed stages begin to get at little rugged in the upper part. 4. The small forcipes are of a peculiar form, one leg being more than three times the length of the other; the short leg is straight, while the long one with an arcuate curve bends towards the side where the short leg is found. The legs end in a little knob. When seen under slight magnifying powers these forcipes look as if they were rugged, but when the magnifying powers are higher, they are seen to be spined, and the spines are arranged in the same way as in the large forcipes. This spinulation and the terminal knobs of the legs, especially that of the long leg, are, however, only to be seen with great difficulty. Their length is $0.028-0.036^{mm}$; they are exceedingly fine, the thickness at the curve not being more than 0.0007^{mm}. This small spicule is easily overlooked; it is Carter's merit first to have seen it, but according to his erroneous view of the growth of the spicules he called it "embryonic form" of the large forceps; neither has he been able to see their form correctly, nor their spines. The microscleres are found through the whole sponge and in the dermal membrane, where the large chela seems to be most frequent. The large forcipes occur in the tissue in bundles that may almost form fibres; the single forcipes in the bundles seem all to be turned one way.

Locality: Station 78, 60° 37' Lat. N., 27° 52' Long. W., depth 799 fathoms, a very small fragment the Faröe Islands, east of Sudero, depth ca. 150 fathoms, one specimen (Th. Mortensen).

Geogr. distr. The Shetland Islands (Bowerbank), between Scotland and the Faröe Islands, depth 363 fathoms (the „Porcupine"). Thus the species is only known from a rather limited territory. Strange to tell, the bottom temperature of the locality at which the „Porcupine" has obtained the species is given to ÷ 0°3 C., while the species is otherwise only known from localities with positive bottom temperatures.

Remarks: As I have examined a specimen sent by the Rev. Mr. Norman, the identification of this species, which is otherwise a very characteristic one, is sure. Norman's specimen shows no sigmata, neither were such found by Carter in his specimen. It is an obvious conclusion that the bodies which Bowerbank has supposed to be sigmata, have been developmental forms of the small chela.

2. **F. fabricans** O. Schmidt.

Pl. XIX, Fig. 3 a—g.

1874. *Esperia fabricans* O. Schmidt, Die zweite deutsche Nordpolarfahrt, II, 2, 433.

1885. *Forcipina bulbosa* Vosmaer (Synon. except.), Bijdrag tot de Dierk., 12te Afl., 3die Gedeelt., 26, Pl. I, fig. 11, Pl. V, figs. 60—68.

1903. *Hamigera (Forcipina) fabricans* Thiele, Arch. für Naturgesch., 1903, I, 385, Taf. XXI, Fig. 15 a—e.

Massive, sometimes somewhat erect. The surface slightly shaggy. The dermal membrane a thin film, supported by projecting bundles of dermal spicules. The upper surface of the sponge set with papillæ, in the points of which oscula open. The skeleton a rather irregular network with irregular, loose, polyspicular primary fibres and transverse spicules placed singly. Spicula: Megasclera: the skeletal spicules styli 0·53—0·715^{mm}, the dermal spicules tylota 0·31—0·45^{mm}; microsclera of four forms, isochelæ arcuatæ 0·042—0·057^{mm}, forcipes of two sizes, large ones 0·060—0·077^{mm}, small ones 0·025—0·034^{mm}, sigmata quite or almost quite plane 0·12—0·14^{mm}.

Vosmaer's figure of the exterior of this species, which is evidently drawn from a damaged specimen, shows an about massive sponge with papillæ on the surface, and the specimens before me have a similar appearance. None of the specimens in hand are entire. One is attached to a stone, another to a Bryozoon. To judge from the material, the species has a massive, sometimes, perhaps, a little erect form. The surface, chiefly in the upper part of the sponge, is set more or less closely with papillæ, which may vary somewhat in size. The largest specimen before me is about 60^{mm} high, and Vosmaer's specimen was of a similar size. The consistency is rather loose, but somewhat elastic; some specimens seem to be more brittle, others more elastic, which is, perhaps, dependent on the degree of contraction. The colour (in spirit) is grayish white or yellowish white. The *surface* is dispersedly and rather slightly shaggy. The *dermal membrane* is a thin and transparent film, supported by projecting bundles of dermal spicules. *Pores* and *oscula:* Unfortunately, the surface and the dermal membrane are highly damaged in the specimens in hand, and consequently some uncertainty is left with regard to the pores and oscula. On the upper part of the sponge some papillæ are found; in one specimen they are scattered and small, not above 1·5^{mm} high, and closely shut in the point; in another specimen they are close-set and larger, and also somewhat irregular; in this latter specimen most of the papillæ have a wide opening in the point. While in the former specimen the papillæ are conical, they form in the latter a cylindric limb round the aperture. These papillæ, no doubt, are oscula. Besides these papillæ, however, some other papillar formations are found; they are most frequently broader, but lower than the oscular papillæ, and consist of a low ridge surrounding a shallow groove. In the membrane coating the groove pores are found more or less close-set; outside these formations I have found no pores. Now the question is whether pores and oscula are thus restricted, each to a set of papillæ of their own, or all the papillæ have a pore membrane, which is torn off in the papillæ showing an opening; in the latter case the low pore papillæ would then be less contracted stages of the higher or quite closed papillæ. Then again the question would be whether the papillæ acted as incurrent or excurrent openings, or in both ways. It is, however, most probable that there are two kinds of papillæ, one kind with oscula, the other with pores; the construction indicates especially that the low pore papillæ cannot be closed as the closely shut oscular papillæ.

The *skeleton.* The *dermal skeleton* consists of bundles of dermal spicules projecting from the skeleton below; they are oftenest erect, sometimes a little recumbent. They may be more or less close-standing; where they are farther from each other, comparatively large parts of the membrane are thus found having no dermal spicules, and only provided with microscleres. In the mentioned papillæ which are formed by the skin, the skeleton is altered. The spicules are lying horizontally in the wall of the papilla, and consequently they do not rise over the surface; they are parallel to the longitudinal axis of the papilla, and are gathered into bands; the general arrangement of the dermal skeleton in projecting bundles passes at the papillæ by degrees into the band-shaped arrangement; the spicules are numerous and very close-lying, towards the point the bands converge; the closed oscular papilla is somewhat spirally twisted. In the pore papillæ the same construction is found, the only difference being that the band-shaped arrangement is less distinct, but the spicules are lying close together in the low ridge; besides some fibres, at all events in the larger pore papillæ, pass under the membrane of the groove, and send off spicula-bundles supporting the membrane and projecting a little. The *main skeleton* consists of a rather irregular network. Primary fibres are found, running in the longitudinal direction or towards the surface, but they are somewhat irregular and loose; transverse fibres are not formed, but transverse spicules are found, most frequently placed singly and very irregularly. The longitudinal fibres are polyspicular, and have generally three to six spicules alongside. Spongin is found where the spicules are united, but it is present only to a slight amount, and is white and clear, so that it is only to be seen with difficulty.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they have a more or less marked, most frequently rather slight, curve, generally situated near the head-end. The point may be a little varying, but may best be described as middle long, it is oftenest distinctly bounded. Their length is $0{\cdot}53-0{\cdot}715^{mm}$, and the thickness is $0{\cdot}0128-0{\cdot}021^{mm}$. Some developmental forms were seen, the youngest ones are long pointed. 2. The dermal spicules are tylota; they are straight, and their ends are most frequently rather slightly swollen. Their length is $0{\cdot}31-0{\cdot}45^{mm}$, and the thickness $0{\cdot}007-0{\cdot}012^{mm}$. The shaft is a little thicker in one end than in the other, and the swelling of this thicker end is most frequently so slight, that the spicule might be called a tylostrongyle; the swelling of the thinner end, on the other hand, is larger and more distinctly marked. The younger the tylotes are, the more marked this difference is. The shaft of the tylotes often shows slight, irregular thickenings, so that they may approach polytylota. b. *Microsclera:* these are of four forms, isochelæ arcuatæ, forcipes of two sizes, and sigmata. 1. The arcuate chelæ have an even and not much curved shaft; the tooth is narrowly elliptical, and there is a longish, pointed tuberculum; the alæ are tooth-like and of about the same length as the tooth. The chela may be of a somewhat varying form, the tooth and alæ especially may be shorter or longer in proportion to the total length. The length is 0·042—0·057^{mm}, the thickness of the shaft is 0·0042—0·0057^{mm}. A few developmental forms were seen. 2. The large forcipes are of a form quite like that figured by Vosmaer l. c. They have a round curve above and two parallel, or quite slightly converging or diverging legs; only rarely the legs are more diverging. The legs are of equal length, or there may be a quite slight difference in this respect; they end in a little swelling. The forcipes are spined; under small magnifying powers the spinulation looks somewhat rugged, but by sufficient enlargement (ca. × 1000) it is seen to consist of well developed spines directed backward and somewhat compressed; they are, moreover, rather distinctly arranged in rows. By this enlargement the swelling at the end of the legs is seen to be a semiglobular knob attached to the leg by the flat side; this knob is somewhat spined or indented in the edge. The forcipes are frequently a little twisted. Their length is 0·060—0·077^{mm}, and the thickness in the middle of the legs is ca. 0·0029^{mm}. Of forcipes a few developmental forms were found, the finest ones are quite smooth, and the ends of the legs are finely tapering without any swelling. 3. The small forcipes have a quite similar form as the large ones, only they are much smaller, and the difference between the lengths of the legs is most frequently a little more marked; they are also spined, quite in the same way as the large forcipes. Their length is 0·025—0·034^{mm}, and the thickness in the middle of the legs is about 0·001^{mm}. 4. Sigmata; these are rather large, they are of the common sigma-form, and are plane or a little contort. Their length is rather constant, 0·12—0·14^{mm}, and the thickness is 0·005—0·007^{mm}. Of the sigma a rather great number of developmental forms were seen, the youngest stages were very fine and had as yet no recurved ends. The microscleres are found through the whole sponge, as well in the skin as in the other parts of the body; in the membrane coating the bottom of the pore grooves, the chelæ are found very abundantly, but none of the other forms.

Note. In the skin cellules sphéruleuses are found in great abundance; they appear as more or less distinctly limited crowdings of refracting granules; often the boundaries of the cells are effaced, so that the dermal membrane appears closely filled with refracting granules more or less gathered in groups.

Embryos. Round in the tissue some embryos were found scattered. They are globular, of an average size of 0·35^{mm}. Most of the examined specimens showed no spicules, some exceptions were, however, found. These latter had microsclera, but only chelæ, which is thus the first occurring form; they occurred abundantly at all stages of development, from fine staves to almost quite developed spicules. They are smaller than the chelæ of the developed sponge, being from 0·030—0·035^{mm} long.

Remarks: From Schmidt's description cited above, this species would not be recognisable at all, and the two figured chelæ do not even belong to it. Thiele, however, has examined the type specimen, and from his description and figures I have been able to identify the species with certainty, although

Thiele has not seen the small forcipes or has paid no attention to them. With regard to Thiele's referring of the species to *Hamigera* see p. 211. Also Vosmaer's description and figures, as well of the exterior as of the spicules, agree in all details with my specimens. The spicule figured by Vosmaer fig. 66 is a developmental form of a forceps; he has overlooked the small forcipes. The species cited by Vosmaer under the synonymy, do not belong here, *F. forcipis* being a quite distinct species, which holds good also of *F. bulbosa* Cart. The *F. bulbosa* mentioned by Topsent (Résultats des Camp. scient. du Prince de Monaco, Fasc. XXV, 179, Pl. I, fig. 13) is not Carter's species, but a new, independent one, and when Topsent mentions Vosmaer's species under it, it is a mistake, as it is not identical with this species either, but differs as well by its spiculation as by the want of the papillæ characteristic of *F. fabricans* (= *bulbosa* Vosm.). The present species is a native of the cold bottom, while as well Carter's species as that of Topsent are natives of the warm bottom, respectively from Cape S. Vincent and the Azores. For further particulars see under the account of the species of the genus p. 210.

Locality: 62° 30' Lat. N., 1° 56' Long. E., depth 275 fathoms (bottom temperature ÷ 0°12 C.) (Ad. Jensen, the cruise of the »Michael Sars» 1902); East-Greenland, Forsblad's Fjord, depth 50—96 fathoms (the Amdrup-Expedition); East-Greenland, without any more particular statement (the East-Greenland Expedition 1891—92).

Geogr. distr. The species has been taken before at East-Greenland, North Shannon (zweite deutsche Nordpolarfahrt, Thiele l. c.), and by the Willem Barent-Expedition off North Cape, 72° 36' Lat. N., 24° 75' Long. E., depth 140 fathoms. To judge from the localities it is probable that the species is a native of the cold bottom.

3. **F. Topsentii** n. sp.

Pl. VII, Fig. 3. Pl. XIX, Fig. 4 a—g.

Massive, cushion-shaped. The surface set with conical papillæ, and slightly shaggy. The dermal membrane a thin film with horizontal dermal spicules and here and there erect bundles. Oscula open into the papillæ of the surface. The skeleton an irregular reticulation, partly polyspicular, partly unispicular. Spicula: Megasclera: the skeletal spicules styli 0·62—0·74^{mm}, the dermal spicules strongyla to tylota 0·357—0·45^{mm}; microsclera of four forms, isochelæ arcuatæ 0·034—0·047^{mm}, forcipes of two sizes, large ones 0·086—0·104^{mm}, small ones 0·022—0·035^{mm}, sigmata, plane or almost plane, 0·12—0·14^{mm}.

Of this species we have one large specimen and some quite small ones. The species is formed like a cushion. The large specimen is torn off from its substratum, which, to judge from the form of the surface of attachment, may have been a shell; the small specimens are attached to bottom material of various kinds, foraminifera, gravel, etc. The sponge is set with rather close-standing, conical, pointed papillæ of an average length of ca. 4^{mm}. The papillæ are numerous in the large specimen, while in the small ones only some few papillæ are found. The largest specimen is somewhat longish, it has a length of 60^{mm}, a greatest breadth of ca. 45^{mm}, and a height of fully 20^{mm}. The small specimens are evidently quite young ones, they are 5—6^{mm} long. The consistency is only little elastic, on the contrary, it is rather hard, almost cartilaginous. The colour (in spirit) of the surface is brown, the papillæ are whitish, the inside of the sponge is grayish white or quite white. The *surface* is slightly and dispersedly shaggy. The *dermal membrane* is a rather thin, easily separable film, resting on the skeleton below and provided with horizontal dermal spicules. *Oscula:* the papillæ described above are oscular papillæ; some of them are closed, others show a little opening at the apex of the cone. If a papilla is cut off, a canal appears under it passing more or less perpendicularly into the sponge, which is consequently set through with a number of more or less perpendicular canals. *Pores* were not seen.

The *skeleton.* The *dermal skeleton* consists of dermal spicules, which are mostly horizontal and irregularly scattered in the membrane; the membrane seems to be resting on the main skeleton below, the spicules of which may project here and there. The dermal spicules, however, form also, here and there, bundles passing from the skeleton below and supporting the membrane. In the walls of the oscular papillæ the dermal spicules are close-lying, all of them parallel to the longitudinal axis, and thus forming a close spiculation in the wall. When the papilla is contracted and closed, the spicules form a compact mass. The *main skeleton* is a quite irregular, partly polyspicular, partly unispicular reticulation. Meshes are formed, but they are quite irregular. Fibres are only seen to a quite slight degree, and, when found, they are only short and little marked. The spicules are united by a slight amount of white and clear spongin.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are somewhat curved, the curve is sometimes situated at the upper end, but sometimes they are more evenly curved, and they may also be somewhat irregularly curved. They are in some degree fusiform, tapering distinctly towards the upper end. The point is even and middle long. Their length is 0·62—0·74^{mm}, and the thickness in the middle is 0·021—0·028^{mm}. Developmental forms occurred quite singly. 2. The dermal spicules may most properly be called strongyla, but most frequently they have end-swellings so as to approach tylota; they are somewhat fusiform. Their length is 0·357—0·45^{mm}, and the thickness 0·0114—0·015^{mm}; sometimes they show a tendency to the polytylote form. In the fully developed spicule the ends are equal; only few developmental forms were seen, showing that the spicules are begun as monactinal. b. *Microsclera;* these are of four forms, isochelæ arcuatæ, forcipes of two forms and sizes, and sigmata. 1. The chelæ arcuatæ resemble the chelæ in the preceding species, *F. fabricans;* they have an evenly, sometimes rather highly curved shaft; the tooth is narrow, lanceolate, and has a short tuberculum, the alæ are somewhat tooth-like and of about the same length as the tooth. Their length is 0·034—0·047^{mm}, and the thickness of the shaft is ca. 0·004—0·0057^{mm}. 2. The large forcipes have two legs of equal length, ending in a small, button-like swelling; the curve may be varying, it may be so strong, that the legs are parallel, and then it may be more and more slight, until the legs form an obtuse angle; the forcipes are spined, and the spines are compressed and directed backward. No serial arrangement of the spines is found here; the terminal knobs of the legs are, as in *F. fabricans,* indented or spined at the edge. Their length, measured from the curve and to the end of one of the legs, is 0·086—0·104^{mm}, and the thickness at the curve is 0·007—0·008^{mm}. A few developmental forms were seen; they are smooth, and the legs do not end in a swelling; they reach a comparatively considerable thickness, 0·004^{mm} at the curve, before they begin to get spines. 3. The small forcipes have about parallel legs, one of which is almost always somewhat longer than the other; the legs end in a small, button-like swelling. These forcipes are spined in the same way as the large ones; sometimes they are somewhat twisted. Their length is 0·022—0·035mm, and the thickness at the curve is about 0·001mm. Quite few specimens of forcipes are seen, forming, as to size, a transition between the two forms. 4. Sigmata; they are of the common sigma-form, and are plane or only very little contort; their length is 0·12—0·14mm, and the thickness 0·007—0·008mm. The microscleres occur throughout the sponge and copiously in the dermal membrane; in the points of the oscular papillæ the chelæ are found abundantly.

This interesting species is a distinct one, and is well distinguished from the other *Forcepia*-species. The form of the large forcipes might lead one to think of *F. bulbosa* Cart., but there is, in other respects, great difference between these two species, thus with regard to the sizes of all the spicules and especially of the forcipes and sigmata, and also with regard to the form of several of the spicules; finally Carter's species is from Cape San Vincent, whereas the present species is a native of the cold bottom.

Locality: Station 113, 69° 31' Lat. N., 7° 06' Long. W., depth 1309 fathoms (bottom temperature ÷ 1°0 C.), six very small specimens; station 119, 67° 53' Lat. N., 10° 19' Long. W., depth 1010 fathoms (bottom temperature ÷ 1°1 C.), one specimen. Thus the species is a native of deep water and of the cold area. The two stations are situated between Jan Mayen and Iceland.

4. **F. Thielei** n. sp.

Pl. VII, Figs. 1—2. Pl. XIX, Fig. 5 a—f.

Erect, formed like an irregular, thick leaf, attached below. One surface oscular surface, the other pore surface. The oscular surface even with rather close-standing oscula, the pore surface with more or less deep grooves separated by sinuous walls; the surface slightly shaggy. The dermal membrane a thin film, supported by bundles of dermal spicules. The skeleton a rather irregular, polyspicular network; primary fibres are found, bending towards the surface, but irregular, between them close-set, single spicules. Spicula: Megasclera: the skeletal spicules styli 0·57—0·72mm, the dermal spicules tylota 0·34—0·40mm; microsclera of three forms, isochelæ arcuatæ 0·021—0·033mm, forcipes 0·037—0·060mm, sigmata, plane or about plane, 0·11—0·13mm.

This species is formed as an erect, thick, somewhat irregular leaf. Below it is expanded and attached with a thick, lumpy base. The species seems to have grown directly on the bottom, a great deal of gravel and other bottom material being found in the basal surface, and bottom material being also embodied in all the lower part of the sponge. Most of the specimens in hand are only fragments, only one of them is about entire; this latter specimen has a height of 180mm, a breadth of 120mm, and a thickness of ca. 25mm, farther down towards the base the thickness is about 50mm. The fragments seem upon the whole to have belonged to specimens of similar dimensions. The consistency is rather firm, but little elastic and somewhat brittle. The colour (in spirit) is grayish white or whitish yellow to light brown. The *surface* is different on the two sides of the sponge, of which one is the oscular side, the other the pore side. The oscular surface is tolerably even; when oscula are shut, however, the entrance to them are seen as rather deep, circular grooves. The pore surface, on the other hand, is most frequently closely grooved, and the grooves are separated by curling or meandering walls. Sometimes the walls run chiefly in the longitudinal direction of the sponge, and the surface may get an appearance, as if longitudinal fibres were running below it. Sometimes the pore surface is fairly even, the walls not being raised; this, I suppose, is owing to the degree of contraction of the sponge. The surface is otherwise finely shaggy from projecting spicules. The *dermal membrane* is a rather thin film, supported by dermal spicules. *Oscula* and *pores:* As mentioned above, one surface is the oscular surface, the other the pore surface. On the oscular side rather close-set, circular openings of various sizes are seen. When the dermal membrane is removed, oscular canals are seen, of an average width of 3^{mm}; this size, therefore, is the largest one attained by the oscula, but they are seen in all degrees of closing. When they are closed or almost closed, the closing membrane is generally somewhat sunk into the canal, so that a more or less deep, about circular groove is seen. From the oscular apertures canals pass into the sponge, partly tolerably horizontally through the leaf, partly also running in other directions. In the upper part of the sponge they may often be seen rather distinctly to run downward and inward in the leaf. On the pore side the pores are found in groups over the subdermal cavities or the openings of the incurrent canals; they were measured from quite small ones up to a diameter of $0{\cdot}12^{mm}$.

The *skeleton.* The *dermal skeleton* consists of penicillate bundles of dermal spicules supporting the dermal membrane. The bundles are partly erect, partly more or less recumbent. On the pore side especially, erect bundles are found in the tissue or the walls between the canals or the subdermal cavities; from the edges of these cavities fibres of dermal spicules pass under the membrane distended over the mouth, and these fibres are then more or less horizontal, but send off spicules into the membrane; by this arrangement the structure arises again here which has been mentioned repeatedly in other species, viz. that the membrane or pore sieve distended over the mouths of the canals, is by the mentioned fibres divided in areas, in which the pores are then lying. On the oscular side the structure is about the same; short fibres of dermal spicules likewise stretch from the edge of the oscular canal, radiating into the membrane and pointing towards the oscular aperture. The *main skeleton* is a mostly polyspicular network, which is, however, rather irregular. Longitudinal fibres are found, passing up through the leaf and bending towards the surface, but their course is somewhat irregular. The spicules placed between them are mostly single. They are placed rather closely and quite irregularly, so that the meshes are irregular, by which means the whole network gets a very irregular appearance. Sometimes the longitudinal fibres may be seen especially distinctly to bend towards the oscular side, which is, perhaps, owing to the fact that they partly follow the course of the canals. Sometimes, on the other hand, the skeleton is far more irregular, so that longitudinal fibres are almost not to be traced. In the nodes of the skeleton a rather copious, but white and clear mass of spongin is found.

Spicula: a. *Megasclera.* 1. The skeletal spicules are styli; they are slightly curved, sometimes through their whole length, but most frequently the curve is nearest to the head-end; more rarely the spicules are straight. The point is rather short or middle long, it is sharp and oftenest bounded by straight lines. Their length is $0{\cdot}57-0{\cdot}72^{mm}$, and the thickness is $0{\cdot}014-0{\cdot}018^{mm}$, most frequently the longest ones are not the thickest ones. Developmental forms occurred singly; the finer ones had a longer point. 2. The dermal spicules are tylota with rather slightly swollen ends; they are oftenest straight, more rarely a little curved. Their length is 0·34—0·40^{mm}, and the thickness ca. 0·0043—0·0086^{mm}. The fully developed spicules have almost equal ends; the swelling of one end, however, is most frequently a little more marked than that of the other; the finer the spicule is, the more distinct is this feature, and the very finest ones are quite monactinal. b. *Microsclera:* these are of three forms, isochelæ arcuatæ, forcipes, and sigmata. 1. Chelæ arcuatæ are of a similar structure as in the preceding species, *F. Topsentii*, but they are smaller; they have an evenly curved shaft, a more or less broad oval tooth with a triangular tuberculum, and the alæ are of the same length as the tooth. Their length is 0·021—0·033^{mm}, and the thickness of the shaft is ca. 0·0021—0·0028^{mm}. 2. Forcipes; these are of only one form, and they are rather characteristic; they have a round curve above, and one leg is considerably longer than the other; the legs are slightly diverging in their upper part, then the shorter leg bends a little more outward, and the longer leg does the same, but this latter bends again inward, so that it forms an even, slight curve with the convexity turned outward. This is the typical form (Pl. XIX, Fig. 5 d), but various deviations may be found. Thus they may be somewhat twisted, and the legs may be of equal, or about equal, length, and in this case they are often more or less uniform, both forming a curve. By slight enlargement the forcipes appear to be slightly spined, but under higher magnifying powers they are seen to be rather finely, but densely spined; the legs end in a button-shaped swelling. Their length, measured from the curve to the end of the longer leg, is 0·037—0·060^{mm}, and the thickness at the curve is ca. 0·0014—0·0028^{mm}. A few, quite fine and smooth developmental forms were seen. 3. Sigmata are of the common sigmaform and are plane or almost plane; they vary in length from 0·11—0·13^{mm}, and in thickness from 0·0057—0·007^{mm}. A few fine developmental forms were found, not yet provided with recurved hooks. The microscleres occur throughout the sponge and in the dermal membrane; in the pore sieves chelæ seem especially to be found.

Note. In the dermal membrane and in the membranes of the canals granulous cells, «cellules sphéruleuses», are found abundantly. They are roundish or longish, of an average size of 0·015^{mm}, and filled with rather large, refracting granules, in spirit their colour is white. Frequently the walls of the cells have disappeared, so that the membrane is seen to be filled with granules, more or less gathered in groups.

Embryos. In some of the specimens embryos were found in great numbers in the tissue. They are globular, of a white colour, and their average diameter is 0·23^{mm}. Some of the examined specimens showed no spicules, others had spicules, and then both megascleres and microscleres were found. The megascleres are somewhat interesting; they are slightly curved, somewhat club-shaped styli, sometimes with a slightly marked head; they attain a length of up to 0·12^{mm}. The most interesting feature is, however, that they are slightly rugged-spined; as *Forcepia*-species with spined spicules exist, one is led to suppose that the spinulation may possibly be a primary character, and that species with spined spicules may be more primitive than those with smooth spicules. A fact leading to the same conclusion has been mentioned under some of the species treated above; thus *M. pedunculata* has smooth styli, but its embryos have spined styli, and *M. pluridentata* has smooth styli, but the fine developmental forms are slightly rugged. — The microscleres are only chelæ, they are of the same structure as the chelæ of the grown sponge, but reach at most a length of 0·025mm. The specimens in question were obtained in the beginning of June.

Locality: Station 57, 63° 37' Lat. N., 13° 02' Long. W., depth 350 fathoms; station 73, 62° 58' Lat. N., 23° 28' Long. W., depth 486 fathoms. Both stations are situated south of Iceland.

F. groenlandica Frstdt.

Pl. XX, Fig. 3 a—e.

1887. *Forcepia groenlandica* Fristedt, Vega Exp. vetensk. Iakttag. IV, 452, Pl. 25, figs. 40—46.

1904. ? *Trachyforcepia groenlandica* Topsent, Résultats des camp. scient. du Prince de Monaco Fasc. XXV, 181, Pl. XV, fig. 14.

Thickly incrusting or massive. Spicula: Megasclera: the skeletal spicules acanthostyli 0·42—0·55mm, the dermal spicules tylota 0·40—0·447mm; microsclera of three forms, isochelæ arcuatæ 0·025—0·035mm, forcipes 0·035—0·0529mm, sigmata, more or less contort, 0·114—0·15mm.

This species has not been obtained by the Ingolf-Expedition, and I have only before me a small fragment of the type specimen; therefore I only mention the spicules more particularly. a. *Megasclera.* 1. The skeletal spicules are acanthostyli; they are slightly curved, either evenly through their whole length, or with the curve nearer to the upper end. The point is rather short, at most middle long. The spinulation is rather scattered, but in this feature some variation may be found; the spines continue out on the very point; at the head-end they are generally more closely gathered. The length of the acanthostyli is 0·42—0·55mm, and the thickness 0·011—0·014mm. 2. The dermal spicules are slender, straight tylota with slightly swollen ends; their length is 0·40—0·447mm, the thickness is ca. 0·007mm. b. *Microsclera;* these are of three forms, isochelæ arcuatæ, forcipes, and sigmata. 1. Chelæ arcuatæ are of a similar form as in the preceding species, *F. Thielei;* their length is 0·025—0·035mm by a thickness of the shaft of 0·0028—0·004mm. 2. Forcipes are of a form reminding much of the forcipes in *F. Thielei;* the shorter leg, however, is generally straight, and the longer leg forms a more curved bow; they are finely spined but not so densely as in *F. Thielei,* and the legs end in a little button. Their length to the end of the longer leg is 0·035—0·0529mm, and the thickness in the curve is ca. 0·0014—0·0021mm. 3. Sigmata are of the common form, and are more or less contort; their length is 0·114—0·15mm, and the thickness ca. 0·005—0·007mm.

Locality: The species was taken by the Sophie-Expedition 1883, at East-Greenland, depth 125 fathoms. Topsent mentions it from the sea at the Azores at a depth of 1196 fathoms.

Note. This species seems to be closely allied to *F. Thielei;* like this it has only one form of forcipes, and the forcipes of the two species resemble each other and are of a characteristic form. It is doubtful whether the *F. groenlandica* mentioned by Topsent is identical with the present species, as its styli are very slightly spined and often smooth, and both styli and tylota are somewhat larger, as also its sigmata are plane. Also Topsent's species must be closely allied to *F. Thielei,* especially the sizes of the spicules are rather equal, but in *Thielei* spines are never found on the styli; accordingly there is some possibility that Topsent's species is an independent one. Topsent establishes on it the genus *Trachyforcepia;* he establishes it with some hesitation, and I cannot, in the spinulation of the styli, find sufficient reason for the formation of a genus, so much the less, as transitions are always found, and this is also here the case.

The genus *Forcepia* is a well characterized genus, and now it contains a rather great number of distinct species. As in several other places among the sponges, the authors have not originally had an eye for the characteristic specific differences, and have regarded the occurrence of forcipes, even if they were somewhat different, as a sign of specific identity. Carter and Vosmaer, therefore, have blended different species. As mentioned under *F. fabricans,* the *F. bulbosa* Cart. mentioned by Topsent, is not Carter's species, but a new one, what is seen distinctly from the spiculation, which is as follows:

	Styli	Tylota	Chelæ	Forcipes	Sigmata
F. bulbosa Cart.	0·56mm	0·308mm	0·038mm	0·038mm	0·067mm
F. bulbosa Tops.	0·71mm	0·36—0·415mm	0·033mm	0·037—0·057mm	0·11—0·12mm

Further Topsent's species has sometimes some spines on the styli, and forcipes seem to be of two or three forms. I propose for Topsent's species the name of *F. azorica.* Thus the result will be that Carter's species *F. bulbosa* keeps its name, Vosmaer's *F. bulbosa* is identical with *F. fabricans* Schmidt, and Topsent's *F. bulbosa* gets the name *F. azorica.*

According to this, the genus *Forcepia* contains at present the following species:

1866. *Forcepia (Halichondria) forcipis* Bow.
1874. — *(Esperia) fabricans* O. Schmidt.
1876. — *(Halichondria) bulbosa* Cart.
1885. — *crassanchorata* Cart.
1887. — *groenlandica* Frstdt.
1895. — *Carteri* Dendy. (This species occupies a special place, as, according to the description, it does not seem to have skeletal spicules, but only dermal spicules. The main skeleton is chiefly composed of sand.)
1904. — *imperfecta* Tops.
— *Topsentii* n. sp.
— *Thielei* n. sp.
— *azorica* nom. n. (= *bulbosa* Tops. l. c. 1904, nec Carter).

It is still to be added that Carter in 1874 (Ann. Mag. Nat. Hist. Ser. 4, XIV, 248, Pl. XV, fig. 47) has established a species, *F. colonensis.* At the time of the establishing only the forceps was known, which had been found isolated; it was very large, 0·26mm. In 1885 he (ibid. Ser. 5, XV, 110, Pl. IV, fig. 2 a—e) refers a species to this one, the forcipes of which are of a similar form, but only attain a length of 0·093mm; according to the description the megascleres of this latter species are of only one kind, viz. tylota. In 1895 the species is again mentioned by Dendy (Proceed. Roy. Soc. of Victoria VIII, 24), who says of the examined specimens that their forcipes are somewhat smaller than those of the type; I suppose that by the type he means the isolated forcipes upon which the species was originally established. The question must, according to this, be of two different species, but as to the former, the one with the large forcipes, nothing definite can be said, as only the forcipes are known, but I think there is some reason to suppose that it is a *Forcepia;* and with regard to the latter, which has of megasclera only tylota, it is at present doubtful whether it belongs to *Forcepia.*

Finally it is to be remembered that the *F. (Trachyforcepia) groenlandica* enumerated by Topsent l. c. is perhaps an independent species.

As to *Forcepia versatilis* Tops. see under the genus *Asbestopluma* p. 75.

Thiele (Arch. für Naturgesch. 1903, I, 384) says that Carter's generic name cannot be used, as one of the species, by Carter referred to *Forcepia colonensis,* of megasclera has only tylota; I think, however, that Carter's name is to be kept, as his original type, to judge from what is stated above, may be supposed to be a *Forcepia*-species. — When Thiele, in the place quoted, will refer *Forcepia* to *Hamigera,* and at most regard it as a subgenus under this genus, this is surely erroneous; or further particulars regarding this fact see under *Lissodendoryx stipitata* p. 173.

Melonanchora Carter.

The form thickly incrusting or massive, sometimes somewhat lobate. The surface closely set with wart-shaped papillæ. The skeleton chiefly polyspicular, but rather irregular, with fibres running chiefly towards the surface, and between them irregularly scattered spicules or spicula-bundles. The dermal skeleton consists of very close-lying, horizontal spicules and of fibres supporting the membrane. A slight amount of spongin is found in the skeleton. Spicula: the megasclera are either of two forms, and then the skeletal spicules are styli, the dermal spicules tylota to strongyla, or only of one form, and then they are tylota to strongyla; microsclera: the characteristic microsclera are sphærancoræ[1]), consisting, when fully developed, of two elliptical rings, intersecting each other at a right angle; to these are added ancoræ spatuliferæ of two sizes.

1. **M. elliptica** Carter.

Pl. VII, Figs. 4—6. Pl. XX, Fig. 1 a—o.

1874. *Melonanchora elliptica* Carter, Ann. Mag. Nat. Hist., Ser. 4, XIV, 216, Pl. XIII, figs. 6—12, Pl. XV, fig. 35 a—b.

[1]) The characteristic, melon-shaped ancora was by Carter called »melon-shaped anchorate»; Vosmaer designated it »mel.», but an established term did not exist. Therefore it was a very natural thing that Topsent (l. c. 1892, 5) wished to give a fixed name to this form, and he chose »sphérancister», finding in the individual arcs of the ancoræ some resemblance to the diancistra in *Hamacantha.* The chosen term, however, is very unfortunate, as these ancoræ have nothing to do at all with diancistra, but are real ancoræ, and this fact ought to be expressed in the name. The most simple thing would be, therefore, to designate this form as melonancora, but by this name there is the drawback that it is the same as that of the genus, and so it may give rise to confusion. I therefore choose to designate these ancoræ as sphærancoræ, a term showing by its ending that the question is of real ancoræ.

1880.	*Melonanchora elliptica*		O. Schmidt, Spong. des Meerbus. von Mexico, II, 85, Taf. IX, Fig. 8 A—F.
1887.	—	—	Fristedt, Vega Exp. vetensk. Iakttag. IV, 454, Pl. 25, figs. 51—55.
1892.	—	—	Herdman, Trans. Liverp. Biol. Soc. VI, 85.
1892.	—	—	Topsent, Résultats des Camp. scient. du Prince de Monaco, Fasc. II, 101.
1903.	—	—	Arnesen, Spong. von der norweg. Küste, Berg. Mus. Aarb. 1903, No. 1, 17, Taf. II, Fig. 4, Taf. V, Fig. 4.
1904.	—	—	Topsent, l. c. Fasc. XXV, 177, Pl. IV, fig. 10.

Massive, sometimes somewhat roundlobed. The surface closely set with higher or lower, wart-shaped pore papillæ, otherwise smooth. The dermal membrane hyaline, very solid, with close-lying, horizontal dermal spicules, supported by fibres of dermal spicules. Oscula spout-shaped, few, scattered between the pore papillæ. The skeleton an irregular, chiefly polyspicular network of fibres passing towards the surface, and between them scattered spicules and spicula-bundles. Spicula: Megasclera: the skeletal spicules styli, often with rounded point, 0·68—0·86^{mm}, the dermal spicules tylota to strongyla 0·41—0·62^{mm}; microsclera of three forms, sphærancoræ 0·054—0·068^{mm}, ancoræ spatuliferæ of two forms, large ones 0·047—0·075^{mm}, small ones 0·021—0·028^{mm}.

This species is of a massive form; the smaller specimens are more or less roundish, the larger ones may be more expanded and somewhat roundlobed. The species has a very characteristic exterior, being rather closely set with wart-shaped papillæ of a peculiar structure, which will be more particularly described below. The specimens in hand which are not torn off from the substratum, are attached to stones and shells. The largest specimen, which is of an irregular, massive form, but is no entire one, has a greatest extent of ca. 100^{mm} and a greatest thickness of 55^{mm}. This specimen shows three flat, round eminences or lobes (Pl. VII, fig. 4). Another, tolerably entire specimen is higher and more lump-shaped, it has a height of ca. 65^{mm} and a similar breadth. The smallest specimen is irregularly roundish, of a diameter of ca. 25^{mm}. The colour (in spirit) is whitish or yellowish white. The skin is firm and solid, but the consistency of the inner body is rather brittle. The *surface* is smooth without projecting spicules. The *dermal membrane* is a hyaline, very solid, and easily separable membrane, provided with close-lying spicules. *Oscula* and *pores*: As mentioned above, the surface is set with close-standing papillæ; these papillæ, in their fully developed state, are formed as high warts, being cylindric and with rounded ends. They are not rarely broadest in their upper part, and the part below is narrowed somewhat like a neck. In their fully developed state they have generally a height of 4—5^{mm}, and a breadth above of 3—4^{mm}; in some specimens, however, they may be somewhat larger. These papillæ, which are supported by a network of spicules, have pores in the meshes of the net. The pores are close-standing, so that the membrane, which is here thin and transparent, becomes a sieve; they are round or a little oval, and their diameter was measured to 0·037—0·18^{mm}. The pores are not only found in the upper part of the papillæ, but also down on their sides. The close spiculation of the dermal membrane ceases at the base of the papillæ, and from this point polyspicular fibres issue passing up into the wall of the papilla and forming a net of meshes, the single meshes of which may again be subdivided by thinner fibres or single spicules. In these meshes the pores are situated. This description holds good of the papillæ, when they are fully developed. Besides these, however, papillæ occur in all degrees of contraction, down to quite small, knob-shaped projections; the somewhat contracted papillæ show only the net of meshes and pores at the top, and the entirely contracted, low knobs have neither the net of meshes nor pores. It is, of course, impossible to tell whether these different stages of the papillæ represent stages of expansion and contraction, or they are stages of development, when they have not been observed to open or close. There is, however, every probability that the question is of contraction and expansion, as the quite low knobs show a compact, more or less confuse accumulation of spicules, filling the knob entirely; then by degrees a beginning of a net of meshes appears at the point, and the larger the papillæ become, the more expanded and regulated the net of meshes becomes. If the question was of a development of new papillæ, it was to be expected that the net of meshes was formed immediately, and that the papillæ only grew in size. Carter says: «Pores and vents respectively situated in the cribriform tubercles», and Vosmaer supposes that the tubercles have nothing to do with pores, but are exclusively oscula. Now there can be no doubt that the papillæ, to judge from their structure upon the whole, exclusively carry pores, neither are pores found anywhere else in the skin. The real oscula have been overlooked both by Carter and by Vosmaer, and they have not been mentioned by later authors either. These oscula are formed as conical spouts, which are formed by the dermal membrane; they may be higher or lower, sometimes they are very low, scarcely projecting, and then they are easily overlooked. The dermal spicules are lying in the oscular wall parallelly to the longitudinal direction of the spout. Oscula are only few in numbers in proportion to the pore papillæ, thus on the largest specimen ca. eight were counted.

The *skeleton*. The *dermal skeleton* consists of very close-lying dermal spicules, all horizontal and situated in several layers. They are not scattered, but form groups in which the spicules are parallel to each other. On account of the dense spiculation the membrane is very solid. The skeletal structure of the pore papillæ and of the wall of the oscular spout has been mentioned above. To the dermal skeleton belong further fibres of dermal spicules rising perpendicularly from the skeleton below and supporting the membrane. The *main skeleton* is an irregular, to a great extent polyspicular, network. Some fibres are found, running towards the surface; they are polyspicular, but may be of rather varying thickness. When one succeeds in getting a section parallel to the direction of the fibres, they are seen to run rather regularly, especially near the surface; in their outer part they consist of dermal spicules, and pass out to and support the dermal membrane. Transverse fibres are not found, but between the fibres a great many spicules are found, placed singly or a few together; they are scattered quite irregularly between the fibres, so that the whole thing conveys a quite irregular impression. A feature contributing to the irregularity of the skeleton is also the many, rather large canals, between which the fibres must bend. Spongin is found in the nodes of the skeleton and in the fibres, but it is white and clear. In the skeleton of the dermal membrane no spongin was observed.

Spicula: a. *Megasclera.* 1. The skeletal spicules are monactinal, most frequently styli, but often with the point so much rounded as to become strongyla, in which case, however, they preserve their monactinal character, one end being thinner than the other. They are slightly curved, oftenest with the curve nearest the head-end, sometimes the curving is a little irregular. The point, as mentioned, may be varying, but is always short; from a distinct point, bounded by straight lines, but short, all transitions are found through shorter and more stubby forms to a broad rounding of the pointed end. In this respect there may be some difference in different individuals; in some, and perhaps in most, styli with quite rounded end are rare, while in a few specimens they are most numerous. Their length varies from 0·68—0·86^{mm}, and the thickness from 0·014—0·021^{mm}, in some individuals they scarcely reach this thickness. A few developmental forms occurred, the finest ones are all pointed, but they may be rounded already when rather thin. 2. The dermal spicules are tylota with very slightly swollen ends; not rarely almost no swelling is found, so that they become strongyla; they are straight or quite slightly fusiform. Their length may be rather varying, from 0·41—0·62^{mm}, not varying so much, however, in one individual, the thickness is ca. 0·008—0·017^{mm}. The developed tylota have equal, or about equal ends, but a few quite fine forms were found, indicating that they are begun as monactinal. b. *Microsclera* are sphærancoræ and ancoræ spatuliferæ of two sizes. 1. The sphærancoræ are the wellknown ancoræ described by Carter as »melon-shaped anchorates». Carter supposed the common ancoræ to be developmental forms of the sphærancoræ, which was in accordance with his general view of the growth of these bodies. Levinsen (Vidensk. Meddel. fra Nat. For. Kobenhavn for 1893, 1894, 13 seq. Tab. I, Fig. 31—49) has already pointed out the error in this view, and he is the only author, who has given a complete, and, apart from a single mistake, correct description of the sphærancoræ and their mode of growth. The sphærancora consists of four arcs, connected with each other at the ends, and forming right angles with each other, so that they form an ellipsoidal body. Each of the arcs consists of a principal part or axis and of a thin plate-shaped brim issuing from the outward-turned dorsal side of this axis; this brim folds round on eiter side of the axis and lies as a thin plate on either side of it; it is of about the same breadth as the axis of the arc, and it is seen to be finely and transversely striated. The sphærancoræ are typical ancoræ, as is shown by their development. The youngest stage observed consists of a thin shaft with three thin, rather long beginnings of teeth at each end; in contradistinction to the common ancoræ no falx is developed here. The teeth now become longer during the growth, and at the same time both they and the shaft become broader in the radiate direction; finally the ends of the teeth meet and coalesce, and the body that was begun as an ancora, consists now of four narrow arcs whose ends are joined, or of two ellipses intersecting each other at a right angle. The body now formed consists only of the middle or axial parts of the arcs, and as yet no striation is seen; in older stages the striation is seen to begin first along the dorsal side of the arc, but reaching by degrees farther inward, until the striated lateral plates or brims are formed in their full breadth, and the sphærancora is complete. The striated brims correspond completely to the alæ and tooth-plates of a common ancora. Strictly spoken, the term striated brims or plates is not quite correct, as it is seen distinctly by sufficient enlargement that the question is not of a brim with striæ, but, on the contrary, of a series of close-standing, fine teeth; in developmental forms with beginning brims it is seen especially distinctly that the teeth are free, later they become a little broader, and then they adjoin each other closely, only their somewhat pointed end is then seen to be free. When the ancora is fully developed, the four arcs are quite equal; it may, however, generally be decided, which of the arcs is the original axis; on the three arcs formed by the coalesced teeth, there is generally found, in the middle of the inner side of the axial part, a little round notch, often bounded on either side by a small spur; on the fourth arc, on the other hand, the arc that is the original axis, only a spur or a few spurs are found. The sphærancoræ may be somewhat varying in appearance; they may especially be more or less highly arcuate, so that the ellipse may be longer or shorter; the shorter and more highly arcuate ones are upon the whole more robust, and have broader arcs than the longer and more slender ones. These variations of the sphærancoræ are generally found in different individuals, while in one individual the variation is most frequently slight. Further some more or less monstrously or irregularly developed forms are seen; thus the ancoræ may be somewhat twisted, and the consequence then is that the teeth do not meet; in this case they either coalesce in an oblique way, or are left free. Sometimes the teeth do not reach their full length, so that the coalescing remains incomplete, or does not take place at all, while in other respects the ancoræ are fully developed.

The description of the construction and mode of growth of the sphærancoræ given here is quite agreeing with Levinsen's observations, with the only exception of a few points. Levinsen's opinion is that two independent forms of sphærancoræ are found, smooth ones and striated ones; but the smooth ancoræ, as has been advanced here, are developmental stages of the striated ones, only they have not yet got the striated lateral brims, which grow forth as the last feature, and may be followed in their growing to greater breadth, so that we get a continuous series from the first stage to the finished sphærancoræ (Pl. XX, fig. 1c—k). The reason why Levinsen has supposed two independent forms to exist, is that he regards the forms with free, not coalesced, but otherwise fully developed, striated teeth mentioned above as the developmental forms of the striated ancora. According to what has been stated above, there can be no doubt, however, that these ancoræ are quite complete and their growth finished; they have only a little shorter teeth than the other sphærancoræ, which leads to the fact that the teeth do not coalesce; they are, accordingly, to be regarded as monstrous forms. Levinsen is also surprised that he finds only very few of the developmental forms of the striated ancora and no young ones, as he refers all the younger developmental forms to the smooth ancora; these latter developmental forms are rather frequent, although the smooth ancora is far less frequent than the striated one; this latter fact is a matter of course, as the smooth ancora is a developmental form. Levinsen, it must be added, says himself that it is the finding of the striated ancora with not-adjoining teeth, which causes him to suppose two forms, while he should otherwise have been inclined to regard the smooth ancora as a developmental form of the striated one.

The length of the sphærancoræ varies from 0·054—0·068^{mm}, and the breadth, measured across two opposite arcs, varies from 0·024—0·038^{mm}. 2. The ancoræ of the large form are of the common structure; they have a slightly curved shaft and three lanceolate teeth at each end, and a narrow ala of the same length as the teeth. The ancoræ are somewhat varying in size, the length from 0·047—0·075^{mm}; the variation, however, is not so large in one individual, as instances may be given 0·047—0·061^{mm}, and 0·057—0·075^{mm}. The breadth is ca. 0·017—0·021^{mm}. A few developmental forms occurred; these, as already mentioned, may easily be distinguished from the developmental forms of the sphærancora, as their beginning teeth at an early stage become high and narrow, i. e. develop a falx, while such is not the case with the sphærancoræ. 3. The small ancoræ are of a similar form, their length is 0·021—0·028^{mm}, and the breadth is ca 0·007^{mm}. The three forms of microsclera are found through the whole sponge; in the dermal membrane the small ancora may be seen, and on the lower side of this membrane the sphærancoræ are found; in the pore sieves the sphærancoræ and the small ancoræ are of frequent occurrence, while the large ancoræ are scarce. The sphærancoræ are frequently, but not always, seen in the membranes of the canals in large numbers; they are placed perpendicularly with one end towards the lumen of the canal, and between them both forms of the ancoræ are seen. The sphærancoræ and the small ancoræ are upon the whole most frequent, while the large ancoræ are present in far smaller numbers.

In this species «cellules spheruleuses» occur so abundantly, that the tissue seems almost exclusively to be formed by them; they are roundish or irregular, filled with rather large, clear, somewhat refracting granules. Their average size is ca. 0·017^{mm}. They are seen in large numbers in the dermal membrane and especially in the canals of the membranes.

Locality: Station 78, 60°37' Lat. N., 27°52' Long. W., depth 799 fathoms; station 81, 61°44' Lat. N., 27°00' Long. W., depth 485 fathoms; station 90, 64°45' Lat. N., 29°06' Long. W., depth 568 fathoms; further it has been taken at the Faröe Islands, southwest of Myggenæs, depth 135 fathoms (Ditlevsen); north of Iceland, depth 58 fathoms (H. M. S. «Beskytteren», Gemzoe), and at 62°29' Lat. N., 5°17' Long. W, depth 190 fathoms (Ad. Jensen, the cruise of the «Michael Sars» 1902). Six specimens in all. The localities are situated in the Denmark Strait, north and southwest of Iceland, and at the Faröe Islands.

Gcogr. distr. The species seems to be very widely distributed; it has hitherto been obtained between Scotland and the Faröe Islands (the «Porcupine»), Reksten Fjord, depth 200—300 fathoms (the «Argo»), Bergen, 53—96 fathoms (Arnesen l. c.), the eastern coast of Greenland, depth 130 fathoms (Fristedt l. c.), in the Caribbean Sea (Schmidt l. c.), and at New Foundland, depth 673 fathoms, and the Azores, depths from 278—724 fathoms (Topsent l. c.).

2. **M. emphysema** O. Schmidt.

Pl. XX, Fig. 2 a—d.

1875. *Desmacidon emphysema* O. Schmidt, Jahresber. der Comm. zur wissenschaft. Unters. der deutsch. Meere in Kiel, für 1872—73, 1875, 118.

1885. ?*Melonanchora elliptica* Vosmaer, Bijdrag tot de Dierk., 12. Afl., 3. Gedeelt., 31, Pl. I, figs. 14 et 22, Pl. IV, figs. 23—34, Pl. V, figs. 69—72.

1903. *Melonanchora emphysema* Thiele, Archiv für Naturgesch. Jahrg. 1903, I, 392.

Incrusting or massive. The surface set with wart-shaped pore papillæ, otherwise smooth. The dermal membrane solid, with close-lying horizontal spicules, supported by perpendicular fibres. Oscula scattered, spout-shaped. The skeleton chiefly polyspicular, consisting of fibres passing towards the surface and sparsely connected by scattered spicules. Spicula: Megasclera of one form only, uniform throughout the skeleton; they are tylota with transitions to strongyla 0·44—0·61^{mm}; microsclera of three forms, sphærancoræ 0·050—0·056^{mm}, ancoræ spatuliferæ of two forms, large ones 0·057—0·078^{mm}, small ones 0·024—0·030^{mm}.

This species is incrusting, or, when growing thicker, of a more massive form. In the exterior it is somewhat similar to the preceding species, being set with papillæ of a similar structure as in *M. elliptica*. In the quite incrusting individuals the papillæ seem to be wanting, and in those only little thicker to be present in rather slight number. The species grows on various bottom material, stones, shells, or more loose material. The largest specimen has a greatest extent of fully 30^{mm}, and is provided with many papillæ, two smaller, about incrusting, specimens have few papillæ, and an incrusting specimen with an extent of 15^{mm} and a thickness of ca. 2·5^{mm} shows no papillæ. Schmidt describes the exterior of the species as »Unregelmässige Knollen und Fladen«, and Vosmaer figures a specimen, which probably belongs to this species and seems to be regularly cushion-shaped, with an extent of fully 50^{mm}. Accordingly the species does not seem to equal the preceding one in size. The colour (in spirit) is grayish. The consistency is as in the preceding species or a little looser. The *surface* is smooth, without projecting spicules. The *dermal membrane* is also here a solid, easily separable membrane with close-lying spicules. *Oscula* and *pores:* What was said with regard to oscula and pores in the preceding species, holds also good of the present one; also here pore papillæ are found of different sizes and stages of development, and conical, spout-shaped oscula.

The *skeleton*. The *dermal skeleton*, as in the preceding species, consists of spicules lying horizontally in the membrane and arranged in more than one layer. In the present species they are generally not so close-lying as in the preceding one, but with regard to this fact some variation may be found in the present species; where they are least close-lying they are scattered without any order, and the membrane may everywhere be seen between them; where they are most close-lying, a tendency to an arrangement in bundles may be observed. The skeletal structure in the pore papillæ and the oscular walls is like that in the preceding species. The *main skeleton* is almost exclusively polyspicular; some rather powerful fibres are found passing from the base towards the surface and towards the dermal membrane, which they support. The fibres are only mutually connected to a very slight degree, and generally only by single spicules which are irregularly scattered and only found sparingly. The polyspicular fibres may attain a thickness of 0·09—0·12^{mm}. In the lower part of the sponge, which is turned towards the underlayer, sand and gravel is generally embodied copiously. Spongin is found in the nodes and in the fibres, it is white and clear and therefore not easily observed; it is not copious although distinctly present, and it seems often to coat the fibres completely, but with a scarcely perceptible layer.

Spicula: a. *Megasclera* are of one kind only, and consequently of the same form in the dermal membrane and the other parts of the skeleton. They are tylota with slightly swollen ends, sometimes the ends are so slightly swollen, that the spicules approach to or are strongyla. They are straight or slightly, most frequently a little irregularly, curved, and they are slightly fusiform. Their length varies from 0·44—0·61^{mm}, and the thickness in the middle is 0·010—0·014^{mm}. A few developmental forms were found; they showed that the spicules are begun as monactinal; the finest one had one end rounded, the other short pointed; as long as the spicules are not fully developed, they show a rather distinct difference between the two ends, one being thicker, the other a little thinner with a most frequently more marked swelling; still in the fully developed forms this difference may often be seen.

It is a surprising fact that in this species only one form of megasclera is found, composing both the dermal and the main skeleton. The question, it is to be remembered, is not of the skeletal spicules having become equi-ended and of the same size as the dermal spicules, but it is a real fact that only one kind is found. According to both form and development it is evident that the megasclera here correspond to the dermal spicules in the preceding species, and thus the skeletal spicules have disappeared. It would be interesting to examine embryos of the present species, for, the skeletal spicules being generally the megascleres occurring as the first in the embryos of the Myxillinæ, they might possibly be found to be represented in the embryos of the species.

b. *Microsclera:* these are of three forms, sphærancoræ and ancoræ spatuliferæ of two sizes 1. The sphærancoræ are of the same construction as in *M. elliptica*, but they have a peculiar form that may best be described as quadrangular-elliptical; their length is 0·050—0·056^{mm}, and the breadth, which is rather constant, the sphærancora being almost unvarying as to form, is ca. 0·028^{mm}. A few developmental forms were found, showing the same kind of development as in the preceding species. On account of the difference as to size and the peculiar form of the sphærancora, its younger developmental forms may easily be distinguished from the corresponding developmental forms of the large ancora. 2. The large ancoræ are also similar to the ancoræ in *M. elliptica*, but they are a little more robust. Their length is 0·057—0·078^{mm}, and the breadth is 0·021—0·025^{mm}. 3. The small ancoræ are of a similar form, their length is 0·024—0·030^{mm}, and the breadth 0·007—0·010^{mm}. Quite singly ancoræ may be found which seem, as to size, to form transitions between the two sizes of ancoræ. Of both forms developmental forms were seen, but only in slight numbers. All the microscleres occur throughout the sponge and in the dermal membrane; here, again, the sphærancoræ are seen in large numbers in the membranes of the canals. The large ancoræ occur in this species in larger numbers than in the preceding one, and the three forms are about equally frequent.

In the dermal membrane «cellules sphéruleuses» are found copiously; they are seen, partly as distinctly limited cells of a size of about 0·015^{mm}, partly gathered to heaps of granules. They are colourless in spirit, with large, round, highly refracting granules.

Remarks: This species was established by Schmidt l. c. as *Desmacidon emphysema*, but with a description that rendered it impossible to recognize it; the sphærancora he took to be a diatom. As I have examined Schmidt's type specimen, I have been able to identify the species with certainty. Thiele l. c. has also examined Schmidt's species and has already shown it to be a *Melonanchora*, but another species than *elliptica*. Thiele supposes that Fristedt's species is also *emphysema*, which might also be indicated by Fristedt's description and figure; by examining his specimen I have seen, however, that it is *elliptica*. On the other hand it is to be supposed from Vosmaer's description and figure l. c. that he has had the present species before him. — In Bronn's «Klassen und Ordnungen der Spongien» Vosmaer, at p. 127, mentions *Melononchora* n. sp., and says in a foot-note: «Wird näher beschrieben in den zool. Resultaten der dritten und vierten holländischen Nordpolexpedition». In Vosmaer's work on the sponges of the Willem Barents expedition 1880—81, however, only *M. elliptica* is mentioned, so that the author presumably has arrived at the conclusion that the species was not different from this latter, what it must, accordingly, be supposed to have been nevertheless.

Locality: Station 78, 60° 37' Lat. N., 27° 52' Long.W., depth 799 fathoms; station 89, 64° 45' Lat. N., 27° 20' Long. Long.W., depth 310 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; further it has been taken east of the Faröe Islands, depth 250 fathoms (Ad. Jensen, the cruise of the »Michael Sars« 1902). The Ingolf stations are situated in the Denmark Strait and southwest of Iceland.

Geogr. distr. The species has hitherto been taken west northwest of Haugesund and southwest of Bukenfjord, Norway, in both places at a depth of 106 fathoms (Schmidt l. c.), and (if Vosmaer's species be identical with the present one) off the northern coast of Norway at depths of 140 and 145 fathoms (Vosmaer l. c.).

Plate I.

Plate I.

		Page
Fig. 1.	*Cladorhiza oxeata* n. sp. One branch is almost quite denuded. $^1/_1$	97
— 2.	*Esperiopsis pedicellata* n. sp., sitting on *Astarte crenata.* $^1/_1$	16
— 3.	*Esperiopsis typichela* n. sp., sitting on *Hornera lichenoides,* the flagelliform appendices are not to be seen. $^1/_1$	22
— 4.	*Esperiopsis villosa* Cart. Broken off below, the dermal membrane partly torn off. Along the upper edge oscula are seen. $^1/_1$	9
— 5.	*Esperiopsis forcipula* n. sp. The largest fragment, probably the upper part of a thick, leaf-shaped sponge; the skin wanting below. $^1/_1$	17
— 6.	*Mycale ovulum* O. Schmidt, on *Halecium* sp.; a large irregular specimen. $^1/_1$	34
— 7.	*Mycale ovulum* O. Schmidt, on *Hydrallmania falcata;* rather large, irregular specimens, probably formed by coalescing, showing several oscula. $^1/_1$	34
— 8.	*Mycale ovulum* O. Schmidt, on *Ptilota plumosa;* egg-shaped specimens, each with one osculum; to the left a specimen with two oscula, probably formed by coalescing. $^1/_1$	34
— 9.	*Artemisina arcigera* O. Schmidt. Rather flat specimen, viewed about from above. $^1/_1$	110
— 10.	*Artemisina arcigera* O. Schmidt. A small specimen on a Brachiopod. $^1/_1$	110
— 11.	*Artemisina arcigera* O. Schmidt. A higher specimen sitting on a fragment of a *Sipho.* $^1/_1$	110

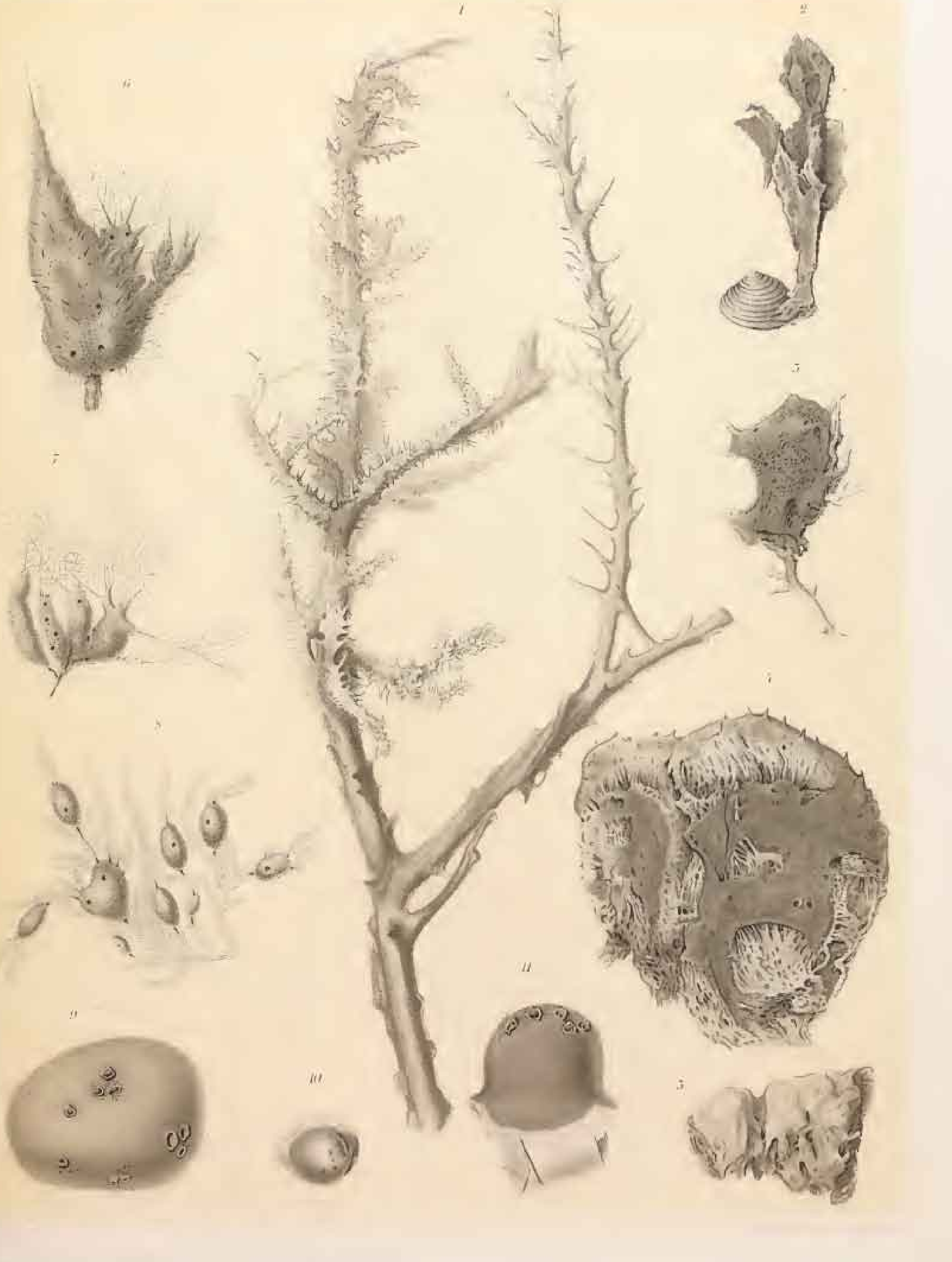

1
2
3
4
5
6
7
8
9
10
11

Plate II.

Plate II.

Page

Fig. 1. *Asbestopluma pennatula* O. Schmidt. The largest specimen, the lateral branches are long above but grow shorter downward; below the stalk-coating is seen; at the lower end the sponge is broken off. In the axis embryos are seen, above in a single row, farther down in a larger crowding. $^1/_1$ 44

— 2. *Asbestopluma pennatula* O. Schmidt. A specimen with almost all the lateral branches long; below the stalk-coating is seen, it is rather thick. At the lower end the specimen is broken off. $^1/_1$ 44

— 3. *Asbestopluma pennatula* O. Schmidt. A small specimen with root; the stalk irregularly bent in an angular way, the stalk-coating is seen reaching about up to the ramigerous part. $^1/_1$ 44

— 4. *Asbestopluma pennatula* O. Schmidt. A somewhat twisted specimen with all the lateral branches short and showing a swelling with embryos; the lower part is wanting. $^1/_1$. 44

— 5. *Asbestopluma pennatula* O. Schmidt. A root-part. $^1/_1$ 44

— 6. *Asbestopluma pennatula* O. Schmidt. A fragment showing the proportion between the length and thickness of the lateral branches. The canals of the axis are seen to shine through. ca. $^{10}/_1$ 44

— 7. *Asbestopluma bihamatifera* Cart. A specimen with all the lateral branches long, viewed in such a position that the longest lateral branches are turned to the sides; the stalk-coating is seen reaching about up to the lateral branches. The specimen is broken off below. $^1/_1$ 51

— 8. *Asbestopluma bihamatifera* Cart. A specimen with very short lateral branches; the specimen is almost entire and show a long root-part, which is angularly bent. The stalk-coating is seen about up to the lateral branches. $^1/_1$ 51

— 9. *Asbestopluma furcata* n. sp. The largest specimen; only one branch is entire, the others are broken off. Only the entire branch shows the small lateral branches. The upper bounding of the stalk-coating is seen on most of the branches. $^1/_1$ 54

— 10. *Asbestopluma furcata* n. sp. At the base of the branch to the right a row of embryos is seen, in the branch to the left a cavity, in which two embryos have been situated, is seen. Below the stalk-coating is wanting; at the very base the surface of attachment is seen. $^1/_1$ 54

— 11. *Asbestopluma cupressiformis* Cart. A specimen with indistinct, coalescing lateral branches; above a leaf-shaped part. $^1/_1$ 58

— 12. *Asbestopluma cupressiformis* Cart. A leaf-shaped specimen. $^1/_1$ 58

— 13. *Asbestopluma cupressiformis* Cart., on *Astarte* sp.; a large specimen with more or less indistinct lateral branches; from the Kara-Sea. $^1/_1$ 58

— 14. *Asbestopluma cupressiformis* Cart. A small specimen with distinct, lateral branches arranged in a somewhat row-like manner. $^1/_1$ 58

— 15. *Asbestopluma lycopodium* Levins. The lateral branches at the top coalesced to longitudinal keels. $^1/_1$ 62

— 16. *Asbestopluma lycopodium* Levins., on *Pectinaria hyperborea*; from the Kara-Sea. $^1/_1$ 62

— 17. *Asbestopluma lycopodium* Levins. The upper end of a specimen, showing distinct longitudinal keels. ca. $^{10}/_1$ 62

— 18. *Asbestopluma hydra* n. sp., on a little stone, ca. $^7/_1$ 66

— 19. *Asbestopluma hydra* n. sp., on a little stone. It is a specimen without branches, the upper surface of the end-swelling has projecting spicules and quite short protuberances, and the swelling is slightly ribbed. ca. $^7/_1$ 66

— 20. *Asbestopluma infundibulum* Levins. The calyx compressed, the edge a little damaged; from the Kara-Sea. $^1/_1$ 68

— 21. *Asbestopluma infundibulum* Levins. A smaller specimen with the calyx slightly compressed; from the Kara-Sea. $^1/_1$ 68

— 22. *Asbestopluma comata* n. sp., on a sponge-spicule. ca. $^3/_1$ 72

— 23. *Asbestopluma comata* n. sp. The upper part of the sponge. ca. $^{20}/_1$ 72

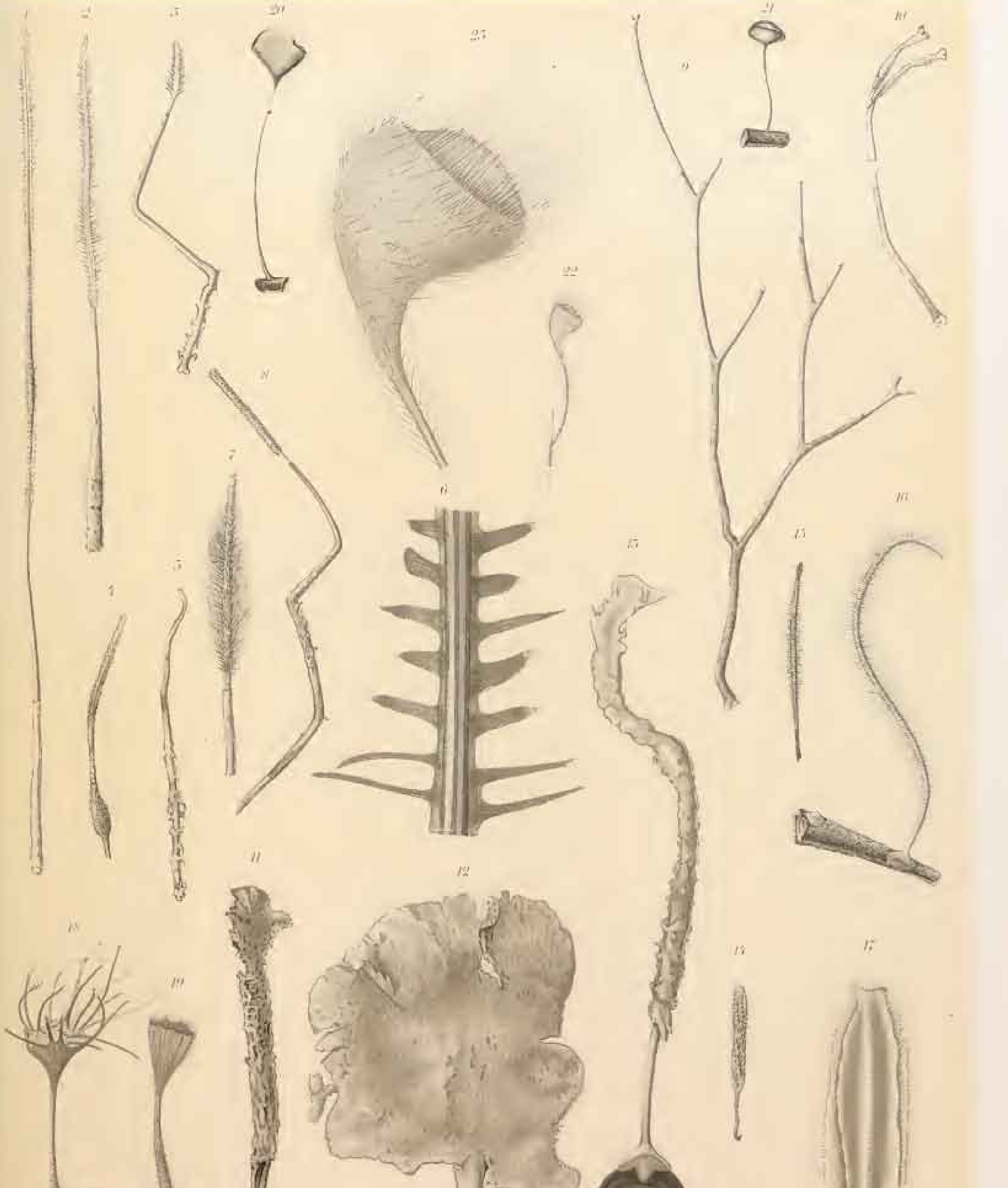


Plate III.

Plate III.

Page

Fig. 1. *Cladorhiza gelida* n. sp. Broken off above, and with some of the branches broken off. Base of attachment below. $^1/_1$ 83

— 2. *Cladorhiza tenuisigma* n. sp. A denuded skeleton, showing here and there remnants of the fibres of the branchlets. Below an irregular coalescing is seen. $^1/_1$ 87

— 3. *Cladorhiza tenuisigma* n. sp. Root-part, turned to one side and with bottom material attached. $^1/_1$ 87

— 4. *Cladorhiza tenuisigma* n. sp. Branch of a slender specimen with long branches, showing the swollen ends and the somewhat circular arrangement of the branchlets. In the stalk-part and the base of the branch embryos are seen to shine through. $^1/_1$ 87

— 5. *Cladorhiza tenuisigma* n. sp. Branch of a robust specimen. $^1/_1$ 87

— 6. *Cladorhiza iniquidentata* n. sp. Broken off above and below, and only one branch entire. $^1/_1$ 91

— 7. *Cladorhiza corticocancellata* Cart. From two damaged branches the axis is seen to project; below the tissue is wanting. $^1/_1$ 93

— 8. *Cladorhiza corticocancellata* Cart. Denuded axes, showing irregular coalescings. The principal axis showing the rings formed by the basal parts of the fibres of the broken off branchlets. $^1/_1$ 93

— 9. *Cladorhiza corticocancellata* Cart. Longitudinal section showing the chambered construction. $^1/_1$ 93

— 10. *Cladorhiza oxeata* n. sp. Richly branched upper part of a branch. $^1/_1$ 97

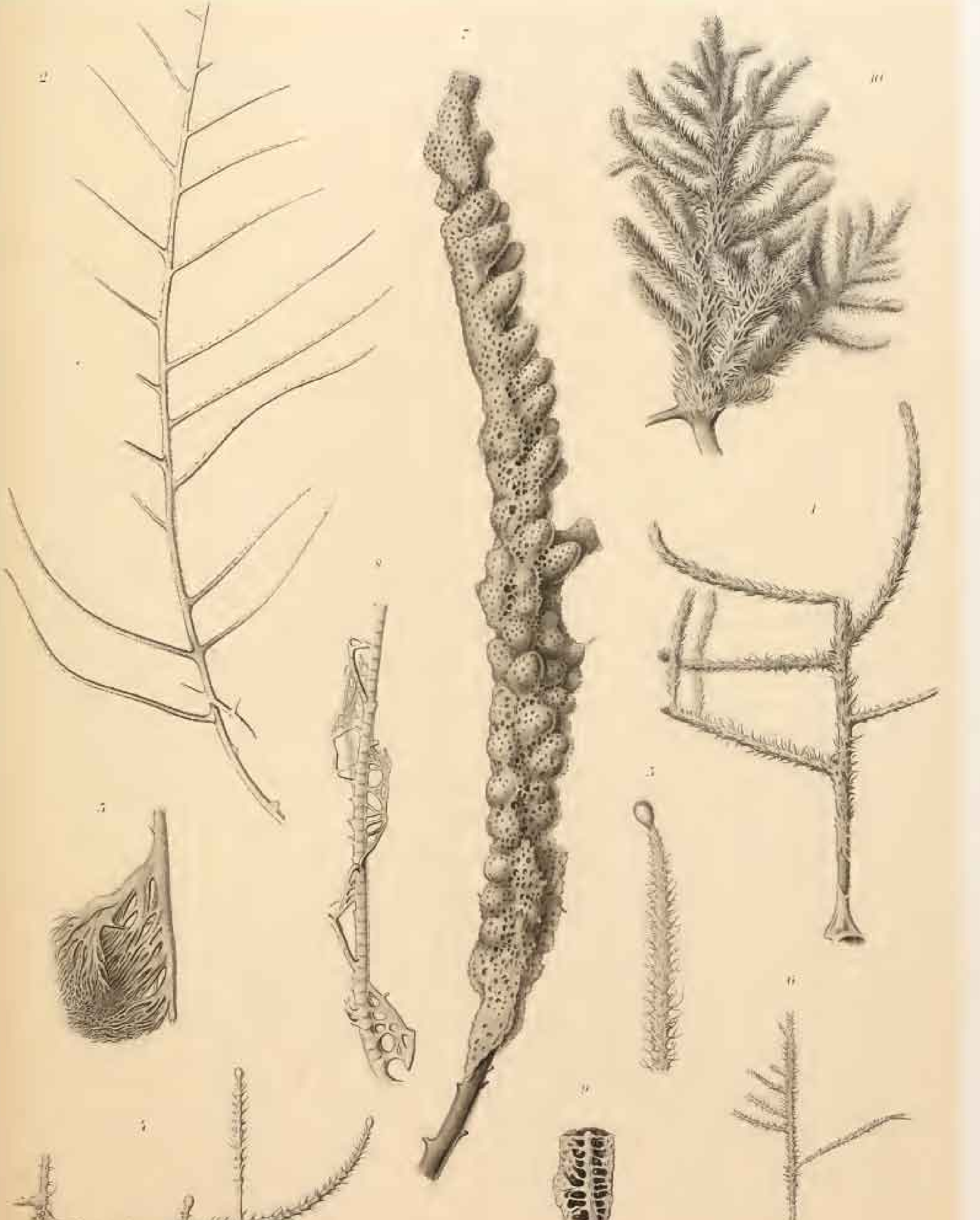


Plate IV.

Plate IV.

Page

Fig. 1. *Chondrocladia gigantea* Arm. Hans. $^1/_2$ 102

— 2. *Homœodictya flabelliformis* Arm. Hans., somewhat damaged, the dermal membrane almost quite wanting. $^1/_1$ 118

— 3. *Homœodictya flabelliformis* Arm. Hans. A small, club-shaped specimen. $^1/_1$ 118

— 4. *Dendoricella rhopalum* n. sp. Highly contracted specimen with very distinct grooves, arranged in a net-like manner, seen from the concave side; two oscula are seen. $^1/_1$ .. 127

— 5. *Dendoricella rhopalum* n. sp. Less contracted specimen, showing three oscula. $^1/_1$ 127

— 6. *Myxilla incrustans* Johnst. Massive specimen, seen about from above, with three oscular cones; the surface very grooved. $^1/_1$ 132

— 7. *Myxilla incrustans* Johnst. Fragment of a specimen with tolerably smooth surface. $^1/_1$ 132

— 8. *Myxilla rosacea* Lieberk., growing on Hydroids. $^1/_1$ 138

— 9. *Myxilla fimbriata* Bow. A rather large specimen, to the right below oscula are seen closely gathered, otherwise single and scattered. The surface damaged in places. $^1/_1$ 141

— 10. *Myxilla fimbriata* Bow. A smaller, roundish specimen, sitting on a shell of a Brachiopod; the skin wanting to a great extent. $^1/_1$ 141

— 11. *Myxilla brunnea* Arm. Hans. A leaf-shaped specimen, the dermal membrane partly torn off. $^1/_1$ 144

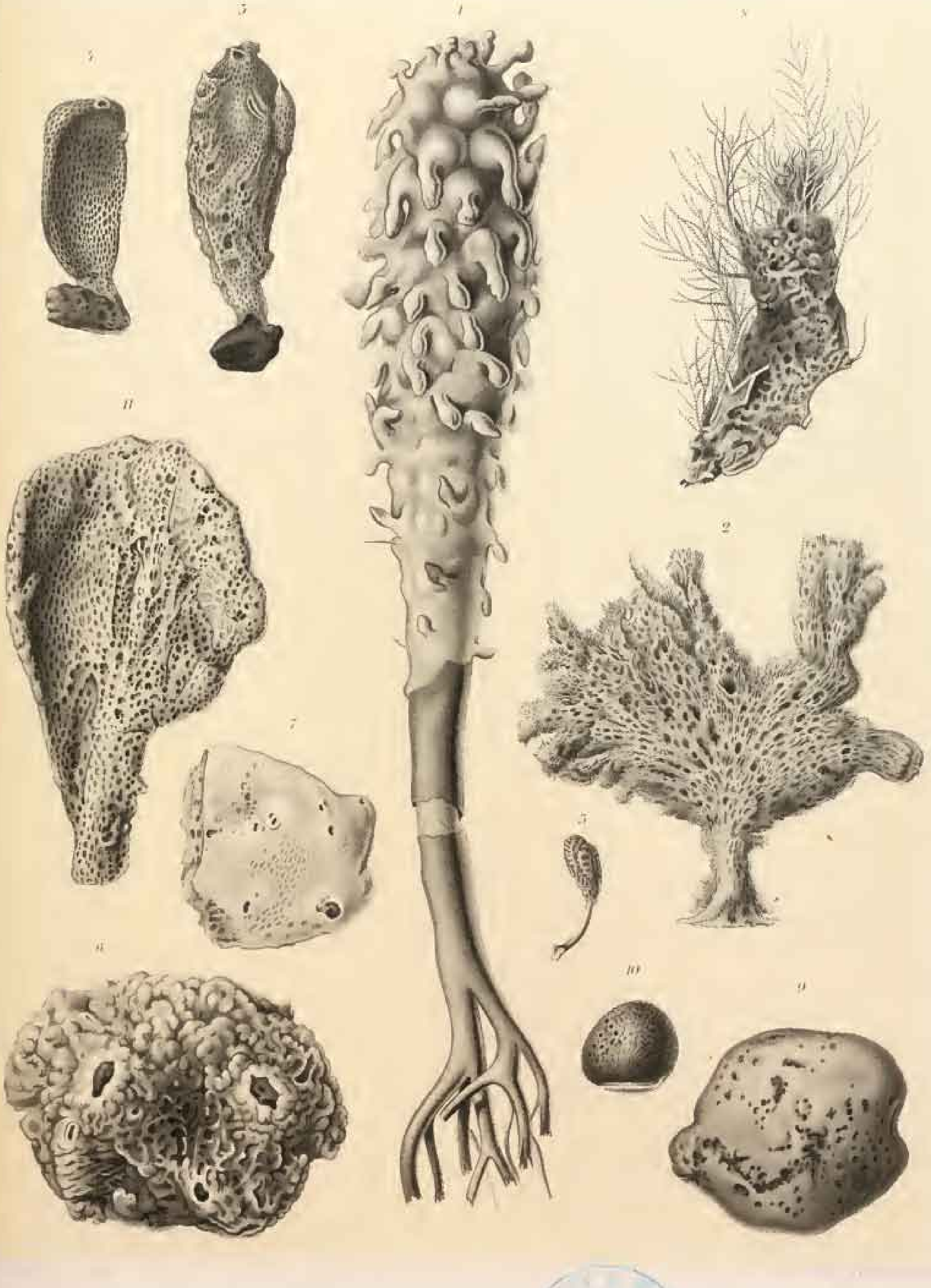


Plate V.

Plate V.

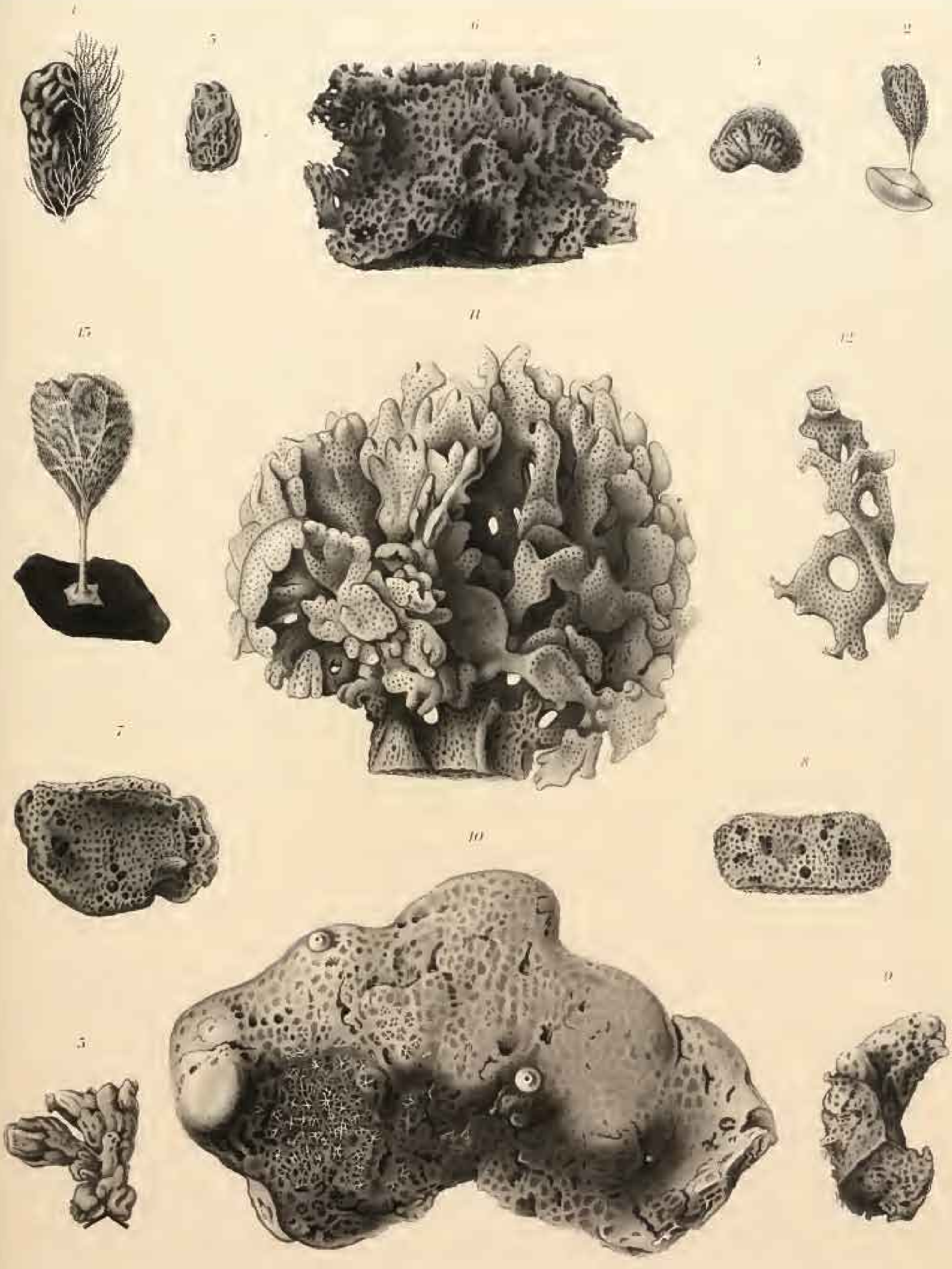

1
6
2
13
11
12
7
8
10
9

Plate VI.

Plate VI.

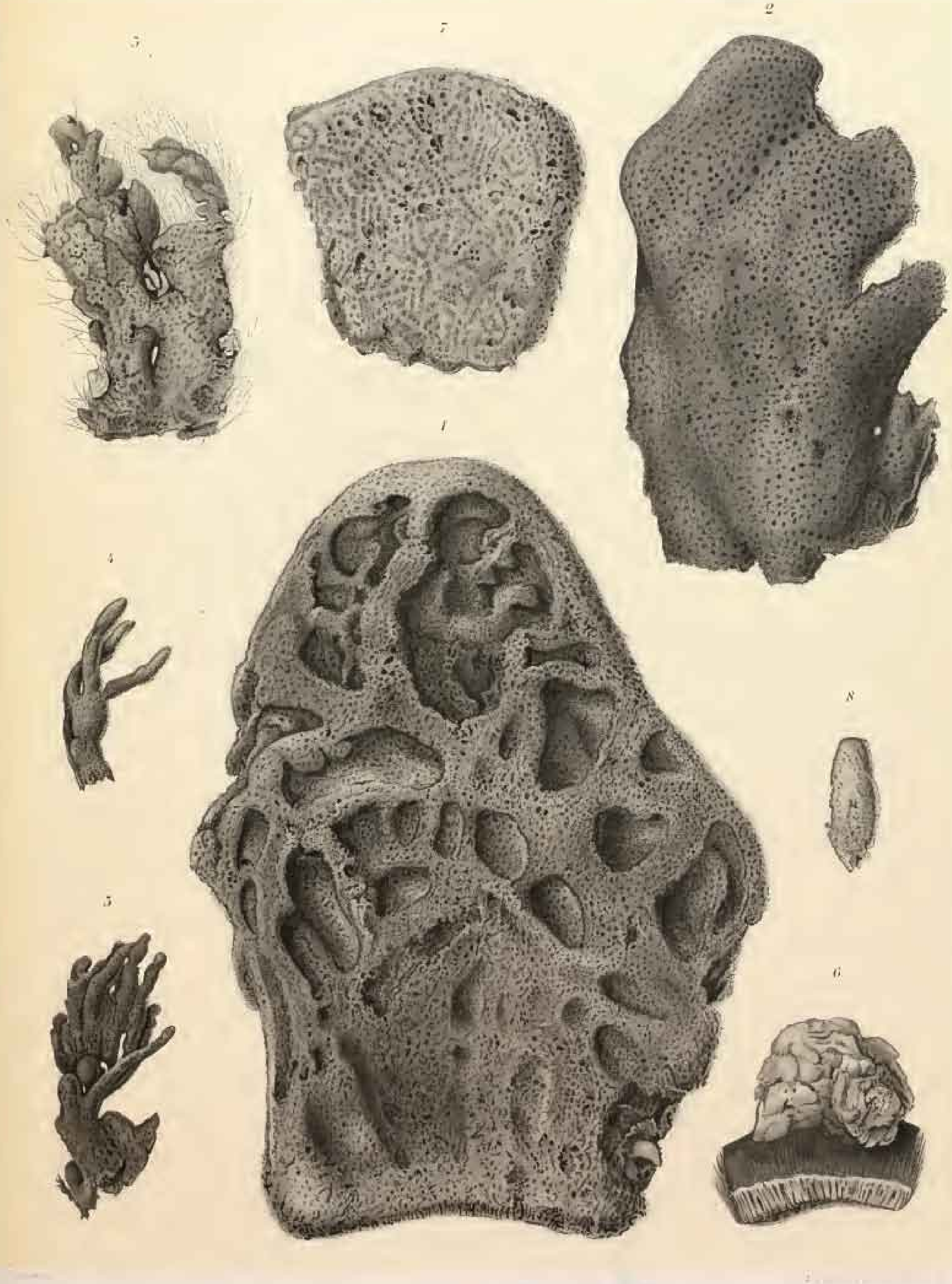
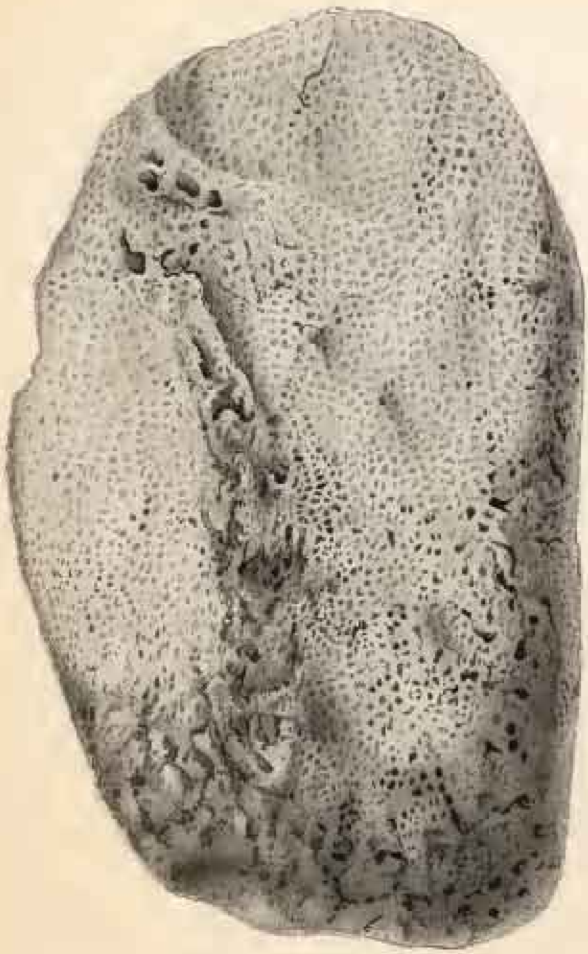

3
7
2
1
4
8
5
6

Plate VII.

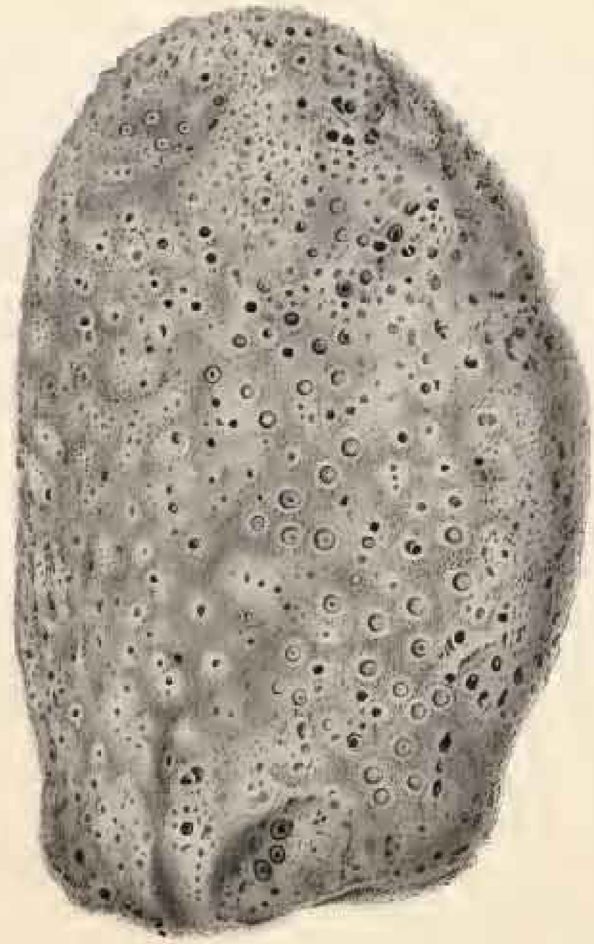
Plate VII.

		Page
Fig. 1.	*Forcepia Thielei* n. sp. Seen from the pore side; the surface damaged in a few places. $^2/_3$	206
— 2.	*Forcepia Thielei* n. sp. Seen from the oscular side, showing oscula, partly quite open, partly quite closed, and in different degrees of closing. $^2/_3$	206
— 3.	*Forcepia Topsentii* n. sp. The papillæ damaged in a few places, so that the canal at their base is seen. $^1/_1$	204
— 4.	*Melonanchora elliptica* Cart. The contour somewhat damaged; five oscula are seen. $^1/_1$	211
— 5.	*Melonanchora elliptica* Cart. Pore tubercle, seen from the side. ca. $^{11}/_1$	211
— 6.	*Melonanchora elliptica* Cart. Pore tubercle, seen from above. ca. $^{11}/_1$	211

1

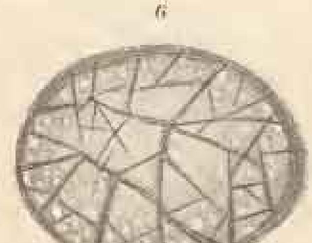


2



3

6



4

5

Plate VIII.

Plate VIII.

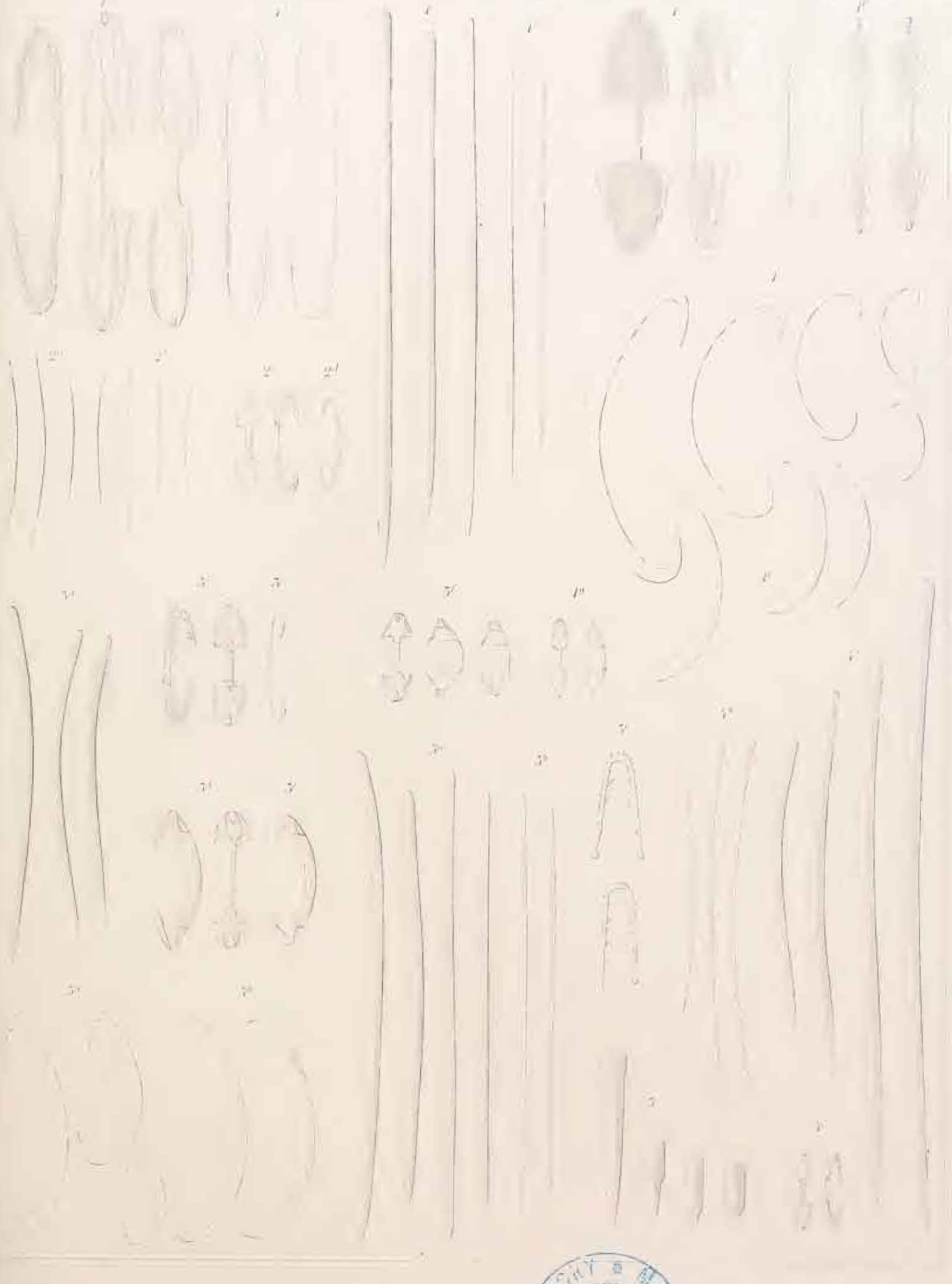


Plate IX.

Plate IX.

Plate X.

Plate X.

Page

Fig. 1. *Mycale ovulum* O. Schmidt. *a* styli of different sizes, *b* three developmental forms, × 165, *c* anisochelæ palmatæ of different sizes and with different dimensions of the parts, front view and side view, *d* chela with almost uniform ends, *e* younger and older developmental form, side view and front view, × 585 34

— 2. *Mycale thaumatochela* n. sp. *a* styli, × 165, *b* anisochela palmata, front view and side view, × 585; *c—g* the peculiar anisochela, *c* side view, the axis to the right, *d* front view, *e* from behind, *f* seen from the small end in optical section showing the tooth in front, the lateral alæ on each side, the ala of the axis behind, and in the middle the lower part inscribed, this latter part seen with the highest focal distance, × 1400, *g* the chela in side view, × 585 39

— 3. *Mycale titubans* O. Schmidt. *a* styli of the large form, *b* styli of the small form, × 165, *c—g* chelæ, *c* front view, *d* turned a quarter of a turning to the right, *e* turned a quarter of a turning to the left, *f* larger chela in the same position as *d*, showing the serrated expansion of the lower tooth, *g* larger chela, from behind, × 1000, *h* sigmata of different sizes, plane and contort, × 380 41

— 4. *Asbestopluma pennatula* O. Schmidt. *a—b* styli from the axis, *a* of the slender, straight ones, *b* of the thicker, curved ones, *c* subtylostyli from the lateral branches, × 120, *d* the head-end of two of the subtylostyli from the lateral branches, × 485, *e* finely spinulous tylostrongyla of different sizes, from the stalk-coating, *f* one of the almost smooth developmental forms, × 485, *g* the characteristic anisochela palmata, front view and side view, *h* seen from the small end, × 1400, *i* anisochelæ palmatæ of the large form in different variations, front view and side view, *k—n* seen from the small end, *k* with irregularly split middle tooth, *l* regular, with intact middle tooth, *m* with a split lateral tooth, *n* with regularly split middle tooth, × 585, *o* sigmata, × 700 44

— 5. *Asbestopluma pennatula* O. Schmidt. Transverse section of the axis, going through two lateral branches, in a place where these are short, the canals of the axis are seen, × 32. 44

— 6. *Asbestopluma pennatula* O. Schmidt. Transverse section of the axis some way below the lateral branches, showing canals and the stalk-coating, × 32 44

— 7. *Asbestopluma pennatula* O. Schmidt. Fragment of a transverse section through the thickened part of the stalk with canals and stalk-coating, a little diagrammatic, × 20 44

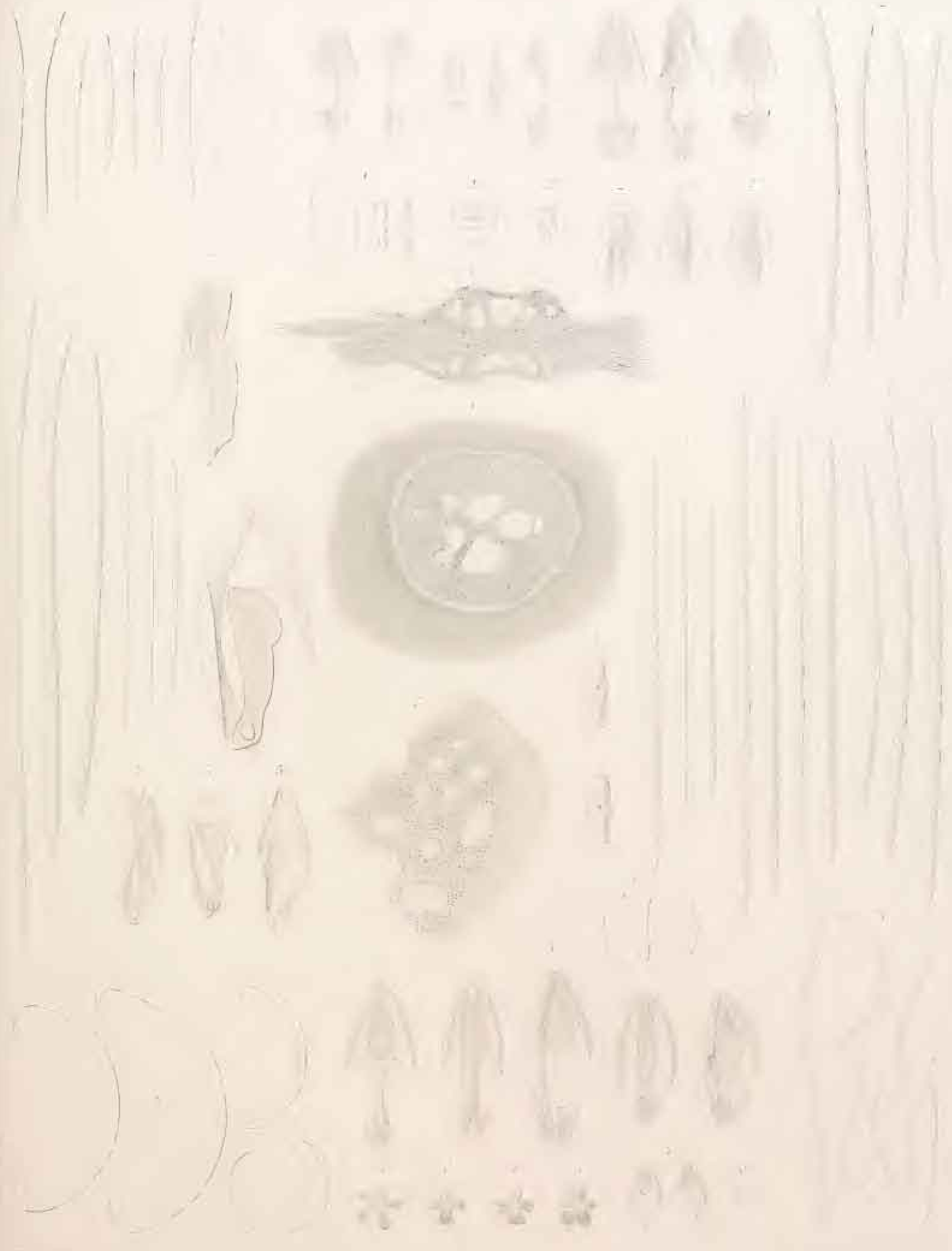


Plate XI.

Plate XI.

Page

Fig. 1. *Asbestopluma bihamatifera* Cart. *a*—*b* styli from the axis, *a* from the upper part, *b* from the lower part, *c* subtylostyli from the lateral branches, × 120, *d* spinulous tylostyli from the stalk-coating, × 485, *e* the characteristic anisochela palmata, front view and side view, × 1400, *f* anisochela palmata of the large form, front view and side view, × 585, *g* sigmata, × 700 51

— 2. *Asbestopluma bihamatifera* Cart. Transverse section of the axis in the ramigerous part, the lateral branches rather short, spicula-bundles and canals are seen, × 32 51

— 3. *Asbestopluma furcata* n. sp. *a* styli from the axis of different sizes, *b* subtylostyli from the lateral branches, × 120, *c* head-end of a subtylostylus, × 485, *d* finely spinulous tylostrongyla from the stalk-coating, × 485, *e* the characteristic anisochela palmata, front view and side view, × 1400, *f* anisochelæ palmatæ of the large form, front view and side view, partly with split, partly with intact small tooth, × 585, *g* sigmata, × 700, *h* subtylostyli from embryo, × 255 54

— 4. *Asbestopluma cupressiformis* Cart. *a* subtylostyli, *b* styli from the lower part of the axis, × 120, *c* anisochela palmata, side view and front view, *d* seen from the small end, × 1400, *e* forcipes, × 700, *f* spicula of different forms, from embryo, × 255 58

— 5. *Asbestopluma cupressiformis* Cart. Embryo showing the spicula-bundle, × 100 58

— 6. *Asbestopluma lycopodium* Levins. *a* styli of different sizes, *b* styli from the base of the stalk, × 120, *c* anisochela palmata, side view and front view, × 1400, *d* forcipes, × 700 62

— 7. *Asbestopluma lycopodium* Levins. Transverse section, showing the fibres of the axis, the spicula of the lateral branches, and embryos in different sizes, × 32 62

— 8. *Asbestopluma hydra* n. sp. *a*—*c* subtylostyli, *a* from the stalk, *b* from the branches, *c* an intermediate form, × 120, *d* head-end of a subtylostylus from the stalk, *e* head-end of a subtylostylus from the branches, × 485, *f* anisochela palmata, side view and front view, × 1400 66

— 9. *Asbestopluma infundibulum* Levins. *a*—*e* styli and subtylostyli, *a* from the calyx and the upper part of the stalk, *b* from the lower part of the stalk, *c* two of the projecting spicules with distinct head-swelling, *d* from the refolded edge of the calyx, *e* two of the long, fine spicules, projecting from the wall of the calyx, × 120, *f* anisochelæ palmatæ of different sizes and with different dimensions, side view and front view, *g* half front view, *h* seen from the small end, *i* tooth of the small end, seen from the inside, × 1400, *k* forceps, × 700, *l* spicula of different forms from embryo, × 255, *m* chela from embryo, × 1400 68

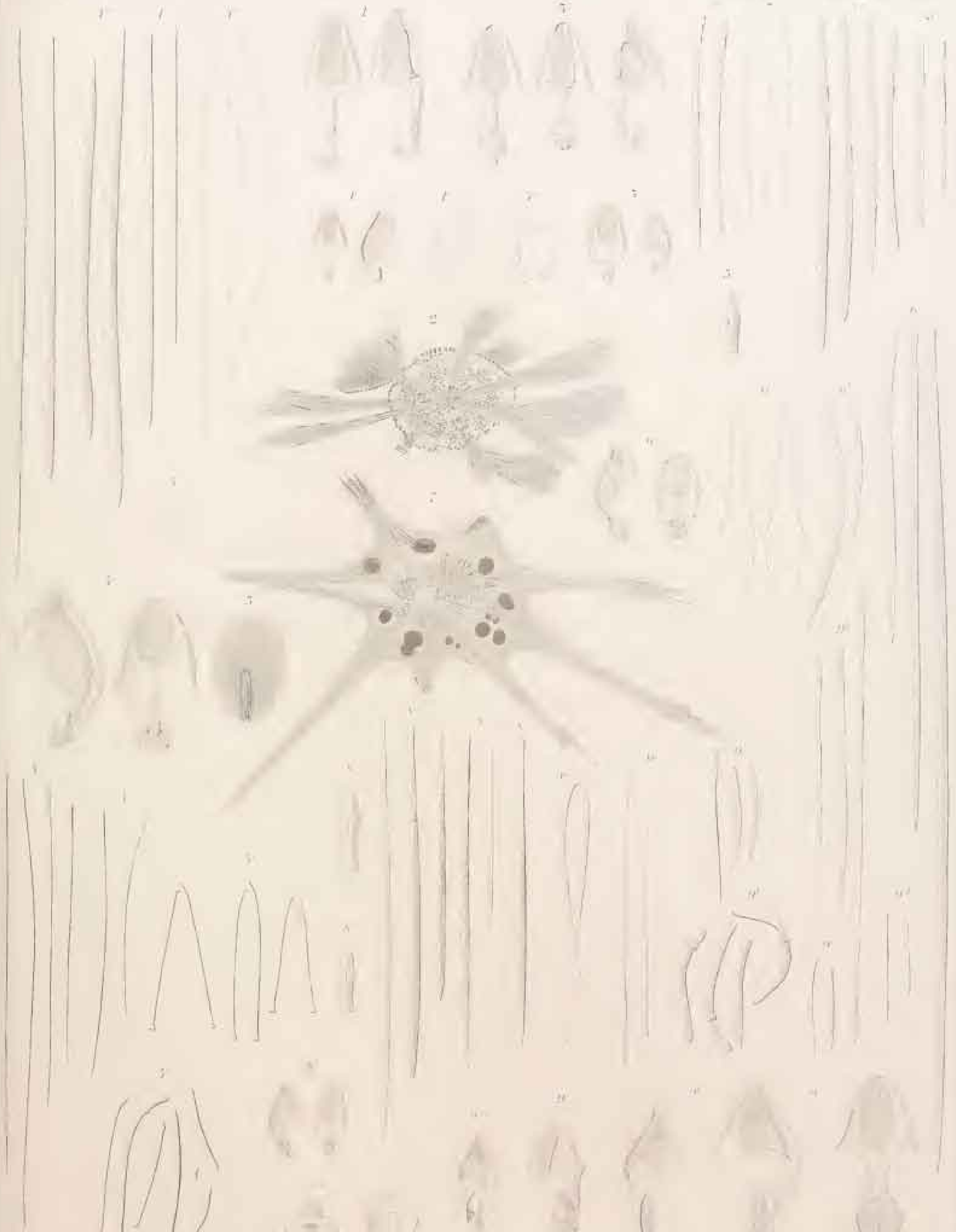


Plate XII.

Plate XII.

Page

Fig. 1. *Asbestopluma comata* n. sp. *a* styli from the stalk, *b* subtylostyli from the calyx-wall, *c* subtylostyli from the refolded edge of the calyx, *d* long and finely pointed styli of those which project from the surface, *e* pearlstring-shaped styli, × 120, *f* anisochela palmata, side view and front view, × 1400 72

— 2. *Cladorhiza abyssicola* M. Sars. *a*—*b* styli, *a* from the axis, *b* from the branchlets, × 120, *c* anisancora unguifera, side view and front view, (as the teeth in the figure seen from the side are seen a little obliquely, the narrow tuberculum is not seen in the middle of the tooth but a little in one side of the tooth), *d* ancora, seen from the large and from the small end, × 1000, *e* sigmata of the large form, *f* sigmata of the small form, ×460 79

— 3. *Cladorhiza gelida* n. sp. *a*—*b* styli, *a* of a preparation from the axis, *b* of a preparation from the branchlets, × 120, *c* anisancora unguifera, side view and front view, the latter a little oblique, *d* one of the youngest developmental forms, × 1000, *e* sigmata of the large form, *f* one end of a sigma, seen about from the front, showing the compression, *g* younger and older developmental form, *h* sigmata of the small form, × 460 83

— 4. *Cladorhiza tenuisigma* n. sp. *a*—*b* styli, *a* of a preparation from the axis, *b* of a preparation from the layer of tissue and the branchlets, × 120, *c* anisancora unguifera, side view and front view, × 1000, *d* sigmata of the common form, *e* sigmata of the peculiar form, × 460 87

— 5. *Cladorhiza iniquidentata* n. sp. *a* styli, × 120, *b* anisancora unguifera, side view and half front view, *c* ancora with seven teeth, the large end seen from the inside and the small end seen from the outside, *d* ancora with eight teeth, the large end seen from the inside, *e* ancora from embryo, side view and front view, × 1000 91

— 6. *Cladorhiza corticocancellata* Cart. *a* styli, × 120, *b* anisancora unguifera, side view and front view, × 1000, *c* sigmata of the large form, *d* a developmental form, *e* sigmata of the small form, × 460, *f* ancora from embryo, about from the front and from the side, × 1000 93

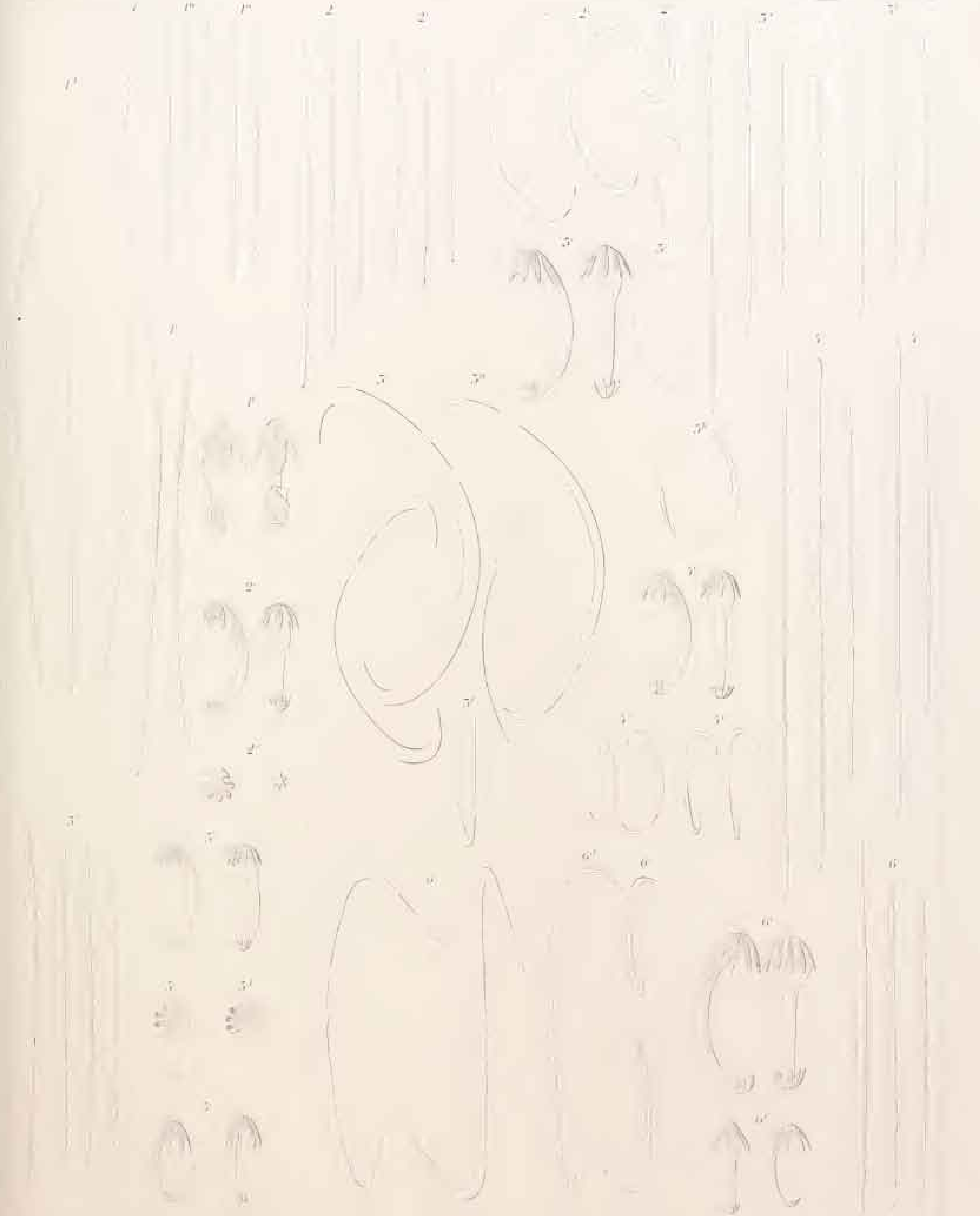


Plate XIII.

Plate XIII.

Page

Fig. 1. *Cladorhiza oxeata* n. sp. *a—b* oxea, *a* from the axis, *b* from the tissue and the branchlets, × 120, *c* anisancora unguifera, front view and side view, × 1000, *d* sigmata of the large form, *e* a developmental form, *f* sigmata of the small form, × 460 97

— 2. *Chondrocladia gigantea* Arm. Hans. *a—b* styli, *a* from the axes, *b* from the tissue, × 77, *c* styli from the stalk-coating, × 340, *d* fragment of a stylus from the stalk-coating, showing the fine spinulation, × 1000, *e* isancora unguifera of the large form, side view and front view, the latter seen a little from the lower end, × 585, *f* ancoræ of the small form, one with six, the other with eight teeth; the former in side view a little from the front, the alæ are not seen; the latter in half front view, not all the teeth are to be seen, × 1000, *g* ancora of the small form with seven teeth, side view, × 585, *h* ancoræ of the small form with eight and with seven teeth, from the end, × 1000, *i* sigmata, × 460, *k* ancora of the large form, from embryo, a little contort, so that the lower end shows four teeth, *l* ancora of the transitional size, from embryo, × 585 102

— 3. *Artemisina arcigera* O. Schmidt. *a—b* subtylostyli, *a* from the main skeleton, *b* from the dermal skeleton, × 165, *c* isochela palmata, front view and side view, × 1400, *d* toxa of different sizes, *e* developmental form of a large and a small toxon, × 255, *f* end of a large and a small toxon, × 1000 110

— 4. *Artemisina apollinis* R. and D. *a—b* styli, *a* from the main skeleton, *b* from the dermal skeleton, × 165, *c* head-end of a dermal stylus, *d* head-end of a skeletal stylus, × 700, *e* isochela palmata, front view and side view, × 1400, *f* toxa of both forms, × 255, *g* the middle part and the end of a toxon, thickened by abnorm apposition of silicium, × 255 114

— 5. *Homœodictya flabelliformis* Arm. Hans. *a—b* oxea, *a* from the skeleton, *b* from the dermal membrane, × 165, *c* isochela arcuata of common form, side view and front view, *d* isochela arcuata of strongly curved form, side view and front view, *e* a younger and an older developmental form, × 700 118

— 6. *Homœodictya palmata* Johnst. *a* oxea, × 165, *b* isochela palmata, front view and side view, *c* an older and a younger developmental form, the latter only consisting of the axis, × 1000 121

Plate XIV.

Plate XIV.

Page

Fig. 1. *Dendoricella rhopalum* n. sp. *a* oxea from the main skeleton, *b* tornota from the dermal skeleton, × 165, *c* isochela arcuata with slightly compressed shaft, side view and front view, *d* isochelæ arcuatæ, one with a broad, entire brim, the other with the brim divided in three lobes, *e* a developmental form, × 1000 127

— 2. *Dendoricella obesichela* n. sp. *a* oxea from the main skeleton, *b* oxea from the dermal skeleton, × 165, *c* isochelæ arcuatæ of different sizes, front view and side view, × 1000, *d* sigmata, × 460 130

— 3. *Myxilla incrustans* Johnst. *a* acanthostyli, *b* older and younger developmental form, *c* dermal tornota, × 255, *d* ends of a spined and of an almost smooth tornotum, × 700, *e* ancora spatulifera of the large form, side view, × 700, *f* ancora spatulifera of the small form, front view and side view, × ca. 840, *g* sigmata of different sizes, × 460, *h* styli from embryo, one of the largest and a smaller one, × 585 132

— 4. *Myxilla rosacea* Lieberk. *a* acanthostyli, *b* a developmental form, *c* dermal tornota, *d* a developmental form, with one end almost pointed, × 255, *e* ends of two tornota, × 700, *f—g* ancoræ spatuliferæ of different sizes, front view and side view, the former a little contort, × 700, *h* sigmata of different sizes, × 460 138

— 5. *Myxilla fimbriata* Bow. *a* acanthostyli, *b* a developmental form, *c* dermal tornota, *d* a not quite young developmental form, × 255, *e* both ends of a typical tornote, × 700, *f* ancora spatulifera of the large form, front view and side view, *g* a young developmental form, *h* ancora spatulifera of the small form, side view, × 700, *i* subtylostylus from embryo, × 585 141

— 6. *Myxilla brunnea* Arm. Hans. *a* acanthostyli, *b* acanthostrongyla, *c* dermal tornota, *d* a developmental form with one end pointed, × 255, *e* both ends of a tornote, × 700, *f* ancora spatulifera of the large form, front view, a little oblique, and side view, *g* ancora spatulifera of the small form, side view, × 700, *h* stylus from embryo, × 585 144

— 7. *Myxilla perspinosa* n. sp. *a* acanthostyli, *b* dermal tornota, × 255, *c* spined end of a tornote, × 700, *d* ancora spatulifera, side view and front view, × 700, *e* sigmata, × 460 . 147

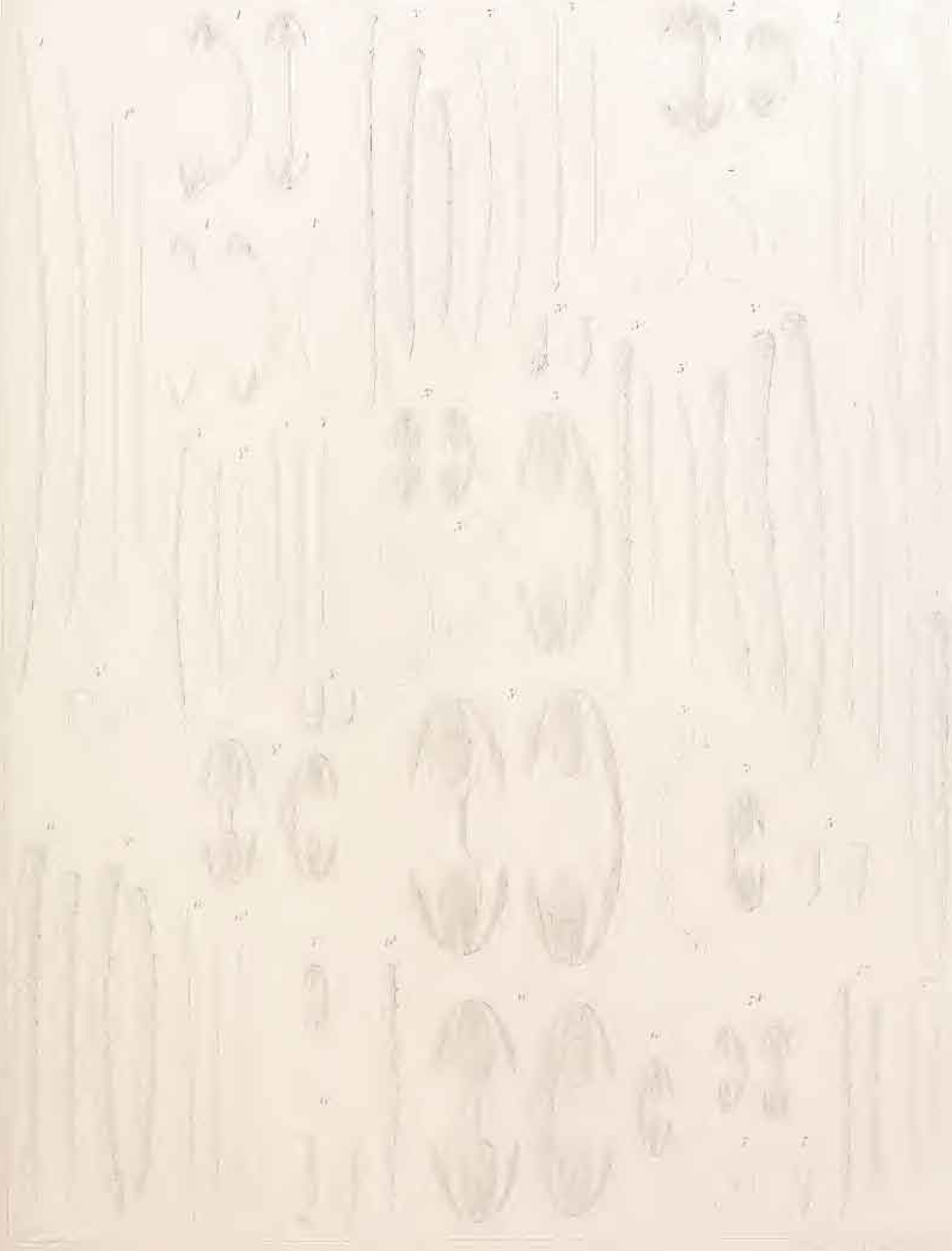


Plate XV.

Plate XV.

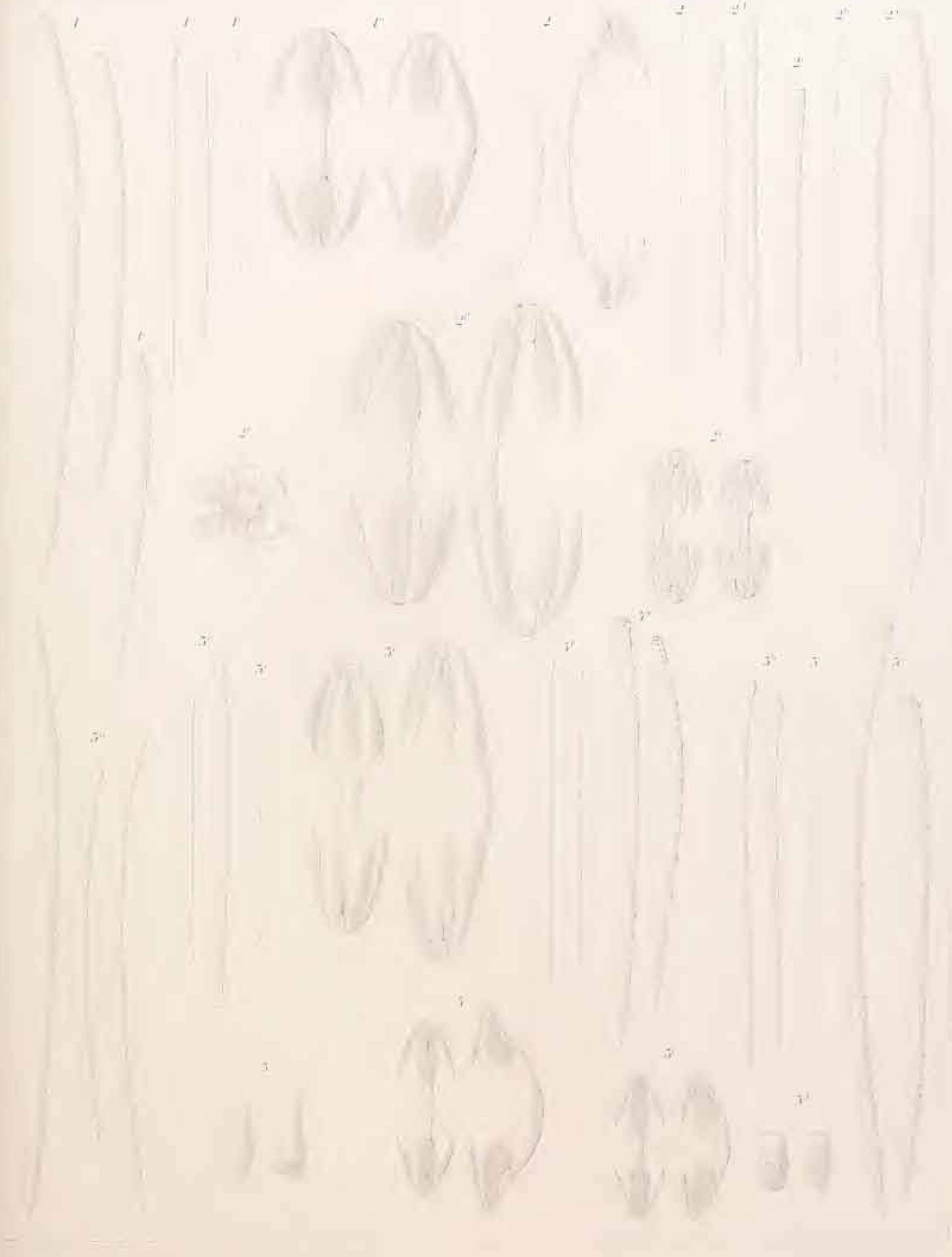


Plate XVI.

Plate XVI.

Page

Fig. 1. *Lissodendoryx fragilis* Frstdt. *a* styli, finely spined and smooth, × 255, *b* upper part of a developmental form, showing the small spines, from an individual with chiefly smooth styles, × 700, *c* tornota, *d* developmental form, × 255, *e* both ends of a tornote, × 700, *f* chela arcuata, front view and side view, × 1000, *g* sigmata × 460 158

— 2. *Lissodendoryx diversichela* n. sp. *a* acanthostyli, *b* tornota, *c* a young tornote, × 255, *d* chela arcuata of the large form, front view and side view, *e* a quite young developmental form and a little older one, the latter showing the flat form of the shaft, × 1000, *f* chela arcuata of the middle form, front view and side view, *g* chela arcuata of the small form, front view and side view, × 1400, *h* sigmata of different sizes, × 460 160

— 3. *Lissodendoryx indistincta* Frstdt. *a* styli, more and less spined, and one quite smooth, *b* tornota or tornostrongyla, × 255, *c*—*e* chelæ arcuatæ of different sizes, *c* front view and side view, *d* from the side and a little from the front, *e* from the side and somewhat from behind, the alæ of the down-turned side are seen, they appear in this situation as lobes, while the alæ of the up-turned side appear clawformed, × 1000, *f* the peculiar chela in different sizes, side view and front view, *g* from the end, × 1400, *h* sigmata of different sizes, × 460 162

— 4. *Lissodendoryx complicata* Arm. Hans. *a* styli, *b* younger and older developmental form, the youngest with a head-swelling, × 200, *c* the upper end of a style, showing axial canal with a little swelling, × 585, *d* tornota, × 200, *e* chela arcuata, front view and side view, × 1000, *f* sigmata of the small form, *g* sigmata of the large form, × 460. 166

Plate XVII.

Plate XVII.

Page

Fig. 1. *Lissodendoryx vicina* n. sp. *a* styli, × 200, *b* the upper end of a style, showing the axial canal with a little swelling, × 585, *c* tylota × 200, *d* chela arcuata, front view and side view, × 1000, *e* sigmata of the small form, *f* sigmata of the large form, × 460 . 169

— 2. *Lissodendoryx stipitata* n. sp. *a* styli, *b* styli from the stalk, *c* tornota, × 200, *d* chela arcuata, front view and side view, *e* developmental form, the incipient alæ are seen as edges turned towards the beholder, × 1000 170

— 3. *Iophon piceus* Vosm. *a* acanthostyli of different sizes and differently spined, *b* tylota, *c* a not quite young developmental form, × 255, *d* both ends of a tylote, × 700, *e* chelæ palmatæ of different sizes and different dimensions of the various parts, front view and side view, × 1000, *f*—*k* bipocilla of different sizes, *f* side view, *g* half front view, *h* from behind, *i* from the upper end, *k* from the lower end, × 1400, *l* acanthostylus from embryo, × 585 175

— 4. *Iophon dubius* Arm. Hans. *a* acanthostyli, *b* tylota, × 255, *c* chelæ palmatæ of different sizes, front view and side view, *d* a not quite young developmental form, × 1000, *e* bipocilla, front view and side view, × 1400 180

— 5. *Iophon frigidus* n. sp. *a* acanthostyli, *b* the upper end of acanthostyli, one with distinctly marked, the other with slightly marked spines, *c* tylota, *d* developmental form, × 255, *e* both ends of a tylote, × 700, *f* chelæ palmatæ of different sizes, front view and side view, × 1000 183

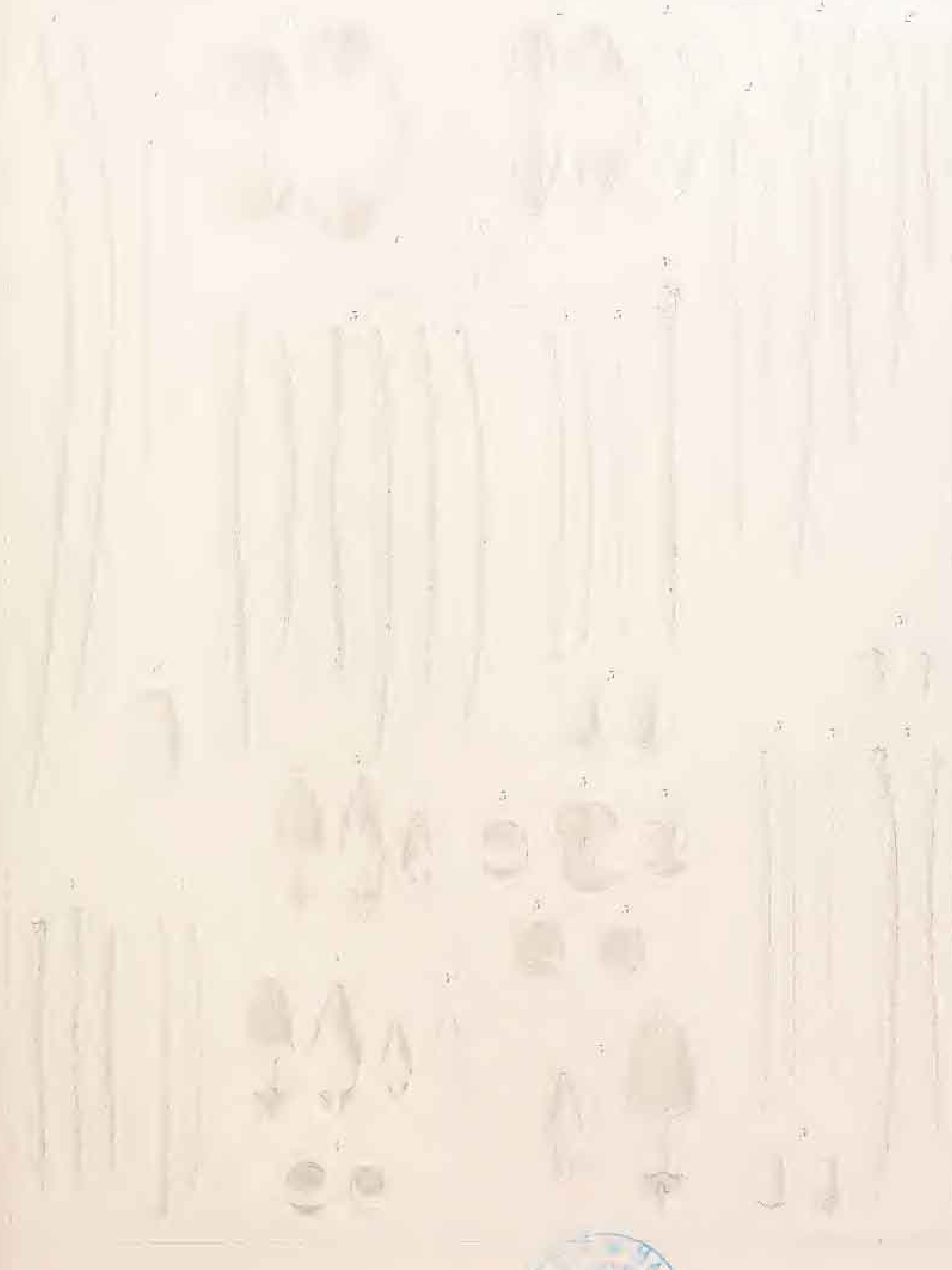


Plate XVIII.

Plate XVIII.

Plate XIX.

Plate XIX.

Page

Fig. 1. *Iotrochota spinosa* n. sp. *a* acanthostyli, *b* tylotum, × 200, *c* birotula of the large form, *d* developmental form, × 1000, *e* birotula of the small form, × 1400 195

— 2. *Forcepia forcipis* Bow. *a* styli, *b* tylotum and polytylote developmental form, × 200, *c* chela arcuata of the large form, front view and side view, *d* chela arcuata of the small form, front view and side view, × 1000, *e* forceps of the large form, *f* developmental form, × 255, *g* a piece of one of the legs, about from the middle, × 1000, *h* forceps of the small form, × 1400 198

— 3. *Forcepia fabricans* O. Schmidt. *a* styli, *b* tylota, one slightly, the other distinctly polytylote, × 200, *c* chela arcuata, front view and side view, × 1000, *d* forceps of the large form, *e* developmental form, × 1000, *f* forceps of the small form, × 1400, *g* sigma, × 460 201

— 4. *Forcepia Topsentii* n. sp. *a* styli, *b* tylotum, × 200, *c* chela arcuata, front view and side view, × 1000, *d* forceps of the large form, × 675, *e* the same of obtuse-angled form, × 460, *f* forceps of the small form, × 1400, *g* sigma, × 460 204

— 5. *Forcepia Thielei* n. sp. *a* styli, *b* tylotum, × 200, *c* chela arcuata, front view and side view, × 1000, *d* forceps, × 1000, *e* sigma, × 460, *f* spined stylus from embryo, × 585. 206

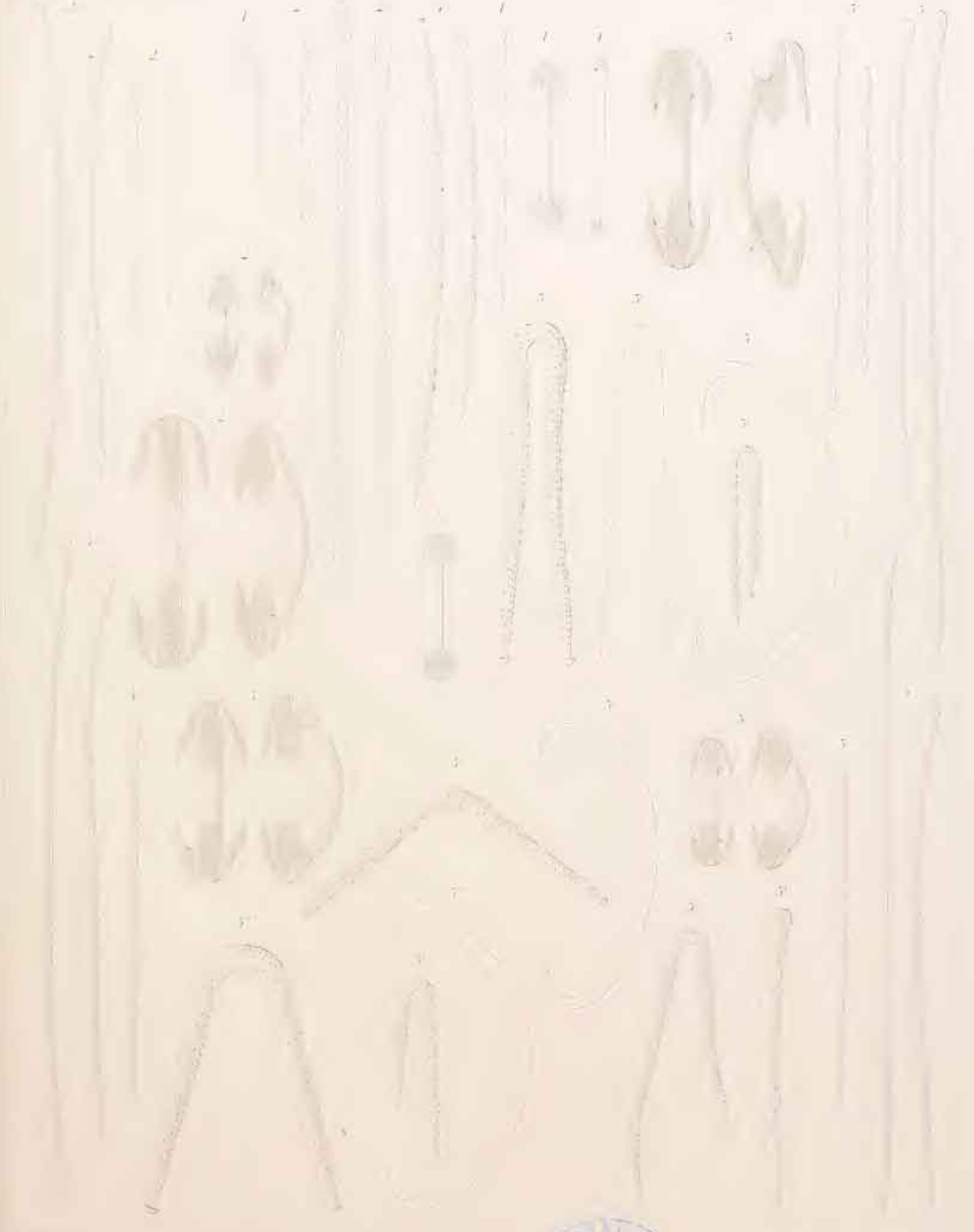


Plate XX.

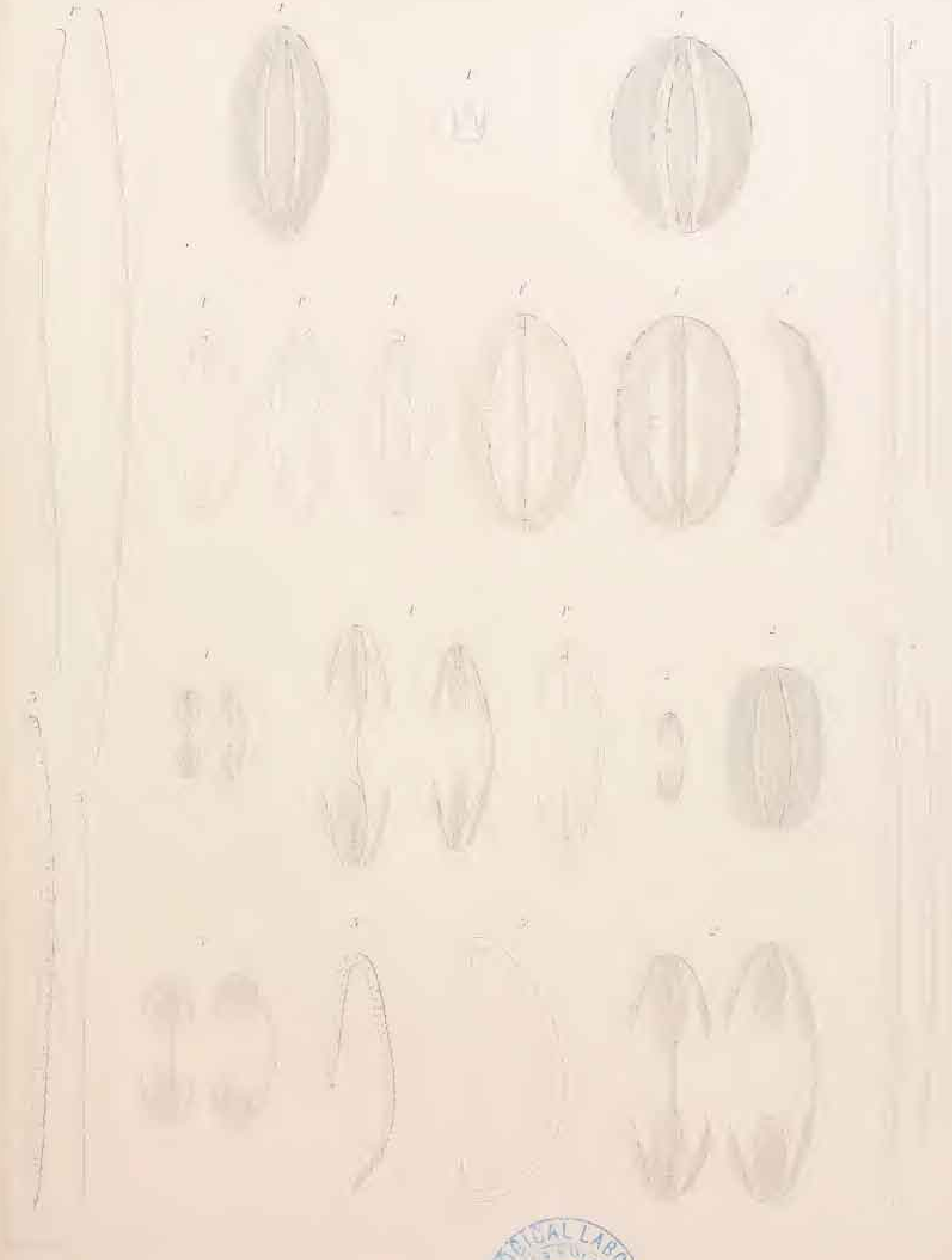
Plate XX.

Page

Fig. 1. *Melonanchora elliptica* Cart. *a* styli, one with rounded point, *b* tylota, × 200, *c* sphærancora of long elliptical form, *d* the same of broad elliptical form, both with the original axis to the right, *e* young developmental form, *f* older developmental form, *g* developmental form with nearly connected teeth, *h* developmental form with the four arcs formed, but without the striated brims, the original axis to the right, *i* form with beginning striated brims, *k* arc with nearly fullgrown striated brims, *l* transverse section through fully developed arc, showing the median part and the side-brims, × 700, *m* ancora of the large form, front view, a little oblique, and side view, *n* developmental form, *o* ancora of the small form, front view and side view, × 700........ 211

— 2. *Melonanchora emphysema* O. Schmidt. *a* tylota, × 200, *b* sphærancora, × 700, *c* ancora of the large form, front view and side view, *d* ancora of the small form, side view, × 700.......... 216

— 3. *Forcepia groenlandica* Frstdt. *a* acanthostylus, *b* tylotum, × 200, *c* chela arcuata, front view and side view, × 1000, *d* forceps, × 1000, *e* sigma, × 460.......... 209



THE DANISH INGOLF-EXPEDITION.

HITHERTO PUBLISHED:

1899.	**Vol. I, Part I.**	1. Report of the Voyage by *C. F. Wandel* (1 plate) ... 2. Hydrography by *Martin Knudsen* (34 plates) ...	Kr. 25,00
1900.	— **Part II.**	3. The deposits of the sea-bottom by *O. B. Bøggild* (7 charts) ... 4. Current-bottles by *C. F. Wandel* (1 plate) ...	- 8,00
1899.	**Vol. II, Part I.**	The ichthyological results by *Chr. Lütken* (4 plates) ...	- 13,00
1899.	— **Part II.**	On the Appendices genitales (Claspers) in the Greenland-Shark, Somniosus microcephalus (Bl. Schw.), and other Selachians by *Hector F. E. Jungersen* (6 plates) ...	
1900.	— **Part III.**	Nudibranchiate Gasteropoda by *R. Bergh* (5 plates) ...	- 4,75
1904.	— **Part IV.**	The North-European and Greenland Lycodinæ by *Adolf Severin Jensen* (10 plates) ...	- 9,75
1899.	**Vol. III, Part I.**	Pycnogonidæ by *Fr. Meinert* (5 plates) ...	- 6,00
1903.	**Vol. IV, Part I.**	Echinoidea, Part I, by *Th. Mortensen* (21 plates) ...	- 20,00
1904.	**Vol. V, Part I.**	Pennatulida by *Hector F. E. Jungersen* (3 plates) ...	- 6,50
1902.	**Vol. VI, Part I.**	Porifera (Part 1), Homorrhaphidæ and Heterorrhaphidæ by *Will. Lundbeck* (19 plates) ...	- 17,00
1905.	— **Part II.**	Porifera (Part 2), Desmacidonidæ (Pars) by *Will. Lundbeck* (20 plates)	- 20,50

UNDER PREPARATION:

Vol. III, Part II. Crustacea Malacostraca, I: Decapoda, Euphausiacea, Mysidacea by *H. J. Hansen.*

Vol. IV, Part II. Echinoidea, Part II, by *Th. Mortensen.*