REPORT ON THE SPONGES

DREDGED UP IN THE ARCTIC SEA BY THE „WILLEM BARENTS"

in the years 1878 and 1879.

BY

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The Sponges, dredged in the year 1878 by Dr. Sluiter, and in 1879 by Mr. van Lith de Jeude, and which I hope to describe here afterwards, are all preserved in spirits. But all are done in toto in liquor, often with many other objects in the same bottle. This is the reason that they are not in a fit condition for studying many histological details. What I have seen of different tissues, I have noticed and illustrated for myself, in order to profit by it afterwards. For the moment it seemed to me too full of gaps for publication. Thus in the following lines I only give an account of the Sponges in a systematic view. Some observations must however be made before I can commence.

In reading the researches of our *recent* Spongiolists we every time become more convinced that the idea „species" is to be taken in a very wide sense. The history of *Thenea muricata* Gray may serve as an example. When I observed specimens of this Sponge for the first time, I believed it to be a new species; but after researches on some more specimens I soon became convinced 1°. that there was a narrow relation between these different specimens, and 2°. that

they did not possess such characters as seemed to me to have a *specific* value. They are varying in size, colour, shape and spiculation. But as never a correlation of this distinctive was to be observed, so I thought it without doubt the most practicable way in uniting them to one single species. Haeckel, Schmidt and F. E. Schulze have described several species that show plenty of varieties. Most of the Calcareous Sponges, our common Sponge (*Euspongia officinalis*), *Spongelia pallescens* a. o. are instances.

Observations on *Thenea muricata* Gray again have proved to me that in several Sponges there are to be discerned two kinds of spicules; viz. such as are characteristic for the species, and others which often occur so few in number that their presence or absence never can be a distinction. I propose to call „*specific spicules*" those which are a „*conditio sine qua non*" for the species: which are *characteristic* for it. Those spicules which form the character of the genus may be called „generic spicules" as f. i. the well-known palmato-inequiended anchors for *Esperia*. Now it is to be noticed that these spicules can occur in other species or genera; but in that case the whole combination of spicules form the character. For this combination of spicules I propose the general term of „indicating spicules" („*spicula indicantia*"). I need not say that when this term is used in the diagnosis of a species, the specific spicules are meaned, in other cases „subspecific" (subspecies = varietas), generic spicules etc.

As for the formulas or signs, used in the following lines, I must refer to my paper on this subject [1]). In the spicules of Tetractinellidae the angle ϕ can be $>$, $<$ or $= 90°$. I must however say that $\phi \begin{matrix} > \\ = \\ < \end{matrix} 90°$ not is to be taken in a strict mathematical sense; $\phi = 90°$ is written when the three teeth (d) are *about* rectangular to the shaft (M); you may say: when the term patento-ternate is to be used. When ϕ is not *much* larger or *much* smaller than 90° (*but*

1) Versuch einer spongiologischen Stenographie. In Tijdschr. Ned. Dierk. Vereeniging. V (1881).

only in these cases!) it may be written so. Naturally there are transitions; in several cases one person will write this, another that, just as two persons in describing the shape of spicules will not always agree whether they are patento-ternate or expando-ternate, of course. In such cases it is perhaps practical to put the sign in parenthesis. So I have done this often when f. i. in subspinulate spicules the heads are very indistinct, or when spicules are not fusiforme but subfusiform. One will see often formulas as (tr^2) ac, tr. ac. (f), ac^2 (sp.), etc.

The sign NB is added, when the shape is an extraordinary one. The anchorates of *Chondrocladia* and *Cladorhiza* f. i. have another shape than the common anchorates.

The system of Mr. Gray contains innumerable things which are absolutely wrong and useless. I wish however to accept his distinction of two great groups, viz. 1°. *Porifera calcarea* and 2°. the other Sponges, which Gray [1]) unhappily calls *Poriphora* (to read *Porifera*) *silicea*. The diagnosis he gives, makes that there is no doubt possible about his meaning „Sponges, provided with a siliceous or horny skeleton, or with a horny skeleton strengthened with siliceous spicules". I propose for this group, which is indeed composed of Sponges more closely allied with another than with the Calcareous Sponges, simply the term: *Porifera non-calcarea*.

A. PORIFERA CALCAREA.

There were dredged only four small specimens of Calcareous Sponges. Now for a good determination it is indispensable to make some slices and to reserve a piece for boiling with kali causticum in order to study the spicules. I have not been able to make slices enough, for the specimens are small and seem to belong each to another species. For that reason I have still some doubt about the determination.

1) Proceed. Zool. Soc. 1867 pag. 502.

1. ? **Sycandra ciliata** (Fabr.) H.

Local. Lat. 74° 9′ N.; long. 45° 2′ E. [Barents Sea] (July 29, 1878).

Geogr. distrib. North-Atlantic Ocean; South-Arctic Ocean.

Depth. 160 Fathoms.

Synon. and literature (to see Haeckel, Kalkschw. II p. 296; III Tabb. 51 and 58).

Observation. The specimen brought home, measures only 1.5 c.m., being one single „person" without „Peristom-Kranz".

2. ? **Sycandra compressa** (Fabr.) H.

Local. Lat. 73° 25′ N.; long. 55° E. [Matosjkin Shar] (Aug. 1878).

Geogr. distrib. North-Atlantic Ocean; South-Arctic Ocean.

Depth. 2—11 Fathoms.

Synon. and literature (to see Haeckel, Kalkschw. II pag. 360; III Tabb. 55 and 57).

Observation. One small specimen (colony of two persons).

3. ? **Sycandra arctica** H.

Local. Barents Sea.

Geogr. distrib. Arctic Ocean.

Depth. Unknown.

Synon. and literature (to see Haeckel, Kalkschw. II, pag. 353; III Tabb. 55 and 60).

Observation. One very small specimen, measuring only 2 c.m.

4. ? **Sycandra utriculus** (O. S.) H.

Loc. Lat. 75° 16′ N.; long. 45° 19′ E. [Barents Sea] (July 30, 1878).

Geogr. distrib. North-Atlantic Ocean; South-Arctic Ocean.

Depth. 160 Fathoms.

Observation. One small specimen.

B. PORIFERA NON-CALCAREA.

Although there have been found true *Ceraospongiae* in the Arctic Ocean, ... Marenzeller [1]) f. i. describes a *Cacospongia*, ... the first two expeditions of the „Willem Barents" have not brought any specimens. All are so-called Siliceous Sponges, among which, as will be seen, very interesting ones and many new species.

5. **Thenea muricata** (Bwk.) Gray. [Pl. I, figg. 1—8; pl. II, figg. 1—21; pl. IV, figg. 114 and 115].

Diagn. *Corpus quasi globosum, cum uno vel pluribus ciliorum protectis. Spongia limo per radicibus inhaerens. Spicula indicantia*: ac^2. | M. ta. | M. ta. d. bif. | st. | st^2. |

Loc. Lat. 60° 52′ 30″ N.; long. 1° 42′ 6″ E.; (May 24, 1878).
„ 76° 30′ „ „ 45° „
„ 73° „ „ 25° „
„ 71° 12′5 „ „ 20° 30′5 „ (July 2, 1879).

Geogr. distrib. Arctic Ocean; Atlantic Ocean; Mediterranean.

Depth. 130—220 Fathoms.

Synon. and literature.

1858. *Tethea muricata* Bwk.
(Bowerbank, Phil. Transact. Vol. CXLVIII part. 2, pag. 308, tab. XXV fig. 18).

1867. *Thenea muricata* Gray.
(Gray, Proc. Zool. Soc. pag. 541).

? 1869. *Normania crassa* (Bwk.)
(Bowerbank, Report Brit. Assoc.)

1869. *Tisiphonia agariciformis* Wyv. Thoms.
(Wyville Thomson, Ann. and Mag. IV.)

1870. *Dorvillia agariciformis* Sav. Kent.
(Saville Kent, Monthly Microsc. Journ. IV).

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1) Die Coelenterata, Echinodermen und Würmer der O. U. Nordpol-Exped. in Denkschr. Akad. Wien. XXXV (1877) pag. 6.

1870. *Tethyopsis columnifer* Stew.
(Stewart, Quart. Journ. Micr. Science X.)
1870. *Wyvillethomsonia Wallichii* Wright.
(Wright, Quart. Journ. Micr. Science X.)
1870. *Stelletta agariciformis* (Wyv. Thoms.) O. S.
(Schmidt, Spong. Atlant. Geb. pag. 68).
1871. *Thenea Wallichii* Wright NB.
(Traquair, Monthly microsc. Journ. IV, pagg. 293—295.
? 1874. *Hymeniacidon placentula* Bwk.
(Bowerbank,
? 1877. *Stelletta echinoides* O. S.
(Schmidt, Archiv. Mikrosk. Anat. XIV.)
1877. *Halyphysema echinoides* H.
(Haeckel, Jen. Zeitschr. XI.)
1879. *Wyvillethomsonia agariciformis* Norm.
(Journ. Conchiology, II, pag. 13.)
1880. *Tisiphonia fenestrata* O. S.
(Schmidt, Spong. Meerb. Mexico II pag. 71.)

To see also:

1862. Bowerbank, Phil. Transact. Vol. CLII part. 2. pp. 770, 793, 782, tab. XXXI fig. 14 and 15.
1864. Bowerbank, Monogr. Brit. Spong. Vol. I, pag. 22.
1868. Bowerbank, Proc. Zool. Soc.
1870. Carter, Ann. and Mag. V pag. 389.
1871. Carter, Ann. and Mag. VII.
1871. Sav. Kent, ibid ibid.
1871. Cubitt, Monthly microsc. Journ. V, pag. tab. LXXXII.
1872. Gray, Ann. and Mag. IX.
1872. Sav. Kent, ibid X.
1872. Bowerbank, Proc. Zool. Soc. pag. 115.
1873. Wyv. Thomson, The Depths of the Sea, pag. 188.
1874. Bowerbank, Monogr. Brit. Spong. Vol. III.
1875. Schmidt, Jahresber. Kieler Bucht, pagg. 115—120.
1875. Marshall, Zeitschr. für Wissensch. Zool. XXV Suppl. pagg. 150, 152 and 168.

1877. Carter, Ann. and Mag. XX.
1878. Merejkowsky, ibid. I.
1878. Carter, ibid. ibid.
1878. Norman, ibid. ibid.
1878. Carter, ibid. II.
1878. Sav. Kent, ibid. ibid.
1880. Sollas, ibid. V. pag. 143.
1880. Norman, ibid. VI.

Special description.

The sponge on which so many different opinions exist, is for more as one reason a very interesting one. It belongs to that group of Sponges that possess a distinct shape; every specimen seems to be an individual, a „Person" in a Haeckelian sense. If I said that the *Thenea* has a distinct form, this is however with slight modifications, as one can see on Plate. I. figg. 1, 2, 3, 6 and. The *type* is the same.

The body is to be divided into two parts viz. the *trunk* and the *roots*. The trunk has a globular form, on which at one or more places the plasma shows little conical papillae, the bases of the roots.

In examining the Sponge accurately, there is to be seen a remarkable *symmetry*. In one of the well preserved specimens one distinguishes at a certain place a horizontal broad split and above this a part of the Sponge that juts out quite like a penthouse. This curious organ is moreover enlarged by a series of very long spicules (Pl. I. fig. 2). This form may be compared with a mediaeval casque. At the top of this casque you see a long bundle of spicules, representing, if you like, the tuft of feathers. In the figg. 5 and 6 however I have represented other specimens that show another form. Instead of one, there are two (or three?) splits, with protruding penthouses. I must call to mind the figures that Oscar Schmidt gives of his *Tisiphonia fenestrata* [1]), showing how the symmetrical form becomes radial. The splits are not always so deep

1) Schmidt, Spong. Meerb. Mexico II tab. X fig. 2.

or broad as in figg. 1 and 5; it may happen that they are very indistinct as in figg. 2 and 3. It is very probable that this curious apparatus shows us a special organ for the entrance of the water. In specimens where the split is large it is covered with a thin membrane containing thousands of little pores. Thus this membrane represents a sieve. It seems to me that all the different specimens only represent one species but in a varying state of contraction. I suppose that the living Sponge can shut and open this penthouse-apparatus; so the second figure whould be the contracted state of fig. 1. I have tried in vain to study the living Sponge; during my stay at Naples no *Thenea* was dredged up. Anybody that has studied a living *Tethya lyncurium* will agree that my supposition is not improbable.

As I only have seen specimens preserved in alcohol, I can't tell what has been the colour of the Sponge in its living state; the specimens of the Barents Expedition are greyish or olive-coloured.

The surface of the Sponge is occasionally very hispid by the protruding spicules, but not always so. Bowerbank is quite right in saying that this „hispidation of the surface of the Sponge is not apparent to the (naked) eye, but is readily sensible to the touch of the finger [1]). A comparison of the figg. 1—8 plate I may show the different hispidation. The little light-greyish specimens are the less hispid.

The roots of the Sponge consist of bundles of flexible long spicules, held together by soft sponge-substance. There may be one or more roots; in the latter case there can be one great thick root and several thinner ones, but it also happens that all the roots have nearly the same value. One time the roots are not or little branched (fig. 1—6) another time they end in numerous thin fibres (fig. 7). Perhaps this difference has some relation with the constitution of the bottom of the sea. In the localities where specimens as in figg. 1, 2 and 3 have been found, the bottom consists of soft

1) Bowerbank, Prov. Zool. Soc. 1872 pag. 116.

blue-greyish clay; there where specimens as in fig. 7 have been dredged up, the bottom was much more stony or sandy, thus more resisting. Now it will be clear that the thin fibres can pierce the soft clay, but, forced to grow through a sandy substance with many little stones, it often will be necessary to change the direction and often only a *part* of the bundle will find an outway. As is represented in figure 7 several of the little sand-particles remain adhering at the fibres of the roots.

Lastly we have to make mention of long bundles that are seen on the top of the Sponge. Sometimes these bundles are very long and slender (fig. 2), another time they are hardly conspicuous (fig. 1) or totally absent (figg. 5, 6 and 7).

In comparing this description and the figures 1—7 with those given by Bowerbank in his „Contributions to a General History of Sponges" [1]) of his *Tethea muricata*, with Wyville Thomson's *Tisiphonia agariciformis* [2]) and with Oscar Schmidt's *Tisiphonia fenestrata* [3]), then it will be clear that there is to be seen a remarkable resemblance between all those Sponges. I hope to show that it is only one species with rather numerous variations! Schmidt was the one of the first Spongiologists who demonstrated the possibility of such great variations. Now anatomy proves to us the near relation between *Tethea muricata*, *Tis. agariciformis*, *Tis. fenestrata* and our Sponge. I regret it very much that the material is not sufficient for histological researches; I could not become acquainted with the whole system of canals.

As I have said in my preface, one must distinguish two kinds of spicules, viz. those that are always abundantly present and those that are very rare or present in one individual and in the other absent. In other terms: spicules that are characteristic for the species, and spicules that are of less importance, and that at most may serve as distinctions for varieties.

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1) Proc. Zool. Soc. 1872 pagg. 115—118, plate V figg. 1—6.
2) Depths of the Sea pag. 188.
3) Spong. Meerb. Mexico, Pl. X. fig. 2 a, b, c.

I could not find a real specific difference between the specimens of the Barents Expedition. It is remarkable that every time I thought I had found a difference, it appeared afterwards that it was too insignificant, while there never existed a correlation of characters. For instance the specimen in fig. 1 has otherwise formed roots than that of fig. 7, and the surface of the latter is more hispid, but the spicules are quite the same. On the contrary specimens as in figg. 1—4 have roots and surfaces that resemble one another totally, but the larger stellate spicules of 1 and 2 were not found in 4. Between 5 and 2 there is much resemblance, but the former has not so many *kinds* of spicules as the latter, etc. The conclusion to which I have come is that either one must accept as many species as individuals or, and this is apparently the best way, one must consider all these specimens as varieties of one single species.

As „specific" spicules („Spicula indicantia") I consider the following ones: ac^2. | M. ta. d. bif. | M. ta. | st. | st^2. | . And now the *Tethea muricata* of Bowerbank possesses these too. I don't hesidate to identify the above described Sponges with Bowerbank's *Tethea muricata.*

In examining exactly the elements of the skeleton we find:

1°. ac^2 [„acerate"] long, slender often nearly filiform, straight or flexuous. The straight ones are nearly always thicker.

The smallest diameter measured only one seventh of the largest one, in spicules of the same length. In order to give an idea of the relative length and thickness of the long spicules I say that, a hundred times magnified, they have a length of $1\frac{1}{3}$ M. and the diameter of a pencil. The ordinary short acerates of the *Renieridae* are sometimes present too.

2°. tr. ac. [„acuate"]. The end never being swollen (as in the „spinulated" spicules). I think they are only modifications of the acerate ones. They don't appear often. When present they have about the same size as the acerates; I have found specimens measuring 11.25 m. m. As I said the acerates can reach a length of 13.33 m. m.

3° M. ta. d. bif. [„ternate, bifurcating"]. I have figured this form of spicules on Plate II. figg. 1, 2, 3 and 4, and there

you can see how much the type varies. Nearly always the „manubrium" is greater than the „dentes", more or less flexuous and ending blunt (fig. 1). The angle that I have named φ is generally little more than 90° (fig. 1); in fig. 21 φ is much larger but these spicules are very rare. The relation between d and d' is also varying. In figg. 3 and 21 d is much longer than d', in fig. 4 on the contrary d' is longer than d. I have seen specimens where d' was eighteen times longer than d. The ends of d' are are either sharp pointed as in the figg. 4 and 21, or blunt as in the figg. 1, 2 and 3.

4°. M. ta $\varphi > 90°$ [„attenuato-expando-ternate"]. This form is not very common; often totally absent. The form is varying rather much. The „dentes" are straight or flexuous, sharp pointed or blunt, long and slender or short and stout. Two blunt ones are to be seen on Plate II. figg. 6 and 7. The manubrium is generally long.

5°. M. ta. $\varphi < 90°$ [„recurvo-ternate"] always very frequent. They appear especially in the roots, and, having the teeth beneath, they do the function of anchors by fixing the root in the sand. They have the same size as the „attennato-expando-ternate" spicules; both are much smaller than the bifurcated ones. The teeth are always sharp-pointed, but varying in length. The figg. 8, 9, 10 and 11 show different kinds of them.

6°. M. ta. Between M. ta. $\varphi > 90°$ and M. ta. $\varphi < 90°$ there are many connections. When the angle φ is *nearly* or wholly right, I have put in the formula: $\varphi = 90°$. Thus when the angle is for instance 100° or even more, you can either write $\varphi = 90°$ or omit the whole indication (M. ta.). All these forms Bowerbank named „patento-ternate." Even when the angle is not quite 90°, *it often makes the impression of it.* In every case this is quite different from the true M. ta. $\varphi < 90°$ or M. ta. $\varphi > 90°$. In the *Thenea muricata* Gray there are plenty of spicules of this kind; the angle φ varying from 90°—110° (120°). It is not impossible that all these *M. ta.* are rudimentary bifurcated spicules. I will call to mind that the teeth d' often are extremely small. The manu-

brium is rather long and slender (as in the *M. ta. d. bif.*) but in a few cases it is shorter than the teeth. I have figured this aberrant form in fig. 5 on Plate II.

7°. *st.* The well-known stellates are dispersed throughout the whole body; at some places they are extremely abundant. Most of them are very small, but with stout radii (fig. 12a, b, c.). In the figures 16* and 17 I have represented two of a larger kind, forming a transition to the gigantic stars represented in the figures 15, 16, 14 and 14* (to see the explanation of the plate). Perhaps there is a generic relation between these and the tetraxile spicules.

8°. *st*². („elongo-stellate"). They have nearly the same size as the small stellate ones. The radii are placed in two or more circles around an axis, as the figures 13, 18, 19 and 20 show.

In examining the surface of the Sponge with a low magnifying power, there is in several cases to be seen, on the top, a ramifying system of canals and cavities (Pl. I, fig. 8) and in the centrum *one* osculum. The membrane that covers the upper surface is provided with many small openings, that we may call the pores. In those specimens where the penthouse is opened (figg. 1, 5, 7) the broad split is covered with a thin membrane provided with numerous such pores. (Pl. IV, figg. 114 and 115). Sections show that under this membrane there are great subdermal cavities, from which probably the incurrent-canals take their origin.

As regards the ramification of the canals etc. I hope to be able of finding it out on my further researches. Among the Sponges of the third and fourth expedition I have found a great quantity of *Thenea muricata;* so it may be that, when a good many sections are made at least the anatomy of the canal system will become clear to me. For the moment I think it is better to say nothing more, than is to be seen on a few specimens and only with a low power.

For the moment I distinguish three varieties.

1. *Thenea muricata* var. α having a rather smooth surface, a light greyish colour, straight roots, often a bundle of long spicules

on the top of the body. The body of the largest specimen measured 1.5 c.m. in diameter. Gigantic stellates, and M. ta. $\varphi > 90°$, rather frequent.

2. *Thenea muricata* var. β. having a more hispid surface, a darker greyish colour, straight roots, no bundle of long spicules on the top of the body. The body of the largest specimen measured 6 c.m. in diameter. Gigantic stellates and M. ta. $\varphi \gtrsim 90°$, when present, very rare.

3. *Thenea muricata* var. γ. having a very hispid surface, a dark green-greyish colour, wrinkled ramifying roots, no bundle of long spicules on the top of the body. The body of the largest specimen measured 2 c.m. in diameter. Gigantic stellates but no M. ta. $\varphi > 90°$.

Schmidt's *Tisiphonia fenestrata* appears to me to belong to the first variety, Bowerbank's *Tethea muricata* to the second. In the Arctic Ocean the latter (var. β.) seems to be the most common variation. All authors, Schmidt, Bowerbank, Wyville Thomson a. o. who give illustrations of our Sponge, seem to have had very mutilated specimens. Thomson's *Tisiphonia agariciformis* is, I believe, only a partly macerated specimen, perhaps of a fourth variety.

6. **Isops sphaeroïdes** n. sp. [Pl. I. Figg. 10 and 11; pl. II. Figg. 27, 28, 39—49; pl. IV, fig. 116.]

Diagn.: *Corpus globulosum. Spicula indicantia*: ac^2 (f) | tr. ac | M. ta. $\varphi = 90°$ | M. ta. $\varphi < 90°$ | M. ta. d. bif. | gl. | st | glst. |

Local: Lat. 71° 12′5 N.; long. 20° 30′5 E. [neighborhood of Hammerfest]. (July 2, 1879).

Depth. 135 Fathoms.

Special description.

a. External character.

There are of the second Dutch Barents-Expedition two specimens dredged up by Mr. van Lith de Jeude. Both are globular. The greater specimen (Pl. I Fig. 10) is hispid by the protruding spicula; the other one doesn't show any protruding spiculation. In the

former specimen there is one osculum that is a little elevated; in the latter this elevation is to be seen also, but there are also other oscula without wall. So it seems, that a wall is not at all a constant distinctive character. Both specimens have a pale yellowish colour.

b. Skeleton.

The cortical layer of globulates is rather thick. The other spicules take their origin in the centrum of the Sponge, here building a hard nucleus. The arrangement of the needles and anchors is a radical one. The elements of this skeleton are the following spicules.

1°. ac^2 and ac^2 (f). (Acerate and sub-fusiformi-acerate). As is to be seen in the figg. 39, 40 and 41 the acerate spicules are more or less sharp pointed; the heads often resemble those of *Isops pallida*; but it will soon be clear on looking at the figures, that they never grow so thick; the length being nearly the same as in *I. pallida*, but the shape is more slender. Frequent.

2°. tr. ac. f. (fusiformi-acuate). These are not very frequent, always longer than the tr. ac. of *I. pallida*. (Pl. II, fig. 27).

3°. M. ta. $\varphi = 90°$ (patento-ternate). The shaft (M) and the teeth (d.) are thinner than those of *I. pallida*. The teeth are sharp-pointed, more or less bent. (Pl. II, fig. 42). Frequent.

4°. M. ta. $\varphi < 90°$ (recurvo-ternate). I have represented two different kinds of the true recurvo-ternate spicules in figg. 45 and 46 on Plate II. In comparing them with the analogous spicules of *I. pallida* it will be clear that there is difference enough. The shaft is much thicker, rising to the same length. In fig. 46 the teeth are very short, rather stout. In both the angle φ is greater than in *I. pallida*.

5°. M. ta. $\varphi < 90°$. There is however yet another kind of spicules, that seems to be characteristic for *I. sphaeroides* viz. the elegant ones, represented in figg. 43 and 44. I can't remember whether I have seen this curious spicules in any other Sponge. I believe that no representation exists of it. If Bowerbank had known them, he would probably have named them *geniculated* recurvo-ternate. The shaft is long and slender, the teeth not very sharp-pointed. They are varying much in length as the figures 43 and

44 show, which are drawn with the camera lucida at the same power (Zeiss A).

6°. M. ta. d. bif. (furcated patento-ternate). The shaft and the teeth are yet thinner than in the M. ta. $\phi = 90°$, but thicker than in the M. ta. $\phi < 90°$. The relation between d and d^1 can be: $d > d^1$, $d = d^1$ or $d < d^1$. They are not extremely frequent but not at all rare.

7°. gl. The globulates are of the ordinary shape.

8°. st. The stellate spicules have about the same shape as those of *I. pallida* but are not thorned. A few times I have seen specimens with some superficially thorned radii, only visible at a great power. (Fig. 47, Pl. II).

9°. glst. The sphero-stellate spicules are much larger than those of *I. pallida*. The radii are very small; see Fig. 48 on Plate II.

In examining this Sponge with the loupe, you will observe many oscula, one time placed on an elevation, another time the wall is unconspicuous. Between these oscula there are to be seen much smaller pores which have about the same diameter as the globulate spicules. The average size of the oscula is about five times the diameter of the pores. Sections through these pores and oscula teach us that both are differing only in size. Very often it is difficult to say if you see an osculum or a pore. On this character Sollas has founded his genus *Isops*, and I believe he is quite right. Sollas disapproves Oscar Schmidt's methode in erecting the genus *Pyxites* for specimens of geodine Sponges which have the oscula congregated in groups. And again Sollas is right in doing so. Lamarck's diagnosis of his *Geodia* is clear enough. According to the law of priority, Lamarck's *Geodia gibberosa* must still be named so, and not *Pyxites*. Schmidt's *Pyxites* has no „raison d'être". Thus I accept Sollas *Isops*. On Plate IV fig. 116 I have given an illustration of a section of *Isops sphaeroides* n. sp. The aspect of the outer surface is hardly differing from that of *Isops pallida*, illustrated on plate IV, fig. 117. It must be remarked that there are also to be seen little conical elevations, of different size. I seems to me that these are the places where

an osculum is breaking out, or where there has been one. Between the greater ones there are perhaps also broken or beginning roots. But not *all* the elevations can represent roots, for they are visible on opposite sides.

O. F. Müller has given an illustration of a Sponge that he entitles *Alcyonium cranium* [1]). I have no doubt that this in an Geodine-Sponge; and even I think there is reason to believe that it is an *Isops*, perhaps *Isops sphaeroides.* Müller does not speak of spicules, of course; for that reason it cannot be certain if it is identical.

7. **Isops pallida** n. sp. [Pl. I, figg. 9 and 15; Pl. II, figg. 22—26, figg. 29—38; Pl. IV fig. 117].

Diagn. *Corpus ellipsoideum vel piriforme, saepe cum radicium exordiïs. Spicula indicantia:* ac^2 (f) | tr°. ac | M. ta. $\varphi = 90°$ | M. ta. $\varphi < 90°$ | gl. | st. sp. | glst. |

Local. Lat. 71° 12′5 N.; long. 20° 30′5 E. [neighborhood of Hammerfest]. (July 2, 1879).

Depth. 135 Fathoms.

Special description.

a. External character.

Both varieties of this Sponge are more or less elongated, pear-shaped and have a faint-yellow colour. The surface is nearly even. In the var. α. the oscula are simply apertures of the „cortical layer", in the var. β. they are surrounded by a wall. I have represented this Sponge (var. β) in fig. 9 Pl. I; the greater number of the oscula are on the top, but they are also to be seen on the lower parts. Some of the oscula posses walls, other ones are destitute of them; besides this there are to be seen many transitions from the fully developed ones to the simple apertures of the var. α. Characteristic for our var. β. are the beginnings of roots (figg. 9 and 15, Pl. I). The var. α. was about 6 c.m. long and 4 c.m. broad (greatest diameter), the var. β. being only 4 c.m. long and 28 m.m. broad (greatest diameter).

1) Zoologia Danica Vol. III. Tab. LXXXV.

b. Skeleton.

The skeleton is formed by a great quantity of spicules radiating from the centrum to the periphery where is formed a stout cortical layer by the globulates. The elements of this ordinary *Geodine*-Sponge-skeleton are the following spicules.

1° ac^2 (f). In both varieties there are very much acerate spicules [ac^2] or sub-fusiform acerate ones [ac^2 (f)] of different kinds. Some of them are very sharp pointed and slowly diminishing as in fig. 29, Pl. II. (var. α), other ones are thick nearly till the end of the spiculum, the top being rather teat-shaped, as in fig. 30, Pl. II. (var. α.); these are the excentric forms; many are between them, and form all possible transitions (fig. 31, 32, Pl. II.). The length as well as the diameter are nearly in all specimens the same. Among these large acerates there are also a few small ones (fig. 33, Pl. II).

2° $t\bar{r}$. ac (acuate spinulate). There are known but a few species of *Geodia*, which possess this kind of spicules. In the first place *Geodia stellosa* Czern. It is not impossible that our *Isops pallida* is but a variety of *G. stellosa* Czern. But as the representation of the spicules given by Czerniawsky is rather schematized and the latin description is not sufficient, so I cannot identify both specimens. Bowerbank has described in Proc. Zool. Soc. '72. pag. 630 his *Pachymatisma areolata*, again one with spinulate spicules. As it is characteristic for this Sponge that the oscula are „congregated in the deep areas of the surface", so I believe that there is no doubt that it is another species, however it is true that the shape of the spicules agree very much. Finally Oscar Schmidt has described a *Geodia* with tr°. ac. to wit *G. globus*. Also Schmidt gives a description that is much too short and without doubt is incomplete. Schmidt himself has stated in his „Spongien des Meerbusens von Mexico" that he has overseen the stellate spicules of the *Geodidae*; so it is very probable that *G. globus* possesses stellate spicules and perhaps also other forms of spicula. Schmidt has found in his *G. globus* only bifurcated anchors; for this reason I cannot indentify this with *Isops pallida*. Perhaps one will find afterwards that *G. globus*

has yet other anchors, and that *I. pallida* is a variety of *G. globus* [1]). The presence of spinulate spicules must in every case be a „conditio sine qua non" for *I. pallida*. In the var. α they are very abundant, in the var. β they are present, but fewer in number. I have figured the tr°. ac. on Plate II. fig. 26. In fig. 25 the head is not very distinct and nearly tr. ac. (acuate).

3° M. ta. $\varphi = 90°$ (expando-ternate). They are rather abundant; the teeth are straight (fig. 24) or more or less bent upwards (fig. 35) or geniculated downwards (fig. 21). Often the teeth are very short and blunt (fig. 36). The manubrium ends sharply, and is 5—6 times longer than the teeth.

4° M. ta $\varphi < 90°$ are few in the var. α, very abundant in the var. β. The manubrium is longer and thinner than the M. of the M. ta $\varphi = 90°$ as is to be seen in comparing the figg. 34 and 23.

5° M. ta. d. bif. are rarely found in both varieties. In every case the d' are shorter than the d; often not all the d's are bifurcated but only one or two. So it seems that *I pallida* is a transitory variety (as Haeckel says) between those forms with distinct bifurcated anchors and those which destitute it. *Ceteris paribus* I should not like to make species form specimens which have them and which are without.

6° gl. The globules (ovaria" of Bowerbank) are of the common shape. It seems that within the family of the Geodidae there is but very little difference in the shape of these globules. Nearly almost they are ellipsoidical, and more or less flattened.

7° st. (sp). There are two kinds of stellates; the radii of the larger ones are a little thorned (fig. 37 Pl. II.) This is however only to be seen with a rather great power; at less Zeiss D. I could not observe these spines upon the radii of the small stellates. Both are very frequent in the var. β, but not so plenty in var. α.

8° glst. Between the stellate spicules there are many spherostellate ones; they have the same diameter as the small st. I am

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1) viz. *Geodia globus* Schmidt; after Schmidt's description this *Geodia* belongs to Sollas' Genus *Isops*.

not sure if the latter are a distinct kind of spicules or only a modification of the glst. I have figured them in Plate II, fig. 38.

In observing the surface of *Isops pallida* with a low power, you will remark two kinds of openings. The larger ones, which are often surrounded with a wall are probably the oscula, the small ones are the pores. At the description of *Isops sphaeroides* I have said that that species and the species now under description show much resemblance. I have figured this upper surface on plate IV (fig. 117). The great multitude of globulate spicules gives an appearance of shagreen to the Sponge.

Sections through the Sponge show that from the centre of the body there are going bundles of spicules, which partly end at the cortical layer of globulates, partly pierce this cortex. Between the mashes of this skeleton is a rather compact pulpa, showing small and large canals. These canals seem to have a proper thin but strong wall, in which there are many muscle-like fibres concentrically placed. Some of these great canals, always wrinkled, are placed in tangential direction, other ones are vertically to the surface. In communication with these great canals are smaller ones. Just under the surface there are plenty of holes (crypts, Sollas) in which the water enters by means of the pores. The fibrous layer under the globulates, is in this species and in *I. sphaeroides* much less developed than in *I. phlegraei* Soll.

In his study on the Sponges of Norway, Sollas has described the system of canals in different Geodine-Sponges. He distinguishes in the cortex of *Geodia Barretti* five layers. 1°. a thin membrane, covering the whole Sponge; 2°. a layer of cells with cylindro-stellate spicules". These two are named *epidermis.* 3°. vesicular connective tissue-cells, 4°. the layer of globates, which are held together by means of fibres. 5°. the muscular layer. As far as I could see I found again these layers, but in different *Geodidae* in different states of development. Beneath this cortex we find in the Genus *Isops* the cortical crypts in which the water is introduced by means of the chonae, and passing through particular sphincters. The crypts are in communication with the incurrent canals, which end al,

rather abruptly in fine „canaliculi" the terminations of which are the ciliated chambres. From here the water comes into the excurrent canaliculi, which assemble together, form „trabecular tubes" and end as a system of wider canals in the excurrent chones. The walls of the greater canals show particular complexes of fibres, „rugae". Now I must begin to say that I am advanced by no means so far as Sollas. In *Isops pallida* f. i. I could not detect ciliated chambres; the small pieces that where at my disposal, and the state of preservation may be the reason, but nevertheless it seems to me remarkable. On the other side I saw very often that the Sponge-body shows a particular trabecular network. I have represented a fragment in fig. 118 (pl. IV). Between the transverse sections of the canals *c* are a great multitude of openings; an exact examination informs us that the whole mass in which the canals are imbedded, is formed by a kind of trabecular network, strengthened here and there by spicules.

The „rugae" as Sollas describes, are also present in *I. pallida* and *sphaeroides*. I have figured on plate IV a part of the canal-wall of *Synops*. They consist of bundles of thin fibres.

These fibres occur also on other places in the membrane which lines the canal, and besides these fibres there are different kinds of cells, some of which have long and thin pseudopodia, which are often in connection one with another. (Compare fig. 119, plate IV). The membranes which line the canals of the Sponge under description have about the same structure.

8. **Synops pyriformis** [1]) n. g.; n. sp. [Pl. III, figg. 52—63; pl. IV, figg. 119 and 154].

Diagnos. *Corpus pyriforme, cum radicium exordiis in limo haerens. Oscula in apice excavato congregata. Spicula indicantia*: ac^2 (*duo vel tria genera*) | tr^2. | M. ta. $\varphi = 90°$ | M. ta. $\varphi > 90°$ | M. ta. $\varphi < 90°$ | st. | st. gl. | gl. |

1) *σύν* and *ὤπες*; the oscula, with their walls, being congregated at the top of the Sponge. Compare the addenda.

Local. Lat. 71° 12′5 N.; long. 20° 30′5 E. (neighborhood of Hammerfest) 1879.

Depth. 135 Fathoms.

Special description.

a. External character.

There are dredged up two specimens; one measures 12 c.m. in height, its greatest diameter being 10 c.m. (Pl. IV, Fig. 154.) The other specimen is more irregular in form. In both specimens the depression on the top measures about 7 c.m. in diameter but is only 1.5 c.m. deep. The oscula possess more developed walls as *Isops Phlegraei* Soll. and other species. The colour is pale ochreous in one specimen, more pinkish in another. On the lower parts there are little roots.

b. Skeleton.

The cortical layer of globates is rather thin; it is the thickest on the lower parts, where it gives off the roots. The bundles of long-shaped spicules take their origin in the centrum, as it is in nearly all *Geodidae*. The elements of this skeleton show much resemblance with those of Bowerbank's *Pachymatisma areolata* [1]), but can't be included in this species. I have found the following kinds of spicules.

1°. ac^2 and ac^2 (f). There are at least three kinds of acerates. In the first place very slender and sharp pointed ones (fig. 53, Pl. II). The second form is represented in fig. 52. The most curious however is that of the thicker spicules, more fusiform than the slender ones, but in every case characteristic by the teat-shaped end (fig. 56, Pl. II). Between these great acerates there are also small sharp pointed spicules, as are found characteristic for the *Renierinae* or *Chalineae* (fig. 57, Pl. III).

2°. tr^2. We see in fig. 55 a specimen of an acerate spicule with teat-shaped head, that forms a transition to the totally blunt spicules, tr^2. (fig. 54, Pl. III). There is another Sponge of this family, that possesses such spicules, viz. *Pachymatisma areolata* of

1) Bowerbank 1872. l. c. pag. 630.

Bowerbank [1]). But as this Sponge possesses the curious „short fusiformi-cylindrical incipiently-spined retentive spicula" (Bowerbank) and these are *not* present in the specimen under description, so it can't been identified.

3°. tr°. ac. (?) In some parts of the body I have found this kind of spicules, but I think they don't belong to the Sponge. It seems that this species (and others!) easily take in foreign objects. I have not only found plenty of Foramiferes, but also spicules of other Sponges: anchors of *Desmacidinae*, hexradiates of *Hexactinellidae* etc. I have thought a long time that I had found in these *Geodidae* of the Arctic Sea, transitions to the *Hexactinellidae*; for I rather often found hexradiate spicules, and totally complete. But now I am convinced that they don't belong to the *Isops*, *Geodia* or any else. We learn however from these facts that even in the Arctic Seas *Hexactinellidae* live

4°. M. ta. $\phi = 90°$. The shafts of these spicules end very often blunt, about in the same manner as the tr^2. The teeth (d) are rather straight, long and not very thick.

5°. M. ta. $\phi > 90°$. There are two kinds. 1°. with geniculated teeth, just as *I. pallida* (Pl. II, fig. 22). The shaft of these ends nearly always blunt. 2°. with straight teeth; they are not so thick as those with geniculated teeth (Pl. III, figg. 58). The angle ϕ in both is about 115°.

6°. M. ta. $\phi < 90°$. There are two kinds, viz. one with short teeth, another with ordinary teeth (fig. 59 and 60, Pl. II). They are not very frequent, but always present.

7°. M. ta. d. bif. of the common shape. Very rare.

8°. gl. As usual.

9°. st. The stellates are of different sizes. The larger ones are represented in fig. 61, Pl. III, the smaller ones in fig. 62.

10°. glst. The sphero-stellates have about the same size as the small st. (fig. 63, Pl. III).

The oscula on the top of the Sponge have at superficial exami-

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1) l. c. tab. XLVIII.

nation quite the same shape as those of the *Isops*-species. They have however 1°. always walls, 2°. are these walls much more developed; the upper parts forming a kind of dome over the sphincter (fig. 155, Pl. IV), about in the same manner, but perhaps less developed, as in *Pachymatisma* Soll.

9. **Geodia Barretti** Bwk. (char. emend. Sollas) [Pl. III, figg. 50 and 51; pl. IV, figg. 120—122].

Diagn. *Corpus irregulatiter sphaeroides. Spicula indicantia*: ac^2 (f) | ac^2 | M. ta. d. bif. | M. ta. $\phi < 90°$ | M. ta. $\phi > 90°$ | gl. | st. |

Local. Lat. 71° 12′5 N.; long. 20° 30′5 E. [neighborhood of Hammerfest] (July 2. 1879).

Geogr. distrib. Vigten Island (Bwk.); Kors-Fiord (Soll.)

Depth. 135 Fathoms.

Synon. and literature.

1858. *Geodia Barretti* Bwk.
(Bowerbank, Phil. Trans. Vol. CXLVIII part. 2 pag. 279).

1867. *Cydonium Barretti* Gray.
(Gray, Proc. Zool. Soc. pag. 548).

To see also:

1862. Bowerbank, Phil. Trans. Vol. CLII, part. 2.

1864. id. Monogr. Brit. Spong. 1 pagg. 168 and 171.

1866. Schmidt, II Supplem. pag. 11.

1869. Carter, Ann. and Mag. IV.

1872. Bowerbank, Proc. Zool. Soc.

1880. Sollas, Ann. and Mag. V pagg. 247—257; tab. X—XII.

1880. Schmidt, Spong. Meerb. Mexico pag. 74.

Special description.

a External character.

„The specimen under description differs in trifling details from (Bowerbank's) *Geodia Barretti*, and must necessarily be included in that species". These words of Sollas [1]) can be used again for

1) l. c. pag. 247.

the specimen from the Barents-Expedition. It is irregular subglobose in form, with great and small elevations on the surface; the greatest diameter is about 13.5 c.m. The oscular tube is nearly circular and measures about 14 m.m. in diameter, and 20 m.m. deep. The colour, the specimen being preserved in spirit, is now pink, here and there rather ochreous.

b. Skeleton. The elements of the ordinary *Geodine* skeleton are the following.

1°. ac^2 (f). Nearly all of the same length. Very frequent. Represented by Bowerbank *) in Fig. 2 on Plate XI.

2°. ac^2. Much smaller than the preceding spicules. Represented by Sollas in Fig. 10 on Plate XI, and by Bowerbank in Fig. 3 on Plate XI. It seems to me that they are always bent as in Sollas' figure.

3°. M. ta. d. bif. (Sollas, fig. 11, Pl. XI, Bowerbank fig. 4, Pl. XI). In the specimen from Hammerfest the secundary teeth (which I have designated by d^1) are nearly always shorter than the primary one's. Compare my own representation on Pl. III, fig. 50.

4°. M. ta. $\phi < 90°$. The illustration of Sollas (l. c. fig. 8, Pl. XI) shows the whole spiculum. I have for that reason only figured the head still more magnified (Pl. III, fig. 51). It seems to me to be characteristic for the species, that the angle ϕ is rather great; the points of the teeth are thus far one from another. The shaft (M) is very slender. They are not very frequent.

5°. M. ta. $\phi > 90°$. Again these are rather rare; most of them are not peculiar forms, but modifications of the patento-ternates.

6°. gl. The globates don't offer any thing remarkable.

7°. st. The stellates are small; only to be seen with great power.

8°. glst. There are yet very minute stellates or perhaps spherostellates, the true construction of which I could not see. It seems to me that the illustrations of Sollas are not quite so as in our specimen from the Barents-Expedition; there at least the radii are yet shorter and not cylindrical. But this difference can't be of value for the species.

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*) Proc. Zool. Soc. 1872.

In fig. 122, plate IV. I have given an illustration of the particular oscular tube, as it is described by Sollas; but as he had only seen a very young specimen so I thought it not bad to illustrate a very large one. Sollas says that the canals communicate directly with the chones in which are the sphincters. But it this big specimen from Hammerfest I saw that between the excurrent chones and the large excurrent canals there is yet a system of crypts, as I have figured on plate IV, fig. 121. It seems to me that these main canals which are arranged *around* the oscular tube have sideward communications with the crypts, and that these are separated from the oscular tube by means of the wellknown sphincters. These great canals are conspicuous for being rather, white, while the surrounded mass in which they are imbedded is more yellowish. The walls of these canals show the same rugae as in the described *Synops.*

10. **Tethya lyncurium** var. **obtusum** [Pl. IV, figg. 123—126].

Diagn. *Corpus globosum, per radicibus inhaerens. Spicula indicantia:* (tr°.) ac. f. | tr. tr. f. | st. |

Local. Lat. 71° 12′5 N.; long. 20° 30′ E. (1879).

Geogr. distrib. of the species: Mediterrenean; Adriatic Sea; Atlantic Ocean.

Depth. 135 Fathoms.

There were dredged up two small specimens of this *Tethya*, which is perhaps a distinct species; but as I have had occasion to see a great quantity of *Tethya lyncurium* from the Adriatic and Mediterrean seas, and often had opportunity to observe that these are varying in the most extraordinary way, so I must include also the specimen under description to *T. lyncurium.* I will publish my observations on *Tethya lyncurium* afterwards; but I will for the moment only mention the fact that this Sponge varies 1°. in colour (ochreous yellow, clear yellow, orange, red). 2°. In the appearance of the papillae; one time they are closed together, and end broadly, so that the Sponge appears compact another time (often in the same subject) they are standing far one from another, a

third time they are more or less pointed. 3°. In the occurrence of roots. I have seen at Naples specimens grown on stones without any appearance of roots, but showing that they are really present when the stone was cleft. 4°. In the shape of the spicules. According to these facts to it seems to me the best way of determining our Sponge again as a variety of *T. lyncurium*.

The spicules found in this specimen are the following.

1°. (tr°.) ac. f. [fig. 123, pl. IV] with more or less distinct head.

2°. tr. tr. f. [fig. 126] with a little constriction beneath the head, in order to form transitions to (tr°.) tr. f. The obtuse ends seem to be characteristic for this variety. These and the preceding kind are very abundant. Both are varying in length; perhaps you may distinguish three kinds.

3°. st. [fig. 124, pl. IV] The radii of the ordinary stellates are much shorter and thicker as in the type specimen of *Tethya lyncurium*. But as Oscar Schmidt now considers his *T. morum* only as a variety of *T. lyncurium*, so I think one is perfectly right in declaring our *obtusum* again as a variety of *T lyncurium*. They have *not* all the same diameter.

4°. st. [fig. 125, pl. IV] The little stars with blunt-ended short radii are very numerous. They are much smaller than the preceding ones, as shows a comparison between figure 124 and 125.

11. **Polymastia penicillus.** (Mont.) Vosm. [Pl. I, figg. 12 and 13; pl. IV, figg. 127—132.]

Diagn. *Corpus uno latere planum, altero convexum; papillarum longarum multitudinem ferens. Spicula indicantia*: tr°. ac. f | (tr°.) ac. (f) |

Local. Lat. 72° 5′ N.; long. 37° 57′ E.; [Juli 25, 1878].

Geegr. distrib. Atlantic and Arctic Oceans; Mediterrenean.

Depth. 140 Fathoms.

Synon. and literature.

1818. *Spongia penicillus* Mont. (acc. to Bwk.)
(Montagu, Wern. Mem. pagg. 93—95; Tab. XIII, fig. 7.)

1862. *Polymastia mam(m)illaris* Bwk.
(Bowerbank, Phil. Trans. CLII).

1863. *Suberites appendiculatus* Bals. Criv.
(Balsamo Crivelli, Atti della Soc. Ital. V.)

1867. *Pencillaria mammillaris* Gray.
(Gray, Proceed. R. Soc. pag. 502.)

? 1879. *Rinalda arctica* Merejk.
(de Merejkowsky, Mém. Acad. St. Pétersbourg, XXVI, pagg. 4—15, tabb. I, II, III).

[Non: 1806. *Spongia mamillaris* O. F. Müller; 1842 *Halichondria mammillaris* Johnst.]

To see also:

1866. Bowerbank, Monogr. Br. Spong. II, pag. 71.

1866. Schmidt, Zweites Suppl. Sp. Adr. M. pp. 12 and 13; Tab. I, figg. 11 and 12.

1870. Schmidt, Spong. Atl. Geb. pag. 51, Tab. VI, fig. 3.

1874. Bowerbank, Monogr. Brit. Spong. III, pag. 31, Tab. XII.

1877. Marenzeller, Coelent. etc. der O. U. Nordp. Exp. pp. 13 and 14.

Special description.

Bowerbank, in his description of *Polymastia mammillaris*, (Monogr. II, pag. 73) says that he has seen original specimens of Montagu's *Spongia penicillus*. For that reason I think one may accept with sufficient security .... (if not, you may always have doubt, and *never* be sure!) that his *Polymastia mammillaris* is really identical with M's specimen. „I have compared the specimens sent me by Mr. Hyndman, from Larne Lough, with the type of Montagu's *Spongia penicillus*, in the possession of Dr. Grant, and there is no difference between the two, either in external appearance or in structural characters". And further: „No reasonable doubt therefore remains, that the specimens dredged by Messrs Thompson and Hyndman in Strangford Lough, in 1835 and sent to Dr. Johnston and those dredged by Mr. Hyndman in Larne Lough which are sent to me, are identical with Montagu's *Spongia penicillus*, and are therefore entitled to be considered as correct types of Johnston's

Halichondria mammillaris". I have no objection to the fact that Bowerbank identifies his Sponge with Montagu's; but why has he changed the name *penicillus* into the latter *mammillaris*? Probably because he identifies his Sponge also with Johnston's *Hal. mammillaris* and that this author identifies his specimen with Muller's *Spongia mammillaris*. Now it seems to me 1°. that Johnston was not right in doing so, for I have Sponges from the coasts of Norway wich much more resemble the specimens of O. F. Müller and which are not identical with the Sponge under description; 2°. that Bowerbank was not right of identifying his Sponge with Johnston's *Hal. mamillaris*. Bowerbank says in his diagnosis (Mon. II, pag. 71) that the spicules are: „fusiformi-enormi-spinulate, rarely fusiformi-acuate". And Johnston says (pag. 143) „The spicula are long and straight fusiform, sharp at both ends" and pag. 142: „spicula fusiform acute at both ends". Thus in comparing these two facts, it will be apparent to everybody that *Hal. mamillaris* Johnst. and *Polymastia mammillaris* Bwk. *are not identical.*

As I have said I possess Sponges which resemble very much the *Spongia mamillaris* of Müller (Zool. Dan. IV, pag. 44, Tab. CLVIII, figg. 3 and 4). This Sponge is probably a *Polymastia* too. But the tubes are much shorter and stouter, and not so frequent.

Now, according to Oscar Schmidt, Balsamo Crivelli's *Suberites appendiculatus* is identical with Bowerbank's *Polymastia mammillaris*. I am by no means sure if this is really the same species. Gray has named this Sponge *Pencillaria mammillaris*, but I think it is not necessary to change the generic name.

With all these, de Merejkowky's *Rinalda arctica* very much agrees. But why has Schmidt erected the genus *Rinalda* for his *R. uberrima*? Is this not a *Polymastia*? It appears to me that the generic name *Rinalda* is superflous, and that again *R. arctica* de Merejk. is a *Polymastia* even probably identical with the *P. penicillus* under description. The Sponge of the Russian investigator is described as follows: „Cette éponge, dont la forme est ordinairement sphérique, legèrement aplatie, atteint dans la plupart des cas 4 Ctm. de dia-

mètre, dans les individus jeunes il arrive qu'elle n'ait que 1 et 2 Ctm.; elle recouvre de petites pierres et des débris de coquilles en les enveloppant de tous côtés pour n'en laisser quelquefois qu'une petite partie à nu de sorte que seul un examen attentif nous permet de ne pas la considérer comme une éponge à existence libre, non fixée à des objets étrangers" (l. c. pag. 4). I have no doubt 1°. that my Sponge is identical with that of de Merejkowsky, for the whole description and the illustrations agree one with another; and 2°. that it is identical with Bowerbank's *P. mammillaris*. There is yet a little particularity in the notice of Mr. de Merejkowsky, viz. that he identifies with his specimens the larger flat ones. „Cependant" says he pag. 4 „le cabinet Zoologique de l'Université de St. Pétersbourg possède deux énormes exemplaires de près de 12 Ctm. de diamètre provenant du Nord de la Norvège; ils ont la forme de plaques comparativement minces (près de 1 Ctm. de grosseur) recouvrant la surface supérieur de grandes pierres". The „Willem-Barents" has on the third voyage (1880) dredged up several of these great disks, which I hope to describe afterwards: and now I am convinced that these are identical with the specimens under description.

I have figured two specimens of the first expedition. The greater one measures about four Cm. the smaller ones only two or two and a half. They are all attached with the convex side to little stones, or shells from Molluscs or Worms. The more flattened side bears the large papillae. This appears to be the normal shape; but there are specimens where the body is thicker or flatter. As is to be seen in a vertical section, most all tubes are hollow. These tubes, perfectly described by de Merejkowsky show the particular arrangement of the bundles of spicules. I have again given an illustration of the tube in figure 127 on plate IV, observed at a low power, and in figure 128 still more magnified. The tube that I have chosen for my illustration is not opened above.

The characteristic arrangement of the spicules in the body is also described by de Merejkowsky. I refer to his interesting paper. The forms of spicules I have found in the Sponge, are the following (Pl. IV, figg. 129—132).

1°. tr°. ac. f. Of these spicules there are three kinds. One kind is very large (fig. 129, pl. IV) another measures only $^1/_{10}$ of it in length (fig. 132a, b, c). Between these two extremes there are spicules about two and a half or three times the length of the small ones. A peculiarity of these is that the top (near the head) is bent or rather nicked (fig. 130).

2° (tr°) ac. (f). The spicules with indistinct heads are yet more indistinctly fusiform. It is nearly (tr°) ac. They are the longest of all and occur especially in the margin of the disk (fig. 130). They are so thin and flexuous that they are often bent in the preparations, mounted in canada balsam. I have figured one in that position. First I thought it was a distinct kind of spicules, but further observations showed me that they are only accidentally curved. It often happens that Sponges of this kind are dredged up, which dont show the protruding marginal spicules. But it seems to me that this has been caused the spicules having broken off. For that reason I can't entitle these Sponges with a new specific name. The arrangement of the spicules .... more or less radiating .... the parallel bundles in the tubes, the small stout pin-shaped needles in the rind, this forms the character of the genus. It may be that further investigations show that I am wrong in identifying the Sponge with Bowerbank's species. But as the original specimen from the British Museum is not yet observed and compared with original specimens of Balsamo Crivelli, de Merejskowsky etc. no person shall to make out the question absolutely. It is a pitty that for some time the confusion and synonymy *must* reign.

As I have stated, I have for description also the Sponges from the third and fourth „Barents-Expedition". I am forced to publish my results hereupon in another paper. I then hope to speak about some histological details of this curious Sponge.

12. **Thecophora semisuberites** O. S. [Pl. IV, fig. 133—136].

Diagn. *Corpus basi latissimo haerens; subconiforme capitatum. Spicula indicantia*: tr°. ac. f. [magnitudine variante]. —

Loc. Lat. 72° 32′,3 N.; long. 36° 39′.5 E. (Barentsea).

Geogr. distribution. Greenland (Schmidt); Atlantic between Scotland and the Faröer-Isles. (Cart.)

Depth. 128 Fathoms.

Literature.

1870. Schmidt. Spong. Fauna Atlant. geb. pag. 50 Tab. VI. Fig. 2.

1873. Wyville Thomson. The Depths of the Sea, pag. 147.

1874. Schmidt. Zweite Deutsche N.-P.-Fahrt II pp. 429, 430.

1875. Carter. Ann. and Mag.

1877. Marenzeller. Coelenteraten etc. der O. U. Nordpol Expedition. pag. 14.

Special description.

Schmidt has given an illustration of the Sponge in toto, but not of the spicules. He says that these are „Stecknadeln". As they have not all the same shape and size, I have figured them on Plate IV, ffgg. 133—136. Fig. 133 represents one of the smallest, wich are very abundant in the rind, fig. 135 on the contrary a fragment of the greater ones. Most of them are fusiform, but the difference in diameter at the top and in the middle is not always great. There are also transitions with very indistinct head at the top. The type however is tr°. ac. f and the varieties: (tr°.) ac. f; tr°. ac. (f), and (tr°.) ac. (f).

If *Thecophora ibla* Wyv. Thomson is another species that remains dubious, for this author has not given illustrations of the spicules. The *shape* of the Sponge, being more elongated, can never be a specific character. I have several specimens of *Thec. semisuberites*, one broad and low another tall and high.

13. **Suberites montiniger** Crtr. [Pl. I fig. 26; pl. IV fig. 137—139].

Diagn. *Corpus globosum vel irregulariter sphaeroideum, basi in lapidibus vel conchiliorum testis inhaerens. Spicula indicantia*: tr°. ac. (f).

Local. Lat. 71° 6′ N.; long 50° 20′ E.) Barents-Sea [30 July 1879].

Geogr. distrib. Arctic Sea.
Depth. 62 Fathoms.
Literature.

1880. Carter, Ann. and Mag. Nat. Hist. Vol. VI. pag. 256.
Special description.

The Sponge described by Carter (unhappily not illustrated by him), is distinguished from other Suberitides by the peculiar shape of the head of the spinulates. It is elongated, oval or more ellipsoidal, as is to be seen in the figures 137—139 on plate IV. The shaft of the spicules is subfusiform, for the diameter in the middle is only a little greater than just beneath the head.

I have found, but very rarely tr^2. f° (sp.); it may be that they don't belong to the Sponge. Carter gives the following description: „Form monticular. Colour grey-black. Surface even. Vents, one large at the summit, fringed. the rest small, on the sides. Texture soft, matted." These words can be applied perfectly well to our specimen.

14. **Suberites** spec. [Pl. I figg. 22 and 23; pl. IV. figg. 140—144].

Diagn. *Corpus fici- vel pyriforme, in lapidibus vel conchiliorum testis inhaerens. Spicula indicantia*: (tr°) ac f. | tr^2. f° (sp.) | ac^2 f° (sp.).

Local. Lat. 71° 6′ N.; long. 50° 20′ E.) Barents-sea [30 July 1879].
Geogr. distrib. Arctic. Sea.
Depth. 62 Fathoms.
Special description.

There is much resemblance between this Sponge and *Hym.* (*Suberites*) *virgultosa* of Bowerbank. The surface is corrugated nearly as in the specimen represented by Bowerbank in Pl. XXXV (Monogr. Br. Spong. III). The appearance of little spines on the inflato-fusiform spicules [tr^2. f° (sp.) and ac^2 f° (sp.)] brings the Sponge to another species. Again in our *Suberites*, the osculum, (nearly always only a single one) is fringed, as in *S. montiniger*. Whether these fringes are also present in the living state, or whether they

are the result of the contraction of the Sponge is not to be discerned any more. The skeleton consists of the following kinds of spicules.

1°. (tr°.) ac. f. [fig. 140.] The greater part of the spicules belong to this kind, many of them forming transitions to

2°. tr°. ac. f. or tr°. ac. (f) [figg. 141, 142, fragments] with distinct heads.

3°. tr^2. f°. (sp.) [fig. 144]. The relation between the pinlike and sub-pinlike needles and the little spined spicules which are especially to be found on the surface of the Sponge, is to be seen in the illustration. The drawings were made with the same magnifying power, and with the aid of the Camera lucida. Besides these occur

4°. ac^2. f°. (sp.) [fig. 143] always larger than the preceding ones; on both the spines are very minute; a rather high power is necessary to detect them. Carter has described a Sponge from the Barents-Sea, which appears to be nearly allied to our species. The diagnosis for his *Suberites montalbidus* is: „Form monticular. Colour grey-white. Surface corrugated. Vents, one large on the summit, naked, the rest small, on the sides. Texture soft, matted. Spicules of two kinds, viz.: 1. skeleton, large, subpinlike, head variable in shape; 2. flesh-spicule, minute, shaft cylindrical, straight or curved, pointed at each end and inflated in the centre". I have however stated that the spines on the „flesh-spicules" are very minute; it is possible that Carter has overlooked them, and he may even have overlooked the small bluntly ended spicules [tr^2 f° (sp.)]. In that case I believe both Sponges to be identical. As yet I *suppose* that we have seen different individuals from one species, and I have labelled it for the collection with the name *Suberites* spec. (*montalbidus* Crtr.?)

15. **Pachychalina caulifera** n. sp. [Pl. I, fig. 14; pl. III, figg. 64—66].

Diagn. *Corpus elongatum, compressum, quasi remiforme. Basis lapidibus vel conchis haerens. Oscula in uno latere plurima, in altero nulla. Spicula indicantia*: ac^2. f.

Loc. Barents-Sea?

Depth. Unknown.

Literature.

1870. Schmidt, Grundz. Spong. Atl. Geb. p. 37.

1870. Mikl. Maclay, Mém. de l'Acad. d. Sc. de St. Pétersbourg VII Ser. Tom. XV, N°. 3, pag. 5, Tab. I, fig. 11.

1878. Dybowski, Zool. Anz. pag. 32.

1880. Id., Mém. de l'Acad. d. Sc. de St. Pétersbourg. VII Ser. Tom. XXVII, N°. 6, pagg. 37, 44 and 45. Tab. III, fig. 3.

Special description.

In Fig. 14 on Plate I I have represented one side of the Sponge, with the oscula. It is very remarkable that the Sponge has another colour in the lower part (the pedicel) as in the upper part. But again there are neither oscula nor pores in the pedicel, and it has stronger fibres, being consequently much more compact.

I hope to show that our Sponge is nearly allied to *Pachychalina compressa* O. S. I will therefore call to mind what is known about that species. Unfortunately nearly all descriptions of *Pachychalina compressa* are very incomplete. The first of Oscar Schmidt [1]) can hardly be entitled a description. Schmidt's name may hardly figure after that of *Pach. compressa*, for Dybowski is in fact the first who has given a short *description* and figured the spicules and fibres. There can be no doubt that our Sponge belongs to Schmidt's genus *Pachychalina* of 1868 [2]) and 1870 [3]). The description of *P. exelsa* O. S. is too short for determining a species.

In the year 1878 Dybowski published that he had found out that the *Veluspa polymorpha* var. *arctica* of Miklucho-Maclay was a *Pachychalina*. He only says [4]): „Es hat sich ferner herausgestellt, dass drei Veluspen-Varietäten Miklucho's zu verschiedenen Gattungen gestellt werden müssen und zwar: . . . . var. *arctica* = *Pachychalina arctica* . . . ." This was only a preliminary account; in 1880 he published his „Studien über die Spongien des Russischen

1) l. c. pag. 37.
2) Schmidt, Spong. Küste v. Alg. pag. 8.
3) l. c. pag. 37.
4) l. c. pag. 32.

Reiches", and said [1]) that the great geographical distribution of Schmidt's *Pachychalina* made him suppose that *P. compressa* and *Vel. polymorpha* var. *arctica* were identical, „und zwar umsomehr, als die Abbildung Miklucho-Maclay's und die Beschreibung O. Schmidt's fast übereinstimmen". I think Dybowski is quite right in doing so.

As Schmidt did not give a detailed description of the structure, Dybowski tried to characterise it.

The horny fibres of the Sponge, are, especially in the lower parts, very conspicuous and the shape of the stout acerate spicules are quite the same in our Sponge, as in Dybowski's. I have represented the Sponge in natural size on Plate I, fig. 14 and the skeleton-elements on Plate III, figg. 65 and 66.

Miklucho-Maclay says l. c. pag. 6 from his var. *arctica*: „Diese Varietät zeigt solche Verwachsungen der Aeste, dass sie die Gestalt eines dicken Blattes annimmt. Die Eigenthümlichkeit dieser Form drückt sich dadurch aus, dass nur die eine (untere) Seite zahlreiche, sehr grosse, meist in Reihen angeordnete Oscula besitzt, während die andere (obere) Fläche keine oder nur spärliche Oscula zeigt".

In comparing this description with our *P. caulifera* I have no doubt that this Sponge and *P. compressa* are closely allied. The former, however is distinguished from the latter by a less marked development of the fibre, by shorter and stronger spicula and by the differentiated shaft. Both species, on the other hand, have several characters in common. So the particular arrangement of the oscula, the compressed form, the elastic fibres and the acerate spicules.

These spicules are about 14 times longer than broad, those of *P. compressa* are more than 25 times longer than thick. The shape is sub-fusiform and the ends of the spicules have a kind of teat-shape, as is to be seen in figg. 66 and 65 on Plate III. The network of the fibres in the pedicel is much stronger and more developed than in the upper part of the Sponge. Strong primary

1) l. c. pag. 44.

fibres are present and the spicules around these are joined together by „keratode" in quadrangular groups as is characteristic for the genus *Reniera*; but here the substance that holds the spicules together is much stronger.

It is very remarkable that in the pedicel no oscules or pores are to be seen. The Sponge is not sufficiently preserved that I could ascertain this by very thin slices. But when it is true the question arises how this part is fed. Merejkowsky has made curious observations on this point. As in his *Esperia stolonifera* the young buds are fed by means of a kind of conduction through the cells, so one can suppose this to be the case here. Metschnikoffs researches on the mode of nourishment in Sponges *) show that small particles of food can be transported by cells. I have repeated some of his experiments and arrived at the same result.

16. **Cribrochalina variabilis** n. sp. [Pl. I, figg. 16 and 17; pl. III, figg. 67—69].

Diagn. *Corpus infundibuliforme; basis per caule longiore vel breviore lapidibus haerens. Spicula indicantia* tr. ac., (*longitudine variante*).

Loc. Barents-Sea; Matosjkin-Shar.

Depth. 220 Fathoms. NB.

Special description.

Several specimens of this fine Sponge were brought home, two varieties of which I have represented on Plate I. Although there is rather a great difference between them, as regards the external characters, the spicules show such a strong resemblance, that they must be united into one species.

16a. *Cribrochalina variabilis* var. *crassa* [Pl. I, fig. 16; pl. IV, fig. 145.]

From an almost cylindrical, wrinkled stem arises the funnel-shaped sponge-body. On the external surface of the upper part

*) Metschnikoff in Zeitschr. wiss. Zool. XXXII. pag. 371.

plenty of pores are to be seen On the stem on the contrary the pores are very few in number, they are totally absent even along a considerable tract. The colour of this pedicel is more browny, that of the body gray-yellowish. The inner surface of the body, i. e. the entrance of the funnel, shows a few oscula. These oscula are in the centrum; at the periphery there are many smaller openings. Perhaps these are oscula too, but it seems to me more probable that they are pores. I must however add that I cannot prove that the large ones are oscula. But this will never be possible when the Sponge is dead; we simply call the openings „oscula" when they are large and pores when they are small. There are indeed many analogious cases with other Sponges! — Fig. 145 on Plate IV shows that these oscula are the openings of a few wide canals, one of which even continues itself in the stem. The walls on the upper part of the sponge-body are very thick in this variety. For that reason I have named it *crassa.*

The skeleton of the stem consists of rather strong so called keratode-fibre, containing the acuate spicules. The fibre in the body is a much softer, and even not always present. The spicules are acuate, often a little constricted at the top; these are *sub*spinulate. It is remarkable that they vary much in length, but not in diameter, as the figg. 68a—h, on Plate III show.

16c. *Cribrochalina variabilis* var. *salpingoides* *) [Pl. I, fig. 17; pl. IV, figg. 146 and 147].

In this variety there is again a rather long pedicel, but here no difference in colour is to be seen between the pedicel and the body. The margin is bent outwards; hence the trumpet-like shape of the Sponge. The surfaces (external and internal) are much more smooth. Only one osculum is to be seen, and accordingly only one large canal, with which the smaller ones communicate (Pl. IV, Fig.

*) σάλπιγξ = a trumpet.

146). The small openings around the larg osculum are probably pores of which there a two kinds viz. macro- and micropores (fig. 147). The colour is warm ochreous-browny.

The skeleton is just as in the first variety; but the fibre of the stem is not so strong. The spicules are all acuates, they are a little stouter than in the variety *crassa*. But as there are all possible transitions between these and those of *Cr. variabilis* var. *salpingoides*, it appeared necessary to unite them into one species.

There is another specimen dredged and brought home by the Willem-Barents, which has however no stem. But I think the pedicel is simply broken off, for it is not complete. There is one great opening in the middle; it is most probable that this central-opening is the end of the osculum, and that the mutilated specimen only represents the uppermost part of the Sponge. Now it may be that the pedicel was rather long as f. ex. in Fig. 17, Pl. I, but it is also possible that is was short. In comparing this *Cribrochalina* with other species, described by Bowerbank a. o., we see that nearly always these Sponges are funnel-shaped *or* fan-shaped; thus it seems that the *Cribrochalinae* tend to develop especially the thinner upper part, at the same time showing but a little stem, the gastral cavity („Gastral-Höhle, Magen") thus becoming very small, till at last there is no cavity and no osculum. So f. ex. it is in all the fanshaped specimens. Oscar Schmidt only saw such specimens and so he fixed as a generic character the want of an osculum.

Three specimens were dredged showing three variations in shape, from a wide funnel with margins bent outwards down to the form of *Cr. variabilis* var. *crassa*. It is remarkable that one of these is dredged (lat. 74° 10′ N.; long. 23° 20′ E.) in 220 fathoms, while the other two specimens, being from Matosjkin-Shar (Nowaja-Semlja) are only from 2—11 fathoms. A *specific* difference however is not to be found. Specimens as represented in fig. 17 form a transition to the variety *crassa*.

17. **Cribrochalina Sluiteri** n. sp. [Pl. I, fig. 18; pl. III, figg. 71—74.]

Diagn. *Corpus flabelliforme; basis per caule breviore lapidibus haerens. Spicula indicantia*: tr. ac. (*duo vel tria genera*) | tr°. ac. |
Local. Lat. 72° 5′ N.; long. 37° 57′ E. (Barents-Sea) Juli 25, 1878.
Depth. 140 Fathoms.
Special description.

This Sponge, dredged by Dr. Sluiter, after whom I have named it, represents one of the totaly fan-shaped specimens of *Cribrochalina*. As there is but one specimen I do not know if it also occurs in the funnelshaped state. The stem is short; but, being broken off, it is possible though not probable that a part of it may have been lost.

The body is of a greyish colour, is smooth to the touch and shows, as is to be seen in figure 18 (Pl. I), many undulations.

The skeleton is formed by acuate spicules, held together by keratode fibre. The spicules themselves are:

1°. tr. ac. (figg. 71—73, pl. III). They are of different shape. In some there is a constriction beneath the top in order to form a sub-pinlike shape, in others this constriction is so insignificant that it is hardly conspicuous. Sometimes they are subfusiform. From the type tr. ac. we see transitions to (tr°.) ac., (tr°.) ac. f. etc. They also vary very much in diameter. Compare figg. 71, 72 and 73.

2°. tr°. ac. (fig. 74, pl. III) smaller than the preceding ordinary ones; they are rather rare.

18. **Chalinula** spec. (robustior O. S.?) [Pl. I, fig. 23; pl. III, fig. 113].

Diagn. *Corpus arborescens; spicula indicantia*: ac^{t}.
Local. Barents-Sea (lat. 71° 6′ N.; long. 50° 20′ E.)
Depth. 62 Fathoms.
Literature.

1870. Schmidt, Spong. Atlant. Geb. pag. 38.

Oscar Schmidt has described in 1870 the species *Ch robustior*. From this Sponge he only says: „Eine isländische Form (*Ch. robustior* N. Mus. Hafn.) hebt sich durch die Grösse der Nadeln (0.23 mm.) von der britischen *Ch. oculata* (0.093 mm. lang) ab". Nobody will disapprove, I hope, that I have put a ? after the name, Schmidt's diagnosis being really *too* short.

19. **Chalinula** spec. [Pl. IV, figg. 148—151.]

Diagn. *Spongia inter Anthozoarum polyparia crescens. Spicula indicantia*: tr. ac. | ac^2. |

Local. Matosjkin-Shar (lat. 73° 10′ N.; long. 57° E.)

Depth. 2—11 Fathoms.

Literature.

1870. Schmidt, Spong. Atl. Geb. pag. 38.

This Sponge grows between polyparia of *Anthozoa*, another time it covers the shells of *Balanidae*. The colour is greyish-white. It appears to me not impossible that it is identical with Schmidt's *Chal. ovulum*, that the specimen of Schmidt was a young one, and the oval shape only accidental. Being wholly uncertain as to this point, I do not give a specific name to the Sponge, as long as I have not yet seen original specimens of *Ch. ovulum*. Illustrations of the spicules are given on plate IV. I found the following kinds:

1°. tr. ac. (figg. 148, 149, 151). Very frequent, nearly always bent or curved, often two times. They are varying in length.

2°. ac^2. (fig. 150). Rather rare. Perhaps not characteristic for the *species*. Schmidt does not mention acerates in *Ch. ovulum*.

20. **Auletta elegans** n. sp. [Pl. I, fig. 20; pl. III, fig. 70; pl. IV, fig. 158.]

Diagn. *Corpus subcilindriforme elongatum cum caule in plantis haerens. Caulis corpore tenuior. Spicula indicantia*: tr. ac.

Local. Lat. 75° 16′ N.; long. 45° 19′ E. (July 30, 1878).

Depth. 160 Fathoms.

Literature.

1870. Schmidt, Spong. des Atlant. Geb. pag. 45.

Special description.

Schmidt has arranged his Genus *Auletta* with the *Renieridae*; but he states himself that this can only be preliminary. Why may it not be placed under the *Chalineae*? The specimen under description seems to be a true *Auletta*; at all events it belongs to the *Chalineae*.

On the surface of this soft flexible Sponge, one observes the network of keratode-fibre; the latter being very well developed but not strong (fig. 20, pl. I). When the Sponge is cleft into two parts (fig. 158, pl. IV), the structure is to be seen very distinctly. The whole body, incl. the long pedicel is hollow. In this „gastral" cavity are the openings of the excurrent canals. The wall of the Sponge is pierced by the incurrent canals, which probably open out into ciliated chambers, and afterwards form the excurrent system. The oscular-opening is not quite on the top of the Sponge, but is a little beneath this, as is to be seen in the section in figure 158.

In the keratode-fibres, which form the skeleton, the spicules are imbedded, which are all acuate:

tr. ac. (fig. 70, pl. III) more or less bent, but they have another shape as those of Schmidt's *Auletta sycinularia*.

21. **Amorphina** spec. [Pl. I, fig. 26].

Diagn. *Spongia incrustans; oscula in conis obtusis; spicula indicantia*: ac^2.

Local. Barents-Sea.

Depth. Unknown.

Description.

For the moment it is better not to give new names to *Renieridae*, unless one is very certain that the species is a new one. Without doubt many species of *Reniera*, *Amorphina*, *Pellina* etc. must be united. It is even uncertain whether these genera are really distinct. Our Sponge under description belongs to *Amorphina*, but many characters of *Pellina* can be applied to it. The family of the *Renieridae* requires a revision perhaps more than any other!

The specimen from the Barents-Sea has a greyish-colour; the cones are pierced by a gastral tube, terminating in an osculum.

The water enters the Sponge by means of thousands of pores, visible over the whole outer-surface; the watercanals end all in the central gastral tube.

The spicula are only of one kind viz. acerate (ac^2.)

22. **Tedania suctoria** O. S. [Pl. I, fig. 24; pl. III, figg. 83—88].

Diagn. *Corpus basi in lapidibus haerens. Superficies cum multis papillis obtusis. Spicula indicantia*: tr^o. | tr. ac. | ac^2 | .

Loc. Lat. 72° 32′,3 N.; long. 36° 39′,5 E. (BarentsSea) [July 15, 1879].

Geogr. distrib. Iceland (Schmidt).

Depth. 128 Fathoms.

Literature.

1870. Schmidt, Spong. Atlant. Geb. pag. 43. Tab. V, fig. 11.

1881. Ridley, Proc. Zool. Soc. pag. 125.

Special description.

This Sponge, represented in figure 24 Pl. I, seems to differ in shape and in the arrangement of the spicules from Schmidt's specimen. The curious papillae however and the characteristic *Tedania*-needles (tr^{o2}.), show the close affinity. Schmidt has given no illustrations of the spicules. The forms I found in the specimen from the Barents-Sea are:

1°. tr^{o2}. (fig. 88). The heads are often elongated as f. ex. in fig. 86. Other specimens have heads as in fig. 84. This figure shows that both ends have not always equal heads (tr^o. tr^o.) and that the shaft can be subfusiform. The *type* is very frequent.

2°. tr. ac. (fig. 87) thin and slender.

3°. tr. ac. (fig. 85) thick and stout. Just beneath the head often a little constriction is often visible, and transitions are formed to (tr^o.) ac. They are about three times longer and four times thicker than the preceding ones.

4°. ac^2. (fig. 83). They have about the same diameter and length as the thin tr. ac. (in fig. 87).

23. **Aleblon piceum** n. sp. [Pl. I, fig. 19; pl. III, figg. 75—82].

Diagn. *Corpus infundibuliforme, piceum. Spicula indicantia*: tr. ac. sp. | (tr^o.) ac. | tr^{o2}. sp. f. | anc. anc. | rut. rut | ∽. NB. |

Local. Barents-sea [lat. 74° 10′ N.; long. 23° 20′; July 19, 1878; lat. 74° 16′ N.; long. 29° 47′ E., July 7, 1879].

Depth. 220 Fathoms (1878); 192 fathoms (1879).

Special description.

Ridley, in one of his interesting papers on Sponges *) accepted Gray's genus *Alebion*, which seemed to him to be „the only genus at all correctly defined, of the four in which he has placed these and the allied species", but he adds: „the character of branching should however, be omitted from it". From this genus *Alebion* Ridley has described a new species, *A. proximum*, from the Straits of Magellan, and included in the same genus three *Halichondriae* of Bowerbank, viz. *H. Pattersoni*, *Hyndmani* and *Ingalli*. In my paper on the *Desmacidinae* [2]) I have arranged these three under *Esperia*; but I now believe that it is better to separate those species which have „cylindrical" spicules with more or less distinct heads, from those in which this kind of spicules are absent. There are yet other Sponges belonging to *Alebion*, about which I hope to be able to give further details another time.

The *Alebion piceum* n. sp. is a cup-shaped great mass of a pitchy colour (in spirit) as shown in fig. 20 on plate I. Ridley, who has seen the three Bowerbankian species above mentioned, states that they are all incrusting; he had the great kindness of comparing my species with his *A. proximum* and those of Bowerbank, and is of opinion that it is another species. The sizes of the spicules to which he, as I believe attaches too much importance, are [3]): „Spined acuate: 0,316 by 0,016 mm.; cylindrical bicapitated 0,28 by 0,009 mm.; inequi-anchorate 0,021 to 0,0316 mm. long; bipocillate 0.0127 mm. long". In comparing these measurements with my figures, it will be clear that f. i. the greatest anchorates and the smallest differ so very much, that it is almost impossible to give an average size.

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1) Proceed. Zool. Soc. 1881 pag. 120.

2) Notes from the Leyden Museum, pag. 144.

3) From a letter of Mr. Ridley.

The spicules I found in my species are:

1°. tr. ac. sp. (fig. 75, *a* and *b*) stout, a little curved; strongly spined.

2°. tr^2. sp. (fig. 76) not frequent; the presence or absence cannot be a specific distinction; it can only have the value of a subspecific one (variety).

3°. (tr°) ac. or tr. ac. (fig. 79.)

4°. $tr^{\circ 2}$. sp. f. (fig. 77 and 78.) They vary 1°. in length, 2°. in the distinctness of the spined heads and 3°. in diameter: specimens as in fig. 77 are strongly fusiform, while others as in fig. 78 can hardly be named fusiform.

5°. rut. rut. and anc. anc. (fig. 81). The ordinary anchorates and the palmato-anchorates as those in fig. 81 a, b, are the most common ones. Between these gigantic specimens occur from time to time from which I give an illustration in fig. 80, and small ones as in fig. 81c.

6°. ∽ NB. (fig. 82). The minute so called bipocillate spicules are very abundant; they are probably a modification of the S shaped spicules or bihamates, that occur in most Desmacidine-Sponges.

24. **Esperia lanx** [1]) n. sp. [Pl. III, figg. 89—95].

Diagn. *Corpus lanciforme. Spicula indicantia*: tr. ac. | ∧ sp. | ∽ | rut. rut. | anc. anc.? |

Local. Barents-Sea [lat. 72° 32′ 3 N.; long. 36° 39′ 5 E.] (July 15, 1879).

Depth. 128 Fathoms.

Special description.

I have not given an illustration of this Sponge because it is not complete. However it appears to have had a dish-like flattened shape, the base having a smaller diameter than the margin. The surface is a little hispid.

The Sponge possesses several kinds of spicules. They are:

1°. tr. ac. (figg. 90 and 91) showing slender and stout ones, often with an indication of head or fusiform shaft.

1) lanx = kind of flat dish, on which food was served.

2°. $\wedge$ sp. (fig. 89). Great bows with sharply pointed, spined extremeties. They ressemble the bows of *Suberites arciger* O. S. and *Clathria lobata* Vosm.

3°. rut. rut. (fig. 94).

4°. anc. anc. (fig. 92) frequent, but very minute, often nearly anc^2. Again in this species I found gigantic anchorates (fig. 93), which are however few in number.

5°. $\subset\supset$ (fig. 95) The bihamates = S-shaped spicules are of the ordinary form.

25. **Esperia constricta** (Bwk.) Vosm. [Pl. III, figg. 99—104; pl. IV, fig. 153].

Diagn. *Corpus irregulare; superficies corrugata. Spicula indicantia*: tr. ac f. | (tr°.) ac. (f.) NB. | rut. rut. | $\subset\supset$ | ac^2. |

Local. Lat. 72° 32′3 N.; long. 36° 39′,5 E. (July 15, 1879).

Geogr. distrib. Shetland (Bowerbank).

Depth. 128 Fathoms.

Synon. and literature.

1866. *Desmacidon constrictus* Bwk.
(Bowerbank, Monogr. Brit. Spong. II, pag. 350.]

Compare also:

1874. Bowerbank, Monogr. Brit. Spong. III, pag. 181, Pl. LXXI figg. 3—10.

1880. Vosmaer, Notes from the Leyden Mus. II, pag. 145.

Special description.

Bowerbank's *Desmacidon constrictus* is without doubt an *Esperia*. But as this author has only had a dried fragment and does not illustrate the external appearance of the Sponge, I could not compare this with the Sponge under description. I must call attention to the fact that it is probable than if he had seen more spicules he would have observed that in this Sponge their shape also varies. For that reason I do not hesitate to identify my Sponge with Bowerbank's *Desmacidon constrictus*, which, as the anchors are inequiended must be brought under *Esperia*.

The Sponge forms a great irregular massive body, which has not

much consistency, although it contains very strong fibres; this may be the reason that Bowerbank only saw flat fragments. The surface is corrugated and rough by protruding spicules (fig. 153, pl. IV). The colour is (in spirit) light gray.

The skeleton consists of strong main fibres which give off thinner and thinner branches. The spicules are the following:

1°. tr. ac. f. (fig. 99).

2°. (tr°.) ac. (f) NB. (fig. 100, fragment). Bowerbank gives the following description of these curious spicules: „They are large and long, somewhat slender, and slightly fusiform; but their peculiarity consists in an irregular constriction of the shaft near its basal extremity. This commences at about one diameter of the largest part of the shaft from the extreme base, and continues for from one to three diameters up the shaft, which then gradually increases in its diameter as in the usual form of a fusiform spiculum". Misled by Bowerbanks illustration I have formulated this spicule ac. ac. NB.[1]) But, having now seen such curious spicules in nature I am convinced that it are modifications not of the acerate, but of the acuate type. My fault is that I have overlooked that Bowerbank himself held this opinion. He says: „The sudden constriction of the shaft near its base gives that portion of it the appearance of an *elongo-curvato-spinulate* termination; but in some of the spicula where the constriction is absent or very slightly produced, the *spinulate* character is entirely obsolete".

3°. ac². Bowerbank observes that he has seen small spicules, „unmistakably visible, but not sufficiently so to determine accurately whether the form was acuate or acerate, although submitted to a linear power of 660". As far as I could see they are acerate, lying in bundles. This kind of small spicules („trichites", Soll.) are observed in many Esperia's.

4°. rut. rut. [figg. 101 and 103]. There are two kinds of palmato-anchorates, the shape of which does not differ enough from Bowerbank's illustration to establish a new species.

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1) l. c. pag. 145.

5°. anc. anc. (anc².) [fig. 104] These little inequiended anchorates, which are nearly equiended are rather rare. It is possible that they do not belong to the Sponge. So many Sponges accaparate foreign bodies (spicules of other Sponges, Foraminifera etc.) that this supposition is not improbable

6°. ∽ [fig. 102] Bihamates of the ordinary shape. Frequent.

26. **Cladorhiza bihamatifera** (Crtr.) Vosm. [Pl. III, figg. 105—112].

Diagn. *Corpus longe; ex stirpe compositum tenui et ramificationibus numerosis parvis. Spicula indicantia*: tr°. ac. | (tr°.) ac. (f.) | rut. rut. | rut. rut. NB. | ∽ | .

Local. Lat. 74° 10′ N.; long. 23° 20′ E. (Barents-Sea).

Geograph. distrib. Atlant. Ocean.

Depth. 220 Fathoms.

Synon. and literature.

1876. *Esperia cupressiformis* var. *bihamatifera*. Crtr. (Carter, Ann. and Mag. XVIII, pag. 318).

1880. *Esperia bihamatifera* (Crtr.) Vosm. (Vosmaer, Notes Leyden Museum II, pag. 147).

Description.

Carter described in 1874 a new Sponge, which he named *Esperia cupressiformis* [1]); in 1874 he described a Sponge which was according to him a variety of this species; in my paper on the *Desmacidinae* I have made a new species out of it, because it seemed to me that both Sponges are very well distinguished from one another. *E. cupressiformis* has „bows" and „forcipiform" spicules; *E. bihamatifera* is without these.

The specimen from the Barents-Sea is a true *Cladorhiza*, having a long, slender main stem, with very small secundary twigs. The specimen, not being complete, I have not illustrated it. The stem is about 15 cm. long, but measures only 3 mm. in diameter; the colour is yellowish-white (in spirit).

The description and illustrations of Carter's *E. cupressiformis*

1) Carter, Ann. and Mag. XIV, pag. 215.

var. *bihamatifera*, agree in all principal points with our arctic specimen. There is much probability that they are identical.

As regards the arrangement of the spicules I refer to Sars [1]). I have observed five forms of spicules:

1°. (tr°.) ac. (f.) [figg. 105 and 106].

2°. tr°. ac. [fig. 107] nearly always bent; point never very sharp;

3°. rut. rut. [figg. 111 and 112] curious by she extreme shortness of the shaft. Varying in size.

4°. rut. rut. NB. [figg. 109 and 110]. These spicules have a very remarkable shape. It is not easy to find out the real shape, but I now believe that they are to be considered as Esperia-anchorates, where all the teeth are fully developped, and not two with one rudimentary. The other extremity of these anchors shows three or four teeth. I confess that further examination on this point is very necessary; but for this more material is required.

5°. ∽ [fig. 108] in innumerable number on the upper surface.

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1) Sars, On some remarkable forms of animal life etc. 1872. pag. 65,

ADDENDA ET CORRIGENDA.

By an unhappy mistake the first and second sheets are printed without exact correction. The most indispensable rectifications are:

Pag. 1,	line 4,	for	*in liquor*,	read	*into liquor.*
„ 6,	„ 8,	„	*Monthly etc.*,	„	*Zool. Rec. VII, pag.* 506.
„ 6,	„ 10,	„	*Bowerbank*,	„	*Bowerbank, Monogr. III.*
„ 7,	„ 10,	„	*on which*,	„	*about which.*
„ 7,	„ 11,	„	*as*,	„	*than.*
„ 7,	„ 15,	„	*can see*,	„	*may see.*
„ 11,	„ 1,	„	*can see*,	„	*may see.*
„ 11,	„ 19,	„	*do*,	„	*have.*
„ 11,	„ 27,	„	*you can*,	„	*you may.*
„ 12,	„ 21,	„	*such*,	„	*suchlike.*
„ 14,	„ 9,	„	*radical*,	„	*radial.*
„ 14,	„ 28,	„	*yet*,	„	*still.*
„ 15,	„ 5,	„	*can be*,	„	*may be.*
„ 15,	„ 35,	„	*I*,	„	*It.*
„ 16,	„ 11,	„	*fig.* 117,	„	*figg.* 117 *and* 118.
„ 17,	„ 6,	„	*much*,	„	*many.*
„ 17,	„ 26,	„	*however*,	„	*although.*
„ 18,	„ 1,	„	*yet*,	„	*still.*
„ 18,	„ 18,	„	*distinct*,	„	*distinctly.*
„ 19,	„ 6,	„	*At*,	„	*In.*
„ 19,	„ 18,	„	*vertically*,	„	*vertical.*
„ 19,	„ 35,	„	*which end al*,	„	*which end.*
„ 20,	„ 17,	„	*describes*,	„	*describes them.*
„ 21,	„ 28,	„	*sharp*,	„	*sharply.*
„ 22,	„ 12,	„	*hexradiate spicules, and totally complete*,	read	*totally complete hexradiate spicules.*
„ 22,	„ 17,	„	*blunt*,	read	*bluntly.*

to add, pag. 23, at the description of *Synops pyriformis:*

The following points seem to me characteristic for *Synops*: Incurrent chones without walls, dispersed over the whole surface. Walls of the excurrent chones more or less developed; excurrent chones congregated on the depressed top of the Sponge. Main excurrent canals in direct communication with the chones, which are however provided with sphincters.

Pag.	24,	line	22,	for	*thus*,	read	*therefore.*
„	24,	„	29,	„	*great*,	„	*high.*
„	24,	„	30,	„	*yet*,	„	*still.*
„	24,	„	34,	„	*yet*,	„	*still.*
„	25,	„	10,	„	*sideward*,	„	*lateral.*
„	25,	„	12,	„	*rather*,,	„	*rather.*
„	25,	„	13,	„	*surrounded*,	„	*surrounding.*
„	25,	„	28,	„	*to*,	„	*in.*
„	25,	„	32,	„	*closed*,	„	*close.*
„	26,	„	15,	„	*as*,	„	*than.*
„	27,	„	6,	„	*R.*,	„	*Z.*
„	29,	„	17,	„	*on*,	„	*during.*
„	30,	„	7,	„	*yet*,	„	*still.*
„	30,	„	16,	„	*caused the*,	„	*caused by the.*
„	30,	„	24,	„	*Merejskowski*,	„	*Merejkowski.*
„	30,	„	24,	„	*no person shall*,	„	*nobody is able.*
„	30,	„	25,	„	*pitty*,	„	*pity.*
„	30,	„	26,	„	*reign*,	„	*remain.*
„	30,	„	28,	„	*forced*,	„	*obliged.*
„	30,	„	31,	„	[*Pl. IV, figg.* 133—136	„	[*Pl. III, figg.* 96—98; *pl. IV, figg.* 133—136,
„	31,	„	23,	„	*that remains*,	„	*ramains.*
„	31,	„	28,	„	*Suberitus*,	„	*Suberites.*
„	31,	„	28,	„	*fig.* 26,	„	*fig.* 25.
„	32,	„	18,	„	*figg.* 22 *and* 23,	„	*figg.* 21 *and.* 22.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1—8. *Thenea muricata* (Bwk.) Gray.

(All figures natural size; figg. 1, 2, 3, 4 and 8 after var. α, figg. 5, 6 after var. β; fig. 7 after var. γ.)

Fig. 1. Specimen with five straight roots and one tuft on the top. The broad split shows the membrane with the pores.

Fig. 2. Specimen with one great root in the middle and five smaller ones around it. On the top is one slender flexuous tuft. The penthouse with its long needles is on the left side. In this specimen the casque-shape is very apparently.

Fig. 3. Elongated form.

Fig. 4. Section through a specimen like n°. 2.

Fig. 5. Section of n°. 6. In the middle is to be seen the centrum from which the radii of spicules go out. Two penthouses.

Fig. 6. Specimen more rough than 1, 2 and 3. The two roots divide themselves on the end. No tuft; two penthouse-apparatus.

Fig. 7. Very rugged specimen with strongly branched roots, in which many sand-particles are inherent. One penthouse fully developed, the other rather small.

Fig. 8. Specimen as n°. 2 seen from the top, showing one tuft and one osculum with the radial canals under the dermis.

Figg. 9 and 15. *Isops pallida*. n. sp.
(natural size.)

Fig. 9. External of the Sponge.

Fig. 15. Section through the middle.

Figg. 10—11. *Isops sphaeroides* n. sp.
(natural size.)

Fig. 10. Specimen with smooth surface.
Fig. 11. Specimen the surface of which is rugged by protruding spicula.

Figg. 12—13. *Polymastia penicillus* (Mont.) Vosm.
(natural size.)

Fig. 12. External of the Sponge, attached on a Worm-Shell.
Fig. 13. Section of specimen attached to a little stone.

Fig. 14. *Pachychalina caulifera* n. sp.
(natural size.)

Fig. 14. View from the side on which many great oscules are visible.

Fig. 16. *Cribrochalina variabilis* n. sp. var. *crassa*.
(natural size.)

Fig. 17. *Cribrochalina variabilis* n. sp. var. *salpingoides*.
(natural size.)

Fig. 18. *Cribrochalina Sluiteri* n. sp.
(natural size.)

Fig. 19. *Alebion piceum* n. sp.
($\frac{2}{3}$ of natural size.)

Fig. 20. *Auletta elegans* n. sp.
(natural size.)

Figg. 21—22. *Suberites* spec. (*montalbidus* Crtr.?)
(natural size.)

Fig. 23. *Chalinula* spec. (*rubustior* O. S.?)
(natural size.)

Fig. 24. *Tedania suctoria* O. S.
(natural size.)

Fig. 25. *Suberites montiniger* Crtr.
(natural size.)

Fig. 26. *Amorphina* spec.
(natural size.)

PLATE II.

Figg. 1—21. *Thenea muricata* (Bwk.) Gray.

Fig. 1. M. ta. d. bif. ($d > d'$) from the side; Hartn. IV, Cam. luc. Zeiss.
Fig. 2. id. from the top. Hartn. IV, Cam. luc. Zeiss.
Fig. 3. id. id. Specimen with remarkable short, blunt teeth d'. Hartn. IV, Cam. luc. Zeiss.

Fig. 4. M. ta. d. bif. (d $<$ d′) from the top; (fragment). Hartn. IV, Cam. luc. Zeiss.

Fig. 5. M. ta. (d $>$ M), from the side. Hartn. IV, Cam. luc. Zeiss.

Figg. 6, 7. M. ta. $\varphi > 90°$. Two kinds, partly. Hartn. IV, Cam. luc. Zeiss.

Figg. 8, 9, 10 and 11. M. ta. $\varphi < 90°$. Showing the different forms of the top; partly. Hartn. IV, Cam. luc. Zeiss.

Fig. 12a, b and c. Three specimens of stars (st.) Hartn. VII, Cam. luc. Zeiss.

Fig. 13. st^2. (»Doppelstern" of Schmidt) Hartn. VII, Cam. luc. Zeiss.

Fig. 14. st. Gigantic stellate Hartn. VII, Cam. luc. Zeiss.

Fig. 14*. id. Hartn. IV, Cam. luc. Zeiss.

Figg. 15 and 16. id. Hartn. VII, Cam. luc. Zeiss.

Figg. 16* and 17. Young gigantic stellates? Hartn. VII, Cam. luc. Zeiss.

Figg. 18, 19 and 20. Stellates, as in fig. 13.

Fig. 21. M. ta. d. bif. [$\varphi > 90°$; d $>$ d′]. Very rare aberrant form. Hartn. IV, Oc. 3. proj. on the table.

Figg. 22—26, 29—38. *Isops pallida* n. sp.

(Figg. 25, 26, 29, 32, 33 and 35 are from var. α; the rest of var. β.)

Fig. 22. M. ta. $\varphi = 90°$. Top of one of the stout tetraxile spicules. The angle φ little more than 90°; the teeth strongly bent, sharply pointed. Zeiss A, Cam. luc. Zeiss.

Fig. 23. M. ta. $\varphi < 90°$ (»recurvo-ternate"). The upper part. Zeiss A, Cam. luc

Fig. 24. Half of ac^2. Zeiss A, Cam. luc. Zeiss.

Fig. 25. tr. ac. Hartn. IV, Cam. luc. Zeiss.

Fig. 26. tr°. ac. Hartn. IV, Cam. luc. Zeiss.

Fig. 29. Top of ac^2. Very slender sharp pointed specimen.

Fig. 30. Top of ac^2. The end teat-shaped. Hartn. IV, Cam. luc. Zeiss.

Fig. 31. Top of ac^2. Hartn. IV, Cam. luc. Zeiss.

Fig. 32. Top of ac^2. Hartn. IV, Cam. luc. Zeiss.

Fig. 33. ac^2. Type of Renieridae. Hartn. IV, Cam. luc. Zeiss.

Fig. 34. Fragment of M. ta. $\varphi = 90°$; d sharply pointed, straight. Zeiss A, Cam. luc. Zeiss.

Fig. 35. Fragment of M. ta. $\varphi = 90°$; d bent sharply pointed. On the left side is represented the end of M. Zeiss A. Cam. luc. Zeiss.

Fig. 36. Fragment of M. ta.; d blunt. Zeiss A. Cam. luc. Zeiss.

Fig. 37. st. sp. Zeiss D, Cam. luc. Zeiss.

Fig. 38. glst. Zeiss D, Cam. luc. Zeiss.

Figg. 27, 28, 39—49. *Isops sphaeroides* n. sp.

Fig. 27. tr. ac. f. Hartn. IV, Cam. luc. Zeiss.

Fig. 28. st. Hartn. VII, Cam. luc. Zeiss.

Fig. 39. ac^2. Fragment of slender one. Zeiss A. Cam. luc. Zeiss.

Fig. 40. ac^2. Fragment of slender one. Zeiss A, Cam. luc. Zeiss.

Fig. 41. ac^2. (f) Half of subfusiform acerate spicule. Zeiss A, Cam. luc. Zeiss.

Fig. 42. M. ta. $\phi = 90°$. Head of a patento-ternate. Zeiss A, Cam. luc. Zeiss.

Fig. 43. Head of M. ta. $\phi < 90°$. Curious form; ϕ very great; d geniculated Zeiss A.

Fig. 44. Head, middle and shaft-point of id. Zeiss A, Cam. luc. Zeiss.

Figg. 45, 46. Heads of M. ta. $\phi < 90°$ ordinary kind. Zeiss A, Cam. luc. Zeiss.

Fig. 47. st. Zeiss D, Cam. luc. Zeiss.

Fig. 48. gl. st. Zeiss D, Cam. luc. Zeiss.

Fig. 49. Head of M. ta. d. bif. Zeiss A, Cam. luc. Zeiss.

PLATE III.

Figg. 50 and 51. *Geodia Barretti.*

Fig. 50. Head and shaft-point of M. ta. d. bif. ($d' < d$). Zeiss A.

Fig. 51. Head of M. ta. $\phi < 90°$. Zeiss A.

Figg. 52—63. *Synops pyriformis.*

Fig. 52. Fragment of ac^2. Sharply pointed one. Zeiss A.

Fig. 53. Fragment of ac^2. Very slender, sharply pointed one. Zeiss A.

Fig. 54. Fragment of tr^2. Bluntly ended acerate spicule. Zeiss A.

Fig. 55. Head of another tr^2. showing a transition to the following kind. Zeiss D.

Fig. 56. Head of ac^2. [tr^2.] with teat-shaped end. Zeiss D.

Fig. 57. ac^2. small form (type: *Renieridae*) more or less bent. Zeiss A.

Fig. 58. Fragment of M. ta. $\phi > 90°$. (modification of M. ta. $\phi = 90°$) Zeiss A.

Fig. 59. Head of M. ta. $\phi < 90°$. Specimen with long teeth. Zeiss A.

Fig. 60. Head, middle and shaft-point of M. ta. $\phi < 90°$. Specimen with short teeth.

Fig. 61. st. Largest kind. Zeiss D, Cam. luc. Zeiss.

Fig. 62. st. Smallest kind. Zeiss D, Cam. luc. Zeiss.

Fig. 63. glst. Zeiss D, Cam. luc. Zeiss.

Figg. 64—66. *Pachychalina caulifera* n. sp.

Fig. 64. Fragment of skeleton of the upper parts. Hartn. IV, Cam. luc. Zeiss.

Fig. 65. Fragment of 66, to show the teat-shape. Zeiss F, Cam. luc. Zeiss.

Fig. 66. ac^2. f. Hartn. VII, Cam. luc. Zeiss.

Figg. 67 and 68a—h. *Cribrochalina variabilis* var. *crassa.*

Fig. 67. (tr^o.) ac. Hartn. VII, Cam. luc. Zeiss.

Fig. 68a—h. Different sizes of spicules, showing that they vary much in length but little in diameter. Hartn. IV, Cam. luc. Zeiss.

Fig. 69, a, b and c. *Cribrochalina variabilis* var. *salpingoides*. Three tr. ac. bent. Hartn. VII, Cam. luc. Zeiss.

Fig. 70. *Auletta elegans* n. sp. Acuate spicule (tr. ac.) Hartn. VII, Cam. luc. Zeiss.

Figg. 71—74. *Cribrochalina Sluiteri* n. sp.

Fig. 71. tr. ac.
Fig. 72. (tr°.) ac. f.
Fig. 73. (tr°.) ac.
Fig. 74. tr°. ac.
} Hartn. VII, Cam. luc. Zeiss.

Figg. 75—82. *Alebion piceum* n. sp.

Fig. 75a, b. tr. ac. sp. Hartn. VII, Cam. luc. Zeiss.
Fig. 76. tr^2. sp. Hartn. VII, Cam. luc. Zeiss.
Fig. 77. $tr^{\circ 2}$. sp. f. Hartn. VII, Cam. luc. Zeiss.
Fig. 78. $tr^{\circ 2}$.) sp. (f.) Hartn. VII, Cam. luc. Zeiss.
Fig. 79. (tr°.) ac. Hartn. VII, Cam. luc. Zeiss.
Fig. 80. anc. anc. Gigantic form. Hartn. VII, Cam. luc. Zeiss.
Fig, 81a., e. anc. anc. Usual size.
c. id. Small size.
} Hartn. VII, Cam. luc. Zeiss.
b., d. rut. rut. Hartn. VII, Cam. luc. Zeiss.
Fig. 82. ᔕ NB. »Bipocillate". Hartn. VII, Cam. luc. Zeiss.

Figg. 83—88. *Tedania suctoria* O. S.

Fig. 83. ac^2.
Fig. 84. $tr^{\circ 2}$.
Fig. 85. tr. ac. Large form.
Fig. 86. Head of a $tr^{\circ 2}$.
Fig. 87. tr. ac. Small size.
Fig. 88. $tr^{\circ 2}$. Specimen with elongated heads
} Hart. VII, Cam. luc. Zeiss.

Figg. 89—95. *Esperia lanx* n. sp.

Fig. 89. ⋀ sp.
Fig. 90. Slender specimen of tr. ac.
Fig. 91. Stout specimen of tr. ac.
Fig. 92. anc. anc. [anc^2.] Small specimens.
Fig. 93. anc. anc. Gigantic specimen.
Fig. 94. rut. rut. Usual size.
Fig. 95. ᔕ
} Hartn. VII, Cam. luc. Zeiss.

Figg. 96—98. *Thecophora semisuberites* O. S. [Var?]

Fig. 96. tr°. ac. (f.) Slender form.
Fig. 97. tr°. ac. f. Stout, bent form.
Fig. 98. tr°. ac. f. Largest size.
} Hartn. IV, Cam. luc. Zeiss.

Figg. 99—104. *Esperia constricta* (Bwk.) Vosm.

Fig. 99. tr. ac. f. Hartn. IV, Cam. luc. Zeiss.
Fig. 100. Head of (tr°.) ac. (f.) NB.
Fig. 101. rut. rut. large size.
Fig. 102. ᔓ (»bihamate" = »S-shaped")
Fig. 103. rut. rut. Usual size.
Fig. 104. anc. anc. (Very rare).
} Hartn. VII, Cam. luc. Zeiss.

Figg. 105—112. *Cladorhiza bihamatifera.*

Fig. 105. Head of tr°. ac. f.
Fig. 106. (tr°.) ac. (f.)
Fig. 107. tr°. ac.
Eig. 108. ᔓ
Fig. 109.
Fig. 110. } rut. rut. NB.
} Hartn. VII, Cam. luc. Zeiss.

Fig. 111. rut. rut. Very small kind. Hartn. VIII, Cam. luc. Zeiss.
Fig. 112. The same still more magnified.

Fig. 113. *Chalinula* spec. (*robustior* O. S.?) Extremity of an ac^a. Hartn. VII, Cam. luc. Zeiss.

PLATE IV.

Figg. 114 and 115. *Thenea muricata* (Bwk.) Gray.

Fig. 114. Fragment of the surface under the penthouse-apparatus. Small power.
Fig. 115. id. still more magnified; the openings are pores, the substance is connective tissue, strengthened by spicula, especially stellates.

Fig. 116. *Isops sphaeroides* n. sp. Section through the upper part; a little magnified.

Figg. 117 and 118. *Isops pallida* n. sp.

Fig. 117. Upper surface with oscule and pores, between the globulates.
Fig. 118. Slice, showing the trabecular network of the body. c. c. c. = section of canals. Hartn. VII.

Fig. 119. Fragment of the innersurface of a great excurrent canal of *Synops pyriformis* n. sp. Hartn. IV.

Figg. 120—122. *Geodia Barretti* Bwk.

Fig. 120. Fragment of oscular tube, showing the small congregated oscula. The sphincters are partly shut, partly opened. Low power.

Fig. 121. Vertical section through the oscular tube and main excurrent canals. About natural size.

Fig. 122. Fragment of the same a little magnified. Apparently there is lateral communication between the canals and the oscula.

Figg. 123—126. *Tethya lyncurium* var. *obtusum*.

Fig. 123. (tr°.) ac. f.
Fig. 124. st. Large stellate. Radii stout, short.
Fig. 125. st. Small stellate.
Fig. 126. tr. tr. f.

} Hartn. VII, Cam. luc.

Fig. 127—132. *Polymastia penicillus* (Mont.) Vosm.

Fig. 127. One of the papillae (»cône", Merejk.), showing some pores, and protruding spicules. Low power.

Fig. 128. Vertical section through one of the papillae. Hartn. Oc. 3. Syst. IV.

Fig. 129. tr°. ac. f. Large spicule from the interior.
Fig. 130. tr. ac. Large spicule from the margin.
Fig. 131. tr°. ac. f. Average sized spicule.
Fig. 132a, b, c. tr°. ac. f. Smallest spicules from the rind.

} Hartn. IV, Cam. luc.

Figg. 133—136. *Thecophora semisuberites* O. S.

Fig. 133. tr°. ac. f. Small specimen.
Fig. 134. (tr°.) ac. f.
Fig. 135. Head of tr°. ac. (f.)
Fig. 136. tr°. ac. f. Largest specimen.

} Hartn. IV, Cam. luc. Zeiss.

Fig. 137—139. *Suberites montiniger* Crtr.

Fig. 137. tr°. ac.
Figg. 138—139. Elongated, oval heads of tr°. ac.

} Hartn. IV, Cam. luc. Zeiss.

Figg. 140—144. *Suberites* spec. (*montalbidus* Crtr.?)

Fig. 140. (tr°.) ac. (f.).
Figg. 141 and 142. Heads of tr°. ac.
Fig. 143. ac^1. (sp.) f°.
Fig. 144. tr^1. (sp.) f°.

Fig. 145. Section (vertical) through *Cribrochalina variabilis* var. *crassa*. Natural size.

Fig. 146. Vertical section through *Cribrochalina variabilis* var. *salpingoides*. Natural size.

Fig. 147. Inner surface of the funnel-shaped form of the latter, showing macro- and micropores. Low power.

Figg. 148—151. *Chalinula* spec.

Figg. 148, 149 and 151. Different kinds of tr. ac.
Fig. 150. ac^2. } Hartn. VII.

Fig. 152. Vertical section through *Auletta elegans* n. sp. Natural size.

Fig. 153. Corrugated surface of *Esperia constricta*. Bwk. Nat. size.

Fig. 154. Vertical section through *Synops pyriformis*. Half nat. size.

Fig. 155. Vertical section through an osculum of *Synops*, magnified. (schematic).


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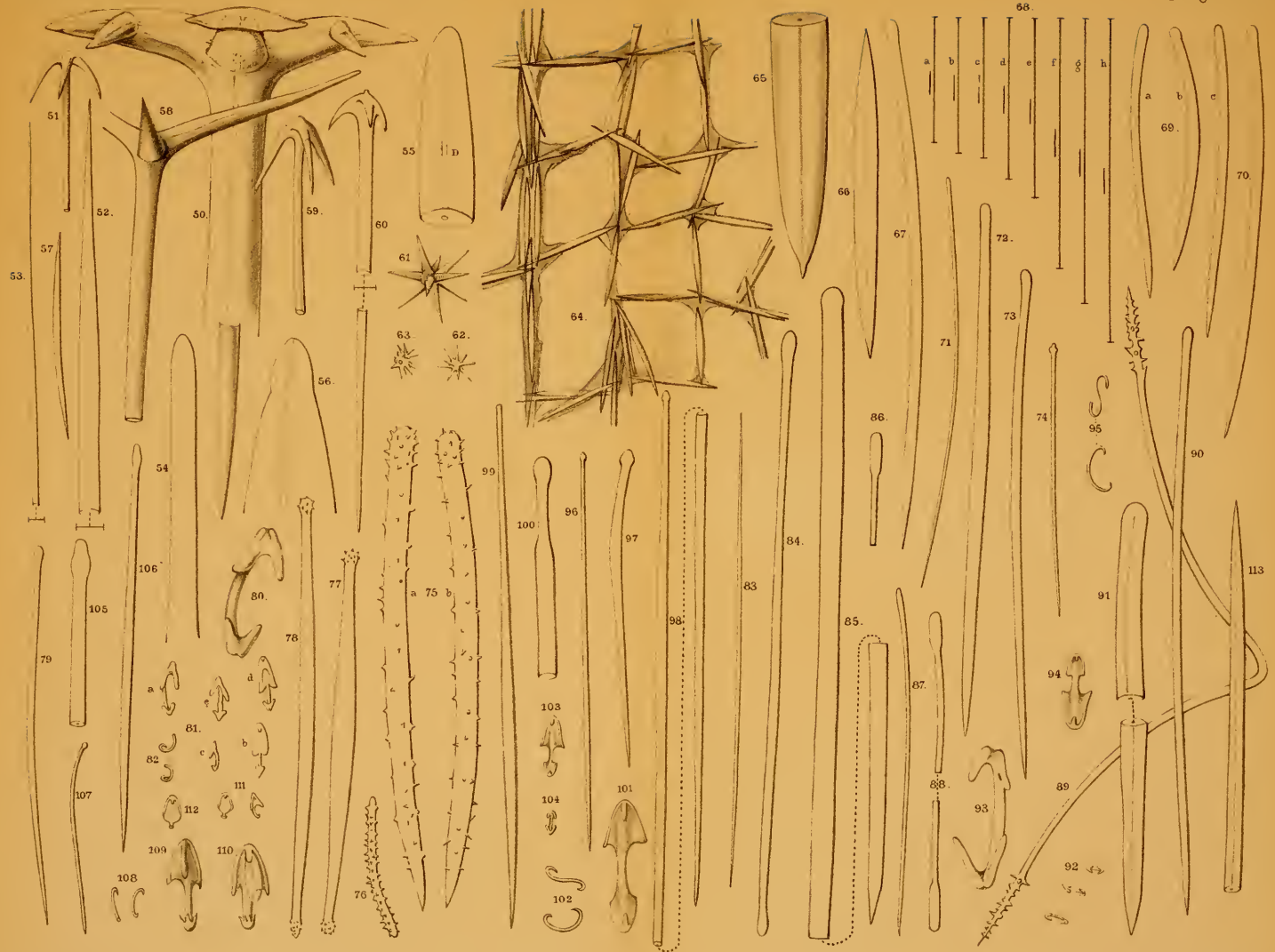
G.C.J Vosmaer del. P.W.M Trap impr A.J Wendel lith.



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