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IX.

DESCRIPTIONS OF SOUTH AFRICAN SPONGES COLLECTED IN THE SOUTH AFRICAN MARINE SURVEY.

PART I.—MYXOSPONGIDA & ASTROTETRAXONIDA.

BY

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The present paper contains an account of the Myxospongida and Astrotetraxonida of South Africa. In order to obtain as complete an account as possible, I have included descriptions or reports of specimens from the British, Natal and Durban Museums, and from Professor Dendy's collection. The number of specimens, hitherto undescribed, reported on is 104, representing 21 species and three varieties, of which 12 species and all the varieties are new.

Apart from the descriptions of new species and the link with the European sponge-fauna given by *Ancorina radix*, Marenzeller, *Ancorina ponderosa*, Bwk., and *Stelletta grubioides*, n.sp., perhaps the most interesting feature of the paper is the discovery, made possible by the examination of a large number of specimens, of the true nature of *Stelletta agulhana*, Lfd., *Pachastrella monilifera*, Schmidt, *Geodia perarmata*, Bwk., *Pachymatisma areolata*, Bwk., and *Donatia magna*, Kirkpatrick.

I wish to record my gratitude to Professor A. Dendy and Mr. R. Kirkpatrick for their very valuable assistance, especially in having given me ready access to literature, specimens and microscopic preparations.

The following is a list of the species :—

Order MYXOSPONGIDA.

1. *Hexadella kirkpatricki*, n. sp.

Order TETRAXONIDA.

Sub-Order ASTROTETRAXONIDA.

Family STELLETTIDÆ.

2. *Stelletta farcimen*, Lfd.
3. *Stelletta horrens*, Kpk.
4. *Stelletta horrens*, Kpk., var. *subcylindrica*, var. nov.

5. *Stelletta agulhana*, Lfd.
6. *Stelletta agulhana*, Lfd., var. *paucistella*, var. nov.
7. *Stelletta sphærica*, n. sp.
8. *Stelletta rugosa*, n. sp.
9. *Stelletta cyathioides*, n. sp.
10. *Stelletta grubioides*, n. sp.
11. *Pachastrella monilifera*, Schmidt.
12. *Aurora primitiva*, n. sp.
13. *Ancorina ponderosa*, Bwk.
14. *Ancorina radix*, Marenzeller.
15. *Stœba natalensis*, n. sp.

Family GEODIIDÆ.

16. *Geodia perarmata*, Bwk.
17. *Geodia* (*Isops*) *ovifractus*, n. sp.
18. *Geodia* (*Isops*) *ovifractus*, var. *cyathioides*, var. nov.
19. *Geodia* (*Isops*) *dendyi*, n. sp.
20. *Geodia* (*Synops*) *megaster*, n. sp.
21. *Pachymatisma areolata*, Bwk.

Family ERYLIIDÆ.

22. *Erylus gilchristi*, n. sp.
23. *Erylus amorphus*, n. sp.

Family DONATIIDÆ.

24. *Donatia magna*, Kirkpatrick.

1. Hexadella kirkpatricki, n. sp.

(Pl. 1, figs. 1-6.)

There are seven specimens in the collection. The smallest (fig. 5) is subspherical and about 10 mm. in diameter, the largest (fig. 4) lobose and about 27 mm. long. All but two are stipitate. The surface is smooth and covered with inhalant pores which can be easily seen with the aid of a hand-lens. The vents, about 0.25 mm. in diameter, are situated at the summits of a number of small papillate projections. Colour in spirit, grey.

The ectosome forms a tough cortex, about ·15 mm. thick, which passes insensibly into the choanosome. The latter is firm and compact, in spirit, but I should imagine it is somewhat loose in actual life.

The water enters the sponge through the inhalant pores and passes through narrow canals traversing the cortex. These in turn open into wide inhalant canals immediately beneath the cortex. Distinct sub-cortical crypts appear to be absent. The flagellate chambers are sac-shaped and somewhat irregular both in shape and size, the largest measuring about

0·18 mm. long, and grouped around the inhalant canals. In places, however, they have the appearance of being arranged in a much-folded lamella consisting of a single layer of cells. Both the ectosome and mesogloea are collenchymatous and I have been unable to detect any fibrous elements in any part of the sponge. A very distinctive feature of the cortex is the large number of foreign siliceous spicules which have become incorporated in it and which are disposed, for the most part, at right angles to the surface. So far as I am aware, this feature is unique among the Myxospongida.

The choanosome contains a number of cavities inhabited by small crustacea (fig. 6). I have not been able to investigate fully the nature of these commensals, but I have shown them to Dr. Callman of the British Museum, and he is of the opinion that they may prove to be the sedentary females of some species of which the free-swimming males only have hitherto been found. However, I hope to say more on this point at some future date.

Lying singly or in groups at the junction of the cortex and choanosome and in the walls of the water-canals, are a number of parasitic algæ (fig. 2), similar to those described by Dendy (1905A) in *Hexadella indica*.

H. kirkpatricki is quite distinct from any known species of Hexadella by the inclusion of foreign spicules in the cortex, by its shape and by details of anatomy.

Registered No. and Locality :—R.N. 82 ; Cape Point Lighthouse, N.E. 16° E. 19° ; 85 fathoms. Bottom, green mud.

2. Stelletta farcimen, Lendenfeld (1906A).

There are three specimens in the collection. Two, in spirit, are sub-cylindrical, erect, very like that figured by Lendenfeld, standing about 9 cms. high by 5 cms. in diameter. The third is dry, irregularly massive with a number of proliferous, low, rounded lobes, measuring 15 cms. in height and about 12 cms. at its broadest point.

The dried specimen (R.N. 55) is a brownish-grey in colour, while the two spirit-specimens are a bright red.

The vents are aggregated in groups in slight depressions of the surface. In R.N. 55 they are found at the ends of some of the lobes. The pores appear to be scattered evenly over the surface.

The cortex is about 5 mm. thick.

The spicules agree very closely with Lendenfeld's original description in form, size and distribution.

Previously-known distribution :—Agulhas Bank, S. Africa.

Registered No. and Locality :—R.N. 55 ; Sandy Point, N. ¼, E. 10 miles ; bottom, rock ; 95 fathoms. R.N. 93, 97 ; False Is., N. 8½ miles ; bottom, sand and shells ; 53 faths.

3. Stelletta horrens, Kirkpatrick (1902b).

The species is represented by three specimens. The first (R.N. 83) is almost identical in shape and size with the type-specimen (*vide* Kirkpatrick l.c. p. 229; pl. 11, fig. 6). The other two are, in shape, like flattened cups. The larger (R.N. 56) stands about 10 cms. high and measures about 22 cms. across the mouth of the cup, while the smaller is only a portion of a specimen, presumably, about 20 cms. across by 5 cms. high.

The colour and details of spiculation of all three specimens closely agree with those of the type.

Previously-known distribution:—Durnford Point, Natal.

Registered No. and Locality:—R.N. 56, 79, 83; Stn. 109.

4. Stelletta horrens, Kirkpatrick, var. subcylindrica, var. nov.

The single specimen is sub-cylindrical, about 3 cms. in diameter and about 3 cms. high, with a shallow depression at the apex, and attached at the base to a mass of shell and other débris. The colour is a pale-brown.

The oscules measure about 1 mm. in diameter and are scattered singly over the surface.

As in *S. horrens* the cortex is feebly developed.

The spicules are of about the same dimensions as those of the type specimen of *S. horrens* and differ from them only in that the cladi of the protriænes are less-markedly claw-like.

This variety is based almost exclusively on the external form, and it may possibly be that it is actually nothing more than a young form of the large cup-shaped species.

Registered No. and Locality:—R.N. 42; Stn. 109.

5. Stelletta agulhana, Lendenfeld (1906a).

The species is represented by four dried specimens, dark-brown in colour, more or less cushion-shaped, the largest 12 cms. long by 9 cms. broad by 6 cms. high; the smallest, 7 cms. long by 4 cms. broad by 6 cms. high. In all, except R.N. 54, the surface is covered to a greater or lesser extent by numerous papillate projections (*vide* Lendenfeld l.c., pl. xxviii, fig. 17), which frequently coalesce to form small anastomosing ridges.

So close does the external form and spiculation, except for certain details to be discussed, agree with the description given by Lendenfeld of his specimen from the Agulhas Bank, that I have no hesitation in assigning the four specimens to this species.

Anatriænes, which Lendenfeld describes as part of the normal spiculation, I have been unable to find. He speaks of them as "frei vorragende Nadeln ——— welche eine dichte Lage an

der Oberfläche bilden", and one cannot but suspect that a mistake has been made here and that these spicules are foreign to the sponge.

Again, he describes, also as part of the normal spiculation, "kleine Dichotriæne der Haut" and ataxasters. I have no doubt that he was here confounding the spicules of an encrusting sponge, described below under *Stoeba natalensis*, n. sp. with those of the Stelletta. That these spicules are those of an incrusting sponge, and are not merely a special cortical skeleton, may be shown by the fact that in R.N. 5, 22 and 78 these small dichotriænes and ataxasters are present on the surface, while R.N. 54, a sponge similar in all respects to the three latter, does not possess them. Similarly, in *S. agulhana*, var. *paucistella* var. nov., R.N. 2, 9, 23, 25, 52, possess these spicules at the surface while R.N. 21 and 51, sponges similar in all other respects, do not.

On the S. African Stellettas I have so far examined, numbering in all some thirty specimens, encrusting sponges were found with but one or two exceptions, and moreover, they belonged to one of the following three species: *Stoeba natalensis*, n. sp., *Desmacella vestibularis*, Wilson (1904), *Trachycladus incrustans* n. sp. It usually happens that the microscleres of the encrusting forms penetrate deeply into the choanosome of the sponge on which they are found, so that it is not difficult to be misled as to the true nature of the spicules in question. Lendenfeld appears here to have made a mistake similar to that of Hanitsch (1889a) in *Seiriola compacta*.

Having regard to the confusion brought about by the mistaken identity of the spicules in Lendenfeld's type-specimen and the consequent erroneous diagnosis of the species. I take the liberty of a re-description based upon the Natal specimens.

The skeleton is composed of oxea, plagio- and dichotriænes, and two forms of oxyaster. Internally, it is confused but becomes radial towards the surface.

Spicules.—(1) Oxea, straight or curved, frequently rounded at one end, 1·5—5·6 x 0·035—0·060 mm.

(2) Plagiotriænes (*vide* Lendenfeld l.c. pl. xxviii, figs. 2, 14, 15) with shaft straight or curved, usually sharply-pointed but sometimes rounded at the ends, 2—3·5 x 0·066—0·126 mm. Cladi 0·25—0·45 mm. long. The angle which the cladi make with the shaft is frequently greater than that figured by Lendenfeld.

One or more of the cladi may be rounded at the end or even reduced to a mere knob. This is usually associated with a rounding-off at the end of the shaft.

(3) Dichotriænes, like the plagiotriænes in shape but usually smaller, 1·0—1·98 x 0·054—0·09 mm. Primary cladi 0·1—0·18 mm. long; secondary cladi, 0·6—0·15 mm. long.

The dichotriænes show considerable variation both in the dimensions of their cladi and in distribution. They may be occasionally almost entirely absent from certain parts of the sponge.

(4) Oxyasters (*vide* Lfd., l.c. pl. xxviii, fig. 12), with numerous sharply-pointed rays and small centrum, 0·14—0·10 mm. in diameter.

(5) Oxyasters (*vide* Lfd., l.c. pl. xxviii, figs. 13, 18), with 3—12 sharply-pointed rays, no distinct centrum, each ray 0·07—0·15 mm. long by 0·01—0·015 mm. thick at the base.

Previously-known distribution :—Agulhas Bank, S. Africa.

Registered Nos. and Locality :—R.N. 5, 22, 54, 78 ; Stn. 109.

6. Stelletta agulhana, Lfd. var. paucistella, var. nov.

There are five specimens of this variety, the smallest is sub-spherical and about 8 cms. in diameter ; the largest, cushion-shaped, measuring 11 cms. long by 11 cms. broad by 6 cms. high, together with two fragments, all agreeing in external form and details of spiculation with the typical form of the species, except that the long-rayed oxyasters are extremely rare and are only found after much searching.

Registered Nos. and Locality :—R.N. 2, 9, 21, 23, 25, 51, 52 ; Stn. 109.

7. Stelletta sphærica, n. sp.

(Pl. 2, fig. 1.)

The single dried specimen is spherical, about 8 cms. in diameter and a light-brown in colour. The cortex is about 8 mm. thick. The oscules are small, about 1 mm. in diameter and scattered in groups over the surface.

The skeleton consists of radially-arranged oxea and plagiotriænes, with two kinds of microscleres, viz.: spherasters and long-rayed oxyasters. The former are arranged in a dermal layer.

Spicules.—(1) Oxea, slightly curved, gradually tapering to a point at each end, 5·4 x 0·198 mm. These spicules often become stylote.

(2) Plagiotriænes (pl. 2, fig. 1a), with stout shaft, frequently curved, tapering to a sharp point, 3·6 mm. long and 0·18 mm. thick immediately below the junction of the cladi. Cladi, 0·45 mm. long and 0·144 mm. thick at the base. Often the cladi are reduced to the point of disappearance and the spicule comes to resemble a tylostyle, with the remains of the axial canals of the reduced cladi still apparent in the knob.

(3) Spherasters (pl. 2, fig. 1b), with 14—18 conical rays, rounded at the ends, 0·028 mm. in diameter.

(4) Oxyasters (pl. 2, fig. 1c), with small but distinct centrum and 12—16 rays, each ray up to 0·03 mm. long.

Intermediate forms between spicules 3 and 4 are common.

Registered No. and Locality :—R.N. 44 ; Sandy Point, N. ½, E. 10 miles ; 95 faths. ; bottom, rock.

8. Stelletta rugosa, n. sp.

(Pl. 2, figs. 2, 3.)

The species is represented by nine dried specimens, eight of which are more or less sub-spherical to slightly pyriform, with the surface raised into a number of low, rounded prominences. The smallest is 15 cms. and the largest 19 cms. at the greatest diameter. At or near the apex of each is a discoidal, plateau-like area raised a little above the general surface. In one case, R.N. 13, there are two such areas, one about 5 cms. the other 2 cms. in diameter. The ninth specimen, R.N. 80, is tuberose 9 cms. long and 5 cms. high by 5 cms. broad, having grown, apparently, in a horizontal position attached at one end. Its surface, although very uneven and rough, exhibits no trace of the low rounded prominences so characteristic of the other eight specimens. The plateau-like area is present.

The difference in shape of the ninth specimen, undoubtedly of the same species as the other eight, appears to be due to having grown amid a great deal of débris, chiefly vegetable, much of which is even now embedded in the surface, or has penetrated to a considerable depth into the sponge.

As in the case of most of the other Stellettas in this collection, their being dried makes a determination of the pores and oscules extremely difficult, but there is little doubt that the raised plateaux are oscule-bearing areas, for in some cases it is possible to make out a number of small oscula 0·25 mm. in diameter.

All specimens are strongly corticate, the cortex being in some cases 1 cm. thick.

The colour is a light-grey externally and a dark-brown in the interior.

All are encrusted with *Trachycladus incrustans*, n.sp.

The skeleton consists of radially-arranged oxea and protriænes and a single form of aster.

R.N. 47 is regarded as the type (pl. 2, fig. 2).

Spicules.—(1) Oxea, straight or slightly curved, 5·4—6·3 x 0·072—0·126 mm.

(2) Protriænes (pl. 2, fig. 3a), shaft usually curved and cladi claw-like. Shaft, 2·7—4·5 x 0·108—0·162 mm. Cladi, 0·36—0·45 mm. long.

(3) Oxyasters (pl. 2, fig. 3b), with 16—18 smooth, sharply-pointed rays, with or without centrum. The rays may become slightly truncate at the ends. Total diameter, 0·016—0·024 mm.

This species is undoubtedly very closely-related to *S. horrens*, Kpk., but differs from it in shape, colour and the complete absence of pycnasters.

Registered Nos. and Locality :—R.N. 3, 6, 10, 13, 47, 48, 49, 50, 80 ; Stn. 109.

9. Stelletta cyathioides, n. sp.

(Pl. 2, figs. 4, 5.)

The species is represented by two specimens from this collection and one from the Natal Museum Collection, all in a dried state. All agree in being goblet-shaped, brownish-grey in colour, with a cortex about 2 mm. thick. The oscules are small and inconspicuous and scattered over the surface.

The largest specimen, R.N. 51, is about 8 cms. high and 7—8 cms. at its greatest diameter. The smallest, from the Natal Museum, is about a quarter of that size.

R.N. 53 may be regarded as the type (pl. 2, fig. 4).

The skeleton is composed of radially-arranged oxea and dichotriænes, with tylasters and two kinds of oxyasters, scattered throughout both cortex and choanosome.

Spicules.—(1) Oxea, sharply-pointed at the ends, usually slightly curved, 3·6—4·5 x 0·072—0·09 mm.

(2) Dichotriænes (pl. 2, fig. 5a), with shaft sharply-pointed, usually slightly curved, 2·88—3·6 x 0·09—0·18 mm. Primary cladi, 0·18 mm. long by 0·09 mm. thick at the base. Secondary cladi, 0·09 mm. long.

(3) Tylasters (pl. 2, fig. 5b), with usually 6—8 stout rays, 0·008—0·012 mm. in diameter.

(4) Oxyasters (pl. 2, fig. 5c), with numerous rays, 0·02—0·024 mm. in diameter.

(5) Oxyasters (pl. 2, fig. 5d), with 6—8 rays, each 0·03—0·04 mm. thick at the base.

This species is most closely related to *S. farcimen*, from which it differs in shape, the absence of specialised groups of oscules and the presence of dichotriænes, with an almost total absence of plagiotriænes.

Registered Nos. and Locality :—R.N. 51, 53 ; Stn. 109.

10. Stelletta grubioides, n. sp.

The species is represented by a single, dried specimen from the British Museum Collection labelled 71.5.12.1. Of a yellowish-grey colour, it is tuberose in shape, with a great deal of fine sand and a small amount of shell-débris embedded in the surface. It is 5 cms. long, 4 cms. broad and 3 cms. high.

The cortex is about 3 mm. thick.

The skeleton is somewhat confused in parts but shows a strong tendency to radial arrangement. The megascleres are

oxea and orthotriænes. The microscleres are chiasters, strongylasters to tylasters, and long-rayed oxyasters.

Spicules.—(1) Oxea, straight or only slightly curved, sharply pointed at each end, 1·98 x 0·036 mm.

(2) Orthotriænes, with straight shaft, 0·72 x 0·026 mm. Cladi, 0·162 mm. long, set almost at right angles to the shaft.

(3) Chiasters, with 6—8 rays, usually strongylote or tylote but sometimes oxeote, 0·008—0·012 mm. in diameter.

(4) Oxyasters, with small but distinct centrum, 0·004 mm. in diam., and 6—9 rays each 0·02 mm. long and 0·0025 mm. thick at the base.

Locality :—Port Elizabeth, S. Africa.

I have named this species according to its likeness to *S. grubii*, Schmidt (*vide* Topsent, 1904A, p. 346), from which it differs only in the form of the cladi of the triænes which in this species extend, as nearly as possible, at right angles from the shaft.

11. Pachastrella monilifera, O. Schmidt.

Pachastrella monilifera, O. Schmidt, 1868A.
Pachastrella abyssi, O. Schmidt, 1870A.
Pachastrella ovisternata, Lendenfeld, 1894.
Pachastrella caliculata, Kirkpatrick, 1902B.
Pachastrella isorrhopa, Kirkpatrick, 1902B.
Pachastrella chuni, Lendenfeld, 1906A.
Pachastrella caliculata, Lendenfeld, 1906A.
(For further synonymy *vide* Topsent 1904A, p. 380.)

There are, altogether, fourteen specimens in the collection, ranging from cup-shaped to flattened or cake-shaped or even irregularly massive. Some form thin incrustations on the surfaces of other sponges. The colour varies from grey to rufous-brown. At first sight I was inclined to regard them as belonging to *P. caliculata*, but further investigation caused me to revise this idea and prolonged research, involving the examination of some forty specimens and all the literature on the subject has left no doubt in my mind as to their identity with Schmidt's *P. monilifera*. Further, I am convinced that the six species included in the synonymy list above, are in reality but variations of one and the same species and that species is, by priority, *P. monilifera*. The merging of six species into one may appear at first sight to be somewhat drastic, but if it is borne in mind that all six are very closely related and separated only by very slight differences in external form or skeleton, the possibility of such action being justified does not seem so remote. Especially is this so when it is found that the differences are, in some cases, only apparent or of little specific value.

Topsent (1904A) declared *P. monilifera*, *P. abyssi* and *P. ovisternata* synonymous, with which I agree without hesitation, although Lendenfeld (1903B) regarded the first two as synonymous and the third as a separate species.

Later on Kirkpatrick (1902B) described two new species from S. Africa, *P. caliculata* and *P. isorrhopa*. In dealing with the first he recognised the likeness between it and *P. monilifera* but chose to keep them separate, as species, on account of the larger size of the spicules of *P. caliculata* and of its distinctly cup-shaped form. The specimens in the present collection, taken from a very closely neighbouring locality, vary considerably in shape, as mentioned above, and, what is more important, possess spicules whose dimensions range from those given by Schmidt and Topsent for *P. monilifera* to those given by Kirkpatrick for *P. caliculata*. The gulf between these two species is, therefore, effectively bridged. I have, moreover, substantiated this by a careful examination and comparison of spicule-preparations from both Kirkpatrick's and the present specimens.

P. isorrhopa, Kpk., as first described differs very little from *P. caliculata* in external appearance and in the form of the main skeleton, except in the presence of amphityles and strongyles. But for these two forms of spicules, the two specimens described by Kirkpatrick under that name could be relegated to *P. monilifera* without further hesitation. It remains to be seen, then, what specific value these two spicule-forms have. The amphityles were "common in one specimen (A), rare in a second (B)." The strongyles were "not found in A, not uncommon in B." This wording suggests the possibility of irregular occurrence. Lendenfeld (1906A) in a description of a specimen of *P. caliculata* from the Agulhas Bank, S. Africa, also mentions the presence of amphityles. Moreover, in the present fourteen specimens, occasional amphityles were found, sometimes singly, sometimes in small groups. Strongyles were not infrequently present also. Never, however, have I found them sufficiently constant or regular in distribution as to constitute a specific character. One must accept one of two conclusions: either these spicules are foreign to the sponge or their occurrence is sporadic and variable. In either case their presence will not affect the value of the species. I see no alternative, therefore, but to regard *P. isorrhopa* as synonymous with *P. monilifera*.

Yet another species was described by Lendenfeld (1906A), this time from W. Africa, which he called *P. Chuni*, admittedly very like *P. caliculata* but distinct by reason of the presence of small oxea, spheres and small dichotriænes. In view of the fact that Lendenfeld himself regarded the two former as foreign spicules there only remains apparently the small

dichotriænes as a justification for the erection of the new species. Curiously enough nobody appears to have remarked the presence of this form of spicule before Lendenfeld, yet in the Natal Pachastrellids, in those of the "Challenger" collection and in several European specimens which I have examined, these dichotriænes are almost invariably present, sometimes plentiful, sometimes but few and scattered. This feature no longer constitutes a difference but rather enhances the similarity between *P. chuni* and *P. monilifera* as here understood. A comparison of Lendenfeld's description of the former species with my own preparation show, I think, conclusively, that it may be regarded, equally with *P. caliculata* and *P. isorrhopa*, as a synonym of *P. monilifera*.

P. monilifera, Schmidt, may, therefore, be regarded as an almost cosmopolitan species.

Previously-known distribution:—Algeria Cape St. Vincent, G. of Mexico, Florida, Tristan da Cunha, Coast of Asturias, Banyuls (*vide* Topsent l.c. p. 381); Natal (Kirkpatrick); C. Bojeador (Lendenfeld); Agulhas Bank (Lendenfeld).

Registered Nos. and Locality:—R.N. 14, 43, 59, 60, 84, 85, 86, 87, 95A, 149A; Stn. 109.

Also four specimens from the Natal Museum collected from the Natal coast, labelled B, E, G, H.

12. Aurora primitiva, n. sp.

(Pl. 4, fig. 1.)

The species is founded on two small fragments cut from an apparently flabellate or cup-shaped specimen, greyish-white externally and a bright yellow in the interior. The pores are distributed evenly, and the oscules up to 1 mm. in diameter, scattered singly, over the surface.

The main skeleton consists of oxea, orthotriænes and a cortical layer of large spherasters. The oxea and triænes form, for the most part, an irregular reticulation, but immediately beneath the cortex they become arranged in small radially-arranged brushes with the heads of the triænes lying tangentially to the inner boundary of the cortex. Occasionally the oxea are aggregated, in the interior, into stout polyspicular bundles. Numerous tylasters and small spherasters are present in both cortex and choanosome.

From stained paraffin-wax sections it has been possible to make out some interesting anatomical details. The cortex is partly fibrous, partly collenchymatous, but I have been unable to find any trace of myocytes binding the cortical spherasters, such as are found in both Geodia and Placospongia. The inhalant chone terminates externally in a single dermal pore, and internally it passes into a small sub-cortical crypt. There are no well-developed sphincters, but small loose bands of

fibrous tissue are sometimes seen around the base of the chones just before they pass into the sub-cortical crypts.

The mesoglœa of the choanosome is finely granular and traversed by narrow, branching canaliculi, which, in turn, are traversed by numerous thin diaphragms. The canal-system is aphodal, the flagellated chambers oval, about 0·028 mm. at the greatest diameter, and provided with a short ophodus.

Spicules.—(1) Oxea (pl. 4, fig. 1a), usually slightly curved, frequently with a slight median swelling, 0·99 x 0·024 mm. long.

(2) Orthotriænes (pl. 4, fig. 1b), with straight shaft, 0·72 x 0·032 mm. Cladi, 0·16 mm. long.

(3) Large spherasters (pl. 4, fig. 1c), with large centrum and 16—20 rays, slightly roughened towards the ends, 0·048—0·06 mm. in diameter.

The earliest stage of this spicule appears to be a small oxyaster 0·014 mm. in diameter, with distinct centrum and slender oxeote rays.

(4) Small spherasters (pl. 4, fig. 1d), with centrum and 12—20 rays, slightly roughened towards the ends, 0·02 mm. in diam. These spherasters are very similar to, and practically indistinguishable from, the young stages of the large spherasters, but their presence in a definite dermal layer, in addition to their being abundantly scattered throughout the choanosome, confirms the suspicion that there are two distinct categories of spherasters present, large and small.

(5) Tylasters (pl. 4, fig. 1e), with centrum usually strongly developed and 6—12 slightly-roughened rays, 0·012—0·02 mm. in diameter.

(6) Microxea, small, slender, slightly curved, scattered throughout the choanosome, 0·80 x 0·003 mm.

Registered No. and Locality :—R.N. 35 ; Stn. 189.

13. Ancorina ponderosa, Bowerbank.

Ecionemia ponderosa, Bowerbank, 1866A.
Stelletta aspera, Carter, 1871.
Ecionemia ponderosa, Carter, 1883B.
Stryphmus ponderosus, Sollas, 1888B.

The species is represented in this collection by two dried specimens differing in size and shape but otherwise closely similar. The first, R.N. 63, is massive, more or less caliculate, 16 cms. high, 20 cms. in diameter, with numerous columnar outgrowths around the sides. The oscules are scattered in the cup-shaped depression of the upper surface. The other, R.N. 8, is potato-shaped, 11 cms. long and 4—5 cms. broad. The colour in both is dark-brown.

The size, form and distribution of the spicules agree very closely with those of Lendenfeld's specimen from the Agulhas Bank, described under *Ancorina progessa* (*vide* Lendenfeld 1906A, pp. 259-261, pl. xiv, figs. 1-10).

In one specimen, R.N. 63, the microrhabds show a tendency towards the formation of spherasters (*vide* Lfd. 1906A, pl. xxv, figs. 10d, e).

Other species of the Ancorina (Stryphnus) type which have been described are *A. carbonaria* (Schmidt), *A. mucronata* (Schmidt), *A. fortis* (Vosmaer), *A. niger* (Sollas), *A rudis* (Sollas), *A. compacta* (Hanitsch), *A progessa*, (Lendenfeld) and *A. unguiculus* (Sollas).

After examination of some of Schmidt's preparations, those of the " Challenger " and a few preparations from specimens found in European waters, and after carefully considering the evidence of the various writers, I have no doubt whatever that all the species enumerated above may be considered as synonyms of *A. ponderosa* (Bwk.), except *A. unguiculus*, which may be more appropriately regarded as a variety of that species. The evidence of Sollas (1888B, *q.v.*) suggests somewhat the advisability of such a view, and to some extent foreshadows the necessity for the merging of these species into one. However, until more material is available I hesitate to take the action myself, but take this opportunity of making a strong suggestion.

If any doubt need be felt, it is in regard to *A. rudis* (Sollas), in which plagiotriænes occur together with the dichotriænes. Nevertheless, on the evidence of Babić (1922, pp. 280-1) this would seem to be no uncommon occurrence in *A. ponderosa*.

We are faced, then, with the possibility of *A. ponderosa* proving to be a cosmopolitan species. This is extremely interesting when it is remembered that *Ancorina* (*Asteropus*) *simplex*, a very widely distributed form, is exceedingly closely-related to it and probably derived from it by the loss of the triænes (*vide* Sollas 1888B, p. 206).

Previously-known distribution :—Guernsey (Norman) ; Devonshire, England (Carter).

Registered Nos. and Locality :—R.N. 8, 63 ; Stn. 109.

14. Ancorina radix, Marenzeller, 1889.

Ancorina radix, Lendenfeld, 1894.
Ancorina (*Sanidastrella*) *radix*, Lendenfeld, 1903B.
Sanidastrella radix, Babić, 1921, 1922.

I have no hesitation in assigning two specimens in this collection to this species. They are small, more or less pyriform, the larger measuring 40 mm. high and 20 mm. at its greatest width. The colour, in spirit, is white.

Neither of them shows any evident point of attachment.

The skeleton is strongly radial and consists of oxea, plagiotriænes, anatriænes, oxyasters and sanidasters, the latter forming a definite dermal layer.

Spicules.—(1) Oxea, straight or slightly curved, 2·88 x 0·054 mm. long.

(2) Plagiotriænes, with shaft slightly curved, 1·8 x 0·054 mm. Cladi, 0·108 mm. long. The cladi are frequently recurved towards the outer extremity and the triæne then comes to resemble an orthotriæne.

(3) Anatriænes, shaft 1·98 x 0·018 mm. and cladi 0·072 mm. long.

(4) Oxyasters, with rays more or less spined towards the ends, up to 0·024 mm. in diameter.

(5) Sanidasters, 0·008—0·012 mm. long.

The rays of the sanidasters are for the most part reduced to small tubercles and the spicule itself comes to resemble a roughened microrhabd rather than a sanidaster. This is interesting in view of the problem which is becoming so necessary of solution as a preliminary to a more logical arrangement and classification of the Astrotetraxonida, viz., the relation of the microrhabd to the sanidaster, and of both to the aster, and of the evolution of the aster itself.

Previously-known distribution :—Adriatic Sea (Marenzeller, Babić).

Registered Nos. and Locality :—R.N. 64, 99 ; Stn. 194.

15. Stoeba natalensis, n. sp.

The species is present in the form of a number of thin incrustations on certain specimens of *Stelletta agulhana* and *S. agulhana* var. *paucistella*. Unfortunately, all the specimens are in a dried state and it is impossible to make out anything more than the spiculation.

The skeleton is composed of radially arranged short-shafted dichotriænes and ataxasters. Small calthrops are rarely present. The ataxasters have, in most cases, penetrated deeply into the choanosome of the sponge encrusted.

Spicules.—(1) Short-shafted dichotriænes, shaft 0·72 x 0·054 mm., primary cladi 0·18 mm. and secondary cladi 0·18 mm. long.

(2) Ataxasters, passing to tuberculate microrhabds, 0·005—0·008 mm. long.

Found on R.N. 2, 5, 9, 22, 23, 25, 52, 78. (For the above R.Ns. *vide Stelletta agulhana* and *S. agulhana* var. *paucistella*.)

16. Geodia perarmata, Bowerbank.

Geodia perarmatus, Bowerbank 1873A.
Geodia perarmata, Carter 1880B.
Geodia perarmata, Sollas 1888B.
? *Geodia sphæroides*, Kieschnick 1896.
? *Geodia arripiens*, Lindgren 1898.
? *Geodia sphæroides*, Thiele 1900A.
? *Geodia sphæroides*, Lendenfeld 1903B.
Geodia perarmata, Dendy 1905A.
Geodia robusta, Lendenfeld 1906A.
? *Geodia sphæroides*, Hentschel 1912A.
Geodia libera, Stephens 1915A.

There are four specimens in the collection varying in size and shape. R.N. 41 is more or less spherical, about 15 cms. in diameter, grey externally but a dark-brown in the interior. R.N. 90 is irregularly spherical, about 8 cms. at its greatest diameter, a light-brown externally and a dark-brown internally. R.N. 92 is pyriform, with a slight cup-shaped depression at the apex, standing about 7·5 cms. high, about 8 cms. across the top, and similar in colour to R.N. 90. R.N. 62 is a flattened cake, 18 cms. by 12 cms. across and 5 cms. high, and a light-brown internally and externally. All were apparently attached at the base. As the specimens are all dried a satisfactory examination of the pores and oscules is impossible, but they all appear to have been covered with a cribriporal membrane which, in places, has been rubbed away exposing a number of small circular vents, about 1 mm. in diameter.

The cortex is about 2 mm. thick and the skeleton usually radial.

All agree in a number of essential points, viz., the skeleton consists of large oxea, dichotriænes, anatriænes, protriænes, small cortical oxea or anatriænes, sterrasters, sub-cortical spherasters, choanosomal oxyasters and small spherasters ; the dichotriænes project beyond the layer of sterrasters and support the surface membrane ; brown pigment cells are abundant in the surface layer.

The spicules, especially the sterrasters, sub-cortical spherasters and oxyasters, are subject to some variation in size and distribution, but there can be no doubt as to the identification of all four specimens with one and the same species.

Although I have not had an opportunity of comparing these with Bowerbank's type-specimen, I have examined Carter's and Dendy's specimens, from the Gulf of Manaar and Ceylon, respectively, and have no doubt as to their identity with *G. perarmata*. If any difference exists, it is that those from

Ceylon have slightly fewer choanosomal oxyasters and cortical anatriænes.

On comparing Lendenfeld's description of *G. robusta* from the Agulhas Bank with the ten specimens referred to above, one is struck with the remarkable similarity between them. The only difference is that he makes no mention of cortical anatriænes or sub-cortical spherasters, but in this reportt (Sponges of the "Valdivia," 1906A), he so consistently pays too great attention to unimportant details and, in doing so, tends to overlook more essential features, that one may be excused for supposing that in this case he has overlooked these two spicule-forms. Especially is this so when one remembers that both forms are by no means conspicuous and may be only sparingly present.

Miss J. Stephens (1915A) described four specimens from S. Africa under *G. libera*, calling attention, at the same time, to the similarity between that species and *G. perarmata*. I have been fortunate enough to be able to compare a preparation from the type of the former species with Dendy's Ceylon and the present S. African specimens and declare *G. libera* a synonym of *G. perarmata*.

Although it is impossible to say definitely, in the absence of suitable material for examination, there seems to be a great possibility that *G. arripiens* and *G. spheroides* may prove to be identical with the present species.

Moreover, examination of spicule-preparations of *Cydonium hirsutus*, Soll., *C. magellani*, Soll., and *C. eoaster*, Soll., suggests a possibility of the synonymy of these three with *G. perarmata*. Such a point, however, cannot be settled without examination of good hand-sections.

Diagnosis of species as here understood :—Flattened, cake-like, spherical, pyriform or massive ; purplish-brown to yellow ; skeleton radial, dichotriænes projecting beyond cortical layer of sterrasters ; brown pigment-cells in dermal layer.

Spicules.—(1) Oxea, 2·0—6·5 x 0·037—0·065 mm.

(2) Dichotriænes, shaft 2·06—6·8 x 0·064—0·17 mm. Cladome 0·4—0·6 mm. in diameter.

(3) Anatriænes, shaft 2·4—11·5 mm., cladi 0·025—0·15 mm. long.

(4) Protriænes, shaft 1·1—3·6 mm., cladi 0·025—0·14 mm. long.

(5) Cortical oxea, 2·25—2·8 x 0·005—0·008 mm.

(6) Cortical anatriænes, sometimes only sparingly present, of about the same dimensions as the cortical oxea but slightly more slender, with small cladome.

(7) Sterrasters, spheroidal to ellipsoidal, the former 0·075—0·13 mm. in diameter, the latter 0·108—0·185 x 0·1—0·135 x 0·1—0·126 mm.

(8) Sub-cortical spherasters, with ends of rays usually spined, 0·024—0·05 mm. in diameter.

(9) Choanosomal oxyasters, 0·013—0·05 mm. in diameter.

(10) Strongylo-spherasters, 0·005—0·015 mm. in diameter.

Previously-known distribution :—G. of Manaar (Carter) ; Ceylon (Dendy) ; Agulhas Bank (Lendenfeld) ; Table Bay, Houtjes Bay, Saldanha Bay (Stephens) ; ? Cochin China (Lindren) ; ? Ternate (Kieschnick) ; ? Aru Islands (Hentschel).

Registered Nos. and Localities :—R.N. 41, Rocky Bank, False Bay, 18—25 faths ; bottom, rocks. R.N. 90, 92, 62 ; Stn. 109.

17. Geodia (Isops) ovifractus, n. sp.

(Pl. 3, fig. 1 ; pl. 4, fig. 2.)

The species is represented by two specimens almost identical in shape and size and general construction. Accordingly the description will be confined to the type-specimen, R.N. 30 (pl. 3, fig. 1).

The sponge is pyriform, about 13 cms. high, with a broad, flattened apex bearing numerous oscula, about 0·5 mm. in diameter, raised upon slight mammiform projections. The pores have about the same diameter as the oscules, but are practically level with the general surface, and are confined to the sides of the sponge.

The exterior is a rufous-brown, the interior almost black.

The cortex is about 1 mm. thick. In both specimens the surface crust of sterrasters is somewhat cracked and broken, and suggests strongly a broken egg-shell.

The surface bears several patches of an encrusting Tetillid, which in turn bears, here and there, small patches of *Pachastrella monilifera* O. S. and a Halichondria sp.

The skeleton is composed of radially-arranged oxea and orthotriænes, a cortical layer of sterrasters, oxyasters, spherasters and microxea.

Spicules.—(1) Oxea, slightly curved, with ends not sharply-pointed, frequently becoming stylote, 6·3 x 0·9 mm.

(2) Orthotriænes (pl. 4, fig. 2a), with, usually, straight shaft, 6·3 x 0·144 mm. Cladi 1·98 mm. long and 0·126 mm. thick at the base.

The cladi are subject to various modifications. The free ends may sometimes be directed slightly forwards, sometimes slightly backwards. Frequently one or two of the cladi are reduced in size. The length of the cladi is remarkable and somewhat unusual.

(3) Sterrasters (pl. 4, fig. 2b), 0·67 x 0·52 x 0·52 mm.

(4) Spherasters (pl. 4, fig. 2c), with large centrum and numerous short, conical, sharply-pointed rays, found chiefly in the choanosome, 0·016—0·02 mm. in diameter.

(5) Oxyasters (pl. 4, fig. 2d), with small centrum and numerous sharply-pointed rays, found chiefly in the choanosome, 0·016—0·02 mm. in diameter.

Forms intermediate between 4 and 5 are abundant.

(6) Microxea (pl. 4, fig. 2e), roughened, curved, centrotylote, scattered abundantly through the choanosome, 0·28 x 0·004 mm.

The only known form of Geodia possessing this type of microxeote is *Geodia* (*Isops*) *toxoteuches* (Lfd.), from which the present species differs in the external form, the form of the cladi of the orthotriænes and other details of spiculation.

Registered Nos. and Locality :—R.N. 30, 31 ; Stn. 109.

18. Geodia (Isops) ovifractus, n. sp. var. cyathioides, var. nov.

The single specimen is cup-shaped, about 10 cms. high and roughly 12 cms. across the mouth of the cup. It is rufous-brown in colour, and covered, over the greater part of the surface, by a Tetillid sp. In spiculation it agrees very closely with the type of the species R.N. 30, but differs in shape and in the character of the pores and oscules. The former are small about 0·3 mm. in diameter, and are found on the outer surface of the cup. The oscules are restricted to the inner surface of the cup and differ little, if at all, from the pores. Both are level with the general surface of the sponge, the small mammiform projections of *G. ovifractus* itself being entirely absent.

Specimen from the Natal Museum Collection labelled I.

Locality :—Unknown (probably Natal coast).

19. Geodia (Isops) dendyi, n. sp.

(Pl. 3, fig. 2, 3 ; pl. 4, fig. 3.)

There is a whole dried specimen, R.N. 91, and a fragment cut from another specimen to all intents similar in shape, preserved in spirit. The whole specimen is horizontally flabellate with slightly inturned margins, attached by a broad base and measuring 35 by 30 cms. across and standing 18 cms. high. The under surface is proliferous and raised into low rounded ridges. The colour, in spirit, is white externally and a dull yellow in the interior. In the dried state it is a pale brown throughout.

The oscules, about 1 mm. in diameter, are situated on slight mammiform projections and are distributed evenly over the upper surface (pl. 3, fig. 2). The pores are smaller but similar in character and distributed evenly over the under surface.

The cortex is about 2 mm. thick.

The main skeleton consists of oxea and orthotriænes forming a confused reticulation in the deeper parts of the sponge but showing a marked tendency to radial arrangement as the surface is approached. The heads of the outermost triænes are disposed tangentially to a cortical layer of sterrasters and immediately below it. Two other forms of aster are present.

Spicules.—(1) Oxea (pl. 4, fig 3a), slightly curved, bluntly pointed at the ends, frequently stylote, 1·98 x 0·044 mm.

(2) Orthotriænes (pl. 4, fig. 3b), with shaft straight or slightly curved, 1·08 x 0·056 mm. Cladi 0·24 mm. long.

(3) Sterrasters (pl. 4, fig. 3c), ellipsoidal, 0·14 x 0·12 x 0·1 mm.

(4) Spherasters (pl. 4, fig. 3d), present in both cortex and choanosome), 0·012—0·02 mm. in diameter.

(5) Oxyasters (pl. 4, fig. 3e), with 2—10 stout rays, each 0·032—0·044 mm. long and 0·006—0·012 mm. thick at the base. Found only in the choanosome.

Registered Nos. and Localities :—R.N. 91, Stn. 109 ; R.N. 45, 18 miles N.W. of E. London, 250-300 faths. Bottom, brackish shingle (hardground).

20. Geodia (Synops) megaster, n. sp.

(Pl. 5, fig. 1.)

The single dried specimen, somewhat broken, is pyriform, about 10 cms. in height and attached at the base, the point of attachment being about 2 cms. across. The sides of the sponge are covered with cribriporal inhalant chones. The apex is smooth and uneven, and bears five large oscula 3—5 cms. in diameter, situated on low, rounded projections raised slightly above the general level of the surface. The colour is a pale greyish-brown.

The cortex is 2 mm. thick.

The main skeleton, confused in the interior but becoming radially-arranged as it approaches the cortex, is composed of oxea, ortho-, pro- and anatriænes. The cladi of the two latter are extremely difficult to find, both in hand-sections and spicule preparations, but their shafts are abundantly found. In the hand-sections, the shafts can be seen traversing the cortical layer of sterrasters, and one must assume, therefore, that the pro- and anatriænes pierce the cortex and that the cladi protrude beyond the surface at right angles to it. In a specimen with the surface much worn, as in R.N. 89, the projecting cladi would be broken off, thus accounting for the rarity with which they are found.

The asters include cortical sterrasters, small spherasters, strongylasters and large choanosomal oxyasters.

Spicules.—(1) Oxea, usually much curved, approaching in extreme cases the form of the letter C or S, 4·5 x 0·72 mm.

(2) Orthotriænes (pl. 5, fig. 1a), with straight shaft, 4·14 x 0·072 mm. Cladi 0·72 mm. long by 0·072 mm. thick at the base, showing much variation both in length and shape. Frequently one or two cladi may be reduced in length.

(3) Anatriænes (pl. 5, fig. 1b), with very long, slender shaft 0·024 mm. thick, and cladi 0·08 mm. long.

(4) Protriænes (Promesomonænes), with very long, slender shaft 0·024 mm. thick, and cladi 0·12 mm. long.

Only two cladomes were seen, both of which were promesomonænes.

(5) Sterrasters (pl. 5, fig. 1c), 0·24 x 0·2 x 0·18 mm.

(6) Spherasters (pl. 5, fig. 1d), found in cortex and choanosome, small, with large centrum and greatly reduced rays, 0·004—0·008 mm. in diameter.

(7) Strongylasters (pl. 5, fig. 1e), found in both cortex and choanosome, with 8—12 rounded rays, usually truncate but occasionally slightly tylote, 0·016—0·20 mm. in diameter.

(8) Oxyasters (pl. 5, fig. 1f), with 4—8 rays microspined along the outer half of their length, without centrum, each ray 0·04—0·06 mm. long and 0·006—0·008 mm. thick at the base.

(9) Microxea, slightly curved, 0·45—0·12 mm. long.

This species resembles *G.* (*Synops*) *nitida*, (Sollas) and *G. littoralis*, Stephens, differing from both, however, in the presence of strongylasters.

Registered No. and Locality :—R.N. 89 ; Stn. 109.

21. Pachymatisma areolata, Bowerbank, 1872c.

Pachymatisma aerolata, Sollas 1888b.
Pachymatisma areolata, Lendenfeld 1903b.
Pachymatisma monœna, Lendenfeld 1906a.

This species, originally described by Bowerbank (l.c.) from the Red Sea, is represented by four extremely fine, dried specimens. They are all about the same shape and size : more or less spherical, about 15 cms. in diameter, with the surface raised into large anastomising ridges circumscribing deep oscula-bearing areas. The pores are scattered generally over the surface. The colour is pale brown.

The skeleton consists of a dense cortical layer of sterrasters, 2 mm. thick, radiating bundles of oxea and triænes, cortical microxea and microrhabds and two kinds of aster scattered throughout both cortex and choanosome.

I have also examined two specimens from Natal, exact locality unknown : one, a small one from the Natal Museum, and a particularly fine specimen from the Durban Museum measuring 25 cms. high by 22 cms. through, both exhibiting

the same characters as the four referred to above. I am indebted to Mr. E. C. Chubb, Curator of the Durban Museum, for the information that this species is very common round the S. African coasts and is constantly being obtained by fishing vessels.

When one considers that these specimens have shrunk in drying, one can imagine that the size in actual life must be considerable.

Lendenfeld (1906a) described a specimen from the S. African coast, under *Pachymatisma monœna*, similar in form to Bowerbank's *P. areolata* from the Red Sea but differing from it in the presence of anatriænes and promesoclade. On examination of a specimen of Pachymatisma from Cape Colony, now in the possession of Professor Dendy, so strikingly like Bowerbank's specimen as to leave no doubt as to its identification, with it, I found, in addition to the spicules described by Bowerbank, anatriænes present in very small numbers. Diligent search has resulted in finding anatriænes and promesoclades in very small numbers in the Natal specimens.

One can only conclude, then, that the occurrence of these two forms of spicule is irregular and variable and that their presence or absence from large tracts of the sponge do not, *coeteris paribus*, affect the value of the species. This would, no doubt, account for Bowerbank's having overlooked them.

I have, therefore, no hesitation in regarding Lendenfeld's *P. monœna* as a synonym of *P. areolata*.

Spicules.—(1) Oxea, with both ends more or less rounded, never sharply-pointed, 3·78 x 0·048 mm.

(2) Orthotriænes, shaft, with free end usually rounded, 3·6 x 0·108 mm. Cladi 0·63 mm. long.

(3) Anatriænes, rare, shaft, 2·7 x 0·032 mm. Cladi 0·06 mm. long.

(4) Promesoclades, rare, shaft 5·4 x 0·018 mm. Cladi 0·1 mm. long.

(5) Sterrasters, 0·2 x 0·16 x 0·16 mm.

(6) Oxyasters, with 6—8 roughened rays, not sharply-pointed each 0·024 mm. long.

(7) Strongylasters, with or without centrum, 0·16 mm. in diameter. By the excessive development of the centrum they may become spherasters (*vide* Sollas 1888b, p. 244, and Lendenfeld 1906a, p. 314).

(8) Microrhabds, with roughened surface, 9·91 x 0·004 mm.

By lengthening of the tubercles, these rhabds frequently come to resemble the sanidasters of *Asteropus simplex*. In the latter, again, by reduction of the rays, the sanidasters frequently appear as tuberculate microrhabds.

Previously-known distribution :—Red Sea (Bowerbank); S. Africa (Lendenfeld); Cape Colony (Dendy's specimen); the coasts of Natal generally (*fide* Chubb).

Registered Nos. and Localities :—R.N. 1, 11, 12, Stn. 109; R.N. 32, Constable Hill, E.S.E. 15 miles, 100 faths., bottom dark mud.

22. Erylus gilchristi, n.sp.

(Pl. 3, figs. 5, 6, 7; pl. 5, fig. 2; pl. 6, fig. 1.)

The eleven dried specimens range from lobose to palmo-digitate, and from about 6 cms. to 13 cms. in height. All are apparently stipitate. The colour is a reddish-brown, becoming white in parts. The type-specimen (pl. 3, fig. 6) consists of a main lobe, somewhat flattened in one plane, with rounded margins and bearing a number of lobose-digitiform processes. The vents, about 0·5 mm. in diameter, are scattered along the margin of the main lobe or in groups on the summits of the digitiform processes. The pores are scattered evenly over the whole surface.

The skeleton is composed of radially-arranged oxea and dichotriænes, the cladi of the latter resting just beneath the cortical layer of aspidasters. The rest of the skeleton is composed of microstyli, rarely microxea, oxyasters and spherasters, distributed through the choanosome.

Spicules.—(1) Oxea (pl. 6, fig. 1a), curved, 2·7 x 0·036 mm.

(2) Dichotriænes (pl. 6, figs. 1b, 1c), with stout shaft tapering to a fine point, 2·16 x 0·09 mm., with cladome 1·26 mm. in diameter.

(3) Aspidasters (pl. 5, fig. 2), with irregular margins, 0·12 x 0·068 x 0·012 mm.

(4) Oxyasters (pl. 6, fig. 1e), with small, distinct centrum and 6—8 rays, total diameter 0·012—0·02 mm.

(5) Spherasters (pl. 6, fig. 1d), 0·006 mm. in diameter. Rays reduced to small knobs.

(6) Microstyli (pl. 6, fig. 1f), 0·18 x 0·006 mm.

(7) Microxea, curved, 0·16 x 0·008 mm.

This species differs from all species of Erylus yet described, by the possession of the small spherasters.

Registered No. and Locality :—R.N. 46, Sandy Point, N. ¼, E. 10 miles, 95 faths; bottom, rock.

23. Erylus amorphus, n. sp.

(Pl. 5, fig. 3; pl. 6, fig. 2.)

The single, dried, sub-spherical specimen has a diameter of about 5 cms. and encloses in its substance a number of Siliquaria shells. The colour is a reddish-brown, becoming white on one side. There is no visible point of attachment. The vents, 1 mm. or more in diameter, are scattered over the surface and situated on small mammiform processes.

The skeleton is arranged in the same manner as that of *E. gilchristi* and differs from it only in the presence of orthotriænes and in the size of the spicules.

Spicules.—(1) Oxea (pl. 6, fig. 2a), curved, 3·6 x 0·09 mm.

(2) Dichotriænes (pl. 6, figs. 2b, 2c), with curved shaft, 2·3 x 0·108 mm., and cladome 1·26 mm. in diameter.

(3) Orthotriænes (pl. 6, fig. 2d), less common than the dichotriænes, shaft 2·0 x 0·09 mm., and cladome 0·9 mm. in diameter.

(4) Aspidasters (pl. 5, fig. 3), with very irregular margins, 0·18 x 0·108 x 0·02 mm.

(5) Oxyasters (pl. 6, fig. 2f), with small but distinct centrum and 6—8 rays, 0·02 mm. in diameter.

(6) Spherasters (pl. 6, fig. 2e), with greatly reduced rays, 0·006 mm. in diameter.

(7) Microstyli (pl. 6, fig. 2g), 0·18 x 0·006 mm.

This species differs from *E. gilchristi* in the external form, the character of the vents and certain details of spiculation.

Registered No. and Locality :—R.N. 26, Sandy Point, N. ¼, E. 10 miles, 95 faths.; bottom, rock.

24. Donatia magna (Kirkpatrick).

Tethya magna, Kirkpatrick 1903.
Tethya magna, Topsent 1918.

There are eleven specimens ranging from spherical and about 3 cms. in diameter to oval and about 8 cms. in diameter. The colour is very constant, being, with one exception, a rich chocolate-brown. All but two were received preserved in formalin. Two were received in a dried state, and the colour, in this condition, is a pale chocolate-brown. Of the nine preserved in formalin, one was a bright-red colour which completely disappeared when the specimen was transferred to alcohol, leaving it a very light yellow. The colour of the other eight was almost unaffected by immersion in alcohol.

All specimens agree very closely with the three originally described by Kirkpatrick both in external form and spiculation, but there are a few minor points of difference which it may be worth while recording.

First, the large spherasters are normally the same shape and size as those figured by Kirkpatrick (l.c. p. 240, pl. ii, fig. 6b), but in all specimens there is a tendency for the rays to become elongated and curved, recalling the condition occasionally obtaining in *D. lyncurium* (*vide* Topsent, 1918, fig. xx, BB). The long-rayed spherasters so formed are usually confined to the choanosome, where they are congregated immediately

beneath the cortex or scattered sparingly through the choanosome. This condition reaches its height in R.N. 67 and 70 where the rays may be 0·09 mm. long and the total diameter of the aster 0·27 mm.

The somal chiasters are fairly constant in shape.

The choanosomal chiasters vary from 0·016 to 0·006 mm. in diameter. The rays are usually the same as in the type-specimens, viz., long, slender, truncated, spined or even slightly rounded at the ends, often roughened along the outer part of the rays. In R.N. 29 and 98 the rays are somewhat conical, spined or sharply pointed at the ends, as in the choanosomal chiaster of *D. arabica*, Topsent (l.c. p. 596, fig. xxviii). Frequently the rays are branched.

Topsent (1918) was inclined to confound this species with *D. globostellata*, Lfd., with which it has much in common. The character of the surface, the colour, the conspicuously well marked radial bundles of tylostyles, the almost complete absence of radial tylostyles between the bundles, together with the other differences in spiculation already noted, however, justified its retention. In the two dried specimens the radial bundles of tylostyles have pierced the cortex, so strong, pact and tightly grouped are they, giving to the dried sponge a somewhat hedgehog appearance. I have examined a great many dried Donatias, but in no case have the radial bundles been so stout or the spaces between the bundles so free from tylostyles as to give such an appearance. The dried surface appears, usually, to have "telescoped" the radial bundles, pushing the outer spicules deeper down into the flesh and leaving the cortex unbroken.

The tendency to differentiation of the large spherasters into somal and longer-rayed choanosomal asters recalls slightly the condition found in *Tethya fissurata*, Lfd., as re-described by Hallman (1914A).

Although details as to external form are lacking, from the description of the spiculation alone there is no doubt that Carter's (1882) specimen from the Cape belonged to this species.

The cortex is thick and very tough, the choanosome is soft and pulpy.

The cortex is very tough and composed almost exclusively of fibrous tissue. Discussions as to the true nature of these fibrous elements in Donatia have been numerous (*vide* Sollas 1880A, p. 136), and the evidence seems to point to its being primitive muscle-fibre. Deszo (1878) found that a living Donatia, when touched, responded by closing its oscula, normally widely-expanded, with sufficient force to eject a stream of water. Parker (1915) has shown that the fibres forming a sphincter around the osculum and scattered in the tissues generally of *Stylotella heliophora* are, in effect, true

muscle-fibre. My own tests with polarized light on the cortex of *D. magna* lead me to believe that the same is true in Donatia. Since *D. magna* has so far not been recorded from the littoral zone, it follows that the development of such a cortex is a protection against animate foes rather than against the destructive inroads of air as in Stylotella or in those Donatias found in the littoral zone.

I have been unable to observe the character of the canal-system in *D. magna*, but it has every appearance of a diplodal system, with small closely-packed flagellated chambers.

The canal-system is always difficult to observe in Donatia, but in some pieces of *D. lyncurium*, specially-preserved in Osmic acid, from Plymouth, presented to me by Miss L. M. Frederick, I was able, by cutting thin paraffin wax sections, to see one or two chambers with narrow inhalant and exhalant canaliculi.

Reproduction :—On none of the specimens I have examined, including those of the present collection and those originally described by Kirkpatrick, is there any indication of reproduction by budding. In one case only, R.N. 98, the surface bears a slight suspicion of having borne buds, but even here it amounts to nothing more than a suspicion. According to Deszo (1878) and Eichenauer (1915) the buds in Donatia are formed by cells which migrate through the cortex and assemble just beneath the surface before entering into outgrowths of the cortex at the ends of the radial spicule-bundles. Assuming this to be the case, it is just a possibility that, with the development of a very thick cortex, such migrations from the choanosome to the surface via the cortex would be difficult, if not impossible. Yet in the Australian Donatias, which grow to as great a size as those from Natal, the cortex is just as thick but they show ample signs of budding. Nevertheless, it seems to be more than mere coincidence that none of the specimens, fourteen in all, of *D. magna* show any positive signs of reproduction by budding.

So far very little indeed has been recorded concerning the sexual processes in Donatia. R.N. 29 contains a number of ova scattered sparsely in the choanosome. They vary much in size : the smallest seen were ovate and 0·08 x 0·06 mm., the largest spherical and 0·2 mm. in diameter. The ova possess a large nucleus and a conspicuous nucleolus, and are enclosed in a capsule composed of a single layer of epithelial cells. The cytoplasm is markedly granular.

In an extensive study of the family Donatiidæ, I have examined about a hundred specimens of various species, and in three cases only, other than those referred to above, have I found ova. They are as follows, viz. : (1) *Tethya cliftoni*, Bwk. described by Ridley from the "Alert" collection, containing

a large number of ova ovate in shape and 0·052 x 0·04 mm. in size; (2) *Tethya inflata*, described by Lendenfeld, ova spherical and 0·08 mm. in diameter; (3) *Donatia japonica*, Soll., described by Dendy in the report on the "Sealark" collection. In one specimen they were approximately 0·052 x 0·04 mm. and in the other 0·08 x 0·048 mm. In each of these cases the ova were like those of *D. magna* except in point of size. Unlike the latter, however, the choanosome of these specimens was crowded with ova. These cells are of the same transparency as the choanosome in which they are lodged and are difficult to observe until they are stained.

In two specimens the choanosome was crowded with embryos. In R.N. 98 they were ovoid, about 1·0 x 0·7 mm. They consisted of a central, brown, granular mass surrounded by a clear, colourless tissue. This no, doubt, represents the primary differentiation into cortex and choanosome. The only spicules present were tylostyles, scattered confusedly in the outer layer. In R.N. 161 the embryos were spherical and about 3 mm. in diameter. The differentiation into cortex and choanosome was more marked, but the strongyloxea were still scattered and showed no signs of radial arrangement. Small spherasters and microsters were present.

Embryos similar to these, but in a more advanced state of development, have been found in *D. fissurata* by Hallmann (1914A), of which he says: "Many large spherical embryos occur throughout the sponge, some of which are over 2·5 mm. in diameter. These have radially arranged stylote megascleres and, as microscleres, a thin superficial layer of tylasters similar to those of the adult, and exceedingly minute development spherasters sparsely scattered in the cortex."

Previously-known distribution:—Cone Point, Natal.

Registered Nos. and Localities:—R.N. 27, 28, Algoa Bay; R.N. 29, 98, Cape Point, N. 50° E. 18½ miles, 180 faths; bottom, green sand and black specks; R.N. 65, 66, 67, 68, 69, 70, Stn. 198; R.N. 161, Port Shepstone, N. 8 miles, 50 faths.; bottom, sand and stones.

Other South African Myxospongida not mentioned in this Report.

Oscarella sp. Lendenfeld 1906A.
Halisarca dujardini, Johnson. Stephens 1915A.

Other South African Astrotetraxonida not mentioned in this Report.

Chelotropella sphærica, Lendenfeld, 1906A.
Chelotropæna tenuirhabda, Lendenfeld, 1906A.
Stryphnus unguiculus, Sollas, 1888B.

Ecionema nigrum, Sollas, 1888B.
Ancorina progessa, Lendenfeld, 1906A.
Penares obtusus, Lendenfeld, 1906A.
Papyrula sphæra, Lendenfeld, 1906A.
Pachamphilla alata, Lendenfeld, 1906A.
Triptolemus incertus, Kirkpatrick, 1903A.
Isops gallica, Lendenfeld, 1906A.
Geodia stellata, Lendenfeld, 1906A.
Geodia littoralis, Stephens, 1915A.
Geodia libera, Stephens, 1915A.
Erylus polyaster, Lendenfeld, 1906A.

List of Stations mentioned.

Station.	Locality.	Position.		Depth in fathoms.	Nature of bottom.
		Latitude.	Longitude.		
108	Off Natal coast	29.44.12 S.	31.20.45 E.	50	Sand and shells.
109	,,	29.44.12 S.	31.20.45 E.	50	Sand and shells.
189	,,	29.40.30 S.	31.10.05 E.	25	Sand and mud.
194	,,	29.32.17 S.	31.16.45 E.	29	Sand and shells.

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EXPLANATION OF THE PLATES.

PLATE 1.

Fig. 1.—*Hexadella kirkpatricki*, n.sp. x 26. Showing section through an osculum (o), and a portion of one of the cavities containing the commensal crustacea (c.c.).
Fig. 2.—*Hexadella kirkpatricki*, n.sp. x 100. Showing inhalant pores (I.P.), cortex (C.), symbiotic algæ (S.A.), primary inhalant canals (P.I.C.), and primary exhalant canals (P.E.C.).
Fig. 3.—*Hexadella kirkpatricki*, n.sp. x 3.
Fig. 4.—*Hexadella kirkpatricki*, n.sp. x 3.
Fig. 5.—*Hexadella kirkpatricki*, n.sp. x 3.
Fig. 6.—*Hexadella kirkpatricyi*, n.sp. x 3. Specimen cut in half to show three cavities lodging the commensal crustacea.

PLATE 2.

Fig. 1.—*Stelletta sphærica*, n.sp., R.N. 44.
1a, Plagiotriænes, x 28; 1b, Dermal spherasters, x 540; 1c, Oxyasters, x 540.
Fig. 2.—*Stelletta rugosa*, n.sp., R.N. 47, x $\frac{1}{8}$.
Fig. 3.—*Stelletta rugosa*, n.sp., R.N. 47.
3a, Protriæne, x 28; 3b, sxyasters, x 540.

Fig. 4.—*Stelletta cyathioides*, n.sp., R.N. 47, x $\frac{1}{3}$.
Fig. 5.—*Stelletta cyathioides*, n.sp., R.N. 47.
5a, Dichotriæne, x 28; 5b, tylasters, x 300; 5c, oxyaster, x 300; 5d, oxyaster, x 300.

PLATE 3.

Fig. 1.—*Geodia* (*Isops*) *ovifractus*, n.sp., R.N. 30, x $\frac{1}{4}$.
Fig. 2.—*Geodia* (*Isops*) *dendyi*, R.N. 91, x $\frac{1}{10}$. Upper oscular surface.
Fig. 3.—*Geodia* (*Isops*) *dendyi*, R.N. 91, x $\frac{1}{10}$. Lower poral surface.
Fig. 4.—*Pachymatisma aerolata*, Bowerbank, R.N. 12, x $\frac{1}{4}$.
Fig. 5.—*Erylus gilchristi*, n.sp., x $\frac{2}{5}$.
Fig. 6.—*Erylus gilchristi*, n.sp., x $\frac{1}{2}$.
Fig. 7.—*Erylus gilchristi*, n.sp., x $\frac{1}{2}$.

PLATE 4.

Fig. 1.—*Aurora primitiva*, n.sp., R.N. 35.
1a, Oxea, x 60; 1b, orthortiænes, x 60; 1c, large spherasters of cortex, x 430; 1d, small spherasters, x 430; 1e, tylasters, x 430.
Fig. 2.—*Geodia* (*Isops*) *ovifractus*, n.sp., R.N. 30.
2a, Cladome of orthotriænes, x 28; 2b, sterraster, x 540; 2c, spherasters, x 540; 2d, oxyasters, x 540; 2e, microxea, x 300.
Fig. 3.—*Geodia* (*Isops*) *dendyi*, n.sp., R.N. 91.
3a, Oxea, x 60; 3b, orthotriæne, x 60; 3c, sterraster, x 540; 3d, spherasters, x 540; 3e, oxyasters, x 540.

PLATE 5.

Fig. 1.—*Geodia* (*Synops*) *megaster*, n.sp., R.N. 89.
1a, Orthotriæne, x 60; 1b, cladome of anatriæne, x 300; 1c, sterraster, x 300; 1d, spherasters, x 540; 1e, strongylasters x 540; 1f, oxyasters, x 540.
Fig. 2.—*Erylus gilchristi*, n.sp., R.N. 46, Aspidaster, x 300.
Fig. 3—*Erylus amorphus*, n.sp., R.N. 26, Aspidaster, x 300.

PLATE 6.

Fig. 1.—*Erylus gilchristi*, n.sp., R.N. 46.
1a, Oxea, x 28; 1b, dichotriæne, x 28; 1c, cladome of dichotriæne seen from above, x 28; 1d, spherasters, x 540; 1e, oxyasters, x 540; 1f, microxea, x 108.
Fig. 2.—*Erylus amorphus*, n.sp., R.N. 26.
2a, Oxea, x 28; 2b, dichotriæne, x 28; 2c, cladome of dichotriæne, x 28; 2d, orthotriæne, x 28; 2e, spherasters, x 540; 2f, oxyasters, x 540; 2g, microxea, x 108.

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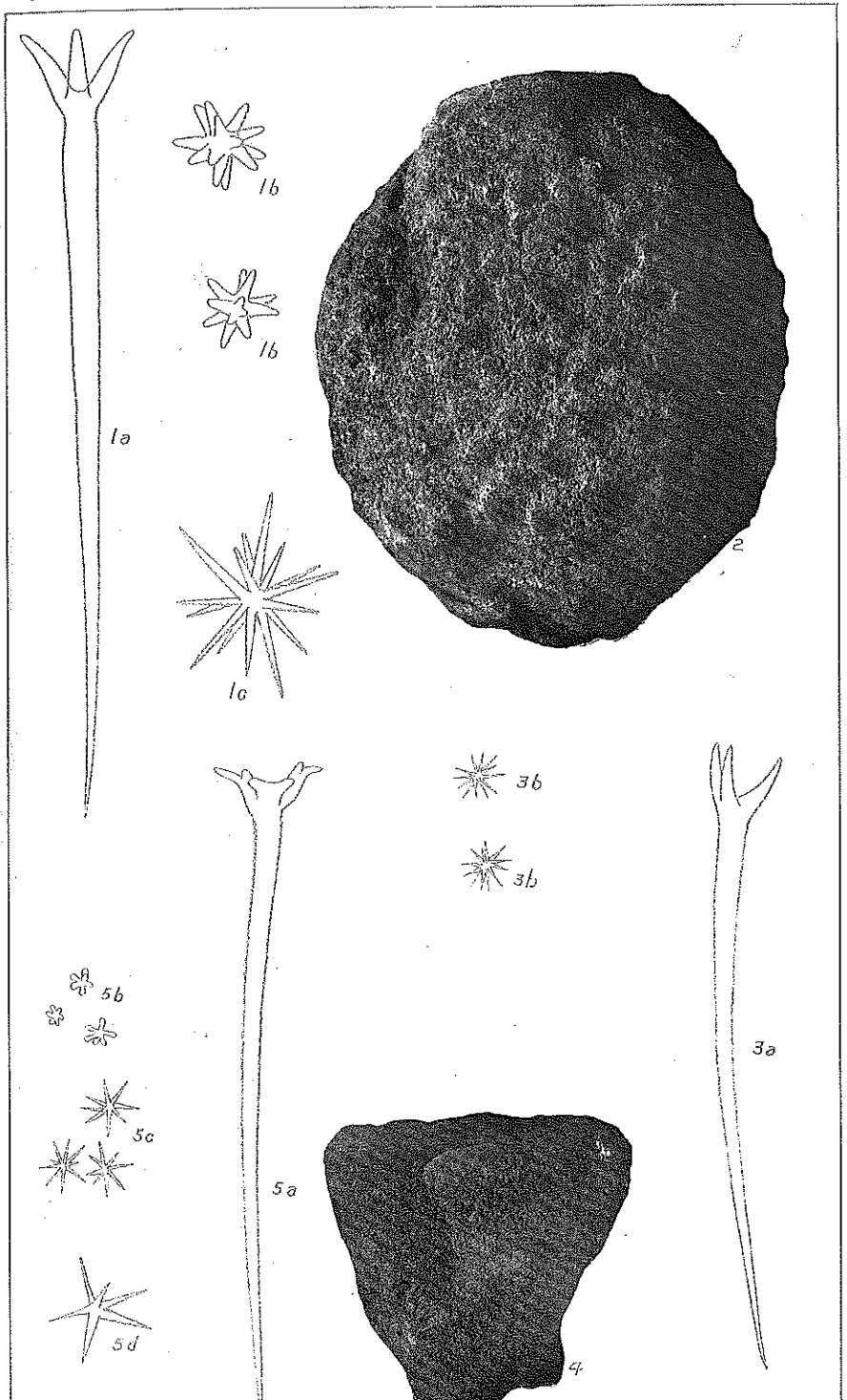
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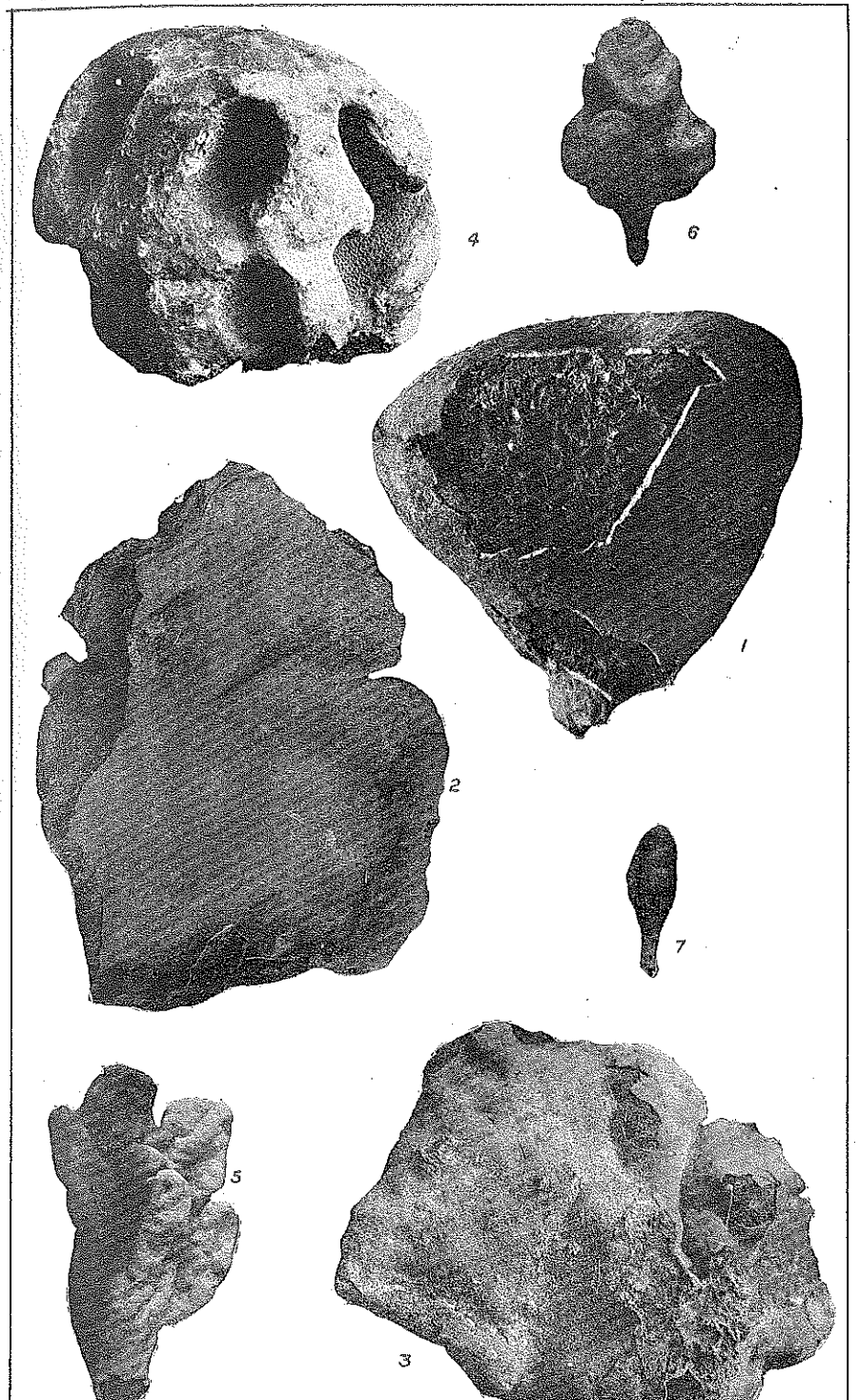
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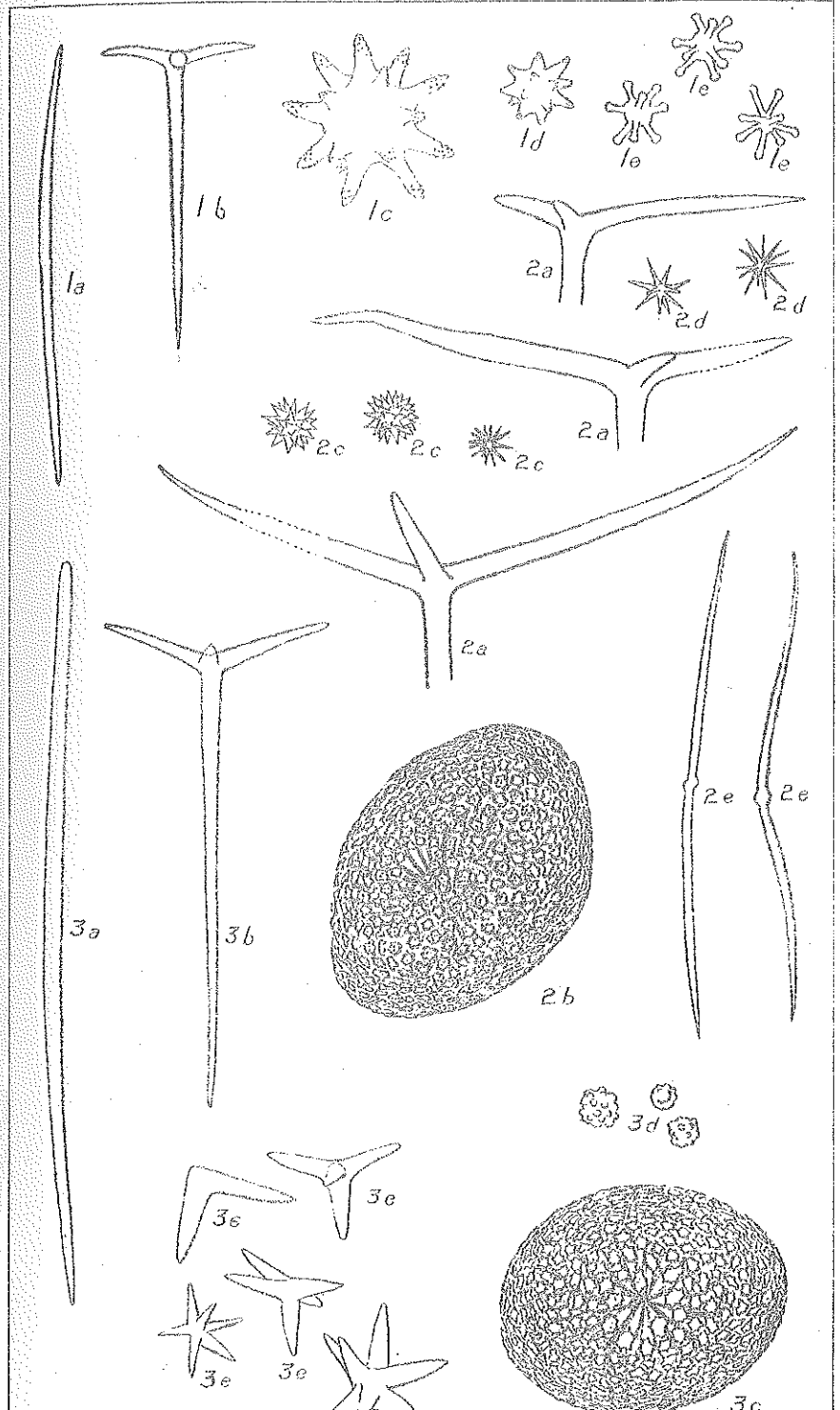
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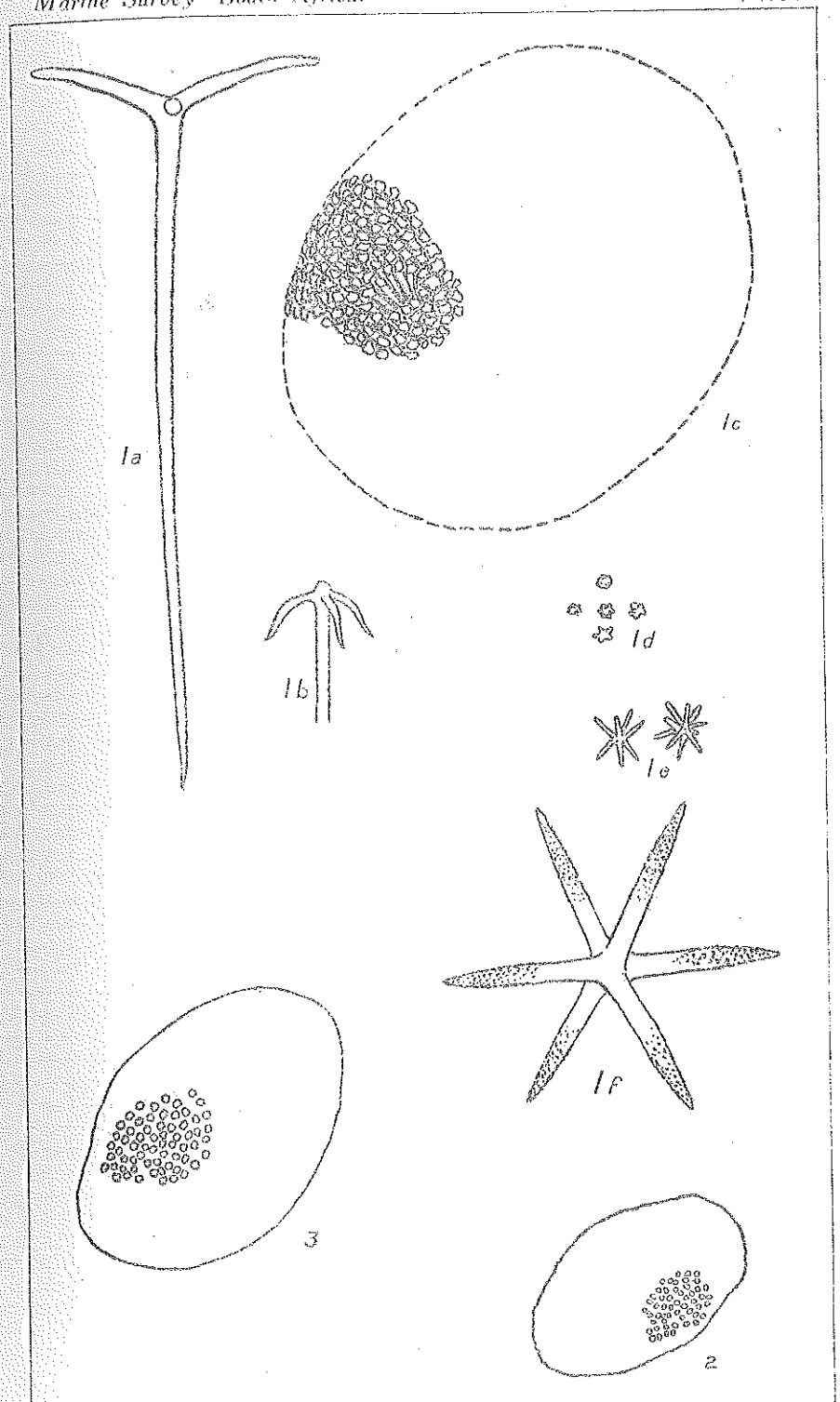
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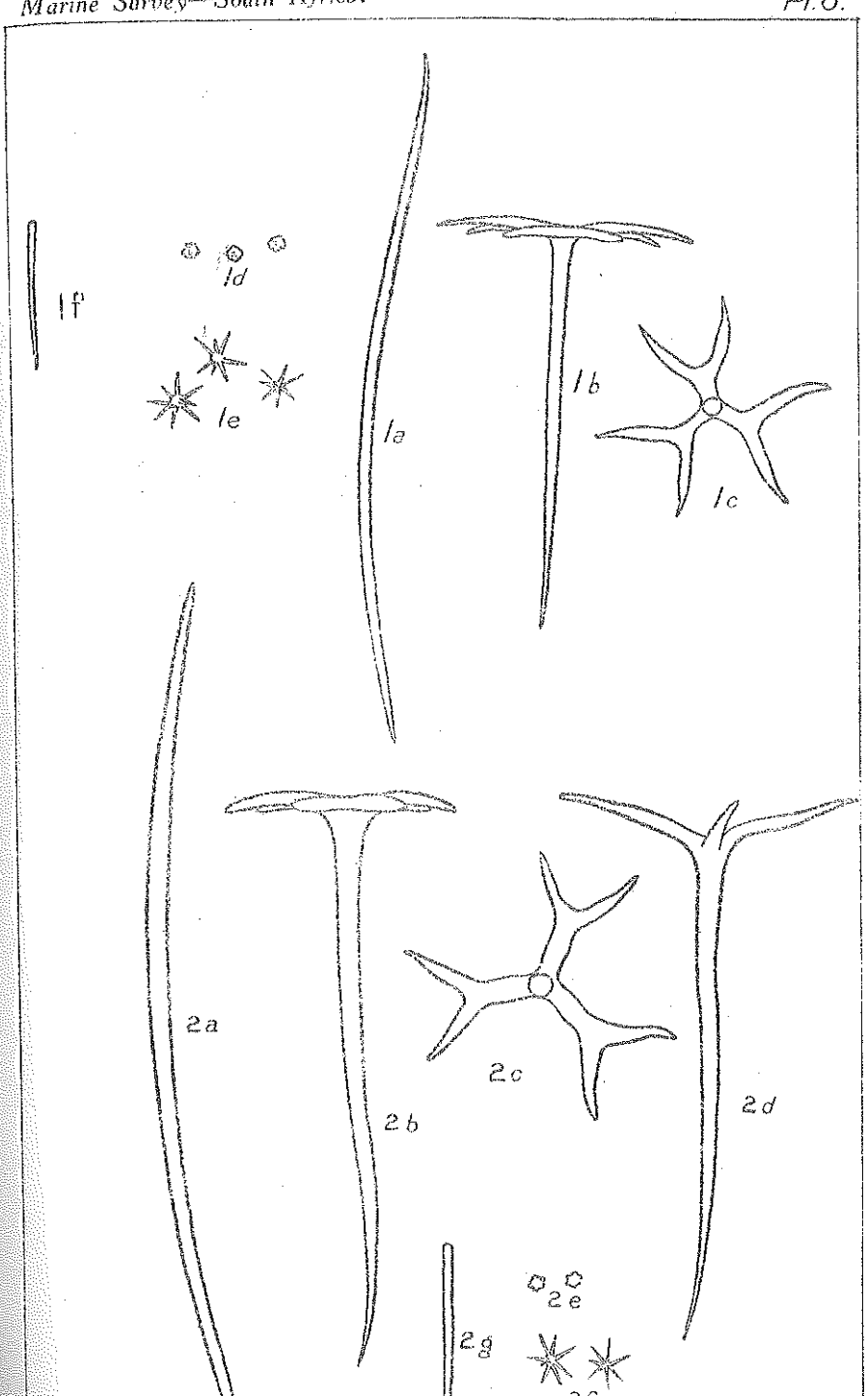
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