PORIFERA (SPONGES).

II. TETRAXONIDA, DENDY (6. p. 63).

By R. Kirkpatrick.

(Plates VIII.–XXVI.)

I. Grade TETRACTINELLIDA, Marshall.

In the collection made by the 'Discovery' there are fifty-nine specimens of Tetractinellida, belonging to four species of *Tetillidae*, all of which have been described before; and, further, there are new varieties of two of the species.

The bulk of the material consists of numerous and large specimens of *Cinachyra barbata* Sollas, a species which was originally obtained from Kerguelen by the 'Challenger.'

The following is a list of species:—

Craniella sagitta (Lendenfeld) var. *microsigma* var. n.
Craniella sagitta var. *pachyrrhabdus* var. n.
Craniella leptoderma (Sollas).
Cinachyra barbata Sollas.
Cinachyra vertex Lendenfeld.
Cinachyra vertex var. *monticularis* var. n.

Sub-Order Sigmatophora, Sollas.

Family Tetillidae, Sollas.

Craniella, Sollas.

Tetillidae without porocalyces, and with a cortical skeleton of oxeas arranged more or less radially and vertically to the surface.

Craniella sagitta *var.* microsigma.

(Plate VIII., figs. 1–13, and Plate IX., figs. 15, 16.)

1907. *Tethya sagitta* Lendenfeld (11a. p. 306).

Sponge large, pyriform or cocoanut-shaped, narrowed and truncate at lower end, with finely pilose surface and with root-tuft. With a few small circular oscules about 0·75 mm. in diameter in the contracted state. The body divided into three zones, an inferior root-tuft zone, a broad median or equatorial poral zone, and a superior oscular zone. Surface, where the pile has been denuded, showing obscurely-marked longitudinal anastomosing ridges, much more evident in the poral region. Pores in sieve-like

groups in grooves between the ridges. Flagellated chambers eurypylous. Cortical skeleton formed of palisade-like rows of oxeas and fan-like bundles of trichodal protriaenes, occurring only in the root-tuft zone and poral zone.

Spicules. Megascleres. 1. Somal Oxeas (VIII. 10)* from 5 to 13 mm. in length and 0·06 to 0·08 mm. in thickness, straight, fusiform, tapering gradually to very sharp ends.

2. Choanosomal oxeas lying scattered between the radial fibres, 1–3 mm. long and 0·04 to 0·06 mm. thick.

3. Cortical oxeas (VIII. 13) almost straight or slightly curved, 1·12 × 0·04 mm.

4. Anatriaenes of two kinds, each varying in length and tapering to a filiform extremity. 4a. (VIII. 5, 5a, 6) with pointed conical cladome, with slender sharp-pointed cladi each 225 μ long, chorda 187 μ long; rhabdome about 12 mm. long, and averaging about 20 μ broad, thick below cladal origin, then with a slender neck followed by long thicker portion tapering finally to filiform extremity.

Anatriaenes, 4b (VIII. 7, 7a) common in root-tuft, with thick rounded conical cladome, with short thick cladi 118 μ long, chorda 118 μ long; rhabdome of nearly uniform diameter till it tapers off to filiform extremity, length varying from 10 to 40 mm.

5. Protriaenes. Cladome commonly with one cladus 0·135 mm., longer than the other two, though there may be two equal long ones, or they may all be equal; rhabdome fusiform, tapering to a filiform extremity, on an average about 9 × 0·054 mm. in length and thickness.

6. Trichodal protriaenes 218 μ long, with one cladus 28 μ in length, longer than the other two; cladal end of rhabdome slightly swollen.

Microscleres. Sigmata 12·3 μ–13 μ long, 7·04 μ broad (when seen in C-like aspect), and 1·5 μ thick, surface micro-punctate.

There are five specimens of this sponge, four large and one very small. The largest (VIII. 1) is a fine example with a root-tuft; this appendage not being present in the other large specimens owing to having been torn away when the sponges were uprooted from the sea-bottom.

The body of the largest specimen is 10·5 cm. long and 11·5 cm. in broadest diameter, and of the smallest 10 × 8 mm. in length and breadth. The mass of root-tuft in the type specimen is about 4 cm. in thickness.

The surface pile of spicules varies considerably in its degree of development; in two examples the surface is almost bare; in two others the pile is soft, and about 3 to 4 mm. in height, with oscular fringes about 4·5 mm. in height. The pile is formed mainly of the projecting triaenes of the radiating fibres of the skeleton, each fibre spreading out fan-like in an oblique or vertical plane. In the specimens bare of the pile, the boundary between the poral and oscular zones (VIII. 2) is a fairly well marked circular line of demarcation situated at the junction of the upper fourth and lower

* Roman numerals followed by Arabic refer respectively to the Plate and figures; thus (VIII. 10) means Plate VIII., fig. 10.

three-fourths of the body. The surface of the oscular zone is smooth and glistening and with faintly marked longitudinal ridges; whereas that of the poral zone has more prominent ridges, and a punctate appearance due to the pores in the grooves between the ridges; this appearance is brought into relief by drying the sponge, for then the poral sieves contract and the points of the palisades of cortical oxeas prick up the dermal membrane; these palisades are not present in the oscular area, which, in fact, is devoid of a cortical skeleton of spicules, though it possesses a fibrous cortex.

The **oscules** are small circular orifices about 0·75 mm. in diameter, five or six in number, arranged in an irregular circle on the broad upper end of the sponge. In the complete state they each have an outer fringe of protriaenes about 4·5 mm. high, and an inner fringe of trichodal protriaenes, a little below which is a sphincter.

The **dermal pores** occur as sieve-like groups in the more or less longitudinal grooves (VIII. 2, 3) between the palisades of cortical oxeas, the meshes of the sieves being supported by fan-like tufts of trichodal protriaenes.

The **Ectosome.** The sponge cuts easily, and a vertical section shows the skeletal fibres radiating from a central nucleus. No well-defined boundary is visible to the naked eye between ectosome and choanosome. In the poral zone (VIII. 3 and IX. 15) the pores lead into sub-dermal spaces bounded by vertical rows of cortical oxeas; the rows of cortical oxeas are likewise present at the base of the sponge in the root-tuft zone. In the oscular zone (IX. 16) there is an ill-defined layer, about 1·5 mm. thick, composed of loose bundles of fibrous tissue crossing in various directions with rounded collencytes scattered about; also there may be a few scattered oxeas.

The **Canal System.** The subdermal spaces beneath the sieve-groups of pores open into canals descending into the choanosome. The pyriform flagellated chambers, 47 × 42 μ (VIII. 4), are eurypylous; the figure shows several chambers opening direct into a terminal exhalant canal.

The chamber system of *Craniella simillima* Bk. and of other species of *Craniella*, described by Sollas in his 'Challenger' Report, is aphodal (**21.** p. 30, Pl. II., fig. 19).

The **Skeleton.** A tangential surface section in the poral region shows best the cortical oxeas, which are mostly arranged in double rows, each row bending outwards slightly towards a row of another double series, so as to form an incomplete arch over a sub-dermal space or channel.

A small "silica pearl" was found in one section.

Numerous large ova occur, with oval body and thick pseudopodia-like extensions, the body being 130 × ·65 μ, and the total diameter over 300 μ. In some instances, the ova are more rounded and compact, with the cytoplasm more drawn together.

I had described the specimens as representatives of a new species, but I now find that they belong to *Craniella sagitta* (Lendenfeld).

Dr. v. Lendenfeld very kindly sent me the revised proofs of his Report "Tetraxonia der deutschen Südpolar-Expedition, 1901–1903," thus enabling me to make the necessary alterations before it was too late.

The 'Gauss' Expedition obtained six specimens, which are all young and small, being from 2–10 mm. in diameter.

The difference in the size of the megascleres of the 'Discovery' and 'Gauss' specimens may be attributed to differences in the age and size of the specimens; but the difference in the size of the sigmata of the two sets of specimens is more notable—those of the 'Gauss' being 14–20μ, and of the 'Discovery' being only 12·3μ to 13 μ in length as viewed in the C aspect. In my opinion difference in size of sigmata has not the importance that is sometimes attached to it.

All the specimens were dredged in the neighbourhood of Winter Quarters in depths of 10–130 fms. Also 'Gauss' Expedition, near its Winter Quarters, 350–385 m.

Craniella sagitta *var.* pachyrrhabdus.

(Pl. VIII., figs. 14, 15; Pl. IX., figs. 17, 18, 19.)

1907. *Tethya sagitta* Lendenfeld (**11a.** p. 306).

This variety is represented by several oblong pieces about 6 cm. in length, deeply blackened by osmic acid, and forming part of a large sponge, which had been cut up for preservation in that reagent.

The fragments are sufficient to show that the surface of the sponge was covered with a spicular pile about 4 mm. in height.

Mr. Hodgson informs me that the bulk of the specimen was lost. He was under the impression that this sponge, which was obtained from the same locality as the var. *microsigma*, and which resembled the latter in general appearance, was identical with it in all its characters. An examination of a section, however, shows that the radiating fibres of the skeleton contain numerous large thick strongyles and styles, about 7 × 0·116 mm. in dimensions (VIII. figs. 14, 15); the sigmata are 18–20 μ long, and slightly thicker and rougher than in the var. *microsigma*.

Plate IX. figs. 18, 19 show collar cells, stained in gentian violet. The cells are here seen to be separate, and the collars apparently not coalescent; but the tissues are not very well preserved; and, though much care was taken in the drawing, a renewed inspection of the preparation from which the illustrations were drawn has shown that the figures of the collars are not satisfactory. The flagellated chambers usually contain only a few collar cells in the normal position (IX. 17), the rest forming detached masses in the centre of the chambers. The flagellum originates from the end of the large oval nucleus, which is situated a little below the surface of the body of the cell.

Locality. Winter Quarters, Hut Point, 25 fms.

Craniella leptoderma.

(Plate XI., figs. 4–14.)

1888. *Tetilla leptoderma* Sollas (**21.** p. 3).

Sponge, club-shaped or pyriform; with verruculate surface; with one large oscule near the summit; with root-tuft. Surface pile of spicules absent in the adult state, and only slightly developed in early stages, large protriaenes being very rare or absent.

Spicules. Megascleres. 1. Large oxeas, 9·7 × 0·081 mm.

2. Smaller oxeas, scattered in the choanosome, 540 to 1350 μ in length.

3. Cortical oxeas (XI. 8), 770 × 30 μ, straight, fusiform.

4. Anatriaenes of three kinds: *a*. (XI. 9) Cladi 170 μ long × 20 μ thick at base, slender, sharp-pointed, chorda 110 μ; rhabdome, about 12 mm. long, thick at junction with cladome, then tapering, again thickening, and finally terminating in a filiform extremity.

b. (XI. 11) Cladome with thick conical cladi, 140 × 35 μ, chorda 60 μ; rhabdome with a thick neck, and then nearly uniform till it tapers to a filiform extremity.

c. (XI. 10) Cladome with very long, straight, slender cladi, 150 × 10 μ, nearly parallel with, or making an angle of, about 10° with the rhabdome, chorda only 31 μ; rhabdome slender (of uncertain length).

5. Protriaenes. Rare, usually with three slender equal cladi, 90 μ long; rhabdome of nearly uniform diameter; but slightly diminishing near the cladome.

6. Trichodal protriaenes, usually (especially in the case of those forming the inner oscular fringe) with one ray greatly prolonged to 140 μ or more, the other two having almost disappeared; rhabdome slightly thickened at cladal origin.

7. Sigmata, 14·25 to 15 μ long, 0·75 μ thick, and 12·3 μ broad in the *c* aspect, with slightly and finely granulated surface.

There are three specimens of this sponge, the largest (XI. 4) being 12 cm. in total length and 5·2 cm. in breadth, with a root-tuft 3·5 cm. in length; the second specimen (XI. 5) is oval, 2·9 cm. long and 1·7 cm. broad, and the smallest is 13 × 12 mm.

The colour of the first two is dirty gray, and that of the last pale buff.

The scale-like, occasionally over-lapping, verrucae, attain a height of 2 mm., and a breadth at the base of 4 mm.

The oscule is oval-shaped, edged with a barely visible fringe of trichodal protriaenes; it measures, in the large specimen, 7·5 × 5 mm.

The **skeleton.** The radiating fibres only very rarely project beyond the surface; near the oscule are a few tufts of oxeas. Over the rest of the surface of the sponge, the dermal membrane covers over the summits of the verrucae, the distal points of oxeas and the cladomes of anatriaenes showing through; medium-sized in large protriaenes, so abundant in *Craniella sagitta*, are almost absent from the two large specimens of the present species, though in the smallest specimen there is one to each conule. Tufts of trichodal protriaenes are present in abundance.

The **ectosome.** On section, the ectosome is scarcely differentiated from the choanosome, excepting that sub-dermal spaces are visible just beneath the dermal membrane.

The cortical oxeas are more densely packed than in the preceding species.

A tangential section shows the pores in longitudinal areas between the densely serried rows of cortical oxeas, and fan-like tufts of trichodal protriaenes supporting the

sieve-like pore-areas; the pore-areas are distributed over the surface up to the neighbourhood of the oscule.

Canal System. The pores lead into sub-dermal channels whence canals descend into the choanosome. The flagellated chambers are eurypylous.

Small ova, 60 × 30 μ, with pseudopodic-like processes, occur in the largest specimen.

A **young specimen** is pear-shaped with a granular surface, and without a root-tuft. Each "granule" is a sharp-pointed conule, with a protriaene projecting from it.

The young specimen of *Craniella sagitta* has a very different appearance, being quite fluffy on the surface owing to the numerous tufts of protriaenes.

Specimens were obtained from: (1) West of Balleney Island in 254 fms., Type specimen (XI. 4); (2) W.Q., Flagon Point, 10–20 fms.; (3) W.Q., Hut Point, 25 fms.

The 'Challenger' dredged specimens off Rio de la Plata, 600 fms.

Cinachyra barbata.

(Plate IX., figs. 1–14.)

1888. *Cinachyra barbata* Sollas (**21.** p. 23. Pls. III., XXXIX.).
1906. *Cinachyra barbata* Kirkpatrick (**10.** p. 662. Pl. XIV.).

Twenty-seven specimens of this sponge, varying in diameter from a few millimetres up to 14 centimetres, were obtained. In addition to these, the collection includes a massive root-tuft no less than 32 cm. across and 12 cm. in thickness, belonging to what must have been a very large specimen, for the concavity into which the latter fitted occupies nearly the whole area of the upper surface of the root-tuft. The largest specimen obtained by the 'Challenger'—from Kerguelen—was 10 cm. in its longest diameter.

As in the case of the 'Challenger' specimens there is a considerable variation in the shape, which is usually spheroidal; some specimens are spherical, the nucleus of the radiating bundles of the skeleton being exactly central, others again resemble an inverted cone, and very young specimens are oval.

An interesting feature shown in adult specimens is the division of the sponge into three zones, viz., (1) a basal root-tuft zone; (2) an equatorial zone of porocalyces; and (3) a polar zone of oscules.

These zones are clearly perceptible in the fine series of well-preserved Antarctic specimens, but are not so well marked in those obtained by the 'Challenger.' The surface pile of spicules in the porocalycal zone is longer and looser than in the oscular zone, and directed obliquely downwards; but the pile in the oscular area is shorter, and more vertical and stubble-like.

The **root-tuft.** A remarkable feature about the root-tuft is its great size in some specimens, in which it may be much more bulky than the sponge body;

generally, however, it is of smaller size than the body, especially in large and old specimens.

The **porocalyces.** In adult specimens the porocalyces form a broad belt round the sides of the body. A few, in large specimens, were nearly 2·5 cm. (one inch) in depth. As I have already stated (**10.** p. 662) the porocalyces are, in all species of *Cinachyra*, inhalant areas perforated by true dermal pores, and are never exhalant or oscular.

The **oscules.** In *Cinachyra barbata* these structures are arranged in an obscurely spiral manner on the upper or "polar" surface of the sponge in adult specimens. In almost every instance, the oscules are tightly contracted, the spicular fringe being closed over them in form of a conical stack. It is this strong contractibility that has led to their being overlooked in most of the species of this genus, the porocalyces having been regarded as partly inhalant and partly exhalant.

The oscules are very rarely found open. Where this happens, the oscular orifice is at the summit of a slight crater-like elevation. Within the circle of long protriaenes forming the oscular fringe is a circle of fine protriaenes on the edge itself and also on the gentle slope leading inwards. At a short distance from the edge, the slope leads to a vertical barrel-shaped tube ending in a well-marked sphinctrate ring, which is about on a level with the innermost plane of the cortex; the oscular tube slightly expands below the sphincter into a sub-cortical cavity in the lateral walls of which are the orifices of exhalant canals proceeding from just beneath the cortex. At its lower end the sub-cortical space is continued on into a large main vertical canal, which passes up radially from the central region, receiving in its turn many affluents. The wall of the oscular tube is mainly composed of a thick sheath of concentrically arranged myocytes.

The vertical section of the oscular tube, when contracted, shows the almost closed lumen of the tube surrounded by a dark zone of sigmata, and with spiral bands of myocytes passing upwards around the lumen.

Two of the eight known *Cinachyra* species, viz., *C. voeltzkowi* Lendenfeld (**11.** p. 101) and *C. malaccensis* I. J. B. Sollas (**19.** p. 219), are described as having scattered pores in addition to the pores of the porocalyces. Some of these "pores" will certainly be found to be oscules situated, in young specimens, more or less antipodally to the porocalyces, others possibly belonging to developing porocalyces; for as W. J. Sollas observes (**21.** p. 29), "in their inception, the porocalyces are simply poriferous areas of the cortex."

Young specimens. Very young specimens (IX. 3) are oval, broader at the superior end, and without a root-tuft, though the surface spicules are longer at the narrow end of the sponge. At this stage the sponge lies with its long axis oblique or horizontal. The smallest specimen in this collection is 3 × 4 mm. in diameter. It has one porocalyx situated in the centre of one side, and one oscule a little to one side of the centre of the summit of the broad end. This nearly bilateral symmetry calls to

mind the species of *Fangophilina* Schmidt, viz. *F. submersa* O. Sch. (**17.** p. 73), and *F. gilchristi* Kirkp. (**10.** p. 667), in which the ovoidal body of the sponge has one large porocalyx and one large oscule situated on the upper aspect. As the sponge grows, the porocalyces increase in number and extend on each side of the original one till they form a complete equatorial belt; in the meantime, the main axis of the sponge gradually rotates from horizontal to vertical, so that the crown of oscules comes in many specimens to lie in a horizontal plane at right angles to the vertical axis.

The **cortex.** In young specimens the cortical oxeas are arranged tangentially in a single layer. In the largest examples, the cortex reaches a thickness of 3·25 mm., the densely packed oxeas being arranged vertically and obliquely to the surface.

The **skeleton.** The only additional observations to be made here are on certain bodies which Sollas (**21.** p. 24) refers to as "Globules; accessory or accidental forms, 0·0535 mm. in diameter." These bodies, which Schulze terms "silica pearls," are now known to be not uncommon in sponges (Schulze, **18.** p. 6, and Weltner, **33.** p. 190). Spheres may be normal spicules of the sponge, as in *Caminus sphaeroconia* Sollas. In many instances, however, spheres or globules result from malformation or incomplete development, as in cases where a tylote spicule is reduced to a knob, or a sphere may result from the reduction of an oxea, as in *Epallax callocyathus* Sollas. In some of the specimens of *C. barbata* there are a considerable number of pearls and some of them are double (IX. 6, 7). One example 114 × 94 μ is oval, with two nuclei and with concentric layers of deposition round each, up to the point where the spheres come in contact; later there is a single oval layer common to the two centres, but an annular depression or kink is always visible in the plane midway between the nuclei of the two original spheres. Sollas (**21.** p. 214, Pl. XXVII., figs. 8–9) figures composite spheres occurring in *Caminus sphaeroconia*, but here the composite sphere does not possess separate central points round which are deposited concentric laminae, but (apparently) one centre and an axial line or rod round the end of which the layers are deposited.

Whether these spheres or silica pearls are always spicules or the result of incomplete development of spicules, or whether they are sometimes due to deposition of layers of silex round some foreign organic or inorganic body, has not been determined. The nucleus is generally a refringent point, but is sometimes irregularly shaped and of a faint yellow colour; attempts to investigate it under high powers generally result in the pearl being crushed.

Several of the smallest pearls, only 6 or 7 μ in diameter, are associated with fan-shaped crystalline bodies (IX. 8–12); these latter proved to be simply crystals deposited from the sea-water. Sometimes the pearl is in the centre of a spheroidal mass of crystals. Under polarised light, the crystals are doubly refracting and are brilliantly defined on the dark field, while the pearls are isotropic, though usually very faintly visible; accordingly a spherical mass of crystals surrounding a pearl has a dark central space.

In a vertical section of the sponge stained in borax-carmine the spheroidal

conglomerations of crystals, 30–45 μ in diameter, are clearly defined owing to their being much more deeply stained than the surrounding tissues. The appearance of capsules in Pl. IX. figs. 13, 14, is due to an optical effect. The deep staining and the well-defined spheroidal shape might cause these bodies to be mistaken for organic structures; they are barely visible when unstained, and it is not easy to separate them from the dehydrated tissues in which they lie, in order to test the action of reagents; when separated they are found to be soluble in water.

Localities. The specimens come from six different localities in the neighbourhood of Winter Quarters, from depths ranging from 10 to 25 fms. Also Kerguelen Island, 25–60 fathoms, 'Voy. Challenger.'

Cinachyra vertex.

(Plate X., figs. 1–14.)

1907. *Cinachyra vertex* Lendenfeld (**11a.** p. 310).

Sponge, generally oval, ovoidal, or conical, with long diameter horizontal. Surface with conules, usually oblique and more or less appressed to the surface, arranged in spiral rows, and terminating in tufts of spicules, the conules and tufts wrapping round the body. With well-developed root-tuft.

Porocalyces, varying greatly in size and appearance, being hemispherical pits with circular orifice, or obliquely directed pockets with slit-like opening; surface hispidated with trichodal protriaenes.

With several oscules situated in a more or less circumscribed area on the side opposite the area of greatest development of porocalyces, or at or near the summit of conico-ovate specimens. The oscules were open only in one instance; they were 3·25 × 2 mm. in diameter, with a marginal fringe, and a platform-like spicule below the rim.

Ectosome, an outer layer of collenclymæ, and an inner of fibrous tissue, with cortical spicules.

Flagellated chambers eurypylous.

Spicules. Megascleres. (1) Somal oxeas, 5·5 × ·057 mm., fusiform, tapering gradually to sharp points.

(2) Choanosomal oxeas 520 × 18 μ, slightly curved.

(3) Anatriaenes; cladome, more or less hemispherical, often with apical umbo, cladi at first at right angles, then making a sharp bend; length 210 μ, thickness at base 70 μ, chorda 300 μ, sagetta 200 μ: rhabdome 6·5 μ broad at junction with cladome, then narrowing slightly, again thickening slightly, and terminating gradually in a fine sharp point.

(4) Protriaenes, cladome usually with one long cladus 170 μ twice the length of the other two; rhabdome 7·5 × ·019 mm. nearly uniform in thickness in distal half, tapering at proximal end to fine sharp termination.

(5) Trichodal protriaenes with rhabdome 550 μ in length, and with longest cladus 50 μ.

Microscleres. (6) Sigmata, 18·36 μ in length, 1·8 μ in thickness, and 10·5 μ in breadth in the C-aspect; surface finely granular.

There are twenty-five specimens of this sponge, the largest being 10·5 × 8 cm. and the smallest 8 × 6 mm. The salient external features of the larger specimens are the spiral series of conules and tufts wrapping round the sponge, and the porocalyces obliquely displaced by the spiral growth of the sponge. The root-tuft is often much more bulky than the sponge body. The conules which form a fleshy basal sheath to the spicular tufts attain a height of 5 mm., and the tufts of an additional 10 mm. The porocalyces have an average diameter of about 4 mm., the oscules being about ·5 mm. in the contracted state; the latter have a fine marginal fringe of small protriaenes.

On section, the flesh is reddish in colour; the cortex indiscernible and can be peeled off in the form of a thin skin, its thickness being about 30 mm.; the outer third is formed of large rounded collencytes, 18 μ in diameter, full of granules, which stain deeply. Covering the outer surface of the sponge is a well-defined layer of sigmaspires; a layer of the same spicules also lines the surface of the canals.

Canal System. Currents pass through the pores in the porocalyces to large sub-dermal spaces leading to one large inhalant canal.

The flagellated chambers are eurypylous. Pl. X. fig. 5 shows numerous apopyles opening into a commencing exhalant canal.

The collar-cells (X. 6) here have their collars concrescent.

Numerous ova are present in some of the specimens, and in various stages—but not in the same specimen—some having pseudopodia-like processes, others being spheroidal and devoid of processes. In one unstained section in balsam the large spherical ova are 330 μ in diameter, with nucleus 50 μ, and nucleolus 9·75 μ in diameter; here the ova can be seen with the naked eye as deep yellow spots, and with a hand lens the clear nucleus can be distinctly made out.

Young specimens. In early stages there is no root-tuft, but in a series of small specimens, the conule tufts can be seen to lengthen at the narrow end of the specimen till they form a root-tuft. At first there is only one porocalyx situated on one side, and a single oscule, surrounded by a fringe of protriaenes, a little below and behind the broad end of the egg-shaped specimen. One small specimen (No. 264, 13, ii. 04) differs from the others in having long tufts each with a long fleshy base, the tufts all pointing downwards from the flat upper end; a few small contracted porocalyces are concealed in the axils of the fleshy conules.

Localities. Winter Quarters. Twenty-five specimens were obtained from ten localities, and from depths varying from 10–30 fathoms.

Cinachyra vertex *var.* monticularis.

(Plate X., figs. 15, 16. Plate XI., figs. 1–3.)

1907. *Cinachyra vertex* Lendenfeld (**11a.** p. 310).

Two small specimens of this species, obtained from deep water (130 fms.), show a remarkable variation in the porocalyces and oscules. The porocalyces instead of being situated below the general surface are elevated above it in the form of rounded warts or monticules about 1 mm. in height; the oscules likewise form small cylindrical chimneys about 2 mm. in height.

The larger of the two specimens is 3·5 × 2·5 cm. in its diameters, not including the root-tuft, which is about 2 cm. in thickness. A large part of the surface is covered with the little porocalycal monticules, and at one end are several oscular chimneys. Situated at a varying height on each monticule is a semilunar slit which opens into a cæcal fold or pocket that has been formed by the upward growth and protrusion of the monticule; when the lip is near the summit of the monticule, it surrounds the latter like a kind of præpuce. The pore-perforated floor of the porocalyx itself is, in every instance, closely folded with longitudinal pleats which, however, can be unfolded. The summit of the monticule is formed by the tops of these folds, and bundles of the hispidating trichodal protriaenes can occasionally be seen projecting from the summit. The long slender bundles of protriaenes divide into two layers at the inferior proximal edge of the semilunar fold, one set being in the fold itself and extending to the edge of the same and sometimes a little beyond, the other set passing up in to the floor and walls of the porocalyx itself. The edge of the semilunar lip is provided with a band of myocytes. This curious variation appears to have taken place as an adaptation necessitated by the spiral mode of growth of the sponge; if such growth became excessive the porocalyces would be in danger of becoming closed altogether from one lip of the orifice overlaying the other.

Locality. Winter Quarters. No. 10 Hole, 130 fms.

II.—Grade MONAXONELLIDA, Dendy.

There are, in all, forty-three species belonging to this group. Of these, eight belong to the Astromonaxinellida, and thirty-five to the Sigmatomonaxinellida. Twenty-two species are new, and there are, in addition, seven new varieties of species already described. There are four new genera, of which one belongs to the *Axinellidae*, two to the *Mycalinae*, and a fourth, *Pyloderma* (Renierinae), has been established to receive *Halichondria latrunculioides* Ridley and Dendy.

New and interesting forms of spicules.—The new Mycaline genus *Cercidochela* is characterised by the possession of remarkable modified isochelae, which I have termed canonchelae (*i.e.*, shuttle-shaped chelae). In them the single central teeth from each end have fused, so that a complete shuttle-shaped spicule results, recalling the melon-

like spicules of *Melonanchora*, in which, however, three opposite pairs of teeth have become united.

Hoplakithara dendyi is remarkable for its exotyles with very large spined heads; this species also has fimbriated placocheles.

The spathulate bipocilla occurring in two new species of *Iophon* are worthy of mention. A bipocillum of this kind occurs, also, outside the genus *Iophon*, viz., in a new species of *Myxilla*.

Geographical distribution.—As might have been anticipated, a large proportion of the known forms have already been recorded from the Southern Hemisphere.

Of the twenty known species, fourteen have been recorded from the South Atlantic or Indian Ocean, or from the southern portion of the east and west coasts of South America. Only two species have been previously recorded from the Antarctic region, viz., *Iophon radiatus* Topsent and *Gellius rudis* Topsent, both obtained by the 'Belgica' expedition from the opposite quadrant of the Antarctic circle.

Of four species which have been recorded from the Arctic region, one, viz., *Sphaerotylus capitatus* (Vosmaer), has never been obtained from any intermediate station. *Artemisina apollinis* (R. & D.), which was obtained by the 'Challenger' from Kerguelen Island, has been recorded by Lundbeck from off Greenland. *Stylocordyla borealis* (Lovén), recorded from the North Sea, and occurring also in the Antarctic, has been obtained from several intermediate localities. Of considerable interest is the occurrence of *Esperiopsis villosa* Carter, a form frequently recorded from high northern latitudes, but only from one intermediate station, viz., in deep water off the Azores.

Classification.—The classification of the main groups adopted here is that of Dendy (**6.** p. 60, 134). Dendy divides the Order Tetraxonida into two grades, Tetractinellida and Monaxonellida, and the latter grade into two sub-orders, Astromonaxonellida and Sigmatomonaxonellida. The use of the last two names implies the theory of the relationship of these sub-orders with the astrophorus and sigmatophorous Tetractinellida respectively.

The divisions Clavulida and Aciculida (Topsent) of the Astromonaxonellida (Hadromerina *pars* Topsent) are adopted; so likewise is Lundbeck's division of the Desmacidonidae (Poecilosclerida Topsent) into two sub-families, *Mycalinae* and *Ectyoninae*, and of the *Mycalinae* into two groups, *Mycaleae* and *Myxilleae*.

A preliminary report giving descriptions of new genera and species has been published in the Ann. Mag. Nat. Hist. (7), vol. xx., pp. 271 *et seq.*, Sept. 1907.

Below is a list of species of Monaxonellida :—

GRADE MONAXONELLIDA DENDY.

I. Sub-order ASTROMONAXONELLIDA Dendy.

I. Tribe CLAVULIDA Vosmaer.

i. Family *Spirastrellidae* Ridley and Dendy.

Latrunculia apicalis Ridley and Dendy var. *biformis* var. n.
Latrunculia apicalis Ridley and Dendy var. *basalis* var. n.

ii. Family *Polymastidae* Vosmaer.

Polymastia invaginata Kirkp.
Sphaerotylus antarcticus Kirkp.
Sphaerotylus capitatus (Vosmaer).

iii. Family *Suberitidae* Schmidt.

Suberites microstomus Ridley and Dendy var. *stellatus* var. n.
Suberites caminatus Ridley and Dendy var. *papillatus* var. n.
Pseudosuberites hyalinus (Ridley and Dendy).

II. Tribe Aciculida.

i. Family *Stylocordylidae*.

Stylocordyla borealis (Lovén) var. *acuata* var. n.

II. Sub-order Sigmatomonaxonellida Dendy.

ii. Family *Axinellidae* Ridley and Dendy.

Axinella supratumescens Topsent.
Sigmaxinyssa phakellioides Kirkp.

iii. Family *Desmacidonidae* Ridley and Dendy.

I. Sub-family *Ectyoninae* Ridley and Dendy.

Hymedesmia areolata Thiele.
Hymedesmia exigua Kirkp.
Hymerrhaphia rufa Kirkp.
Ophlitaspongia nidificata Kirkp.
Lissomyxilla hanitschi Kirkp.

II. Sub-family *Mycalinae* Thiele.

I. Group *Myxilleae* Lundbeck.

Iophon radiatus Topsent.
Iophon spatulatus Kirkp.
Iophon flabello-digitatus Kirkp.
Lissodendoryx spongiosa (Ridley and Dendy).
Myxilla decepta Kirkp.
Tedania variolosa Kirkp.
Tedania coulmani Kirkp.

II. Group *Mycaleae* Lundbeck.

Artemisina apollinis (Ridley and Dendy).
Esperiopsis villosa (Carter).
Mycale magellanica (Ridley).
Mycale acerata Kirkp.
Mycale sp.
Desmacidon kerguelenensis Ridley and Dendy var. *antarctica* var. n.
Desmacidon kerguelenensis var. *cactoides* var. n.
Desmacidon spinigera Kirkp.
Desmacidon maeandrina Kirkp.
Joyeuxia belli Kirkp.
Cercidochela lankesteri Kirkp.
Hoplakithara dendyi Kirkp.

III. Family *Haplosceridae* Topsent.

I. Sub-family *Gelliinae* Ridley and Dendy.

Gellius rudis Topsent.
Gellius fimbriatus Kirkp.

Gellius pilosus Kirkp.
Gellius cucurbitiformis Kirkp.
Gellius glacialis var. *nivea* Ridley and Dendy.
Oceanapia tantula Kirkp.

II. Sub-family *Renierinae* Ridley and Dendy.
Pyloderma latrunculioides (Ridley and Dendy).
Petrosia fistulata Kirkp.
Reniera scotti Kirkp.
Reniera dancoi Topsent.

Sub-Order Astromonaxonellida, Dendy.

Tribe Clavulida, Topsent.

Family Spirastrellidae, Ridley and Dendy.

Latrunculia apicalis *var.* biformis.

(Plate XV., figs. 1–7.)

Latrunculia apicalis Ridley and Dendy (**15.** p. 234).

There are three specimens of the new variety. The one selected as the type is massive and conical, 9 cm. high and 7·5 cm. broad at the base. The surface is covered with the little disk-like poral papillae, but in place of many conical oscules, such as are found in the typical form described by Ridley and Dendy, there is one large oscule (16 mm. in diameter and much contracted) at the summit of the specimen. The chief variation from the type is in the character of the discasters, of which there are two kinds, one with an apical spike resembling that found in the typical form, but stouter and shorter, and the other kind without the apical spike. Mr. Highley's figures show the characters of these two forms; the first kind is 362 μ long and 200 μ in greatest breadth; the second kind is 190 × 150 μ. All the specimens have what appear to be reduced discasters, *i.e.*, spined styles in which the toothed disks of the discaster have become reduced to spines. The smooth styles are nearly straight, 325 × 12·5 μ, and with tornote pointed ends.

Two of the specimens are chocolate brown in colour, but a third is paler and has more of the reduced discasters. One specimen is labelled "The green Sponge." The alcohol in which they have been preserved is dichroic, being amber-coloured by transmitted, and olive green by reflected, light.

The specimens were all dredged near Winter Quarters in 10–15 fms.

Latrunculia apicalis, *var.* basalis.

Latrunculia apicalis Ridley and Dendy (**15.** p. 234.).

There is one small, thin cake-shaped specimen 30 × 20 mm. in area and 6 mm. thick, of a light-brown mud colour.

There are several of the discoidal raised pore-areas, and one conical oscular papilla. The flagellated chambers are aphodal, 49 × 19 μ, the aphodus being 32·5 μ long. The

discasters vary somewhat, the apparently typical form being 64 μ long and 39 μ broad, with a small spike at the base, and a still smaller one at the apex; sometimes neither the basal nor apical spines are present, and the spicule resembles more nearly the discaster of *Latrunculia brevis* Ridley and Dendy. There are two small basal whorls of spines; above them is a plano-convex whorl with denticulate edges and deeply cleft along 3–5 radii; then follow two smaller whorls pointing upwards.

The smooth styles are fusiform, with tornote point, 557 μ long, 6·5 μ in diameter at the head, and 10·5 in diameter at the centre.

The specimen was dredged West of Balleney Island in 254 fms.

Family Polymastidae, Vosmaer.

Polymastia invaginata.

(Plate XII., fig. 1B, and Plate XIV., figs. 5–15a.)

Polymastia invaginata Kirkpatrick (**10a.** p. 271).

Sponge hemispherical, free or attached, covered with a thick pile of pointed spicules. With one large ocular papilla usually completely invaginated, so that the summit of the oscule is on a level with, or below the general surface. Under surface with a fleshy basal pad.

Pores in longitudinal meridional groups in the cortex.

Colour in spirit pale yellow above, and often gray and semi-transparent on the under surface in free specimens.

Consistence dense and firm.

Flagellated chambers spherical, 30·5 μ in diameter, diplodal (XIV. 7).

Skeleton. Choanosomal, formed of fibres curving upwards from the base to the periphery, penetrating the cortex and forming the thick surface pile; with stellate clusters of small tyles between the fibres.

Cortical skeleton formed of a dense layer of vertical tyles of various lengths embedded in a tough, fibrous layer from ·5 to 1·25 mm. thick.

Basal skeleton consisting of spicules transversely arranged, and crossing each other in an irregular manner.

Spicules. Large, smooth, slightly curved styles, or occasionally strongyles, 2240 × 40 μ.

Cortical tyles, with small spheroidal head, short neck, fusiform straight shaft, varying in length from 140 to 350 μ, and in thickness from 12 to 19 μ. A few very slender styles scattered in the choanosome, 70 × 6 μ, with head and neck making an angle with the shaft. Some medium-sized cortical tyles in the ocular papilla with long, oval heads. Tyles of the stellate clusters, slender, with the head making an angle with the shaft, 200 × 15 μ.

There are fourteen large specimens and five very small ones of this species. The largest is 8 cm. in diameter and 4·5 cm. high; and the smallest, which is triangular,

is 8 mm. high, 8 mm. in length at the base, and 4 mm. in thickness. In some the pile has been rubbed off, exposing the smooth, fleshy cortex. Some of the specimens are growing on large stones; others are free, but with numerous embedded pebbles in the fleshy basal pad.

In many specimens the oscule is invisible, being entirely retracted within a cavity below the summit, and with the opening of that cavity, contracted to a point and concealed by the surface pile of spicules; a vertical section reveals the oscular papilla in its cavity. One specimen has two oscular papillae. The general structure of the skeleton recalls *Trichostemma*, which likewise has a basal pad, with fibres radiating from base to periphery, and with a cortex of tyles. *T. sarsii* also has the stellate groups of tyles between the fibres of the choanosome. The basal pad is composed of stellate-celled collenchyma, the collencytes with their branched anastomosing processes being embedded in a clear, gelatinous matrix.

Most of the specimens were dredged in the neighbourhood of Winter Quarters in depths of 10–30 fms.; one came from near Mounts Erebus and Terror, 500 fms.

Sphaerotylus, Topsent (**26.** p. 244).

Polymastidae, massive; provided with tylostyles, and with exotyles in the form of spherotyles or spherostyles.

This genus was established by Topsent to contain *Polymastia capitata*, Vosmaer (**32.** p. 16). I have slightly extended the original definition by the addition of the word "spherostyles," because one of the two species of *Sphaerotylus* in the present collection has exotyles in the form of spherostyles, i.e., exotyles with the proximal inner end simply rounded and not enlarged into a knob, a spherostyle being a style with the distal or outer end enlarged. The difference between a spherostyle and a spherotyle is hardly of generic importance, consequently *Sphaerotylus* must include forms with spherostyles.

Hitherto only three Astromonaxonellid sponges with exotyles have been described, viz., *Tylexocladus joubinii* Topsent, *Proteleia sollasii* Ridley and Dendy, and *Sphaerotylus capitatus* (Vosmaer). The 'Discovery' collection contains two species of *Sphaerotylus*, a new one *S. antarcticus*, and one which appears to me to differ in no important respect from the Arctic species *S. capitatus* (Vosmaer).

Sphaerotylus antarcticus.

(Plate XII., figs. 1A–16 and Plate XIII., figs. 1–7.)

Sphaerotylus antarcticus Kirkpatrick (**10a.** p. 272).

Sponge, dome-shaped or spheroidal, attached or free. Surface beset with a covering of long spherostyles, and with a dense short pile of cortical microtyles. With several usually elongated papillæ with or without a large terminal orifice. Dermal pores distributed over the cortex, each pore opening into a single tubular

canal in the cortex; the mouth or pore of the pore canal guarded by a ring of radiating cortical tyles (XIII. 3). Flagellated chambers diplodal (XIII. 7).

Skeleton formed mainly of radiating fibres composed of styles, with diverging brushes of spherostyles near the surface. Cortex with a surface layer of densely packed tufts of small vertical tyles, and a sub-cortical layer of tangential styles and tyles.

Spicules. Spherostyles (XII. 8–12) 8 mm. in length by 30 μ in diameter in the middle, and 14 μ in the region below the distal knob; distal knob 28 μ in diameter, hemispherical, with granular surface and with a few square teeth or serrations on the edge.

Styles straight, fusiform, blunt-pointed, 2·8 mm. in length, 41 μ in diameter in the middle, 23 μ in diameter at the rounded end.

Cortical tyles (XII. 15, 15a), curved, 146 μ long, head, 3·25 μ in diameter; slender neck, 2·75 μ thick with broad oar-blade-like shaft, circular in section, 7 μ thick.

Styles of lower cortical tangential layer (XII. 7), also in choanosome, 900 × 20 μ. Tyles of the same layer, nearly straight, 270 μ long; with head 7 μ in diameter, and relatively thick neck 6·8 μ in diameter (XII. 16–16A).

Slender curved tyles, 460 × 10 μ, scattered in choanosome (XII. 13).

Young specimens are oval with one long closed papilla; the bundles of divergent exotyles are more or less separate and distinct, and the distal knobs retained and not broken off; the radial bundles of fibres radiate out from a point below the centre of the specimen.

There are five large specimens, of which three encrust rocks and two are free, and six very small ones, all of which are free. One of the large free ones (XII. 5) is a globular fluffy ball 6 cm. in diameter, with a few stumpy, much contracted papillæ; another free specimen is dome-shaped, with a flat, fleshy base like a thin pad. The typical shape is that of a dome, with the skeletal fibres radiating upwards and outwards from the base to the surface. The spheroidal form results from the growing round of the edges till they meet; accordingly a section shows a central core with cortical microtyles still present, but displaced, and with main fibres radiating out all round the core.

The largest encrusting specimen (XII. 1), which is growing on a boulder of black volcanic rock, is 10 cm. in diameter and about 3 cm. in height, the papillæ, about twenty in number, rising to an additional height of 3–4 cm. The papillæ are coated with the thick pile of microtyles, but there are no exotyles. A few of the papillæ have large terminal orifices with apparently cicatrised edges, as if the breach had arisen from a bursting away of the summit from pressure from within the papilla; these papillæ, at any rate, are oscular; but so also, probably, are some of the closed papillæ, which have irregular cribriform patches around the summit or along one side of the papilla. The same difficulty of deciding on the function of these organs occurs also in the case of species of *Polymastia*.

The radial bundles of styles proceed from base to periphery, and usually do not penetrate the surface; the exotyles form pyramidal tufts which originate just below the cortex, this arrangement being well seen in young specimens.

Specimens were obtained from Winter Quarters, Flagon Point, 10–20 fms.; from No. 12 hole, 25–30 fms.; and from McMurdo Bay up to 20 fms.

Sphaerotylus capitatus.

(Plate XII., fig. 1c, Plate XIII., figs. 8–13, and Plate XIV., figs. 1–4.)

1882. *Radiella schoenus* Sollas (**20.** p. 163), Nomen nudum.
1885. *Polymastia capitata* Vosmaer (**32.** p. 16).
1898. *Sphaerotylus capitatus* Topsent (**26.** p. 244).

The single specimen (XII. 1c) is attached to a block of volcanic rock on which specimens of *S. antarcticus* and *Polymastia invaginata* are growing. The sponge is in the form of a flattened dome 1·5 cm. in diameter and 5 mm. in height, with a small papilla 5 mm. in length, rising from near the centre of the upper surface. From one side of the specimen slender bud-bearing stalks arise to a height of 2–4 mm.; sometimes the buds are in linear series (XIV. 2), sometimes zigzag (XIV. 4).

The axes of the stalks are the prolongations of radial fibres, and consist of tyles. The buds, which vary from ·5 mm. to 1·25 mm. in diameter, bristle with the sharp points of small and medium-sized tyles.

The largest bud (XIV. 3) has exotyles, and shows all the stages of their development. Firstly, there is a thickening of the distal end of an ordinary sharp-pointed tylostyle, which becomes cylindrical; then the end becomes roughened, and finally clavate.

Merejkowsky (**14.** p. 4, Pl. I., figs. 8, 12, and Pl. III., figs. 1–3) figures buds forming on stalks at the summits of the papillæ of *Polymastia mammillaris* (*Rinalda arctica*) from the White Sea. The stalks and buds strikingly resemble those of *Sphaerotylus capitatus*, excepting that the latter grow direct from the general surface of the body and not from the summits of the papillæ.

Merejkowsky gives an interesting account of the development of these buds, which drop off from their stalks, and become flattened and disk-like as they rest on the bottom. The surface becomes covered with *débris* which the spines help to retain. He supposed that the decaying organic *débris* served as nutriment, which was directly absorbed by the surface of the young sponge.

The flagellated chambers are diplodal. The colour of the specimen in spirit is pale yellow. The body presents a surface uniform to the naked eye, but under a strong lens the summits of the club-shaped exotyles are visible. These spicules arise in bundles of the shape of inverted cones, the apices of which are a short distance below the cortex.

The cortical skeleton is formed of slender tyles. There is no sub-cortical layer of tangential spicules.

The choanosomal skeleton is formed of fibres radiating upwards from the base to the periphery, and spreading out in the upper third of their course; they do not penetrate the cortex.

Spicules. Choanosomal tyles of the radiating fibres, 1120 × 20 μ, straight, fusiform, attenuating gradually to a sharp point; head long, oval, 20 μ long, 17 μ broad.

Tyles scattered between the radial fibres, varying in length from 370 to 600 μ, slightly curved.

Exotyles in form of spherotyles, 760 μ long and 40 μ in diameter at the broad distal end, which is clavate, and with a granulated surface; the heads at the proximal end (in the interior of the sponge) are 15 μ in diameter.

The cortical tyles (XIII. 11), 218 × 12·5 μ, are slender, tapering, curved, and with small oval heads and a thin neck; there is a shorter, straighter variety of cortical tyle (XIII. 12, 12a) with a relatively thicker neck, and abruptly pointed.

Although there is some uncertainty as to the actual size of the spicules in the specimen described by Vosmaer, yet the relative proportions and characters of these spicules are very similar in the Arctic and Antarctic specimens. The Arctic specimen was globular and 2 cm. in diameter.

Topsent mentions *Radiella schœnus* Sollas, as a synonym of Vosmaer's species. Sollas gives the only names without generic or specific definition.

The specimen was obtained from Winter Quarters, off Flagon Point, 10–20 fms. It has also been found at Lat. 72° 14′ 8″ N., Long. 22° 30′ 9″ E., 165 fms., Vosmaer, Willem Barents Expedition.

Family Suberitidae, Schmidt.

Suberites microstomus *var.* stellatus.

(Plate XV., figs. 8–13.)

Suberites microstomus Ridley and Dendy (**15.** p. 199).

There are four small specimens in the form of smooth, pale-coloured, whitish rounded masses, smooth to the eye but slightly rough to the touch, encrusting the stems of branching Polyzoa; the largest is about 4·5 cm. long and 2·5 cm. broad, and forms a nodulated mass on the branch of the Polyzoon.

There are two or three minute conical pointed oscular papillæ about 1 mm. high. The pores occur in stellate areas among the cortical tyles which occupy the rest of the surface. The skeleton is composed of radiating fibres and of a dense cortical layer of vertical or oblique tyles.

Spicules. Megascleres. Large straight fusiform tyles with an oval head, gradually attenuating to a sharp point, 1130 × 24 μ. The head (XV. 9a) is usually sub-tylote or even stylote, and has a sub-terminal oval swelling 13 μ in diameter. The cortical tyles vary considerably, the figures showing three kinds. The largest 500 × 30 μ

(XV. 10) with a small spherical head 20 μ in diameter, with a slender neck, and a thick fusiform shaft, blade-like in optical section, and with tornote end; a few of these spicules are scattered in the choanosome between the radiating fibres. A second kind (XV. 12) 220 × 20 μ is straight, with a short, thick neck and cylindrical shaft with blunt point. A third kind (XV. 11) 220 × 7 μ is slender, slightly curved, and sharp-pointed.

The new variety differs from the typical form in having stouter cortical and choanosomal spicules. This is at once obvious on looking at the vertical sections of the two forms, the cortical spicules especially being much thicker and denser in the new variety. Again, the poral areas on the surface of the type are small and circular (XV. 14), whereas those of the new variety are stellate (XV. 13).

The specimens were dredged near Winter Quarters, at No. 10 hole, 130 fms.

The typical form was obtained from between Kerguelen and Heard Island from 150 fms. (Voy. 'Challenger').

Suberites caminatus *var.* papillatus.

(Plate XV., fig. 16, and Plate XVI., figs. 11–14.)

Suberites caminatus Ridley and Dendy (**15.** p. 198).

There are two specimens, each firmly attached to a piece of rock; one has two oscular chimneys, the other only one. The body of the larger specimen is 2·5 cm. in diameter and 1·5 cm. in height, the oscules being 7 mm. in height.

The upper half or more of the surface is covered with small flattened papillæ, each about 1 to 1·25 mm. in diameter, and about ·7 mm. high. These structures carry the pores in stellate grooves (XV. 16). At the base of the sponge is a chitinous lamella with tangential tyles scattered irregularly and intercrossing. At the base of the larger specimen the basal lamella is produced into a fringe of little processes formed of flattened bundles of tyles, the distal ends of which have become rounded. The skeleton is formed of radiating choanosomal fibres and of a dense cortical layer of dressed tyles.

Spicules. Straight fusiform tyles (XVI. 14), 1530 × 20 μ, with small oval head 15 × 10 μ. Cortical tyles mostly of two kinds; one (XVI. 12) with small spherical head, with relatively slender neck and thick cylindrical shaft, blade-like in optical section, with tornote pointed end; the other (XVI. 13) shorter and stouter and with thicker neck. A fourth kind of spicule, rather rare (not figured), is a sub-tylote, 1,530 × 20 μ long, with a very slender curved distal end projecting beyond the surface, resembling the distal end of the heteroxea of *Stylocordyla*.

The chief variation from the type lies in the poral papillæ. In the typical form the pores are in stellate grooves. The papillæ of the new variety called to mind the same structures in *Trichostemma irregularis* R. & D. On examination, the papillæ in this species also proved to be poral, with the pores in radiating grooves.

The two specimens were dredged from a depth of 254 fms., due west of Balleney

Island. The typical form came from off the Rio de la Plata, 600 fms. (Voy. 'Challenger'). Topsent records it from near Fayal, 130 mètres, and 55 miles N.N.W. of Fayal, 1900 mètres.

Pseudosuberites hyalinus.

(Plate XXVI., figs. 7a–b.)

1887. *Hymeniacidon? hyalina* Ridley and Dendy (**15.** p. 168).
1898. *Pseudosuberites hyalinus* Topsent (**27.** p. 103).
1900. *Pseudosuberites hyalinus* Topsent (**28.** p. 170).

The single specimen is of a compressed cylindrical shape, 6 cm. long and 8 mm. in diameter. The colour is white. There does not appear to be any area of attachment, both ends being complete and rounded. Two thin walled oscules, each about 2 mm. in diameter occur along one edge of the specimen, the exhalant canals proceeding towards them being clearly visible. On one side of one of the oscules is a wall of spicules formed by a continuation and flattening out of some of the lateral or secondary skeletal bundles.

A longitudinal section shows clearly a central loose core of longitudinal fibres each about 100 μ thick, anastomosing slightly and giving off at right angles bundles of spicules which support the dermal membrane; in the thinner parts of the specimen these bundles are one spicule in length, but at the thickest part they may be two or three spicules in length and traversed by longitudinal bundles. The original specimens obtained from Kerguelen by the 'Challenger' are "massive and amorphous," and the skeleton is more of the "halichondrioid type," but here also the longitudinal bundles and those supporting the dermal membrane can be distinctly made out. In the Antarctic specimen the cylindrical shape has brought about the more regular arrangement. The Mediterranean sponge, identified by Topsent (**27.** p. 103) as *P. hyalinus*, is massive, amorphous, and encloses foreign bodies. The surface is mammillated and a little hispid, this condition resulting from the prolongation of the lateral bundles or fibres of the skeleton. The tyles of the Antarctic form are about 1000 × 19 μ, those of the Kerguelen form 1100 × 25 μ, and those of the Mediterranean form from 300 × 10 μ to 1200 × 26 μ.

An interesting feature is that all the spicules point in a direction upwards or upwards and outwards.

Two other species of *Pseudosuberites* are *P. sulphureus* (Bowerbank), from the seas of N.W. Europe, and *P. andrewsi*, Kirkp. (**9.** p. 135), from Christmas Island; this last species forms a cake-like crust, and its spicules are much smaller than those of *P. hyalinus*, being only 350 × 6 μ.

The specimen was dredged from W.Q. No. 10 hole, 130 fms.

The species has been found off S.W. Patagonia, Voy. 'Challenger,' St. 311, 175 fms., and off the Mediterranean coast of France in 500 to 600 mètres, Topsent.

Tribe Aciculida, Topsent.

Family Stylocordylidæ, Topsent.

Stylocordyla borealis *var.* acuata.

(Plate XVI., figs. 6–10.)

1868. *Hyalonema boreale* Lovén (Öfvers. Vetensk Akad. Förhand., Årg. xxv, No. 2, p. 105, pl. ii.).
1873. *Stylocordyla borealis* Wyville Thomson ('The Depths of the Sea,' p. 113, fig. 13).

The small specimen representing this variety has a slender stalk 6·2 cm. long with an oval head 7 × 5 mm. A second broken stem arises from the common base which has a few grains of gravel and a fragment of the horny tube of a Hydroid attached to it.

The following spicular elements occur :—

1. Large oxeas with a central swelling (XVI. 10), in the axis of the stem, 1450 × 60 μ.

2. Smaller oxeas without central swelling (XVI. 8), in the radiating fibres of the head, 900 × 20 μ.

3. Heteroxeas (XVI. 9) 1000 × 10 μ in the radiating fibres of the head.

4. Microstyles (XVI. 7, 7a) 110 × 4 μ vertically dressed at the surface of the stem, and not found in the head. In the typical form there are microxeas, which may be centrotylote. The variety is named "*acuata*" from the presence of the microstyles.

Topsent (**25.** p. 286) considered that *Stylocordyla stipitata* Carter, differs from *S. borealis* in not having microxeas, which the latter possesses ; and he based his opinion on the absence of these spicules from certain preparations of *S. stipitata* lent to him by Canon Norman ; but I have found the microxeas in abundance in Carter's type specimen. Accordingly there is probably only one known species of *Stylocordyla*, viz., the typical *S. borealis*, and two varieties, var. *globosa* R. & D., and var. *acuata* nov.

The figures of Lovén and Sars do not show any indication of the microxeas being centro-tylote, but this condition is found in specimens from the Bay of Biscay.

The Antarctic variety has no dermal tangential microscleres in the head, but microxeas occur in this position in the typical forms from the North Atlantic.

The 'Discovery' dredged the specimen from off Erebus and Terror in 500 fms. The species has been obtained from the following localities :—

North Sea (Lovén) ; between Scotland and Faroe (Carter, Schulze) ; Grenada (Schmidt) ; South of Nova Scotia, 85 fms. (Voy. 'Challenger') ; Bay of Biscay, 1710 mètres (Topsent) ; Bahia 7–20 fms. (Voy. 'Challenger') ; var. *globosa*—Southern Ocean 145 fms. (Voy. 'Challenger') ; off Kerguelen 10–100 fms., Voy. 'Challenger.'

Sub-Order Halichondrina, Vosmaer.

Family Axinellidæ, Ridley and Dendy.

Axinella supratumescens.

(Plate XXII., fig. 8, and Plate XXVI., figs. 6a–b.)

1907. *Axinella supratumescens* Topsent (**31.** p. 6).

The specimen, which is a small conico-cylindrical fragment 3·5 cm. long and 9 mm. in diameter, is the broken-off end of a branch. The surface is finely hispid, and the broken end shows the dense but flexible central axis.

The straight or slightly curved styles are mainly of two sizes, the larger (XXVI. 6a) being 594 × 12·5 μ, and the smaller (XXVI. 6b), which forms the surface tufts, 306 × 6·25 μ.

The specimen was dredged near Winter Quarters in 10 fms.

The 'Français' Antarctic Expedition obtained numerous specimens from Booth-Wandel Island and Wiencke Island, from low water up to 30 mètres (Topsent, **31.** p. 74).

Sigmaxinyssa Kirkpatrick.

1907. *Sigmaxinyssa* Kirkpatrick (**10a.** p. 272).

Cup-shaped Axinellidæ with longitudinal skeletal fibres joined by transverse ones on the inner aspect, and with tufts given off at right angles to these on the outer aspect. Megascleres, oxeas; microscleres, sigmata and toxa.

Sigmaxinyssa phakellioides.

(Plate XVII., fig. 6, and Plate XXIV., figs. 4a–c.)

1907. *Sigmaxinyssa phakellioides* Kirkpatrick (**10a.** p. 272).

Sponge sessile, cornucopia- or cup-shaped. Inner surface smooth, outer surface coarsely pilose. Consistence rather hard, but flexible. Colour in spirit, grayish drab. Inner surface with numerous small oscules, each about 1 mm. in diameter; outer surface pilose, with dermal membrane perforated by round pores 95 μ in diameter.

Skeleton. On inner surface formed of close set longitudinal lines joined by cross bars, and giving off tufts of fibres, which proceed outwards at right angles to the outer surface, pushing up the dermal membrane, but barely projecting beyond it.

Spicules. Oxeas, 835·5 × 42·25 μ, curved at centre, sharp-pointed. Sigmata, 81·25 μ long, 35·75 μ broad, and 3·25 μ thick, often with an angular bend at centre of shaft. Toxa, 130 μ long, and 3·25 μ thick at centre, with smooth surface.

This species bears in its outward aspect a very close resemblance to cup-shaped species of *Phakellia*; also the skeletal arrangement is like that of *Phakellia*; the oxeas, sigmata and toxa are those of a typical *Gellius*. The Axinellid genus *Sigmaxinella* Dendy, which has microscleres in the form of sigmata, has styles for megascleres.

The only specimen was dredged off Coulman Island in 100 fms.

Family Desmacidonidæ, Ridley and Dendy.

I. Sub-Family Ectyoninæ, Ridley and Dendy.

Hymedesmia areolata.

(Plate XXII., fig. 3–3c.)

1905. *Hymedesmia areolata* Thiele (**23.** p. 452).

There are two specimens, one a fine large one, the other a small nodule; both have a broken surface, and on the label is the legend "Broken off a stone."

The larger specimen is an oval mass 12·5 cm. long, 6·5 cm. high, and 5·5 cm. thick.

The species is easily recognised from the areolated appearance of the surface. There are numerous oval or circular poral pits, 1·5 mm. across, with over-hanging edges; the concave floor is perforated with pores.

The densely packed ectosomal oxeas are arranged radially round the pore pits.

The oscules are small inconspicuous cones contracted to a point.

The flagellated chambers are aphodal, 36 × 23 μ in diameter.

Thiele's specimens were in the form of incrustations on chitinous tubes.

The 'Discovery' specimens were dredged near Winter Quarters in $12\frac{3}{4}$ fms.

The species has also been recorded from Calbuco, Chile, 40 mètres (Thiele).

Hymedesmia exigua.

(Plate XXII., fig. 4, and Plate XXVI., figs. 2a–f.)

1907. *Hymedesmia exigua* Kirkpatrick (**10a.** p. 273).

Description. The sponge forms a thin translucent grayish-white crust, about 5 mm. in diameter, on a stone. The surface is smooth, and the substance of a fleshy consistence.

The **skeleton.** The choanosome contains scattered short acanthostyles, and the dermal membrane tangential tylotes isolated or in bundles of a few.

Spicules. Megascleres. Acanthostyles, 94 × 19 μ, short, thick, with spines pointing backwards slightly. Ectosomal tyles, 157 × 3·5 μ, straight, smooth, with oval heads, 5 μ long, and 4·5 μ broad.

Microscleres. Pluridentate isancorae spatuliferae; with five foliate teeth, 5 μ in length, at each end, sometimes with three or four; shaft deeply curved, 2·5 μ thick, sometimes with central alate expansions.

Sigmata 9·6 μ long, 5·6 broad, ·5 μ thick, scattered separately in the choanosome.

The new species resembles in several respects *H. zetlandica* Bowerbank, but the ancorae of the latter have only three teeth, the sigmata are much longer (51 μ) and in sheaves; also the ectosomal tyles are much larger, viz., 328 × 3·25 μ, and the spines of the acanthostyles more verticillate. *Hymedesmia irritans* Thiele, from

Juan Fernandez, has nearly the same spicular elements, but of different dimensions, and has the labis among its microscleres.

The specimen was dredged from 254 fms. due west of Balleney Island.

Hymerrhaphia rufa.*

(Plate XXII., fig. 5, and Plate XXVI., fig. 3a–e.)

Hymerrhaphia rufa Kirkpatrick (**10a.** p. 274).

Description. The sponge forms a thin mud-coloured brown crust on a branched Polyzoon. The surface is smooth, and no pores or oscules are visible. The consistence is rather tough. The **skeleton** of the choanosome is formed of longer and shorter acanthostyles dressed vertically, that of the ectosome being formed of tangentially arranged anisotornotes, either isolated or in bundles.

Spicules. Megascleres. Larger acanthostyles, 312 × 25 μ, swollen at the head, spined all over, with larger curved spines at the head. Smaller acanthostyles, 131 × 18·75 μ. Anisotornotes of ectosome, 344 × 12 μ, straight, fusiform, attenuating gradually at one end but abruptly at the other. Microscleres.—Isancorae, 28·5 μ long, with three or four teeth at each end; rarely, the teeth are not developed, the ends being in the form of hemispherical cups (XXVI. 3e).

Dredged near Winter Quarters, No. 10 hole, 130 fms.

Ophlitaspongia nidificata.

(Plate XXII., figs. 6, 6a, and Plate XXVI., fig. 5a–d.)

Ophlitaspongia nidificata Kirkpatrick (**10a.** p. 274).

Sponge massive, of an inverted pyramidal shape, sessile, narrow and contracted at its point of attachment. Surface uniformly coarsely spinous. Circular oscules (·7 mm. in diameter) on the upper surface, at the bases of the spines. Sub-dermal cavities flat and shallow. Flagellated chambers diplodal. Colour in spirit, dirty gray, the tips of the spines being yellowish. Consistence hard and tough.

Skeleton consisting of dense branching axes of styles cemented with spongin and echinated by smooth styles passing at right angles from the axis to the surface. Ectosomal spicules in form of slender straight styles. (Considerable tracts of dermal membrane were devoid of these spicules.)

Spicules. Megascleres, large, straight, smooth styles, on an average about 1000 × 50 μ. Also smooth curved kind 625 μ long. Ectosomal styles, straight, smooth, tapering gradually to a point, 406 × 9 μ. Microscleres, toxa smooth, 638 μ long, 6·25 μ thick at the centre. These spicules occur in nests or groups of 5–10.

The specimen is attached to a stone by a narrow base about 2 cm. in diameter. The height is 6·5 cm., and the greatest breadth on the upper surface 7·5 cm. The upper surface is triangular, each angle being slightly produced and provided with an oscule, there being also an oscule in the centre.

The spines, which are simply the ends of skeletal fibres, are about 1 cm. in height.

* Inadvertently the specific name has been badly chosen, the colour—in alcohol—being that of pale brown mud.

At the base of the spines is the thin dermal membrane, generally torn away, thus exposing the circular openings of inhalant channels.

The new species comes well within the genus *Ophlitaspongia* Bk., as amended by Dendy (**5.** p. 36). *O. seriata* Bk., *O. subhispida* Carter, and *O. membranacea* Thiele, all have toxa, but the first and third species are encrusting, and the second has long slender branches. The chief characters of the new species are the strongly spined surface, and the great development of the spicular core, the spongin not being so abundant as in other species, and not forming distinct fibres.

The single specimen was dredged off Coulman Island in 100 fms.

Lissomyxilla Hanitsch.

This genus was established by Hanitsch (**8.** p. 194), to include Ectyonine Sponges with fibres having a core of smooth styles echinated by acanthostyles and with special ectosomal megascleres; with or without microscleres. Unfortunately the species he selected as type of the genus (*Tethea spinosa*, Bowerbank) in no way fell in with the definition, since, as Topsent points out (**28.** p. 265), this species has neither echinating spicules nor special ectosomal spicules, and Topsent refers Lissomyxilla to the limbo of useless names. Among the 'Discovery' sponges, however, is a specimen which fits in with Hanitsch's definition of *Lissomyxilla*, which runs, "Skeleton fibres of the choanosome, formed of smooth monactinals echinated by spined styles. Megascleres of the ectosome smooth diactinals or monactinals. Microscleres (isochelae, &c.) may be present." Accordingly, I propose to revive the name.

Lissomyxilla hanitschi.

(Plate XXII., fig. 7, and Plate XXVI., fig. 4a–c[1].)

1907. *Lissomyxilla hanitschi* Kirkpatrick (**10a.** p. 275).

Description. There are two much-worn pieces of this sponge of a dark, dirty-gray colour, and a third young small specimen, whitish in colour, growing on a specimen of *Hornera*. The largest specimen is 4 cm. high and 5 cm. in diameter at the base; the dermal membrane is worn away, exposing several openings of exhalant canals, 4 mm. in diameter. The dermal membrane of the smallest specimen is transparent, smooth, and raised up at one place into a small conical oscule, with radial tangential spicules in its walls.

The **skeleton** of the choanosome is formed of branching fibres on an average about 150 μ thick, echinated by spined styles in an obscurely verticillate manner, the whole skeleton, as seen in sections, having a somewhat confused appearance. The ectosomal spicules partly proceed obliquely from the main fibres to the dermal membrane, and partly lie tangentially in that membrane.

Spicules. Megascleres. Smooth styles, 500 × 19 μ, smooth, curved near the head, sharp-pointed.

Echinating acanthostyles, 219 × 18·75 μ (without including spines), larger spines situated on the head 9 μ long.

Ectosomal amphityles, 356 × 11 μ straight, very slightly fusiform, subtylote, and with a small mucro at each end.

Microscleres, none.

Myxilla victoriana Dendy (*Halichondria pustulosa* Carter), (**5.** p. 30), would come under this genus, although, at the same time, it is in possession of isochelae, and the heads of the styli of the main fibres occasionally have a slight indication of spination

Two fragments (No. 123) were dredged off Coulman Island in 100 fms. A third specimen (No. 38) on *Hornera* was obtained from east end of Barrier, 100 fms., bottom mud, stones, and rocks.

II. SUB-FAMILY MYCALINAE, Thiele.

I. GROUP Myxilleae, Lundbeck.

Myxilla decepta.

(Plate XXII., figs. 1–2a, and Plate XXV., fig. 3a–f.)

1907. *Myxilla decepta* Kirkpatrick (**10a.** p. 278.)

Description. There are two very small specimens of this species. One is in the form of an extremely thin incrustation on a piece of rock; the surface is pilose owing to the projection of vertically dressed acanthostyles, each surrounded by tufts of ectosomal spicules. The other, which incrusts the branch of a Polyzoon, is thicker, and the surface here is partly smooth, partly provided with minute sharp-pointed conules supported by acanthostyles. The colour of both specimens is reddish brown.

The **skeleton** in the very thin incrustation, at first sight, resembles that of a *Hymerrhaphia*; each vertical acanthostyle is isolated, and with its head on the base and its pointed end projecting. In the thicker specimen it is possible to make out primary and secondary lines of skeletal fibres.

The ectosomal spicules are partly arranged in paniculate tufts, partly lying tangentially in the dermal membrane.

Spicules. Megascleres. Choanosomal acanthostyles, 468 × 23·5 μ, curved, spined at the head only, with sub-tornote points. Ectosomal strongyles 238 × 4·6 μ, straight, smooth, cylindrical, usually with a pointed mucro at one end.

Microscleres. Arcuate isochelæ, 19·5 μ long, 5·6 μ broad, palmate tooth 8 μ long ovoid, with rounded distal edge; with thick curved shaft; with tongue-shaped alæ about 8 μ long.

Isancoræ unguiferae, 15·3 μ long, with slender, curved, sometimes wavy shaft, with three sharp claw-like teeth at each end.

Chelate bipocilla 8 μ long, with deeply curved shaft with spathulate ends each with three triangular denticles; these spicules are fairly common and not accidental.

There are also several isochelæ arcuatæ in which the alæ and denticle are replaced at one end by a spoon-like lamella.

The presence in *Myxilla* of chelate bipocilla similar in many respects to those found in the new species *Iophon spatulatus* and *I. flabello-digitatus* is exceptional; somewhat similar structures occur, however, in *Myxilla iophonoides* Svartzevsky (Mem. Soc. Nat. Kieff, Tome XX., p. 340, Pl. XV., fig. 27g–l) from the White Sea, but there are no isochelæ arcuatæ. In other respects the spiculation of the new species is that of a typical *Myxilla*. The isochelæ arcuatæ, though only half the length, resemble in shape those of *Myxilla nobilis* R. and D., from off the Rio de la Plata, and *M. digitata* R. and D., from the Cape of Good Hope.

The specimen incrusting the rock was dredged from 254 fathoms, due west of Balleney Island; and the specimen incrusting the Polyzoon from Winter Quarters, No. 6 hole, 125 fathoms.

Lissodendoryx spongiosa.

1887. *Myxilla spongiosa* R. & D. (**15.** p. 134, Pl. XXVII., figs. 3–3f).
1901. *Lissodendoryx spongiosa*, Topsent (**29.** p. 18).

One small specimen and three minute fragments were obtained from three localities in the neighbourhood of Winter Quarters. The complete specimen is cylindrical, 2 cm. long, and ·5 cm. in diameter, and is attached by part of its length to the branch of a Polyzoon. The specimen is well preserved. The colour is white, an opaque white axis showing through the transparent dermal layer.

The spicular elements are similar to those of the Challenger type, and sigmata occur in all, though in varying proportion. Topsent describes a variety of this species from the 'Belgica' collection, viz., *L. spongiosa*, var. *asigmata*, which is wholly without sigmata.

The specimens were dredged near Winter Quarters, (1) from near the ship, 20 fms.; (2) No. 12 hole, 25–30 fms.; (3) McMurdo Bay, 4–10 fms. The species has been found also off Rio de la Plata, 600 fms., Voy. 'Challenger.' The 'Belgica' collected the var. *asigmata* in Lat. 71° 14′ S., Long. 89° 14′ W. in 450 mètres.

Iophon radiatus.

(Plate XXI., figs. 3, 4, 4a–c, and Plate XXV., fig. 4 a–c[1].)

1902. *Iophon radiatus*, Topsent (**29.** p. 21, Pl. III., fig. 13).

Specimens and fragments come from five different localities. They are mostly in the form of small cylinders about 4 mm. in diameter and varying in length up to 5 cm. The longest (XXI. 4) is 5 cm. long and 4 mm. broad, tapering to a point at one end. The colour is dark brown, a dark axial core of choanosome showing through the semi-transparent dermal membrane. One specimen, the largest (XXI., fig. 3), has broadened out into an oblong loose rather flabby mass, torn at each end, 4 cm. in length and 2·5 cm. in breadth, and with a branch given off on each side near one of the ends.

Several oscules about 9 mm. in diameter occur along the margin ; they are slightly raised and with a thin plain rim with special spicular armature. The pores occupy irregular oval areas about 2 mm. in diameter. The spicules resemble those of specimen No. 421 described by Topsent, the dimensions being as follows :—The amphityles 266 × 10 μ ; acanthostyles spined at the head and near the point, 447 × 16 μ ; larger anisocheles 36 μ long, a smaller kind 20 μ long ; bipocilla 9·75 μ long, usually with one end pocillate and the other flattened and with three to five minute denticles.

An interesting feature is the presence of embryos ·25 mm. in diameter with a solid cylindrical core of peculiar spined amphityles 105 × 5 μ reaching from surface to centre, and with anisocheles with a spine at the small end, 15·9 μ long and arranged in rosettes, the latter being distributed around the summit of the spicular plug or cylinder.

Specimens were obtained from (1) Winter Quarters No. 12 hole, 25–30 fms. ; (2) East end of Barrier, 100 fms. ; (3) No. 5, Seal Hole, 178 fms. ; (4) From near the ship, February 28, 1902 ; (5) Off Coulman Island, 100 fms.

The 'Belgica' collected specimens from Lat. 71° 14′ S., Long. 89° 14′ W., 450 mètres, and from Lat. 71° 19′ S., Long. 87° 37′ S., 450 mètres.

Iophon spatulatus.

(Plate XXI., figs. 5, 5a–c, and Plate XXV., fig. 5a–d.)

1907. *Iophon spatulatus* Kirkpatrick (**10a.** p. 276).

Sponge slender, cylindrical, branched. Colour, pale brown in spirit. Oscules oval, about 1 × ·6 mm. in diameter, slightly raised ; surrounded by a radiating zone of tyles. Pores in sieve-like areas 2–3 mm. in length and about 2 mm. in breadth, on a level with the general surface.

Flagellated chambers 26 × 23 μ.

Skeleton. Dermal ; a closely packed layer of dermal amphityles.

Choanosomal, a loose network of 3–6 spicules thick, forming the core of the cylinder ; multispicular fibres, giving off strands at right angles ; the longitudinal fibres are joined obliquely or transversely by fibres one or two spicules thick, which support the dermal membrane.

Spicules. Megascleres, smooth styles, 462 × 25 μ, with a mucro at the basal end. Ectosomal sub-amphityles 225 × 12·5 μ, fusiform with the swelled ends smooth laterally, and with the extremities only slightly convex, in fact almost truncate, and covered with spines.

Microscleres. Palmate anisochelæ 18·7 μ long, 6·2 μ broad (front view).

Bipocilla, rare, 13·6 μ long, 1·15 μ thick, shaft deeply curved, slightly twisted, and with ends almost similar, spatulate, with crenulated edges ; occasionally with five relatively large denticles in place of the finer crenulation. A second kind of bipocilla have a longer, less curved shaft with scoop-like rather than spathulate

ends, each scoop having four or five denticles. One example has three sharp prongs at one end and the spathulate prolongation at the other.

The species is represented by numerous small, for the most part fragmentary, slender cylindrical pieces. Many of the fragments came from the same locality as the specimens of *I. radiatus* and were mixed up with them. Generally it was easy to separate the two by the colour, that of *I. radiatus* usually being of a much darker brown; but in one or two instances the specimens of the new species were also dark coloured. Several of the fragments are branched. The specimen figured (XXI. 5) is 4 cm. long and 5 mm. in diameter. The oscules are provided with a ring of radiating amphityles, whereas *I. radiatus* is devoid of such structure. A glance at the spicules at once enables one to distinguish the two species. The ectosomal amphityles of *I. radiatus* have well-marked knobs spined all over, and not merely at the ends. The choanosomal spicules of *I. spatulatus* are apparently modified acanthostyles, smooth along the shaft, but with the spines at the rounded end gathered into one large spine situated on the summit, thus giving it a tornote aspect. In one instance, the single spine is represented by a little tuft of the spines. The axial canal terminates some distance below the base of the spine.

Several spherical embryos 268 μ in diameter were present in one fragment, but there were no special spicules in them.

Since writing the above description, accounts of two new species of *Iophon* from the Antarctic have been published by Topsent (**31.** pp. 4–6), viz. *I. unicornis* and *I. pluricornis*. The two new species described in the present Report and Topsent's two species all possess the curious modified acanthostyles. *I. unicornis* Topsent, has no bipocilla, and *I. pluricornis* has bipocilla apparently with pocillate ends; the 'Discovery' species have spathulate bipocilla with crenulated ends; and further, there are differences, viz., in the shape of the body, the arrangement of the skeleton, and the character of the ectosomal spicules, which lead me to regard the 'Discovery' specimens as belonging to distinct species. A differential diagnosis of the four Antarctic species with modified acanthostyles is given at the end of the description of the next species.

Fragments were dredged at No. 11 hole, 28 fms.; at No. 12 hole, 25–30 fms., and off Coulman Island, 100 fms.

Iophon flabello-digitatus.

(Plate XXI., figs. 6, 6A–C, Plate XXV., fig. 6a–f, and Plate XXVI., fig. 1a–c[1].)

1907. *Iophon flabello-digitatus* Kirkpatrick (**10a.** p. 277).

Sponge forming a large palmato-digitate or digitate growth in one plane; branches compressed, usually with oscules along one edge. Surface finely verruculate; with elongated pore areas supported by fan-like wisps of ectosomal spicules.

Colour dark brown; consistence soft, the sponge being readily broken.

Skeleton typically formed of a network of spiculo-fibre, the primary lines of which proceed upwards and outwards from the inner surface of oscular tubes to the outer surface of the sponge, where their ends form the verrucae; the secondary fibres join the primary at right angles forming rectangular meshes about 1·25 mm. square. The thickness of the primary fibres is about ·7 mm., that of the secondary about ·5 mm.

The ectosomal skeleton consists of fan-like bundles and wisps of spicules, isolated or proceeding upwards and spreading out from the terminal main fibres.

Spicules. Megascleres. Smooth styles, 590 × 25 μ, curved, with a mucro at the head end.

Ectosomal spicules, 344 × 12·5 μ, sub-amphitylote, fusiform, with a marginal ring of vertical spines at both ends and a terminal central spike at one extremity.

Microscleres. Palmate anisochelae of two sizes, a large kind 35 μ long and 10·7 μ broad, with thick shaft; with triangular palmate tooth, 17·5 μ long, at the large end, not quite as long nor as broad as the alae; lower margin of alae convex. Lower central tooth with a curved upper edge produced into a spine.

A small kind 17·5 μ long, 6·2 μ broad; upper palmate tooth triangular, rounded above, as broad and as long as the alae; lower border of alae concave; lower tooth with simple rounded upper edge.

Bipocilla varying in length from 5·5 to 11 μ, according to the convexity of the shaft which is usually deeply curved; both ends spathulate, nearly similar, and with crenulate edges, or with 5–7 teeth.

The fine specimen (No. 184) which constitutes the type of the new species, is 24 cm. wide and 25·6 cm. high. Unfortunately, owing to the very soft nature of the tissues, the sponge has been broken into many fragments. A short stem expands into a palmate portion, from the edge of which arise several compressed digitate branches, usually with round sphinctrate oscules along one edge; the oscules lead into a pseudogastral cavity extending nearly to the opposite edge of the branch. The bipocilla of the new species somewhat resemble those of *I. spatulatus*, but the difference in the body form, skeletal arrangement and spiculation are too many to necessitate detailed enumeration.

A second specimen (No. 202) has two compressed branches rising from a flattened contracted base, the under surface of which is coated with pebbles. The oscules face each other along the edges of the entering angle. The branches are each about 10 cm. in length, the greatest breadth being 4·5 cm.

A third specimen (No. 287) of this species, which might, indeed, be regarded as a variety, forms a discoid crust on a small Ophiurid. There are embryos, 340 μ in diameter, present, and some, but not all, of these have a plug of peculiar tylote spicules in them, with a ring of anisocheles round the outer end of the bundle. The tylote spicules of the embryo, 161 × 7·8 μ, have a smooth rounded end surrounded by spines, the other end being cylindrical with marginal spines, and a single central spine.

The anisocheles of the embryos nearly resemble the smaller kind of these spicules found in the choanosome of the type specimen.

The type specimen (No. 184) was dredged near Winter Quarters, No. 11 hole, 28 fms.; specimens 202, 287, and 289 were dredged from No. 10 hole, 130 fms.

Differential Diagnosis of the Four Species of Iophon with Modified Acanthostyles.

	Shape.	Ectosomal Spicules.	Bipocilla.
Iophon unicornis . .	Massive, of irregular configuration; fistular oscules rising from upper surface.	240 × 10 μ. Heads with a bouquet of spines at extremities.	Absent.
Iophon pluricornis .	Plate-like; oscules apparently level with surface.	280 × 10 μ. Heads elliptical, with spines at extremities, or over the whole surface of head.	Apparently with pocillate end or ends.
Iophon spatulatus . .	Slender cylindrical: with oscules slightly raised.	225 × 12·5 μ. Ends truncate, with spines at extremities only.	Having spathulate ends with crenulated edges.
Iophon flabello-digitatus	Palmato-digitate, with oscules along the edges of branches.	344 × 12·5 μ. Ends truncate, with terminal marginal rim of spines at both ends and terminal central spike at one end.	Having spathulate ends with crenulated edges.

Tedania variolosa.

(Plate XXI., figs. 1, 1a, and Plate XXV., fig. 1a–b.)

1907. *Tedania variolosa* Kirkpatrick (**10a.** p. 279).

Sponge in form of a mass of thick flabellate or digitate fronds arising from a common base; with circular sphinctrate oscules, each about 1 cm. in diameter, situated at the summits, or along the upper edges of the branches, the canals into which they lead extending nearly to the base of the branches. General surface of the sponge covered with circular pore areas each about 4 mm. in diameter, the oval or circular pores being about 90 μ in diameter, and the strands of the poral reticulum about 30 μ in breadth. Colour in spirit, pale brown. Consistence, soft and fleshy, being easily torn.

Flagellated chambers, 42 × 35 μ, oval, aphodal, with aphodus (in a measured example), 13 μ long.

Skeleton. Choanosomal skeleton formed of loosely agglomerated compound, longitudinal or main bundles about 1 mm. in diameter, curving out to the surface as

they pass upwards; the separate fibres of the main bundles about 80 μ thick. The main bundles joined at right-angles by secondary fibres, 1–3 spicules thick. Spongin not perceptible. Ectosomal skeleton formed of circles of strongyles, the spicules isolated or in fan-like wisps, arranged partly vertically, partly tangentially round the pore areas; the vertical spicules usually isolated, and the tangential ones in wisps. On drying the sponge, the edges of the pore areas stand up sharply, the areas themselves sinking in, giving a pock-marked aspect to the surface.

Spicules. Megascleres. Choanosomal styles, 402 × 13 μ, curved at about one-fourth of the length from the round end, smooth, but occasionally with a few spines about the head.

Ectosomal strongyles, 261 × 6·5 μ, smooth, occasionally slightly swollen at each end.

Microscleres. None.

The single specimen is in the form of a squarish mass of thick fleshy flabello-palmate or digitate lobes; the height is 18 cm., and the breadth 13 cm. The flabellate fronds are obviously formed of fused tubular digitations, as can be seen from the oscules along the upper edge and from the faintly indicated longitudinal grooves down the sides. The walls of the oscular canals are smooth and lined with numerous orifices of exhalant canals, about 3 mm. in diameter. The arrangement of the pores in circular areas each surrounded by a zone of ectosomal spicules is not common in *Tedania*; it occurs in the second new species described below, and something of the kind is found in *Tedania tenuicapitata* Ridley (**15a.** p. 124), from the Straits of Magellan. In the present species this feature is so well marked as to give the surface a pock-marked appearance.

The rhaphides, usually so characteristic of *Tedania*, have entirely disappeared; but the loss of microscleres is of such frequent occurrence that it has not seemed necessary to create a new genus or subgenus to include such forms; though, perhaps, the more or less definite arrangement of the ectosomal spicules might, in the present instance, necessitate such a course.

The specimen was dredged near Winter Quarters, 10 fms.

Tedania coulmani.

(Plate XXI., fig. 2. Plate XXV., fig. 2a–b[1].)

1907. *Tedania coulmani* Kirkpatrick (**10a.** p. 280).

Description. The single specimen is in the form of a finger-like fragment 5·5 cm. long and 1·7 cm. in its greatest thickness. The colour is dirty gray, and the consistence soft. The surface shows the same circular pore-sieve areas as in *T. variolosa*. Along one side of the sponge the surface has been torn away, exposing an exhalant canal running along the length of the specimen, but the terminal oscule has apparently been torn away.

Skeleton. Rings of spicules partly vertical, partly tangential, isolated or in tufts, surround the pore areas.

The choanosomal skeleton is formed of primary longitudinal fibres about 120 μ thick, joined by secondary fibres one spicule in length and 2–3 in thickness, joining the former at right angles.

Spicules. Megascleres. The choanosomal acanthostyles, 475 × 18 μ, curved, smooth, or with sparse spines, usually on the upper and lower thirds of the length.

Dermal ectosomal tornotes, 319 × 12·5 μ, smooth, straight, fusiform, larger at one end than the other. Under a high power each end shows a rounded shoulder prolonged into a mucronate spine. Microscleres absent.

The present species resembles *T. variolosa* in having the circular pore areas, and in the absence of rhaphides, but differs widely in the character of the dermal tornotes. Both species differ from all other species of *Tedania* in having no microscleres. The nearest species to the present one are *Tedania tenuicapitata* Ridley, from the Straits of Magellan, and *Trachytedania spinata* Ridley, from the same locality; both of these have rhaphides, and neither have the circular pore areas, though in *T. tenuicapitata* there is a tendency to a radial arrangement of bundles of dermal spicules. The spination of the acanthostyles recalls a similar character in *Trachytedania spinata*.

The specimen was dredged off Coulman Island in 100 fms.

II. GROUP Mycaleae, Lundbeck.

Artemisina apollinis.

(Plate XX., figs. 4, 4a–c.)

1887. *Amphilectus apollinis* Ridley and Dendy (**15.** p. 124).
1894. *Artemisina apollinis* Topsent (**24.** p. 13).
1905. *Artemisina apollinis* Lundbeck (**13.** p. 114).
1907. *Artemisina apollinis* Topsent (**31.** p. 70).

The single example is a massive cake-shaped specimen 8 × 8 cm. in area, and 4·5 cm. in its greatest thickness. The colour is dirty white in alcohol. One of the surfaces is smooth and opaque, and probably the sponge lay free on the bottom on this side. There is a large oval oscule (1·5 × ·5 cm.) on one of the edges, and several much smaller oscules on the upper surface. The sizes, in μ, of the spicules are:— curved styles 600 × 16; straight styles 400 × 6; chelae 13; toxa 300 (or less) × 3. The flagellated chambers, 29 × 23 μ in diameter, are eurypylous. An interesting feature, not occurring in the type specimen from Kerguelen Island, is the presence of small fusiform villous processes (XX. 4a) on the surface, especially round the margins of the oscules; similar villi, but larger, are found in the nearly related sponge named *Esperiopsis edwardii*, var. *americana* R. and D. The finding of this sponge in the Antarctic adds another to the list of bipolar species.

Topsent (**31.** p. 70) records a new species, *Artemisina dianae*, from Booth-Wandel Island, Antarctic, apparently very closely related to *A. apollinis*. The 'Discovery' specimen resembles *A. dianae* in having curved styles of the same length, but they are narrower; and the spined toxa are much smaller in the first species.

The specimen was dredged near Winter Quarters, off Hut Point, 25–30 fms.

The 'Challenger' obtained specimens from Kerguelen Island, 20–60 fms.; and the Danish Ingolf Exp. from East Greenland, depth ?, Lundbeck.

Esperiopsis villosa.

(Plate XX., figs. 3, 3a–c, and Plate XXIV., figs. 9a–b².)

1874. *Esperiopsis villosa* Carter (**1.** p. 213).
1887. *Esperiopsis villosa* Fristedt (**7.** p. 451).
1904. *Esperiopsis villosa* Topsent (**30.** p. 211).
1905. *Esperiopsis villosa* Lundbeck (**13.** p. 9).

The single specimen, which has been broken off from its attachment, is massive below, but divides above into two cylindrical lobes. The colour is pale brown in spirit.

A few small oscules, evidently much contracted, occur at the summits of the lobes. The surface is finely villous, from the presence of the projecting points of fan-like lines of oxeas.

Here and there the flesh has become macerated away, leaving fluffy lines of fine skeleton fibres.

The only difference worthy of mention that I can find between the Northern and Antarctic specimens is the absence of the placochelæ or isochelæ palmatæ with broad shafts. I can only discover two kinds of isochelæ palmatæ. The sigmata occur in many sizes. Some have bifurcated terminations, as figured by Fristedt, and Lundbeck.

Spicules. Megascleres. Styles 671 × 18 μ, fusiform, straight, occasionally with head slightly bent.

The styles in Carter's type from Faroë are almost identical in character.

Microscleres. Larger palmate isochelæ, 43 μ long, 9·75 μ broad, length of teeth, 16 μ.

Smaller palmate isochelæ, 18 μ long, 4 μ broad. Sigmata, numerous, varying from small up to very large sizes.

The distribution of this species is very interesting, occurring as it does in Arctic and sub-Arctic waters; then, as an intermediate link between Arctic and Antarctic, in deep water off the Azores.

The specimen was dredged near Winter Quarters, in McMurdo Bay, 20 fms.

This species has been found (1) Between Scotland and Faroë, 440 fms., Carter; E. Coast of Greenland, 254 m. (140 fms.), Fristedt; off Iceland, Denmark Strait and Davis Strait, 44–553 fms., Lundbeck; Azores 2,252 m. (1,196 fms.), Topsent.

Mycale magellanica.

(Plate XX., fig. 2.)

1881. *Esperia magellanica* Ridley (**15a.** p. 117).
1887. *Esperella magellanica* Ridley and Dendy (**15.** p. 67).
1905. *Mycale magellanica* Thiele (**23.** p. 442).

The 'Discovery' collection contains one large piece, much damaged. The figure (XX. 2) shows the smooth surface in contrast to the hispid surface of the new species *M. acerata* described below.

The specimen was dredged near Winter Quarters, from No. 10 hole, 130 fms.

The species is also recorded from Sandy Point, 7–10 fms.; from Otter Island, Patagonia; and from east of Cape Virgins.

Mycale acerata.

(Plate XX., figs. 1, 1a–b, and Plate XXIV., figs. 10a–e[1].)

1907. *Myxilla acerata* Kirkpatrick (**10a.** p. 280).

Sponge large, massive, with numerous small rounded mammillae; surface finely reticulate and finely hispid. Colour, creamy-white in spirit. Consistence, soft, the tissues being easily torn. The flesh reddish (but soon decolorised), and showing the glistening white strands of the skeleton.

Oscules in form of wide thin-walled cylindrical chimneys with rather jagged upper edges, about 1 cm. in height, and 1–2 cm. in diameter.

Skeleton. Ectosomal:—A network of triangular meshes formed by bundles of oxeas, the strands being from ·35 mm. thick and the meshes about ·5 mm. across. Main skeleton formed of long thick anastomosing fibres which attenuate gradually from 1·5 mm. in thickness and break up a little below the surface into panicles of much finer fibres which support the dermal membrane and penetrate the strands and nodes of the dermal reticulum, giving rise to a finely hispid condition of the surface. Parallel groups of oxeas scattered in the choanosome.

Spicules. Megascleres. Oxeas $850 \times 16 \cdot 25\ \mu$, slightly curved, rather abruptly pointed at one end, and more tapering at the other. These oxeas form the fibres, and also are gathered into bundles, one spicule in length, of parallel oxeas, scattered in the choanosome.

Microscleres. Large anisochelae palmatae, $105 \times 50\ \mu$, separate or in rosettes, usually with an angular bend in the shaft; with a triangular upper tooth $60\ \mu$ long, about the same length as the upper alae, which latter are very wide. With the lower tooth oblong, $12 \cdot 8\ \mu$ high, with a slightly convex edge; in one of the specimens this edge is produced into a long denticle (XXIV. 10 c).

A smaller kind of anisochelae palmatae (fig. 10d, d[1]), $47\ \mu$ long and $17\ \mu$ broad, at the upper end, with a long oval tooth $20\ \mu$ long, extending below the alae.

Trichodragmata, $62 \times 12\ \mu$, the trichites being very fine, sharply-pointed oxeas.

There are three fine specimens of this species, the largest forming a thick

massive flabellate body 17 cm. high, 11 cm. broad, and 7 cm. thick; a second specimen is massive and spheroidal, being about 15 cm. in diameter. The white mammillated surface covers a reddish flesh in which the glistening fibres of the skeleton are visible. The mammillae are on an average about ·75 cm. in height, and 1 cm. in diameter at the base. The new species bears a very close resemblance to *Mycale magellanica* Ridley, which likewise has a mammillated, finely reticulate surface and glistening skeletal fibres, but in the latter the surface is smooth and not hispid (XX. 2), and the megascleres are styles, or sub-tyles, such as are normally found in the genus *Mycale*. The microscleres also are different in the two species.

A second species of *Mycale* with oxeate megascleres is *Mycale intermedia* (O. Sch.), from East Greenland (**16.** p. 433) and Thiele (**22.** p. 381, fig. 12). The specimen consisted only of a fragment; the spicules, which are all considerably smaller than in the Antarctic species, have the following dimensions:—Oxeas, 450 μ long, 10–12 μ thick; large anisocheles, 50–60 μ long; small anisocheles, 18 μ long.

Specimens were dredged from three separate localities near Winter Quarters, viz.: (1) No. 6 hole, 125 fms.; (2) No. 12 hole, 25–30 fms.; No. 5 hole, seal hole, 178 fms.

Mycale, sp.

Several pieces of glistening white skeletal framework were dredged from No. 12 hole. The largest is cylindrical, 7 cm. long and about 3 cm. in diameter. A very small quantity of the body substance still remains in some of the angles of the meshwork.

The spicules are:—Styles, fusiform, straight, abruptly pointed, 562 × 17·5 μ; large palmate anisochelae, separate or in rosettes, 100 μ long and 35 μ broad, with the larger tooth 47 μ long, nearly the same length as the alae, triangular, with straight lower border; with the central tooth at the smaller end squarish, with straight upper edge; small anisochelae, 14 × 48 μ, with oval tooth 28 μ long, extending further than the alae; sigmata 224 μ long, 104 μ broad, and 6·5 μ thick.

This species resembles in many respects a form described by Thiele (**23.** p. 443, fig. 61, a–d) as Mycale sp., from Punta Arenas, Straits of Magellan; but the sigmata are much smaller in the South American form, being only 15 μ, and the small anisochelae are smaller and with a narrower and shorter upper central tooth. No specific name is given, owing to the incompleteness of the specimens.

Dredged near Winter Quarters, No. 12 hole, 25–30 fms.

Desmacidon kerguelenensis *var.* antarctica.

(Plate XIX., figs. 1, 1a, and Plate XXIII., figs. 1a–d¹.)

Desmacidon kerguelenensis Ridley and Dendy (**15.** p. 110).

Sponge ovoid or cylindrical, with hispid or finely conulated surface, the conules surmounted by fine tufts of spicules, conules and tufts rising to a height of 1 to 2 mm. Consistence, soft; colour in spirit, dirty white.

A single round oscule at the summit. Pores round or oval, scattered, 20 μ in diameter. Dermal layer not detachable; sub-dermal spaces 190 μ in depth. Flagellated chambers about 30 μ in diameter.

Skeleton composed of rather thick main fibres about 10 spicules broad viewed *en face*, about 190 μ or more in thickness, with a few loose spicules between the main fibres, scattered, but with a tendency to be parallel to the surface, and forming distinct horizontal bundles just below the surface. Spongin is present, but not easy to detect.

Spicules. Megascleres. Oxeas 676 × 26 μ, slightly curved at centre, terminating gradually in fine points.

Microscleres. Isocheles 19·5 μ long, 6·5 μ broad in lateral view, with slender convex shaft without perceptible alae; with broad saddle-shaped teeth with their distal edges not far from each other, but not touching or overlapping.

Four small specimens of this sponge were obtained. The largest is 4 cm. long and 1·4 cm. in diameter. The surface has a finely hispid aspect in two specimens, but is finely conulated in the third, and smooth and worn down in the fourth. The variety differs from the type (**15.** p. 110) in having much larger megascleres, those of the type being only 350 × 18 μ. The isocheles of the type, again, are longer, viz., 28 μ. After a careful examination of the isocheles of the Kerguelen specimen in a good light and with the spicules slowly rotating in balsam, I found that the median sub-dental continuation of the shaft did not bend backwards from the tooth as in *Desmacidon* (*Homoeodictya*) *palmata*; the appearance of bending back (see **15.** Pl. xxiii., fig. 3*b*) being due to the lateral bend of the palmate tooth; accordingly, even if *Homoeodictya* be a true genus or sub-genus, *D. kerguelenensis* would not belong to it.

Three specimens were dredged near Winter Quarters, from No. 12 Hole, 25–30 fms.; off Hut Point, 100 fms.; and off Coulman Island, 100 fms.

Desmacidon kerguelenensis *var.* cactoides.

(Plate XIX., fig. 2, and Plate XXIII., fig. 2a–b[1].)

Sponge pyriform, laterally compressed; surface prickly, with an Acanthella-like aspect. Consistence rather firm. Colour in spirit, pale yellow.

Skeleton formed of rather stout main fibres proceeding to the surface, where they conspicuously push up the dermal membrane, with scattered spicules in between the main fibres.

Spicules. Megascleres. Slightly curved strongyles, but sometimes with rather blunt pointed ends (*i.e.* oxeas), 768 × 31·25 μ.

Microscleres. Isochelae palmatae 17 μ long and 6·25 μ broad with the wide saddle-shaped palmate teeth almost in contact or even overlapping.

The single specimen is attached to a worm tube by a contracted stalk-like base; the length is 5·5 cm., and the greatest breadth 3·5 cm. It was a matter of doubt whether to regard this form as a distinct species; but it will be obvious from the

figures of the spicules that the differences between the var. *antarctica* and var. *cactoides* are merely those of degree; the teeth of the isochelae, for instance, are more approximated in the latter than in the former; further, the rounding of the ends of the oxeas is not an important distinction; and lastly, the cactus-like surface would result from a branching of the ends of the skeletal fibres just below the surface, so that the dermal layer would stretch over the points of bifurcation.

If the new variety were devoid of cheles it would be placed under *Batzella*, thus justifying Thiele's observation (**23.** p. 438) that the latter genus might be regarded as a *Desmacidon* which had lost its chelae.

One specimen was dredged from Winter Quarters, No. 12 hole, 25–30 fms.

Desmacidon spinigera.

(Plate XIX., figs. 3, 3A, and Plate XXIII., figs. 3a–c[1].)

1907. *Desmacidon spinigera* Kirkpatrick (**10a.** p. 283).

Sponge digitiform, or knob-like; surface coarsely spinous. Consistence rather hard. Colour pale red. Several small oscules about 2 mm. in diameter.

Dermal membrane spread like a delicate net between the spines, and at some distance from the floors of the sub-dermal spaces. Flagellated chambers oval, $46 \times 32\,\mu$.

Skeleton formed of coarse, longitudinal, main strands, about $180\,\mu$ thick, radiating out to the surface, with loose scattered spicules between, united in horizontal bundles only beneath the surface.

Spicules. Megascleres. Oxeas $731 \times 26\,\mu$, curved at centre, mostly sub-tornote, though some attenuate gradually, with sharp pointed ends.

Microscleres, of one kind, viz., isochelae palmatae, $24 \cdot 64\,\mu$ long, and $5 \cdot 28\,\mu$ broad on side view; pointed at each end; with straight axis; with palmate teeth $8 \cdot 8\,\mu$ long, and with narrow alae $8 \cdot 8\,\mu$ long.

Four specimens were obtained. The type specimen (XIX. 3) from 10 hole, 130 fms., is digitate, 7·5 cm. in length and 2 cm. in diameter. The spines are ·2–·5 cm. long, those at the lower end pointing obliquely upwards, but above becoming vertical to the long axis. Another specimen forms a spheroidal knob encrusting the stem of a zoophyte.

A third specimen is in the form of cylindrical fragments.

A fourth specimen, much macerated, is massive and bifurcated, and about 12·5 cm. long; further there is a considerable amount of spongin present, sometimes appearing as distinct fibres, where the spicules have become lost or dissolved away. The spicules are in all respects identical with those of the foregoing forms.

This species bears much resemblance to *Desmacidon setifer*, Topsent, obtained by the 'Belgica' from the Antarctic. The isocheles are of much the same character, but those of *D. setifer* are very much larger, viz., 75–100 μ by 18–20 μ. Further,

the consistence of *D. setifer* is soft, the colour yellowish in spirit, and the surface hispidation much finer.

The four specimens were dredged: (1) No. 48, from 10 hole, 130 fms.; (2) No. 124, near Winter Quarters, 20 fms.; (3) No. 124b, off Coulman Island, 100 fms.; (4) No. 126a, from 12 hole, 25–30 fms.

Desmacidon maeandrina.

(Plate XIX., figs. 4, 4a, and Plate XXIII., figs. 4a–b³.)

1907. *Desmacidon maeandrina* Kirkpatrick (**10a.** p. 282).

Description.—The material consists of three sub-cylindrical fragments tapering at the distal end.

The consistence is hard and dense. The colour in spirit is dirty brownish-gray.

The surface is fairly uniformly level, and presents flattened papillae or meandrine ridges, slightly roughened at the top by projecting oxeas (best seen on side view with a lens).

The dermal membrane roofs over the grooves and spaces between the papillae and ridges. The pores are mostly circular and about 95 μ in diameter.

The small circular oscules, numerous and scattered, are about 1 mm. in diameter. The skeleton is formed of a thick, main axis, consisting of rather loose, longitudinal strands; from this are given off at right angles cylindrical or lamellar bundles of loose strands, which proceed to the surface and form the papillae and ridges.

Spicules. Megascleres. Oxeas, 579 × 39 μ, curved (usually) or bent at the centre, with sharp, pointed ends. Microscleres. Isancorae unguiferae, 26 μ long, and 15·8 μ broad, shaft strongly curved and 3·52 μ thick. With usually five teeth or claws, about 5·28 μ long, at each end, viz., a central, single, and two lateral bifurcated teeth.

The largest of the three pieces of this sponge is 6·2 cm. long and 16 mm. in diameter. The fragments appear to be broken off from some branched specimen, and I shall refer to them as branches. They are sub-cylindrical, being slightly compressed in one plane. The chamber system is aphodal, the flagellated chambers (44 × 29 μ) being pyriform. There is a considerable amount of variation in the teeth of the isancorae, the number varying from three to six, the most usual number being five.

In some respects the new species resembles *Desmacidon* (?) *ramosa* (R. and D.) (**15.** p. 107), obtained by the 'Challenger' from the Cape of Good Hope and Marion Island. In both species there is a central axis of longitudinal fibres, whence fibres proceed to the surface at right angles, but here the resemblance ends. In the 'Challenger' species the radiate bundles branch in a fan-like manner, finally forming an almost uniform surface layer of vertical oxeas. The microscleres in *D.* (?) *ramosa* are isochelae arcuatae. As in the case of *D.* (?) *ramosa*, it is doubtful whether the new species, with its *Raspailia*-like skeleton of axial and radial fibres, should be placed under *Desmacidon* or under a new genus.

The specimens were dredged off Coulman Island, 100 fms.

Joyeuxia belli.*

(Plate XVI., Figs. 1–5a.)

1907. *Joyeuxia belli* Kirkpatrick (**10a.** p. 283).

Sponge attached, ovoid, with a thick firm rind enclosing a soft pulp. With short conical oscular, and long trumpet-shaped poral papillae. Surface finely pilose. Colour of surface yellow, of the rind whitish, and of the pith deep yellow.

Flagellated chambers 23 × 20 μ; diplodal.

Skeleton. Cortical skeleton formed of layers of strongyles crossing each other at right angles. The walls of the oscular and poral papillae supported by a layer of longitudinal strongyles. The surface of the sponge hirsute with a fine pile of strongyles standing out at right angles or obliquely. Choanosome without spicules.

Spicules. Slightly flexuous smooth strongyles 850 μ long, 10 μ in diameter at the ends, and 13 μ in diameter at the centre.

There is one adult specimen 5 cm. long, 3·5 cm. broad and 3 cm. thick, with a deep groove on the under aspect, by which it was probably attached to a worm tube or stem of a Hydroid. There is also a small conical specimen 6 mm. high, attached to a piece of rock.

I was at first disposed to regard this remarkable species as a member of a new genus, partly on account of its very thick rind, which is in places over a millimetre in thickness, and partly because of the highly specialised poral papillae; but apart from these characters, the new form evidently shows the closest affinities to *Joyeuxia*. The three hitherto described species all have a rind enclosing a soft pulp, the latter being without or almost without a skeleton; then too the pulp is highly coloured. *Joyeuxia tubulosa* Topsent and *J. ascidioides* (Fristedt) have fistulae, which, however, appear to be oscular. Two of the species, *J. viridis* and *J. tubulosa* have strongyles; *J. ascidioides* has tyles and also cheles. Accordingly Topsent places the genus near *Desmacidon*.

The poral papillae attain a height of 1 to 1·2 cm.; they are expanded at the end, the margin being sharp, usually a little jagged, and showing the ends of strongyles. The mouth is closed by a sieve-like funnel-shaped membranous pore-area, which is supported on its under surface by strands of tissue passing from the wall of the tube to the poral membrane.

The tube passes through the thick cortex into the choanosome, where it expands before branching into four or five inhalant canals.

Between certain parts of the inner surface of the cortex and the choanosome is what appears to be a space (see XVI. 2); but in other parts the choanosome abuts on to the cortex; probably these peripheral spaces do not result from contraction of the tissues, but form part of the exhalant canal system.

* Named in honour of Emeritus Professor F. J. Bell, of the Zoological Department of the Natural History Museum, and editor of the "Reports on the Natural History Collections" brought home by the 'Discovery' from the Antarctic.

The inconspicuous oscular papillae are only about 4 mm. high, and are tightly contracted.

The tissue of the cortex is crowded with branched collencytes immersed in a gelatinous matrix.

I am indebted to Professor Dendy for pointing out to me certain resemblances between the poral and oscular papillae of *Latrunculia* and the present species; in the case of both genera, too, the tissues are rich in pigment. Possibly we may have here a clue to the true position of *Latrunculia*, the discasters of which appear to be spined oxeas, or styles, the spines of which have become verticillate.

The specimens were dredged near Winter Quarters, Flagon Point, 10–20 fms.

Joyeuxia viridis Topsent was obtained from the Azores, 454–845 mètres; *J. tubulosa* Topsent, also from the Azores, from 200 mètres; and *J. ascidioides* (Fristedt) from Baffin Bay, 169 fms. (7. p. 445).

Cercidochela Kirkpatrick.*

1907. *Cercidochela* Kirkpatrick (**10a.** p. 284).

Mycalinae with peculiar shuttle-shaped chelæ or canonochelae,† with the single central teeth from each end of the shaft joined together, and with a semi-circular vertical lamella extending inwards from the shaft and from the dental bridge, so as nearly to meet.

Cercidochela lankesteri.‡

(Plate XIX., figs. 5, 5A, and Plate XXIII., fig. 5a–l.)

1907. *Cercidochela lankesteri* Kirkpatrick (**10a.** p. 284).

Sponge elongated, slender, fusiform. Colour white; consistence soft. Surface smooth to the naked eye, but finely hispid under a lens. With several small scattered oscules about 1 mm. in diameter, level with the surface. Flagellated chambers aphodal, oval, 31 × 21 μ.

Skeleton formed of long longitudinal lines of spicule fibres about 100 μ thick, not forming a definite central axis, radiating out in plumose manner to the surface; with a few isolated spicules arranged in a scalariform manner at right angles to main fibres. Spongin not perceptible.

Spicules. Megascleres. Oxeas 452 × 19·5 μ, curved at centre, attenuating gradually to sharp points slightly planed away on inner aspect. Microscleres. Canonochelae, somewhat shuttle-shaped,§ 45·5 μ long by 22·75 μ broad, with the two teeth fused to form a bridge, and with a semi-circular lamella passing upwards from

* κερκίς, ίδος, a shuttle.

† κανών, όνος, a shuttle.

‡ Named in honour of Professor Sir E. Ray Lankester, K.C.B., F.R.S.

§ The canonochelae are, in this species, shaped like an oval basin with a truncated bottom, but they look shuttle-like as commonly seen in balsam slides, viz., lying on one side with the lamellae uppermost (see XIX. 5f).

the shaft and downwards from the dental bridge, both lamellae being nearly on the same plane and nearly meeting, the lamellae sometimes with basal tubercles. Developmental forms in shape of thin oval linear bodies, the oval at first not being complete.

The unique specimen representing the new genus and species is 12·5 cm. long and 1 cm. in breadth at the centre. The body attenuates to fine ends, and apparently has not been attached to anything.

The remarkable canonochelae recall to mind the spherancorae of *Melonanchora*, but the latter spicules have three pairs of fused teeth.

The canonochelae are scattered about in the choanosome in considerable numbers. The shape may be compared with an oval basin with the bottom cut out, and with two semi-circular lids or lamellae passing horizontally from the upper edge of the basin, so as to nearly meet; further it is necessary to imagine such a basin turned up on its side.

The earliest developmental forms have an elongated C shape; then the open C becomes a closed oval; by this time the falx at each end is perceptible, and the beginnings of the lamellae appear. A further change leads to a marked asymmetry, the thin oval ring becoming a broad band by widening in a direction away from the edges whence the lamellae arise. If the widening of the band were to continue the growing edges would meet and a sort of lateral dome would result, but growth does not go so far as this.

It is often difficult to make out the real form of a transparent body, with its lines, curves, lamellae, &c., crossing each other in various directions and altering their appearance with the slightest shifting of position. In the present instance the figures will show the remarkable variations in form corresponding to change in position, and it was only after a very prolonged examination that the real shape became apparent, a result finally due to Mr. Highley's ingenuity in devising a medium of suitable consistency in which the spicules could be made to slowly rotate on their long and short axes. Fig. 5 f is the position in which, in spicule preparations, the spicules commonly lie, viz., on the detruncated bottom of the basin and with the lamellar edges uppermost. Fig. 5 h, which resembles the Diatom *Amphora*, shows the aspect when the shaft portion or the dental portion of the band is uppermost and viewed in its breadth; the axial canal which traverses the shaft and part of the dental bridge is best seen in this aspect. When a spicule in this position continues to rotate a little more we see either the lamellae along one side or the free growing edges of the band on the other. Fig. 5 g shows the growing edge of the dental bridge nearly meeting the edge of the shaft. Fig. 5 k shows half of a spicule broken across, with the axial canal (which forms nearly a complete circuit) exposed at each lower corner of the figure. Lastly an end view is seen in fig. 5 l.

The specimen was dredged near Winter Quarters at No. 10 hole, 130 fms.

Hoplakithara Kirkpatrick.*

1907. *Hoplakithara* Kirkpatrick (**10a.** p. 285).

Mycalinae possessing exotyles with large spherical spined heads, and with fimbriated placocheles.

Hoplakithara dendyi.

(Plate XIX., figs. 6, 6a, 6b, and Plate XXIII., fig. 6a–c^2.)

1907. *Hoplakithara dendyi* Kirkpatrick (**10a.** p. 286).

Sponge in form of a small cushion, attached by a narrow base. Surface smooth to the naked eye. Colour, pale brown in spirit. Consistence, hard externally, soft within. Flagellated chambers 32·5 μ in diameter, spheroidal, eurypylous.

Skeleton with protective armour formed by gigantic spheroidal heads of exotyles, the exotyles being arranged as radiating bundles in form of inverted cones, with the apices a little below the cortex; with scattered strongyles.

Spicules. Megascleres. Exotyles† with the heads a little inclined to the long axis of the spicule, the proximal end (in the interior of the sponge) rounded, the distal end swollen into large spherical heads, with short cylindrical spines covering the distal three-fourths of the head. Total length 358 μ, the shaft enlarging in diameter from 6·5 μ at the proximal end to 16 μ just below the head. Head, 55 μ in diameter; cylindrical denticles, 1·76 to 3·52 μ in height, with finely denticulate edge, and with cup-like depression at the summit.

Strongyles straight, fusiform, smooth, 467·5 μ long, 9·75 μ in diameter at centre, 6·5 μ in diameter at ends.

Microscleres. Placocheles, fimbriated, 84·5 μ long, 29·25 μ broad; length of tooth, 37·75 μ.

Sigmata very small, slender, **C**-shaped, 8·8 μ long, 5·28 μ broad, ·9 μ thick.

The minute spheroidal or cushion-shaped specimen was 2·2 mm. in height and 3 mm. in horizontal diameter; it was growing on the side of an Alcyonarian, creeping over a branched *Cellepora*. No pores or oscules were discernible. The under surface, which was narrowed to the point of attachment, was paler in colour than the upper.

The new genus is closely related to the Mycaline genera *Rhaphidotheca* and *Guitarra*, to the former by its exotyles, and to the latter by its fimbriated placocheles.

The distal knobs of the exotyles of *R. marshall-hallii* Kent, 49 μ in diameter, are smooth and spherical, and those of *R. rhopalophora* Schmidt (*R. affinis* Carter, *see* Thiele **22.** p. 383) are 104 μ long and 30 μ broad and club-shaped. Lundbeck (**13.** p. 32) regards these two species as probably identical, and certainly the differences are slight.

In the centre of the heads of the exotyles of *H. dendyi* is an oval granular zone, which at first suggests a cavity filled with protoplasm, but that there is no cavity is

* ὅπλα (pl. of ὅπλον), armour; κιθάρα, a guitar.

† Professor Dendy, to whom I showed these remarkable exotyles with their large spined heads, regarded them as possible examples of spicules which might form a surface layer of pseudasters by reduction of the shafts.

evident from the fact that the axial canal can be seen traversing the granular zone. Some of the exotyles have one or more swellings in the length of the shaft.

The single example was dredged near Winter Quarters, at No. 6 hole, in 130 fms.

Family HAPLOSCLERIDAE Topsent.

Sub-Family GELLIINAE Ridley and Dendy.

Gellius rudis.

(Plate XVII., figs. 1, 1a, and Plate XXIV., fig. 1 a–b.)

1902. *Gellius rudis*, Topsent (**29.** p. 14, Pl. I., fig. 9, and Pl. III., fig. 4).

The type of this species, described by Topsent, was a small globular specimen 27 mm. in diameter. The present collection contains six pieces of this sponge, some of them of large size; accordingly I am enabled to slightly supplement the original description. The largest fragment, 18 × 5 × 2·5 cm. in dimensions, is massively lobate and closely resembles *Petrosia similis* var. *massa* R. and D. (**15.** plate III., fig. 6).* The other specimens are in the form of thick sub-cylindrical unbranched or branched fragments, the largest (Pl. XVII., fig. 1) being 14 cm. in length and 2·5 cm. in diameter. Several of the pieces have oscules about 7 mm. in diameter with circular raised rims.

The surface, where the dermal membrane is intact, is to the naked eye quite smooth; though, where the dermis is rubbed off, the surface appears very finely hispid as Topsent describes, and feels rough to the touch.

A vertical section of a branch in the plane of the axis shows main longitudinal lines of fibres curving outwards from the axis to the surface as they pass upwards, and dividing in a more or less paniculate fashion near the surface; the secondary fibres, one or two spicules thick in the centre of the specimen, become much thicker a little below the dermal membrane.

The oxeas (XXIV. 1a), 403 × 20 μ, are sub-tornote. The C-shaped sigmata have a uniform curve almost in one plane; they are 37 μ long, 19·4 μ broad, and ·8 μ thick,

* In this variety the skeletal arrangement is very similar to that found in *Gellius rudis;* the terminal branchlets of the main fibres are spread out beneath the dermal layer, and anastomose with branchlets from neighbouring main fibres; this sub-dermal reticulum, then, is due solely to the spreading out of the periphery of the paniculate ends of the main fibres (as in *G. rudis*), and is not as one might at first suppose a special dermal skeleton; the central tufts of the main fibres proceed vertically up to the surface; also, not a few scattered oxeas pass obliquely or vertically upwards from the subdermal network of spicule fibres; accordingly the dermal membrane is to a great extent supported on the tips of vertical oxeas. Though Ridley and Dendy clearly saw that the dermal reticulation was only the uppermost layer of the main skeleton (**15.** p. 11), it was not quite correct to state that the dermal membrane was not supported on tufts of spicules; a vertical section shows that it is supported in this manner, viz., by the central tufts of all the main fibres, as well as by oxeas from the subdermal reticulum. The spicules of *P. similis* var. *massa* resemble those of *G. rudis* in shape, but are smaller (viz. 239 × 9·75 μ). Accordingly *P. similis* var. *massa* is closely similar to *G. rudis* in form, in skeletal arrangement, and in spiculation; in fact it very probably represents an example of a *Gellius* which has lost its sigmata. I have gone into this matter in some detail because it is always interesting to trace the probable line of descent of a Renierine sponge from some form with microscleres. Further, an instance of this kind furnishes some support to part of Dendy's recent scheme of classification, viz., that of making the Gelliinae the starting-point of the Halichondrina.

and frequently have a small central knob. (Figures are given for convenient comparison with the nearly related new species, *G. fimbriatus*, described below.)

The pores, abundant over the areas roofing over the spaces between the main fibres, are circular or oval and vary from 30–70 μ in diameter; the subdermal spaces are about a millimetre in depth; there are also smaller and shallower subdermal spaces between the more central terminal branches of the main fibres. The flagellated chambers, which are unusually small, viz., about 23 μ in diameter, are spheroidal and eurypylous; as seen in section they line labyrinthine folds and spaces.

The cellules sphéruleuses attain the large size of 35 μ in diameter, the sphérules also being of considerable size, viz., 8 μ.

Sections of the branches show nests containing 30–50 embryos, forming conspicuous red patches in the sections in balsam; each embryo is about 235 μ in diameter, and of yellowish colour, though red in masses. Some contain rhaphide-like oxeas. On the surface of the figured specimen are several little hemispherical pits from 2–5 mm. in diameter; these are probably the exposed surfaces of the embryo-containing cavities, and not due to parasites.

The specimens were dredged in McMurdo Bay, in depths up to 20 fms. The 'Belgica' obtained a specimen from Lat. 70° 23′, Long. 82° 47′ W., from 500 mètres.

Gellius fimbriatus.

(Plate XVII., figs. 2, 2a, and Plate XXIV., fig. 2a–b.)

1907. *Gellius fimbriatus* Kirkpatrick (**10a.** p. 286).

Sponge in form of a thick triangular cake, or conico-cylindrical. Texture soft, easily broken. Colour in spirit, pale buff.

Surface level, or almost imperceptibly hispid; showing through the dermal membrane a somewhat areolated pattern, each areola being formed by the end of a main fibre giving off fimbriated twigs which roof over the subdermal spaces between the main fibres. A few circular oscules about .5 mm. in diameter and with slightly raised rims occur.

Skeleton formed of longitudinal lines of flat, loose, band-like main fibres, with an irregular and obscure reticulation of single spicules between. The main fibres spread out in a paniculate manner a little below the dermal membrane.

Spicules. Megascleres. Oxeas, 537 × 16·25 μ, slightly bent or curved at centre, attenuating gradually to sharp points.

Sigmata varying in size, the largest being 40 μ long, 17·6 μ broad, and 1·76 μ thick, with one or more angular bends in the curve, usually one end of the shaft with an angular bend, the other end curved.

The specimen selected as the type of this species has a flattened angular pad-like body, 10 cm. long. 4·5 cm. broad, and 2·5 cm. thick; it apparently lay free on the bottom.

The upper surface alone shows the areolated appearance below the dermal membrane, the under surface being nearly opaque.

A second specimen is conico-cylindrical in shape, 11 cm. long and 3 cm. in diameter, the lower end being broken off. This specimen also apparently lay on the bottom along part of its length, as the pore surface extends all round only at the upper end of the specimen.

A third specimen from Coulman Island is fan-shaped, 7 cm. high, 3·5 cm. thick, 7 cm. broad at the upper edge, and 3 cm. broad at the base, where it is attached to two small stones. The surface is quite worn away, and the body of the sponge full of débris.

An "areola" with its central node (the end of the main fibre) and lateral branchlets occupies on an average an area of 6 × 4 mm.

The ends of the main fibres are arranged in linear series.

The dermal membrane is separated about 3 mm. from the floors of the large sub-dermal spaces, and the band-like supporting pillars are about 2 mm. broad. A vertical section gives the appearance of a miniature "hall of a thousand columns." The dermal membrane on the under surface of the sponge contains scattered oxeas arranged tangentially.

The pores vary a good deal in size and shape, being oval or round, and 45–120 μ in diameter. The flagellated chambers are spheroidal, eurypylous, and about 25 μ in diameter. The triangular cushion-like shape of the type recalls to mind *Gellius flagellifer* (R. and D.), but there are no flagellate sigmata in the new species. *G. rudis* (Topsent) has a much firmer and denser structure; the oxeas are shorter, thicker, and with tornote ends, and the sigmata are more slender and with uniform curve.

Dredged near Winter Quarters, off Hut Point in 12–20 fms.; also off Coulman Island in 100 fms.

Gellius pilosus.

(Plate XVII., figs. 3, 3a, and Plate XXIV., fig. 3a–c.)

1907. *Gellius pilosus* Kirkpatrick (**10a.** p. 287).

Sponge in form of an erect flattened triangular or elongate lamella divided or digitate at the upper edge.

Consistence soft, fleshy, compressible.

Colour in spirit, dirty white or very pale yellow.

Surface finely conulose and pilose owing to the projection of the ends of the main skeleton fibres about 1 mm., the conules being about ·6 mm. apart from each other.

A few oscules about 1 mm. in diameter, on a level with the surface.

Skeleton formed of slender main axial fibres on an average about 2–5 spicules thick, curving out to the surface where they form the pile, and of secondary fibres, usually one, but sometimes two or three spicules thick, at right angles to the main ones, with which they form oblong scalariform meshes. Spongin well developed at the nodes of the network.

Spicules. Megascleres. Oxeas, 537 × 22·75 μ, sharp pointed, sub-tornote, a few being distinctly tornote.

Microscleres. Sigmata, very abundant both in choanosome and ectosome, C-shaped, 39 × 16·25 μ in length and breadth, and 1·5 μ thick.

There are two specimens. One of them is in the form of a triangular lamella dividing into two sub-terete branches, the total length being 10·5 cm., the breadth 3·5 cm., and the thickness 1 cm. The second specimen is 11 cm. long and 3 cm. broad, with little more than a notch at the upper edge, indicating a division into branches. The fleshy matter is nearly all macerated out, leaving a flexible skeletal framework. In the first specimen the surface shows the little conules penetrated by spikes 2–3 spicules thick, with squarish concave depressions about ·5 mm. between any four conules. The dermal pores are imperceptible. There is a thin collenchymatous ectosome about ·15 mm. thick, excavated by shallow sub-dermal cavities; the eurypylous flagellated chambers are ovoid, 26 × 23 μ. The new species bears some resemblance to *Gellius flagellifer* (R. and D.), but differs from it in the absence of the peculiar flagellate sigmata. Further, *G. flagellifer* has an even surface, and a dermal skeleton network of spiculo-fibre; but in the new species the secondary fibres, usually not more than one spicule thick, are often not present at or just below the surface.

Dredged near Winter Quarters, off Hut Point, 25–30 fms.; and at No. 12 hole, 25–30 fms.

Gellius cucurbitiformis.

(Plate XVII., figs. 5, 5a–c, Plate XXIV., figs. 5a–b.)

1907. *Gellius cucurbitiformis* Kirkpatrick (**10a.** p. 288).

Sponge small, free, bulbous with fistular prolongations. Surface smooth, showing under a lens a fine white reticulum. Colour in spirit, pale brown. Consistence, rather soft.

Skeleton. With a distinct dermal layer of irregularly arranged tangential oxeas. Choanosomal skeleton a reticulum (with square or triangular meshes) of spiculo-fibre, the strands 2–3 spicules thick, with a faint indication of main fibres radiating to the surface.

Spicules. Megascleres. Oxeas, 342 × 9·75 μ, slightly curved, sub-tornote.

Microscleres. Sigmata varying in size, the smallest being about 20 μ long, C-shaped and with uniform curve, and the largest 39 μ long, 19·8 μ broad and 1·2 μ thick.

There are two small specimens, both of which were found in a tangled mass of *débris* surrounding a worm-tube. The larger, the type specimen, consists of a basal bulbous portion, 13 mm. long, 7 mm. broad, and 8 mm. high, from one side of which arises a rather thick-walled fistula 13 mm. high and 5·5 mm. in diameter; at the opposite side is a broken circular area, from which, in all probability, a second fistula

arose; lastly, between these two, is a small raised knob with a rounded orifice on one side of it. The narrow oscular canal is not central, but along one side of the thick walled complete fistula.

The second specimen is tubular, with a slightly enlarged solid base, whence arises a fistula; the total length is 2·2 cm., and diameter ·6 cm. No pores are discernible; the subdermal spaces are about ·2 mm. in depth.

The eurypylous flagellated chambers are 23 μ in diameter. Cellules sphéruleuses, 8–9 μ in diameter, are common.

There is no bast-like subdermal layer as in *Oceanapia mollis* Dendy (**4.** p. 248), and the spicules of the latter are smaller, the oxeas being 200 × 8 μ, and the sigmata only 16 μ. Lundbeck (**12.** pp. 64, 66) describes two species of *Gellius* with fistulae, and with a well-developed dermal bark, viz.: *G. luridus* and *G. microtoxa*, but both these species have toxa in addition to sigmata.

The two specimens were dredged off Hut Point (Winter Quarters) in 25–30 fms.

Gellius glacialis, var. nivea.

(Plate XVII., fig. 4.)

1887. *Gellius glacialis* var. *nivea* Ridley and Dendy (**15.** p. 42, Pl. VIII., fig. 8, etc.).

The one example is in the form of a small spherical knob attached to a branched Polyzoon, resembling in these respects the 'Challenger' specimen from Prince Edward Island. The sponge, which is 17 mm. in diameter, is brittle, and has a well-marked ectosomal skeleton formed of tangential oxeas. The megascleres and sigmata are smaller than those of the 'Challenger' specimen, but are in other respects of the same character; accordingly I have not regarded the Antarctic specimen as a new variety.

The larger sigmata are often united in bundles of sigmadragmata.

The following table gives the dimensions in μ of the spicules of *G. glacialis*, and of the 'Challenger' and Antarctic specimens of var. *nivea*.

	G. glacialis.	var. *nivea* 'Challenger.'	var. *nivea* 'Discovery.'
Oxeas .	670 × 40	704 × 29·25	522 × 19
Sigmata .	75 × 45 × 3·5	209 × 74·5 × 5·7	119 × 67 × 6·5

Dredged off Coulman Island, 100 fms.

The 'Challenger' obtained *G. glacialis* from Agulhas Bank, 150 fms., and var. *nivea* from Prince Edward Island, 140 fms.

Oceanapia tantula.*

(Plate XVIII., figs. 5, 5a, 5b, and Plate XXIV., fig. 8a–e[1].)

1907. *Oceanapia tantula* Kirkpatrick (**10a.** p. 289).

Description.—The sponge consists of five small fragments of tubes, the longest of which is 8 mm. in length, by 4 mm. in diameter; three of the pieces are hollow, thin-walled and tubular; the other two are solid. One of the solid pieces seems to belong to the top of a fistula.

The colour is transparent white.

Skeleton. The dermal layer is composed of a chitinous-looking membrane with strongyles lying tangentially, usually in one layer and densely packed, but sometimes more or less scattered.

The white strands of the loose subdermal reticulum are visible through the surface. They are longitudinal, and only anastomose occasionally. The strands are less than ·1 mm. in diameter. They vary in composition; in some parts being composed of strongyles smaller than those of the dermal layer, in other parts of smooth trichodragmata, or again of strongyles, amphityles and trichodragmata. The pale transparent choanosomal tissues are crowded with small spined rhaphides.

Spicules. Megascleres. Strongyles, $437 \times 19\,\mu$, slightly fusiform, curved once or sometimes twice. Occasionally one end is pointed, the spicule becoming a style.

Amphityles, $395 \times 7{\cdot}25\,\mu$, slightly fusiform, heads $13\,\mu$ long, 9·75 mm. broad.

Microscleres. Long, smooth raphides, separate or in bundles forming part of the subdermal reticulum, $650 \times 2{\cdot}5\,\mu$.

Short scattered spined raphides, usually stylote, $162\,\mu$ long, and about $2{\cdot}5\,\mu$ broad.

H. V. Wilson describes (**34.** p. 128) a species of *Oceanapia*, viz. *O. bacillifera* with strongyles, but it has the usual sigmata.

Oceanapia (*Phloeodictyon*) *singaporensis* (Carter) has strongyles in the dermal layer, but oxeas as well as strongyles in the skeleton fibres, and there are no microscleres.

The species of the Gelliine genus *Rhaphisia* have oxeas, trichodragmata, and, in one species, toxa; but there are no fistulae, and there is no subdermal reticulum of spicular fibres.

It is regrettable that there is so small an amount of material on which to base a new species, but the marked characters of that which is available seem to render such a proceeding justifiable.

Dredged near Winter Quarters, from No. 10 hole, 130 fms.

* *Tantulus*, ever so little.

Sub-Family RENIERINAE, Ridley and Dendy.

Pyloderma.

Halichondria (pars) Ridley and Dendy (**15.** p. 6).

Renierinae with a parchment-like, easily-separated, dermal membrane in which are situated closely-packed tangential oxeas, and with distinct round or oval pore areas.

Pyloderma latrunculioides.

1887. *Halichondria latrunculioides*, Ridley and Dendy (**15.** p. 6, Pl. I., fig. 5, &c.).

There is one flabellate specimen attached to a small stone. The height is 6 cm., the width at the upper rim 5·5 cm., and the thickness 1·8 cm. The oscules, generally contracted into little white conules, are scattered about among the pore areas, and not collected on the edges as in the 'Challenger' examples. Each oscular opening leads into a smooth funnel-like cavity with a sharp-edged circular sphincter-like opening at the base.

The strongly marked characters of this peculiar species seem to me to necessitate its removal from *Halichondria* and its inclusion under a new genus. In the 'Challenger' Report Ridley and Dendy state that they were at first doubtful whether the arrangement of the pores in definite areas would prove to be a character of generic importance, and finally decided that this feature was only one of adaptation. Prof. Dendy has since told me that he now thinks that this species should be placed in a distinct genus, and in this opinion I concur. There are no microscleres to help in tracing its affinities and the body skeleton is Renierine in character; accordingly it is for the present placed among the Renierinae.

Dredged off Coulman Island in 100 fms. The 'Challenger' obtained specimens from a depth of 600 fms. off the mouth of the Rio de la Plata.

Petrosia fistulata.

(Plate XVIII., figs. 4, 4a–b, and Plate XXIV., fig. 7.)

1907. *Petrosia fistulata* Kirkpatrick (**10a.** p. 290).

Sponge tubular. Surface smooth, showing the round openings of the inhalant canals about ·4 mm. in diameter and close together.

Inner surface of the tube of the sponge finely or rarely coarsely pilose, and showing the round openings of the exhalant canals about 1 mm. in diameter. Colour in spirit, pale yellow. Texture firm, but slightly compressible. Eurypylous flagellated chambers spheroidal, 24·5 μ in diameter.

Skeleton formed of main fibres proceeding from the inner to the outer surface, joined by secondary fibres one spicule thick, so as to form obscurely quadrangular or hexagonal tubes about ·5 mm. in diameter; ends of spicules cemented with spongin.

Spicules. Oxeas, 492 × 24·4 μ, bent usually, or curved at centre, sub-tornote.

There are four specimens, the two larger being uniformly cylindrical and the smaller ventricose. The largest is 6 cm. long, the diameter being 2·1 cm. and the thickness of the wall 5 mm.

The dermal membrane roofing over the inhalant orifices is usually supported there by two or three single spicules radiating to the centre. The pores are ·95 μ in diameter.

Small embryos about ·76 mm. in diameter occur. The new species comes nearest to the species from Kerguelen, which Carter (**3.** p. 287) identified as *Thalysias subtriangularis* Duch. and Mich., but which Ridley and Dendy (**15.** p. 9) regarded as synonymous with *Petrosia similis* * (Ridley and Dendy).

The spicules of the Antarctic species are very much larger than those of Carter's, and partly in consequence of this the skeletal network of the latter is much denser from a closer approximation of the fibres.

The dimensions of the oxeas of four nearly related species of *Petrosia* are as follows:—

Petrosia similis (R. and D.), 225 × 16 μ.
Thalysias subtriangularis (D. and M.), Carter, 190 × 12 μ.
Petrosia (*Schmidtia*) *aulopora*, O. Sch., 175 × 7 μ.
Petrosia fistulata, 493 × 24·4 μ.

Dredged near Winter Quarters, No. 12 hole, 25–30 fms.; McMurdo Bay, 96–120 fms.

Reniera scotti.†

(Plate XVIII., figs. 1–2, and Plate XXIV., fig. 6.)

1907. *Reniera scotti* Kirkpatrick (**10a.** p. 291).

Sponge consisting of one or more fistulae. Texture very soft and easily lacerated. Colour in spirit, varying from yellow to pale reddish. Outer surface varying from being finely hispid to having large conules and meandrine ridges. Inner surface of fistulae very finely hispid in the spaces between the numerous orifices of exhalant canals. Flagellated chambers large hemispherical, 60 × 40 μ.

Skeleton formed of parallel longitudinal lines of main fibres, about 2–6 spicules thick, curving outwards from the inner to the outer surface, where they pass into the conules and ridges; secondary fibres at right angles to the main ones, one or two spicules thick. The spicules are not closely united, and spongin is only present in very small amounts.

Spicules. Oxeas 343 × 14·6 μ, curved or bent at centre, sub-tornote.

* The specimen from Kerguelen Island which Carter identifies as *Thalysias subtriangularis* Duch. & Mich. is, I believe, specifically distinct from *Petrosia similis* R. & D. The fine spicular network of the former, with its slender main fibres, and still more slender unispicular secondary fibres, contrasts strongly with the thick cable-like longitudinal and transverse strands of the latter. Carter's specimen appears to me to belong to a new species.

† This fine species is named in honour of Captain R. F. Scott, R.N., C.V.O., the leader of the Expedition.

There are six specimens and fragments. The outward appearance varies greatly according to age and size. In one small specimen the surface is finely hispid, in larger ones conulose, and in very large ones conulated and with high meandrine ridges. The largest specimen No. 118 (Pl. XVIII., fig. 1) is in the form of a wide thick-walled tube, 12 cm. high and 6 cm. in diameter, and with walls 1·5 cm. thick, but attenuating towards the rim of the tube. This specimen is incomplete below. The orifice is circular, and within the rim is a diaphragm contracted to a white line.

The surface is covered with large conules and meandrine ridges rising to a height of nearly 1 cm.

The dermal membrane, in the spaces between the conules and ridges, shows as a fine lace-like reticulum, with circular pores 133 μ in diameter, and beneath it the orifices (1–1·5 mm. in diameter) of the inhalant canals are visible. The exhalant orifices on the inner wall of the tube are much larger than the inhalant; they vary from 1 to 6 or 7 mm., their edges are smooth and rounded. In the second largest specimen, these orifices are arranged in longitudinal rows, and are oval with the long diameter vertical. This arrangement results from the way in which the contraction of the tubular sponge body is restricted by the main longitudinal skeletal fibres running beneath the inner surface.

In a third specimen (No. 132), the outer surface of the wall is almost smooth to the naked eye, though under a lens it is seen to be finely hispid, with the top of oxeas projecting from minute conules.

In another specimen the basal part of the sponge divides into two tubes, one of which is nearly smooth, and the other with ridged surface.

The species closely resembles *R. spinosella*, Thiele (**23.** p. 459), from Punta Arenas. In Thiele's species the body is tubular, with conulated surface, and the texture is very soft; but the skeletal framework is irregular, and the oxeas, though similar in form, are much shorter, smaller and more slender, being only 150–170 μ long and 7–8 μ thick.

Another species showing certain resemblances to *R. scotti*, viz. *R. aquaeductus* Schmidt, var. *infundibularis* (R. and D.), has a unispicular skeletal network.

Specimens were dredged near Winter Quarters, in No. 12 hole, 25–30 fms.; S.E. of Cape Armitage, 100 fms.; off Flagon Point, 5–25 fms.; off E. end of Ice Barrier, 100 fms., mud and stones.

Reniera dancoi.

(Plate XVIII., fig. 3.)

1901. *Reniera dancoi*, Topsent (**29.** p. 12, Pl. II., fig. 1, and Pl. III., fig. 3.)

There are two specimens. One is of a compressed digitate form, 10 cm. long, 2·5 cm. wide, and 1 cm. thick. About the middle of one side is a projecting shoulder with an oscule. Near, but not quite at the summit, on the opposite edge, is a second oscule. The specimen is contracted at the centre; the alternate oscules

and contracted waist give the impression of a budding of the upper half of the specimen from the lower.

The colour is pale brown in spirit, and is due apparently to the abundance of masses of cellules sphéruleuses; the specimens described by Topsent are grayish or whitish.

The 'Discovery' specimens have, in parts, a hispid rather than a conulose surface, the spicules standing above the level dermal membrane like sticks out of water; but in other places the surface is finely conulose. The oxeas are 642 × 18 μ, those of the 'Belgica' being 630 × 18–20 μ. By deep staining of a portion of macerated skeletal network a small amount of spongin becomes discernible at the nodes. The flagellated chambers, 55 × 40 μ, though rather large, are smaller than those of Topsent's specimens, in which they are of unusual size, viz. 70 × 50 μ. The second specimen is merely a shapeless fragment.

Dredged near Winter Quarters, off Hut Point, 25 fms.; No. 12 hole, 25–30 fms. The 'Belgica' Expedition obtained several small specimens from 450 mètres, in Lat. 71° 19′ S., Long. 87° 37′ W.

MEMOIRS REFERRED TO.

1. Carter, H. J.—Descriptions and figures of Deep-sea Sponges . . . from the Atlantic Ocean, dredged . . . H.M.S. Porcupine. Ann. Mag. Nat. Hist. (4) xiv., 1874.
2. Carter, H. J.—Some Sponges from the West Indies and Acapulco in the Liverpool Free Museum. Ann. Mag. Nat. Hist. (5) ix., 1882.
3. Carter, H. J.—Spongiidae from Kerguelen Island. Transit of Venus Exp^{n}. Phil. Trans. vol. 138 (extra). London, 1879.
4. Dendy, A.—Catalogue of the Non-Calcareous Sponges . . . Port Phillip Heads. Part i. Proc. Roy. Soc. Victoria, vol. vii., n.s., 1895.
5. Dendy, A.—Catalogue of Non-Calcareous Sponges . . . Port Phillip Heads. Part ii. Proc. Roy. Soc. Victoria, vol. viii., n.s., 1896.
6. Dendy, A.—In Herdman, Ceylon Pearl Fisheries. Supplementary Report, xviii. London, 1905.
7. Fristedt, K.—Sponges from the Atlantic and Arctic Oceans and Behring Sea. Vega-Expeditionens vetenskapliga jakttagelser Arbeten. Bd. iv., 1887.
8. Hanitsch, R.—Revision of the Generic Nomenclature and Classification in Bowerbank's "British Spongiadae." Trans. Liverpool Biol. Soc., vol. viii., 1894.
9. Kirkpatrick, R.—On the Sponges of Christmas Island. Proc. Zool. Soc. London, 1900.
10. Kirkpatrick, R.—On the Oscules of Cinachyra. Annals and Mag. Nat. Hist., 1905 (7), vol. xvi.

10a. Kirkpatrick, R.—Preliminary Report on the Monaxonellida of the National Antarctic Exhibition. Ann. and Mag. Nat. Hist. (7), vol. xx., September 1907.

11. Lendenfeld, R. von.—Spongien von Sansibar. Abhand. Senckenberg. Gesellsch., 1899, Bd. xxi.

11a. Lendenfeld, R. von. Deutsche Südpolar-Expedition, 1901–1903. Bd. ix. Zoologie I. Tetraxonia. Berlin, 1907.

12. Lundbeck, W.—Porifera (Part i.). Homorrhaphidae and Heterorrhaphidae. The Danish Ingolf-Expedition, vol. vi., Copenhagen, 1902.
13. Lundbeck, W.—Porifera (Part ii.). Desmacidonidae. The Danish Ingolf-Expedition, vol. vi., Copenhagen, 1902.
14. Merejskowsky, C.—Études sur les Éponges de la mer Blanche. Mém. Acad. Imp. Sci. (7), xxvi., N°. 7, St. Pétersbourg, 1878.
15. Ridley, S. O., and Dendy, A.—Report on the Monaxonida collected by H.M.S. 'Challenger.' London, 1887.

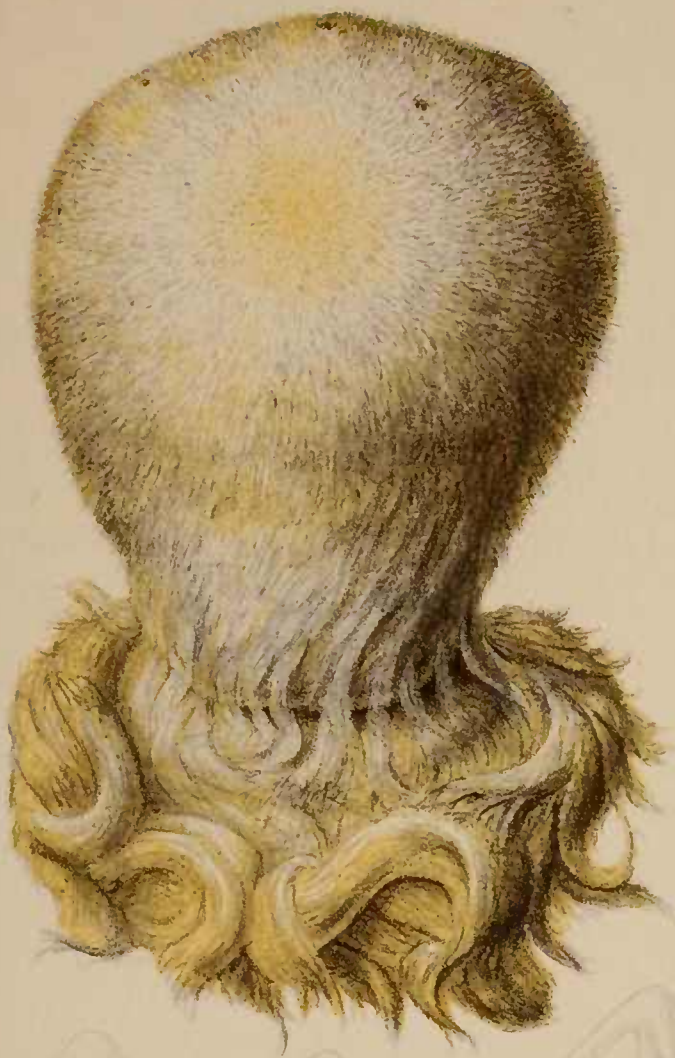
15a. Ridley, S. O.—Account of the Zoological Collections made during the survey of H.M.S. 'Alert' in the Straits of Magellan. Proc. Zool. Soc. London, 1881.

16. Schmidt, O.—Die zweite deutsche Nordpolarfahrt, 1869–70. Zweiter Band, Zoologie, Kieselspongien. Leipzig, 1874.
17. Schmidt, O.—Die Spongien des Meerbusen von Mexico. Jena, 1879.
18. Schulze, F. E.—Über die Ableitung der Hexactinelliden-Nadeln vom regulären Hexactine. Sitzungb. Akad. Wiss., Berlin, xlvi., 1893.
19. Sollas, I. B.—On the Sponges collected during the Skeat Expedition to the Malay Peninsula, 1897–1900. Proc. Zool. Soc. London, vol. ii., 1902.
20. Sollas, W. J.—The Sponge-fauna of Norway. Annals and Mag. Nat. Hist., 1882, (5), vol. ix.
21. Sollas, W. J.—Report on the Tetractinellida collected by H.M.S. 'Challenger.' Zoology, vol. 25. London, 1888.
22. Thiele, J.—Beschreibung einiger unzureichend bekannten Monaxonen Spongien. Archiv. Naturg., 1903. Band i. Berlin.
23. Thiele, J.—Die Kiesel- und Hornschwämme der Sammlung Plate. Zool. Jahrb. Suppl. vi., Dr. L. Plate, Fauna Chilensis: Bd. iii., Heft 3. Jena, 1905.

24. Topsent, E.—Une réforme dans la Classification des Halichondrina. Mém. Soc. Zool. France, tome vii. 1894.
25. Topsent, E.—Résultats scientifiques de la Campagne du 'Caudan' dans le Golfe de Gascogne, 1895. Éponges. Annales de l'Université de Lyon, xxvi., (4). Paris, 1896.
26. Topsent, E.—Éponges nouvelles des Açores (première série). Mém. Soc. Zool. France, vol. xi., p. 225–255. Paris, 1898.
27. Topsent, E.—Introduction à l'étude monographique des Monaxonides de France. Archiv. Zool. Exp. et Gén. (3) vi. 1898.
28. Topsent, E.—Étude Monographique des Monaxonides de France. Archiv. Zool. Exp. et Gén. (3). tome viii. 1900.
29. Topsent, E.—Expédition Antarctique Belge. Résultats du Voyage du S.Y. 'Belgica' en 1897–99. Zoologie. Spongiaires. Anvers, 1902.
30. Topsent, E.—Résultats des Campagnes Scientifiques du Prince de Monaco. Spongiaires des Açores. Monaco, 1904.
31. Topsent, E.—Poecilosclérides nouvelles recueillies par le 'Français' dans l'Antarctique. Bulletin du Muséum d'histoire naturelle. Paris, 1907. No. 1.
32. Vosmaer, G. C. J.—The Sponges of the Willem Barents Expedition, 1880–81. Bijdragen tot de Dierk. Afl. 12. Amsterdam, 1885.
33. Weltner, W.—Susswasserspongien von Celebes. Archiv. für Naturgeschichte, 1901. Beiheft.
34. Wilson, H. V.—Reports on an Exploration off the West Coasts of Mexico, Central and South America, and off the Galapagos Islands, by the 'Albatross' during 1891. The Sponges. Mem. Mus. Comp. Zool. Harvard, vol. xxx. No. 1. Cambridge, U.S.A., 1904.

PLATE VIII.

FIG. 1.—*Craniella sagitta* (Lendenfeld) var. *microsigma*, n. var., $\frac{3}{4}$ nat. size, p. 1.
FIG. 2.—Surface at junction of poral and non-poral or oscular zones (× 2).
FIG. 3.—Section showing poral areas and sub-dermal spaces (× 6).
FIG. 4.—Eurypylous flagellated chambers opening into terminal exhalant canal (× 425).
FIG. 5.—Anatriaene (× 50). 5a, Cladome of same (× 160).
FIG. 6.—Cladome of anatriaene with straighter cladi than 5a (× 160).
FIG. 7.—Anatriaene with short, thick cladi (× 50). Cladome of same (× 160).
FIG. 8.—Protriaene (× 50), 8a, cladome of same (× 160).
FIG. 9.—Cladome of protriaene with equal cladi (× 160).
FIG. 10.—Large oxea (× 50).
FIG. 11.—Trichodal protriaene (× 160).
FIG. 12.—Sigmata (× 700); 12a, the same (× 1400).
FIG. 13.—Cortical oxea (× 50).
FIG. 14.—*Craniella sagitta* var. *pachyrrhabdus*, n. var. Style (× 50).
FIG. 15.—Strongyle (× 50).



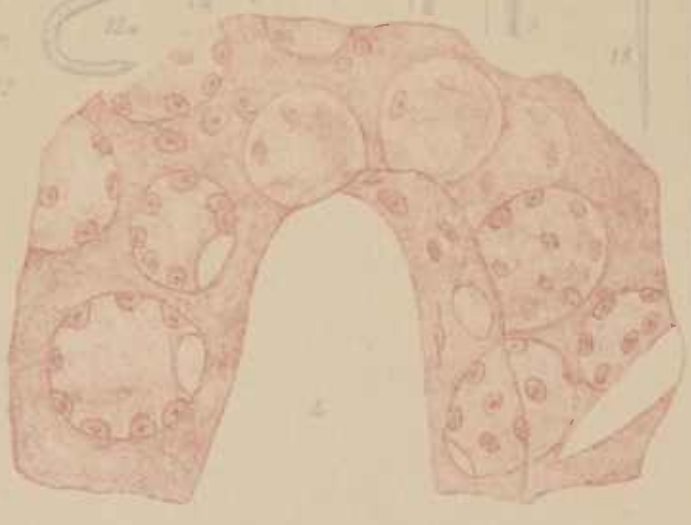


PLATE IX.

FIG. 1.—*Cinachyra barbata* Sollas, $\frac{3}{4}$ nat. size, p. 6.

FIG. 2.—Vertical section through an oscule (× 5).

FIG. 3.—Young specimen with one porocalyx in front and one oscule at the upper end (× 3).

FIG. 4.—Cortical oxea from a large specimen (× 100).

FIGS. 5–7.—Single and double "silica pearls" (× 700).

FIGS. 8–12.—"Silica pearls" around which crystals of sea-salts have become deposited (× 425).

FIGS. 13, 14.—Spheroidal masses of sea-salt crystals (in optical section), which stain deeply in carmine (× 425).

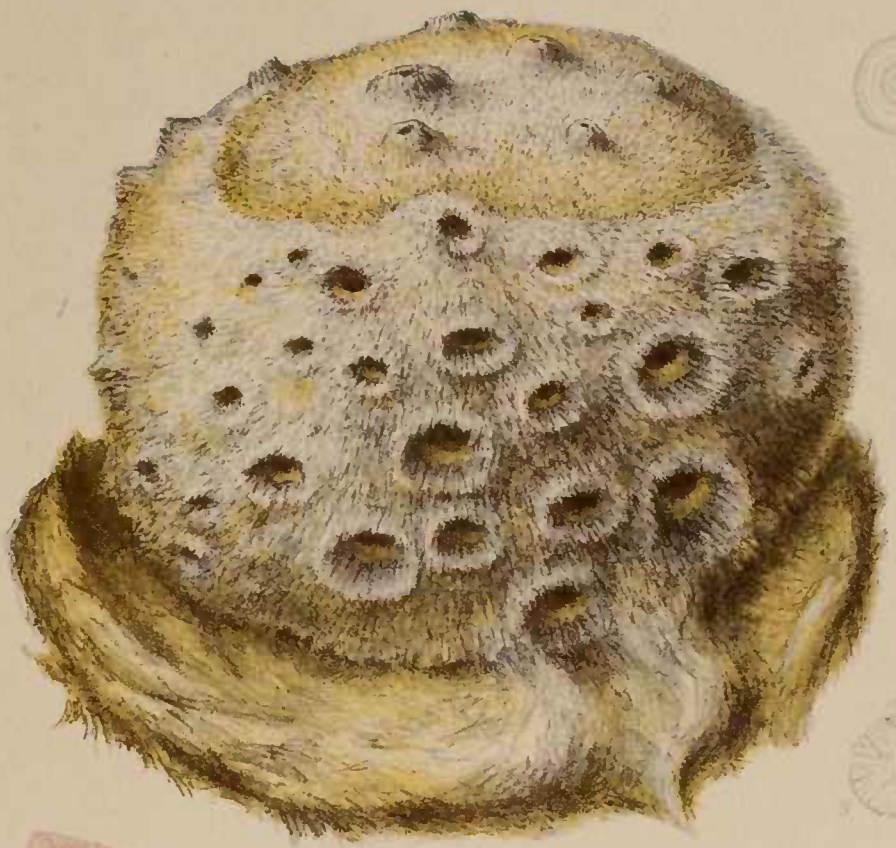
FIG. 15.—*Craniella sagitta* var. *microsigma*, vertical section of cortex in poral region, showing radial cortical oxeas arching over sub-dermal spaces (× 12).

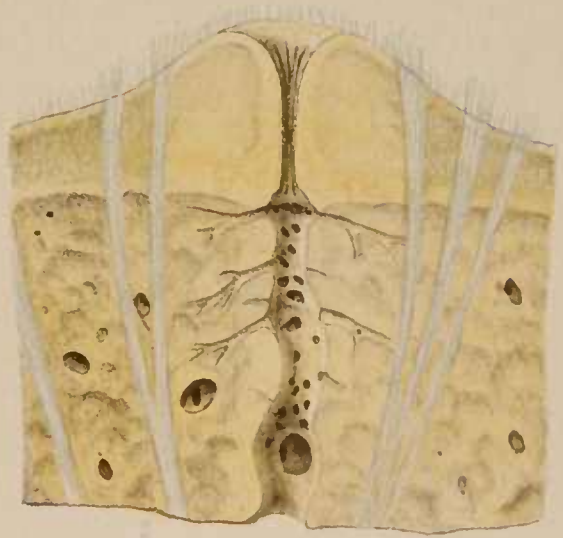
FIG. 16.—*Craniella sagitta* var. *microsigma*, vertical section of cortex in oscular region showing absence of radial cortical oxeas (× 12).

FIG. 17.—*Craniella sagitta* var. *pachyrrhabdus*, flagellated chambers (× 200).

FIGS. 18, 19.—Collar cells of the same (× 1900).

NOTE.—The flagellated chambers as seen in fig. 17 are nearly denuded of collar cells, which have probably become separated owing to the action of the osmic acid used in the case of this specimen; consequently the collar cells with their collars, as seen in the figures, have probably not become fixed in their normal position. See remarks on p. 4.



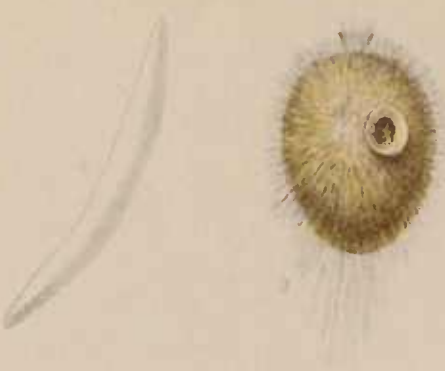
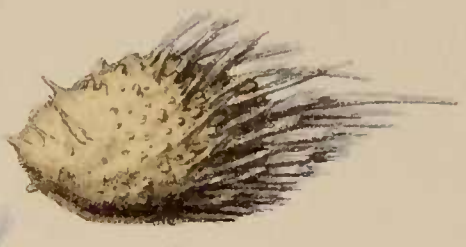
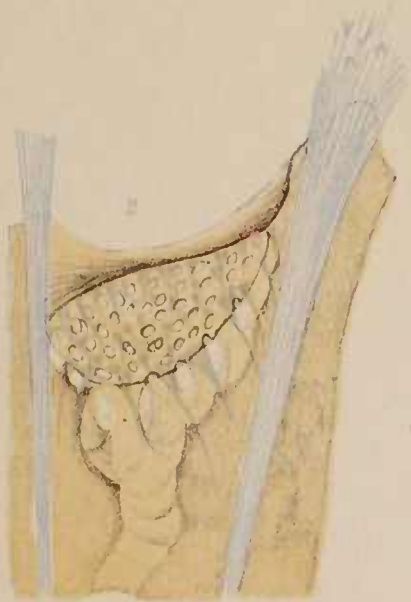


PLATE X.

FIG. 1.—*Cinachyra vertex* Lendenfeld, nat. size, p. 9.
FIG. 2.—Vertical section of a porocalyx (× 10).
FIG. 3.—Vertical section of an oscule (× 10).
FIG. 4.—Vertical section of cortex (× 25).
FIG. 5.—Flagellated chambers, apopyles opening into beginning exhalant canal (× 160).
FIG. 6.—Collar cells (× 1600).—The section shows the cut edges of the concrescent collars of the collar cells; the diffused coloration beneath these cut edges apparently represents Sollas's membrane torn down in the course of section cutting. The material from which the section was cut was deep black from the effects of osmic acid, and was not good from a histological point of view.
FIG. 7.—Large somal oxea (× 100).
FIG. 8.—Choanosomal oxea (× 100).
FIG. 9.—Anatriaene with bend in cladi (× 100).
FIG. 10.—Anatriaene with uniformly curved cladi (× 100).
FIGS. 11, 12.—Protriaenes.
FIG. 13.—Trichodal protriaene (× 100).
FIG. 14.—Sigmata (× 700); 14a, the same (× 1400).
FIG. 15.—*Cinachyra vertex* var. *monticularis*, n. var., nat. size, p. 11.
FIG. 16.—Oscular chimney of the same (× 10).





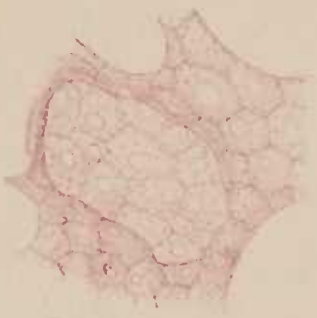
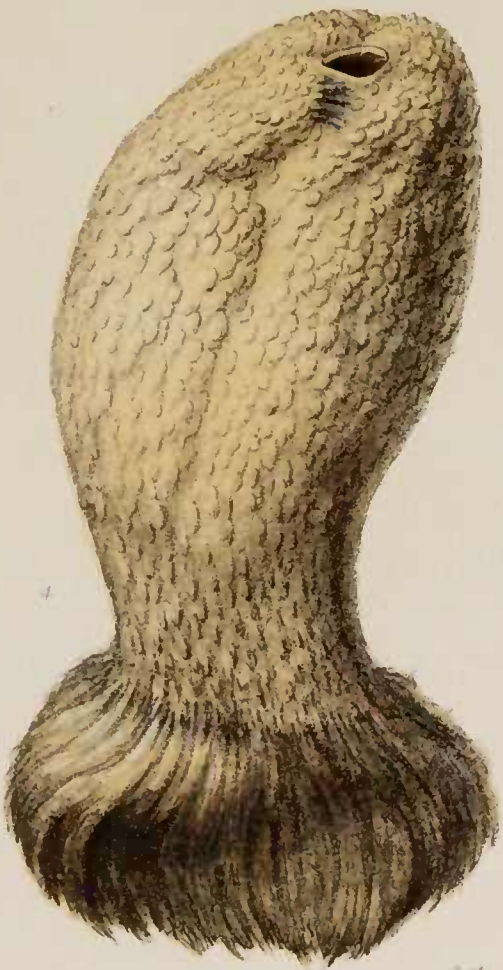
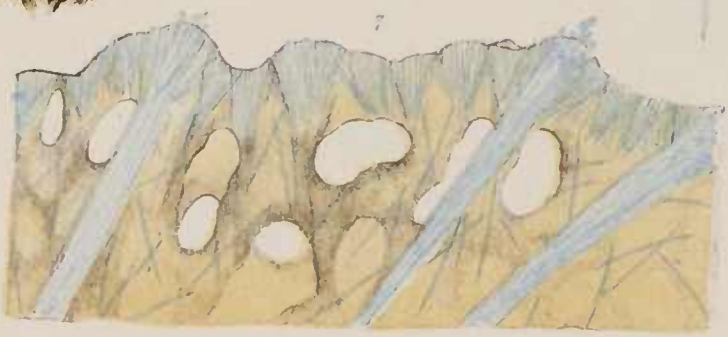
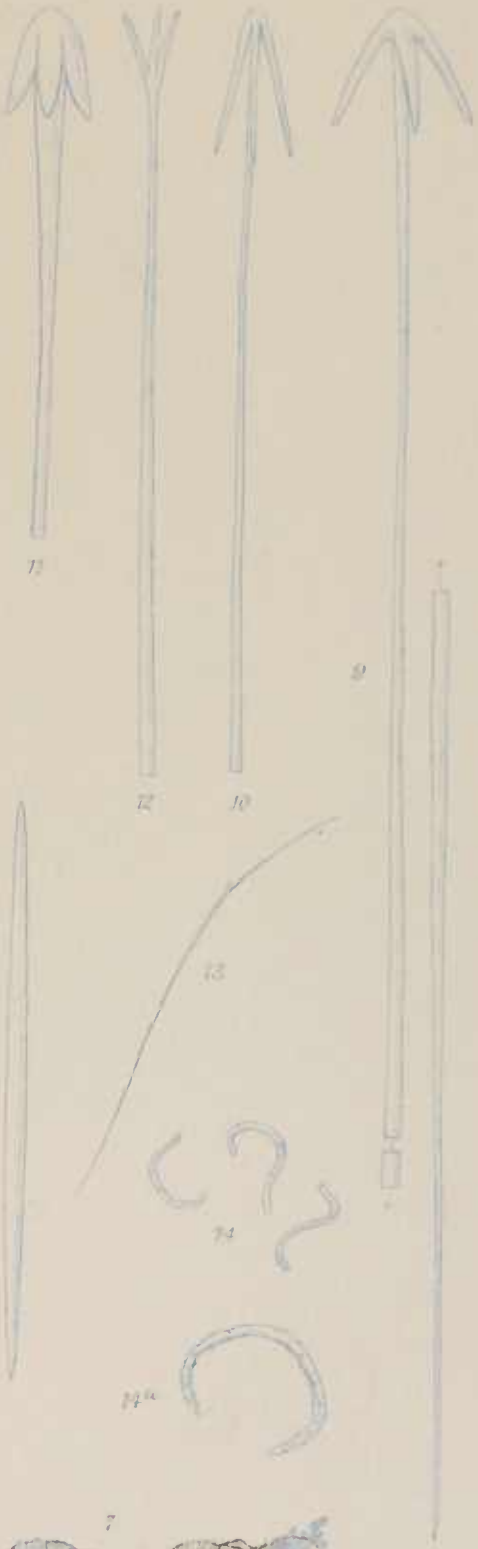


PLATE XI.

FIG. 1.—*Cinachyra vertex* var. *monticularis*, two porocalycal monticules (× 10).
FIG. 2.—One, ditto clarified and lightly stained (× 20).
FIG. 3.—Vertical section of a monticule (× 20).
FIG. 4.—*Craniella leptoderma* (Sollas), nat. size, p. 4.
FIG. 5.—A smaller specimen of the same, nat. size.
FIG. 6.—Tangential section of surface (× 100).
FIG. 7.—Vertical section (× 15).
FIG. 8.—Cortical oxea (× 100).
FIG. 9.—Anatriaene (× 100).
FIG. 10.—Another kind of anatriaene (× 100).
FIG. 11.—A third kind of anatriaene (× 100).
FIG. 12.—Distal end of protriaene from root-tuft (× 100).
FIG. 13.—Trichodal protriaene (× 100).
FIG. 14.—Sigmata (× 700); 14a, the same (× 1400).







Antarctic (Discovery) Exp. Sponges Pl. II. F. Highley London

PLATE XII.

FIG. 1.—A. *Sphaerotylus antarcticus* Kirkp. Nat. size ; p. 16. B. *Polymastia invaginata* Kirkp. ; p. 15. (Note. The surface pile is, in the natural condition, more upright than in this specimen, where it has been crushed down.) C. The larger of the two small specimens above C is *Sphaerotylus capitatus* Vosmaer, nat. size ; p. 18 ; the smaller is *S. antarcticus*.

FIGS. 2, 3.—*Sphaerotylus antarcticus*, young specimens. Nat. size.

FIG. 4.—Portion of another young specimen (× 25).

FIG. 5.—*Sphaerotylus antarcticus*. A spheroidal specimen. Nat. size.

FIG. 6.—Style from radiating main fibre (× 100).

FIG. 7.—Style from inner cortical tangential layer (× 100).

FIG. 8.—Spherostyle (× 100) ; 8a head of same (× 425).

FIGS. 9–12.—Heads of various spherostyles (× 425).

FIG. 13.—Slender curved choanosomal tyle (× 100).

FIG. 14.—Beaded tyle from radial fibres (× 425).

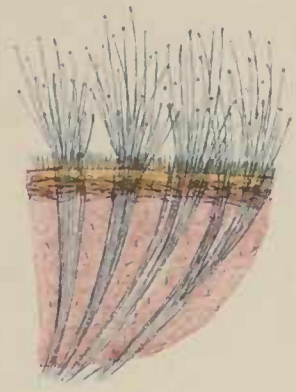
FIG. 15.—Curved cortical tyles of outermost layer of cortex (× 100) ; 15a, the same (× 160).

FIG. 16.—Straight tangential tyle of lower cortical layer (× 100) ; 16a, the same (× 425).

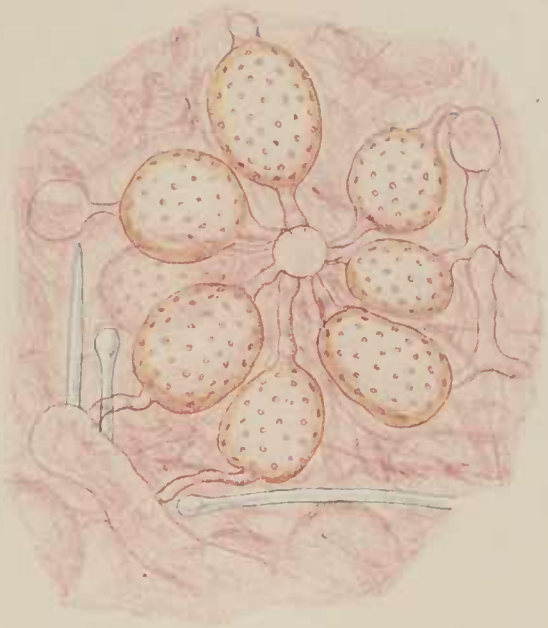
Antarctic Discovery Exp. Sponges Pl 13. P. Highley, London.

PLATE XIII.

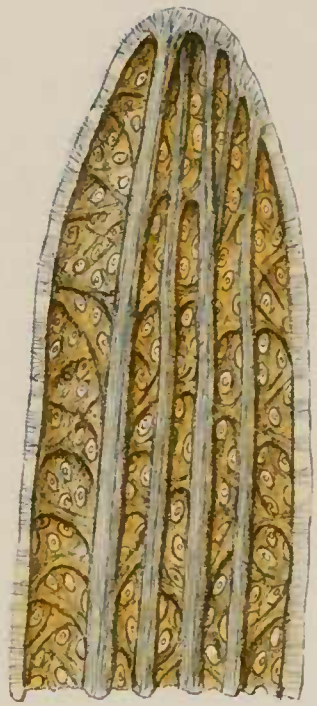
FIG. 1.—*Sphaerotylus antarcticus*. Section of young specimen (× 3).
FIG. 2.—Section of same (× 20).
FIG. 3.—Dermal pores (× 100).
FIG. 4.—Inner surface of cortex showing terminations of pore canals (× 100).
FIG. 5.—Horizontal section of papilla (× 15).
FIG. 6.—Vertical longitudinal section of papilla (× 15).
FIG. 7.—Diplodal flagellated chambers (× 400).
FIG. 8.—*Sphaerotylus capitatus* (Vosmaer) choanosomal tyle (× 100); 8a, head of the same (× 160).
FIGS. 9, 10.—Smaller tyle and sub-tyle from spread out ends of radiating fibres of skeleton (× 160).
FIG. 11.—Cortical tyle, also found in choanosome between the main fibres (× 100).
FIG. 12.—Smallest kind of cortical tyle (× 100); 12a, the same (×160).
FIG. 13.—Exotyle (× 100); 13a, clavate head of same (425).



1

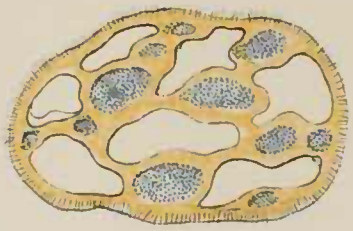


7



6

2



5

3

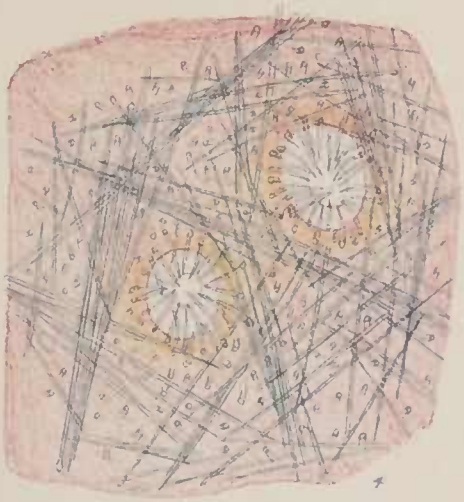
11

10

9

8a

8



4

13

12a

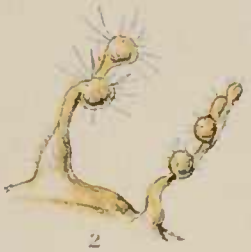
12

13

PLATE XIV.

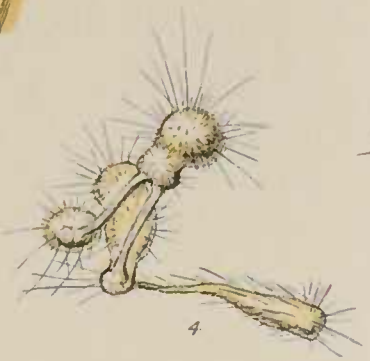
FIG. 1.—*Sphaerotylus capitatus*, vertical section (× 25).
FIGS. 2–4.—Buds of the same (× 15).
FIG. 5.—*Polymastia invagnata*, specimen cut in half ; nat. size, p. 15.
FIG. 6.—Vertical section (× 25).
FIG. 7.—Flagellated chambers (diplodal) (× 400).
FIG. 8.—Stellate group of tyles in choanosome (× 100) ; 8a, separate tyles of stellate groups (× 100)
FIG. 9.—Straight style (× 100).
FIG. 10.—Curved style (× 100) ; 10a, narrower head of another spicule (× 100).
FIG. 11.—Strongyle (× 100).
FIG. 12.—Long slender tyle (× 100).
FIGS. 13, 14.—Cortical tyles (× 100).
FIG. 15.—Choanosomal tyles (× 100) ; 15a, the same (× 160).

1



2

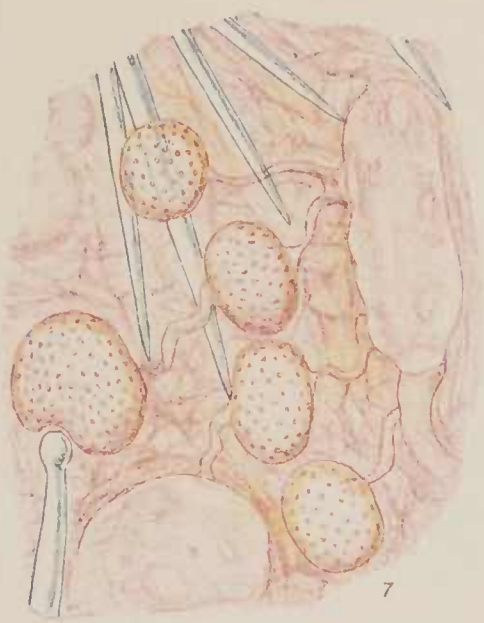
3



4

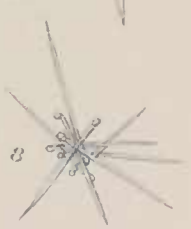
5

6



7

8a



8

11

12

10a

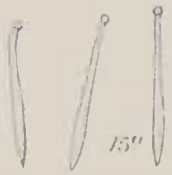
13

10

9

14

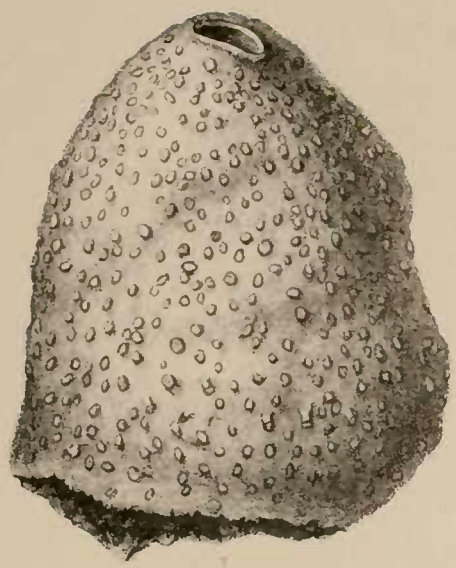
15



15'

PLATE XV.

FIG. 1.—*Latrunculia apicalis* R. & D. var. *biformis* var. n., $\frac{2}{3}$ nat. size, p. 14.
FIG. 2.—Style of same (× 100).
FIG. 3.—Discaster with apical spine (× 700).
FIG. 4.—Discaster without apical spine (× 100); 4a (× 700).
FIG. 5.—Reduced discaster (× 100).
FIGS. 6, 7.—Reduced discasters from another specimen (× 160).
FIG. 8.—*Suberites microstomus* R. & D. var. *stellatus*, var. n., nat. size, p. 19.
FIG. 9.—Sub-tyle of same (× 100); 9a (× 400).
FIGS. 10, 11, 12.—Cortical tyles (× 100).
FIG. 13.—Surface of *S. microstomus* var. *stellatus*, showing stellate poral areas (× 25).
FIG. 14.—Surface of typical *S. microstomus*, showing circular poral areas (× 25).
FIG. 15.—Surface of typical *S. caminatus* R. & D., showing stellate poral areas (× 25).
FIG. 16.—Surface of *S. caminatus* R. & D. var. *papillatus*, var. n., showing papillated stellate poral areas (× 25), p. 20.



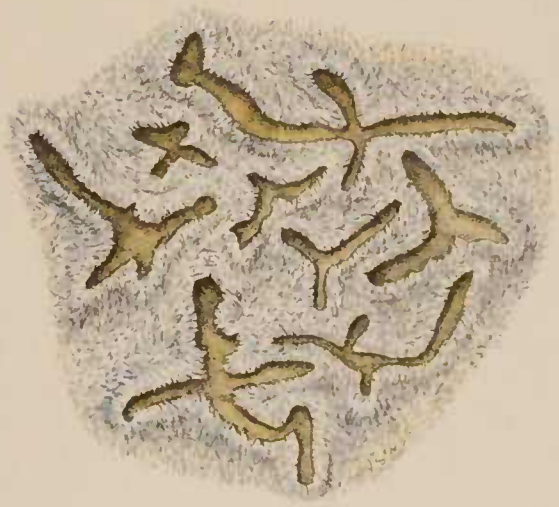
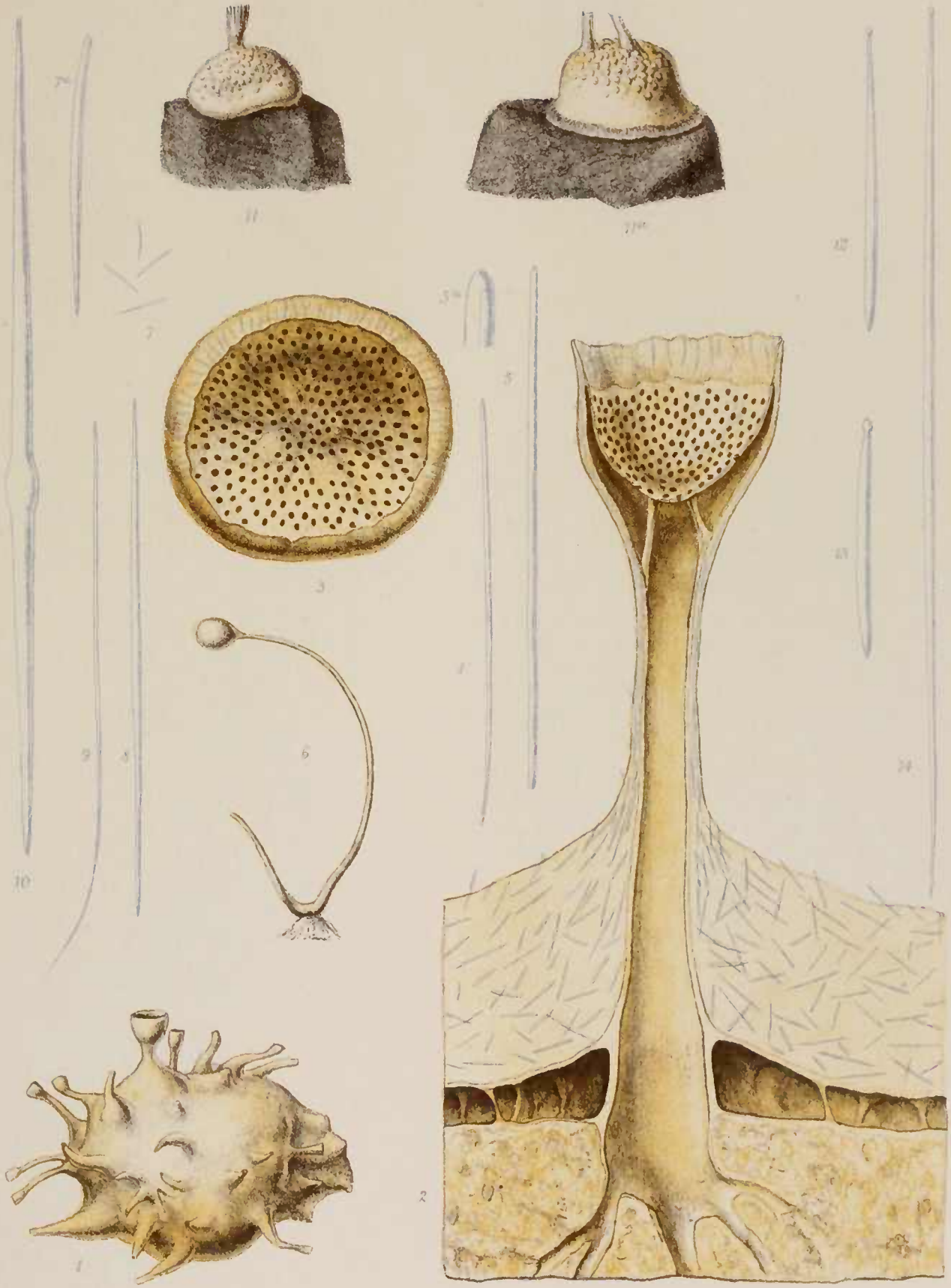


PLATE XVI.

FIG. 1. *Joyeuxia belli* Kirkp., nat. size, p. 41.
FIG. 2. Section of same through a poral tube, cortex and choanosome (× 10).
FIG. 3. End of a larger poral tube, showing poral sieve (× 10).
FIG. 4. Style (rare) (× 100).
FIG. 5. Strongyle (× 100); 5a, further enlarged.
FIG. 6. *Stylocordyla borealis* Lovén var. *acuata* var. n., nat. size, p. 22.
FIG. 7. Ectosomal micro-styles (× 100); 7a (× 500).
FIG. 8. Smaller oxea of the head of the sponge (× 100).
FIG. 9. Heteroxea (× 100).
FIG. 10. Large oxea of stem, with central swelling (× 100).
FIGS. 11, 11a.—*Suberites caminatus* R. & D. var. *papillatus* n. var., nat. size, p. 20.
FIG 12. Cortical tyle (× 100).
FIG. 13. Ditto (× 100).
FIG. 14. Tyle from radiating skeletal fibre (× 100).



Antarctic (Discovery) Exp. Sponges Pl. 16 P. Highley, London

PLATE XVII.

FIG. 1.—*Gellius rudis* Topsent, p. 45.
FIG. 1a.—Section of same (× 5).
FIG. 2.—*Gellius fimbriatus* Kirkp., nat. size, p. 46.
FIG. 2a.—Section of same (× 5).
FIG. 3.—*Gellius pilosus* Kirkp., nat. size, p. 47.
FIG. 3a.—Section (× 5).
FIG. 4.—*Gellius glacialis* var. *nivea* Ridley and Dendy, nat. size, p. 49.
FIG. 5.—*Gellius cucurbitiformis* Kirkp., nat. size, p. 48.
FIG. 5a.—Another specimen of same, nat. size.
FIG. 5b.—Surface (× 65).
FIG. 5c.—Section (× 65).
FIG. 6.—*Sigmaxinyssa phakellioides* Kirkp., nat. size, p. 23.

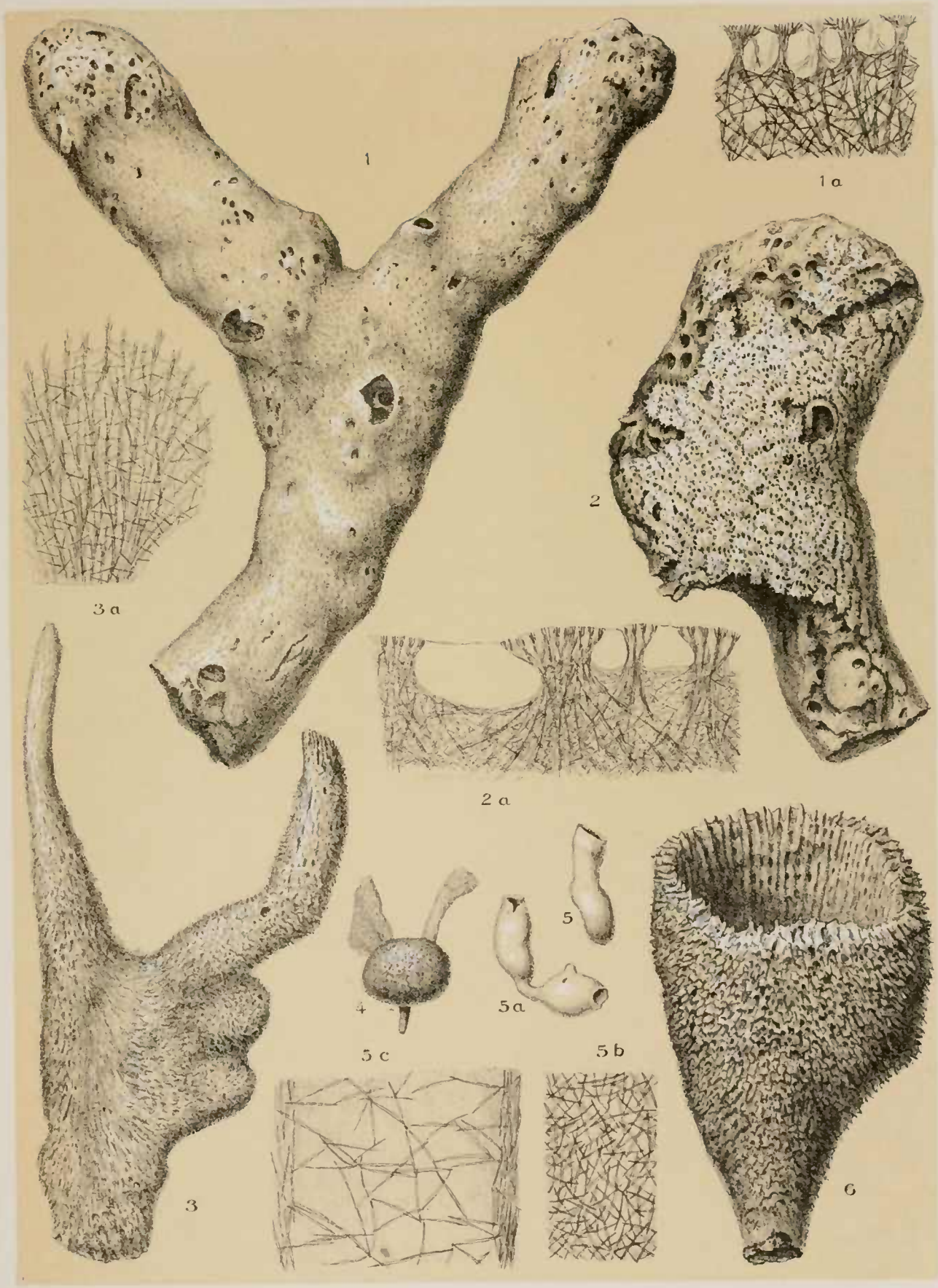

1
1a
2
3a
2a
5
5a
4
5c
5b
3
6

PLATE XVIII.

FIG. 1.—*Reniera scotti* Kirkp., nat. size, p. 52.
FIG. 1a.—Surface, showing pores (× 2).
FIG. 1b.—Vertical longitudinal section (× 8).
FIG. 2.—*Reniera scotti*, another specimen.
FIG. 3.—*Reniera dancoi* Topsent, nat. size, p. 53.
FIG. 4.—*Petrosia fistulata* Kirkp., nat. size, p. 51.
FIG. 4a.—Surface of same (× 4).
FIG. 4b.—Section (× 8).
FIG. 5.—*Oceanapia tantula* Kirkp., fragments of fistulae, p. 52.
FIG. 5a.—Closed end of one of the fistulae (× 4).
FIG. 5b.—Section (× 8).

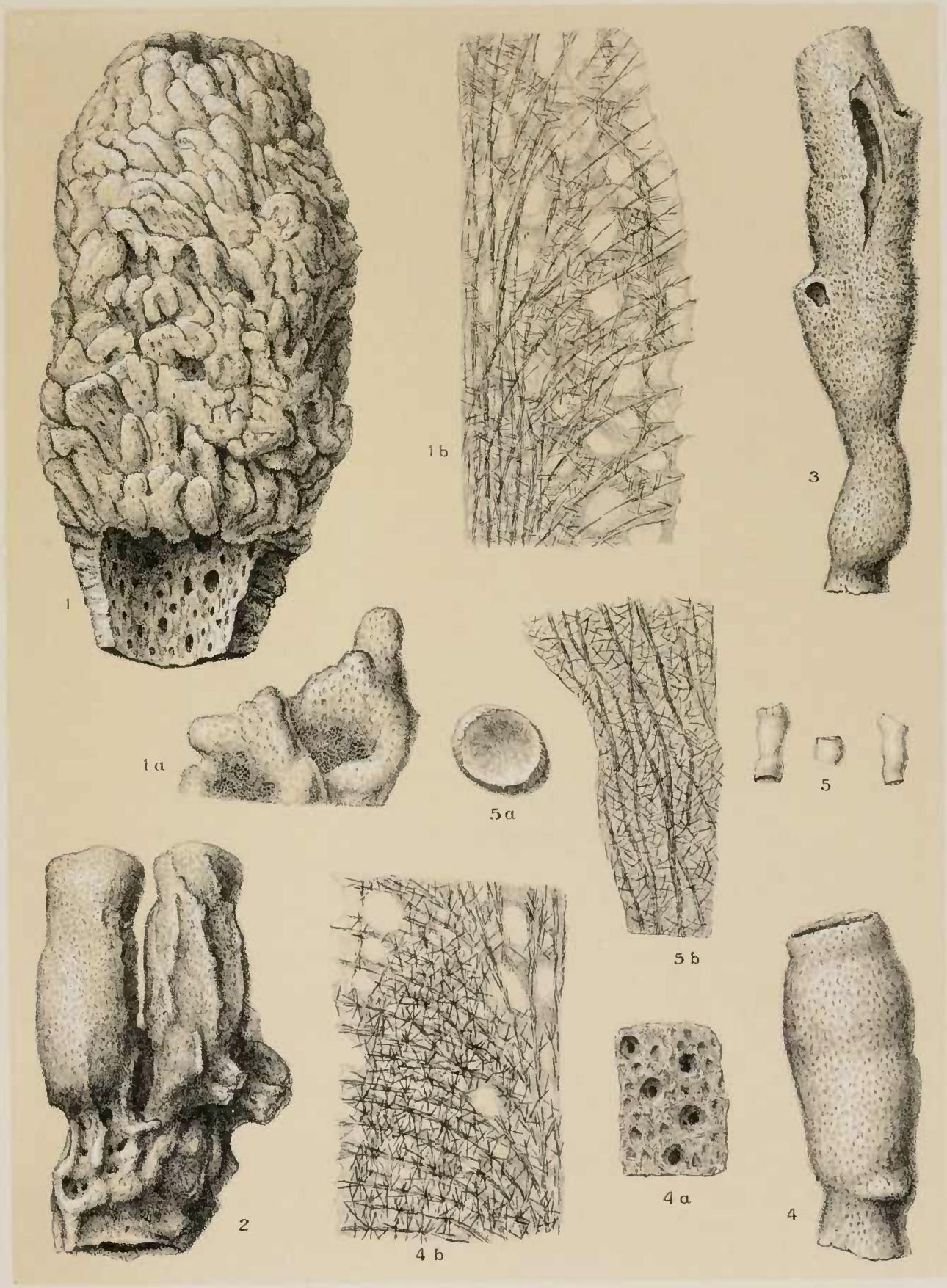

1
1 b
3
1 a
5 a
5
5 b
2
4 b
4 a
4

PLATE XIX.

FIG. 1.—*Desmacidon kerguelenensis* R. & D. var. *antarctica* var. n. Nat. size, p. 37.
FIG. 1a.—Section of same (× 5).
FIG. 2.—*Desmacidon kerguelenensis* R. & D. var. *cactoides* var. n. Nat. size, p. 38.
FIG. 3.—*Desmacidon spinigera* Kirkp. Nat. size, p. 39.
FIG. 3a.—Section of same (× 3).
FIG. 4.—*Desmacidon macandrina* Kirkp. Nat. size, p. 40.
FIG. 4a.—Section (× 2).
FIG. 5.—*Cercidochela lankesteri* Kirkp. Nat. size, p. 42.
FIG. 5a.—Section of same (× 15).
FIG. 6.—*Hoplakithara dendyi* Kirkp. Nat. size, p. 44.
FIG. 6a.—The same (× 8).
FIG. 6b.—Oblique section across the upper half of the specimen (× 25).

3

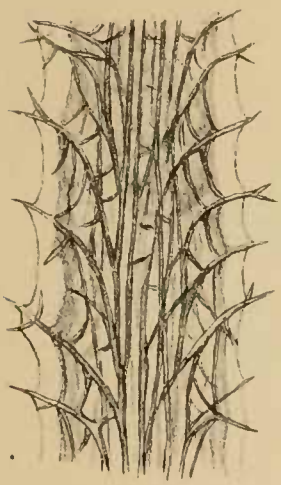
1a

1

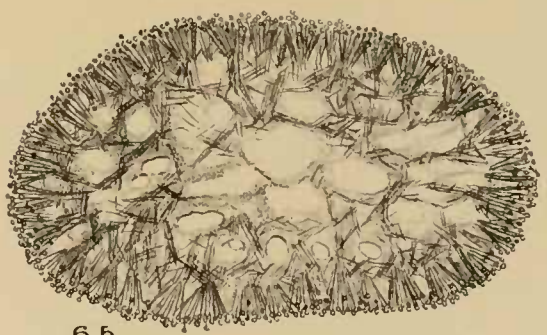
2

6

6a



3a



6b

5

5a

4

4a

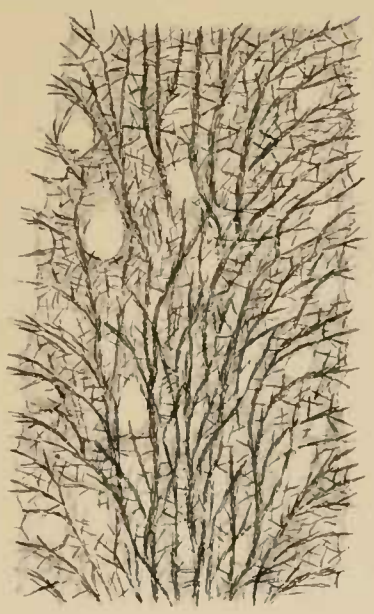


PLATE XX.

FIG. 1. *Mycale acerata* Kirkp. $\frac{2}{3}$ nat. size, p. 36 ; *a*, surface (× 5) ; *b*, vertical section, nat. size.

FIG. 2. *Mycale magellanica* (Ridley). Dermal reticulum showing the uniformly level surface, p. 36.

FIG. 3. *Esperiopsis villosa* (Carter). Nat. size, p. 35 ; *a*, *b*, villous and pilose surface (× 10) ; *c*, vertical section (× 5).

FIG. 4.—*Artemisina apollinis* (R. & D.). $\frac{2}{3}$ nat. size, p. 34 ; *a*, villous process on the surface of the sponge (× 5) ; *b*, surface (× 5) ; *c*, vertical section (× 5).

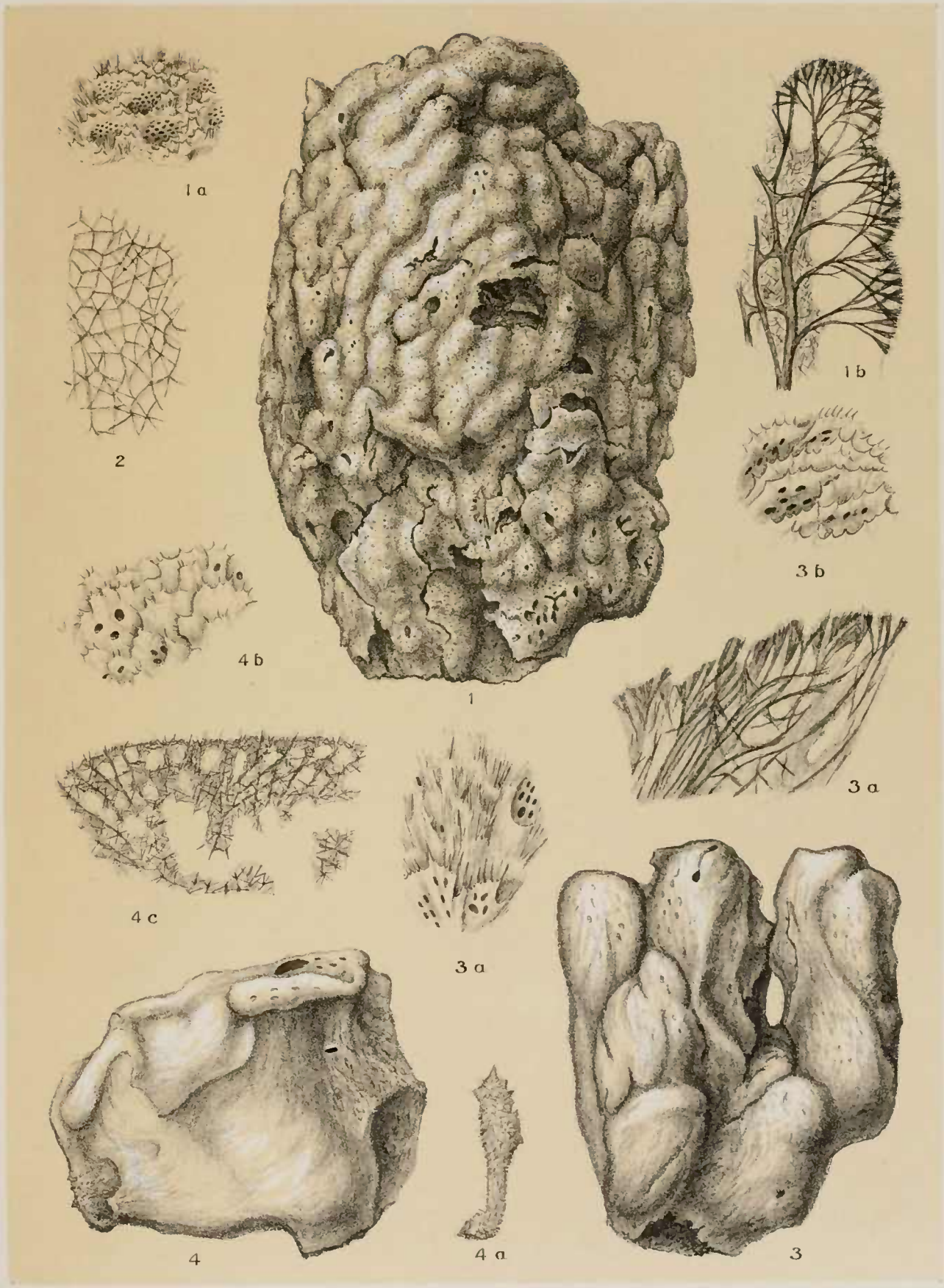

1a
2
4b
4c
1
1b
3b
3a
3a
4a
4
3

PLATE XXI.

FIG. 1.—*Tedania variolosa* Kirkp., sp. n. $\frac{1}{2}$ nat. size, p. 32.
FIG. 1*a*.—Pore areas of same (× 10).
FIG. 2.—*Tedania coulmani* Kirkp., p. 33.
FIGS. 3, 4, 4*a*.—*Iophon radiatus* Topsent. Nat. size, p. 28. 3*a*. closed oscule, × 2.
FIG. 4*b*.—Open oscule of same (× 10).
FIG. 4*c*.—Pore area of same (× 10).
FIGS. 5, 5*a*.—*Iophon spatulatus* Kirkp., nat. size, p. 29.
FIG. 5*b*.—Oscule of same fully contracted, side view (× 10).
FIG. 5*b*^{1}.—Oscule of same, front view (× 10).
FIG. 5*c*.—Pore area of same (× 10).
FIG. 6.—*Iophon flabello-digitatus* Kirkp. $\frac{1}{4}$ nat. size, p. 30.
FIG. 6*a*.—Branch of same, $\frac{1}{2}$ nat. size.
FIG. 6*b*.—Oscule of same, nat. size.
FIG. 6*c*.—Pore area of same (× 6).

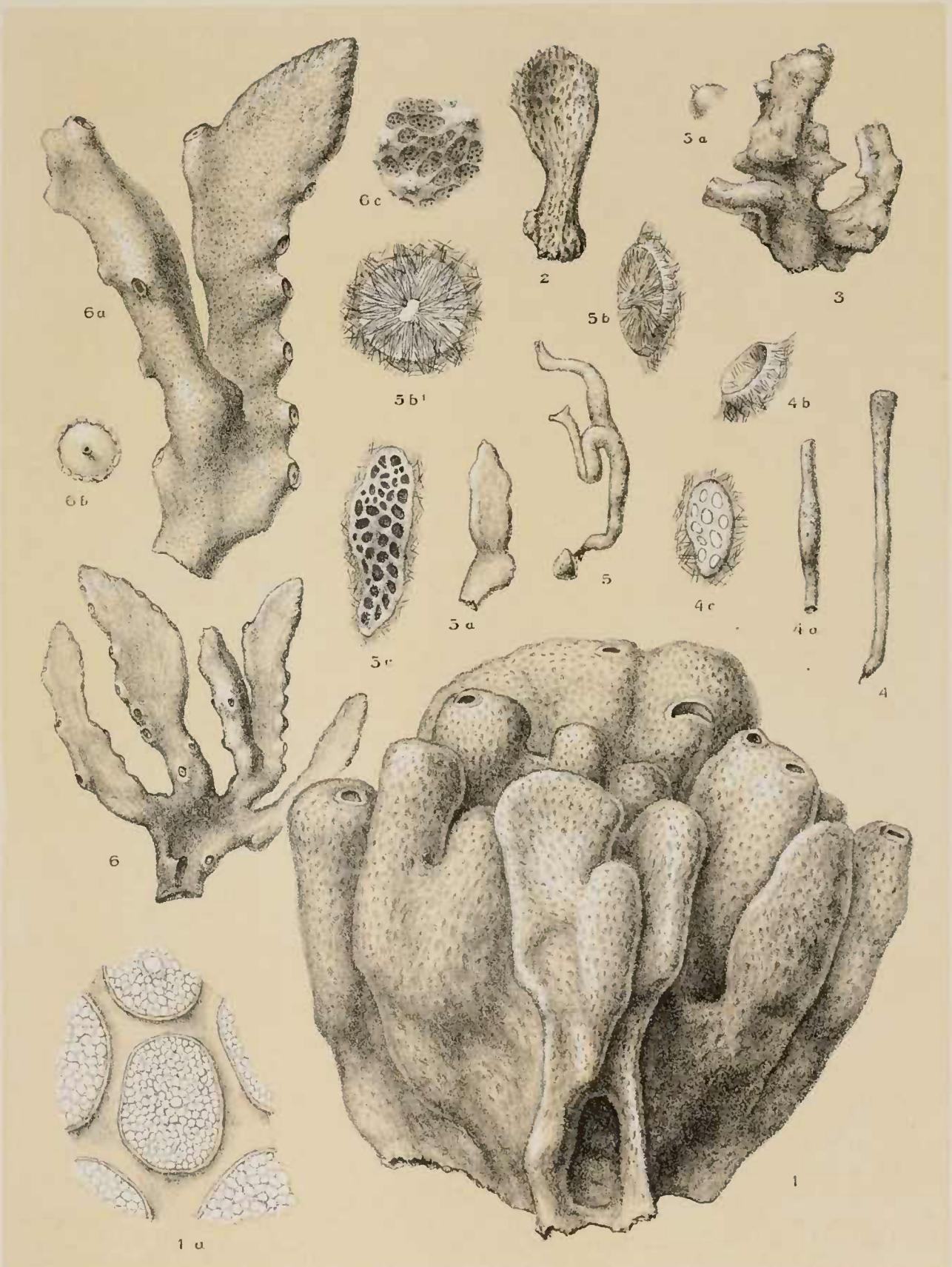

6a
6c
2
3a
3
6b
5b
5b¹
4b
5
4c
4a
4
3c
3a
6
1
1a

PLATE XXII.

FIG. 1.—*Myxilla decepta* Kirkp. on branch of Polyzoon, nat. size, p. 27.
FIG. 2.—The same encrusting a stone, nat. size.
FIG. 2*a*.—Surface of Fig. 2, enlarged.
FIG. 3.—*Hymedesmia areolata* Thiele, $\frac{2}{3}$ nat. size, p. 24.
FIG. 3*a*.—Oscule of same (× 2); Fig. 3*b*, pore area (× 5); 3*c*, vertical section (× 5).
FIG. 4.—*Hymedesmia exigua* Kirkp., nat. size, p. 24.
FIG. 5.—*Hymerrhaphia rufa* Kirkp., nat. size, p. 25.
FIG. 6.—*Ophlitaspongia nidificata* Kirkp., nat. size, p. 25.
FIG. 6*a*.—Section of half of echinated fibre (× 20).
FIG. 7.—*Lissomyxilla hanitschi* Kirkp., nat. size, p. 26.
FIG. 7*a*.—Vertical section of same (× 20).
FIG. 8.—*Axinella supratumescens* Topsent, nat. size, p. 23.
FIG. 8*a*.—Longitudinal vertical section of same (× 20).

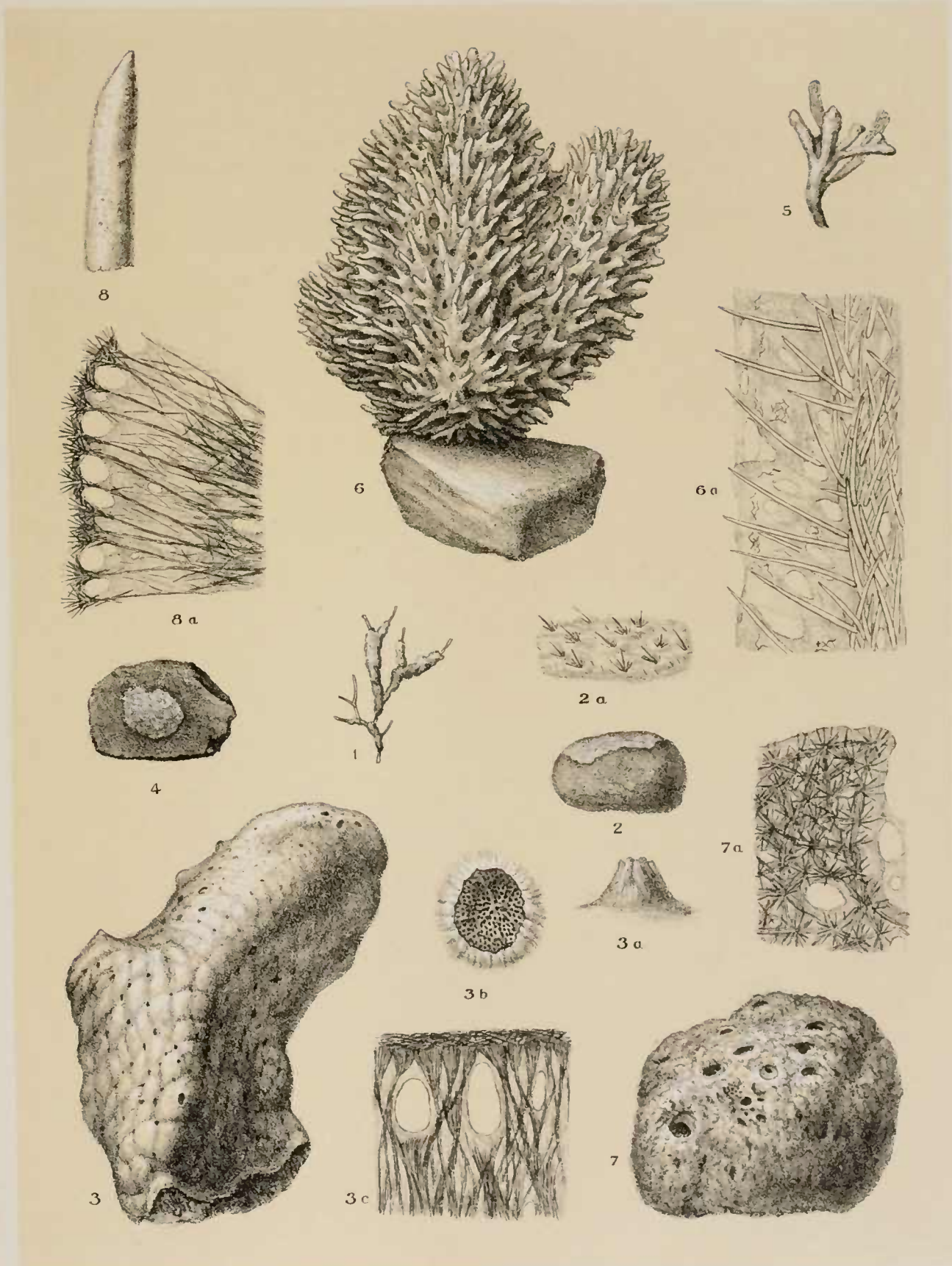

8
6
5
8a
6a
1
2a
4
2
7a
3a
3b
3
3c
7

PLATE XXIII.

FIG. 1.—*Desmacidon kerguelenensis* R. & D. var. *antarctica* var. n.; *a*, oxea (× 160); *b*, side view; b^1, front view of isochela (× 1760); *c*, a variety with smaller palmate tooth (× 1760); *d*, d^1, side and front views of isochela from type of *D. kerguelenensis*, R. & D. (× 1760); p. 37.

FIG. 2.—*Desmacidon kerguelenensis* var. *cactoides* var. n.; *a*, strongylate oxea (× 160); *b*, b^1, front and side views of isochela (× 1760); p. 38.

FIG. 3.—*Desmacidon spinigera* Kirkp.; *a*, *b*, oxeas (× 160); *c*, c^1, side and front views of palmate isochela (× 1760), p. 39.

FIG. 4.—*Desmacidon macandrina* Kirkp.; *a*, oxea (× 160); *b*-b^3, ancorae unguiferae (× 700); p. 40.

FIG. 5.—*Cercidochela lankesteri* Kirkp.; *a*, oxea (× 160); *b*, *c*, *d*, *e*, canonochelae, developmental forms (× 700); *f*, lateral view showing lamellae (× 700); *g*, lateral view of side opposite to lamellae (× 700); *h*, back view, *i.e.*, of the shaft, showing straight line of axial canal within the right edge (× 700); *k*, half of a spicule broken across (× 700); *l*, end view (× 700), p. 42.

FIG. 6.—*Hoplakithara dendyi* Kirkp.; *a*, oxea (× 160); *b*, spherostyles (× 160); b^1, spines on head of *b* (× 700); b^2, end view of a spine; *c*, c^1, c^2, side, front, and back views of a fimbriated placochele, p. 44.

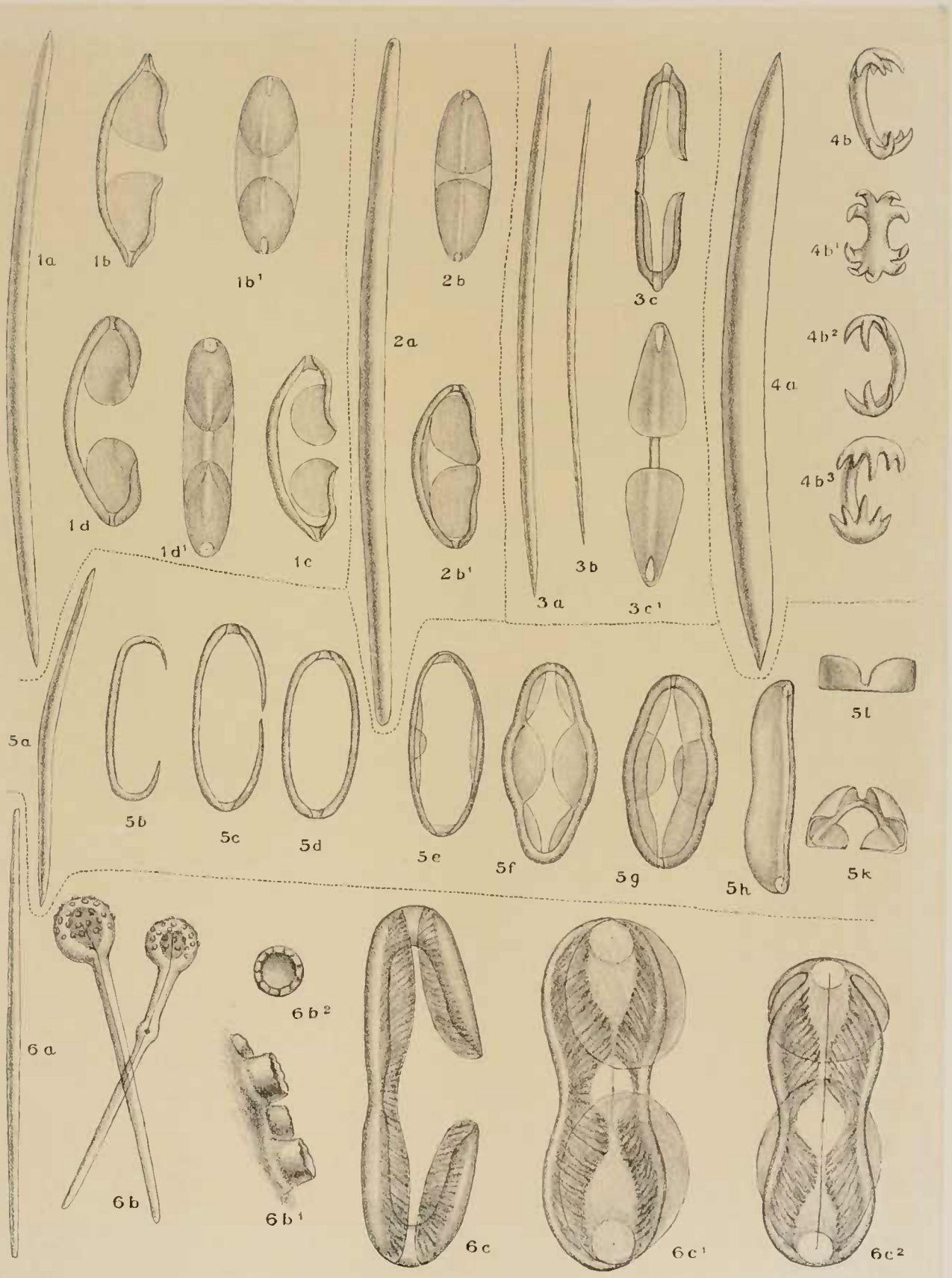

1a
1b
1b¹
1d
1d¹
1c
2a
2b
2b¹
3a
3b
3c
3c¹
4a
4b
4b¹
4b²
4b³
5a
5b
5c
5d
5e
5f
5g
5h
5i
5k
6a
6b
6b¹
6b²
6c
6c¹
6c²

PLATE XXIV.

FIG. 1.—*Gellius rudis* Topsent ; *a*, oxea (× 160) ; *b*, sigma (× 700), p. 45.

FIG. 2.—*Gellius fimbriatus* Kirkp. ; *a*, oxea (× 160) ; *b*, sigma (× 700), p. 46.

FIG. 3.—*Gellius pilosus* Kirkp. ; *a*, oxea (× 160) ; *b*, *c*, sigmata (× 700), p. 47.

FIG. 4.—*Sigmaxinyssa phakellioides* Kirkp. ; *a*, oxea (× 160) ; *b*, sigma (× 700) ; *c*, toxon (× 160), p. 23.

FIG. 5.—*Gellius cucurbitiformis* Kirkp. ; *a*, oxea (× 160) ; *b*, sigma (× 700), p. 48.

FIG. 6.—*Reniera scotti* Kirkp. ; oxea (× 160), p. 52.

FIG. 7.—*Petrosia fistulata* Kirkp. ; oxea (× 160), p. 51.

FIG. 8.—*Oceanapia tantula* Kirkp., sp. n. ; *a*, strongyle (× 160) ; *b*, style (× 160) ; *c*, amphityle (× 160) ; *d*, long smooth rhaphide (× 160) ; *e*, shorter spined rhaphide (× 160) ; e^1, the same (× 700), p. 50.

FIG. 9.—*Esperiopsis villosa* (Carter) ; *a*, palmate isochele, larger kind (× 700) ; *b*, smaller kind, side view (× 700) ; b^1, front view (× 700) ; b^2, front view (× 2900), p. 35.

FIG. 10.—*Mycale acerata* Kirkp. ; *a*, oxea (× 160), p. 36 ; *b*, palmate anisochele, side view (× 700) ; b^1, the same, front view (× 700) ; *c*, a variety with a spike on the margin of the central tooth of the smaller end (× 700) ; *d*, smaller anisochele, side view (× 700) ; d^1, front view of same (× 700) ; *e*, trichodragmata (× 160) ; e^1, a rhaphide (× 700).

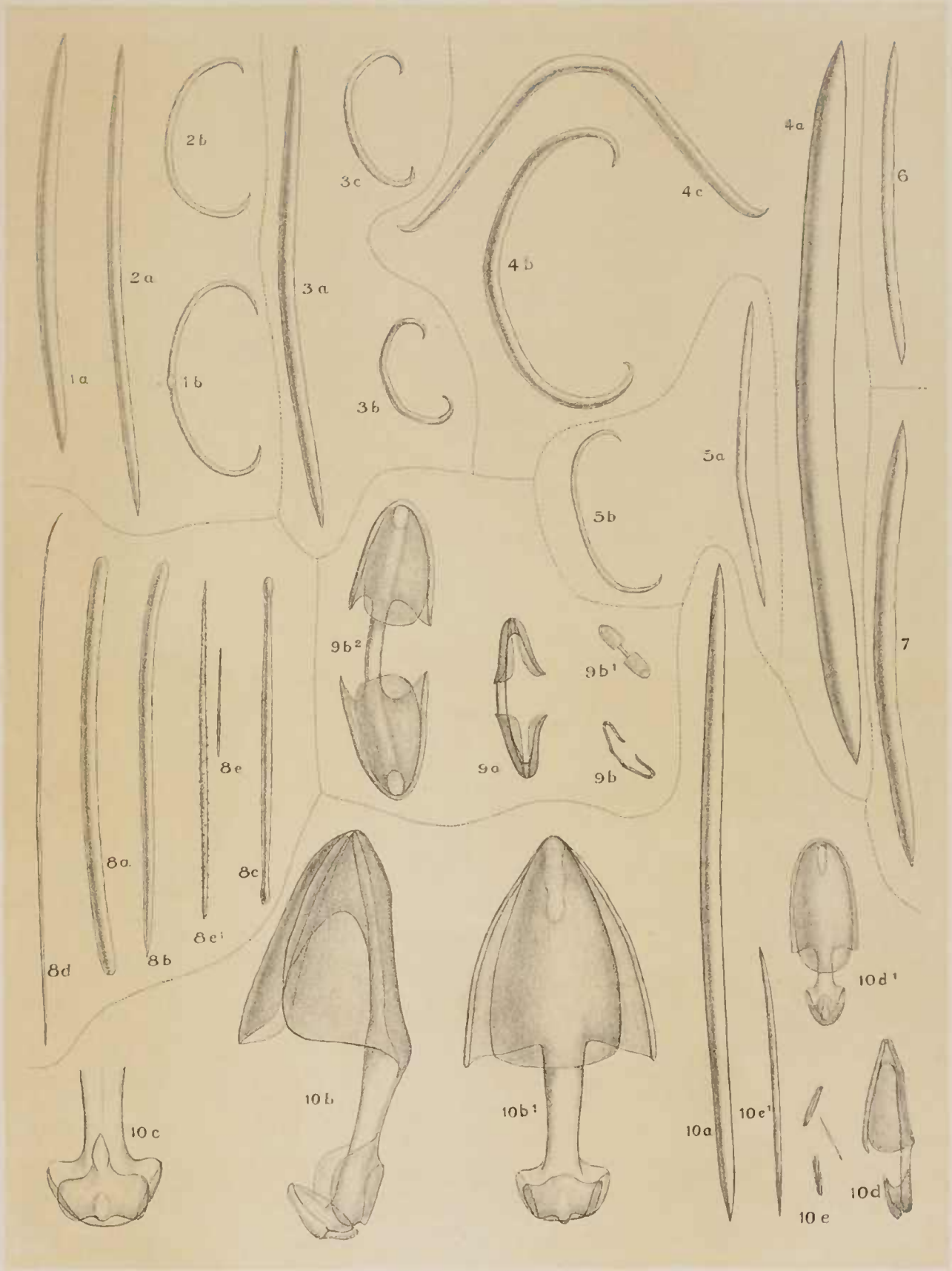

1a
2a
2b
1b
3a
3c
3b
4c
4b
4a
6
5a
5b
7
9b2
9b1
9a
9b
8e
8a
8c
8b
8e1
8d
10b
10b1
10a
10e1
10d1
10c
10e
10d

PLATE XXV.

FIG. 1.—*Tedania variolosa* Kirkp. ; *a*, smooth style (× 160) ; *b*, ectosomal strongyle (× 160), p. 32.

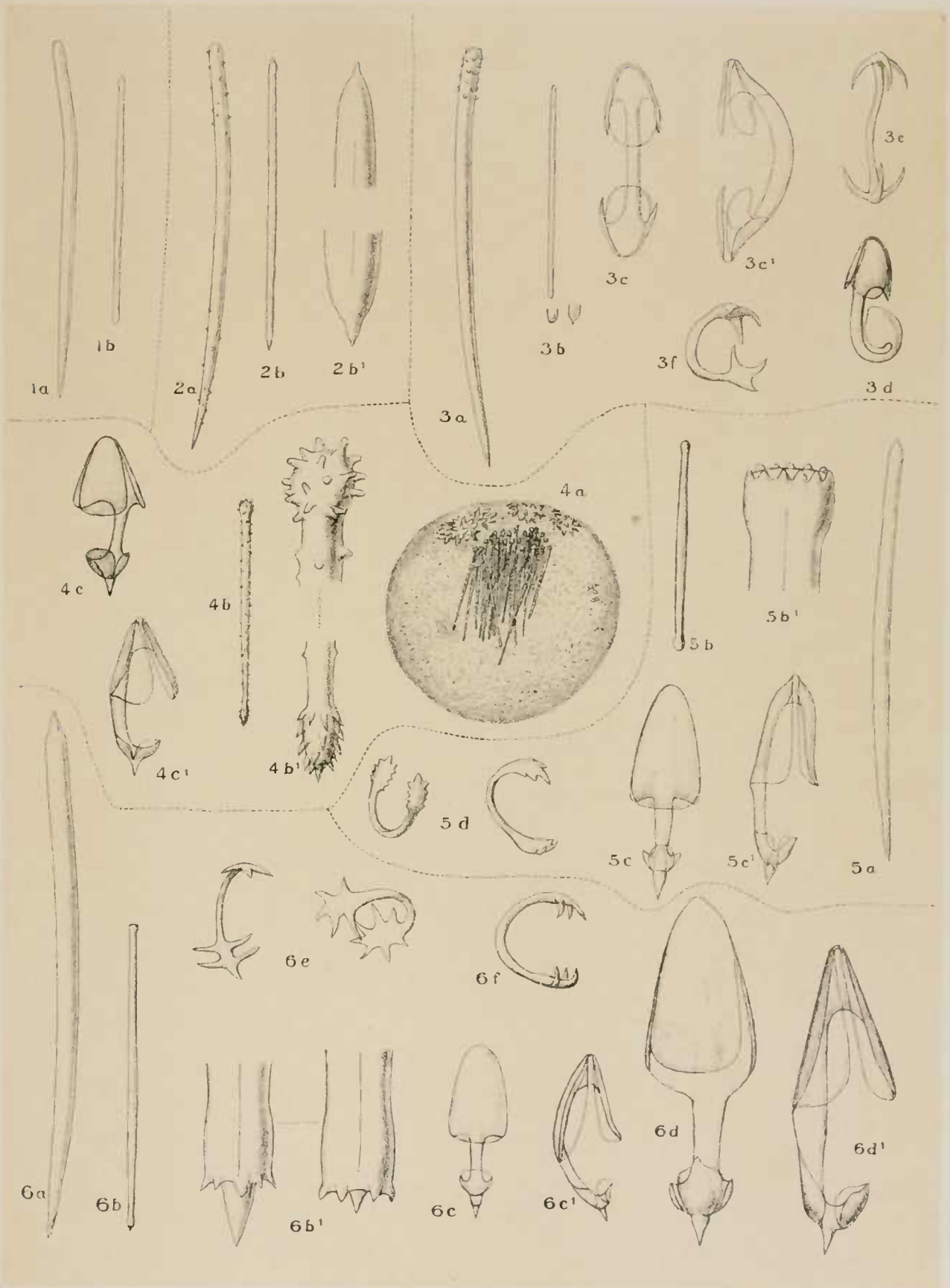
FIG. 2.—*Tedania coulmani* Kirkp. ; *a*, slightly spined style (× 160) ; *b*, ectosomal tornote (× 160) ; b^1, ends of same (× 700), p. 33.

FIG. 3.—*Myxilla decepta* Kirkp. ; *a*, acanthostyle (× 160) ; *b*, ectosomal strongyle ; *c*, front view ; c^1, side view of arcuate isochele (× 1760) ; *d*, the same, with one end spoon-shaped (× 1760) ; *e*, isancora unguifera (× 1760) ; *f*, chelate bipocillum (× 1760), p. 27.

FIG. 4.—*Iophon radiatus* Topsent ; *a*, part of embryo (× 160) ; *b*, amphityle (× 380) ; *c*, the same (× 1760) ; *c*, front view ; c^1, side view of palmate anisochele (× 1760), p. 28.

FIG. 5.—*Iophon spatulatus* Kirkp. ; *a*, smooth, modified acanthostyle (× 160) ; *b*, amphityle (× 160) ; b^1, end of the same (× 1760) ; *c*, front view ; c^1, side view of palmate anisochele (× 1760) ; *d*, spathulate bipocilla (× 1760), p. 29.

FIG. 6.—*Iophon flabello-digitatus* Kirkp. ; *a*, smooth, modified acanthostyle (× 160) ; *b*, sub-amphityle (× 160) ; b^1, ends of same (× 1760) ; *c*, c^1, front and side views of smaller palmate anisochele ; *d*, d^1, ditto of larger anisochele (× 1760) ; *e*, spathulate bipocilla (× 1760) ; *f*, (?) chelate bipocillum (× 1760), p. 30.



Antarctic (Discovery) Exp. Sponges Pl 25 P. Highley, London.

PLATE XXVI.

FIG. 1.—*Iophon flabello-digitatus* Kirkp. (specimen incrusting an Ophiurid): *a*, embryo with bundle of amphityles and ring of anisocheles (× 100): *b*, tyle of embryo (× 380): b^1, the same (× 1760); *c*, c^1, anisochele of embryo, front and side view (× 1760), p. 30.

FIG. 2.—*Hymedesmia exigua* Kirkp.; *a*, tylote (× 160): a^1, the same (× 380); *b*, acanthostyle (× 160); *c*, pluridentate isancora spatulifera (× 1760); c^1, the same from above: *d*, *e*, the same, with central alae on shaft (× 1760), *f*, sigma (× 1760), p. 24.

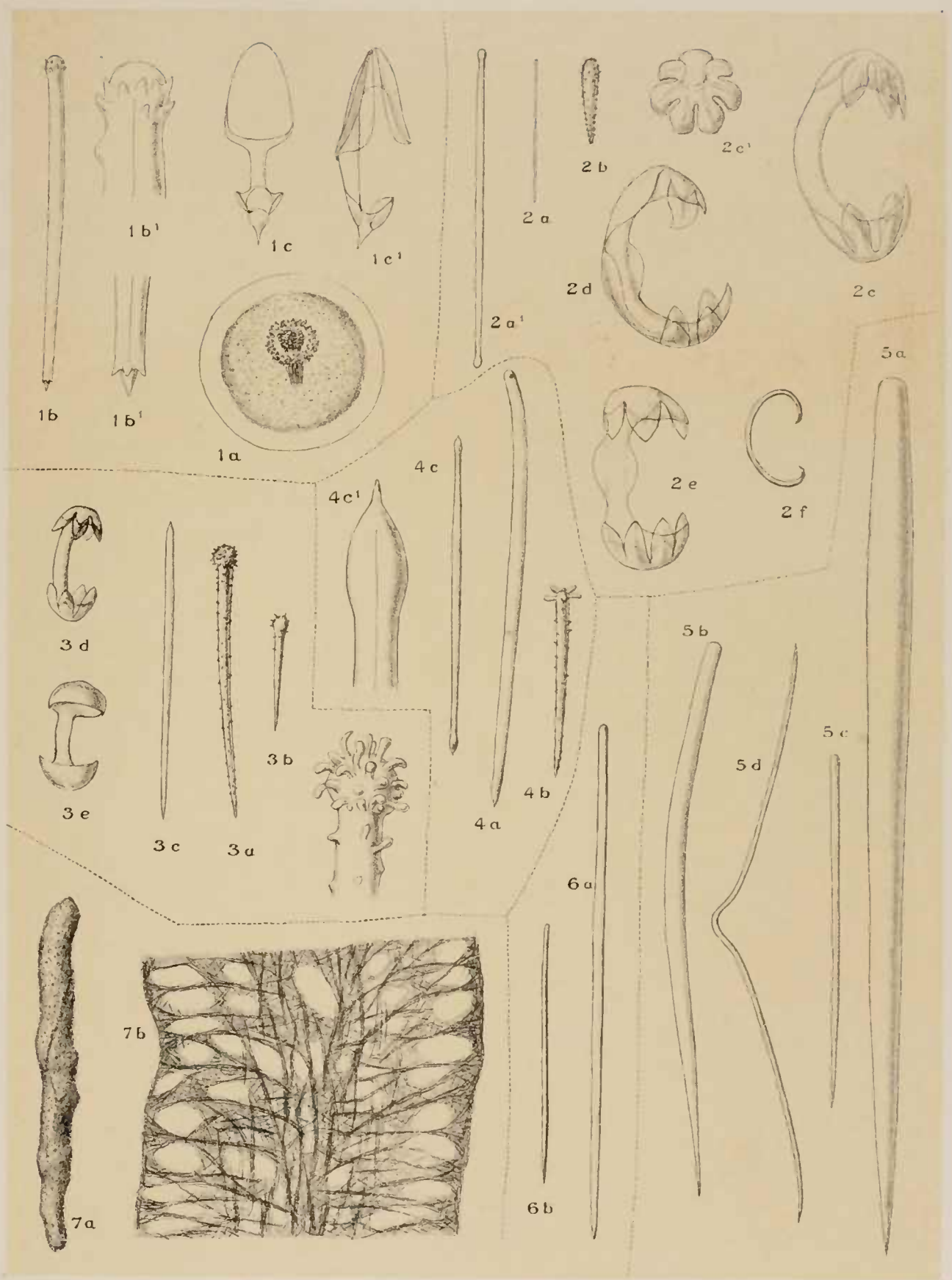
FIG. 3.—*Hymerrhaphia rufa* Kirkp.: *a*, larger acanthostyle (× 160); *b*, smaller acanthostyle (× 160): *c*, ectosomal anisotornote (× 160); *d*, isancora spatulifera (× 1700); *e*, a variety of the same with cup-like ends (× 700), p. 25.

FIG. 4.—*Lissomyxilla hanitschi* Kirkp.: *a*, smooth style (× 160): *b*, echinating acanthostyle (× 160): *c*, ectosomal amphityle (× 160); c^1, end of same (× 1760), p. 26.

FIG. 5.—*Ophlitaspongia nidificata* Kirkp.; *a*, smooth style (× 160); *b*, a smaller curved style (× 160); *c*, a still smaller straight (? ectosomal) style (× 160); *d*, toxon (× 160), p. 25.

FIG. 6.—*Axinella supratumescens* Topsent; *a*, large style (× 160); *b*, small ectosomal style (× 160), p. 23.

FIG. 7.—*Pseudosuberites hyalinus* (Ridley and Dendy); *a*, specimen, natural size; *b*, vertical longitudinal section (× 10), p. 21.


1b
1b¹
1b¹
1a
1b¹
1c
1c¹
2a¹
2a
2b
2c¹
2c
2d
2e
2f
5a
4c
4c¹
4a
4b
3d
3e
3c
3a
3b
5b
5d
5c
6a
6b
7a
7b