PORIFERA.

By R. Kirkpatrick.

The Sponges brought home by the 'Discovery' from the Antarctic Region were obtained mostly from two localities, viz., from 183 mètres (100 fathoms) off Coulman Island, about 200 miles north of the Winter Quarters, and from the neighbourhood of the Winter Quarters (Lat. 77° 49′ S., Long. 167° 7′ 4″ E.), from depths ranging from 9 m. to 366 m. (5–200 fms.); one specimen, a new species of Hexactinellida, came from 914 m. (500 fms.) off Mount Erebus, and another, also a new species of the same group, was dredged from 464 m. (254 fms.) when the ship was crossing the Antarctic Circle, on the voyage home; and, lastly, a few Sponges were dredged near the edge of the great Ice Barrier, some degrees eastward of Winter Quarters.

The specimens were procured by means of dredges of various kinds, such as trawls and D-nets, sometimes with tangles attached. Wherever possible, the apparatus was lowered in open water, but after the ship was frozen in, holes were made in the ice; and it was necessary to adopt elaborate precautions to prevent the dredges being lost and to enable them to be dragged along the bottom. By these means there were obtained a large number of specimens, which afford testimony to the indefatigable industry and resourcefulness of Mr. T. V. Hodgson, who was in charge of the dredging operations.

Mr. Hodgson, in his Preliminary Report on the biological collections (**3**, p. 397), observes, "A predominant feature in the fauna was the enormous quantity of sponges and sponge débris, anywhere near the 20-fathom line sponges and sponge débris forming the bulk of the haul as a rule."

The bulk of the collection so far as concerns the size and number of specimens is made up mainly of Tetractinellida and Hexactinellida. There are fifty-nine specimens of Tetractinellid Sponges, some of them of large size, belonging to four species; the 'Belgica' Antarctic Expedition dredging in the neighbourhood of the meridian of 90° W. found none belonging to this group. The Monaxonellida are represented by forty-three species, and the Calcarea by twenty-four species. There are no Keratosa or Horny Sponges.

With the exception of two dried specimens and of a few in formalin, the collection is preserved in strong spirit.

I.—HEXACTINELLIDA.

(7 Plates.)

The Hexactinellid Sponges, comprising thirty-four specimens and sixteen macerated fragments, all belong to one Family, the *Rossellidæ*. The specimens represent five genera, of which three are new, and ten species, of which eight have not been described before. The following is a list of species with depths and localities:—

FAMILY ROSSELLIDÆ, F. E. Schulze.

(Sub-Family Rossellinæ, F. E. Schulze.)

1. *Hyalascus hodgsoni*. Off Mount Terror, 914 mètres (500 fathoms).
2. *Rossella antarctica* Carter. W.Q., 238 m. (130 fms.).
3. *Rossella podagrosa*. W.Q., 18–55 m. (10–30 fms.).
4. *Rossella racovitzæ* Topsent. W.Q., 18–36 m. (10–20 fms.).
5. *Rossella hexactinophila*. Antarctic Circle, Long. 155° 21′ E., 464 m. (254 fms.).
6. *Aulorossella pilosa*. Off Coulman Island, 183 m. (100 fms.).
7. *Aulorossella levis*. W.Q., 18–325 m. (10–178 fms.).
8. *Aulorossella longstaffi*. W.Q., 238 m. (130 fms.).
9. *Anaulosoma schulzii*. W.Q., 36–75 m., (20–41 fms.).

Sub-Family Lanuginellinæ, F. E. Schulze.

10. *Anoxycalyx ijimai*. W.Q., 329 m. (180 fms.).

Two species in the above list have been described before: one of these, *Rossella antarctica* Carter (**2**, p. 114), was dredged by Sir James Clark Ross in Lat. 74° 30′ S. Long. 75° E., 549 m. (300 fms.), during the voyage of discovery to the Antarctic Regions in 1839–43; the other, *Rossella racovitzæ* Topsent (**11**, p. 33), was obtained in 1897–99 by the 'Belgica' from Lat. 70°–71° S., Long. 80°–87° W., 450–569 m. (267–310 fms.).

To the one species previously known from the Antarctic, the 'Belgica,' dredging in Lat. 70°–71° S., Long. 80°–89° W., added the following nine:—

1. ? *Caulophacus* sp. 450 m. (246 fms.).
2. *Rossella nuda* Topsent. 430 m. (235 fms.).
3. *Rossella racovitzæ* Topsent. 450–569 m. (246–311 fms.).
4. *Bathydorus spinosus* F. E. Schulze. 569 m. (311 fms.); also from Penguin Island, 2926 m. (1600 fms.) ['Challenger'].
5. *Rhabdocalyptus australis* Topsent. 450 m.
6. *Farrea occa* (Bowerbank) Carter. 450 m.
7. *Eurete gerlachei* Topsent. 450–550 m. (246–301 fms.).
8. *Chonelasma* sp. 450–500 m. (246–273 fms.).
9. *Uncinatera plicata* Topsent. 430–500 m. (235–273 fms.).

All of the eighteen Antarctic species belong to the Hexasterophora, not one representative of the Amphidiscophora having been found hitherto.

In connection with bathymetrical distribution it is interesting to note that specimens of four of the species obtained by the 'Discovery' come from comparatively shallow water, from depths ranging from 18–75 m. (10–41 fms.).

A curious phenomenon remains to be noticed. On October 24th, 1903, Lieutenant Armitage's sledge party found a dried macerated Hexactinellid Sponge and also tufts of spicules being "blown about by the wind amongst the erratics on the ice." The existence of recent Hexactinellid Sponges on the surface of the earth and brought there by natural agencies is a very unusual occurrence; for, generally, these Sponges live in too deep water to be cast up by storms. In the present instance, probably the sea bottom was scooped up by ice, and the material afterwards floated up on detached masses of ice. Both the specimen and tufts of spicules belong to a new species, viz., *Aulorossella levis*, common in shallow water up to 20 fathoms.

Abbreviations and Explanations.

(1) W.Q. means "Winter Quarters."

(2) A Roman and an Arabic numeral in brackets mean number of plate and figure; thus (I. 6) means Plate I., fig. 6.

ORDER HEXACTINELLIDA, F. E. Schulze.

Sub-order Hexasterophora, F. E. Schulze.

Family Rossellidæ, F. E. Schulze.

Sub-family Rossellinæ, F. E. Schulze.

Hyalascus, Ijima.

Hyalascus hodgsoni.

(Plate III. fig. 1, and Plate IV. figs. 1 a–g.)

Sponge an elongated, slightly flattened oval sac, broadest a little above the base, with an oval orifice with thin, soft, felt-like, unarmed edge.

Surface with a few small, pointed, tuft-like conuli; with oxydiactin, and rarely oxypentactin pleuralia. With rounded base provided with short scattered bundles of basalia (probably forming a root-tuft in complete specimens). Gastral membrane continuous (to the naked eye). Autodermalia hexactins, rarely pentactins; hypodermalia oxypentactins with smooth surface. Gastralia slender hexactins. Intermedia holoxyhexasters,* hemioxyhexasters, rarely monoxyhexasters*; discohexasters, and microdiscohexasters. Colour (in spirit), pale buff; consistence rather soft and flexible, but firm enough for the walls to be self-supporting when out of spirit.

Description of the specimen. The single specimen representing the new species appears to be in an incomplete state, and has probably been denuded of many pleuralia,

* The term monoxyhexaster is used for oxyhexasters in which all the secondary or terminal rays are single, hemioxyhexasters (Ijima) being oxyhexasters in which only one, or some, but not all, of the terminal rays are single, and holoxyhexasters oxyhexasters with all the primary rays ending in more than one terminal ray; similarly, the terms holodiscohexaster, hemidiscohexaster (Schulze), and monodiscohexaster explain themselves. Prof. Ijima's view (**4**, p. 118, footnote) that the first kind of spicules, viz., monoxyhexasters, should be designated "hexasters" and not "hexactins" (Schulze, **9**, pp. 8–11) seems to me justifiable. Firstly, the axial canals are confined to the basal portion of each ray (primary ray) and do not extend to the terminal portion (secondary ray). I have examined numerous monoxyhexasters and some monodiscohexasters, and by using a 12-inch oil immersion and by adjusting the light, I have invariably found that the axial canal comes to an abrupt end not far from the

and possibly also of a root-tuft. A few external (? velar) hypodermal oxypentactins are present on the surface, and little tufts of broken-off basalia project from the rounded base of the specimen. There may be a well developed root-tuft in complete specimens; further doubts on this point were suggested by the condition of four specimens of a species of *Craniella* from the Antarctic, three being almost smooth at the lower end, owing to the root-tuft having been detached in dredging, whereas the fourth has a large root-tuft.

The dimensions of the specimen are as follows:—Height, 14cm.; greatest breadth, 6cm.; diameter of orifice, which is slightly torn, about 4cm.; greatest thickness of wall, 1·1cm.

The lumen of the deep gastral cavity is occupied by numerous scattered internally projecting pleuralia, which have been driven in from the outside. The circular openings of the ostia, about 1·5mm. in diameter, are clearly visible beneath the dermal layer; also the slightly larger postica are perceptible beneath the gastral layer, which roofs them over with a fine lace-like reticulum.

Skeleton. The skeletal framework is formed of bundles of diactins; there are no large hexactins.

Spicules. The principalia are oxydiactins, about 7000 × 80μ in size, with fine tapering ends smooth or only very slightly spined. A much smaller kind, 1400 × 18μ, separate, and not in bundles, with roughened ends and four central knobs, is common beneath the dermal and gastral membranes.

The **autodermalia** (IV. 1a) are spined hexactins, each ray being 131μ in length and 15·5μ broad at the base, slightly tapering to a blunt extremity; pentactins (IV. 1b), with the odd ray proximal, occur, but very rarely.

The **hypodermalia** (IV. 1d, d^1) are oxypentactins with slender smooth tapering paratangentials, each about 2700 × 40μ, the rays being either orthotropal or anorthotropal.

The **autogastralia** (IV. $1d^2$) are spined hexactins with slightly longer and more slender and sharply pointed rays than the autodermalia, each ray being 136 × 7·5μ.

The **intermedia.** Holoxyhexasters* (IV. 1e) and hemioxyhexasters (IV. $1e^1$), varying in diameter from 100 to 120μ, are common. Monoxyhexasters* (IV. $1e^2$), 108μ in diameter, occur only rarely. Medium-sized holodiscohexasters (IV. 1f, f^1), from 80–100μ in diameter, are also rare; the short slender primary rays, about 7μ in length,

base of the ray, and that the remaining portion of the ray is devoid of any trace of an axial canal, that it is, in fact, more of the nature of a spine. Secondly, in many instances, all the transitions can be traced from holohexasters, through several grades of hemihexasters to monohexasters. In a preparation of *Rossella racovitzæ* Topsent, for example, these transitions can be traced in a crowd of discohexasters, the monodiscohexasters having short thick primary rays with the axial canal extending only to the point where the thick portion (primary ray) joins the more slender solid terminal portion. To call such spicules as these last discohexactins would be to lose sight of the fact that they clearly have six primary and six single secondary rays, for the latter do not lose the character of being secondary simply because they are single. A genuine hexactin would, by its definition, have no secondary rays. The designation "hexactinose," used by Ijima, would, perhaps, be better written "hexactinoid," or hexactin-like, but even this term is not without objection, since such a spicule with its primary and secondary rays is seen, under a high power, not to resemble a true hexactin. Accordingly the prefixes "holo-," "hemi-," and "mono-," added to "oxy-" or "disco-" hexaster, are suggested as indicating and defining the form and relationship of these spicules. The following figures show the limitation of the axial divide into two or three terminals tipped with toothed discs. Microdiscohexasters (IV. 1g), 43μ in diameter, have slender primary rays, each $6 \cdot 5\mu$ in length, ending in a plano-convex capitulum,† from the distal convex surface of which are given off disc-tipped terminal rays of two lengths.

This species is placed under *Hyalascus* on account of the absence of calycocomes, this negative character being the chief one which separates the genus from *Rossella.*

The three other known species of *Hyalascus* (**5**, p. 87), viz., *H. sagamiensis* Ij., *H similis* Ij., and *H. giganteus* Ij., are Japanese. They are all vase- or sack-shaped ; the first-named species is vase-shaped, has an orifice with everted lips, and is much contracted below ; the second, which Ijima regards as possibly identical with the first, has a basal stalk ; the third is in the form of a large flattened sac with a plain orifice. In all the Japanese species the autodermalia are mainly pentactins, but in the Antarctic species these spicules are mainly hexactins, pentactins being very rare.

Near the lower end of the sponge is a small conical elevation about $1 \cdot 3$ cm. in height, with a central axis of diactins. The autodermalia have here undergone a remarkable change (IV. $1c$–c^2) ; they have become more or less fused together, and have lost one or more of their rays, while the spines resemble the flat articular surfaces and tubercles on the desmas of Lithistid Sponges. All the stages of transition can be traced from a slightly modified pentactin to a long desma-like form, such as that figured in Plate IV., fig. $1c^2$. Probably these changes have resulted from irritation set up by contact with some foreign body, just as basidictyonalia form at the point of attachment of many of the Hexactinellida. On another part of the dermal surface is a small round patch, $1 \cdot 5$ cm. in diameter, lighter in colour than the rest of the surface, occupied by small densely crowded autodermalia. Ijima (**5**, p. 90) refers to similar patches on the gastral surface of *H. sagamiensis*, " due to excessive local accumulations of gastralia."

Dredged from 914 mètres (500 fathoms) off Mount Erebus.

Rossella antarctica.

(Plate I., figs. 1 to 4, and Plate IV., figs. 2a to g, and 3a to k.)

1872 *Rossella antarctica*, Carter (**1**, p. 409, pl. xxi.).
1875 ,, ,, (**2**, p. 114, pl. x., fig. 4).
1887 ,, F. E. Schulze (**6**, p. 139, pl. lv.).

Three specimens of this species were obtained. They were brought up in the same haul from Winter Quarters, No. 10 hole, 130 fms. The specimens show a

canals to the primary rays, and the spine-like nature of the secondary rays:—Pl. IV., fig. $2d^{4-5}$ shows an hexactin-like monoxyhexaster with the axial canals extending but a very short distance from the centre, the rest of each ray being solid. Pl. VII., fig. 1h, shows a monodiscohexaster with the axial canals extending only to the end of the basal thick portion of each ray. Pl. IV., fig. $3d^6$ shows three spheroidal reduced hexasters in which the primary rays have disappeared as rays, while the secondary rays remain as one or more spines, or even spheres, attached to the central sphere, the axial canals being confined to the central node or sphere. Pl. IV., fig. $3d^4$ (on the left edge of the plate) shows a monoxyhexaster in which one of the six secondary rays is becoming reduced, this being a stage on the way to becoming a spheroidal reduced hexaster.

† The descriptive term "capitulum" is suggested for the enlargement or swelling at the distal end of the primary rays of calycocomes, aspidoplumicomes, strobilocomes, microdiscohexasters, etc. The shape of the "capitulum" in these spicules calls to mind the receptaculum and capitulum of the Compositæ.

considerable amount of variation, and will be described separately as A, B, and C. Had they not come from the same spot, I would probably have regarded B and C as representing a variety of the typical form. All the specimens possess a well-developed root-tuft, therein differing from those obtained from Kerguelen and other localities in the Southern Indian Ocean, and from near the mouth of the Rio de la Plata in the South Atlantic. Prof. Schulze mentions in the 'Challenger' Report (p. 139) that he had never found the loose root-tuft, which Carter represents in his diagrammatic figure (**2**, pl. x., fig. 4), and he considers this modification in the original specimen to be conditioned by the looser nature of the substratum.

Prof. Ijima observes (**5**, p. 5) that "a case of one and the same Hexactinellid species being firmly fixed when growing on a hard substratum, but producing a root-tuft when living on a soft bottom, has never as yet been shown to exist." The 'Discovery' and 'Challenger' specimens of *Rossella antarctica* seem to me to furnish instances of specimens of the same species being fixed solidly or by a root-tuft in accordance with the nature of the bottom. In spite of the considerable range of variation in bodily form, mode of fixation and spiculation, the Antarctic and the more northerly forms appear to me to come within the limits of one and the same species, but I regard the latter as belonging to a variety—*var. solida.* The microdiscohexasters, too, are considerably larger in the typical Antarctic specimens than in the northern variety. If the anchor spicule figured by Schulze (**6**, pl. lv., fig. 12) really belongs to the specimen from which it was obtained, its presence suggests that the sponge, now solidly fixed without a root-tuft, was derived from a form with such an appendage.

Specimen A.—(Plate I., fig. 1, and Plate IV., fig. 2 a–g.)

This, which is the smallest of the three specimens, closely resembles the original one obtained by Sir James Ross and diagrammatically figured by Carter (**2**, pl. x., fig. 4). The total length is 7 cm., the body being 4 cm., the root-tuft 2 cm., and the oral fringe nearly 1 cm. in length. The greatest breadth is 3 cm. The velum is about 7 mm. from the surface of the body. Numerous oval or pyriform buds, each about 2 mm. in length, are present amidst the dense tangle of the velum. The orifice is narrow, oval, about 1 cm. in length, and acute-angled at each end. The diactin marginalia surrounding it form a sloping palisade which meets in the middle line above, the inclination increasing from without inwards. The root-tuft, which encloses débris of worm-tubes, fragments of Polyzoa, etc., is formed of pentactins in the shape of four-pronged anchors with thick curved prongs. The surface of the body is level, though here and there small, barely perceptible conuli occur. The **skeleton** is mainly formed of long wavy bundles of slender diactins.

Spicules.—The **principalia** are long slender diactins, often with roughened, rounded or bulbous ends. There are also parenchymal regular hexactins (IV., 2a) scattered about. The **marginalia** are sharp-pointed oxydiactins 1·5 cm. long and 160 μ thick. The **basalia** are long, slender, four-pronged anchors 4 cm. in length, with curved prongs 459 μ in length. The **autodermalia** (IV., 2 b–b^2) are hexactins ($2b^1$), pentactins (2b), and rarely stauractins ($2b^2$), each ray being 75 $\times$ 11 μ, wholly spined, nearly cylindrical, and with blunt end. The pentactins have a well-developed distal spiny knob. The **hypodermalia** are slender oxypentactins with paratangential rays with roughened surface and with large prickles. These well-known spicules are not figured owing to want of space. The **autogastralia** (IV., 2c) are large slender hexactins, each ray being 173 $\times$ 6 μ. Some of the hexactins, a little below the surface, are very large, with the radial rays (each 252 $\times$ 21 μ) longer than the other four. The **intermedia.**—The holoxyhexasters (IV., 2d, d^1), hemioxyhexasters (IV., $2d^2$), and monoxyhexasters (IV., $2d^3$, $2d^4$), about 164 μ in diameter, have very slender roughened rays, the primary rays being very short or almost absent. The calycocomes (IV., 2f) are 80 μ in diameter, with long tuberculated primary rays, each 22 μ in length, ending in a solid hemispherical capitulum from which the only slightly divergent secondary rays proceed, presenting, as Carter put it, a dinner-fork-like aspect in optical section. Another kind of calycocome (IV., 2g) has shorter, thicker, and smoother primary rays, a knob-like capitulum, and more divergent secondary rays. Medium-sized holodiscohexasters, like those figured by Schulze (**6**, pl. lv., fig. 15) do occur, but rarely. Plate IV., Fig. 2e, shows a modified hemidiscohexaster 45·5 μ in diameter, having bulbous primary rays, and terminal discs little more than a circle of spines. The microdiscohexasters (IV., 2h), 50 μ in diameter, have long primary rays 10 μ in length, ending in a conical point, the secondary rays being given off in two circles a little separated from each other.

Scattered over the outer surface of the upper part of the specimen are numerous small flattened pyriform buds about 52 mm. in length, each bud being supported on one or two pleuralia which penetrate it. None of the buds are sufficiently developed to show oscule or central cavity. The hypodermal oxypentactins have their paratangential rays much more curved than in the adult state, and the prickles are hardly at all developed. The soft tissues appear much contracted by the strong spirit. A section shows an outer trabecular layer surrounding a central mass of choanosome, there being only a slight development of an inner trabecular layer, and that so contracted as to appear solid rather than reticular.

Specimen B.—(Plate I., fig. 2, and pl. IV., fig. 3h.)

This is a large spheroidal sponge, 15·5 cm. in height, with a dense velum resembling a tangled thicket, extending about 1·1 cm. away from the surface, and with a thick root-tuft. The orifice, which is oval and with sharp angles at each end, is 3·7 cm. in length by 1·4 cm. in its greatest breadth.

The marginalia, projecting about 2 cm., lean towards each other across the orifice, the innermost layer extending almost horizontally across from one side; on a level with the oscule is a depression, looking like a second oscule, but the appearance is due to the presence of a worm-tube in the wall of the sponge, thereby leading to a dis-arrangement of the pleuralia and velum.

The gastral cavity is capacious, and is lined by a continuous gastral membrane. The wall of the sponge is about 2 cm. thick. The spicules, with certain exceptions, resemble those of specimen **C** described below.

Specimen C.—(Plate I., figs. 3, 4 and pl. IV., figs. 3a–3l, excepting 3h).

This is a remarkable twin specimen, ovate spheroidal in shape, and with two oscules. The height is 14 cm. and width 19 cm. The massive, dense root-tuft is 5·5 cm. in length. The edges of the oscules are slightly inverted, so that the innermost marginalia, projecting 2·5 cm., slope downwards and inwards. A vertical section through the line joining the oscules shows the sponge body, apart from the massive root-tuft, to be somewhat hour-glass-shaped with the long axis horizontal.

The common gastral cavity is nearly divided into two by a thick, central, pyramidal boss reaching from floor to roof, but not forming a complete partition.

The wall of the sponge attains in one part the great thickness of 3·8 cm. The gastral surface shows numerous circular orifices, from 1 to 3 mm. in diameter, in this respect differing from other known specimens of this species, in all of which the gastral surface is covered with a continuous layer.

The twin condition of the specimen cannot be regarded as one of any specific importance. Among the specimens of *R. antarctica* obtained by the 'Challenger' from 274 m. off Kerguelen Island is a twin specimen with a short common base whence spring two thick cylindrical tubes; the shape somewhat resembles that of a gigantic tuning-fork. The gastral cavities communicate through an oval foramen below, and the gastral membrane is continuous throughout.

Spicules of **Specimen C**.—The **principalia** are diactins with rounded or bulbous, roughened ends, and large regular hexactins with smooth tapering rays each 640μ in length.

The **marginalia** are smooth, thick, fusiform diactins, about 4 cm. in length, and 270μ in thickness in the middle.

The **basalia** (IV. 3a, a^1) are anchor pentactins with four prongs, usually curved, but sometimes straight. Both in **B** and **C** these anchor spicules are present among the hypodermalia some distance above the root-tuft, and some have the prongs anorthotropal, thus supporting Schulze's supposition that pentactin basalia are often modified hypodermal pentactins.

The **autodermalia** (IV. 3b.) are chiefly pentactins with or without a distal knob; hexactins being fairly common in **B**, but rare in **C**.

The **oxypentactin hypodermalia**, as might be expected, are larger than in specimen **A**, and have thicker rays with longer prickles.

The **autogastralia** (IV. 3c) are mainly hexactins with spined, blunt-ended rays, each 83 × 11μ; in **C** autogastral pentactins (IV. 3c[1]) are, in addition to the hexactins, quite common.

On re-examining the autogastral hexactins of **A**, **B**, **C**, I find the differences are not so great as is depicted in IV. 2c and IV. 3c. The spicule shown in IV. 2c has exceptionally long and slender rays, and that shown in IV. 3c has exceptionally short and blunt rays. In specimen **B** the rays (266 × 15μ) are slender, sharp-pointed and slightly spined.

Intermedia. The holoxyhexasters, hemioxyhexasters and monoxyhexasters show a considerable amount of variation and abnormality, especially in the twin specimen **C**. The holoxyhexasters and hemioxyhexasters are on an average from 100 to 110μ in diameter; fig. 3d shows a small holoxyhexaster (in optical section) only 62μ in diameter. Usually the primary rays are small but distinct. The monoxyhexasters (IV. 3d[3-4]), 126μ in diameter, have sharp-pointed secondary rays with rough surface, are broad at the base and tapering to a sharp point. The abnormal spicules figured in fig. 3d[6] have the primary rays reduced to a central node or sphere, and the secondary rays to a few spines. In some hexasters (IV. 3c) the secondary rays terminate in two or three sharp prickles.

3d[5] shows a stauractin-like monoxyhexaster, 145μ in diameter, the rays having a roughened surface. That these spicules are not young autodermal stauractins is shown by the fact that the axial canals extend only a short distance from the centre.

The calycocomes (IV. 3f–h), 80 to 90μ in diameter, show considerable variation, not only in specimens **B** and **C**, but also in the same specimen, viz., variation in size, in length and thickness of the primary rays, in the length and degree of divergence of the secondary rays, and in the presence or absence of terminal disks. Fig. 3h, from specimen **B**, is evidently abnormal; here some of the secondary rays have fine bifid or trifid terminations.

Hemidiscohexasters of medium size (IV. 3e, e[1]), average about 85μ in diameter; the rays are sometimes thicker and straighter than is usual in this species.

Monodiscohexasters, 90μ in diameter, occur rarely. Prof. Schulze figures (**6**, pl. LV., fig. 8) a spicule of this kind—the only one found by him—from a specimen from Kerguelen Island.

The microdiscohexasters (IV. 3k), 50μ in diameter, are mostly similar to those in specimen **A**, with a narrow conical capitulum, whence two circles of secondary rays originate; some, however, have a more disk-like capitulum (IV. 3l); the secondary rays in both kinds are extremely slender, being almost invisible under any object-glass lower than $\frac{1}{12}$ inch. Curiously enough, these rays are much more easily discernible in the younger and less developed specimen **A**.

All from W.Q., June 3rd, 1903. No. 10 hole; 238 m. (130 fms.).
Other specimens have been found at:—
Lat. 77$\frac{1}{2}$° S., long. 175° W.; 548 m. (300 fms.); Sir J. C. Ross's Expedition.
Prince Edward Island, 256 m. (140 fms.); Voy. 'Challenger.'

SOME OF THE CHARACTERS OF THE VARIOUS SPECIMENS OF *Rossella antarctica* ARE TABULATED BELOW.

	Specimen described by Carter, and Specimen A, 'Discovery.'	Specimens B and C, 'Discovery.'	Southern Indian Ocean, 'Challenger.'	S.E. Atlantic, Station 320, 'Challenger.'
Shape of Specimen, etc.	Oval, Single.	Spheroidal, Single or Double.	Cylindrical or Barrel-shaped, Single or Double.	Cylindrical, Single.
Root-tuft	Present.	Present.	Absent.	Absent.
Surface conules . .	Scarcely perceptible.	Scarcely perceptible.	Fairly well marked.	Fairly well marked.
Autodermalia . . .	Pentactins with distal knob. Hexactins not uncommon. Stauractins very rare.	Pentactins with or without distal knob. Hexactins very rare.	Pentactins without distal knob. No hexactins.	Pentactins without distal knob. No hexactins.
Autogastralia . . .	Slender hexactins.	Hexactins in B. Hexactins and Pentactins in C.	Hexactins.	Hexactins.
Oxyhexasters . . .	All slender, and with primary rays short or absent. Monoxyhexasters with slender rays.	Thicker, with longer primaries. Monoxyhexasters, thick-rayed and abundant.	Monoxyhexasters abundant and with thick rays.	Monoxyhexasters abundant and with thick rays.
Calycocomes . . .	With long, slender, tuberculated primaries, and dinner-fork-like secondary rays. Diameter, 85 μ. Also a form with divergent rays.	Primary rays thicker, smoother, and relatively shorter. Diameter, 80–100 μ; rarely 175 μ.	With short, smooth primary rays; secondary rays more divergent. Diameter, 112 μ.	With short, smooth primary rays; secondary rays more divergent. Diameter, 84 μ.
Discohexasters . . .	Very rare; also abnormal forms with bulbous primaries.	Rare, often abnormal, with thick, straight, secondary rays.	Common, with slender, curved rays.	Common, with slender, curved rays.
Microdiscohexasters .	Diameter, 50 μ.	Diameter, 50 μ.	Diameter, 40 μ.	Diameter, 40 μ.

All the specimens have a velum of oxypentactins having paratangential rays with roughened surface and prickles. The Antarctic specimens have a root-tuft, but the northerly ones (*var. solida*) are solidly fixed.

Possession Island, 384 m. (210 fms.); Voy. 'Challenger.'
Kerguelen Island, 274 m. (150 fms.); Voy. 'Challenger.'
East of Buenos Ayres, 1097 m. (600 fms.); Voy. 'Challenger.'

Rossella podagrosa.

(Plate III., figs. 2, 3, and Plate V., figs. 1a–m.)

Sponge cylindro-conic, broadest about the middle, with wide, oval, thin-edged orifice, armed with upright marginalia; the walls thick and firm, with a well-developed root-tuft, composed of diactins and of oxypentactins of the same character as those of the velum. With a velum about 5 cm. from the surface; with buds of considerable size, solidly attached to the parent by a broad base. The hypodermalia oxypentactins with rough or smooth rays, without prickles.

The calycocomes with relatively short primary rays; discohexasters with long secondary rays.

There are ten specimens of this species, one of large size, four of medium size, and five small ones, some of which are probably detached buds. All the larger and three of the smallest specimens possess relatively large buds, with oscule and gastral cavity, and fixed by a broad base; compared with these, the buds on one of the specimens of *R. antarctica* (see page 7) are very small, being only 2 mm. in diameter, and detached from the main body, though still adherent to the pleuralia. The largest specimen (Pl. III., fig. 2) is 20 cm. in length, and 8·5 cm. in greatest breadth; the orifice is 2·5 × 2 cm. in diameter; the walls attain a thickness of 2·5 cm. Two buds and the scar of a third are present on the outer wall.

Beneath the fine, gauze-like dermal layer are seen the round openings of the ostia from ·5 to 2 mm. in diameter.

The diactin marginalia project about 1·8 cm. The root-tuft is about 3·5 cm. in length. A few slender diactin pleuralia project a little above the general velar surface. The gastral membrane, which forms a continuous, finely pilose layer, with a sharply-defined circular rim a little below the edge of the orifice, roofs over the openings of the postica with a fine, sieve-like network, the meshes of which are formed of bundles of diactins covered with autogastral hexactins. In one specimen the lower part of the gastral membrane is cavernous. In all but the smallest specimens the central cavity is deep, but in the latter it only extends to half the length of the sponge body.

The **skeleton** is mainly formed of bundles of diactins with a few large hexactins.

The **spicules. Principalia.** The long diactins mostly smooth, or only very faintly roughened near the ends, usually straight, tapering very gradually to slender, sharp points, a large spicule being 8·25 × ·054 mm. Hexactins of two kinds, either regular with thickly spined rays, each 380 × 10μ (V. 1b), or with the rays nearly smooth, and with the odd pair of rays (each 1500 × 45μ) equal or unequal, and longer than the other four (V. 1a).

The **autodermalia** (V. 1c) are pentactins with or without a distal knob, with all the rays (each 180 × 13μ in length) tapering and wholly spined. Hexactins occur, but rarely.

The **hypodermalia** (V. 1d–d[2]) (pleuralia and basalia) are oxypentactins with rough or smooth rays, orthotropal or anorthotropal, the average length of a paratangential being 1660 × 50μ.

The **autogastralia** (V. 1e) are hexactins 266 × 12μ, and closely spined.

The **intermedia** are holoxyhexasters (rare), hemioxyhexasters (V. 1f, f[1]), and abundant monoxyhexasters (V. 1f[2], f[3]), about 169μ in diameter. The calycocomes (V. 1g, g[1]) are 226μ in diameter. The primary rays are only 8μ in length; the capitulum is 14·5μ in length and 22μ in breadth; the secondary rays, 3 to 5 in number, are thick, and either without any terminal knob, or with a very small one.

Fig. 1h, a calycocome, with long primary rays, and without terminal disks, is only 87μ in diameter, and is probably immature.

The discohexasters (V. 1k) are of large size, averaging 110μ in diameter; the primary rays (each 4·5μ in length) terminate in two to four long, disk-tipped secondary rays.

Fig. 1l shows a monodiscohexaster 120μ in diameter.

The microdiscohexasters (V. 1m) are 51μ in diameter; the primary rays, each 7μ in length, terminate in a convex disk-shaped capitulum, from the distal surface of which rays two lengths are given off, the longer rays having larger disks.

Rossella podagrosa differs from *R. antarctica* in that the hypodermal oxypentactins are without prickles; secondly, the basalia resemble the pleuralia, whereas in *R. antarctica* the basalia are anchor-like; further, the calycocomes of the new species have very short primary rays; and lastly, the buds are entirely different in the two species.

Rossella nuda Topsent, has no velum.

Rossella racovitzæ Topsent, is likewise without a velum, and its surface is covered with conules.

Rossella hexactinophila, a new species about to be described, closely resembles *R. podagrosa*, but is distinguished by its hexactin autodermalia, and by the different shape and larger size of the calycocomes; also its oxyhexasters have more slender rays.

All specimens were obtained from Winter Quarters by means of the D-net. (1) No. 104, Hut Point, September 24, 1902, 26 m. (14 fathoms); (2) Nos. 118, 120, Hut Point, November 13, 1902, 46 m. (25 fathoms); (3) No. 137, Flagon Point, January 17, 1903, 18–36 m. (10–20 fathoms); (4) No. 139, January 23, 1903, 18–36 m.; (5) No. 239, 12 hole, 46–55 m. (25–30 fathoms).

Rossella hexactinophila.

(Plate III., fig. 4, and Plate VI., figs. 1a–g.)

Sponge forming an elongated oval flattened sack with a sharp-edged oval orifice provided with marginalia. With a velum; and with a root-tuft about 2 cm. in length mainly composed of oxypentactins resembling those of the velum.

Autodermalia hexactins; oxypentactine hypodermalia with rough or smooth surface and without prickles; oxyhexasters with extremely slender rays.

The single specimen representing the above species is in a bad state of preservation, the five half-macerated fragments of grayish colour being saturated with mud. Mr. Hodgson gives the information that on the return voyage the trawl was put overboard and dragged for some distance over a dead level bottom of mud, but that at one spot the trawl passed over a patch of stones dropped by an iceberg. This would account for the condition of the specimen. With some difficulty the fragments were pieced together in the manner shown on Pl. III., fig. 4; there was no doubt about the base with its small but indubitable root-tuft, nor about the oscular end, but possibly a fragment may be missing from the intervening part; enough remains, however, to show that the sponge was narrow at the orifice and broader at the lower end than above. The specimen, as made up, is 16 cm. in length, and 5 cm. in breadth below the middle. The orifice, which is 1·5 cm. in diameter, is partly surrounded by diactin marginalia projecting about 1·5 cm. The root-tuft is formed of dense tufts of basalia caked with mud at the ends. The velum has been mostly rubbed away; but patches of it exist, especially in the fragment bearing the oscule. The gastral membrane is continuous.

Skeleton.—The framework is formed of bundles of thin slender diactins.

Spicules.—The **principalia** are diactins very long and slender, averaging $3500 \times 1·5\mu$, mostly entirely smooth, and with sharp-pointed ends, though some are slightly roughened at the ends.

The **autodermalia** (VI. 1a) are hexactins, with rather sharp-pointed rays each $154 \times 12\mu$, and spined throughout; the hexactins give a pilose appearance to the surface, especially when viewed under a lens.

The **hypodermalia** are oxypentactins, orthotropal, and mostly with straight smooth rays, each about $900 \times 20\mu$; others are larger, $1000 \times 25\mu$ (VI. 1b, b^1.), with slightly curved wavy rays.

The **autogastralia** (VI, 1c) are hexactins, considerably larger than the autodermalia, each ray being 319μ in length, and $11·25\mu$ in breadth at the base, tapering to a sharp point, and only sparsely spined.

The **intermedia** include holoxyhexasters (VI. 1d), hemioxyhexasters (VI. 1d^1), and only rarely monoxyhexasters (VI. 1d^2), about 110–125μ in diameter; the primary rays are 8–10μ in length; and the secondary rays are extremely slender.

The calycocomes (VI. 1e), 426μ in diameter, have short primary rays, 13μ in length, continuing each into a long solid capitulum 40μ in length and 16μ in breadth, whence originates a circle of eight to ten finely spined knob-tipped secondary rays.

The holodiscohexasters (VI. 1f, f^1) of medium size, 125μ in diameter, with short primary rays dividing into four or five disk-tipped secondary rays, occur only rarely.

The microdiscohexasters (VI. 1g), 48μ in diameter, have their primary rays,

7μ in length, each ending in a convex disk-shaped capitulum, from which arises a circle of disk-tipped secondary rays in two lengths.

The new species comes very near to *R. podagrosa*, which it closely resembles in general shape, in the characters of the orifice and of the marginalia and basalia, and might perhaps be regarded as a strongly marked variety of that species ; but *R. hexactinophila* differs from *R. podagrosa* in having hexactin autodermalia ; in having very much larger calycocomes with elongated cylindrical capitula, the capitula in *R. podagrosa* being more or less hemispherical ; and in having oxyhexasters with extremely slender secondary rays.

Antarctic Circle, Long. 155° 21′ E., 464 m. (254 fms.).

Rossella racovitzæ.

(Plate I., fig. 5, and Plate IV., figs. 1–7.)

Rossella racovitzæ, Topsent (**11**, p. x., and **12**, p. 33).

The collection contains only one example of this species, which appears, however, to have been common in the region explored by the 'Belgica,' since no less than ten specimens and fragments were obtained in four hauls.

The present specimen is 16 mm. in length and 13 mm. in breadth, not including the pleuralia, which extend 8 mm. from the surface.

The 'Discovery' specimen differs in several respects from those described by Topsent.

The principalia are diactins with roughened rounded ends, sometimes swollen.

The autodermalia are pentactins and stauractins, hexactins being absent ; the rays are thick, slightly spined and a little swollen at the ends.

Just below the surface, along with the oxypentactins, are many thick curved diactins $1080 \times 12\mu$.

The oxyhexasters are not remarkable except in the smallness of their numbers ; they appear to be replaced by the discohexasters.

The calycocomes are 225μ in diameter, whereas those of the 'Belgica' are 400μ.

The discohexasters, 168μ in diameter, are very abundant ; the large disks at the ends of the secondary rays attain a diameter of 16–20μ, and have long sharp denticles; these spicules present all the transitions from holodiscohexasters, through hemi- to mono-discohexasters.

The microdiscohexasters (rare), 56μ in diameter, have the secondary rays of only one length.

'Discovery,' Winter Quarters, Flagon Point, January 17, 1903 ; Dredge 18–36 m. (10–20 fathoms).

The 'Belgica' Expedition dredged it in Lat. 70° 15′–71° 15′ S. Long. 80° 48′–87° 39′ W. 450–569 m. (247–310 fathoms).

Aulorossella.

Sack- or barrel-shaped *Rossellinæ* with three kinds of discohexasters, viz., calycocomes, medium discohexasters and microdiscohexasters. With surface conules.

With hypodermal pentactins with short, thick, smooth paratangentials, associated with conules or bundles of pleuralia ; hypodermal pentactins entirely absent from the areas between the conules.

The new genus resembles *Rossella* in possessing three kinds of discohexasters including calycocomes, but differs from it in the character and distribution of the hypodermal pentactins.

In the absence of the hypodermal pentactins from the interconular areas *Aulorossella* approaches *Aulosaccus*, in which these spicules are entirely lacking. In *Scyphidium longispina* Ij. the same spicules are restricted to the upper part of the body, and, in that situation, mostly to the conules ; but *Scyphidium* is devoid of the calycocomes, and so also is *Vitrollula* Ij. Possibly when pleuralial bundles are strongly developed, the autodermal surface is less in need of support by means of a layer of hypodermal pentactins, and these latter become restricted to the conules, and their paratangential rays become shortened till they disappear altogether.

In *Aulorossella levis* sp.n. only a very few anchor-like pentactins are present in the bundles of pleuralia prostalia ; but these spicules are very abundant in the pleuralial bundles of *A. crassa*, the pentactins being here wholly covered by the dermal membrane. Apropos of the origin of the anchor-like pleuralia and basalia, Schulze observes (**8**, p. 83) : "This leads me to suppose that the anchors are to be considered as protruded and enlarged hypodermalia." At first the three species of *Aulorossella* described below were placed under *Aulosaccus*. Prof. Ijima, in his description of *Aulosaccus schulzei* Ij., the type of the genus *Aulosaccus*, expressly states, however (**5**, 112), that no pentactins enter into the composition of the hypodermal skeleton ; and, further, only two kinds of discohexasters occur.

Apropos of the presence or absence of hypodermal pentactins, it will not, I think, be out of place to make here a slight correction concerning the species of *Aulosaccus* Ijima (**5**, p. 252 and p. 107), in which genus Prof. Ijima places three species, viz., *A. schulzei* Ijima, *A. ijimai* Schulze, and *A. mitsukurii* Ijima. If Schulze (**7**, pp. 30, 100, and **10**, p. 176) is right in retaining *Calycosaccus* for *C. ijimai* Schulze on account of its markedly pinula-like autodermal and autogastral hexactins with their long obliquely directed spines, then *Aulosaccus* contains only one species, viz., *A. schulzei* Ijima ; the species *mitsukurii* belongs, as will be shown below, to *Scyphidium*.

With regard to *Scyphidium mitsukurii* Ijima, the British Museum possesses the specimen referred to by Prof. Ijima (**5**, p. 121) as O.C. No. 4399, and stated by him to be specifically identical with the type of *Scyphidium* (*Aulosaccus*) *mitsukurii*. The specimen is badly preserved, and patches of dermal membrane remain only here and there ; but in these patches, and beneath the autodermalia, there are hypodermal pentactins with orthotropal smooth paratangential rays. Prof. Ijima himself says (**5**, p. 109) : "If *A. mitsukurii* were only provided with pentactinic hypodermalia I should have no hesitation in referring it to *Scyphidium*." Among the autodermal stauractins and pentactins are peculiar pentactins with very short, closely-spined paratangential rays and a long, smooth proximal ray; the proximal ray of the ordinary autodermal pentactins is thick and closely spined in its whole length. It is possible that the specimen O.C. 4399 in the British Museum is not specifically identical with the type specimen of *S. mitsukurii* Ij. in Tokyo.

Aulorossella includes three species, all new, collected by the 'Discovery' in the Antarctic Region, viz., *Aulorossella pilosa*, *Aulorossella levis*, *Aulorossella longstaffi*.

Aulorossella pilosa.

(Plate II., fig. 1, and Plate VI. figs. 2–2k.)

Sponge in form of an oval slightly compressed sack, having an oval orifice with thin unarmed margin, the wall provided with large sharp-pointed conuli mostly with long tufts of diactin and, rarely, anchor-like pentactin pleuralia. Gastral cavity deep, and with a continuous finely pilose surface. With a dense, massive root-tuft composed of diactins and anchor-like pentactins.

The intermedia include holoxyhexasters—a form in which each primary ray ends in four or five secondary rays being especially abundant—hemioxyhexasters and, rarely, monoxyhexasters. There are three specimens of this species, all about the same size. The largest is 14 cm. in total height, and 9 × 6 cm. in diameters of the body about the middle; the pleuralia extend 3·5 cm. from the surface. The body-wall attains a thickness of 2 cm., and the conuli a height of 7 mm.

The dermal surface shows a fine lace-like network beneath which are seen the openings of the ostia.

The gastral surface (VI. 2) has a finely pilose appearance when viewed laterally, and feels rough, these characters distinguishing the species from the nearly related *Aulorossella levis*, which has a smooth gastral surface. The surface is finely reticulate, the meshes being ·2 to ·3 mm. in diameter and ·2 mm. in depth; the meshes are formed of strands of hypogastral diactins, bristling with hexactins; about six meshes stretch over each of the postica.

Skeleton. The framework is made up of bundles of diactins; beneath the dermal and gastral surfaces are numerous thick curved isolated diactins roughened at the ends; medium-sized parenchymal hexactins occur only rarely.

Spicules. The **principalia** are diactins varying greatly in length and diameter; they attenuate very gradually to roughened, blunt-pointed ends.

The **autodermalia** (VI. 2b) are pentactins with the rays straight, thickly spined, and diminishing gradually to a thick, blunt end; the paratangential rays are each 131 × 18μ in diameter, and slightly bent downwards towards the odd proximal ray.

The **hypodermalia** are pentactins (VI. 2c) with smooth, slightly curved paratangential rays, each 320 × 40μ, making an angle of 70° to 80° with the shaft; a distal knob or swelling may or may not be present; the odd proximal ray is 2400μ in length. Sometimes these spicules are found among the diactin pleuralia projecting far beyond the surface, but usually they are situated beneath the autodermal pentactins, either near the surface or concealed amidst bundles of pleuralia.

The anchor-like **basalia** (VI. 2a) have four thick, straight prongs, $560 \times 80\mu$, sharply bent, so as to form an angle of about 35° with the shaft.

The **autogastralia** are completely spined hexactins, each ray being $140 \times 12\mu$.

The **intermedia.** The oxyhexasters vary from 56 to 80μ in diameter; the commonest form is a holoxyhexaster, with principal rays $8–10\mu$, each ending in four straight, sharp-pointed secondary rays (VI. 2d); VI. $2d^1$ shows a variety with curved secondary rays. Hemioxyhexasters in various grades occur, but are not so abundant as the first kind; monoxyhexasters are very rare. Fig. VI. $2d^2$ shows a micro-oxyhexaster $22 \cdot 8\mu$ in diameter, with thick club-like primary rays, each ending in three prickles.

The calycocomes (VI. 2e, e^1) average about 130μ in diameter, the primary rays being trumpet-shaped, slender at their origin, and expanding gradually up to a disk-shaped capitulum; the secondary rays vary in number from three to six. Fig. 2g shows a calycocome with the terminal rays curving in at their extremities. Fig. 2f shows a portion of a larger calycocome, 210μ in diameter, with a cylindrical capitulum partly embraced by the bases of the secondary rays; an axial canal extends about half-way into each capitulum.

Holodiscohexasters (VI. 2h), 94μ in diameter, with short, slender, bifurcated primary rays, occur only rarely.

The microdiscohexasters (VI. 2k) are 34μ in diameter; each primary ray ends in a sharp-pointed, conical capitulum.

Dredged from 183 m. (100 fms.) off Coulman Island.

Aulorossella levis.

(Plate II., figs. 2, 3, and Plate VI., figs. 3–3h.)

Sponge sack-shaped, with an oval orifice with thin unarmed edge. With conules mostly tufted with pleuralia. Root-tuft formed of a compact mass of tufts of basalia. Central cavity deep and spacious. Gastral wall smooth, showing sieve-like groups of openings. Autodermalia pentactins and (rarely) stauractins, autogastralia pentactins, and to a less extent hexactins. Intermedia including, among other kinds, numerous hemioxyhexasters and monoxyhexasters.

There are four specimens of this species, one large one of pale yellow colour (A) in spirit, selected as the type, another (B) much larger, dried, and of dark brown colour, and two small ones (C, D), in spirit.

The dimensions, in centimètres, of specimen A are as follows:—height, 20; root-tuft, 5; diameters in median horizontal plane, 12×10; orifice, $3 \cdot 5 \times 2$; depth of central cavity, 11; thickness of wall, 3; height of cones, 1; length of pleuralia from surface of sponge, 3.

Specimen B is 27 cm. in height and 32·5 cm. in diameter; the colour is now dark brown, but Mr. Hodgson states that it was pale yellow when captured; many of the conules form large, thick, thumb-like projections.

The larger of the two smallest specimens (II. 3) is 3 cm. in height and 2·2 cm. in width, the total height and length, including the pleuralia, being 7 cm. Mr. Hodgson informs me that, on one occasion, he hauled up from 228 m. (125 fms.), No. 6 hole, a huge specimen, apparently of this species, 2 feet in height and 18 inches in diameter, but in spite of desperate efforts to secure it, resulting in his arms becoming like a pincushion, the specimen fell back into the water and was lost.

The dermal surface shows a fine network in which larger and deeper meshes formed by strands of hypodermal diactins are filled in by much finer square meshes formed by the autodermal pentactins.

The gastral membrane (VI. 3) is smooth and shows sieve-like groups of small orifices, which are much larger than those of *A. pilosa.* The membrane is supported by bundles of hypogastral diactins which form a network with large meshes; usually in each mesh there is one large oval orifice, ·5 to 1 mm. in long diameter, with a sharply-defined thin membranous edge. The sieve-like groups of orifices are separated from each other by unperforated areas or zones, which are sometimes of considerable extent in the upper part of the central cavity.

Skeleton. The skeletal framework is constructed of bundles of diactins, and of large regular hexactins, which latter are especially abundant in specimen B.

Spicules. The diactin **principalia** are very long and have their ends either rough or smooth, and sharply pointed (more so than those of *A. pilosa*). The regular hexactins (VI. 3a) have thick rays each $960 \times 90\mu$, smooth or rough at the ends; many of these spicules are abnormal in having their "paratangential" rays curved and bent away from the normal plane like the ribs of an umbrella.

The **pleuralia** are usually diactins; a few anchor pentactins occur in the larger, but many in the smaller specimens.

The **basalia** are pentactins, which attain a length of 10 cm. (VI. 3b), and have very stout prongs, 125μ in thickness at the base.

The **autodermalia** (VI. 3d) are pentactins, with wholly spined rays; each tangential ray, $113 \times 17\mu$, tapers slightly.

The **hypodermal** oxypentactins (VI. c3) are grapnel-like; they are usually found entirely below the surface of the conules, but there are only a few in each conule. Sometimes they project outside among the pleuralia.

The **autogastralia** are chiefly pentactins (VI. $3d^1$), each ray being $150 \times 18\mu$ and wholly spined; many hexactins, slightly smaller than the pentactins, also occur; at the nodes of the hypogastral network there is usually a hexactin about twice the size of the autogastral hexactin and with the rays smooth at their bases.

The **intermedia.** Oxyhexasters. Holoxyhexasters are very rare. Hemioxyhexasters (VI. 3e, e^1) are 120μ in diameter, and with almost aborted primary rays.

The monoxyhexasters (VI. 3e[2]) are fairly common; they are about 100μ in diameter. The calycocomes (VI. 3f, f[1]) are 220μ in diameter, the primary rays being 14μ in length; the solid hemispherical cup-shaped capitulum is 9μ in length and breadth; the secondary rays form a plume-like circle of six to eight slender, slightly divergent rays, tipped with very small disks.

Holodiscohexasters (VI. 3g), 96μ in diameter, are very rare; the short primary rays, 9μ in length, divide into two to four secondary rays ending in disks with four to five sharp recurved teeth. The microdiscohexasters (VI. 3h) are 40μ in diameter.

This new species closely resembles *A. pilosa* in its outward appearance, but differs from that species chiefly in the structure of the gastral membrane (VI. 3), and in the absence of the holoxyhexasters, so abundant in *A. pilosa.*

Numerous macerated fragments, consisting solely of a skeletal framework of bundles of diactins with large hexactins, and occasionally autodermal pentactins, were obtained from 10–20 fathoms in McMurdo Bay. These, together with a sack-shaped skeleton and a tuft, 20 cm. in length, of diactin and anchor-like pentactin basalia, found by a sledge party on the ice, all belong to *Aulorossella levis.*

Winter Quarters: (1) two large specimens taken in the trawl 150 yards south of the ship, in 18–36 m. (10–20 fms.); (2) two small young specimens from No. 5 hole (Seal Hole), August 7, 1902, 325 m. (178 fms.); (3) Macerated fragments from McMurdo Bay, 18–36 m. (10–20 fms.).

Aulorossella longstaffi.*

(Plate II., fig. 4, and Plate VII., figs. 1a–k.)

Sponge barrel-shaped, almost solid, with only a very shallow gastral cavity with wide circular orifice having a thin unarmed edge. Surface irregularly tuberculated and ridged, pleuralia almost entirely absent (there being only two or three scattered about). Inferior end without a definite root-tuft, but with a few large conules with a few basalia. Autodermalia thick pentactins, autogastralia thick hexactins. Amongst the parenchymalia curious tetractins.

The sole specimen of this interesting species is 6·8 cm. in height, 3·9 cm. in breadth about the middle; the orifice is nearly 2 cm. in diameter, and the gastral cavity only 1·4 cm. in depth. In its stumpy fleshy appearance, the specimen somewhat resembles a kind of cactus plant. Both the dermal and gastral surfaces are smooth and glistening, and almost opaque, scarcely showing any trace of a hypogastral network. The shallow gastral cavity has in its floor two depressions separated by a ridge.

The **skeleton** is mainly constructed of bundles of diactins; and in addition to these, large regular hexactins are distributed in the sponge body.

* The species name is given in honour of Mr. Longstaff, whose munificent donation of £25,000 made possible the fitting-out of the expedition.

Spicules. The **principalia** are diactins varying in length and thickness, but sometimes very thick and strongly tuberculated at the ends (VII. 1a). Large regular hexactins, with rays spined at the ends, also occur. Among the principalia must be reckoned the remarkable pyramidal tetractins (VII. 1b, b^1) with usually equal rays varying in length in different spicules from 320–1000μ, spined only at the ends. Sometimes below the point of junction of the rays there is an enlargement, apparently an aborted fifth ray. Some of the hypodermal pentactins resemble the tetractins in having their four paratangential rays pyramidal.

A few anchor-like pentactin pleuralia with straight prongs making an acute angle with the shaft are present.

Only diactins are visible in the few short broken tufts of basalia, but possibly some of the spicules with broken ends may be pentactins.

The **autodermalia** (VII. c.) are thick, closely-spined pentactins with rays each $169 \times 24 \cdot 5\mu$.

The pentactin **hypodermalia** are found beneath the tubercles and conules; they vary considerably in shapé; in some (VII. $1d^1$) the paratangential rays make an angle of 70° to 90°, others (VII. 1d, d^2, d^3) an angle of 30° to 45° with the shaft; they may be wholly smooth, but are usually spined at the ends of the prongs.

No less than eighteen of these spicules were found beneath the surface of one conule.

The **autogastralia** (VII. 1e) are hexactins with closely spined rays, each ray being $118 \times 15 \cdot 5\mu$.

The **intermedia.** Oxyhexasters (VII. 1f, f^1, f^2) of the three kinds (holo-, hemi- and monoxyhexasters) occur, the first and last kind being rare. The diameter is about 115μ. The calycocomes (VII. 1g, g^1), 230μ in diameter, have slender primary rays $8 \cdot 3\mu$ in length, and the solid capitulum 12μ in length and $8 \cdot 5\mu$ in breadth. The terminal rays, four to seven in number, are roughened and tipped each with a small disk. Each ray has an oval swelling (VII. $1g^1$) near its origin and on the inner aspect, at alternately higher and lower levels. Discohexasters are rare. Fig. 1h shows a monodiscohexaster 55μ in diameter. The axial canals extend only to the end of the basal thickened part (primary portion) of each ray. The microdiscohexasters (VII. 1k) are 40μ in diameter, the primary rays being $7 \cdot 5\mu$ in length.

W.Q., June 3, 1903. No. 10 Hole. 238 m. (130 fms.).

Anaulosoma.*

Rossellinæ without a central cavity, but with the gastral surface flat and exposed at the superior end of the sponge. Without hypodermal pentactins. With oxyhexasters, calycocomes, discohexasters, and microdiscohexasters. The new genus resembles *Bolosoma*, *Caulophacus*, and *Aulochone* in having an exposed gastral surface. Among the *Rossellinæ*, *Anaulosoma* agrees with *Aulochone* and *Aulosoccus* in being

* ἀ, privative; αὐλή, hall; σῶμα, body.

without hypodermal pentactins. *Aulochone*, which has an everted gastral surface, differs from the new genus in being stalked, and in possessing only one kind of discohexaster.*

Anaulosoma schulzii.

(Plate III., figs. 5, 6, and Plate V., fig. 2 a–m).

Sponge shaped somewhat like a molar tooth, with rounded or carinated mammillæ at the lower end, and with a free gastral surface at the upper end. Surface smooth, without pleuralia, with a few diactin marginalia at the junction of the dermal and gastral surfaces. With a few very small tufts of diactin basalia extending downwards from the mammillæ. Principalia, bundles of diactins, also hexactins, pentactins, stauractins, and tauactins. Autodermalia, pentactins ; hypodermalia diactins in bundles forming a network. Autogastralia, pentactins, with a few hexactins.

There are two specimens (A, C) and two fragments (B, D) of this sponge. Specimen A (III., 5), the type, from McMurdo Bay, is 6·5 cm. in height, 4·5 cm. in width, and 3·3 cm. in thickness. The texture of the sponge is loose. The thin felt-like gastral surface, with several thin-edged exhalant orifices, is easily distinguishable from the lace-like dermal surface, the two being separated by a sharp edge. The oval gastral surface, 5 × 3 cm., which occupies the whole upper end of the sponge, slopes downwards a little ; the largest of the "oscules" is oval, and 1 × ·5 cm. in diameter ; the walls of the large canal into which it leads are lined simply with scattered canalaria in the form of oxyhexasters. The autogastralia are pentactins, and rarely hexactins. Two or three deeply curved diactins are present on or near the gastral margin, but it is doubtful whether they are really marginalia, or, indeed, whether they belong to the specimen at all. The lower end of the sponge is prolonged into two rounded extensions, each with a small tuft of basalia.

The small specimen C (III. 6) is somewhat wedge-shaped, the inferior end narrowing to a ridge, with a small tuft of basalia projecting obliquely downwards and outwards from only one of the ends of the ridge. The upper end, or gastral surface, 1·1 cm. in diameter, is in the form of a small circular area, with one small circular orifice (1·5 mm. in diameter) of an exhalant canal. Round the margin is a circle of small diactin marginalia projecting about 6 mm. The two fragments (B, D) are the lower halves of broken specimens ; in them the broken surface shows the openings of numerous canals passing vertically upwards from the base.

In *Anaulosoma schulzii* there is a marked difference in the appearance of the dermal and gastral surfaces, the former showing a fine lace-like reticulum perceptible to the naked eye, while the latter has an opaque, felt-like appearance. This difference is chiefly due to the arrangement of the hypodermal skeleton. In the dermal region

* I have recently found microdiscohexasters in *Aulochone* (*Crateromorpha*) *lankesteri* Kirkp. from South Africa. These spicules escaped my notice when I first described the sponge (Ann. Mag. N.H. (7) VII., 1901, p. 457).

there is the extremely fine square-meshed reticulum formed by the tangential rays of the autodermal pentactins. Beneath this are subdermal spaces separated by the proximal rays of the pentactins from the hypodermal network with its much larger triangular or trapezoidal meshes. The strands of the hypodermal network are formed of straight tangentially arranged bundles of rather thick diactins. The gastral region, on the other hand, is without subgastral network and spaces, and the bundles of diactin principalia are not distinguishable from those of the rest of the parenchyma.

Canal-System and Soft Tissues.—The main exhalant canals run vertically upwards from base to summit, receiving lateral branches in their course. A section shows circles of the flagellated chambers opening into the finer canals. The subdermal trabecular network, and the lining of many of the exhalant canals, are crowded with masses of knollen-thesocytes, each thesocyte being about 8–10μ in diameter. In unstained balsam preparations these masses of thesocytes are clearly distinguished by their dark yellow colour; further, they take a deeper stain with borax carmine than do the rest of the sponge tissues.

The **skeleton** is formed mainly of bundles of diactins and of separate large hexactins, pentactins, stauractins, and tauactins.

Spicules.—The **principalia** are diactins which vary considerably in length and thickness, the average kind being about 7560 × 22μ, tapering to fine points and spined at the extremities. The spicules, which, in specimen A, are regarded as possible marginalia, are in the form of two or three long curved diactins about 5 cm. in length. They have become misplaced, and possibly may not belong to the sponge. The delicate marginalia in specimen C project about 6 mm., and are about 13 mm. in length.

The little tufts of diactin basalia are about 2·5 cm. in length.

The large regular hexactins (V. 2a) have rays 800 × 60μ, slightly spined at the ends; large pentactins, stauractins, and tauactins (V. 2b, c, d) also are present.

The **autodermalia** (V. 2e) are pentactins with rays 172 × 24·5μ, closely spined. Young pentactins with fine, smooth, sharp rays occur both in the dermal and gastral layers.

The **autogastralia** are mostly pentactins similar to the autodermalia; a few small regular hexactins also occur, especially in specimen C. Plate V., figs. 2f–2f^4, shows several modified hexactins and a pentactin from the region round the single exhalant orifice in specimen C.

The **intermedia**. Oxyhexasters. Holoxyhexasters (V. 2g), 197μ, with bifurcate primary rays, short or almost absent, are not uncommon; a kind (V. 2g^1), 86μ, in which each primary ray ends in a disk, whence five to six sharp-pointed secondary rays diverge, occurs less frequently.

Hemioxyhexasters (V. 2g^2), about 180μ, are abundant; and monoxyhexasters (V. 2g^3), also about 180μ in diameter, occur, but rarely; fig. 2g^2 shows a hemioxyhexaster in which one of the secondary rays has a trifid termination. (The small " 2 " of 2g^2 has been omitted in the plate.)

The calycocomes (V. 2h, h[1]) are, on an average, about 225μ in diameter, the primary rays being 9μ in length; each capitulum, 6·75μ in length and 14·5μ in breadth, ends in two to four roughened secondary rays tipped with button-like disks.

Hemidiscohexasters (V. 2k, k[1]), 100μ in diameter, occur but rarely; the primary rays end in one to three secondary rays tipped with disks having four to six long recurved teeth. Fig. 2l shows an exceptional form, 91μ in diameter, with thick primary and secondary rays, the latter again dividing into two or three short branches.

The microdiscohexasters (V. 2m) are 43μ in diameter, with primary rays 5·5μ in length, and with a convex capitulum, whence about six disk-tipped secondary rays arise.

Winter Quarters: (1) one specimen (A), the type, and a fragment (B), February 28, 1902, McMurdo Bay, 36 m. (20 fms.); (2) a small specimen (C), No. 4 hole, January 30, 1902, 75 m. (41 fms.); (3) a fragment (D), No. 12 hole, September 8, 1903, 45–55 m. (25–30 fms.).

Sub-Family Lanuginellinæ.

Anoxycalyx.

Lanuginellinæ without Oxyhexasters, with Graphiocomes.

Anoxycalyx ijimai.

(Plate III., fig. 7, and Plate VII., figs. 2–2g[1].)

Sponge in form of a small compressed pyriform sack, with the surface studded with small conules and small flattened pyriform buds. With slender tufts of long fine diactin pleuralia and basalia. The orifice narrow and oval, with a plain rim, and without marginalia. Autodermalia stauractins (mainly) and pentactins, with the odd ray proximal, more rarely tauactins and angular diactins; hypodermal pentactins confined to the conules; autogastralia hexactins, with large microdiscohexasters, with graphiocomes, and very large strobilocomes.

The largest of the three small specimens is 2·2 cm. in the length of the body, and 7·5 cm. in total length, *i.e.*, including the pleuralia; the greatest width is 1·7 cm. and the thickness 7 mm.; the slit-like orifice is 4 mm. in width. The largest buds attain a length of 2 mm.

The **skeleton** is mainly formed of bundles of diactins.

Spicules. The diactin **principalia** of the bundles are very slender, wavy, tapering to fine points, and roughened at the ends; a much thicker kind are isolated, or with slender comitalia. Pl. VII., fig. 2a, shows a parenchymal triactin × 150. The slender wavy pleuralia attain a length of 5 cm.

The **autodermalia** are chiefly stauractins (VII. 2b), with each ray 234 × 12μ, slightly spined, curved inwards, rounded at the end; occasionally these spicules have thick club-like rays (VII. 2b[4]).

The autodermal pentactins (VII. 2b[1]) are fairly numerous; the odd proximal ray is spined. Fig. 2b[2] shows a tauactin. The rays of the curious angular diactins (VII., 2b[3]) form an angle of 60°.

The **hypodermalia** are pentactins (VII. 2c) with long, deeply-curved paratangential rays 1240 × 55μ, tapering to a sharp point. In one or two instances these spicules project out a small distance, and might be regarded as basalia.

The **autogastralia** (VII. 2d) are hexactins with slender, sparsely-spined cylindrical rays, each 188 × 5·6μ.

Intermedia. The strobilocomes (VII. 2f, f[1]) are 175μ in diameter; each primary ray (13·5μ in length) ends in a cone or strobilus rounded at the distal end, and giving off a series of four verticils of long slender S-shaped rays, each tipped with a toothed disk; the verticils increase in length from below upwards, the lowest and outermost being the shortest, and the highest and innermost the longest. The plumes of the secondary rays are more loosely tufted than is the case in most other species, where the rays of the verticils and the verticils themselves are more closely packed.

The graphiocomes (VII. 2e, e[1]) are 150μ in diameter; each primary ray is 7·25μ in length and ends in a broad disk, from the whole distal convex surface of which a diverging tuft of fine raphide-like rays is given off.

The microdiscohexasters (VII. 2g, g[1]) are of large size, being 60μ in diameter; the primary rays end in a circle of disk-tipped secondary rays surrounding a central cone continued into a ray ending in a disk.

The new genus is near to *Lophocalyx*, but differs from it and from other genera of *Lanuginellinæ* in having no oxyhexasters.

Pl. VII., fig. 2, shows a thin section of one of the largest buds, which has an oscule and central cavity.

The section has been made in a direction slightly oblique to the long axis, and shows the convex outer ends of the flagellated chambers; although several of these outer ends have been cut through, the artist has put them in, the figure being a combination one, and, I fear, slightly diagrammatic.

W.Q., January 2, 1904. No. 14 Hole. 329m. (180 fms.).

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11. TOPSENT, E.—"Notice préliminaire sur les Éponges de l'expédition antarctique Belge." Arch. Zool. exp. et gén., 1901 (sér. 3), vol. ix.
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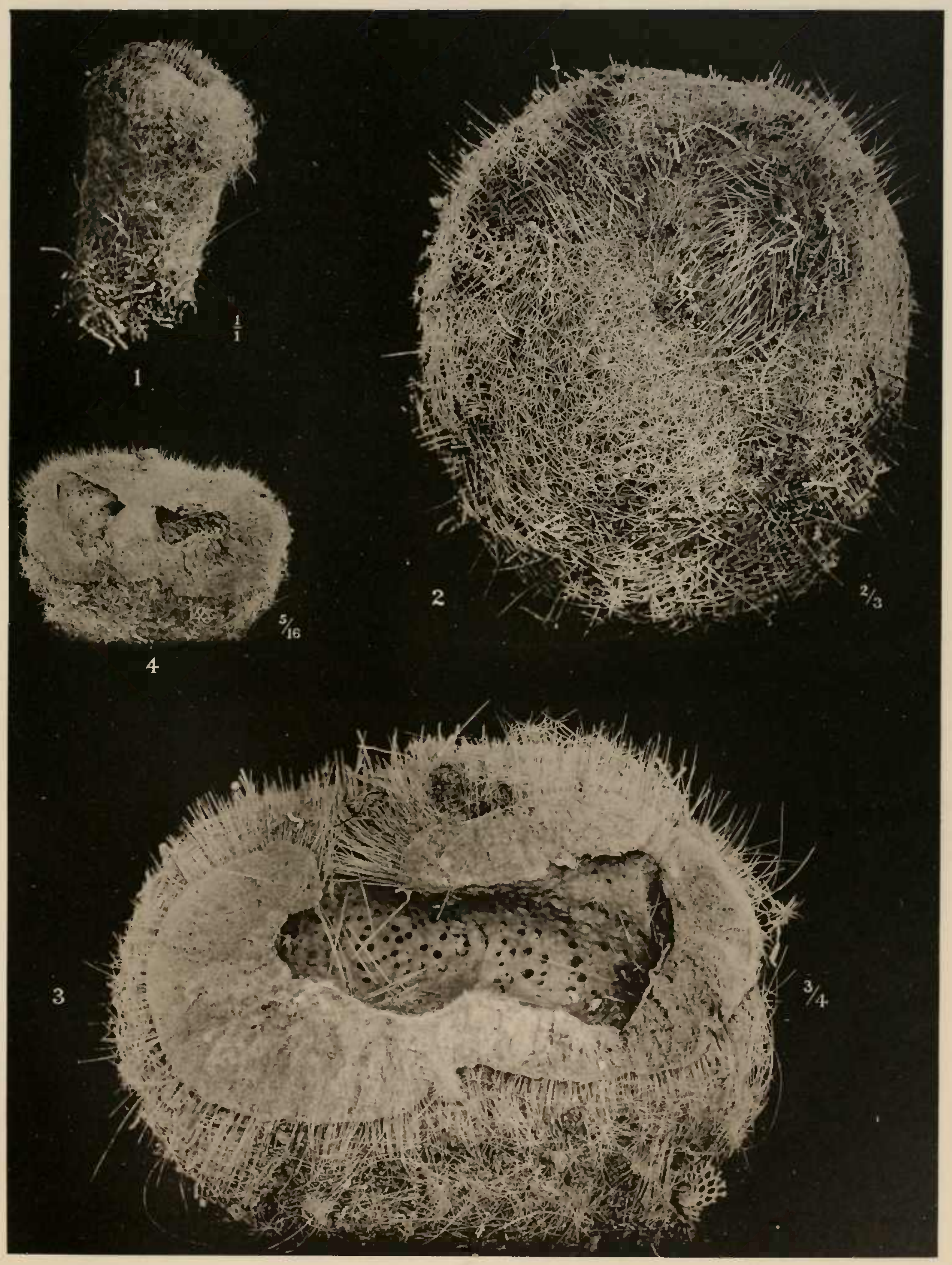
PLATE I.

FIG. 1.—*Rossella antarctica* Carter, Specimen A. Nat. size. (Page 5.)

FIG. 2.—*Rossella antarctica*, Specimen B. $\frac{2}{3}$ nat. size. (Page 7.)

FIG. 3.—*Rossella antarctica*, Specimen C, vertical section. $\frac{3}{4}$ nat. size. (Page 8.)

FIG. 4.—*Rossella antarctica*, Specimen C, vertical section showing the other half. $\frac{5}{16}$ nat. size.



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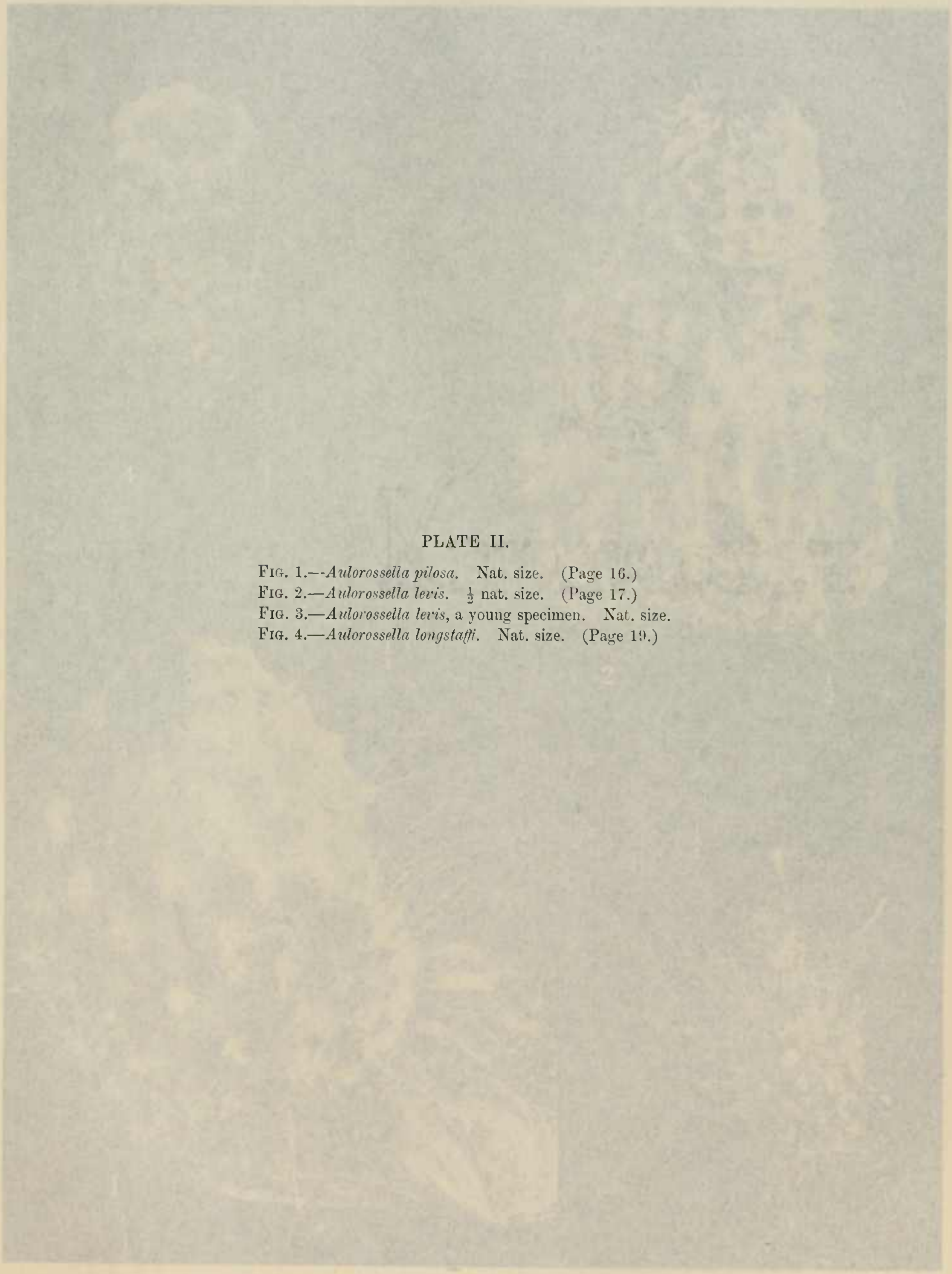
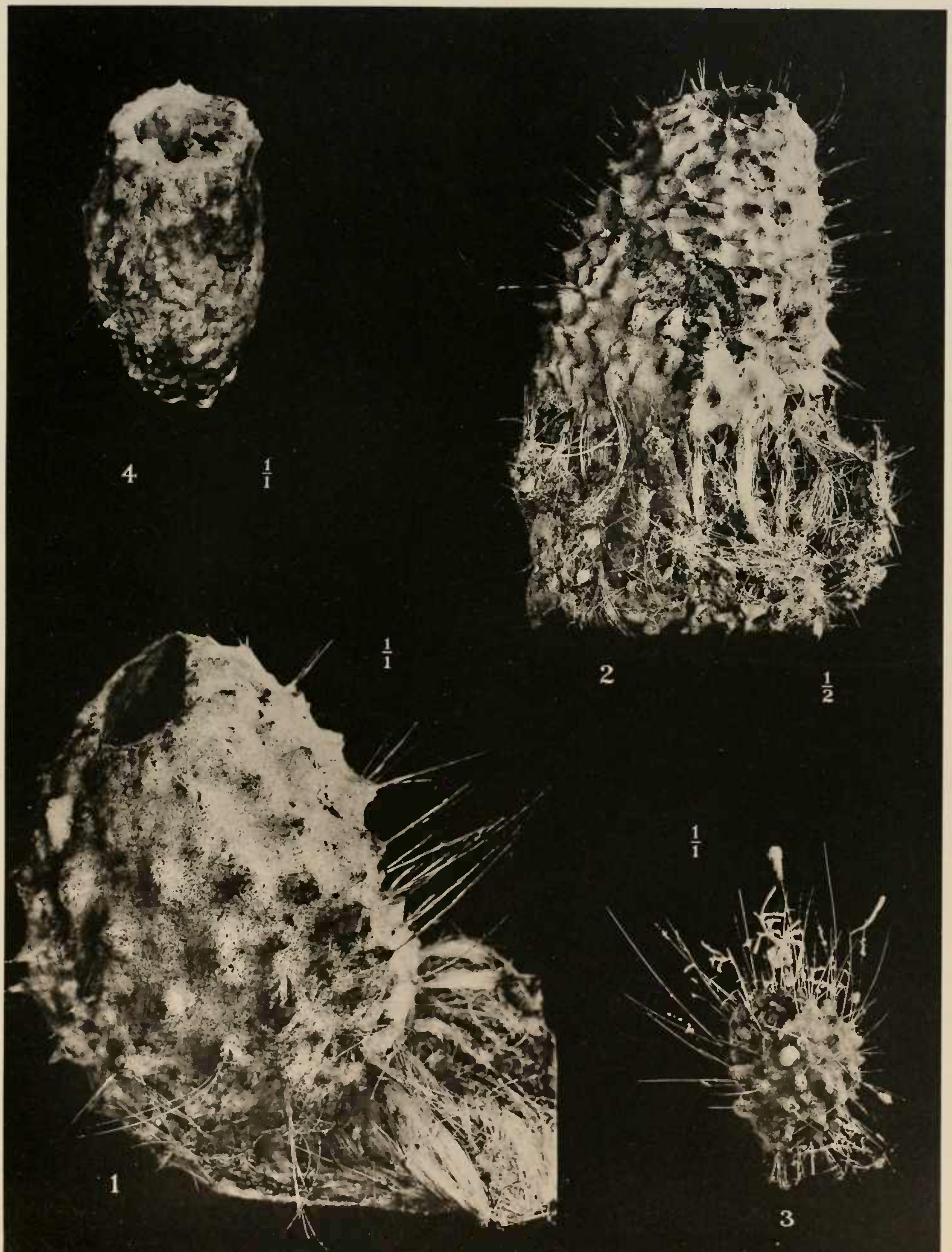


PLATE II.

Fig. 1.—*Aulorossella pilosa*. Nat. size. (Page 16.)
Fig. 2.—*Aulorossella levis*. ½ nat. size. (Page 17.)
Fig. 3.—*Aulorossella levis*, a young specimen. Nat. size.
Fig. 4.—*Aulorossella longstaffi*. Nat. size. (Page 19.)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1/1
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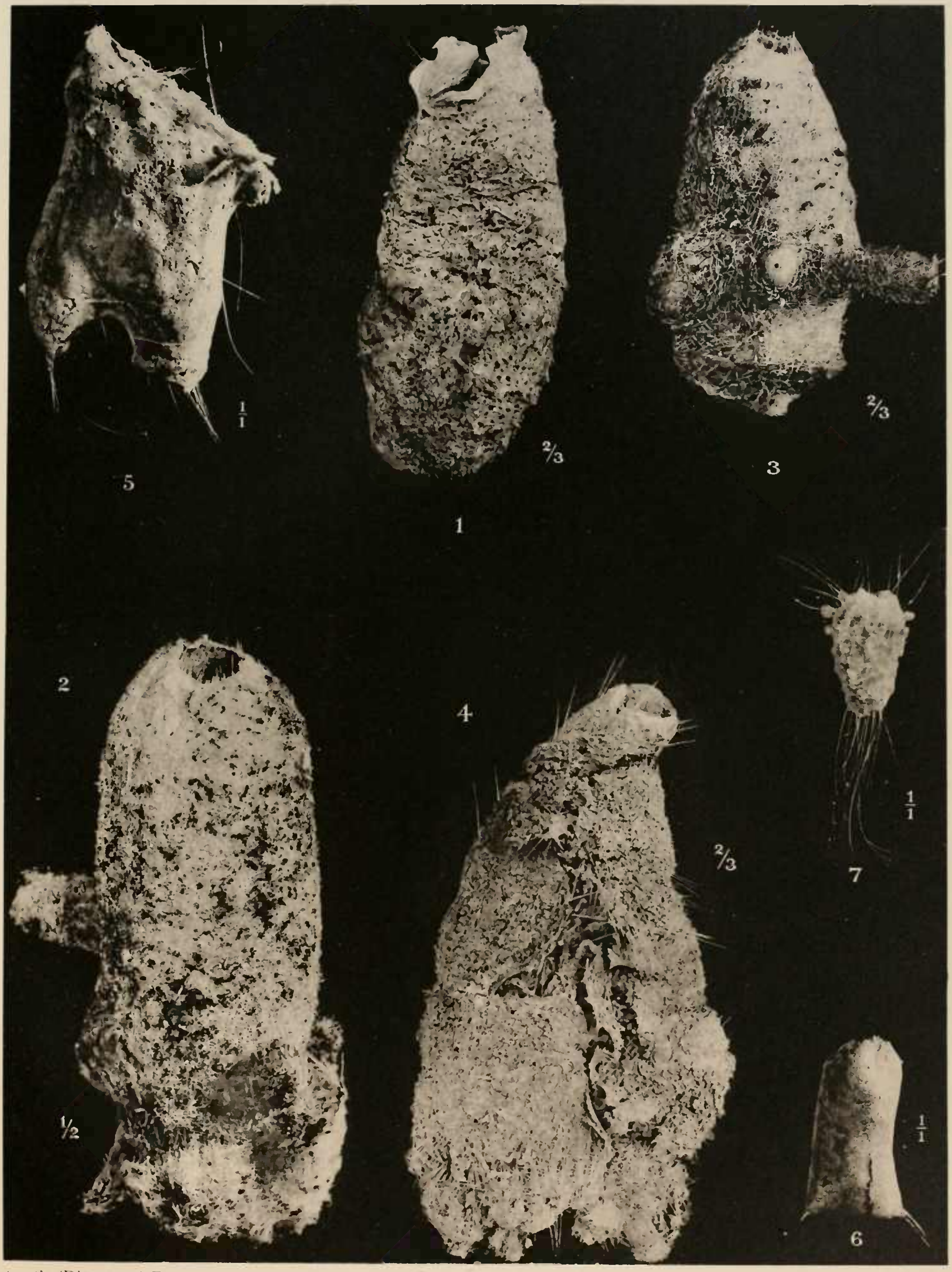
1/2
1/1
1/1
1
3

PLATE III.

FIG. 1.—*Hyalascus hodgsoni.* $\frac{2}{3}$ nat. size. (Page 3.)
FIG. 2.—*Rossella podagrosa.* $\frac{1}{2}$ nat. size. (Page 11.)
FIG. 3.—*Rossella podagrosa*, another specimen. $\frac{2}{3}$ nat. size.
FIG. 4.—*Rossella hexactinophila.* $\frac{2}{3}$ nat. size. (Page 12.)
FIG. 5.—*Anaulosoma schulzii.* Nat. size. (Page 21.)
FIG. 6.—*Anaulosoma schulzii*, another specimen. Nat. size.
FIG. 7.—*Anoxycalyx ijimai.* Nat. size. (Page 23.)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2/3
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2/3
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2
4
2/3
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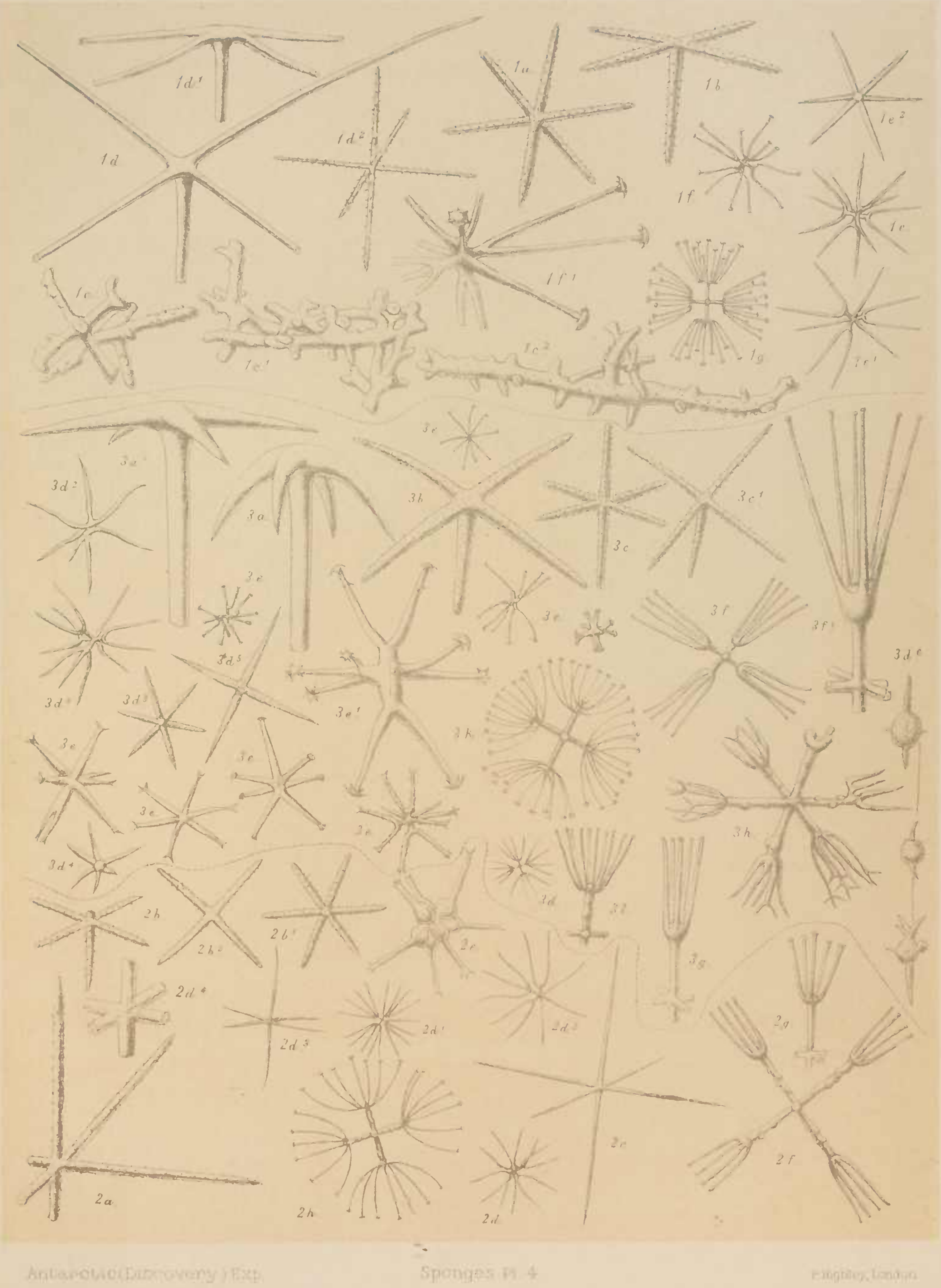
7
1/2
1/1
6

PLATE IV.

FIG. 1*a–g*.—*Hyalascus hodgsoni*. Spicules. (Page 4.)
FIG. 1*a*.—Autodermal hexactin. (× 160.)
FIG. 1*b*.—Autodermal pentactin. (× 160.)
FIG. 1*c*, c^1, c^2.—Modified autodermalia. (× 160.)
FIG. 1*d*, $1d^1$.—Hypodermal oxypentactins. (× 50.)
FIG. $1d^2$.—Autogastral hexactin. (× 160.)
FIG. 1*e*.—Holoxyhexaster. (× 240.)
FIG. $1e^1$.—Hemioxyhexaster. (× 240.)
FIG. $1e^2$.—Monoxyhexaster. (× 240.)
FIG. 1*f*.—Holodiscohexaster. (× 240.)
FIG. $1f^1$.—The same (part). (× 700.)
FIG. 1*g*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2*a–g*.—*Rossella antarctica* Carter. Spicules of Specimen A. (Page 6.)
FIG. 2*a*.—Parenchymal regular hexactin. (× 160.)
FIG. 2*b*.—Autodermal pentactin. (× 160.)
FIG. $2b^1$.—Autodermal hexactin. (× 160.)
FIG. $2b^2$.—Autodermal stauractin. (× 160.)
FIG. 2*c*.—Autogastral hexactin. (× 160.)
FIG. 2*d*, $2d^1$.—Holoxyhexasters. ($2d^1$ in optic. sect.) (× 160.)
FIG. $2d^2$.—Hemioxyhexaster. (× 160.)
FIG. $2d^3$.—Monoxyhexaster. (× 160.)
FIG. $2d^4$.—Central part of $2d^3$, showing termination of axial canals. (× 700.)
FIG. 2*e*.—Hemidiscohexaster (modified). (× 700.)
FIG. 2*f*.—Calycocome. (Optic. sect.) (× 700.)
FIG. 2*g*.—Portion of another calycocome with shorter smooth shaft and divergent rays. (× 700.)
FIG. 2*h*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 3*a–k*.—*Rossella antarctica*. Spicules of Specimen C, only 3*h* being from Specimen B. (Page 8.)
FIG. 3*a*, $3a^1$.—Oxypentactin basalia. (× 50.)
FIG. 3*b*.—Autodermal pentactin. (× 160.)
FIG. 3*c*.—Autogastral hexactin. (× 160.)
FIG. $3c^1$.—Autogastral pentactin, a kind only found in Specimen C. (× 160.)
FIG. 3*d*.—Holoxyhexaster. (Optic. sect.) (× 240.)
FIG. $3d^1$, $3d^2$.—Hemioxyhexasters. (× 240.)
FIG. $3d^3$, $3d^4$.—Monoxyhexasters. (× 240.)
FIG. $3d^5$.—Stauractin-like monoxyhexaster. (× 240.)
FIG. $3d^6$.—Three spheroidal reduced oxyhexasters. (× 240.)
FIG. 3*e*.—Seven discohexasters, showing variation in form. (× 240.)
FIG. $3e^1$.—Hemidiscohexaster. (× 700.)
FIG. 3*f*.—Calycocome. (Optic. sect.) (× 240.)
FIG. $3f^1$.—The same (a part). (× 700.)
FIG. 3*g*.—Part of another calycocome. (× 700.)
FIG. 3*h*.—Abnormal calycocome, from Specimen B. (× 700.)
FIG. 3*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)
FIG. 3*l*.—Portion of a variety of microdiscohexaster. (× 700.)



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1c²
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1d²
1e¹
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2b
2b¹
2c
2d
2d¹
2d²
2d³
2d⁴
2e
2f
2g
2h
3a
3b
3c
3c¹
3d²
3d³
3d⁴
3d⁵
3e¹
3f
3f¹
3g
3h

PLATE V.

FIG. 1*a–m*.—*Rossella podagrosa*. Spicules. (Page 11.)
FIG. 1*a*.—Parenchymal hexactin. (× 50.)
FIG. 1*b*.—Parenchymal hexactin. (× 50.)
FIG. 1*c*.—Autodermal pentactin. (× 160).
FIG. 1*d*, $1d^1$, $1d^2$.—Hypodermal oxypentactins. (× 50.)
FIG. 1*e*.—Autogastral hexactin. (× 160.)
FIG. 1*f*, $1f^1$.—Hemioxyhexasters. (× 160.)
FIG. $1f^2$, $1f^3$.—Monoxyhexasters. (× 160.)
FIG. $1f^4$.—Small monoxyhexaster. (× 160.)
FIG. 1*g*.—Calycocome. (Optic. sect.) (× 240.)
FIG. $1g^1$.—The same. (× 700.)
FIG. 1*h*.—Small calycocome, without disks. (× 240.)
FIG. 1*k*.—Holodiscohexaster. (× 240.)
FIG. 1*l*.—Monodiscohexaster. (× 240.)
FIG. 1*m*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2*a–m*.—*Anaulosoma schulzii*. Spicules. (Page 22.)
FIG. 2*a*.—Parenchymal hexactin. (× 50.)
FIG. 2*b*.—Parenchymal pentactin. (× 50.)
FIG. 2*c*.—Parenchymal stauractin. (× 50.)
FIG. 2*d*.—Parenchymal tauactin. (× 50.)
FIG. 2*e*.—Autodermal pentactin. (× 160.)
FIG. 2*f*–$2f^4$.—Modified (Autogastral ?) hexactins, and pentactin, all from Specimen C. (× 160.)
FIG. 2*g*, $2g^1$, $2g^2$, $2g^3$.—Holo-, Hemi-, and Mon-oxyhexasters. (The small "2" of $2g^2$ is not visible on the plate.) (× 160.)
FIG. 2*h*.—Calycocome. (Optic. sect.) (× 240.)
FIG. $2h^1$.—Part of same. (× 700.)
FIG. 2*k*.—Hemidiscohexaster. (× 240.)
FIG. $2k^1$.—Part of the same. (× 700.)
FIG. 2*l*.—Curious discohexaster, with three orders of rays. (× 700.)
FIG. 2*m*.—Microdiscohexaster. (Optic. sect.) (× 700.)

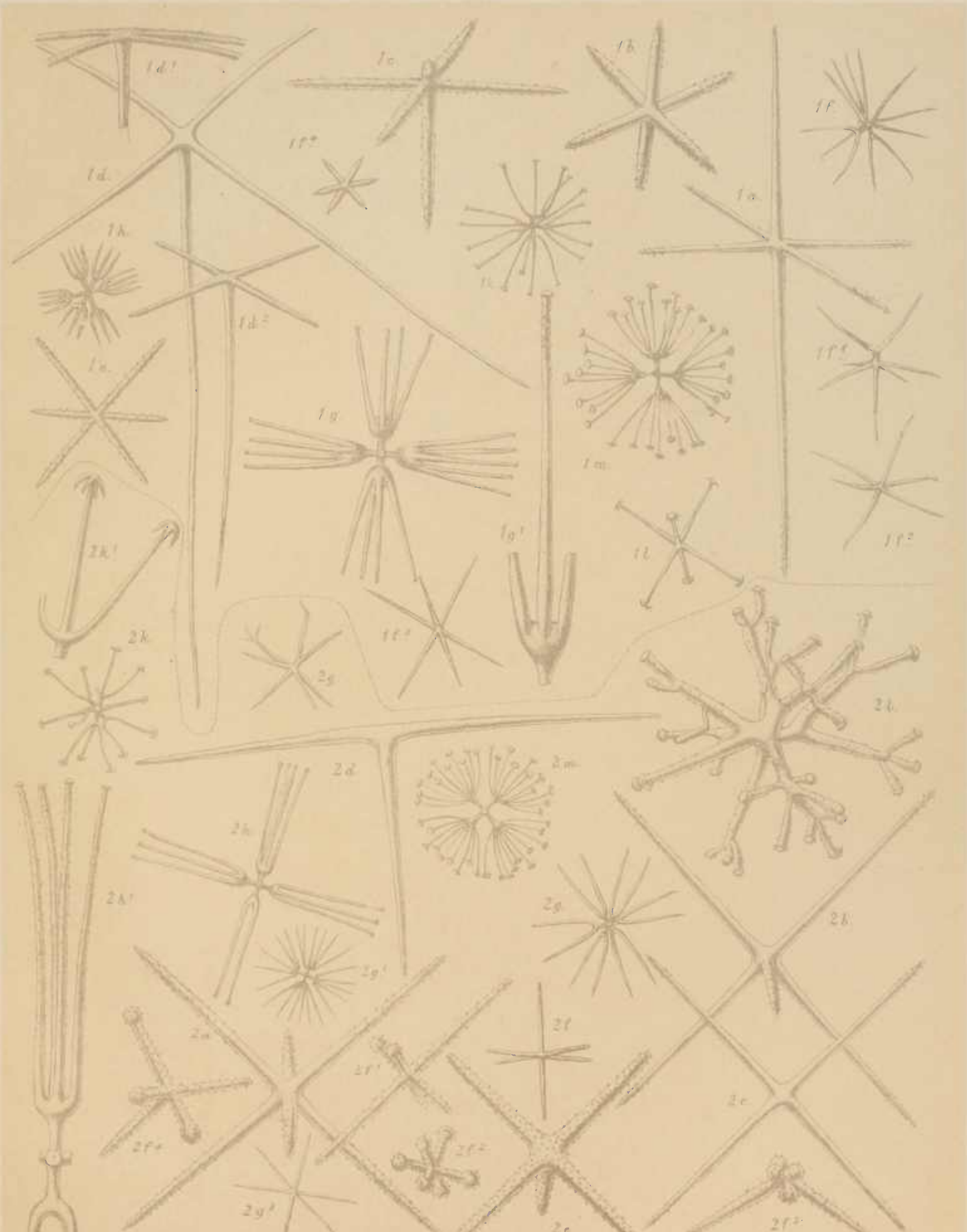

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PLATE VI.

FIG. 1*a–g*.—*Rossella hexactinophila*. Spicules. (Page 13.)
FIG. 1*a*.—Autodermal hexactin. (× 160.)
FIG. 1*b*, *b*¹.—Hypodermal oxypentactins. (× 50.)
FIG. 1*c*.—Autogastral hexactin. (× 160.)
FIG. 1*d*.—Holoxyhexaster. (× 240.)
FIG. 1*d*¹.—Hemioxyhexaster. (× 240.)
FIG. 1*d*².—Monoxyhexaster. (× 240.)
FIG. 1*e*.—Calycocome. (Optic. sect.) (× 160.)
FIG. 1*f*.—Holodiscohexaster. (Optic. sect.) (× 240.)
FIG. 1*f*¹.—The same, one secondary ray. (× 700.)
FIG. 1*g*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2–2*k*.—*Aulorossella pilosa*. (Page 16.)
FIG. 2.—Gastral membrane. (× 10.)
FIG. 2*a*.—Basalial oxypentactin. (× 50.)
FIG. 2*b*.—Autodermal pentactin. (× 160.)
FIG. 2*c*.—Hypodermal pentactin. (× 50.)
FIG. 2*d*.—Holoxyhexaster. (Optic. sect.) (× 240.)
FIG. 2*d*¹.—Holoxyhexaster, a variety. (Optic. sect.) (× 425.)
FIG. 2*d*².—Dwarf holoxyhexaster. (× 700.)
FIG. 2*e*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 2*e*¹.—Portion of 2*e*. (× 700.)
FIG. 2*f*.—Portion of calycocome from another specimen. (× 700.)
FIG. 2*g*.—Ditto, with incurved secondary rays. (× 700.)
FIG. 2*h*.—Holodiscohexaster. (× 160.)
FIG. 2*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 3–3*h*.—*Aulorossella levis*. (Page 18.)
FIG. 3.—Gastral membrane. (× 10.)
FIG. 3*a*.—Parenchymal hexactin. (× 50.)
FIG. 3*b*.—Basalial oxypentactin. (× 50.)
FIG. 3*c*.—Hypodermal oxypentactin. (× 50.)
FIG. 3*d*.—Autodermal pentactin. (× 160.)
FIG. 3*d*¹.—Autogastral pentactin. (× 160.)
FIG. 3*e*, 3*e*¹.—Hemioxyhexasters. (× 240.)
FIG. 3*e*².—Monoxyhexaster. (× 240.)
FIG. 3*f*.—Calycocome. (Optic. sect.) (× 240.)
FIG. 3*f*¹.—Ditto, part. (× 700.)
FIG. 3*g*.—Holodiscohexaster. (Optic. sect.) (× 240.)
FIG. 3*h*.—Microdiscohexaster. (Optic. sect.) (× 700.)

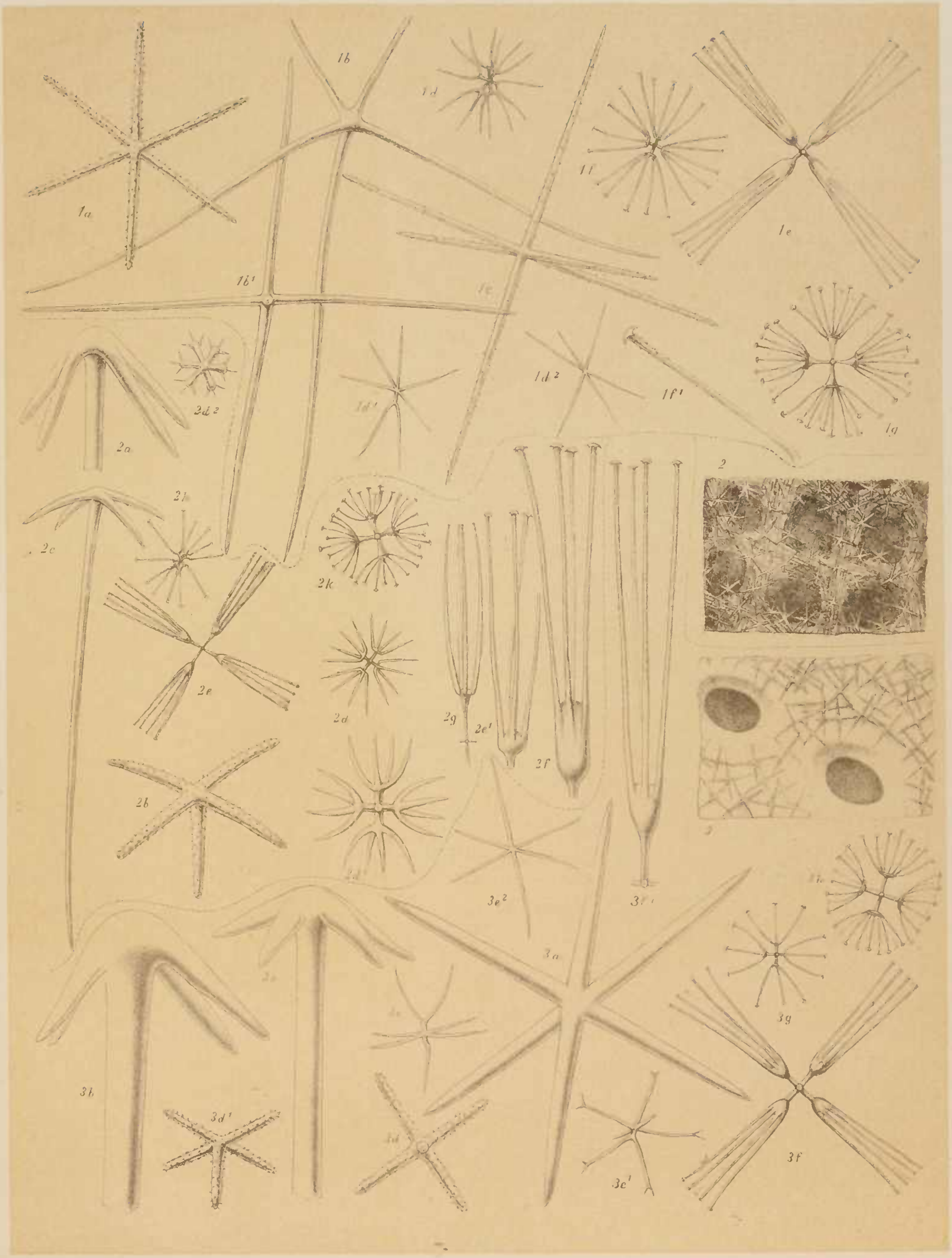

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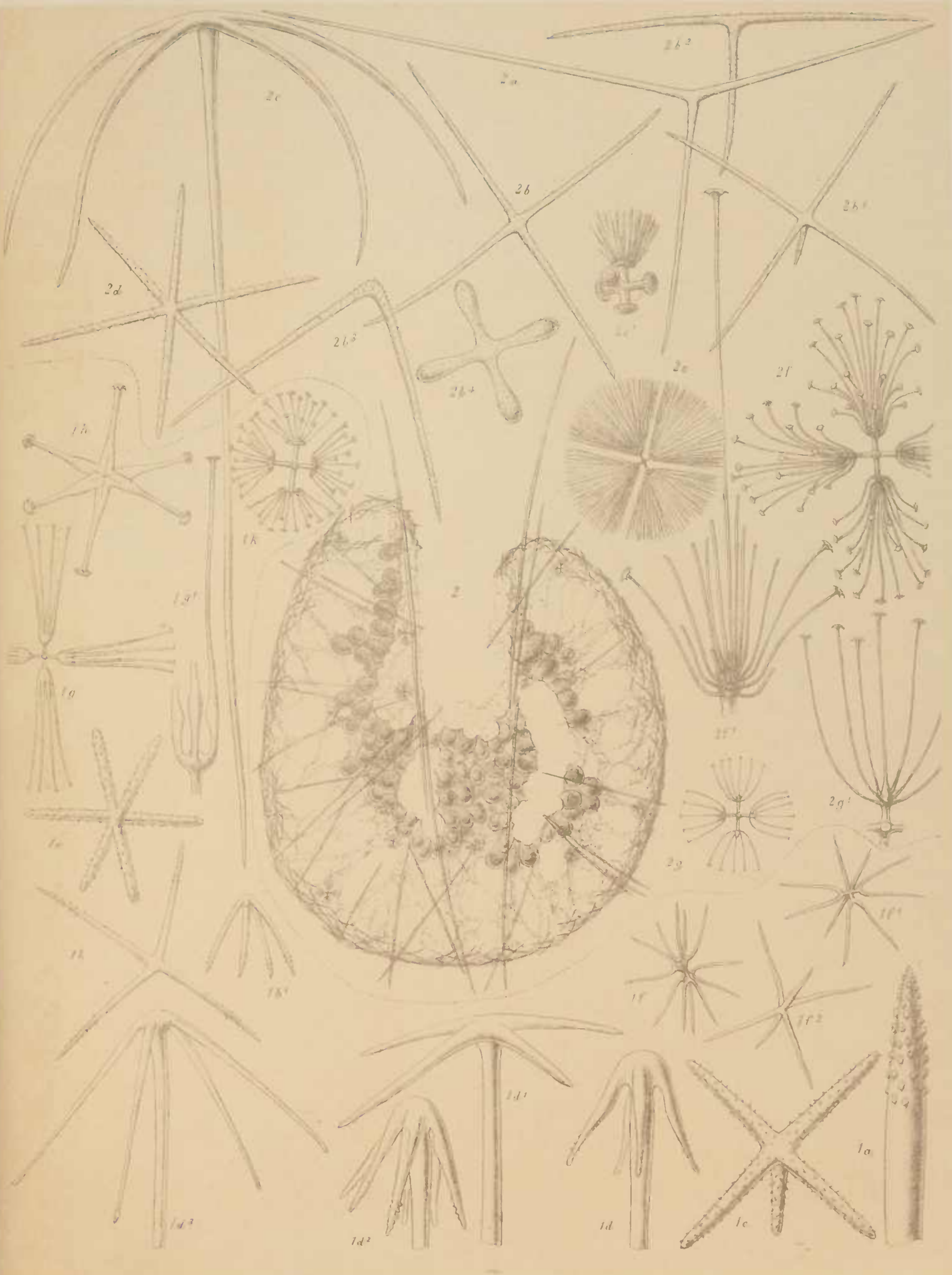
PLATE VII.

FIG. 1*a–k*.—*Aulorossella longstaffi*. Spicules. (Page 19.)
FIG. 1*a*.—One end of large parenchymal diactin. (× 50.)
FIG. 1*b*, 1b^1.—Pyramidal parenchymal tetractin. (× 50.)
FIG. 1*c*.—Autodermal pentactin. (× 160.)
FIG. 1*d*, 1d^1, 1d^2, 1d^3.—Hypodermal pentactins. (× 50.)
FIG. 1*e*.—Autogastral hexactin. (× 160.)
FIG. 1*f*.—Holoxyhexaster. (× 240.)
FIG. 1f^1.—Hemioxyhexaster. (× 240.)
FIG. 1f^2.—Monoxyhexaster. (× 240.)
FIG. 1*g*. Calycocome. (Optic. sect.) (× 240.)
FIG. 1g^1.—Part of same. (× 700.)
FIG. 1*h*.—Monodiscohexaster. (× 700.)
FIG. 1*k*.—Microdiscohexaster. (Optic. sect.) (× 700.)

FIG. 2–2g^1.—*Anoxycalyx ijimai*. (Page 23.)
FIG. 2.—Section of bud. (× 30.)
FIG. 2*a*.—Parenchymal triactin. (× 50.)
FIG. 2*b*.—Autodermal stauractin. (× 160.)
FIG. 2b^1.—Autodermal pentactin. (× 160.)
FIG. 2b^2.—Autodermal tauactin. (× 160.)
FIG. 2b^3.—Autodermal angular diactin. (× 160.)
FIG. 2b^4.—Modified autodermal stauractin. (× 160.)
FIG. 2*c*.—Hypodermal pentactin. (× 50.)
FIG. 2*d*.—Autogastral hexactin. (× 160.)
FIG. 2*e*.—Graphiocome. (Optic. sect.) (× 240.)
FIG. 2e^1.—A part of same. (× 700.)
FIG. 2*f*.—Strobilocome. (Optic. sect.) (× 240.)
FIG. 2f^1.—A part of same. (× 700.)
FIG. 2*g*.—Microdiscohexaster. (Optic. sect.) (× 240.)
FIG. 2g^1.—The same. (× 700.)


2a
2b
2b²
2b³
2b⁴
2b⁵
2c
2d
2e
2f
2f¹
2g
2g¹
2
1a
1c
1d
1d¹
1d²
1d³
1e
1f
1f¹
1f²
1g
1g¹
1h
1k
1k¹