

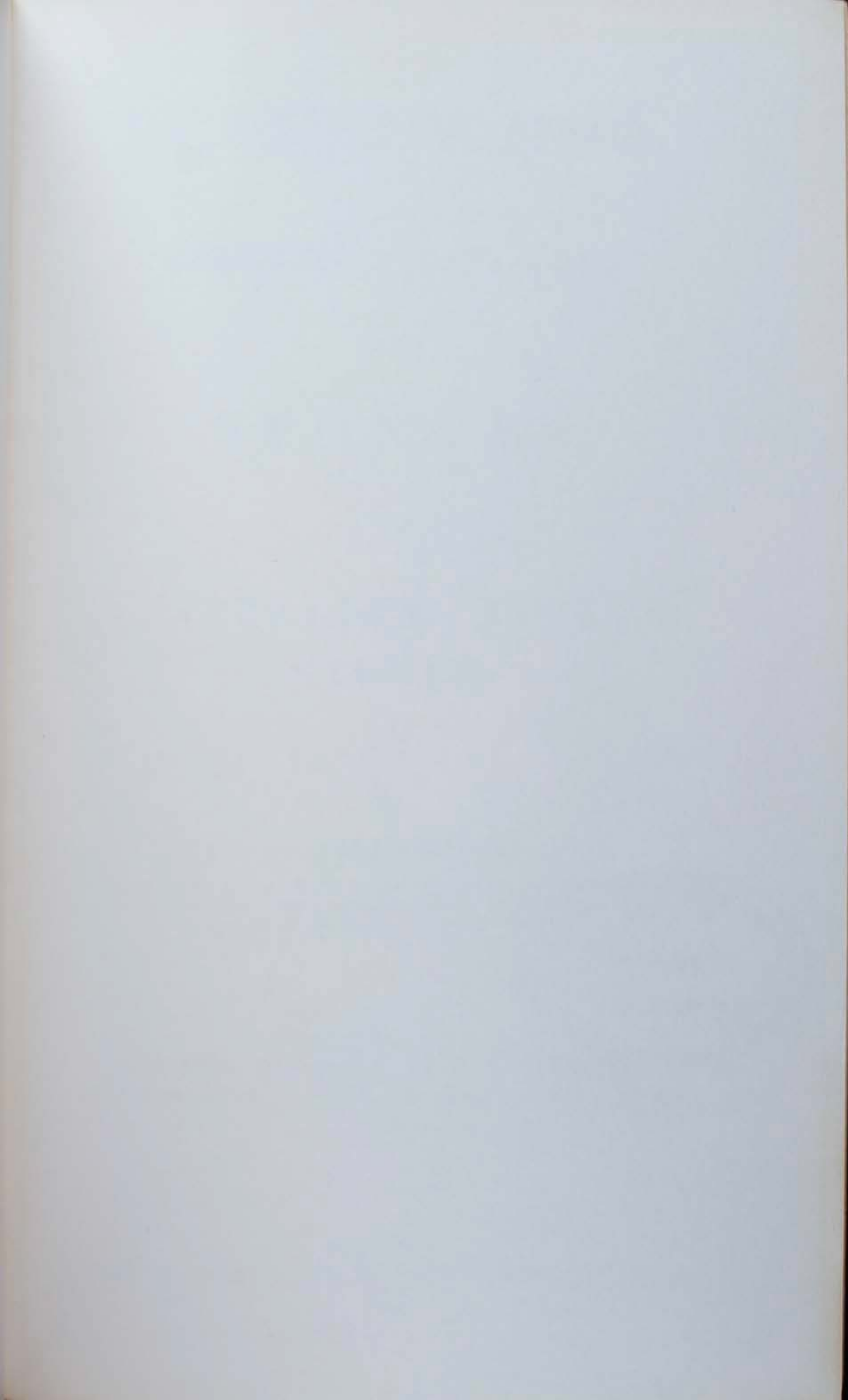
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DESCRIPTIVE CATALOGUE

OF THE

S P O N G E S

IN THE

A U S T R A L I A N M U S E U M,
S Y D N E Y.

BY

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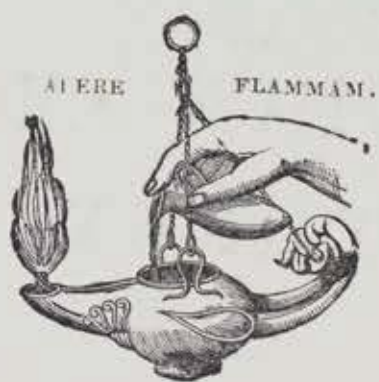


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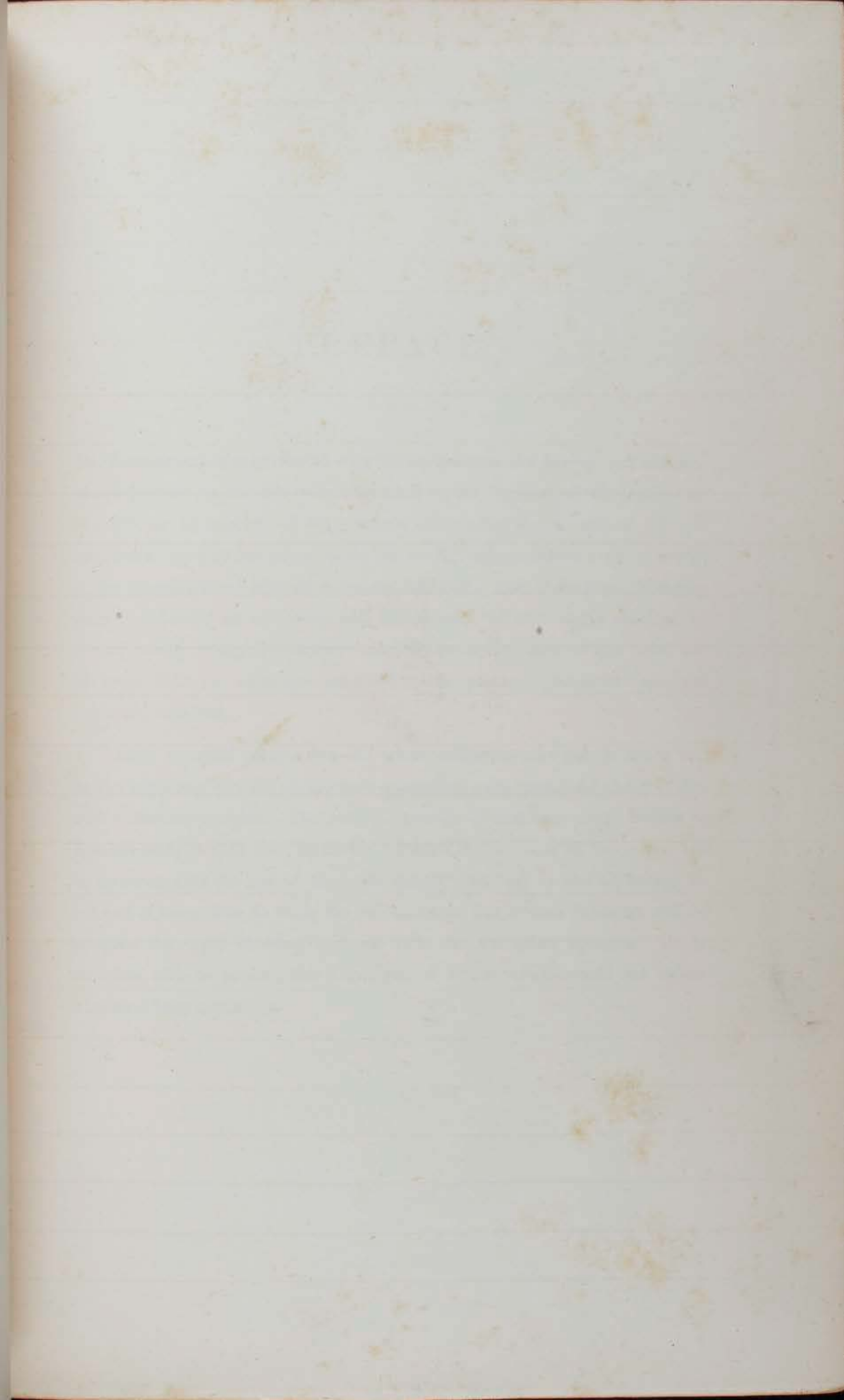
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1888.



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P R E F A C E .

DR. LENDENFELD was entrusted with the compilation of a descriptive Catalogue of the Sponges in the Australian Museum by the Trustees of this Institution in 1885, as on account of his previous knowledge of the subject he was considered specially competent to do the work ; and a workroom was provided at the Museum fitted with all necessary facilities. The Collections, however, were found to be so extensive, and the number of new forms obtained by almost weekly dredging-operations during the continuance of the work was so large, that the Catalogue assumed much greater dimensions than was originally expected.

After a careful examination the whole collection was put in order, and by the beginning of 1886 all the good specimens were numbered and provided with preliminary names. The Author's change of residence from Sydney to London, early in that year, somewhat retarded the progress of the work ; but he considers that the loss of time was amply made up by the advantage he enjoyed of being able to study the collections in the British Museum, and to compare the types of other authors with the Australian Sponges. He is therefore able to present this Catalogue in a form which would not otherwise have been attainable.



INTRODUCTION.

SPONGES have been known to science for a long time. From the numerous references to them in Homer, it may be inferred that the bathing-sponge was in use amongst the ancient Greeks. Aristotle distinguished, in his *Περὶ ζώων ιστορίας*, three species of Sponges; his opinion was that Sponges were animals.

Other Authors of the Classical and the Middle Ages did not add any observations to those made by the great Alexander's great tutor.

Although some of the papers of these authors were perhaps not absolutely and entirely fanciful, yet we may say that the true nature of Sponges was discovered by Grant in 1825.

The manner in which the older celebrated authors—Linné, Cuvier, Lamarck, and Lamouroux—treated the Sponges was by no means satisfactory; and also the works of Pallas and Esper (certainly the best of their time) are not so good as they might have been.

Very little was done to establish the knowledge of species until Bowerbank and O. Schmidt studied the British and Adriatic Sponges respectively. Through their labours the standard of spongiological works was raised very considerably.

F. E. Schulze subjected a number of Adriatic Sponges to a very careful anatomical and histological examination, and published the results of his labours in the form of a series of monographic essays, which are the most important contributions to our knowledge of Sponges. It may be said that F. E. Schulze has established a "new school" of Spongiology, represented by Vosmaer, Poléjaeff, and myself.

But, in spite of Schulze's labours, and those of Carter, Sollas, myself, and others, our knowledge of Sponges was not on a satisfactory footing until now.

Through the extensive collections made by the 'Alert' and 'Challenger' in all parts of the world, and through my own labours in the Australian seas, we have been placed in the possession of sufficient material to attain a much clearer insight into the nature, affinities, and distribution of Sponges.

The results of these labours are laid down in four large monographs, two of which have lately appeared and two are in the press.

Three of these monographs (by F. E. Schulze on the Hexactinellida, by Ridley and Dendy on the Monaxonida, and by Sollas on the Tetraxonida) appear in the 'Challenger' Reports. The fourth, written by myself, deals with the Horny Sponges, and is being published by the Royal Society.

Thus, when all these monographs have appeared, our knowledge of Sponges will be established on a firm basis, as the only remaining group, the Calcareous Sponges, has already been made the subject of a monograph by Haeckel, and has been studied by Poléjaeff and myself.

This satisfactory and complete working out of Sponges is partly due to the facilities afforded me by the Trustees of the Australian Museum and by individuals in New South Wales.

I have to perform the agreeable duty of expressing my thanks to the Hon. William Macleay, who, in the first place, enabled me to study the rich Sponge-fauna of Port Jackson carefully; and to the Trustees of the Australian Museum, and to Dr. Ramsay, the Curator, who have met and assisted me in a liberal manner in carrying on my researches. I am equally indebted to the Authorities of the British Museum, and particularly to Dr. Günther and Mr. S. O. Ridley, for the uniform kindness with which they assisted me during the time I was working there.

We may now review our knowledge of Sponges, and give an outline of the chief results attained.

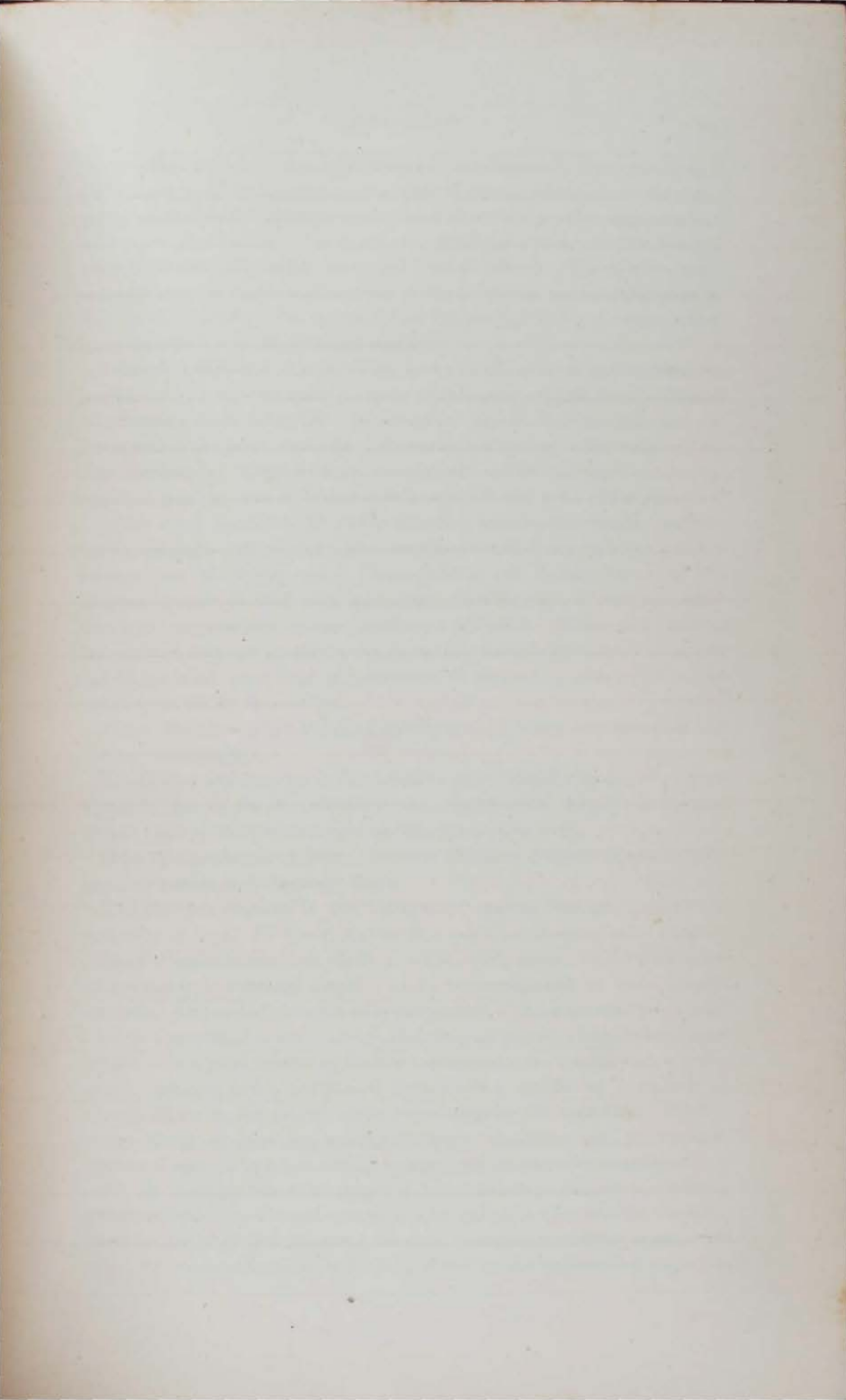
The simplest Sponges (the Asconidæ among the Calcarea) have the shape of a sac the thin walls of which are perforated by numerous small holes. This wall is composed of a structureless jelly- or glue-like substance known as the *ground-substance*, in which cells of various kinds and also the skeleton are contained. The surface of the mesoglœa is covered with a continuous layer of epithelial cells. Nowhere does the mesoglœa come in direct contact with the surrounding water. Every epithelium-cell bears one cilium, which is apparently in continuous motion. The cells on the external surface are low and flat, and derived from the ectoderm of the gastrula-larva; those on the inner side are high and cylindrical, and their free end bears a long flagellum and a conic prolongation of the margin—a collar. These cells are of entodermal origin, and known as *collar-cells*; they are very peculiar in shape, and no cells of this kind have been found in any Metazoa except Sponges. They are similar to certain flagellate Protozoa, *Salpingoeca* and *Codosiga*.

The sexual cells, the connective-tissue cells, the muscular and sensitive cells, the gland-cells, and the skeleton-producing cells are imbedded in the mesoglœa, which extends between the ectoderm and entoderm, and all these cells are of mesodermal origin.

The epithelia, both ectodermal and entodermal, invariably appear as single layers of cells, and do not produce any organs of the interior.

As mentioned above, the flagella are in continuous motion, and, particularly those of the collar-cells, produce a pretty strong current of water, which enters by the small pores in the sac-wall and leaves by the large terminal aperture—the mouth of the sac, which is termed the *osculum*.

All the more highly organized forms of Sponges can be easily derived from the simple Ascon described above. In the first place, the wall of the sac becomes folded and forms diverticula. Then the collar-cells, which clothed the whole of



the inner surface of the Ascon-sac, confine themselves to these diverticula, and are replaced in the central cavity, into which the diverticula open, by flat entodermal epithelial cells, which are similar in structure to the ectodermal epithelial cells on the outer surface. The diverticula, which alone in these higher Sponges are clothed with collar-cells, are termed *ciliated chambers*. The afferent pores, scattered over the whole of the surface of the Ascon-sac, confine themselves to the ciliated chambers. The central cavity communicates with the outer water by one aperture only, the terminal osculum.

A further differentiation is produced by the development of a special dermal lamella, which covers the outer surface. This lamella—the skin—is perforated by numerous small holes, the *inhalant pores*. In the Hexactinellida and the Hexaceratina the pores lead into wide cavities which are often traversed by slender trabeculæ. These *subdermal cavities* communicate with the chambers by numerous small holes in the chamber-wall—the afferent pores of the chambers.

In the other Sponges—the higher Calcarea, the Chondrospongiæ, and the Cornacuspongiæ—the layer of ciliated chambers is folded in a more complicated manner than in the two orders Hexactinellida and Hexaceratina; and the intervening space is filled with mesogloea, which develops to such an extent that only comparatively narrow canals are left open. These canals lead on the one hand from the inhalant pores in the skin down to the ciliated chambers, and on the other hand from the chambers to the central, often small, cavity which opens out by the osculum.

These canals are much branched and form two systems—the *inhalant* and *exhalant* canal-system.

The ciliated chambers are in the Syconidæ and Sulleibidæ, among the higher Calcarea, and in the Hexactinellida and Hexaceratina, large, oval or sac-shaped; and in the other Sponges smaller, spherical or oval.

Most Sponges have a skeleton. The few which are destitute of any support may be regarded as rudimentary forms.

The skeleton consists in the Calcarea of spicules composed chiefly of carbonate of lime. In the Hexactinellida and Chondrospongiæ the skeleton consists of spicules composed chiefly of silica, which appears in the amorphous state and may be compared to opal. In the Cornacuspongiæ we find originally a skeleton composed of monaxon siliceous spicules. These are attached to each other by a cement of a horn- or silk-like chemical nature, which is known as *spongin*. In a great number of the Cornacuspongiæ the quantity of spongin greatly increases, and a skeleton is formed which consists of a network of spongin-fibres, in the axis of which proper spicules are contained. Finally, in the Horny Sponges the spicules disappear altogether, and the skeleton consists of spongin in which foreign bodies (sand &c.) are often embedded.

All the Sponges the development of which is known undergo a complete metamorphosis. The ova and spermatozoa are similar to those of other Metazoa. The sexes are often distinguished; but some Sponges are certainly hermaphrodite. The ovum is fructified in the body of the mother, and passes through the

first stages of development in special capsules or in the canals of the mother. It develops into a ciliated gastrula, which leaves the body of the mother and swims about freely on its own account for some time. Finally the embryo attaches itself to a suitable surface, loses its regular shape, and grows out to form a sponge. We know little about the later stages of development, and I recommend them to the special attention of students.

The digestive functions of Sponges are carried on in an unknown manner. We do not even know what Sponges feed on. Their organization precludes the possibility of their devouring things of a large size, and I am inclined to believe that their nourishment consists of the organic substances contained *in solution* in the water which passes through their elaborate and complicated canal-system. I should like to draw the attention of students to this point also.

Sponges are met with both in fresh water and in the sea. The freshwater forms are few in number, and the Australian freshwater Sponges are very similar to the European. The diversity of marine forms is very great, and it appears that the Australian coast is particularly rich in Sponges.

The systematic position of Sponges has been extensively discussed, and many different views have been put forward with regard to it. I think, however, that my publications on the subject* may be regarded as fairly establishing the fact that Sponges are Metazoa and not Protozoa, and that they belong to the Grade Cœlentera, and do not form a separate group equivalent to the groups Metazoa and Protozoa. Within the Grade Cœlentera I distinguish two Phyla:—(1) Mesodermalia, the chief organs of which are mesodermal in origin; and (2) Epithelaria, the chief organs of which are epithelial (ectodermal and entodermal) in origin. The Mesodermalia comprise the Sponges, and the Epithelaria comprise the Hydromedusæ, Scyphomedusæ, Anthozoa, and Ctenophora.

The classification of Sponges is at present in some confusion, as every author establishes a different system, and no time is allowed to verify them before another new system crops up. I shall here of course follow the system established by myself. Time will show whether my system or another is correct; but I rather suspect that none of them will be found quite satisfactory. The system here employed differs somewhat from that published by me in the 'Proceedings of the Zoological Society' for 1886.

After this short Introduction I now enter on my proper subject—the descriptions of the Sponges which were in the Australian Museum at the beginning of 1886. This work is simply a descriptive Catalogue, and I do not wish to have it considered in any other light.

* Proc. Zool. Soc. 1886; Zool. Jahrb. vol. ii.

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ERRATA.

Page 42, line 3 from bottom, *for* Ancorinidæ *read* Tetillidæ.

Page 172, line 11 from bottom, *for* *Stelospongia* *read* *Stelospongos*.

THE
S P O N G E S
IN
THE AUSTRALIAN MUSEUM.

Phylum **MESODERMALIA.**

Cœlentera with a transgressing canal-system, with entodermal collar-cells. The chief organs are of mesodermal origin.

1. Classis **CALCAREA.**

Mesodermalia with a skeleton composed of calcareous spicules.

1. Ordo **HOMOCÆLA.**

Calcarea the entoderm of which consists exclusively of collar-cells.

Familia **ASCONIDÆ.**

Sac-shaped Homocœla, often forming colonies, without a thick mesoderm which the canals perforate.

The Asconidæ are identical with Haeckel's Ascones. Haeckel's genera are adopted preliminarily.

Genus **ASCETTA**.

Asconidæ with predominant triact spicules, some of which may possess an incipient fourth ray; without diacts.

Ascetta procumbens, Lendenfeld.

Ascetta procumbens, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1086 (1885).

The sponge consists of numerous slightly curved cylindrical tubes, which chiefly extend in one plane, anastomose to form perforated plates, and attain a diameter of 25 and a thickness of 2·5 millim.

The skeleton is regular. The rays of the spicules are 0·1 millim. long and at the base 0·015 millim. thick; they are pretty stout, conic, and slightly rounded at the ends. Our species is distinguished from the allied species by the rays of its spicules being neither cylindrical as in *Ascetta coriacea* nor pointed as in the numerous varieties of *Ascetta primordialis*; besides that, the spicules are shorter than those of the latter and thicker than those of the former.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip (*Lendenfeld*). East coast of Australia: Port Jackson (*Lendenfeld*).

2. Ordo **HETEROCELA**.

Calcarea with differentiated entoderm. The ciliated chambers are clothed with collar-cells and the gastral cavity with entodermal pavement-cells.

I adopt Poléjaeff's name, with a different definition but nearly identical meaning.

Familia **SYCONIDÆ**.

Heterocœla with cylindrical ciliated chambers which traverse the body-wall, are situated radially and open direct into the gastral cavity. Sensitive cells around the inhalant pores.

Identical with Haeckel's Sycones.

Connected with the Asconidæ by *Homoderma* and with the Leuconidæ by *Vosmaeria*.



Subfamilia **SYCONINÆ**.

Syconidæ with unbranched, distally separate ciliated tubes, and without complicated canal-system.

(Subgenera of Sycones with the end-syllable "aga" of Haeckel.)

I divide this subfamily, which comprises a great number of the Sycones, Haeckel, according to Haeckel's principle, preliminarily into the seven genera which, according to Haeckel, comprise *all* Syconidæ.

Genus **SYCANDRA**.

Syconinæ with diact, triact, and tetract spicules.

Comprising Haeckel's subgenera *Sycocarpus*, *Sycocercus*, *Sycocubus*, *Sycotrobus*.

Sycandra arborea, Haeckel.

Sycandra arborea, E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 331 (1872).

Sycandra arborea, R. von Lendenfeld, "Das Nervensystem der Spongien," Zoologischer Anzeiger, viii. Jahrgang, No. 186 (1885).

Sycandra arborea, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1095 (1885).

Sycon arborea, N. de Poléjaeff, "Report on the Calcareæ," The Zoology of the Voyage of H.M.S. 'Challenger,' part xxiv. p. 40 (1883).

Branched sessile colonies, composed of more or less cylindrical tubular individuals, with small frills. Colonies composed of from 5 to 30 persons, each measuring from 8 to 20 millim. in length and from 4 to 8 millim. in diameter. Inhalant pores very regularly disposed, and surrounded by rings of muscular cells—sphincters. The inhalant pores lead into subdermal extensions of the intercanals, which are wide and have a quadratic transverse section.

Spicules.—*Gastral tetract Spicules*. The radial centripetal ray pointing towards the osculum and also curved in that direction, pointed, conic; 0.04–0.06 (exceptionally 0.08) × 0.008 millim. (Haeckel), 0.08 × 0.008 millim. (my measurements). The two aboral rays paired and straight; the other longitudinal and curved, concave towards the gastral cavity; all of equal size, 0.037–0.04 × 0.006 millim.—*Parenchymal triacts*. Sagittal; lateral rays 0.16–0.1 × 0.005–0.006 millim. The unpaired ray in the proximal part of the ciliated tubes shorter than the others, 0.05 × 0.004 millim.; in the distal part longer, 0.12 × 0.007 millim.—*Dermal diacts* short and stout,

curved and irregular, massed on the summits of the ciliated tubes. In each group 6–10 long diacts, $0.96-1 \times 0.05$ millim., and very numerous short ones $0.04-0.2$ millim. long, of the same thickness. The latter are inflated at the distal ends. The terminal knobs, which have a diameter of $0.08-0.1$ millim., form a hard pavement on the surface.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip (*Lendenfeld*), Bass Straits (*Haeckel*), Moncœur Island ('*Challenger*'). East coast of Australia: Port Jackson (*Ramsay*).

***Sycandra ramsayi*, Lendenfeld.**

Sycandra ramsayi, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1097 (1885).

Sac-shaped or spherical *Sycandra*, which never form colonies, and which attain a height of 50 and a diameter of 40 millim. The body-wall is very thick; so that even the largest specimens have a comparatively small gastral cavity, which is more or less tubular, sac-shaped. In consequence of the thickness of the body-wall, the ciliated chambers attain an exceptional length; they are longest in the middle of the sponge: their length decreases towards the oral and aboral ends. The sponge attains, in consequence of the long protruding dermal diacts, a very hairy appearance. The circular osculum, 5–10 millim. in diameter, is surrounded by a frill of very long (4 millim.) longitudinal diacts. The protruding, nearly conic, distal ends of the elongate ciliated chambers are crowned by clusters of very long and slender diacts.

Spicules.—*Gastral tetracts*. Very slender, irregular; centripetal radial ray conic or cylindrical, nearly straight, 0.22×0.005 millim.; transverse tangential rays straight, 0.2×0.0048 millim.; longitudinal tangential ray $0.1 \times 0.003-0.004$ millim., pointing towards the aboral pole. The centripetal radial rays protrude into the gastral cavity.—*Parenchymal Spicules*. Triacts and tetracts, with numerous transition-forms. The largest tetracts perfectly regular; all rays straight, slender, and slightly conic, 0.17×0.0048 millim. The rays of the largest triacts, which are likewise regular, of the same dimensions. Towards the outer surface the spicules become sagittal, the unpaired rays always being longer and pointing outwards. Measurements of the dermal tetracts and triacts: centrifugal ray $0.15-0.18 \times 0.006$ millim., tangential rays $0.07-0.12 \times 0.006$ millim.—*Dermal protruding diacts* straight, slightly leaning towards the osculum, cylindrical in the centre, and conic at both ends; the proximal end more abruptly pointed than the distal end; $1.8-2.5 \times 0.021$ millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, "Bottle and Glass rocks," on black mud, 10 fathoms (*Ramsay*).



This sponge, one of the most beautiful in Port Jackson, was provisionally set down by Miklucho-Maclay as *Baeria Ramsayi*. The genus *Baeria* may with further investigation be reestablished, when we are in a position to replace Haeckel's artificial classification by a more natural one. The specific name has been retained.

Subfamilia UTEINÆ.

Syconidæ, the ciliated chambers of which coalesce throughout, so that there are no projecting distal cones, and the outer surface is smooth and continuous. The tubes are simple and unbranched; there is no complicated canal-system.

Genus GRANTESSA.

Uteinæ with sparsely scattered bunches of long dermal protruding diacts, which are not determined in their number or position by the ciliated chambers.

Grantessa sacca, Lendenfeld.

Grantessa sacca, R. von Lendenfeld, "A Monograph of the Australian Sponges. —Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1098 (1885).

Large sac-shaped sponges, which do not form colonies and which are characterized by the large size of their gastral cavity and the thinness of the body-wall. The sponge attains a length of 80 millim. and has the shape of a straight or slightly curved cylinder, with a circular transverse section 20–25 millim. in diameter. The body-wall is only 2–2.5 millim. thick. Intercanals with triangular transverse section, regular, and conspicuous, connected with the outer water by small pores, which pervade the dermal layer. No subdermal extensions of the inhalants.

Spicules.—*Gastral tetracts* rare; one differentiated ray protruding into the gastral cavity, straight, short and stout, conic and pointed, 0.055–0.006 × 0.005 millim. Tangential rays regular, in one plane, vertical to the centripetal ray, 0.07 × 0.005 millim.—*Triact Spicules of the Parenchyma* sagittally differentiated; centrifugal unpaired ray straight, conic, rounded at the end, 0.2–0.3 × 0.006–0.007 millim.; the paired rays slightly bent, with the convex side looking inward, 0.11 × 0.004 millim. Regular triacts with straight, cylindrical, abruptly pointed rays are met with towards the outer surface; their rays measure 0.1–0.14 × 0.007 millim. Dermal triacts, similar

in shape to the sagittal ones in the parenchyma, are very numerous; their unpaired ray is situated radially, and pointed inwards. The paired rays stand nearly vertical on this one and are very variable in size; always, however, very slender; they form a dense and hard dermal felt.—The *Dermal diact spicules* are cylindrical and pointed at both ends, more abruptly at the distal end. They are very slender, and consequently nearly always broken off in preserved specimens. They measure $2-3 \times 0.014$ millim. These spicules are massed in clusters of from 10 to 15, and they protrude five sixths of their length beyond the surface, on which they stand vertical. The clusters are regularly disposed, and situated at intervals of about 2 millim. from one another. Small linear diacts are also met with in these clusters.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, on rocky bottom (*Lendenfeld*).

Familia LEUCONIDÆ.

Heterocœla with ramified inhalant and exhalant canals, and with spherical ciliated chambers. The outer surface is not differentiated into distinct poriferous and osculiferous areas.

This family comprises the Leucones of Haeckel with spherical chambers with the exception of the Teichonidæ.

Genus LEUCETTA.

Leuconidæ with exclusively triact spicules.

This genus is nearly identical with Haeckel's genus of that name.

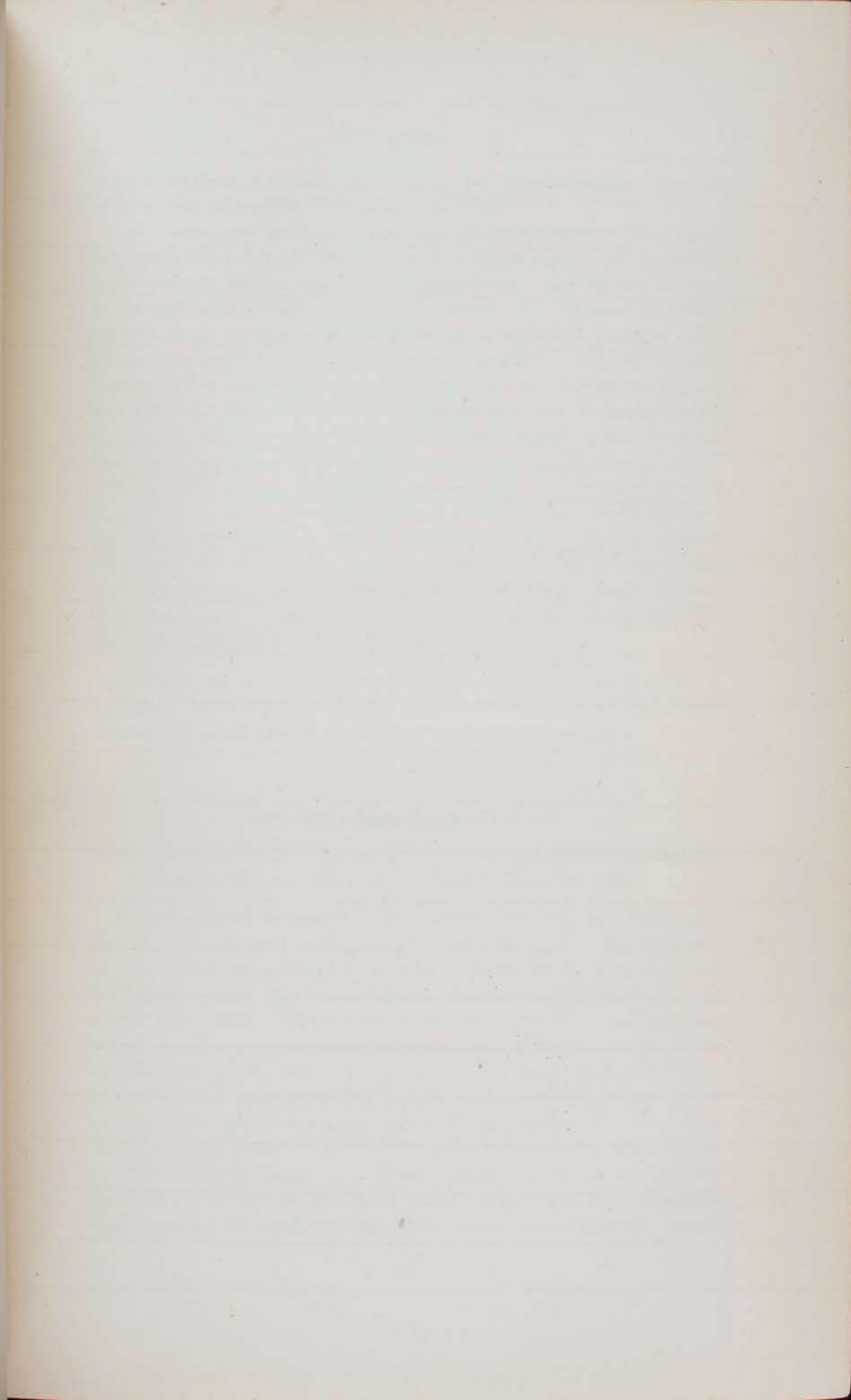
Leucetta microrrhaphis, Haeckel.

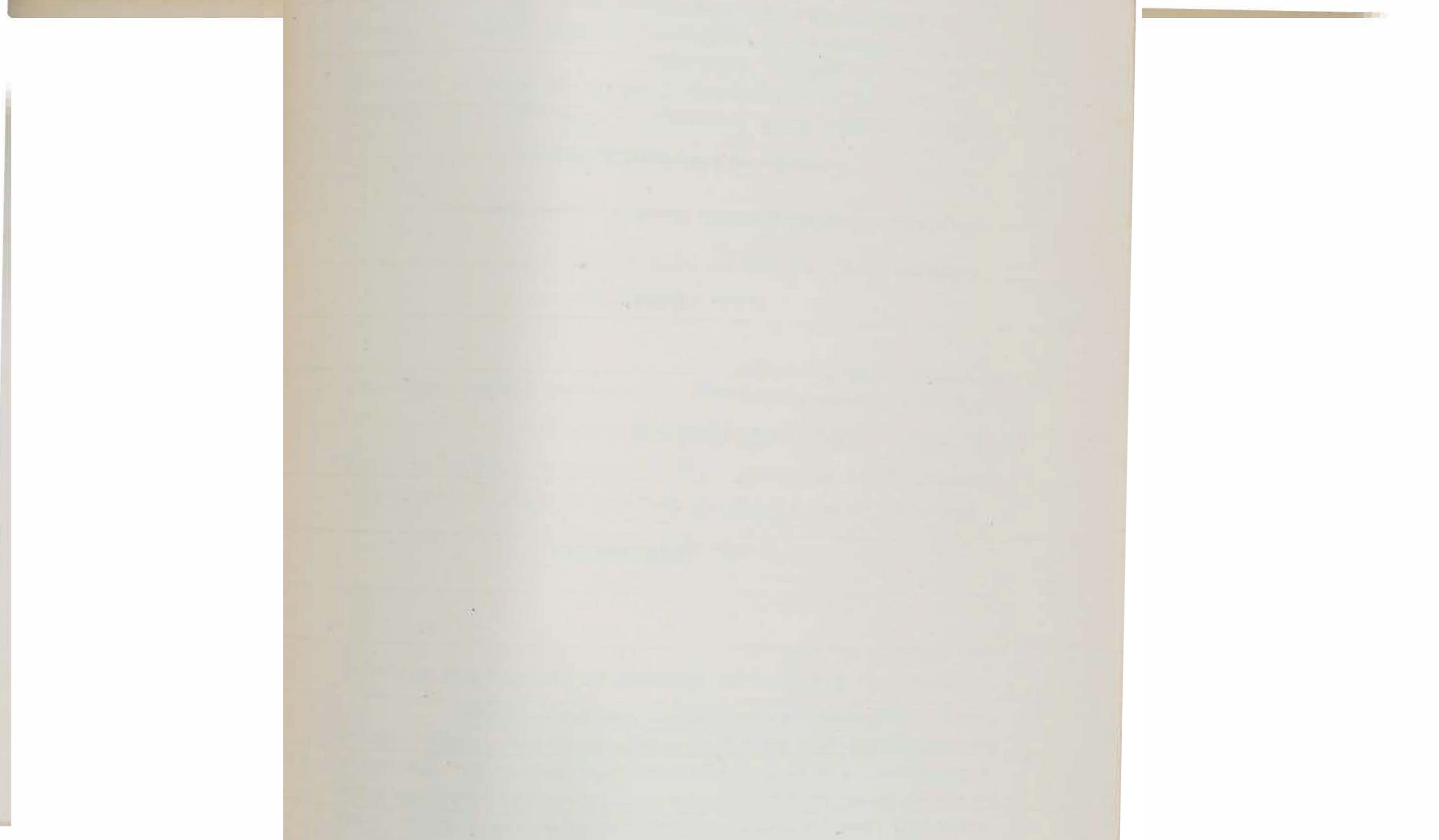
Leucetta microrrhaphis, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1117 (1885).

Leucetta microrrhaphis (*Leucetta primigenia*, var. *microrrhaphis*), E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 119 (1872).

Leucetta primigenia, var. *microrrhaphis*, S. O. Ridley, Report on the Sponges, Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' 1881-82, p. 482 (London, 1884).

Dermal and gastral surfaces smooth. Triacts regular. Rays straight, pointed. Numerous small spicules measuring 0.142×0.011 millim., and





rarer large ones of a similar shape measuring 0.8×0.085 millim.; very rare spicules of an intermediate size are also met with.

I have seen many specimens of Haeckel's *Leucetta primigenia*. They are all slightly ramified; 3-6 cylindrical pieces, with uneven surface, grown together and meeting at sharp angles. These cylinders taper towards the terminal oscula, and attain a length of 25 and a diameter of 8 millim. The gastral cavity is large, the body-wall not exceeding 2 millim. in thickness. The inhalant pores are covered with thin perforated membranes, and lead into wide bulbous cavities, from the proximal ends of which the inhalant canals take their origin. A great number of canals radiate from each subdermal lacuna; the latter have a diameter of 0.12 millim. The small spicules are very regularly tangentially disposed in the surface in such a manner that they form a network with hexagonal meshes, in which the pores are situated; but there is not a pore to each mesh. The spiculation of all these specimens is the same (as above), corresponding to that of Haeckel's var. *microrrhaphis* of *Leucetta primigenia*. Ridley (*l. c.*) has obtained the same sponge from Torres Straits. The similarity in the structure of my specimens and their constant difference from other forms of Haeckel's species lead me to assume that this variety of Haeckel's should be considered a distinct species.

GEOGRAPHICAL DISTRIBUTION.—Australia? (*Haeckel*). North coast of Australia: Torres Straits ('Alert'). South coast of Australia: Port Phillip (*Lendenfeld*). East coast of Australia: Port Jackson (*Lendenfeld*).

***Leucetta megarrhaphis*, Haeckel.**

Leucetta megarrhaphis (*Leucetta primigenia*, var. *megarrhaphis*), E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 119 (1872).

The specimens of this sponge which I have seen are irregularly lobose, compressed, and measure (the largest) $150 \times 100 \times 25$ millim. The surface is smooth. A few large oscula of an irregular shape are found near the margin of the flattened sponge. The spirit-specimens are not well preserved; they are of a dirty brown colour. The inner part of the sponge is taken up by an extensive gastral cavity of irregular shape, which, however, copies the outline of the outer surface roughly, so that the body-wall is of pretty uniform thickness throughout. In some places the opposite walls coalesce, and the sponge appears solid. There seem to be only very small subdermal cavities, from which, however, pretty large inhalants extend downwards; these are of irregular, cylindrical shape; some of them extend centripetally nearly to the gastral wall; at the end they bend round abruptly and form tangential branch-canals, from which the small final ramifications are given off. These

canals measure 0.4–0.8 millim. in diameter. The exhalants are more irregular, and join to form canals with a diameter varying from 0.6–0.2 millim., which open with circular pores of the same width into the gastral cavity. These pores are in some places 1.5–2.5 millim. distant; in others they are further apart.

The *skeleton* is composed of dense masses of triact spicules; these are equiangular. The rays of the smaller ones measure 0.160×0.12 on an average, those of the large ones 0.640×0.02 millim. The spicules of the small variety are larger than those observed by Haeckel, whilst the large ones are not so numerous.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Genus LEUCORTIS.

Leuconidæ with triact and diact spicules.

Leucortis elegans, n. sp.

The sponge consists of a meandric, much and irregularly curved lamella with a very uneven surface and numerous oscula. This structure has faint resemblance to the human brain, and may attain a length of 130, width of 100, and height of 40 millim. The lamella appears, if studied more closely, to surround a very extensive cavity, which is the common gastral cavity of the sponge, and in connexion with the outer water by numerous oscula. The lamella is accordingly the *body-wall*. The dredge frequently brings up fragments of this extremely tender structure only—small pieces of the lamella. Of these the one side is the inner (gastral) surface and the other the outer one. This lamella, or the body-wall as I shall henceforth designate it, is about 0.8–1.2 millim. thick, so that the proportion of the thickness of the body-wall to the diameter of the body-cavity is a very unusual one, 1:30 or more. This accounts for the extreme laxity and tenderness of the whole structure. The oscula are generally situated on raised irregular ridges; they are circular and frilled, and have a diameter of 1 millim. The frill is about 1 millim. high. Both the inner and outer surfaces are smooth; macroscopically the two can be distinguished because the inner surface appears less dense than the outer. The sponge is in spirit white, with a yellow tinge. The subdermal cavities are highly developed. The inhalants are irregular and small. The exhalants join to form large canals which extend tangentially through the thin body-wall and often undermine the gastral surface for some distance; they open into the gastral cavity with very large, circular pores 2–4 millim. in diameter, which are not numerous. The exhalant canals in the middle of the body-wall measure 1–1.5 millim. in diameter; those below the



gastral surface have the same size as the vents, measuring 2–4 millim. in diameter. The exceptionally extensive gastral cavity has been mentioned above.

Skeleton.—(1) *Triact Spicules*. These form the bulk of the skeleton. Two varieties of them are found:—(A) Dermal triacts: the rays of these do not lie in one plane, but are disposed like the edges of a low triangular pyramid. They are equiangular, and the rays slightly curved concave to the pyramid. The rays measure 0.16×0.01 millim., are conic, and pretty sharply pointed. (B) Triacts of the Parenchyma: Equiangular; the rays lie in one plane and measure 0.36×0.02 millim., are conic and sharp-pointed. The rays of adjacent spicules are parallel and join in such a manner that the ray of the one spicule which points one way is joined for the greater part of its length to the ray of the adjacent spicule which points the opposite way. In this respect our sponge is similar to *Amphoriscus*.—(2) *Diact Spicules*. These are not very numerous, imbedded in the outer surface of the sponge, and vertical to it. They project slightly beyond the surface. They are curved, more so near the outer end than proximally. The distal end is very abruptly pointed, like a Roman sword. The thickest portion of the spicule is situated just below the outer end. The proximal part is slightly conic and rounded at the end. These spicules measure 1.20×0.04 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Genus **LEUCANDRA**.

Leuconidæ with diact, triact, and tetract spicules.

Nearly identical with Haeckel's genus *Leucandra*.

Leucandra meandrina, Lendenfeld.

Leucandra meandrina, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1128 (1885).

A solitary, cylindrical, tubular sponge, which attains a length of 120 and a diameter of 25 millim. The dermal surface is smooth, without projecting spicule-rays; the gastral surface and also that of the larger exhalant canals appears hairy or velvet-like. The outer surface is very uneven, and bears an intricate meander-like sculpture in high relief. The gastral cavity is cylindrical, and the thickness of the body-wall is very different in different parts in consequence of the above-mentioned surface-sculpture. The canal-system is rather peculiar; there are no lacunose extensions of the inhalant canals, no subdermal cavities. In the gastral part of the body-wall we meet with very regular longitudinal canals of

an oval transverse section; the short axis of the ellipse is situated radially. The thickness of the body-wall is 1.8–2.1 millim., and the gastral cavity is very large accordingly. The longitudinal canals measure, on an average, 0.7×1.2 millim. These exhalent, wide, collecting-canals open separately into the gastral cavity, without forming anastomoses or lacunes. The remarkable gastral tetract spicules clothe these canals in the same way as the gastral cavity itself, so that they make rather the impression of branches of a ramified gastral cavity than of exhalant canals.

Spicules.—The skeleton consists of gastral tetract spicules with a very elongated, protruding centripetal ray, parenchymal triacts of two kinds, and parenchymal, radially situated, and slightly protruding large diact spicules. The *gastral tetracts* are sagittal and regular. The centripetal ray measures from 0.07 to 0.28 millim. in length; the longer ones predominate, they have a very constant basal thickness of 0.005 millim. The tangential rays lie in one plane, which is vertical to the centripetal ray. They, and also the angles between them, are equal. Like the centripetal ray, the tangential ones are quite straight or slightly and irregularly curved at the distal end; they measure 0.18×0.005 millim. All rays are cylindrical and pointed. The *triacts of the parenchyma* are regular or slightly irregular, never sagittal, and stout or slender; the stout ones predominate throughout; the slender ones are more numerous towards the outer surface. The rays of the stout triacts measure 0.28×0.021 ; those of the slender ones have the same length, but are only 0.007 millim. thick. Among the triacts there are also a few small tetracts with rays corresponding to those of the slender triact spicules. Transition-forms between these tetracts and the slender triacts are present in great abundance. Transition-forms between the slender and the stout triact spicules do not exist. The *diact spicules* are spindle-shaped and pointed at both ends; they measure 1.5×0.035 millim., and are rare. Around the osculum there are no differentiated spicules.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

***Leucandra cataphracta*, Haeckel.**

Leucandra cataphracta, E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 203 (1872).

Leucandra cataphracta, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1129 (1885).

The sponge consists of a solitary person, which has an elongate, cylindrical, fusiform, or flattened shape. A slender peduncle and a narrow oscular





part are generally met with. These cylinders attain a length of 20 to 30 millim. and a diameter of 6 millim. The gastral cavity is narrow, only one sixth to one fourth of the diameter of the outer cylindrical surface. Osculum terminal, without frill. A great number of very fine gastral pores, which lead into very minute parietal canals, open in the surface of the stomach. In longitudinal sections through the wall these latter are hardly visible.

The main mass of the *skeleton* is, in this species, quite different from that of all other *Calcarea*; it is composed of several layers of enormous longitudinal diact spicules, which lie parallel to the outer surface. These spicules are coated and united by a cement which consists of small, mostly sagittal, triact spicules. The large *diact spicules* are spindle-shaped, either tapering to both ends or inflated at the oral end, mostly slightly curved, rarely straight, 1 to 3 × 0.15 to 0.2 millim. All diacts lie in a longitudinal direction, parallel to the longitudinal axis of the body, but pointing a little outwards at the oral end. They are situated in several parallel layers closely packed (ten to fifteen layers in the thickest part of the body-wall). The small interstices between the diacts are filled up by small *triacts*, which surround particularly the inner diacts sheath-like. Most of them are sagittal, and parallel, with their basal ray, to the longitudinal axis of the body, whilst both the lateral rays diverge towards the oral side and often embrace the diact spicules. The unpaired angle 150° to 170°, the paired ones 95° to 105°. The straight basal ray measures 0.15 to 0.2 millim. in length; its basal thickness is 0.005 to 0.008 millim. Between the sagittal rays there are also single, irregular, rarely regular, triact spicules. The sagittal *tetracts* clothe the whole inner surface of the gastral cavity and the large canals, and are arranged regularly; the basal ray points towards the aboral side. They possess an unpaired angle of 160° to 170°, and two paired angles of 95° to 100°. Their basal ray is 0.25 to 0.35 millim. long, straight, their slightly curved lateral rays are 0.2 to 0.3 millim. long, and, like the basal ray, only 0.005 millim. thick. The apical ray is two to six times thicker, that is 0.01 to 0.02 or 0.03 millim. Its length varies, in the greater part of the gastral cavity it is only 0.1 to 0.15 millim., but towards the osculum 0.3 to 0.4 millim. long. The entrance to the gastral cavity is in this way surrounded just below the osculum by a circle of strong apical rays.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Frauenfeld*); Port Denison (*Ramsay*).

***Leucandra typica*, Poléjaeff.**

Leucandra typica, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1130 (1885).

Leuconia typica, var. *tuba*, Poléjaeff, Report on the Calcarea, The Zoology of the Voyage of H.M.S. 'Challenger,' part xxiv. p. 56 (1883).

This sponge attains a length of 40 millim., and an average diameter of 12 millim., the thickness of the body-wall is 3 millim. The spherical ciliated chambers have in this species particularly regular outlines, and are smaller than in any other allied forms, their diameter rarely exceeding 0.03 millim.

Skeleton.—*Gastral tetract Spicules*. Basal ray straight, tapering from the base to a sharp point, usually shorter, 0.18 millim., and rather thinner than lateral rays, forming with each of these latter an angle varying from 105° to 110° ; lateral rays more or less cylindrical, either straight or slightly curved forwards, rarely exceeding 0.225 millim. in length, and 0.015 millim. in thickness; apical ray curved, more or less sharply pointed, length not exceeding 0.06 millim., variable. This ray is often rudimentary; and there are amongst the tetract spicules many triact spicules also.—*Triact spicules of the Parenchyma* mostly quite regular; rays straight, smooth, tapering from the base to sharp points, reaching 0.75 millim. in length, and 0.065 millim. in diameter.—*Dermal triact Spicules*. Sagittal, all rays of the same length, rarely exceeding 0.35 millim., and of the same diameter, 0.02 millim., either tapering from the base to sharp points, or of a cylindrical form; basal ray straight; lateral rays curved forwards, forming each with basal ray an angle of about 115° .—*Diact Spicules*. In the walls of the body, sparsely scattered here and there in the parenchyma, either isolated or in groups, fine linear, straight, occasionally slightly curved, 0.3 millim. long; near the osculum piercing the wall in perpendicular direction, either spindle-shaped or rather cylindrical, but sharp-pointed, straight, or slightly curved, 0.1 millim. long, 0.004 millim. in diameter.

GEOGRAPHICAL DISTRIBUTION.—North Atlantic: off Bermudas, 32 fathoms, mud ('Challenger').

East coast of Australia: Port Jackson (*Lendenfeld*).

Leucandra villosa, Lendenfeld.

Leucandra villosa, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1131 (1885).

This sponge appears in the shape of a very large, thin-walled, and irregular sac, with an extremely wide osculum. These sacs, of an irregular cylindrical or oval shape, attain a length of 50, and width of 25 millim. and more. They generally appear compressed, with an oval transverse section, the large axis of the ellipse about twice as long as the small one. The osculum is nearly as

wide as the body; narrower in the oval specimens, it becomes relatively much wider in the cylindrical ones. The body-wall is only 2-4 millim. thick, so that the gastral cavity appears very roomy. The osculum is destitute of a frill. Our sponge seems always to be solitary. The outer surface is covered by dense spicules protruding a good distance, and consequently makes the impression of a thick fur. The inner surface is slightly roughened. The canal-system is different in different parts of the sponge: near the osculum it is extremely simple, no lacunes or anastomoses of any kind are found there. The body-wall is consequently very thin in this part (2 millim.). Further down towards the aboral pole the gastral wall is perforated by large, densely scattered round holes, measuring 1.5 to 2.5 millim. in diameter. These exhalant pores lead into longitudinal canals of an oval, transverse section, similar to those described in a very different species, *Leucandra meandrina*, by myself. The apertures, or rather short radial canals connecting the longitudinal tubes with the gastral cavity, are conic or trumpet-shaped, wide at the mouth, they open with an aperture not exceeding 0.5 millim. in diameter into the tubes. These longitudinal tubes are clothed with the same skeleton as the stomach.

Spicules.—*Gastral tetract Spicules.* Centripetal, sagittally differentiated ray, straight, slender, and protruding into the tubes and gastral cavity; this ray is cylindrical and pointed, rarely slightly curved towards the end, measuring $0.2-0.55 \times 0.01$ millim. Three tangential rays equal, in a plane vertical to the centripetal ray, straight, conic, and pointed, with equal angles between them; these rays measure 0.28×0.01 millim.—*Triacts and tetracts of the Parenchyma.* Regular triacts with straight, conic, and rounded rays, measuring 0.35×0.02 millim., are predominant in the body-wall. Besides these there are triacts of a similar size as the former, with curved rays and more or less irregular angles. I have never met with proper sagittal triacts. On these irregular spicules, and also on a few regular ones, an incipient fourth ray can be observed. These forms lead up to tetracts with conic, curved, and terminally rounded rays, measuring 0.3×0.018 millim., which are, however, rare.—The *dermal diacts* are of two kinds: very slender linear spicules, and larger, but also slender and very long spindle-shaped spicules. The latter are set at nearly right angles to the surface of the sponge, and are very numerous; they cause the hairy appearance of our sponge. They are sharply pointed at both ends, and immersed about $\frac{1}{5}-\frac{1}{4}$ of their length in the body. They measure $2-3.5 \times 0.035$ millim. The shorter ones are common, those measuring over 3 millim. in length found only exceptionally. The linear diacts measure 1×0.006 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Leucandra erinaceus, n. sp.

This sponge is spindle-shaped and hollow. The body-wall is only 2–3 millim. thick. The gastral cavity extends down from the osculum nearly to the base of the sponge. Generally there is a cylindrical peduncle with uneven surface 6 millim. thick and 30 millim. long. The body-cavity extends down through the peduncle, which appears hollow accordingly. The peduncle gradually extends above to form the body of the sponge, which has a circular transverse section, and is wider in the centre than at either end, where it attains a diameter of 18 millim. The body is about as long as the peduncle, so that the entire length of the whole sponge is 60–80 millim. At the upper end a circular osculum 8 millim. in diameter, which is not protected by a frill, is situated. The surface of this sponge appears hairy or villous, in consequence of the diacts which project several millimetres beyond the surface, and which are very close together. Alive, in spirit, and dry the sponge is pure white. The inhalant pores lead into *small* subdermal cavities. The inhalant canals branch in a penicillate manner, and extend mostly in a centripetal direction. The exhalants are of a similar nature, and join to form larger canals, which extend sometimes for a short distance tangentially below the gastral wall, and finally open with circular vents 0.6–1 millim. in diameter into the wide gastral cavity, which, having the same shape as the sponge itself, appears cylindrical and extended below the osculum.

Skeleton.—The bulk of the skeleton consists of very large diacts situated radially and protruding 1–3 millim. beyond the surface. The other spicules are small triacts and tetracts. there are about twice as many of the former as of the latter. (1) *Triact Spicules*. Equiangular, with straight, slightly conic rays, rounded at the ends. The rays measure, on an average, 0.2×0.016 millim. Intermediate stages between these and the tetracts are abundant; in some the rays are slightly curved in an undulating manner. (2) *Tetract Spicules*. Slightly larger than the triacts, the three tangential rays often curved, angle between them and the fourth ray 110° ; rays average 0.24×0.02 millim. (3) *Diact Spicules*. Spindle-shaped, slightly curved, obtusely pointed at each end, $1-4 \times 0.08-0.11$ millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Leucandra vaginata, Lendenfeld.

Leucandra vaginata, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1133 (1885).

Solitary, cylindrical sponges, with relatively hairy inner, but nearly smooth outer surface (compared to the nearly related *L. aspera*). Our sponge has the



shape of an irregular cone or spindle, or may be ovate. The osculum is always situated terminally on the narrow end of the cone.

Leucandra vaginata attains a height of 30–40 millim., and a diameter of 12–20 millim. The body-wall is thick, particularly in the short and irregular specimens, the gastral cavity measuring only $\frac{1}{5}$ – $\frac{1}{3}$ of the diameter of the sponge. The osculum is sometimes surrounded by a frill. The canal-system is rather complicated; the inhalant pores lead into a reticulation of tangential canals below the surface, all of which possess a circular transverse section and a diameter of 0.2 millim. The meshes of this reticulation are wide, so that no lacunes, which might be regraded as subdermal cavities, are formed. Towards the gastral wall we meet with irregular, circular canals extending tangentially, but not regularly longitudinally. I am doubtful as to whether these form a reticulation; I think not. If anastomoses are present they are very rare. From these canals numerous small radial tubes, only 0.2 millim. in diameter, lead into the gastral cavity. The terminations of these, the pores in the gastral wall, are of the same dimensions as the canals to which they belong, and very close together.

Spicules.—The skeleton consists of similar elements as that of the foregoing species. *Gastral tetracts.* Centripetal, protruding ray 0.1×0.008 millim., conic, pointed, mostly straight, sometimes slightly curved near the end. Tangential ray sagittally developed; one ray situated longitudinally and pointing towards the aboral pole, shorter than the other two; angles on the sides of it equal, about 100° ; this ray measures 0.08×0.006 millim., the other two equal rays 0.12×0.008 millim.—*Triact and tetract spicules of the Parenchyma.* The triacts are equiangular, with straight, conic, terminally rounded rays, the rays mostly sagittally developed; the unpaired ray longer than the other two, pointing outward, and measuring 0.28×0.014 millim., the others 0.22×0.014 millim. Some regular triacts are also met with; their rays have varying intermediate dimensions between the longer and shorter ones of the sagittal triacts; some of the latter show an incipient fourth ray. Decidedly tetract spicules are rare; their rays have the same dimensions as those of the triacts, but are generally curved.—*Diaet Spicules.* These measure 0.7×0.035 millim., are spindle-shaped and slightly curved, the concave side towards the osculum. They are immersed in the body of the sponge about half their length, and stand nearly vertical to its surface; both ends are sharply pointed. These spicules are not very numerous. The sheath, which covers the spicules of calcareous sponges generally, is very highly developed on the protruding part of these spicules, much more so than in any other calcareous sponge known to me; and I have derived the specific name from this characteristic peculiarity.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Leucandra saccharata, Haeckel.

Leucandra saccharata, E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 228 (1872).

Leucandra saccharata, R. von Lendenfeld, Das Nervensystem der Spongien, Zoologischer Anzeiger, viii. Jahr. no. 186 (1885).

Leucandra saccharata, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1137 (1885).

Leuconia saccharata, S. O. Ridley, Report on the Sponges, Report on the Zoological Collection made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' 1881-82, p. 482 (London, 1884).

This sponge occurs in the shape of solitary persons, and also in colonial forms, with or without oscula. The solitary form, with a naked osculum, has the shape of a cylinder or cone, and is sometimes compressed leaf-shaped measuring 10-50 × 5-30 millim. It is attached by a broad base, or a rudimentary solid peduncle. The osculum at the terminal end is circular or oval, and measures 3-10 millim. in diameter; sometimes it is closed. The colonial forms appear as large undulating masses with highly projecting gyri, often similar to a "range of volcanoes" (*Haeckel, l. c.*). The largest sponge seen by Haeckel measured 60 × 40 millim. Carter was therefore wrong in saying that his *Teichonella prolifera* is "by far the largest calcisponge on record." I have seen specimens measuring 140 × 80 × 30 millim., which were only fragments brought up by the dredge; so that although the upper limit of size to which this sponge may grow is unknown, it is clear that this species is a giant among the Calcarea.

The body-wall is from 2 to 5 millim. thick; the gastral cavity follows in shape the outer surface pretty regularly, but is not influenced by the external gyri. The canal-system appears simple; the outer cortex is perforated by numerous small pores, which are equidistant, and which measure 0.04 millim. in diameter; the solid parts of the cortex between them are of the same dimensions as the pores. Below the pores the inhalant canals commence with trumpet-shaped extensions, and lead centripetally downwards into the parenchyma. These canals are cylindrical, and situated radially; they measure 0.16 millim. in diameter, and do not taper towards their centripetal termination, but end *cul-de-sac*-like. No tangential inhalant canals are met with: there exist no anastomoses or subdermal cavities; the ciliated chambers measure 0.04 millim. in width. The exhalant canal-system is slightly more complicated. Radial canals, parallel to the inhalant ones, lie between the latter, and have the same shape and dimensions as these. They do not open directly into the gastral cavity, but join it by means of short tangential tubes; 5 to 20 of these coalesce to a very short radial tube 0.1 millim. in diameter, which opens into the gastral cavity with a trumpet-shaped extension.

Spicules.—The skeleton chiefly consists of large tetracts, to which minute diacts are added in the cortex, and tangential triacts in the gastral wall. The outer surface is covered with a smooth cortex of a brilliant white colour, which is chiefly composed of a cement of minute diacts of peculiar shape; these consist of a longer, conic, and pointed centripetal part, and, originating from the distal thick end of this, in an oblique direction, a shorter, also pointed, centrifugal part, which has the shape of a triangular pyramid. From the edges of this pyramid strong spines take their origin, which are as long or longer than the spicule is thick, and give to the edges of the pyramid a strongly serrated appearance; these minute spicules measure 0.06×0.004 millim. In the cortex we meet here and there with middle-sized triacts and large tetracts. The largest tetracts are regularly disposed; their rays are sagittally developed; three of them extend tangentially in the outer surface and lie in one plane, the fourth extends centripetally, and is exactly radial in its position, standing vertical on the plane of the other three; this centripetal ray is 1–1.5 millim. long, and straight. The tangential rays are 0.5–1 millim. long, and curved inward at the base; all rays are 0.06–0.08 millim. thick. These spicules are very regularly situated at equal intervals. Below the cortex a layer of tetracts is met with, the sagittal rays of which are situated centrifugally and meet the centripetal rays of the dermal tetracts.—Parenchymal smaller triacts regular, with rays measuring $0.2-0.5 \times 0.002-0.004$ millim. Parenchymal larger triacts with rays measuring $0.6-0.8 \times 0.006-0.008$ millim. Between these regular spicules a few irregular triacts are met with.—Parenchymal tetracts irregular and variable, slightly smaller than the dermal ones described above. Gastral and canal-walls (exhalant) are coated by a layer of sagittal triacts, which are situated tangentially. The surface of the stomach and exhalant canals is consequently perfectly smooth. The lateral rays enclose an angle of 160° , and measure 0.3×0.024 millim., the basal sagittal ray measures only 0.07×0.012 millim. Below the outer surface groups of spindle-shaped cells are met with, which are mesodermal, and which I regard as sensitive elements.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Bass's Straits (*Haeckel*). East coast of Australia: Port Jackson (*Ramsay, Lendenfeld*), Port Denison (*Ramsay*).

***Leucandra conica*, Lendenfeld.**

Leucandra conica, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part III.," Proceedings of the Linnean Society of New South Wales, vol. ix. part 4, p. 1126 (1885).

A small, solitary, irregular, more or less cylindrical sponge, with an osculum

which bears a small, hardly perceptible fringe of spicules, or appears naked. The outer and inner surfaces are pretty smooth. The sponge attains a length of 30 millim., and a diameter of 12 millim. The gastral cavity is cylindrical and rather narrow, measuring only a third of the diameter of the sponge. The thick body-wall is lacunar; wide canals, with a circular transverse section, measuring from 0.2–5 millim. in diameter, traverse it in every direction. Below the outer surface we meet with extensive anastomosing subdermal cavities, from which comparatively narrow canals take their origin; these can be traced for some distance in a centripetal direction. The cylindrical canals mentioned above belong to the exhalant canal-system, and are connected with the gastral cavity by very wide (0.4 millim.) and irregular tubes, which are not perpendicular to the gastral wall, but extend upwards towards the osculum. The apertures in the gastral wall at their terminations are scattered sparsely, and measure on an average 0.5 millim. across. The ciliated chambers have a diameter of 0.06 millim.

Spicules.—The skeleton consists mainly of triacts in the parenchyma. The gastral tetracts are small and irregularly scattered; the rays and angles are all different. The rays vary from $0.028-0.08 \times 0.004-0.007$. The parenchymal triacts are very regular; sometimes the rays are slightly bent, they are conic and blunt, and measure 0.35×0.01 .—Diacts of the parenchyma more or less radially disposed, pointed at both ends, slightly protruding beyond the surface, spindle-shaped, and measuring 1.5×0.035 millim., rather rare.—Minute diacts in a continuous layer in the outer surface, all parallel and situated radially, measuring 0.08×0.002 . These spicules are rounded at the proximal and pointed sharply at the distal end. Although forming a continuous layer, they nevertheless do not produce a dense and hard armour, as in those species which possess a “Stäbchen-Mörtel” (*Haeckel*). Diacts forming the frill round the osculum of the same appearance as the former, measuring $0.3-0.5 \times 0.002$, often slightly bent; thickest towards the proximal rounded end, and tapering from there to the distal end, which is, in specimens, generally broken off.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, Laminarian zone (*Lendenfeld*).

***Leucandra aspera*, Haeckel.**

Grantia aspera, J. E. Gray, Proceedings of the Zoological Society of London, 1867, p. 554 (1867).

Grantia aspera, O. Schmidt, Die Spongien des Adriatischen Meeres, ii. Supplement, Seite 4 (1866).

Leucandra aspera, E. Haeckel, Die Kalkschwämme; eine Monographie, Band ii. Seite 191 (1872).

Spongia inflata, Delle Chiaje, Memoire sulla storia e anatomia degli animali senza vertebrale, Napoli, vol. iii. p. 114 (1828).

Sycinula aspera, E. Haeckel, "Prodrömus eines Systems der Kalkschwämme," Jenaische Zeitschrift für Medizin und Naturwissenschaften, Band v. Heft ii. Seite 242, spec. 60 (1870).

Sycinula aspera, O. Schmidt, Die Spongien des Adriatischen Meeres, iii. Supplement, Seite 35 (1868).

Sycon asperum, O. Schmidt, Die Spongien des Adriatischen Meeres, Seite 15 (1862).

GEOGRAPHICAL DISTRIBUTION.—Mediterranean.

2. Classis **SILICEA**.

Mesodermalia with a siliceous or horny skeleton, or without any skeleton.

1. Ordo **HEXACTINELLIDA**.

Silicea with very loose soft parts, and with spicules which are either isolated or united to form a continuous framework, and belong or are reducible to the triaxial system.

Subordo **LYSSACINA**.

Hexactinellida in which the spicules either remain altogether isolated, or are in part subsequently and irregularly united by transverse synapticula.

Familia **EUPLECTELLIDÆ**.

Lyssacina with hexasters; chambers isolated and thimble-shaped. The dermal skeleton contains dermal sword-shaped oxyhexacts with long proximal ray.

Genus **EUPLECTELLA**.

Euplectellidæ with parenchymal oxyhexasters.

Euplectella aspergillum, Owen.

- Euplectella aspergillum*, C. Claus, Ueber *Euplectella aspergillum*, Marburg (1868).
Euplectella aspergillum, W. Marshall, "Untersuchungen über Hexactinelliden,"
 Zeitschrift für wissenschaftliche Zoologie, Band xxv. Supplement, Seite
 142 (1875).
Euplectella aspergillum, W. Marshall, "Ideen über die Verwandtschaftsverhält-
 nisse der Hexactinelliden," Zeitschrift für wissenschaftliche Zoologie, Band
 xxvii. Seite 113 (1876).
Euplectella aspergillum, R. Owen, "New Genus and Species of Sponges," Pro-
 ceedings Royal Society London, vol. ix. pp. 3-5 (1841).
Euplectella aspergillum, R. Owen, "Description of a New Genus and Species
 of Sponge," Transactions Zoological Society London, vol. iii. part 2,
 p. 203, tab. xiii. (1843).
Euplectella aspergillum, F. E. Schulze, "On the Structure of the Soft Parts of
Euplectella aspergillum, Owen," Transactions Royal Society Edinburgh,
 vol. xxix. p. 661, tab. A (1880).
Euplectella aspergillum, F. E. Schulze, Report on the Hexactinellida, Reports
 of the Results of the Voyage of H.M.S. 'Challenger,' vol. xxi. p. 64 (1887).

GEOGRAPHICAL DISTRIBUTION.—Philippine Islands. Off the coast of
 Portugal. 95-100 fathoms.

Familia **ROSSELLIDÆ**.

Euplectellidæ the dermalia of which have no centripetal ray.

Genus **HOLTENIA**.

Monozoic, sac-shaped Rossellidæ, with or without osculum,
 always without peristomal apparatus. Root-tussac irregular and
 only slightly developed. Besides the typical hexaradiate spicules
 there are some with only five rays, besides those with four rays.
 Pappus-shaped termini to the defensive spicules. Cloacal cavity
 clothed with hexaradiate spicules.

Holtenia pourtalesii, Schmidt.

- Holtenia pourtalesii*, W. Marshall, "Ideen über die Verwandtschaftsverhält-
 nisse der Hexactinelliden," Zeitschrift für wissenschaftliche Zoologie, Band
 xxvii. Seite 113 (1876).
Holtenia pourtalesii, O. Schmidt, Grundzüge einer Spongienfauna des atlan-
 tischen Gebietes, Seite 14 (1870).

Holtenia pourtalesii, O. Schmidt, Die Spongien des Meersbusen von Mexico, Seite 65 (1880).

GEOGRAPHICAL DISTRIBUTION.—Atlantic Ocean: Florida. 254–324 fathoms.

Familia **HYALONEMATIDÆ**.

Lyssacina with amphidiscs in the limiting membranes and pentact pinulæ in the dermal and gastral surfaces.

Genus **HYALONEMA**.

Hyalonematidæ at the lower end of the funnel-shaped, somewhat spherical body, of which a long and slender root-tuft is observed, the spicules of which are four-toothed anchors. No uncinates. Marginalia are diacts pointed above, with spined distal ray.

Hyalonema sieboldii, Gray.

Hyalonema mirabilis, Gray, "On the Coral known as the Glass-plant," Proceedings Zoological Society London, vol. iii. p. 63 (1835).

Hyalonema sieboldii, Gray, "Note on the Glass-rope, *Hyalonema*," Annals and Magazine Natural History, ser. 3, vol. xviii. p. 287 (1866).

Hyalonema sieboldii, W. Marshall, "Untersuchungen über Hexactinelliden," Zeitschrift für wissenschaftliche Zoologie, Band xxv. Supplement, Seite 142 (1875).

Hyalonema sieboldii, W. Marshall, "Ideen über die Verwandtschaftsverhältnisse der Hexactinelliden," Zeitschrift für wissenschaftliche Zoologie, Band xxvii. Seite 113 (1876).

Hyalonema sieboldii, Max Schultze, Die Hyalonemen, Bonn (1860).

Hyalonema sieboldii, F. E. Schulze, Report on the Hexactinellida, Reports on the Results of the Voyage of the 'Challenger,' vol. xxi. p. 190 (1887).

GEOGRAPHICAL DISTRIBUTION.—Seas of Japan. 200 fathoms.

2. Ordo **HEXACERATINA**.

Silicea with large, sac-shaped, ciliated chambers, with simple inhalant canals. Skeleton, when present, composed of pithed horny fibres. Without siliceous or calcareous spicules.

Familia **DARWINELLIDÆ.**

Hexaceratina with horn-fibres and with horn-spicules.

Familia **APLYSILLIDÆ.**

Hexaceratina with horn-fibres, but without horn-spicules.

Genus **IANTHELLA.**

Aplysillidæ with cellular cavities in the spongin-wall of the horn-fibres.

Ianthella concentrica, Hyatt.

Ianthella concentrica, A. Hyatt, "Revision of the North American Porifera, with Remarks upon Foreign Species.—Part I.," *Memoirs of the Boston Society of Natural History*, vol. ii. (1875).

Ianthella concentrica, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysiniidæ," *Zeitschrift für wissenschaftliche Zoologie*, Band xxxv. Seite 385 (1878).

This sponge presents the shape of a regular cup which is attached by a comparatively broad base; it attains a height of 150 millim. and has a circular margin 110 millim. in diameter. The shape of the cup is that of a cone. Just below the margin the wall of the cup is 10 millim. thick, it becomes thicker further down. The surface is rendered uneven by the projection of very irregular broad and low conuli, which are on an average 8 millim. apart and 2-3 millim. high. The external and the internal surface of the cup present the same appearance. The oscula are confined to the inner side of the cup; they are circular, and 1.5-3.5 millim. wide; rare and small near the margin of the cup, they become larger and more numerous towards the base.

The *skeleton* consists of a very irregular network of immensely thick fibres. The meshes of the network are 10 millim. wide and the fibres are 1 millim. thick. Of all the sponges known to me, this has the thickest fibre. The sponge, when dry, is of a dark blue colour; it is very hard, and quite incompressible.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia, Western Australia (*Baily*).

Fiji (*Hyatt*).

Ianthella flabelliformis, Gray.

- Alcyonium irregulare* &c., Albert Sebæ, *Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio*, 1734–1760, vol. iii. p. 183, nos. 2–4, partim (1734–1760).
- Flabellum aruense* &c., Georg. Everard Rumphius, *Amboynsche Rariteyt-kamer*, vol. vi. (1741).
- Ianthella flabelliformis*, W. Fleming, "Ueber *Ianthella*, Gray," *Würzburger Verhandlungen*, Neue Folge, Band ii. (1871).
- Ianthella flabelliformis*, J. E. Gray, "Note on *Ianthella*, a new Genus of Keratose Sponges," *Proceedings of the Zoological Society London*, 1869, p. 50 (1869).
- Ianthella flabelliformis*, N. de Poléjaeff, *Report on the Scientific Results of the Voyage of H.M.S. 'Challenger,' Zoology*, 1884, vol. xi. part 24, p. 37.
- Ianthella flabelliformis*, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysiidæ," *Zeitschrift für wissenschaftliche Zoologie*, Band xxx. Seite 385 (1878).
- Keratophyton majus* &c., Hermann Boerhaave, *Index alter plantarum horti Lugduno-Batavi*, Leyden, p. 6, partim (1720).
- Spongia flabelliformis*, E. J. C. Esper, *Die Pflanzenthier*, vol. ii. p. 213 (1791–1830).
- Spongia flabelliformis*, J. de Lamarck, *Histoire Naturelle des Animaux sans Vertèbres*, Deuxième Edition par de Blainville, vol. ii. p. 550, partim (1832).
- Spongia flabelliformis*, C. von Linné, *Hortus Cliffortianus*, p. 480, partim (1737).
- Spongia flabelliformis*, C. von Linné, *Systema Naturæ*, 12 Editio, p. 1296, partim (1767).
- Spongia flabelliformis*, P. S. Pallas, *Elenchus Zoophytorum*, p. 380 (1766).
- Spongia flabelliformis* &c., Royen, *Prodromus*, p. 522, no. 6, partim.
- Verongia flabelliformis*, E. Ehlers, *Die Esper'schen Spongien*, p. 11 (1870).

This sponge is more or less fan-shaped. It consists of a large lamella, which is expanded in a plane or folded longitudinally. This lamella is attached by a short peduncle; it may be simple or (and this is particularly the case in large specimens) several fronds may grow out from one and the same stem. Sometimes the lamella appears branched, inasmuch as secondary lamellæ grow out from the first. The sponge attains a height of 500–1000 millim. and a similar width. The lamellæ of large specimens are on an average 10 millim. thick, whilst those of small specimens rarely exceed 5 millim. in thickness. The whole of the surface is covered with conuli, which are on an average 4 millim. apart and 1 millim. thick at the rounded distal end. The height of the conuli varies greatly from 1–7 millim. The conuli are connected

with each other by elevated ridges, which separate the concave fields. The inhalant pores are situated on one side of the lamella, the oscula on the other. The latter are 0.5–1.5 millim. wide, and generally situated in groups of five to seven. The colour of the sponge when alive is bright yellow; when the sponge is exposed to air or fresh water it changes to a dark blue; in spirit it becomes dark brick-red or copper colour.

The *skeleton* consists of radial fibres, which form bands extending from the stem to the margin of the plate; these bands are vertical to the surface of the lamella. The main fibres approximate and coalesce in the stem, so as to form a very dense structure. In the sponge-lamella the bands of main fibres are connected by transverse fibres, vertical to the former and parallel to the surface; these form similar bands as the main fibres. Besides these two systems of fibres, which form regular square meshes, there are fibres vertical to the surface, which are situated at the points of intersection of the two former systems. The branches of the latter, which appear ramified in a dendritic manner, terminate in the conuli. Dry specimens are very hard; living ones exceedingly soft; spirit-specimens are flexible and readily compressible.

The sponge is abundant in parts of the East Indies and on the Australian coast. It is one of those few Australian sponges which have been known in Europe for a considerable time.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits ('*Challenger*'). West coast of Australia (*Baily*). East coast of Australia: Port Jackson (*Lendenfeld, Ramsay*).

Indian Ocean (*auctorum*).

***Ianthella basta*, Gray.**

(PLATE IX.)

Alcyonium irregulare &c., Albert Sebæ, *Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio*, 1734–1760, vol. iii. p. 183, tab. 95, nos. 2, 4, partim.

Basta marina &c., George Everard Rumphius, *Amboynsche Rariteyt-Kamer*, 1741, vol. vi. tab. 89. fig. 1.

Ianthella basta, J. E. Gray, "Note on *Ianthella*, a new Genus of Keratose Sponges," 1869, *Proceedings of the Zoological Society London*, 1869, p. 51.

Ianthella basta, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysiniidæ," *Zeitschrift für wissenschaftliche Zoologie*, Band xxx. Seite 485 (1878).

Ianthella flabelliformis, S. O. Ridley, *Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert' in 1881–1882*, *Spongida*, p. 392, p. 601 (?).

- Ianthella homei*, J. E. Gray, "Notes on *Ianthella*, a new Genus of Keratose Sponges," Proceedings of the Zoological Society London, 1869, p. 51.
- Ianthella homei*, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysinidæ," Zeitschrift für wissenschaftliche Zoologie, Band xxx. Seite 485 (1878).
- Keratophyton majus* &c., Hermann Boerhaave, Index alter plantarum horti Lugduni-Batavi, Leydæ, 1720, Seite 6, partim.
- Rete philippense* &c., Jacob Petiver, Gazophylacii Naturae et artis decades 10, Londini, 1713, vol. i. p. 32, partim.
- Spongia basta*, E. J. C. Esper, Die Pflanzenthier, 1791–1830, vol. ii. p. 25.
- Spongia basta*, J. de Lamarck, Annales du Muséum des Sciences Naturelles, vol. xx. p. 442.
- Spongia basta*, Lamouroux, Histoire Naturelle des Corallaires flexibles, vol. ii. p. 57.
- Spongia basta*, P. S. Pallas, Elenchus Zoophytorum, 1766, p. 309.
- Spongia flabelliformis*, J. de Lamarck, Histoire Natural des Animaux sans Vertèbres, 2^e édition, 1832, vol. ii. p. 550, partim.
- Spongia flabelliformis*, C. von Linné, Hortus Cliffortianus, Amsterdam, 1737, p. 480, partim.
- Spongia flabelliformis*, C. von Linné, Systema Naturæ, 12th edition, 1767, p. 1296, partim.
- Spongia flabelliformis* etc., Royen, Prodrumus, p. 522, no. 6, partim.

This sponge appears as a thin ramified lamella, attached by a small base and expanding above more or less in one plane, so as to form a flabellar structure, which is composed of spirally twisted bands growing up from a small base; these are on an average 4 millim. thick, and ramify, forming irregular anastomoses above. The sponge attains a height of 250 millim. and a breadth of 150 millim. The surface is conulated; the conuli are small, sharp-pointed, and about 3 millim. apart; the inhalant pores are situated on one, and the oscula on the other side exclusively; the latter are on an average 1 millim. wide and scattered.

The skeleton is composed of fine fibres, which form regular, rectangular, elongate meshes. The sponge is pretty hard and elastic when dry, but very flexible in spirit. The colour in spirit is reddish; dry, blue-black. The dry skeleton is black with a reddish tinge.

GEOGRAPHICAL DISTRIBUTION.—Australian Seas. North coast of Australia: Torres Straits (*Macleay*), Port Darwin ('*Alert*').

Indian Ocean (*Gray*). Mascarene Islands ('*Alert*').

VERTICAL DISTRIBUTION.—13–20 metres ('*Alert*').

Genus **APLYSILLA.**

Small, lamellar, mostly incrusting Aplysillidæ, with a skeleton composed of numerous isolated, small, dendritically ramifying, upright fibres. Without cells in the spongin-wall of the fibres.

Aplysilla rosea, Schulze.

Aplysilla rosea, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysinidæ," Zeitschrift für wissenschaftliche Zoologie, Band xxxv. Seite 416 (1878).

Aplysina cruor, H. J. Carter, "Supplement to the Descriptions of Mr. Bracebridge Wilson's Australian Sponges," Annals and Magazine of Natural History, ser. 5, vol. xviii. p. 286 (1886).

Aplysina nævus, H. J. Carter, "Descriptions and Figures of Deep-sea Sponges and their Spicules, from the North Atlantic Ocean, dredged up on board H.M.S. 'Porcupine,'" Annals and Magazine of Natural History, ser. 4, vol. xviii. p. 229 (1876).

Aplysina nævus, H. J. Carter, "Supplement to the Descriptions of Mr. Bracebridge Wilson's Australian Sponges," Annals and Magazine of Natural History, ser. 5, vol. xviii. p. 285 (1886).

Verongia rosea, Barrois, "Embryologie des quelques éponges de la Manche," Annales des Sciences Naturelles (1876).

Incrusting, 3-5 millim. high, sponges. The surface is covered with high and slender conuli, which are on an average 2 millim. apart. The colour of the living sponge is rose-red. The fibres of the *skeleton* are at the base 0.2 millim. thick; they taper towards the upper end and terminate in the conuli.

GEOGRAPHICAL DISTRIBUTION.—European coast of the North Atlantic and Mediterranean (*Barrois, Carter, Schulze*).

South coast of Australia: Port Phillip Heads (*Wilson*). East coast of Australia: Port Jackson (*Lendenfeld*).

Aplysilla violacea, Lendenfeld.

Aplysilla violacea, R. v. Lendenfeld, "Ueber Cœlenteraten der Südsee.—II. Neue Aplysinidæ," Zeitschrift für wissenschaftliche Zoologie, Band xxxviii. Seite 237 (1883).

Incrusting sponges, 1.5-14 millim. thick. Irregular protuberances often arise from the upper surface, which is covered with conuli 2-4 millim.

high; these are on an average 2·5 millim. apart. The oscula are 1-2 millim. wide and on an average 20 millim. apart. The sponge-crusts appear to have an unlimited lateral growth. I have observed crusts which extended for many yards without a break. The colour of the living sponge is violet, with a crimson or carmoisin-red fluorescence. Spirit-specimens appear dark blue.

The *skeleton* consists of isolated fibres, which are at the base 0·2 millim. thick. The thickness of the pith-cylinder is equal to three-fourths of the thickness of the fibre. The fibres appear somewhat irregularly and angularly bent and bear small branches, which are disposed in an irregular verticillate manner.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip (*Lendenfeld*). East coast of Australia: Port Jackson (*Lendenfeld*).

Genus **DENDRILLA**.

Large, erect Aplysillidæ, with a dendritic or reticulate skeleton, without cells in the spongin-walls of the fibres.

Dendrilla elegans, n. sp.

Erect, pedunculate, somewhat pyriform sponges, from the upper end and the sides of which small, rounded, digitate or lobose processes arise. The whole sponge attains a height of 220 millim. and a width of 90 millim. Large lacunæ are observed in the interior; these are disposed in such a manner as to lead one to suppose that the massive body of the sponge is the result of the partial conrescences of digitate parts. The surface is pretty smooth, covered with scattered low conuli; these are in the upper part 5 millim., in the lower part 12 millim. apart. The oscula are scattered and small.

The final ramifications of the fibres of the *skeleton* are about 0·2 millim. thick. The pith-cylinder has a diameter equal to two thirds of the diameter of the fibre, and is often not quite centrally situated.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Dendrilla tenella, n. sp.

Massive, lobose, digitate sponges, attaining a height of 40 millim. The surface is covered with numerous conuli, which are low and very close together. The oscula are situated, chiefly, on the summits of the processes; they are 3 millim. wide.

The skeleton consists of dendritically ramifying fibres, which anastomose here and there. The stems are 0.3 millim. thick. The pith-cylinders have a diameter equal to four fifths of the diameter of the whole fibre in the branches, but equal to only half of the thickness of the fibre in the stems.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

***Dendrilla cæspitosa*, Carter.**

Aplysina cæspitosa, H. J. Carter, "Supplement to the Descriptions of Mr. Bracebridge Wilson's Australian Sponges," *Annals and Magazine of Natural History*, ser. 5, vol. xviii. p. 282 (1886).

The sponge consists of a 240 millim. high and 180 millim. broad mass of folded 1-3 millim. thick fronds. The whole structure is very light and loose. The living sponge is light yellow, the skeleton is black. The surface is covered with slender conuli, 2 millim. high and 2 millim. apart.

The final ramifications of the fibres of the *skeleton* are remarkably smooth, 0.16 millim. thick. The thickness of the pith-cylinder is equal to about two thirds of the fibres.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip Heads (*Wilson*). East coast of Australia: Port Jackson (*Lendenfeld*).

***Dendrilla rosea*, var. *typica* (Selenka), n. var.**

Aplysilla cactus, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—IV. Mittheilung. Die Familie der Aplysinidæ," *Zeitschrift für wissenschaftliche Zoologie*, Band xxxv. Seite 417 (1878).

Dendrilla rosea, R. von Lendenfeld, "Ueber Cœlenteraten der Südsee.—II. Mittheilung. Neue Aplysinidæ," *Zeitschrift für wissenschaftliche Zoologie*, Band xxxviii. Seite 271 (1883).

Spongelia cactus, E. Selenka, "Ueber einige Schwämme aus der Südsee," *Zeitschrift für wissenschaftliche Zoologie*, Band xvii. Seite 565 (1867).

Irregularly massive, pedunculate sponges, which attain a height of 150 millim. The peduncle of large specimens is 15 millim. thick. The surface is covered with very large conuli, which are on an average 5 millim. high and 10 millim. apart. The oscula are few in number and situated on the upper surface; they are smaller and more numerous in small specimens than in large ones. In very large specimens a single osculum is observed on the summit of the sponge; this has a diameter of 10 millim. The living sponge is flesh-coloured.



The final ramifications of the *skeleton*-fibres are pretty smooth, slightly and irregularly bent, and 0·16 millim. thick. The pith-cylinder has a thickness equal to about two thirds the thickness of the fibre.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip (*Lendenfeld*); Bass Straits (*Selenka*). East coast of Australia: Port Jackson (*Lendenfeld*).

Dendrilla digitata, n. sp.

This sponge consists of a bunch of erect, digitate processes which coalesce for the greater part of their length. The whole sponge attains a height of 50 millim. The digitate processes are 3–15 millim. thick. The surface is covered with sharp and slender conuli, which are 3·5 millim. apart. The oscula are oval, 2–4 millim. wide, and scattered over the sides of the digitate processes.

The final ramifications of the *skeleton*-fibres anastomose more frequently than in other species; they are straight, and 0·08–0·16 millim. thick. The pith-cylinder is equal to half the thickness of the fibre. The fibres occasionally approximate and join to form perforated plates, particularly in the basal part of the sponge.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Dendrilla janthelliformis, n. sp.

This sponge appears as a thick, erect lamella, 70 millim. high and 50 millim. broad. It is very lacunose. The surface is covered with very low and blunt conuli. The oscula are situated on the margin, and are 4–7 millim. wide. The colour of the living sponge is dark violet.

The final ramifications of the *skeleton*-fibres anastomose more frequently than in some other species; they are straight, and 0·06 millim. thick. The thickness of the pith-cylinder is equal to half the thickness of the fibre.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Dendrilla cavernosa, Lendenfeld.

Dendrilla cavernosa, R. von Lendenfeld, "Studies on Sponges," Proceedings of the Linnean Society New South Wales, vol. x. p. 557 (1886).

Digitate, branched sponges, attaining a height of 400 millim. The digitate processes are straight, cylindrical, and 25 millim. thick. The surface is

covered with irregular conuli, 2-4 millim. high and, on an average, 8 millim. apart. The oscula are scattered, 3 millim. wide. The whole sponge appears perfectly hollow. The digitate processes are tubular, with walls about 3 millim. thick; the cavities of these tubes join below in the basal mass of the sponge, from which the digitate processes grow up, to a large hollow space. This cavity opens outward at the termini of the digitate processes by large circular pseudoscula, which are covered with perforated membranes; the pores of which can be contracted or dilated, and are surrounded by rings of sensitive cells.

The final ramifications of the *skeleton*-fibres are 0.14 millim. thick, and nearly straight; they anastomose here and there. The pith-cylinders have a thickness equal to about half the thickness of the fibres.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Familia HALISARCIDÆ.

Hexaceratina without horn-fibres and without horn-spicules.

Genus BAJALUS.

Halisarcidæ with simple, sac-shaped, not ramifying, ciliated chambers; without a reticulation of supporting-threads; and with large and complicated subdermal cavities.

Bajalus laxus, Lendenfeld.

Bajalus laxus, R. von Lendenfeld, "A Monograph of the Australian Sponges.—Part IV. The Myxospongiæ," Proceedings of the Linnean Society New South Wales, vol. x. p. 5 (1885).

Our sponge represents an irregularly ramified or lobose mass of a dull purple colour. The separate processes are either digitate and slender, or short, broad, and lobular; they measure to 18 millim. in length and from 2 to 10 millim. in breadth. The long and slender processes are cylindrical; the truncate ones generally more or less flattened. Both kinds of processes never occur on the same specimen; so that one might distinguish two varieties of this species—one with broad, the other with slender ramifications. The whole sponge never seems to attain a large size: the finest specimen I have seen measured 50 × 40 × 20 millim. It is always more or less expanded in one

plane. The oscula are situated terminally on the processes, so that there are as many vents to the sponge as there are branches. The oscula are surrounded by small "chimneys" similar to the tubes described by Schulze, which appear as prolongations of the osculum-margin in *Oscarella lobularis*. The surface of the sponge is perfectly smooth, as in *Halisarca dujardini*. The oscula measure from 1 to 2 millim. in width, and are liable to great alterations in size. The "chimney" can be retracted, so as to leave the oscular opening nearly bare. The inhalant pores measure 0.1 millim. across; they are circular. Each is covered by a thin and tender perforated plate. The perforations are circular or polygonal, with rounded corners, and measure 0.01 millim. in diameter. These little pores are liable to great alterations in size, and can be contracted and even closed by the sponge.

Canal-system.—The outer skin is divided from the interior of the sponge—from the zone of ciliated chambers—by a broad subdermal cavity 0.15 millim. wide. This cavity is continuous; it is traversed in all directions by a highly complicated network of fine threads, measuring 0.005–0.01 millim. in thickness. These repeatedly ramified, anastomosing threads are cylindrical, and between the joining-points more or less straight. They connect the skin and the body of the sponge; and appear to be to a certain extent contractile. The zone of ciliated chambers is folded. Broad and conic inhalant canals lie between the folds.

The *ciliated chambers* are of a regular elongate, oval, cylindrical shape. They are longer than in *Aplysilla*, and somewhat similar to the radial tubes of the Syconidæ or the ciliated chambers of *Euplectella*. They measure 0.17 millim. in length, and are 1 millim. wide. The afferent pores form groups of three to five. Some chambers are in direct communication with the subdermal cavity; whilst others draw their supply of water from the inhalant canals. The ciliated chambers are not constricted at their exhalant aperture, which is circular and opens either into a narrow exhalant canal, or direct into the gastral cavity in the centre of the sponge.

The *exhalant canal-system* consists of narrow more or less radial canals, which extend slightly upwards towards the osculum; these canals are cylindrical, and curved in such a manner that their distal portion runs for a short distance parallel to the outer surface, whilst their proximal part is radial, and often stands at nearly a right angle to the former. These canals open out into an extensive gastral cavity which occupies the central portion of the sponge. This cavity is traversed by a few stout ramified threads of tissue. The narrow exhalant branch canals have a diameter of 0.1 to 0.3 millim. The central gastral cavity has a diameter equal to a fourth or a third the diameter of the part of the sponge in which it is situated. The threads pervading it in varying direction are distant and rare; they are more or less cylindrical, and measure 0.1 millim. in thickness. Towards the osculum they become more

scarce: in the uppermost 5 millim. of the oscular tube or gastral cavity there are no threads.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip (*Lendenfeld*).

3. Ordo **CHONDROSPONGIÆ.**

Silicea, the ground-substance of which is hard and tough, like cartilage. A cortex is often developed. The ciliated chambers are spherical and small. The ground-substance is granular. A supporting skeleton is nearly always developed*; it is composed of tetraxon or monaxon siliceous spicules; the latter are monact, styli, or tylostyli. The spicules are never cemented by spongin; they form bundles, which are often regularly radially situated. Microsclera often present, mostly polyact.

This Order comprises the Corticates of Oscar Schmidt, together with the Lithistidæ and Gumminæ of the same author. It is composed of a portion of the Myxospongiæ, all the Tetraxonia, and a portion of the Monactinellidæ, as conceived by Zittel. It differs from Vosmaer's Ordo Spiculispongiæ only by *Halisarea* not being contained in it.

Subordo **TETRAXONIA.**

Chondrospongiæ with tetraxon spicules.

1. Group **LITHISTIDA:**

Body hard, with a central gastral cavity or with numerous vertical tubes. Tetraxon, branched, irregular spicules present. Monaxon megasclera and microsclera also occur. The spicules of the supporting skeleton are mostly interwoven so as to form a very dense skeleton.

No specimens in the Australian Museum.

* *Chondrosia* and *Chondrilla* are the only genera in which it is absent.

2. Group CHORISTIDA.

Chondrospongiæ with tetraxon spicules of regular shape.

Tribus **Tetradina.**

The chief spicules are tetracts with equal rays, and canelabras.

No specimens in the Australian Museum.

Tribus **Trianina.**

The centres of the tetract spicules with one differentiated ray lie in the surface, in which the equal rays extend tangentially.

Familia **GEODIDÆ.**

Trianina with a cortex of globostellate spicules. The body is spherical or irregularly massive and branched. In most forms, particularly the regular ones, the supporting skeleton exhibits a regular radial structure. Large monaxon and tetraxon megasclera and stellate microsclera are observed. Chonæ, which can be closed by a muscular sphincter, are present.

Genus **GEODIA.**

The oscula situated in groups at the base of a common depression, which forms, when highly developed, a præosculum. Ectochonæ not much depressed, nearly cup-shaped. Body often spherical, sometimes also massive or branched.

Geodia nigra, n. sp.

Massive, lobose sponges which are attached by a broad base. The spherical specimens have a diameter of 30–40 millim.; the lobose forms appear as four

to eight such spherical ones joined in one mass, which may attain an extent of 100 millim. Colour in spirit very dark brown, nearly black. The cortex is of a darker colour than the interior. Surface shagreen-like and very uneven, roughened by projecting ridges and knobs, which are raised 0.8–1.2 millim. over the general surface of the sponge. The oscula are situated in groups at the base of shallow depressions. Ectochoenæ pretty narrow. Cortex 0.48 millim. thick. Below this, exceptionally few canals of the subdermal system are found; these attain a diameter of 0.24 millim.

Skeleton.—(1) *Tetraxon Megasclera*. Angles between centripetal and tangential rays $>90^\circ$; centripetal ray 1.5×0.04 millim., slightly conic, and abruptly but not sharply pointed; tangential rays 0.16×0.03 millim., slightly curved, conic, sharp-pointed. These spicules are met with just below the cortex; they are not numerous.—(2) *Monaxon Spicules*. In radial slightly oblique bundles just below the cortex, more irregularly disposed in the interior. Smaller monact spicules are also found in the cortex. The large spicules of the interior are tylostyli, slender, slightly curved, 2×0.016 millim., cylindrical, and pretty abruptly pointed. The monact spicules of the cortex are styli, disposed irregularly, cylindrical, and not very sharply pointed; they measure 0.1×0.08 millim. These spicules form dense masses in the outermost layer of the cortex.—(3) *Polyact Spherical Globostellate Spicules*. Highly granular; diameter 0.067 millim.; forming a dense layer in the cortex, with the exception of the oscular area. Similar spherical spicules are found in great abundance throughout the interior. Here there are also a great number of their young stages. The globostellates in the interior are more spiny than those in the cortex.—(4) *Stellate Spicules*. The stellates are not at all numerous in this species; they are of one kind only, small, with numerous slender and smooth rays.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Broughton Island (*Ramsay*).

Genus **ISOPS**.

Geodidæ the inhalant pores and oscula of which are free and not covered by sieve-membranes. Ectochoenæ bell-shaped, deep. Globostellates present in all parts of the cortex. Spicules of the interior monact. Various varieties of stellate microsclera present.

Isops sollasi, n. sp.

This species grows in the shape of a thick-walled, pedunculate cup, or irregularly curved lamella. The smaller specimens in particular are very

regularly calyciform; in these, the peduncle, which is short and irregular, measures 20–30 millim. in diameter and is about 40–50 millim. long. The total height of the sponge varies from 100 to 180 millim. The margin of the cup is narrow, sharp, and regularly circular, in a plane vertical to the axis of the sponge. The mouth of the cup has a diameter of 40–50 millim., and the cup is 50–60 millim. deep; irregularly conic. The thickness of the cup-wall varies much, from 10 to 30 millim., in consequence of the irregularities both of the inner and outer surface. The lamellar specimens attain a length of 300 millim., and a thickness of 30–40 millim. The surface of the cup-shaped specimens is rendered very uneven by numerous irregular outgrowths and depressions, whilst the surface of the lamellar forms appears more uniform and smooth. The surface has a rough, somewhat shagreen-like appearance; this is particularly well visible in dried specimens. A difference in the degree of roughness of the outer and inner surfaces of cup-shaped specimens, or the different sides of lamellar ones, can easily be discerned. The oscula are found on one side of the lamellæ only, and the oscular side is the smoother one of the two. In the cup-shaped specimens the oscula are confined to the inner surface of the cup. The oscula are circular, and measure 0.5–1 millim. in diameter. They are, on an average, 1.5 millim. apart; more numerous in depressed portions of the surface than in others, and absent near the margin. In spirit of a uniform melange colour; dry, lighter brown, yellowish in the interior.

This sponge is generally inhabited by commensals, particularly tubicole Annelids, the abodes of which are so similar to true sponge-canals that it is difficult to recognize their true nature. Apart from these, our sponge does not present any great peculiarities. The entochonæ are slender and small; the ectochonæ large and dome-shaped, about as wide as long, measuring 0.6 millim. each way. The cortex is 0.8 millim. thick and of uniform structure throughout. Below the outer surface tangential canals of the inhalant system can be observed, most of these have a diameter of 0.1 millim., whilst a few attain a width of 0.3–0.5 millim. Their transverse section is circular.

Skeleton.—(1) *Tetraxon Megasclera*. Abundant just below the superficial layer of globostellates. Scarce in the interior. Long ray always centripetal. Angles between centripetal and tangential rays $>90^\circ$. Centripetal differentiated ray 1×0.025 millim., slightly conic, and abruptly but not sharp-pointed. Tangential rays 0.26×0.02 millim., slightly curved, conic, not sharp-pointed.—(2) *Monaxon Megasclera*. Forming a network in the interior, single or in bundles of two or three series; those below the cortex disposed radially: 0.8×0.016 millim.; slightly curved, and tapering abruptly to a sharp point.—(3) *Polyact Globostellates*, forming a hard cortex, 0.8 millim. thick; also found scattered in the interior of the sponge; 0.048 millim. in diameter, with a granular surface. Young stages, measuring 0.02 millim. in

diameter, are covered with long and slender spines.—(4) *Polyact Stellate Spicules*. There are two varieties of these spicules scattered indiscriminately throughout the interior of the body:—(A) With numerous short and thick spines, 0.016 millim. in diameter. (B) With comparatively few rays or spines; the number varies from two to twelve. The rays of these spicules are very slender and thin; they measure 0.014×0.0016 millim.; the whole spicule attains a diameter of 0.028–0.03 millim. Young stages of both varieties are found in abundance. The small spicules of the slender-spined variety possess more rays than the large ones; and it is to be supposed that the number of spines decreases with increasing age.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay, Lendenfeld*).

Genus **CYDONIUM**.

Inhalant and exhalant pores similar; the former generally in a group together. Oscula and pores both over chonæ. Globostellate and stellate microsclera.

Cydonium erinaceus, n. sp.

This sponge is of a rather variable shape. Specimens with thick digitate or lobose processes are the most numerous; massive ones, however, also occur. Large specimens are usually branched; they measure $200 \times 100 \times 50$ millim. The processes are generally situated on the margin of the usually compressed sponge, and are as thick as the sponge itself (50 millim.), and being rounded, dome-shaped, about equally long. Here and there there are oval depressions in the surface, which measure 8×12 millim.; at their bottom, which lies 3 millim. below the surface, the oscula are situated. The sponge is excessively hard, like a Lithistid. The surface is even, but appears spiny in consequence of the presence of numerous large tetract spicules, which project several millimetres beyond it. Colour in spirit dirty white or light brown. The chonæ are similar to those of the species described by Sollas. The canals which are found in the pulpa mostly extend in a centripetal direction: some are wide and irregular, having a diameter of 2 millim.; a greater number are more regular, and have a diameter of about 0.6 millim.

Skeleton.—(1) *Tetract Supporting-Spicules*. Abundant below the cortex. Angle between centripetal and tangential rays = 100° ; centripetal ray straight, conic, pointed, $1-3 \times 0.04$ millim.; tangential rays curved, concave towards the interior; all of equal size and with equal angles, 0.4×0.03 millim., conic, not sharply pointed.—(2) *Tetract Velar Spicules*. These are attached by their centripetal ray, which is planted in the outer part of the

cortex. The greater part of the centripetal ray, and also the tangential rays, are free; the latter form a kind of veil, which is, as the centripetal rays project about 2.5 millim., that distance away from the surface of the sponge. The measurements of these spicules and their shape are the same as those of the tetract supporting-spicules. The veil produced by these spicules is comparable to analogous structures in certain Hexactinellida.—(3) *Monact Supporting-Spicules*. In the interior, the pulpa, of the sponge, bundles of styli are met with, which consist of 5–7 spicule-series. The spicules are slightly curved, cylindrical, and sharp-pointed at one end; they gradually taper towards the other rounded end; these spicules are very long and slender, measuring 2×0.04 millim.—(4) *Monact Spicules of the Cortex*. In the outermost layer of the cortex dense masses of oxea are found; these are situated obliquely or perpendicular to the surface; they are sharp-pointed and slightly curved, measure 0.32×0.012 millim., and resemble the spicules of certain Renieridæ very closely.—(5) *Globostellates*. These are very large and oval, or somewhat kidney-shaped; those in the cortex form dense masses; they are the largest, appear comparatively smooth, possess an umbilicus, and measure 0.16 millim. in diameter. The globostellates in the interior, where they are numerous but scattered, are smaller and more regularly spherical. Young stages in every degree of development are found here; these possess dense and sharp spines. The spines when broken off are sharp, regularly conic, 0.015 millim. long, and at the base 0.003 millim. wide.—(6) *Stellate Spicules of the Cortex*. The outermost layer of the cortex is composed of exceedingly minute stellates with 6–10 rays measuring 0.003–0.005 millim. in diameter; they form a layer about 0.05 millim. thick, which is penetrated here and there by the cortical oxea.—(7) *Stellates of the Pulpa*. Two varieties of stellates are met with in the interior:—(A) Stellates similar to the cortical ones; these are pretty numerous. (B) Stellates of much larger dimensions, with stout, conic rays 0.03 millim. in diameter; these are scarce, and it is often difficult to find them.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Familia STELETTIDÆ.

Trianina with stellate microsclera in the cortex, but without globostellates.

Genus STELETTA.

Stellettidæ with simple stellate microsclera.

Stelletta tethyoides, n. sp.

Spherical sponges, which are attached by a broad base and attain a diameter of 50 millim., with a depression on the upper side about 5 millim. deep, at the bottom of which large oval oscula measuring 6×3 millim. are situated. In smaller specimens the vents are smaller. Colour in spirit dark brown on the outer surface, light brown in the interior. The spherical shape is rendered somewhat irregular by numerous slight irregularly scattered protuberances. The surface is shagreen-like. The chonæ of the inhalant system approach the shape of ordinary subdermal cavities; they appear as tangential canals extending below the surface and measure 0.25 millim. in diameter; large radial canals, which are for 3 to 20 millim. straight and 0.5 to 1 millim. wide, extend in a centripetal direction downwards from these. The exhalant canals join to form large oscular tubes, with a diameter of 2 millim. For about 20 millim. below the surface of the oscular area the space is taken up by a lacunose tissue.

Skeleton.—(1) *Tetract Supporting-Spicules*. These are found in the subcortical layer only. Angle between the centripetal and tangential rays = 100° ; centripetal ray 1.2×0.016 millim., straight, smooth, pointed; tangential rays 0.16×0.012 millim., slightly curved, conic, not sharply pointed.—(2) *Monact Spicules of the Pulpa*. Oxea, slightly curved, sharp-pointed, 1.2×0.012 millim., numerous, near the outer surface in bundles, towards the interior more irregularly disposed. A few styli of similar dimensions also occur in the interior.—(3) *Stellate Spicules of the Cortex*. A cortex 0.15 millim. in thickness covers the whole of the sponge, with the exception of the oscular area. This cortex is pervaded by the narrow and slender ectochonæ, and composed of a dense mass of stellate spicules, which have 10 to 15 conic rays. These spicules have a diameter of 0.05 millim.; each ray is about twice as long as thick at the base, measuring 0.016 millim. in length.—(4) *Stellate Spicules of the Pulpa*. There are three kinds of stellates in the interior of this sponge:—(A) With few cylindrical, exceedingly slender rays, measuring 0.032×0.002 millim.; the central mass of this spicule is exceedingly small. (B) Small, stout, stellate spicules, with numerous sharp and conic rays, measuring 0.016 millim. in diameter. (C) Large, stout stellates, with numerous conic rays, measuring 0.064 millim. in diameter.

GEOGRAPHICAL DISTRIBUTION.—Solomon Islands (*Australian Museum, Sydney*).

Genus **PSAMMASTRA**.

Stellettidæ with stellate microsclera and spined rods.

Psammastra gigas, n. sp.

Irregularly spherical massive sponges, which attain a diameter of 200 millim. and are attached by a small base; with irregular indentations and excrescences on the surface, and one large osculum measuring 20 millim. in diameter on the upper side. Some specimens are contracted towards the base, so as to appear pear-shaped. The surface is uneven and rough; the colour in spirit dirty brown.

The tufts of tetract supporting-spicules, which expand in the surface, allow space for large subdermal cavities between each other; these cavities appear in the shape of tangential canals, and frequently anastomose to form a perfect reticulation, which undermines the skin. The tangential canals have an elliptic transverse section and an average width of 0.5 millim. They join to form larger inhalant canals, which extend for some distance in a centripetal direction. These canals are much curved and appear very irregular; they have an average width of 2 millim., and join below to form large lacunose canals, which pervade the whole of the massive sponge. The latter have an irregularly circular, transverse section, and an average width of 6 millim. They form anastomoses, and in this way a perfect reticulation of inhalant lacunæ is produced in the interior of the sponge. From all parts of this inhalant canal-system slender branches originate, which supply the ciliated chambers. Membranous diaphragms are frequent in the inhalant canals. The exhalant canals are similar to the inhalants, but do not anastomose; they join to form large branches, which open into an oscular tube passing right through the whole sponge, and measuring 25 millim. in diameter.

Skeleton.—(1) *Tetract Megasclera*. Abundant in the cortex and scattered throughout the sponge. Angle between the centripetal and the tangential rays $\leq 90^\circ$; centripetal ray straight, conic, not sharply pointed, 1.7×0.03 millim.; tangential rays strongly curved, anchor-like, 0.2×0.024 millim.; curvature and angles very variable. Those tangential rays which are strongly curved are only half as long as the others, or less.—(2) *Monact Megasclera*. Oxea slightly curved, cylindrical, pretty abruptly pointed, points rounded, 1.2×0.016 millim., rare in the surface tufts, forming bundles in the interior.—(3) *Monact Microsclera*. The outer surface contains two varieties of these spicules, which together form a thin cortical layer. All the spicules are more or less vertical to the surface and project slightly beyond it. (A) Spined strongyla 0.048×0.005 millim. (B) Slender hair-like rods very thin and smooth, pointed at each end, 0.12×0.002 millim. Both varieties are also found scattered throughout the interior of the sponge.—(4) *Stellate Microsclera*. These are not numerous and very small; they are found in the interior of the sponge;

their rays are slender, straight, and cylindrical; the whole spicule measures 0·01 millim., in diameter.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Genus **THALASSOMORA**, n. gen.

Stellettidæ of spherical shape, without fibre-cortex. The centripetal ray of the tetract megasclera is longer than the tangential rays. Microsclera of three kinds: small, spindle-shaped, and stellate bodies in the interior; and slender, rod-shaped, smooth spicules projecting beyond the surface and perpendicular to it, causing the outer surface to assume a velvet-like appearance.

Thalassomora nigra, n. sp.

Spherical sponges, which are attached by a small base and attain a diameter of 30–60 millim., a little broader than high, irregular and massive. Surface pretty even and smooth; in consequence of the projecting dermal oxea, velvet-like. Colour in spirit dark purple, nearly black on the surface, light brown in the interior. The specimens are badly preserved and this colour is very likely unnatural.

There is no proper subdermal cavity: between the surface-tufts of tetract spicules very small cylindrical canals extend in a tangential direction; these have an average width of 0·08 millim. and are very numerous, they are situated just below the surface. A little further down larger tangential canals, with a more or less triangular transverse section, are met with; these have a diameter of 0·4 millim. In this lower zone also canals leading down in a centripetal direction make their appearance; these have an average diameter of 0·17 millim., and from them, small irregularly tangentially extending canals originate, which have for the most part oval transverse sections. The exhalants join to form curved oscular tubes with a circular transverse section and a diameter of 1–2·5 millim. These tubes pervade the whole body of the sponge, and give it in sections a somewhat bread-like appearance. The oscula are small, only 1 millim. wide, scattered and not numerous.

Skeleton.—The supporting skeleton consists of large tetracts in the outer layers and of monacts (oxea) in the interior. The microsclera are of three kinds:—(1) *Tetract Megasclera*. Abundant in the surface and just below it; absent in the interior. Angle between the centripetal and tangential rays $> 90^\circ$ (mostly = 120°); centripetal ray $1·8 \times 0·056$ millim., conic, pointed; tangential rays $0·3 \times 0·05$ millim., very slightly curved, conic, not sharp-pointed.—

(2) *Monact Megasclera*. Oxea 1.6×0.058 millim., nearly straight, spindle-shaped, sharp-pointed, forming a fibrous skeleton in the interior. The bundles contain 5–12 series of spicules.—(3) *Stellate Microsclera*. Small, inconspicuous, scattered through the pulpa; with slender rays, 0.008 millim. in diameter.—(4) *Spindle-shaped Microsclera*. Small, numerous, scattered throughout the interior, of an oval shape, 0.01 millim. long, and 0.0024 millim. thick in the centre.—(5) *Monact Microsclera of the Skin*. Vertical to the surface and projecting beyond it, slender hair-like rods 0.16 millim. long and 0.001 millim. thick; generally rounded at the ends (strongyla).

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Molle, Queensland (*Ramsay*).

Familia **ANCORINIDÆ** *.

Trianina without microsclera.

Genus **ANCORINA**.

A cortex is developed. Megasclera monact and tetract. No root-tufts of spicules.

Ancorina australis, n. sp.

Massive sponges, with irregular, small, digitate processes, attached by a small base and measuring 35 millim. in diameter. Surface hairy, shagreen-like; viewed from without, a dark reticulation with meshes 1 millim. wide makes its appearance in it. This network is the expression of the terminations of the tufts of radiating spicule-bundles which are separated in the surface by tissue, in which only few spicules are contained. Colour in spirit light grey.

The subdermal cavities are small, and have the shape of tangential canals extending between the surface-tufts of radiating spicules; most of them have a triangular transverse section; their average width is 0.2 millim.; here and there they extend laterally to a transverse diameter of 1 millim. The inhalant canals which originate from them are small and much and irregularly branched. The exhalant canals join to form irregular lacunæ in the interior of the sponge, the walls of which are very spiny; the spines form a perfect filter. The oscula are circular and situated in groove-shaped depressions on the surface of the sponge; they measure from 1–2 millim. in diameter.

* The family Ancorinidæ in this sense is much more restricted than the "Ancorinidæ" of *Vosmaer*.

Skeleton.—(1) *Tetract Spicules of the Supporting-Skeleton*. The tetract spicules form two layers in the cortex and are also scattered throughout the pulpa of the sponge. Between the tufts which form the outer layer, and which expand towards the outer surface, small tangential subdermal canals are met with. Below these another layer of similar spicules is situated. Angle between the centripetal and tangential rays $\begin{matrix} > \\ \equiv \\ < \end{matrix} 90^\circ$; centripetal ray straight, conic, sharp-pointed, 1.4×0.021 millim.; tangential rays either short and strongly curved—angle between them and the centripetal may $< 90^\circ$, or long and only slightly curved, this angle $> 90^\circ$ —conic, pointed; the tangential rays are 0.024 – 0.15 millim. long, and at the base 0.02 millim. thick. The tetracts in the interior are similar to these, but more slender.—(2) *Tetract Velar Spicules*. These spicules are attached to the outer surface and give it the hairy appearance mentioned above. As far as their shape and dimensions are concerned they resemble the spicules with the long tangential rays, described above, of the cortex; they project 1 millim. beyond the surface.—(3) *Monact Spicules of the Interior*. Oxea nearly straight, sharp-pointed, 1.2×0.016 millim., in bundles and scattered; some of these spicules in the interior of the sponge possess irregular excrescences. Monact spicules of the same dimensions are also found in the surface-tufts.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Familia **THENEIDÆ**.

Trianina with large efferent pores to the ciliated chambers, and spirastrellid microsclera.

No specimens in the Australian Museum.

Familia **TETILLIDÆ**.

Trianina with sigmate, spiral, or rod-shaped microsclera.

Genus **SPIRETTA**, n. gen.

Ancorinidæ without a fibre-cortex, with projecting tetract velar spicules, and monact microsclera, but no stellates, with abundant small spiral microsclera.

Spiretta raphidiophora, n. sp.

Irregularly spherical sponges, which are attached by a small base, and attain a diameter of 40–80 millim. Colour in spirit dark brown on the surface, light brown in the interior. The specimens are not well preserved, and no reliance can therefore be placed on this observation. Surface slightly uneven, rough, and hairy. Very few triangular tangential canals form the subdermal cavity. The interior of the sponge is very dense, no canals of any kind are visible there with the naked eye; with the microscope, very scarce canals, with a circular transverse section and a diameter of 0.08–0.3 millim., can be seen extending irregularly through the sponge. The oscula are scarce and very small, 0.5 millim. in diameter.

Skeleton.—This species is very rich in spicules. The supporting spicules form thick bundles, which radiate from the centre and take up the greater part of the body; the interstices are filled up with monact and spiral microsclera. The radial bundles are composed of large styli and a few tetracts, in which the tangential rays are very small. Besides these there are tetract velar spicules projecting beyond the surface of the sponge.—(1) *Tetract Megasclera*. Found below the surface; absent in the interior. Angle between the centripetal and tangential rays $< 90^\circ$; centripetal ray = 1×0.01 millim., straight, conic, and pointed; tangential rays curved, anchor-like, 0.08×0.008 millim., sharp-pointed; two equal, the third sometimes absent, sometimes dissimilar to the other two, and sometimes the three tangential rays of uniform shape and size.—(2) *Tetract Velar Spicules*. In every respect similar to the tetract supporting-spicules, and projecting 0.3 millim. beyond the surface.—(3) *Monact Megasclera*. Forming the bulk of the bundles in the interior and also of the cortex. (A) Styli 0.6×0.07 millim., straight, cylindrical, conic and rounded at one end, and sharp-pointed at the other. (B) Oxea straight, spindle-shaped, and sharp-pointed, measuring $3-4 \times 0.05$ millim.—(4) *Monact Microsclera of the Cortex*. Abundant, straight or curved, 0.4×0.003 millim., rounded at each end.—(5) *Monact Microsclera of the Interior*. Scattered irregularly throughout the sponge; oxea 0.24×0.02 millim., very slender, and sharp-pointed at each end.—(6) *Spiral Microsclera*; very abundant, particularly in the cortex, forming 1 or $1\frac{1}{2}$ –2 regular spiral turns; very small, measuring 0.014×0.0008 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Spiretta porosa, n. sp.

Irregularly spherical sponges, which attain a diameter of 50 millim., with a circular, slightly depressed zone on the upperside, in which numerous large oscula are situated; these are oval, and measure 8×3 millim. in diameter. Surface hairy and rather uneven, in consequence of the projection of the centri-

fugal monact spicules of the bundles and the slender tetracts. Colour in spirit grey. No subdermal cavities. Below the thin cortical layer, canals of some size are met with, which form irregular anastomoses and have an average diameter of 0.16 millim. The tissue in the interior is rendered exceptionally loose in consequence of the presence of wide exhalant canals, which join to form oscular tubes 2-3 milim. in diameter; these are much curved, and terminate in the oscula described above.

Skeleton.—The skeleton resembles that of the Tethydæ very closely. There is a central sphere of irregularly disposed spicules, 4 millim. in diameter; from which gracefully curved, 0.5 millim. thick, bundles radiate.—(1) *Monact Megasclera*. Styli 4×0.036 millim., more or less spindle-shaped, and straight or curved like the bundles. These form the bulk of the spicules in the bundles. The pointed ends of the centrifugal spicules project 2 millim. beyond the surface. Some of these spicules may be tylostyli; such, however, are not frequent.—(2) *Tetract Megasclera*. Small and insignificant. Angle between the centripetal and tangential rays $< 90^\circ$ (about 60°); centripetal ray 1.2×0.006 millim., tapering towards a sharp-pointed end, generally slightly curved; tangential rays anchor-shaped, curved, and sharp-pointed, thick at the base, measuring 0.04×0.007 millim. These spicules are more frequent just below the outer surface than in other parts of the sponge and altogether absent in the interior.—(3) *Tetract Velar Spicules*. Similar in every respect to the supporting-spicules described above. The end of the centripetal ray is planted in the skin. The tangential rays of these spicules are in most cases regular, anchored; sometimes, however, they point outward, the angles between them and the centripetal ray being 140° , so that they appear fork-shaped. Occasionally such spicules are also found in the subcortical layer. In the interstices between the bundles, tetract spicules are found in which the centripetal ray is very long and thin, measuring 1×0.003 millim.; the angles are variable; the anchorates predominate, but pitchforks of various shape also occur.—(4) *Spiral Microsclera*. These are extremely abundant throughout the sponge; they measure 0.007×0.0006 millim. and exhibit 1 or $1\frac{1}{2}$ turns.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Denison, Q. (*Ramsay*).

Familia TETHYOPSILLIDÆ.

Trianina with dense masses of radially extending monaxon megasclera and comparatively few and rudimentary tetracts, with short and irregular tangential rays.

Genus **TETHYOPSILLA**, n. gen.

Tethyopsillidæ of spherical shape; the whole surface is more or less hairy. Tangential rays of the tetract megasclera very irregular and short. No microsclera.

Tethyopsilla stewartii, n. sp.

Small, pretty, regularly spherical sponges, which measure only 20 millim. in diameter and are attached by a small base; broader than high. The specimens which I have seen from Mauritius attain a diameter of 40 millim. The surface is even and hairy, in consequence of the presence of projecting spicules. In spirit light flesh-coloured.

The cortical layer has a thickness of 1.2 millim. Below it tangential canals are met with, which are 0.16 millim. high, and laterally expanded; they form numerous anastomoses, and form a true subdermal cavity. Narrow inhalants lead down to them. The canals, which extend downward from these subdermal cavities and pervade the pulpa, are, like those of the exhalant system, narrow, so that the pulpa has a very solid appearance. The exhalants join to form a few oscular tubes 0.7 millim. in diameter, which extend radially and terminate in very small oscula, which are slit-shaped, 1.2 millim. long and 0.3 millim. wide. These oscula are raised slightly above the surface.

Skeleton.—(1) *Tetract Megasclera*. Most irregular. In numbers in the tufts of the cortical layer; absent in the interior. Angle between the centripetal and tangential rays variable; centripetal ray 2×0.01 millim., straight, conic, pointed; tangential rays one, two, or three often below the end; never alike, short, and much curved. It frequently occurs that the angles between the different tangential rays and the centripetal are very different; one often observes angles of 60° , 120° , and 160° in the same spicule.—(2) *Monact Megasclera*. In the interior abundant, but also forming parts of the surface-tufts. Oxea 1.5×0.01 millim., straight, cylindrical, sharp-pointed; forming bundles and more or less irregular masses, as the centripetal continuations of the surface-tufts.—(3) *Tetract Velar Spicules*. Attached to the outer surface by the proximal end of the centripetal ray, which is immersed in the cortex, we find a perfect forest of tetracts; these project 1–1.5 millim. and have similar dimensions to the cortical tetracts. Their tangential rays are still more variable, however. Two varieties of velar spicules can be distinguished:—(A) Hard Variety: angle between the centripetal and tangential rays generally $= 140^\circ$, centripetal ray 1.5×0.01 millim.; tangential rays equal, straight or slightly concave outside, sharp-pointed, measuring 0.04×0.006 millim; radial ray always vertical to the surface. These pitchfork-like spicules are frequent

all over the surface.—(B) Elastic Variety: the head bears only one or two very short and much curved, pointed, tangential rays. The head is bent down and immersed in the surface, like the proximal end of the radial ray, but not so firmly. The radial ray is hereby completely curved round, and forms a semicircle. The slightest touch is sufficient to liberate the head of the spicule, which then, in consequence of the vertical insertion and elasticity of the radial ray, is thrown out with great force. These elastic defensive spicules appear analogous to the cnidoblasts of the *Cnidaria*.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Lendenfeld*).

Mauritius (*Haast*).

Subordo MONAXONIA.

Chondrospongiæ with monaxon megasclera, styli and tylostyli.

Familia TETHYDÆ.

Spherical Monaxonia with regular subdermal cavities between the distal ends of the radial spicule-bundles.

Genus TETHYA.

Tethydæ with stellate microsclera.

Tethya multistella, n. sp.

I distinguish two varieties of this species—*megastella* and *microstella*.

Spherical sponges, 20–40 millim. in diameter, attached by a small base, or also by half the surface; in the latter case the specimens attain a more semi-spherical shape. Surface regularly tuberculose. The tubercles are divided from each other by a network of depressions, which occasionally appear as sharp lines (transition-form to *Tethya fissurata*), but more often have the appearance of simple and undefined concavities. The tubercles are raised 1.5–2.5 millim. above the depressions, and represent the terminations of the spicule-bundles. Light red, flesh-, or rose-coloured in the living state; if properly preserved the colour is retained in spirit without much alteration; badly preserved specimens are colourless, white. The interior is always dirty white: the

cortex and the buds alone contain the red pigment. The oscula are circular, 2-4 millim. wide, and very slightly raised above the surface; they are situated on the upper surface of the sponge. There are, according to the size of the specimen, from one to five oscula.

The sponge is much more dense than the European *Tethya lynceurium*. The canals are narrow. In the cortex radially depressed and very irregular lacunæ, sometimes 2 millim. broad and up to 0.4 millim. high, are met with. Also circular canals are found, which have a diameter of 0.4 millim. Both extend tangentially and form subdermal cavities, which are supplied by narrow canals from without. The canals in the pulpa are, with the exception of the exhalant stems, very narrow, on an average 0.064 millim. wide, and disposed radially.

Skeleton.—A mass of irregularly tangentially disposed spicules forms a solid centre, 2-5 millim. in diameter, which is regularly spherical. From this the 0.3-0.5 millim. thick bundles of supporting-spicules radiate, which extend in the cortex in a trumpet-shaped manner, and terminate in the tubercles. The centrifugal ends of the most distal spicules project 0.2-0.3 millim. beyond the surface. The microsclera may be more or less abundant; but as any number of transition-forms between multistellular and paucistellular specimens have been observed by me, I consider these differences as of no systematic importance.—(1) *Megasclera*. Styli 2-3.5 × 0.018 millim., straight, slightly contracted at the rounded end, not very sharply pointed. In the cortex similar smaller spicules are found in connection with the surface-tufts of the radial bundles, which measure 0.5 × 0.006 millim. The pointed end is turned outward and projects beyond the surface.—(2) *Stellate Microsclera*. These are of two kinds:—(A) With Conical Rays: abundant in the variety *Tethya multistella megastella*, and rare in the variety *Tethya multistella microstella*; their rays are conic and sharp-pointed; they grow out from the central spherical mass, which measures 0.012 millim. in diameter, and are 0.01 millim. long and at the base 0.007 millim. thick. (B) With Cylindrical Rays, which have a terminal knob: these are small, only 0.01 millim. in diameter, and frequent in the variety *microstella*. With a higher power the terminal knob on the rays can be dissolved into two or more short terminal recurved spines. These spicules are very different from the young stages of the larger stellates, which always have the same shape as the adult spicule, however small they may be. The outer layer of the cortex is composed of these stellates, which form a pretty dense layer in it in the variety *microstella*.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay, Lendenfeld*). South coast of Australia: Port Phillip (*Lendenfeld*). New Zealand, Port Chalmers (*Parker*); Chatham Islands (*Parker*).

Tethya corticata, n. sp.

Spherical sponges, 25–40 millim. in diameter, covered with conuli, always attached by a small base; root-like excrescences usually grow out from the lower surface. The surface is irregular. Sharp, 2–3·5 millim. high conuli are found on the upperside of the sponge; the conuli are flattened, cylindrical, or conic, and at the base 1·5–2·5 millim. thick. A few oscula of irregular outline and with a diameter of 2–4 millim. are found on the surface. Colour of the cortex light red, flesh-colour in spirit. The interior dull white.

Inhalant pores in the depressions between the high conuli lead into inhalant canals which, extending centripetally, penetrate the cortex. Two or three join to form a straight radial stem. These stem-canals are widened in a trumpet-shaped manner at the proximal end; in the centre they have a diameter of 0·08 millim., and they are as long as the cortex is thick, namely 2–2·5 millim. The internal canals are larger than in most other *Tethyæ*; they are radial and have an average diameter of 0·16 millim.

Skeleton.—The central mass of supporting-spicules is spherical and has an average diameter of 4 millim.; the radiating bundles are 1 millim. thick; stellate microsclera are abundant, particularly in the cortex.—(1) *Megasclera*. Styli $2 \times 0\cdot013$ millim., straight, obtusely pointed at the outer end. The distal ends of the centrifugal spicules project only 0·1 millim. over the surface. The cortical spicules which surround the surface-tufts of the bundles are vertical to the surface, and measure $0\cdot4 \times 0\cdot006$ millim.; they are similar in shape to the styli of the interior.—(2) *Stellate Microsclera*. Of two kinds:—(A) Large stellates, with conic rays: abundant in the cortex, diameter 0·06–0·08 millim.; each ray very regular, conic, 0·02–0·024 long, and at the base 0·006 millim. thick; these rays readily break off, and are often found scattered throughout the cortex. (B) Small stellates, with cylindrical, slender, terminally thickened rays: particularly abundant in the canal-walls; diameter 0·016 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson (*Ramsay*).

Tethya fissurata, n. sp.

Irregularly spherical, more or less kidney-shaped sponges, with a flat base. Body high, measuring 40 by 35 millim. From the base rootlets originate, which attain a length of 20 millim. and more, are much and irregularly curved, and have a thickness of 2–4 millim. The structure of the surface is very remarkable; protuberances are found on it, which give one the impression that they do not belong to the sponge, and are separated from it by deep incisions; these protuberances widen centrifugally, having the shape of broad and low inverted cones; 3 millim. wide and 1–2 millim. high; their terminal face is depressed, and round the central depression a few spines are seen, like

marginal conuli; these make the circumference appear irregular, polygonal. These remarkable rosettes attached to the surface are connected with each other by threads and bands 0.5–2 millim. in breadth, which bridge over the 2–3 millim. wide fissures between the rosettes. Spicules protrude from the rosettes to a great length and give the sponge a hairy appearance. Two to four oscula, 1.5 millim. in diameter, are situated on the upper surface.

Numerous small canals originate from the bottom of the fissures, and join to form inhalant stems, which traverse the cortex and extend to insignificant subdermal cavities at the limit between cortex and pulpa. There appear to be no inhalant pores in the projecting rosettes. Below the inhalant pores there are peculiar chonæ-like arrangements for regulating the water-current. In the pulpa irregular canals descending from the subdermal cavities are met with; some of these extend tangentially in a lacunose manner; sand-grains are observed in their walls.

Skeleton.—The skeleton consists of a hard, spherical, central mass of irregularly disposed spicules, which measures 6 millim. in diameter. The bundles which radiate from this centre are 1–1.5 millim. thick, and expand distally in the surface rosettes, where they are surrounded by small monact spicules, and there are two kinds of stellates.—(1) *Megasclera*. Styli 3×0.08 –0.1 millim.; straight, cylindrical, obtusely pointed, the pointed end centripetal; greatest thickness at the truncate end.—(2) *Monact Spicules of the Cortex*. Styli surrounding the surface-tufts and projecting, like the spicules in the distal part of the radial bundles, some distance beyond the surface, 0.9×0.012 millim., obtusely pointed at the centrifugal end, which projects 0.5 millim. beyond the surface. The large bundle-spicules project 1–2 millim.—(3) *Stellate Microsclera*. Two varieties:—(A) Large stellates, with conic rays, forming dense masses in the cortex; body of spicule 0.048 millim. in diameter, with on an average twenty conic sharp-pointed rays 0.08 millim. long and at the base 0.016 millim. thick. (B) Small stellates, with slender, cylindrical rays, which are terminally thickened; these spicules form the outer coating of the sponge, and are also scattered throughout the interior; they measure 0.01 millim. in thickness. Besides these a great abundance of the young stages of the larger kind of stellate is to be found.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Molle, Q. (*Ramsay*); Port Jackson, N. S. W. (*Ramsay, Lendenfeld*). New Zealand (*Lendenfeld*).

***Tethya inflata*, n. sp.**

Spherical sponges, sometimes depressed in the centre, 40 millim. broad and 20 millim. high, attached by a broad base. Surface smooth, with very long (30 millim.) and 0.2 millim. thick, thread-shaped appendages, which grow out

irregularly from all parts of the surface; they are not very numerous, and generally arranged in groups or zones, leaving portions of the surface without appendages. The cortex of spirit-specimens is of a light flesh-colour, the interior dirty yellow. The cortex is in the free part of the sponge 3 millim., at the base only 1 millim. thick. Oblique, up to 0.16 millim. wide, canals are met with in the cortex, which join to form tangentially extended subdermal cavities. The inhalant stems extend centripetally down from these, pervading the cortex; they are widened in a trumpet-shaped manner at each end, and at the narrowest portion 0.08 millim. wide. The usual radiating canals are found in the interior.

Skeleton.—The centre from which the bundles radiate is situated in the middle of the base; the bundles have a thickness of 0.5 millim. There are two kinds of stellate microsclera, which are particularly abundant in the skin.—(1) *Megasclera*. Styli 2×0.014 millim., cylindrical and straight, sharp-pointed, the pointed end looking outward. In the cortex smaller spicules of a similar kind are met with; these are often curved, and measure 0.6×0.07 millim.—(2) *Stellate Microsclera*. Of two kinds:—(A) Larger stellates, with conic, pointed rays, sparsely scattered throughout the body of the sponge, measuring 0.05 millim. in diameter. (B) Small stellates, with slender, cylindrical rays, terminally thickened, forming a dense outer coating on the surface, and present also in the walls of the inhalant canals, measuring 0.012 millim. in diameter.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

***Tethya phillipensis*, n. sp.**

Spherical or kidney-shaped sponges, generally broader than high, measuring $20-35 \times 15-20$ millim.; attached by a small portion of the base only. The kidney-shaped specimens are always attached at the indenture. Sometimes thick and short, root-like appendages are developed. Surface tuberculated, divided by reticulate depressions into polygonal areas, which measure on an average 2 millim. in diameter, and are raised 0.5 millim. over the surface. By a perforation of the membrane, which extends between the projecting tubercles, a structure is produced which strongly resembles the rosettes of *Tethya fissurata*, above described. In the living state and in well-preserved spirit-specimens the cortex and portions of the pulpa are light red, flesh-coloured, the remainder of the sponge is colourless. The cortex is 2-3 millim. thick; at the lower limit of the cortex, irregular tangential canals, with an average diameter of 0.4 millim., are met with; very narrow radial canals extend down from these.

Skeleton.—(1) *Monact Megasclera*. The radial bundles 0·3 millim. thick, are composed of styli which measure $2 \times 0\cdot018$ millim. and which are straight and cylindrical; the pointed end looks outward; the distal spicules of the bundles project slightly beyond the surface. Similar spicules, measuring $1 \times 0\cdot008$ millim., surround the surface-tufts, pointing obliquely outward; it is always the pointed end which projects.—(2) *Stellate Microsclera*. Three varieties of stellates occur in this species :—(A) Large, spherical spicules, with conic rays, measuring 0·06 millim. in diameter, and forming a dense mass in the cortex; the same spicule is also found in abundance in the interior of the sponge. (B) Small stellates, with slender cylindrical rays, which are terminally thickened; these stellates measure 0·006 millim. in diameter, and are not found on the outer surface; in the cortex they are rare, but more abundant in the pulpa. (C) A stellate spicule found in the pulpa, which is peculiar to this species; it is about as frequent as the foregoing variety. This stellate has no visible central body and it has slender conic rays, which are covered with long spines; these spicules measure 0·03 millim. in diameter, each ray is 0·014 millim. long, and at the base 0·003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

***Tethya lævis*, n. sp.**

Spherical or oval sponges, attaining a diameter of 20–50 millim., attached by a small base, 2–6 slit-shaped oscula on the upperside, which measure $1 \times 0\cdot2$ millim. in diameter; thread-shaped appendages, which may attain a length of 20 and a thickness of 2 millim., are found either in groups or appear scattered irregularly over the surface. The surface is smooth or slightly tubercular; often one portion of the surface is smooth and the other tubercular. In spirit light brown on the outer surface and in the interior; the lower layer of the cortex appears white. The small inhalants join to form stems, which traverse the cortex in a centripetal direction, and have a diameter of 0·1 millim. Irregularly reticulating canals, which pervade the cortex in every direction, connect the vertical canals with each other. The canals in the interior are not so regularly radial as in other species of this genus.

Skeleton.—The centre from which the bundles radiate is situated in the middle of the sponge; the radiating bundles have a thickness of 0·8 millim.; they divide in the cortex into several branches, and expand so much that no space is left between the surface-tufts. Stellate spicules are found in the cortex and pulpa.—(1) *Megasclera*. Styli $2 \times 0\cdot1$ millim., cylindrical, sharp-pointed, sometimes very short, only 0·6 millim. long, pointed end always centrifugal. There are no smaller cortical monact spicules around the surface-tufts, as in the other species.—(2) *Stellate Spicules*. Of three kinds :—(A) Large spherical spicules,

with sharp conic rays; abundant in the surface, but very scarce in the interior. (B) Small stellates, with slender, cylindrical, terminally thickened rays, forming a dense layer on the outer surface and scattered throughout the interior, particularly in the walls of the canals. (C) Small stellates, without any visible central body, and with slender, spined, conical rays, 0.04 millim. in diameter.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus **TETHYORRHAPHIS**, n. gen.

Tethydæ with small diact microsclera, besides the stellates.

Tethyorrhaphis lævis, n. sp.

Spherical sponges, 30–45 millim. in diameter, sometimes higher than broad, attached by a small base; without rootlets; occasionally with short irregular outgrowths around the base of attachment. Surface slightly tubercular in some parts of the sponge, even and smooth in others; the tubercles are separated by rounded concave depressions, and project not over 1 millim. In spirit light brown on the outer surface, the interior of a lighter colour.

Just below the surface extensive laterally extended, tangential canals, 0.2 millim. in diameter, are met with. The inhalant pores are situated in zones over these canals; from them the usual centripetal canals originate, which often divide into two or more branches before they leave the cortex; anastomoses between them occur very rarely. The cortex is 2 millim. thick, below it we find irregular canals from 0.05 to 0.17 millim. in diameter pervading the pulpa. Radial canals are rare. The oscula are small, and scattered over the upper surface.

Skeleton.—The bundles which radiate from the centre of the sponge have a thickness of 0.5–0.8 millim.; they expand distally to form the usual surface-tufts. Diact and stellate microsclera are abundant in the cortex and pulpa.—(1) *Megasclera*. Strongyla 2×0.036 millim., spindle-shaped, the greatest thickness (0.036 millim.) about 0.5 millim. from the centripetal end, which is about four times as thick as the distal; both ends are rounded; the distal rays project 0.2 millim. beyond the surface. There are no smaller cortical spicules surrounding the surface-tufts.—(2) *Stellate Microsclera*. There are three varieties of stellates:—(A) Spherical, large spicules, with conic rays 0.064 millim. in diameter, fairly abundant just below the surface and along the inhalant canals, but very scarce in the interior. (B) Small stellates, with slender cylindrical terminally thickened rays, 0.012 millim. in diameter, scattered throughout the interior, pretty scarce.

(C) Small spicules, with slender cylindrical rays without terminal thickenings, 0.02–0.03 millim. in diameter, scattered throughout the interior, more numerous than the foregoing, but also rather scarce.—(3) *Strongylote Microsclera*. These form a dense layer 0.08 millim. in thickness below the outer surface, and extend down the walls of the inhalant canals; they are also found in abundance scattered throughout the interior of the sponge. These spicules are mostly straight and rounded at each end; strongyla; they have a slightly roughened surface, and measure 0.012×0.001 millim. Some of these spicules are slightly bent, whilst others are angularly bent; the angle varies from 180–120 degrees; such forms may produce a third ray which appears sagittal, and a number of transition forms between the diacts and triacts have been observed by me, similar to those described by F. E. Schulze in *Plakina*. But there are also some transition forms between these triacts and polyact stellates. The whole series represents the development of these diacts from the slender-rayed stellates by a reduction of the number of rays.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Tethyorrhaphis tuberculata, n. sp.

Spherical or subspherical sponges, which are attached by a broad base, equal to about two thirds of the diameter. Broader than high: 25×35 to 30×40 millim. Surface tubercular. Tubercles of uniform width, but not of uniform height throughout; rounded, conic, or mammilliform, divided by a reticulation of sharp incisions; 2.5 millim. wide at the base, and from 1 to 3 millim. high. Oscula 1 millim. wide, scarce, and scattered over the surface. Alive bright red; in spirit more dull. The red colour pervades the whole of the cortex; the pulpa is dull white. Cortex 3 millim. thick. No subdermal cavities. Inhalant pores in the depressions between the tubercles. The small inhalants form a few anastomoses; they measure only 0.03 millim. in diameter, and pervade the cortex in an irregularly radial direction, being much and irregularly curved. The pulpa is very dense. Most of the canals in it extend in a radial direction.

Skeleton.—Central supporting sphere 4 millim. in diameter. Radiating bundles 0.7–1 millim. thick, much expanded in the surface-tufts, the margins of which are in contact, so that the depressions between them appear as sharp narrow incisions.—(1) *Megasclera*. Styli or strongyla. Straight, spindle-shaped; the greatest thickness near the proximal end; measuring 2.5×0.025 millim. The distal end generally the narrower of the two; difference in thickness between the two ends, 1:3. The points of the styli are remarkable for the abrupt manner in which they taper, like a Roman sword. Sometimes a terrace-like diminution

of thickness is observed; the end then appears telescope-shaped. The margins of the tufts are composed of styli measuring 0.6×0.015 millim. Some of these are situated so that the pointed end lies centripetally; most, however, point their sharp end outward. The distal spicules project $0.1-0.2$ millim. beyond the surface.—(2) *Stellate Microsclera*. Globate stellates 0.056 millim. in diameter, with pointed conic rays, not numerous, scattered throughout the sponge, particularly in the canal-walls.—(3) *Diact Microsclera*. Very abundant, forming a layer 0.03 millim. thick in the outer surface; rough, 0.012×0.002 millim., mostly straight, sometimes curved or bent in an angular manner.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Tethyorrhaphis gigantea, n. sp.

Spherical sponges, attached by a small base, covered with monticular projections, which are separated from each other by irregular depressions. Height $60-90$ millim.; breadth $50-70$ millim. The superficial projections are raised 8 millim. over the depressions. Surface regularly tuberculose. The tubercles higher on the elevated parts than in the depressions; 2.5 millim. broad and from 1.2 millim. high. Oscula very small, few in number, mostly on the upper side of the sponge. Alive intensely orange-red on the surface; of a lighter colour in the interior; in spirit light yellow. Cortex $3-4$ millim. thick. Radially compressed and irregular tangential canals are found in the cortex just below the outer surface; they are divided from the outer water by a very thin perforated membrane. The pores are arranged in zones following these superficial canals, and measure 0.06 millim. in diameter.

Skeleton.—Central sphere 4 millim. in diameter. Radiating spicule-bundles further apart than in any other species (4 millim.), $0.5-0.7$ millim. thick, expanding only slightly in the surface-tufts.—(1) *Monact Megasclera*. Strongyla, spindle-shaped, 2×0.035 millim.; thickest portion much nearer the blunter end, which is usually situated centripetally, and about $2\frac{1}{2}$ times as thick as the other. The rounded ends are slightly inflated. There are no monact cortical spicules round the surface-tufts.—(2) *Stellate Microsclera*. Of three kinds:—(A) Globose stellates, with conical pointed rays, 0.07 millim. in diameter; in the outermost portion of the pulpa and along the cortical canals. (B) Small stellates, with slender cylindrical terminally thickened rays; scattered throughout the pulpa, not numerous. (C) Small stellates, with slender, rough cylindrical rays, which are often not of uniform length, and in other ways irregular; measuring 0.02 millim. in diameter. These spicules are likewise scattered throughout the sponge; they are very rare in the cortex.—(3) *Oxeote Microsclera*. Scattered sparsely throughout

the sponge; more abundant in the surface and the walls of the inhalant canals, measuring 0.014×0.003 millim., with irregular thickenings and excrescences.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Tethyorrhaphis conulosa, n. sp.

Spherical sponges, 30–40 millim. in diameter, attached by a small base. The surface is covered with high conical protuberances, on an average 6 millim. broad and 6 millim. high; these are rather irregular at the base, and taper to sharp points. The conuli on the upper side of the sponge have a more rounded apex, towards the base they become pointed, and those which surround the base itself are prolonged to form thread-shaped rootlets, which may attain a length of 15 millim. Colour of the living sponge yellowish red; in spirit more dull. The lower surface of the cortex is quite smooth; its thickness accordingly subject to great variations. Below the depressions the cortex is only 2 millim. thick; while it attains a thickness of 8 millim. and more below the high conuli. Tangential canals, 0.4 millim. wide, extend below the surface of the depressions. Numerous narrow branched canals, which are on an average 0.08 millim. wide, arise from these and extend centripetally. In the pulpa the canals extend in a very irregular manner; their average diameter is 0.016 millim.

Skeleton.—Radial spicule-bundles 2 millim. apart and 0.5 millim. thick.—(1) *Monact Megasclera*. Strongyla, straight or curved, 2×0.04 millim., thickest portion near the middle, spindle-shaped, blunter end about four times as thick as the other. These spicules form the radial bundles. In the cortex, between the surface-tufts, styli, measuring 0.56×0.014 millim., and situated oblique to the surface, are met with; these are straight, the pointed end looking outward. Neither these nor the distal bundle-spicules project beyond the surface.—(2) *Stellate Microsclera*. Of two kinds:—(A) Globose Stellates with conic sharp-pointed rays, measuring 0.07 millim. in diameter. These spicules are found only in the outermost layer of the pulpa. (B) Small Stellates with slender cylindrical rays, measuring 0.04 millim. in diameter, scattered irregularly throughout the sponge.—(3) *Oxeote Microsclera*. Very abundant, particularly in the cortex, where they are on an average only 0.024 millim. apart. These spicules form a thin but very dense layer on the surface, and measure 0.018×0.003 millim.; their shape is variable. Transition-forms between these and the stellates, variety B, are not rare.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus **TUBERELLA**.

Tethydæ with a smooth surface or with tubercular protuberances. Without fibrillous cortex. Spicules: styli of varying size.

Tuberella tethyoides, Keller.

Tuberella tethyoides, C. Keller, "Neue Cœlenteraten aus dem Golfe von Neapel," Archiv für mikroskopische Anatomie, Band xviii. Seite 271.

GEOGRAPHICAL DISTRIBUTION.—Mediterranean: Naples.

Familia **SOLLASELLIDÆ**.

Monaxonia the cortex of which is composed of the expanding surface-tufts of the radiating spicule-bundles. Chonæ are situated between these. The skeleton of the interior consists of irregular, not radially disposed, spicule-bundles.

Genus **SOLLASELLA**, n. gen.

With stylote megasclera and without microsclera.

Sollasella digitata, n. sp.

Irregular digitate sponges, which are attached by a small base. The digitate processes are regularly cylindrical, with a transverse circular section 12–15 millim. in diameter. Very often two or more branches partly coalesce for some distance, so that the processes become irregular. The whole sponge attains a length of 130 millim. The individual, terminally rounded, branches are 30–50 millim. long. The surface appears hairy, some spicules protruding 2 millim. beyond it; these, however, are not numerous. Polygonal fields 1–2 millim. in diameter are found on the surface; these are expressions of the terminations of the surface-tufts of the spicule-bundles. These fields are divided from each other by sharply defined incisions, which are 0.6 millim. wide, and about as deep. Colour black in the interior; the cortex is of a lighter brown colour. In the depressions between the surface-tufts, rows of inhalant pores of a

structure similar to that of the chonæ of the Geodidæ are found; these are 0.15 millim. wide, and communicate below with extensive lacunæ which separate the cortex from the pulpa of the sponge. The latter form a nearly continuous subdermal cavity 0.1–0.2 millim. wide. The interior of the sponge is lacunose; the greater part of the space is occupied by very irregularly curved canals with a pretty uniform width of 0.25 millim.

Skeleton.—The skeleton of the pulpa consists of irregularly situated, isolated, and more or less curved oxea measuring 0.7×0.008 millim.; these spicules are cylindrical, and abruptly pointed; one end generally more blunt than the other. Irregularly disposed bundles composed of large styli, which measure 2×0.045 millim., and which are often accompanied by bundles of the smaller kind described above pervade the pulpa. The bundles in the subcortical layer, composed chiefly of large styli, extend tangentially and longitudinally. We also observe bundles composed nearly exclusively of the smaller kind of spicules, extending in a radial direction and connecting the surface-tufts with the internal skeleton. The surface-tufts themselves are distally as broad as the fields above described, and composed of oxea and styli, which measure $0.5-0.6 \times 0.01-0.012$ millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Familia SPIRASTRELLIDÆ.

Monaxonia with spirastrellid microsclera.

Genus SPIRASTRELLA.

Massive Spirastrellidæ with stylote or tylostylote megasclera; microsclera, stellates, and short-spined stronglya.

Spirastrella australis, n. sp.

Large and massive lamellar sponges, 10–20 millim. thick, attaining a height of 300 millim. and to a breadth of 250 millim., attached by a small base. The surface of the lamella is very smooth and even; the lamellæ are slightly curved, and the surface is generally more smooth on the concave than on the convex side; oscula 1 millim. wide, scattered over both the concave and convex surfaces. Colour of surface in spirit light brown; the same colour in the interior. The canals, which extend from the uniformly scattered inhalant

pores downward, are oblique to the surface, 0.2 millim. long and 0.04 millim. wide, and join in an irregular manner to form larger stems, which occasionally attain a width of 0.5 millim.; 1.3 millim. below the surface, cylindrical canals, with a diameter of 0.6 millim., extend in a strictly tangential direction; these are not numerous and about 4 millim. apart; they represent the subdermal cavity. The canal-system in the interior is very regular; there the canals have an average width of 0.2 millim.; only the much curved oscular tubes are wider, having a diameter of about 1 millim.; the sponge therefore appears very dense.

Skeleton.—The skeleton consists of a dense mass of large spirastrellids and small bundles of slender tylostyli.—(1) *Tylostylote Megasclera*. Tylostyli 0.6 × 0.01 millim., cylindrical, pointed at one end; bulb terminal, spherical, 0.016 millim. in diameter.—(2) *Spirastrellid Microsclera*. Very irregular, elongate stellates and short rods with long spines, about as frequent as the regular stellates; the different shapes appear as transition forms between the regular stellates of the Tethydæ and the spined rods of *Papillina*; their diameter averages 0.04 millim.; their rays or spines are conic and sharp-pointed, about $1\frac{1}{2}$ times as long as thick at the base.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus PAPILLINA.

Cavernose Spirastrellidæ with tubercular papillæ on the surface; microsclera, spined strongyla.

Papillina panis, n. sp.

(PLATE I. figs. 1, 2.)

Massive, irregular, lamellar or cup-shaped erect sponges; the largest specimens attain a length of 300 millim. and a thickness of 60 millim. at the base, tapering to 20 millim. below the margin; the sponge is always attached by a broad base. The surface is covered everywhere, except in the vicinity of the vents, by rounded papillæ, which have the shape of segments of spheres, and which are divided from each other by a network of broad and flat depressions; the papillæ are from 6–9 millim. apart, have a breadth of 2–4 millim. at the base, and project 1–2 millim. above the depressions. Surface purplish brown or dirty white; interior light greyish brown in the living state; the colour remains unchanged in spirit.

Vents, covered for the most part by movable membranes, are found on

the margins of lamellar individuals or in groups on the massive ones; they are circular and have a diameter of 8 millim.; the oscular tubes which extend down from them are much curved, have a circular transverse section, and do not anastomose. The depressions between the papillæ are occupied by perforated membranes; the inhalant pore-sieve appears accordingly as a continuous network of broad zones. In these a reticulation of 0.2–0.4 millim. wide bands, the meshes of which are 0.4–0.7 millim. wide, is observed; the meshes are again subdivided by slender bands into three to six parts, in each of which there are on an average eight 0.05 millim. wide pores. Large canals, 0.8 millim. in diameter, are found in abundance below this region; 5 millim. below the surface they join and open into tangential canals, of irregular transverse section, which have an average diameter of 2.5 millim.; from these canals the smaller inhalants originate, which form anastomoses; the exhalant canals are irregular and wide, like the inhalants, and join to form oscular canals 0.2 millim. in diameter, which open into large tubes.

Skeleton.—The skeleton consists of supporting spicules and microsclera. The *Megasclera* form irregular, on an average 0.6 millim. thick bundles; they are tylostyli, measuring 0.8×0.018 millim., obtusely pointed at one end, and generally slightly curved; the bulb is situated terminally, spherical, and measures 0.023 millim. in diameter. The *Microsclera* are spined strongyla of varying shape; they measure on an average 0.06×0.01 millim.; are either straight or curved, and covered with irregularly scattered, conic spines, which are 0.01 millim. long and generally at the base half as thick; these spicules are very abundant, particularly in the canal-walls.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Papillina ramulosa*, n. sp.**

Massive, lobose, very irregular sponges, attaining 200 millim. in length, 160 in breadth, and 80 in thickness. The surface is smooth, but rendered very uneven and irregular by numerous digitate, lamellar, or tubercular excrescences; these processes are generally developed more highly at the distal ends of the lobes than on their sides; the digitate ones all extend towards the terminations of the lobes. Colour light purplish brown in spirit, the same colour in the interior and on the surface. Small vertical inhalant canals join to form stems 0.1 millim. wide, which open into tangential canals situated 0.6 millim. below the surface. These rather scarce canals are irregular in shape and measure on an average 0.3 millim. in diameter; they represent the subdermal cavity, which is not highly developed. The interior of the sponge is very dense; the canals are not numerous, and have an average width of only 0.12

millim.; the more slender branches which supply the ciliated chambers are very narrow and rendered invisible by contraction in spirit-specimens. The exhalants join to form oscular tubes 1.5 millim. wide, which terminate in the scattered, equally wide, circular oscula.

Skeleton.—The supporting skeleton is composed of spicule-bundles which ramify in a dendritic manner and have a thickness of 0.5–1 millim.; microsclera are very abundant.—(1) *Megasclera*. Styli and tylostyli, measuring 0.4×0.012 millim., straight, abruptly pointed at one end; the bulb where developed spherical, situated terminally, on an average 0.02 millim. in diameter; the tylostyli are more numerous than the styli. These spicules form the bundles above mentioned, and are also very abundant, scattered irregularly throughout the ground-substance; a great many are situated in the surface, and there lie either tangentially or more or less oblique to the surface; some protrude 0.2 millim. beyond it.—(2) *Microsclera*. Spined strongyla, 0.05×0.008 millim.; the spines are not numerous, about fifteen to each spicule, sharp-pointed, and as long as the spicule is thick; these microsclera are mostly straight, although irregularly curved ones are not unfrequent; they are very abundant throughout the sponge.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus RAPHYRUS.

Spirastrellidæ with a regular honeycomb-like structure in the interior and a regular network with hexagonal meshes, corresponding to this, on the surface. This network consists of lines raised over the general surface of the sponge. The bulk of the microsclera are short and stout, spined strongyla.

In 1862 Oscar Schmidt* described two sponges as *Papillina suberea* and *P. nigricans*, from the Mediterranean; in 1866 Bowerbank† described a sponge as *Raphyrus Griffithsii*, which has also been figured‡. Oscar Schmidt afterwards§ combined this *Raphyrus* of Bowerbank with his own *Papillina suberea*, an arrangement which has been followed by Norman||. The genera *Raphyrus*, Bowerbank, and *Papillina*, O. Schmidt, would according

* O. Schmidt, Die Spongien des Adriatischen Meeres, 1862, p. 69.

† J. S. Bowerbank, Monograph of the British Sponges (Ray Society), vol. ii. p. 354.

‡ J. S. Bowerbank, Monograph of the British Sponges (Ray Society), vol. iii. pl. lxiv.

§ O. Schmidt, Grundzüge einer Spongienfauna des Atlantischen Gebietes, 1870, p. 77.

|| A. M. Norman, Monograph of the British Sponges, by the late J. S. Bowerbank (Ray Society), vol. iv. supplementary, p. 182.

to this appear identical. Among the Australian sponges there are forms which doubtlessly belong to the genus *Papillina*, O. Schmidt, whereas others again appear very different from these and coincide with Bowerbank's *Raphyrus*. All, however, contain, besides the tylostyli, short, spined strongyla. I assume that these also occur in the European species, but escaped the observation of Bowerbank and O. Schmidt. I think that both these genera should be retained. In *Papillina* the internal cavities are irregular and large; in *Raphyrus* they are very similar to the cells of a honeycomb, smaller, and very regular.

Raphyrus hixonii, Lendenfeld.

(PLATE I. fig. 3.)

"*Raphyrus hixonii*, a new Gigantic Sponge from Port Jackson," Proceedings of the Linnean Society of New South Wales, vol. x. (1886).

The smaller specimens are irregular, bulbous, with several vents on the upper convex surface. The large specimen is massive, expanded above, and was attached to the sand of the sea-bottom by a flat expanded base, 300 millim. broad; it extends above; the upper surface is uneven and horizontal. Seen from above the outline appears very irregular, with lobose projections beyond a circular circumference. The sponge measures about 600 millim. in width and 350 millim. in height; there are massive semi-spherical projections over the sides and upper surface; the latter are particularly regular and well defined. These protuberances extend 50 millim. over the depressions between them, and are 120 millim. broad. In the large specimen there are nine such protuberances on the upper side, in the centre of each of which a vent is situated. In the smaller specimens these vents are scattered over the smooth and uniform surface of the convex upper side; in the large specimen they are found in the centres of the upper protuberances. These vents lead into short conic tubes, which are not oscula, but præ-oscula. In the large specimen there are, according to the above, nine such tubes, 260 millim. long, and at the mouth 30 millim. wide; they are straight, but not regularly conic, as occasionally there are extensions halfway down, whereby their diameter may be locally increased to 50 millim. All these tubes are vertical and open on the upper, expanded surface on the summits of the protuberances. The sponge weighed, when fresh, about 100 kilog.; now that it has been dried it weighs about 14 kilog. Alive, in spirit, and dry the sponge is very hard, a pressure of 70 kilog. in no way affects a surface of 50 sq. centim. The colour in the living state is a very bright red, similar to rosanilin red; in spirit the sponge becomes pale flesh coloured, and dried it is brown. The spirit extracts a deep orange-

coloured pigment, very similar to that extracted by spirit from many other sponges.

The surface is reticulated throughout in a very regular and uniform manner, and is very similar to the surface of Bowerbank's *Raphyrus griffithsii*, and also to that of some species of *Halme* among horny sponges. Young and old specimens always show the same reticulation on the surface; there seem never to be papillæ in the place of the meshes, as is the case in young specimens of the genus *Papillina*, O. Schmidt. The reticulation is produced by a very regular network of 2 millim. broad projecting lines. In the meshes between these there are slight depressions about 4-5 millim. deep; the regularly polygonal meshes themselves have a width of 3-4 millim.; the concave membranes which are expanded in the meshes are very soft, whilst the projecting lines are exceedingly hard; in these membranes we find groups of small pores, which lead into the inhalant canals. This network covers the whole of the surface of the sponge, and extends in the conic tubes down to their bottom. Oscula are found scattered irregularly over the whole of the surface; they are circular and measure from 2-10 millim. in diameter; these oscula are as frequent on the exposed parts of the sponge as in the sides of the conic tubes.

The whole sponge consists of a reticulate structure. Lamellous fibres with an average thickness of 1 millim. form a network, which appears very regular on every section; these fibres consist of a very hard tissue, with few and small canals and a great abundance of spicules; in the meshes between them there is a very much softer tissue, with wider canals or irregular lacunæ; here, only few and insignificant spicules are observed. Below the pore-sieves, in the concave membranes which extend in the meshes of the surface-network, large irregular cavities are met with. The pores are situated, as stated above, in small groups; the sieve-membranes are very thin and delicate. The pores can apparently be entirely closed by the sponge. The subdermal cavity extends far down and gives off branches, which ramify to supply the ciliated chambers or extend to form lacunæ in other parts of the interior of the sponge; most of the lacunæ found throughout the interior of the sponge belong to the inhalant system. The ciliated chambers are small and difficult to see; they are spherical and measure 0.02 millim. in diameter; from the chambers very narrow canals originate, which unite to form the larger exhalants. The chambers are situated in groups, which occur both in the tissue of the hard fibres, and also in the soft pulpa which occupies the cells of the honeycomb-like structure. The exhalant canals do not form extensive lacunæ; the larger branches and stems are found only in the soft tissue of the meshes; the oscular tubes follow the network in their lower part, and are therefore much curved; they are narrow, long, and ramified in an irregular manner.

Skeleton.—The skeleton consists of the tylostyli and styli described by Bowerbank and O. Schmidt in their genera *Raphyrus* and *Papillina*, to

which two other kinds of spicules, not noticed by these authors, must be added.—*Surface Skeleton*. The surface of the hard projecting ridges in the surface-net is occupied by a number of small spicules, which form a layer about 0.06 millim. thick; these spicules are very variable in their shape, straight or curved, with large and irregular spines all over the surface, and particularly at the ends—spirastrellid; they are of very uniform size, and measure 0.03 millim. in length and 0.007 millim. in thickness. Besides forming a dense armour on the projecting ridges, they are found scattered also in the concave membranes of the meshes.—*Skeleton of the Hard Fibres*. The main support of the whole sponge is constituted by a reticulate mass of styli and tylostyli, which are mostly situated longitudinally and disposed in such a manner as to point towards the free surface in the projecting ridges, or towards the soft pulpa in the meshes of the interior. These spicules are not cemented together by any horny substance; they are very abundant, and form hard, dense masses throughout the fibres in the interior; scattered, these spicules are also but rarely found in the soft pulpa of the meshes in the interior; they are of uniform size, 0.5 millim. long and 0.02 millim. thick, cylindrical, and abruptly pointed. The bulb of the majority of spicules measures 0.03 millim. in diameter, sometimes it increases to a diameter of 0.036 millim., and may show indications of points at its greatest diameter; one of these points may grow out to form a spine 0.09 millim. long; this, however, is rare. On the other hand the bulb may be absent altogether. Proper styli are not unfrequent.—*Skeleton of the Pulpa*. The soft tissue in the meshes contains, besides scattered spicules of both the preceding kinds, also small clusters of very slender and gracefully curved spined oxea; the clusters of these are found scattered irregularly throughout the soft tissue and comprise from 7 to 12 spicules, crossing each other in a perfectly irregular manner. These spicules attain a length of 0.2 millim. and a thickness of 0.003 millim.; they bear short and sharp spines.

In the soft tissue of the internal meshes remarkable granular, highly colourable cells are met with in great abundance. The shape of these elements in *Raphyrus hixonii* is subject to great variations: the cells are spherical, about 90 per cent. of them; irregular lobose, 2 per cent.; spindle-shaped, 6 per cent.; or with indications of dividing, 2 per cent. A nucleus is indicated by a more transparent patch in the centre, but it is not clearly visible. In stained specimens the whole cell (or, rather, the granules) take up so much colouring-matter that the whole structure is rendered non-transparent; the nucleus in the fresh state and in spirit-specimens is light and transparent because it is free from granules. The granules are large, and refract the light very strongly. The differences in shape between these cells lead me to assume that they are a peculiar kind of amœboid wandering cell. I further assume that in this case, as also in

other sponges, these cells are in connection with the digestive functions of the sponge and take up and absorb microscopic food-particles, which may get into the lacunæ of the inhalant system and there come in contact with the epithelium.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus **PAPILLISSA**, n. gen.

Very lacunar Spirastrellidæ, with tubercular papillæ on the surface. The septa between the lacunæ are so much reduced in thickness as to attain a membranous character. Long and slender spined oxea form the bulk of the microsclera.

Papillissa lutea, n. sp.

Massive, irregular, laterally expanded sponges, attaining a width of 120 millim. and a height of 80 millim., attached by a small base. The surface is covered with round papillæ; these are on an average 8 millim. apart, at the base 4 millim. broad, and raised 1 millim. above the depressions between them. There are numerous circular, 4 millim. wide, vents scattered irregularly over the surface. Colour in the living state bright yellow; in spirit yellowish white. The vents mentioned above are not true oscula, they lead into a system of vestibular lacunæ which occupies the interior of the sponge; these lacunæ have an average diameter of 4 millim., and communicate with each other by large apertures. The canal-system proper is very simple; the canals are narrow, and the tissue very dense.

Skeleton.—The supporting-skeleton consists of dense masses of rather irregularly disposed *tylostylote Megasclera*, which measure 0.6×0.012 millim.; they are straight or slightly curved and sharp-pointed at one end; the bulb is generally spherical, and situated either terminally or a little within the truncate end; it measures 0.024 millim. in diameter, and its usually spherical shape is subject to great variations; when the bulb is situated otherwise than terminally, the spicule attains the shape of a sword. There are three kinds of *Microsclera*:—(1) Spined strongyla, straight or slightly curved, 0.08×0.008 millim., with numerous short spines; very rare. (2) Very small curved spicules, 0.024×0.003 millim., with two regular undulating curves in them. (3) Spined oxea, 0.2×0.004 millim., mostly slightly curved; spines numerous and very small.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*, *Lendenfeld*).

Familia **SUBERAMATIDÆ.**

Monaxonia with sigmate microsclera.

No specimens in the Australian Museum.

Familia **SUBERITIDÆ.**

Monaxonia without microsclera.

Genus **POTERION.**

Large cup-shaped pedunculate Suberitidæ. The skeleton consists of spicule-bundles and scattered spicules, which are tylostyli. The pores are situated on the outer side of the cup and circumvallate oscula on the inner side.

Poterion neptuni, Hardwicke.

Poterion neptuni, P. Harting, Mémoire sur le genre *Poterion*, Natuurkundige Verhandelingen, Utrechtsch. Genootsch. pp. 1-40, Taf. 1-4 (1870).

Spongia patera, T. Hardwicke, Bulletin Férussac, p. 165 (1826).

Spongia patera, T. Hardwicke, "Description of a Zoophyte of Singapore," Asiatic Researches, xiv. p. 180 (1822).

GEOGRAPHICAL DISTRIBUTION.—Pacific Ocean.

Genus **SUBERITES.**

Dense and irregularly shaped Suberitidæ, with narrow canals.

Suberites domuncula, Nardo.

Alcyonium domuncula, G. Olivi, Zoologia Adriatica (Bassano, 1792).

Halichondria compacta, N. Lieberkühn, "Beiträge zur Anatomie der Spongien," Müller's Archiv (1859).

Suberites domuncula, G. D. Nardo, Classification der Schwämme, Isis, 1833 (1834).

Suberites domuncula, O. Schmidt, Die Spongien der Adriatischen Meeres. Seite 67 (1862).

The Australian specimens lead a similar mode of life to the European *Suberites domuncula*; they always form the abode of a crab; I have, however, not seen them enclosing a shell inhabited by a *Pagurus*. The largest Australian specimens measure only 35 millim. in breadth and 15 millim. in height. The surface is smooth. The colour is bright yellow. Between the surface-tufts of spicules tangential canals are found 0.2 millim. below the surface; these are irregular and measure on an average 0.14 millim. in diameter; further down radial canals of equal dimensions are seen, which belong to the exhalant system; they join to form canals of irregular shape, which are 1 millim. wide; these are not rare in the interior and pour their contents into the wide and short oscular tube.

Skeleton.—The skeleton consists of irregular masses of tylostyli which form a reticulate structure; towards the surface they are united to very short bundles, which extend to form the surface-tufts; the spicules of the surface-tufts protrude 0.18 millim. beyond the surface, with their pointed end; so that, as O. Schmidt remarks, "Die Oberfläche ist glatt, fühlt sich aber rauh an." Spicules 0.7×0.008 millim., cylindrical, gradually and sharp-pointed at one end, and slightly constricted below the bulb, which is spherical and measures 0.014 millim. in diameter; the bulb is situated a little below the termination; the truncate end of the spicule appears as a slight centrally situated excrescence of the bulb.

GEOGRAPHICAL DISTRIBUTION.—Mediterranean.

Australian Seas: South coast of Australia (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Genus **PLECTODENDRON**, nov. gen.

Pedunculate Suberitidæ, forming a regular network extended in one plane. The spicules form very loose, anastomosing bundles.

Plectodendron elegans, n. sp.

The whole sponge forms a flabelliform reticulation, which extends in one vertical plane and is attached by a peduncle, 25 millim. long and in the central contracted portion about 12 millim. thick; it widens above and below. The reticulation of the sponge itself is composed of somewhat prismatic trabeculæ, which are compressed in a direction vertical to the plane, in which the sponge expands; their transverse section is square, with rounded corners, and they measure $9 \times 6-7$ millim. in thickness; the meshes of the network are elongate, irregularly widened at the ends, and measure 6×25 millim.; they are disposed longitudinally. The whole sponge

attains a height of 200 and a width of 250 millim. I have seen in other museums some specimens which appeared to me to be at least twice the size of the largest in this collection. The surface is pretty even and smooth; the projecting ends of the spicules in the surface-tufts, however, give it a roughness clearly perceptible to the touch, although not perceptible to the eye: a faint and regular network, with meshes 1.5 millim. wide, makes its appearance on the surface; it is the result of the tissue in the interstices of the surface-tufts being of a darker hue than the tufts themselves. Colour in spirit light brown, uniform throughout. Inhalant pores are found in the slight depressions between the surface-tufts only; they lead into tangential canals situated 0.3 millim. below the surface; these canals are 0.2 millim. high (diameter in a radial direction), and tangentially very much extended, so as to form true subdermal cavities. The exhalants join to form rather wide, oval canals, 1 millim. in diameter, which are the beginnings of oscular tubes; the latter terminate in oval oscula, situated in the *meshes* of the sponge-net; they measure 1 to 2×7 millim. and are fairly numerous; no oscula are ever found on the *face* of the flabelliform sponge.

Skeleton.—The irregular reticulation of loose and scattered spicules in the interior becomes more regularly fibrous towards the surface; the bundles terminate in widely extended surface-tufts. The whole of the skeleton consists of spindle-shaped, slightly curved, sharp, and at one end gradually pointed, tylostylote spicules, measuring 0.24×0.008 millim.; the bulb measures 0.014 millim. in diameter; it has the shape of a depressed rotation ellipsoid, and is situated terminally; the distal surface is quite flat and level, vertical to the axis of the spicules. Thus the spicule attains the shape of a nail.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*). North coast of Australia: Torres Straits (*Macleay*); Northern Territory, S. A. (*Haacke*).

Genus CLIONA.

Boring Suberitidæ, the skeleton of which consists of smooth tylostyli.

Cliona, sp.?

The holes which this sponge bores in shells are 0.4–1.1 millim. wide and very regularly circular; they lead into irregular canals, which repeatedly curve and pervade the whole of the shell. I have not observed the sponge itself, only the holes which it bores, and can therefore not give any description.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*). New Caledonia (*Ramsay*).

Subordo **OLIGOSILICINA.**

Chondrospongiæ without any supporting skeleton. Microsclera, when present, stellate.

Familia **CHONDRILLIDÆ.**

Oligosilicina with stellate microsclera and a distinct cortical layer.

The microsclera of this Subfamily are of a very simple kind, and all represent the shape of a spined ball with numerous irregularly disposed axes; the axes are represented by the spines which radiate from the sphere; the possible variations are that the spines may attain a relative great length, whilst the diameter of the central solid sphere is inconsiderable; in this way the star-shaped spicule is produced; the spines of this may be smooth or rough, serrated by secondary spines of a very small size. If the central solid sphere attains a large size and the spines become small, then the shape of a spiny ball is attained, which may be more like a *Datura* fruit, or a Swiss "Morgenstern," according to whether the spines are numerous and slender, or not numerous, short and thick.

Genus **CHONDRILLA.**

Chondrillidæ in which the commencement of the inhalant canal-system consists of a great number of parallel radial canals, leading from the inhalant pores direct into tangential canals, which collect the water, and from which the inhalant system of the pulpa originates.

Chondrilla secunda, Lendenfeld.

Chondrilla nucula, H. J. Carter, "Description of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 200 (1885).

Chondrilla secunda, R. von Lendenfeld, "A Monograph of the Australian Sponges, Part IV.—II. Ordo Myxospongia, *Haeckel*," *Proceedings of the Linnean Society of New South Wales*, vol. x. part 1, p. 15 (1885).

Chondrilla secunda, R. von Lendenfeld, "Notes to the Australian Sponges recently described by Carter" (*Description of Sponges from the Neigh-*

bourhood of Port Phillip Heads, South Australia, Ann. & Mag. Nat. Hist. ser. 5, vol. xv. p. 196), Proceedings of the Linnean Society of New South Wales, vol. x. part 2, p. 152 (1885).

I named this sponge the second to commemorate the fact that it was, of the thousands of different forms collected by me in Australia, the second specimen I found.

Our sponge represents in outer appearance a lamellar or irregular bulbous mass; the lamellar shape being the most frequent. The lamellæ are not of uniform thickness throughout; they attain an average size of 30×60 millim. and more, and measure in the thickest part 12 millim. in diameter; in places these lamellæ are very thin, or even pierced so as to present a sieve-like appearance. The bulbous variety of this species is not large, it is spherical, attains a diameter of 25–35 millim., and is attached to stones &c. by a small basis only; also the more frequent lamellar form is attached to stones by small parts of its lower surface only. I obtained most of my specimens adrift.

The surface is perfectly smooth. The colour is subject to similar variations as in some European species, and varies from light dull yellowish grey to dark bluish black. Mostly the side exposed to the light seems to be of a darker colour than the other. However, a strict rule can be established here as little as in the case of *Chondrosia reniformis*. The colour of the outer surface is alone subject to these variations; the interior of the sponge always has the same dull grey colour. The oscula are raised slightly over the surrounding surface, 3–6 in number; they are always situated on the upperside of flat specimens, are circular, and measure 2–3 millim. in diameter. The bulbous specimens have only one osculum. The dark parts of the cortical layer are non-transparent in consequence of the great number of pigment granules; the light parts are more transparent and better suited for investigation. The outermost zone always appears radially striped in consequence of the inhalant canals being vertical to the surface in their distal portion.

Structure.—Our species does not seem to differ from *Chondrilla nucula* in any respect except in the shape of the spicules. There are two kinds of spicules; both kinds are met with not very abundantly throughout the sponge; towards the outer surface and particularly also in the canal-walls they become much more numerous. The larger kind measures 0.064 millim., the smaller kind 0.012 millim. in diameter. The spines of the larger kind are about 0.006 millim. long and 0.004 millim. broad; the spines of the smaller kind measure 0.003×0.001 millim. The larger spicule has the shape of a ball with distant short and smooth spines, which are terminally rounded; the surface of the central sphere is clearly visible between the spines. In the small spicule the spines are pointed and relatively much longer, three times as long as broad at

the base, and regularly conic; the surface of the central sphere is not visible because the spines stand so close together that their bases are in contact.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

***Chondrilla corticata*, Lendenfeld.**

Chondrilla corticata, R. von Lendenfeld, "A Monograph of the Australian Sponges, Part IV.—II. Ordo Myxospongia, *Haeckel*," Proceedings of the Linnean Society of New South Wales, vol. x. part 1, p. 154 (1885).

This species is characterized by its extremely hard cortex.

It has only been found in the shape of rather thin lamellæ, which are peculiarly bent and curved, and often attain the shape of a cup. The flat, extended sponge measures, when full-grown, 70 millim. in length and 40 millim. in width. It is the largest Australian *Chondrilla* I have seen. The lamella is of uniform thickness throughout, measuring from 10–12 millim. in diameter.

The outer surface is smooth. The whole sponge has a light brown colour. The oscula are few in number, about seven to a large specimen; they are circular and slightly drawn in, that is to say, situated at the bottom of slight funnel-shaped depressions in the surface, and surrounded by a slightly elevated ring; sometimes they lie in the plane of the surface. The interior of the sponge is a little darker in colour than the cortex. The canals in the pulpa are more numerous and smaller than in other species. The structure of the pulpa exhibits no peculiarity; the cortex, however, is interesting.

There are two kinds of spicules—spherical and stellate ones. The *spherical spicule* measures 0·015 millim.; the spines are particularly short, broad and conic, and terminate in very sharp points; they measure 0·001 millim. in length and are at the base 0·0015 thick. The *stellate spicule* measures 0·01 millim.; the spines are mostly smooth and generally taper to a fine and sharp point; they are slender and conic, measuring 0·004 millim. in length and at the base 0·0008 millim. in thickness. In the pulpa we find both these kinds of spicules pretty uniformly distributed, with a slight preponderance of the stellate spicules; here the spicules are, on the whole, scarce and in thin sections they appear very far apart. In the outer part of the cortex, just below the outer surface, we meet with a regular hard pavement composed of the spherical spicules, which lie closely packed in three or four layers above one another; they are situated as close together as their spherical shape will allow, and their spines are interposed in such a manner that the pavement which they form attains a high degree of firmness. Similar cortical layers are

known in *Geodia* and some other sponges. No other species of *Chondrilla* possesses a cortex.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Chondrilla australiensis*, Carter.**

Chondrilla australiensis, H. J. Carter, "On two New Species of Gummineæ," Annals and Magazine of Natural History, ser. 4, vol. xii. p. 23 (1873).

Chondrilla australiensis, R. von Lendenfeld, "A Monograph of the Australian Sponges, Part IV.—II. Ordo Myxospongia, *Haeckel*," Proceedings of the Linnean Society of New South Wales, vol. x. part 1, p. 153 (1885).

Incrusting or self-supporting and spreading horizontally, flat, cake-shaped; of a dirty yellow or buff colour. Surface smooth, glistening; consistence pretty elastic, tolerably tough. Oscula numerous, small, of different sizes, in groups, or terminal on the lobes. Cortex translucent. Spicules of two kinds:—(1) With short, sharp, conic spines, taking up the whole surface of the sphere. (2) With slender, sometimes terminally bifid or trifid serrated spines. These two kinds of spicules are most numerous towards the outer surface; the short-spined spicules measure 0·026 millim., the others 0·022 millim.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Carter*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Chondrilla papillata*, Lendenfeld.**

Chondrilla papillata, R. von Lendenfeld, "A Monograph of the Australian Sponges, Part IV.—Ordo II. Myxospongia, *Haeckel*," Proceedings of the Linnean Society of New South Wales, vol. x. part 1, p. 153 (1885).

This species is characterized by a very peculiar roughness of the surface. The sponge is lobose or massive, not lamellar or globose, as many other species. It appears somewhat like a horny sponge, in consequence of its erect shape and the papillæ on its surface. It consists of a central mass, from which cylindrical or slightly flattened processes grow up. The whole sponge attains a maximum diameter of 60 millim. (height). The processes measure 10–14 millim. in breadth. The oscula are situated terminally on the processes; they are circular and have a diameter of about 2 millim.; they are not surrounded by chimneys. The whole surface is rendered very

rough by the projecting papillæ, which stand very close together; these papillæ are spherical and attached by a broad base; they appear as two-thirds of spheres and stand so close together that the spaces between them are always smaller than their own diameter. The colour of this species in spirit is a uniform light mélange or brown; the interior has the same colour as the surface, only in a lighter shade.

In internal structure this sponge shows no aberrant peculiarity. The spicules are of two kinds:—There are spherical spicules with short, sharp, conic spines; and stellate spicules with slender, conic, serrated spines. The *spherical spicule* measures 0·019 millim., the spines 0·003 × 0·002 millim.; the *stellate spicule* measures 0·013 millim., the spines 0·008 × 0·0015 millim. Both kinds of spicules are met with somewhat sparsely scattered through the whole of the sponge; in the papillæ, however, the spicules are massed, so that the distance between the spheres is about equal to their diameter; the spicules lie here three or four layers deep. In this part of the sponge the spherical spicules predominate very much over the stellate ones; in the pulpa the difference in percentage of the two is slight; if there is any perceptible difference the stellate form predominates.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Familia CHONDROSIDÆ.

Oligosilicina without microsclera, with a distinct cortical layer.

Genus CHONDROSIA.

Chondrosidæ with a smooth surface; the oscula without serrated frills.

Chondrosia ramsayi, Lendenfeld.

Chondrosia ramsayi, R. v. Lendenfeld, "A Monograph of the Australian Sponges, Part IV.—II. Ordo Myxospongia, *Haeckel*," Proceedings of the Linnean Society of New South Wales, vol. x. part 1, p. 147 (1885).

I dedicate this species to the Curator of the Australian Museum.

Flat irregular massive sponges, attached to rocks &c. at a few points of the lower surface only, generally having the shape of convex lamellæ, the convex side being uppermost. The lamella attains a size of 40 × 30 millim.,

and a thickness of 10-14 millim.; smaller specimens are proportionately thinner.

The colour is very constant; it is always in reflected light dark bluish black, and in transmitted light dark brown. The surface is shiny, but *not quite smooth*. A reticulate structure, as described by O. Schmidt in *Chondrosia plebeja*, does not exactly make its appearance, but still the roughness is of a kind not met with in other *Chondrosia* species, so that by this alone our species can be distinguished. A transverse section shows that the cortex is highly developed; it has a dark outer margin and is light coloured towards the interior. The pulpa is of a uniform dark brown colour; a few canals are seen, but these are rare and small. The oscula are numerous and grouped together; they possess small "chimneys," thin membranous frills which are about 1 millim. high, simple, cylindrical, with a smooth margin.

The canal-system shows some peculiarities which distinguish it from other species. It may perhaps eventually be advantageous to establish a new genus for this species for this reason.

Scattered all over the surface we find small pores, measuring about 0.01 millim.; these are circular, and situated in groups of 5-10, and there is always a group of such pores at the base of each concavity of the rough surface. Below each group of pores we find an extensive subdermal cavity, which is connected with adjacent cavities of a similar kind by tangentially extended, lacunose canals. Two layers of canals can be distinguished. The canals of the outer layer communicate with each other by means of very rare and minute pores, and with the larger lacunes below by means of similar pores, which in consequence of their paucity and smallness are difficult to find. All these lacunes lie so close together that only narrow walls of tissue remain between them. The average diameter of the lacunes in the outer layer is 0.05, of those in the lower layer 0.2 millim.; the whole lacunose layer has a thickness of 0.4 millim. Below this no lacunæ are found in the cortex, except a few very distant and large irregular tangential canals, which collect the water from the small communicating outer lacunæ; these canals have very irregular transverse sections and an average diameter of 1 millim. The cortex is also 1 millim. thick, so that the whole thickness of it is taken up by the canals; the lower side of these large tangential canals, from which numerous inhalant canals originate, lies in the surface which divides the cortex from the pulpa of the sponge. The canals which descend from the large superficial tangentials are cylindrical and follow a more or less radial direction; repeatedly ramifying, they become smaller the further they penetrate into the sponge. The ciliated chambers surround their final cæcal narrow ramifications. They are spherical, have a diameter of 0.05 millim., and do not appear to be very numerous. The inhalant pores could not be found; the exhalant openings are small and circular. Regarding their shape and position they do not differ

from those in *Chondrosia reniformis*. The exhalant canal-system is simple and not lacunose; it shows no peculiarities.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Chondrosia collectrix, n. sp.

Irregular, incrusting sponges, which attain a height of 20 millim. and a breadth of 60 millim. The surface is smooth or slightly conulated. The body contains a great quantity of foreign material, portions of hydroid skeletons, sand, &c.; the sponge-tissue itself appears only as a cement between these foreign bodies; there are fewer in the outer layers than near the base of the sponge. The surface of spirit-specimens is light purplish grey; the interior brown. Subdermal cavities are found in the shape of tangentially extended canals 0.2 millim. below the surface, which are on an average 0.17 millim. wide, and connected with the inhalant pores on the outer surface by straight or curved canals, 0.024 millim. in diameter. The inhalant canals, which extend from the subdermal cavities centripetally, are irregular and 0.4 millim. wide. The interior is very dense.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

4. Ordo **CORNACUSPONGIÆ.**

Silicea with pretty soft mesogloea and oval or spherical, not very large, ciliated chambers. A supporting skeleton is always present; it is composed of diact, monaxon megasclera, held together by a varying amount of spongin; or of spongin-fibres without proper siliceous spicules, in which foreign bodies are often imbedded. Microsclera never stellate.

Familia **SPONGILLIDÆ.**

Freshwater Cornacuspongiæ, with gemmulæ and a skeleton composed of spicule-bundles.

Genus **SPONGILLA.**

Spongillidæ, the spicules in the gemmule-capsules of which are spined oxea.



Spongilla sceptroides, Haswell.

Spongilla sceptroides, W. A. Haswell, "On Australian Freshwater Sponges," Proceedings of the Linnean Society of New South Wales, vol. vii. p. 209 (1883).

Spongilla sceptroides, R. v. Lendenfeld, "Die Süßwasser-Cœlenteraten Australiens," Zoologische Jahrbücher (Spengel), Band ii. Seite 89 (1887).

Sponge green, incrusting, smooth, pretty elastic, not crumbling. Skeleton-spicules small, curved, spindle-shaped, sharply pointed at each end, with small spines. Statoblast round, enclosed by slender, long, straight, cylindrical spicules, with long pointed thorns; the thorns accumulate towards the ends, where they form distinct swellings; the central part of the spicule has no thorns.

I add to this description of Haswell's (*l. c.*) that the skeleton-spicules are cylindrical and abruptly pointed, and measure on an average 0.25 millim. in length and 0.01 millim. in thickness. The specimen seen by me is a branch 8 millim. thick and 20 millim. long.

GEOGRAPHICAL DISTRIBUTION.—Near Brisbane, Queensland (*Haswell*).

Genus **TUBELLA**.

The gemmule-capsule consists of a layer of radially disposed amphidiscs; the terminal discs of unequal size (inæquibirotulate).

Tubella nigra, Lendenfeld.

Tubella nigra, R. v. Lendenfeld, "Die Süßwasser-Cœlenteraten Australiens," Zoologische Jahrbücher (Spengel), Bd. ii. Seite 91 (1887).

Sponge incrusting, black; the crusts are 3–5 millim. thick, the surface is continuous and appears velvet-like. The sponge extends horizontally, and attains a length of 70 millim. and a breadth of 50 millim.; the outline is irregular, lobose. The sponge is soft; the spicule-bundles which form the fibres of the skeleton are very slender, often composed of a single row of spicules. The canals are narrow and insignificant. The gemmules form a continuous layer at the base of the sponge.

The *skeleton-spicules* are spindle-shaped and gradually pointed; their average length is 0.22 millim., and the central part measures 0.0074 millim. in thickness. They are sharply pointed, entirely smooth, and slightly curved. The *gemmules* are irregularly globular and measure 0.3 millim. in diameter; the umbilical depression is well pronounced. The amphidiscs are 0.033 millim. long; the slender stalk, which bears a few sharp and slender spines, is 0.0015 millim. thick; the spines sometimes attain a length equal to the radius of the

centripetal, smaller, terminal disc. The terminal discs are very regular, rotulate, with many sharp, equal teeth; the thickened end of the amphidisc-shaft slightly projects over each terminal disc in the shape of a semispherical protuberance; the diameter of the larger centrifugal disc is 0.0125 millim., and of the smaller centripetal one 0.008 millim.

GEOGRAPHICAL DISTRIBUTION.—In a swamp near Sydney, New South Wales (*Whitelegge*).

NOTE.—I have received *Tubella-gemmulae* from Lake Hindmarsh in Victoria. I think that they may be referable to this species.

Genus MEYENIA.

Spongillidæ, the gemmule-capsules of which consist of amphidiscs, the two terminal discs of which are similar to each other (equibirotulate).

Meyenia fluviatilis, auctorum.

Meyenia fluviatilis, H. J. Carter, "History and Classification of the known Species of *Spongilla*," *Annals and Magazine of Natural History*, ser. 5, vol. vii. p. 92 (1881).

Spongilla fluviatilis, auctorum.

Sponge massive, irregular, when dry fragile and crumbling. Skeleton-spicules spindle-shaped and gradually pointed, curved. The gemmule is surrounded by amphidiscs, with equal deeply-toothed terminal discs.

This species is frequent in Europe, and occurs also in Australia; I consider the Australian form a *variety* of the European species.

Meyenia fluviatilis, var. **ramsayi**, Haswell.

Meyenia fluviatilis, var. *ramsayi*. R. v. Lendenfeld, "Die Süßwasser-Cœlenteraten Australiens," *Zoologische Jahrbücher (Spengel)*, Bd. ii. (1887) Seite 92.

Spongilla ramsayi, W. A. Haswell, "On Australian Freshwater Sponges," *Proceedings of the Linnean Society of New South Wales*, vol. vii. p. 210 (1883).

Haswell (*l. c.*) gave a short description of this sponge, and established a new species for it. The study of Haswell's types at the museum in Sydney, and of specimens found by myself, has led me to the conclusion that this is not a new species, as Haswell thought, but only a variety of the common European freshwater sponge.

The sponge is, when alive, of a light brown or dirty yellow colour. It is massive, and has irregular ridges on the surface; the oscula are scattered.

The sponge grows on immersed branches, which it encloses sometimes entirely for a length of 50 millim., and attains a thickness of 30 millim.; it is tolerably hard. The skeleton consists of spicule-bundles. The canals are remarkably wide, and the sponge therefore appears very lacunose.

The gemmules are situated at the base; they coincide entirely with those of the European forms, which I have been able to compare with this Australian variety; their average diameter is 0.35 millim. The skeleton-spicules are not so spindle-shaped as those of other forms of the same species, but appear more cylindrical and abruptly pointed; they are on an average 0.22 millim. long and 0.01 millim. thick in the centre and slightly spiny; the spines are on an average 0.008 millim. high and 0.01 millim. apart; there are no larger thorns. I have never seen any perfectly smooth spicules. The amphidiscs of the gemmule-capsules are 0.029 millim. long, and possess a very stout shaft which is 0.005 millim. thick. On this shaft there are a few stout spines, the length of which is about two-thirds of the thickness of the shaft.

This variety is distinguished from the preparations of Bowerbank and Carter, which I have examined in the British Museum, by the considerably larger size of the supporting-spicules, and also by the amphidiscs of the Australian variety having large and stout thorns, which is not the case in those of the European form. Cylindrical skeleton-spicules, which, according to Carter, do not occur in the European form, are nevertheless to be found in some of Bowerbank's type-preparations. The terminal discs are 0.02 millim. broad and very strong; their margin is deeply serrated. The teeth are about 12-16 in number.

GEOGRAPHICAL DISTRIBUTION.—Bell River, Wellington, New South Wales (*Haswell*). Macquarie River, near Dubbo, New South Wales (*Lendenfeld*).

Familia **HOMORRHAPHIDÆ.**

Cornacuspongiæ with oxeote or strongylote megasclera; no differentiated microsclera, except toxæa. Without gemmulæ. Marine.

Subfamilia **RENIERINÆ.**

Spicules never completely enveloped in horny fibre.

Genus **RENIERA.**

Homorrhaphidæ with a skeleton composed of loose spicules, which form a network with triangular meshes.

The spicules for the most part do not form bundles, but remain isolated and

form a network with, often, triangular meshes, the sides of which are formed by single spicules; the spicules are cemented by spongin only at their ends.

Reniera collectrix, n. sp.

This species is massive and generally more or less spherical, sometimes slightly depressed, cake-shaped. It attains a diameter of 100 millim. and a height of 80 millim. The lower surface is attached at several points. The oscula are on an average 5 millim. wide and circular; they are situated in groups on the upper surface. The surface is rendered uneven by the presence of rounded tubercular projections, which are on an average 2 millim. high, the distribution and size of which is very variable, sometimes they are not developed at all. The colour of the living sponge is dark crimson; its consistence very hard. It contains in the ground-substance a great quantity of foreign material, sand-grains, &c., some of which have a diameter of 1 millim. and more. The canals are narrow and inconspicuous. Extensive lacunæ are found only in the vicinity of the oscular tubes, which lead from the oscula vertically downward to the base of the sponge.

The *skeleton* consists of strings of single spicules, which are attached to each other at their ends; others are scattered irregularly throughout the ground-substance. The *spicules* are oxea and styli; the former more numerous than the latter; they are straight exceptionally, also slightly and irregularly curved, and measure 0·09 millim. in length and 0·003 millim. in thickness.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Reniera australis, n. sp.

Massive, lobose, horizontally extended, more or less incrusting sponges, with dome-shaped protuberances on the upper surface, on the summits of which the circular, 3–5 millim. wide, oscula are situated. Surface smooth. The sponge attains a height of 30 millim., a length of 150–200 millim., and a width of 100 millim. Colour in the living state rosy red, in spirit grey.

The *skeleton* consists of longitudinal fibres, which are on an average 0·02 millim. thick, and composed of 3–5 series of rather loosely packed spicules. Between these fibres a very dense network of irregularly scattered spicules is observed; the spicules constituting it are not attached to each other by any cement, but appear to lie loose in the ground-substance. The *spicules* are oxea, straight, sharp, and somewhat abruptly pointed, 0·12 millim. long and 0·004 millim. thick. The spicules forming the fibres are similar to those in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson N. S. W. (*Ramsay*).

Reniera megarrhaphea, n. sp.

Massive, lobose, digitate, erect sponges, which are attached by a small base, and attain a height of 150 millim. The digitate processes generally coalesce for the greater part of their length, and taper towards their upper end; on their summits the irregular and small oscula are situated. Also on the sides of the digitate processes a few slightly elevated oscula are situated. The surface is smooth, the base of attachment generally very narrow.

The *skeleton* consists of bundles of spicules, arranged somewhat in the fashion of a network, the meshes of which measure 0.015–0.02 millim. The *spicules* in the bundles are rather irregularly situated; they are straight or slightly curved oxea, 0.5 millim. long, and 0.03 millim. thick in the centre. There are also much smaller ones, densely packed, and scattered more or less irregularly between the fibres, and also participating in their formation; these are straight, pointed oxea, about 0.02 millim. long and 0.008 millim. thick. Spongin cementing the spicules is not discernible.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Reniera pandæa, n. sp.

Sponge fan-shaped, attached by a small base, 150 millim. high, 200 millim. broad, and 20–30 millim. thick. Oscula on the upper semicircular margin, numerous, circular, on an average 5 millim. in diameter. Surface smooth.

The *skeleton* is composed of a network of 0.02 millim. thick fibres, with 0.3 millim. wide meshes. The fibres consist of densely packed parallel *spicules*; these are styli, slightly curved, 0.13 millim. long and 0.005 millim. thick, conic, and tapering to a somewhat blunt point. Similar spicules are also found scattered in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Reniera lobosa, n. sp.

Irregular, massive, lobose sponges, with smooth surface and scattered circular, 3 millim. wide oscula.

The *skeleton* is composed of longitudinal main fibres—spicule-bundles, which are connected with each other by scattered spicules; these fibres are on an average 0.16 millim. apart and 0.05 millim. thick; they consist of very irregularly situated spicules, which protrude beyond the surface of the fibre. The *spicules* are oxystromgyla, slightly angularly curved in the middle, 0.01

millim. thick and 0.19 millim. long. The connecting spicules are similar. Besides these, more slender spicules of a similar kind also occur.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus **PETROSIA**.

Hard sponges, the skeleton of which consists of a dense network of thick spicule-bundles.

Petrosia hebes, n. sp.

Irregular, massive sponges, horizontally extended, 80 millim. broad and 30 millim. high; with digitate processes on the upper surface, which attain a length of 40 millim. and a thickness of 15 millim.; they are irregularly curved, knotty, and often flattened. The surface is smooth. Oscula inconspicuous and scattered, circular, 1–3 millim. in diameter.

Skeleton composed of a network of very thick (0.2 millim.) fibres, with 0.5 millim. wide meshes; the fibres are composed of stout and large oxystrogyote spicules with blunt ends, which measure 0.22 millim. in length and 0.013 millim. in thickness. Similar spicules are scattered abundantly throughout the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **HALICHONDRIA**.

The skeleton consists of an irregular network of fibres, composed of long and slender spicules.

This genus is here accepted in the sense of Ridley and Dendy.

Halichondria rubra, n. sp.

Large sponges, with digitate, conical protuberances, which terminate in rather sharp points; the branches are 20–30 millim. thick. The whole sponge attains a height of 300 millim. The surface is smooth; the oscula are scattered and of varying size, 2–5 millim. in diameter. In the living state the sponge is of a bright scarlet colour, which is sometimes retained by spirit-specimens.

The *skeleton* consists of a network with distinct main and connecting fibres. The main fibres, which extend longitudinally, are 0.15 millim. thick, and the connecting fibres, which are vertical to the former, have an average diameter

of 0.07 millim.; the meshes of the network are more or less quadratic, 0.35 millim. wide. The fibres are composed of irregular spicule-bundles. The *spicules* are straight oxystrongyla with sharp or blunt points, 0.2 millim. long and 0.006 millim. thick. Similar but more slender spicules are scattered abundantly through the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W., 30 metres (*Lendenfeld*).

***Halichondria rubra*, var. *digitata*, nov.**

(PLATE II. fig. 1.)

This variety is distinguished from the species *H. rubra* by the small diameter of its digitate processes, which are also more numerous; they are cylindrical, and do not exceed 15 millim. in thickness. The sponge attains a height of 300 millim. The surface is roughened in consequence of the main fibres slightly protruding beyond it. The scattered oscula are circular, 3–4 millim. wide.

The *skeleton* consists of a network in which main and connecting-fibres can be distinguished. The main fibres measure 0.15 millim. in thickness, and the connecting-fibres 0.07 millim.; the meshes of the network are 0.35 millim. wide. The *spicules* are slender and often slightly curved; they are on an average 0.15 millim. long and 0.004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

***Halichondria mammillata*, n. sp.**

Large, massive, or horizontally extended, cake-shaped sponges of irregular shape, from the upper surface of which dome-shaped protuberances grow out. The sponge attains a breadth of 200 millim., the processes are 40–60 millim. high, at the base 40 millim. broad, and situated close together. The surface is smooth; on the summit of each dome a circular osculum, 7–12 millim. wide, is situated; from this a cylindrical oscular tube of the same diameter extends downward.

The *skeleton* consists of stout main fibres, which are connected by single spicules and by loose spicule-bundles. The main fibres are 0.12 millim. thick and on an average 0.24 millim. apart. The *spicules* are mostly straight, exceptionally also slightly curved, sharp-pointed, oxystrongyla, 0.25 millim. long and 0.006 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Halichondria clathriformis, n. sp.

Sponge lobose, massive, attaining a height of 250 millim., erect, attached by a small base, with very large and conspicuous oscula, 10 millim. wide, which lie scattered on the summits of the lobes, and a smooth surface.

The *skeleton* consists of bundles of loosely packed spicules, which are connected by very numerous others, scattered in such a way that the whole often appears like a dense mass of irregularly disposed spicules. *Spicules*: oxystrongyla, slightly curved in the middle and very slightly tapering towards the ends; the ends are somewhat rounded, and from them a very narrow and sharp spine projects, which lies axially and renders the spicule sharp-pointed. The spicules are 0.33 millim. long and 0.011 millim. thick in the centre; the terminal spine is 0.006 millim. long.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **RENIOCHALINA**, n. gen.

Lamellar, thin, branched, more or less flower-shaped Renierinae, with smooth surface and a fibrous skeleton; the spicules are partly embedded in spongin.

Reniochalina stalagmitis, n. sp.

The sponge is attached by a small base. It consists of a much-folded lamella, about 2.5 millim. thick, which rises from the base of attachment upward and outward, thus giving to the sponge the appearance of a broad cone; the interior of the cone is filled with the meandric windings of this lamella and with secondary lamellæ which are attached to it. From the upper free margin lobose and digitate processes arise, and the whole attains more or less the shape of a flower. The sponge is of dark colour in the living state. The surface is roughened by the projecting skeleton-spicules. The oscula are small, numerous, and scattered all over the surface.

The *skeleton* consists of three systems of fibres—one longitudinal extending from the base to the margin of the lamellæ, the second transverse, and the third perpendicular to the plain in which the two others extend. The fibres belonging to the first two systems accordingly extend in the direction of the lamella, whilst those belonging to the third system are perpendicular to it and to the surface; these fibres consist of bundles of somewhat irregularly disposed spicules. The meshes between the fibres are square and on an average 0.2 millim. wide, the fibres themselves are 0.045 millim. thick. The

spicules are oxea, not very sharply pointed, slightly curved, 0.3–0.5 millim. long, and 0.01–0.025 millim. thick. The largest spicules are those which form the fibres of the third system, some of these protrude beyond the surface.

GEOGRAPHICAL DISTRIBUTION.—Western Australia (*Baily*).

Reniochalina lamella, n. sp.

The sponge consists of a flabelliform lamella, attached by a small base; the lamella is more or less folded, but always retains its flabelliform shape. The oscula are numerous, scattered, small, and inconspicuous. The surface bears small, slender conuli, 1–1.5 millim. high, and appears roughened by projecting spicules.

The *skeleton* consists of three systems of fibres—one longitudinal extending from the base to the margin of the lamellæ, the second transverse, and the third perpendicular to the surface of the lamella. The fibres belonging to the first two systems accordingly extend in the direction of the lamella, whilst those belonging to the third system are perpendicular to it; these fibres consist of bundles of somewhat irregularly disposed spicules. The meshes between the fibres are square and on an average 0.2 millim. wide, the fibres themselves are 0.045 millim. thick. The *spicules* are very variable. The prevalent form is a straight oxystrongylus, with somewhat blunt points. Besides this, oxea and styli are found; some of the spicules are curved. Their size varies, like their shape, very much; the largest in the interior attain a length of 0.3 millim. and a thickness of 0.012 millim., and those which project beyond the surface a length of 0.35 millim. and a thickness of 0.0014 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Subfamilia CHALININÆ.

Homorrhaphidæ with distinct horn-fibre, in which the spicules are embedded.

Group CACOCHALININÆ.

Chalininæ of massive irregular shape, with thin fibres and slender spicules.

Genus CACOCHALINA.

Massive Cacochalininæ with very wide meshes in the skeleton-

net and no special surface-skeleton. Slender tylostyli or oxea abundant, scattered irregularly throughout the axis of all fibres. No apparent oscula.

Cacochalina globosa, Lendenfeld.

Cacochalina globosa, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 762 (1887).

Irregular, massive sponges, attached by a small base, 140 millim. high and 100 millim. broad. *Skeleton*-net rather loose, with stout fibres. *Spicules* abundant, oxea, gradually and sharp-pointed, 0.16 millim. long and 0.004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Genus **CHALINOPORA**.

Irregularly branched or lobose Cacochalinae, with finer skeleton-net and a special fine surface-skeleton. Oscula large, conspicuous. Slender oxea abundant.

Chalinopora subarmigera, Ridley.

Chalinopora subarmigera, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 767 (1887).

Cladochalina subarmigera, S. O. Ridley, "Report on Sponges," Report on the Zoological Collections made in the Indo-Pacific during the Voyage of H.M.S. 'Alert,' 1881-82, p. 397 (1884).

Irregular, cylindrical, repent sponges. Branches 10-15 millim. thick and 100-200 millim. long. The large, slightly raised oscula, which measure 1-4 millim. in diameter, are situated in a row. *Skeleton*-net regularly hexactinellid, meshes on an average 0.5 millim. wide, fibres 0.05 millim. thick. *Spicules*: oxystrongyla, gradually pointed, 0.1 millim. long and 0.0025 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North and East coasts of Australia: Torres Straits ('Alert'); Port Jackson, N. S. W. (*Lendenfeld*).

Chalinopora tenella, Lendenfeld.

Chalinopora tenella, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 765 (1887).

Massive sponges, with irregular protuberances; 120 millim. long and 80 millim. broad. Oscula scattered. Sponge very soft. *Skeleton-net* rather irregular. *Spicules*: oxea, 0·14 millim. long and 0·004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South and East coasts of Australia: Port Phillip, V. (*Lendenfeld*); Port Jackson, N. S. W. (*Ramsay*).

Chalinopora lamella, Lendenfeld.

Chalinopora lamella, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 767 (1887).

This sponge forms a thin, pedunculate, flabelliform lamella, 120 millim. high, 60 millim. broad, and 10 millim. thick, with smooth faces and large lobes on the free margin. Oscula marginal. *Skeleton-net* with narrow meshes. *Spicules*: oxystrongyla, sharp-pointed, numerous, 0·11 millim. long and 0·004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Chalinopora siphonopsis, Lendenfeld.

Chalinopora siphonopsis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 767 (1887).

Sponge massive, lobose, 160 millim. long and 120 millim. broad. Oscula situated terminally on the lobes. *Skeleton-net* with fine meshes. *Spicules*: styli, 0·14 millim. long and 0·003 millim. thick, not very abundant.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **CLADOCHALINA**.

Lobose and branched Cacochaliniæ, with abundant small spicules and narrow meshes of the skeleton-net.

Cladochalina euplax, Lendenfeld.

Cladochalina euplax, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 769 (1887).

Massive, lobose, lamellar sponges, which attain a breadth of 80 millim. and a thickness of 12 millim. The oscula are confined to one side; they are

on an average 2 millim. wide and 8 millim. apart. *Skeleton-net* with meshes 0.4 millim. wide and fibres 0.06 millim. thick. *Spicules*: oxea, curved, 0.07 millim. long and 0.002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Cladochalina mollis, Lendenfeld.

Cladochalina mollis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 768 (1887).

Massive forms with mammiform protuberances, at the ends of which the small oscula are situated. The sponge attains a greatest breadth of 200 millim. and a height of 50 millim. *Skeleton-net* with meshes, on an average, 0.35 millim. wide and fibres 0.06 millim. thick. *Spicules*: oxea, curved, 0.077 millim. long and 0.0017 millim. thick, numerous.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **CHALINELLA**.

Cacochalininæ with very fine fibres; spicules scarce and small.

Chalinella tenella, Lendenfeld.

Chalinella tenella, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 770 (1887).

Small, massive, horizontally expanded, tender sponges, with oscula 1.5 millim. wide. *Skeleton-net* with meshes 0.2 millim. wide and fibres 0.013 millim. thick. *Spicules*: oxea, 0.033 millim. long and 0.0009 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

Group **PACHYCHALININÆ**.

Hard, regularly digitate, or lamellar Chalininæ, with very thick fibres.

Genus **CHALINISSA**.

Hard, digitate, lamellar Pachychalininæ, with smooth undulating surface, which is strengthened by a dense special surface-skeleton.

Oscula large and numerous, but not prominent. Spicules oxea, numerous and large in the fibres, and also in the soft parts of the sponge.

Chalinissa elongata, Lendenfeld.

Chalinissa elongata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 774 (1887).

The sponge consists of a bundle of few, straight, slender and erect branches, which are 700 millim. long and 20 millim. thick. This bundle is attached by a peduncle, 100 millim. long. *Skeleton-net* with meshes 0.26 millim. wide and fibres 0.07 millim. thick. *Spicules* forming a distinct axial string in the fibres, are particularly regularly longitudinally situated: oxea, 0.083 millim. long and 0.005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Chalinissa elegans, Lendenfeld.

Chalinissa elegans, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 773 (1887).

A bundle of digitate processes 20 millim. thick and 100 millim. long, which are attached to a rather flattened peduncle 150 millim. long, 20 millim. broad, and 12 millim. thick. The whole sponge attains a length of 400 millim. and a breadth of 150 millim. It has broad and low protuberances on the surface. Oscula large and pretty abundant. *Skeleton-net* irregular, with meshes 0.4 millim. wide and main fibres 0.1 millim. thick. *Spicules*: oxea, slightly curved, 0.06 millim. long and 0.003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Broughton Islands, Q.; Illawarra, N. S. W. (*Ramsay*).

Chalinissa communis, Lendenfeld.

(PLATE VIII.)

Chalinissa communis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 772 (1887).

Very large dendritic sponges with erect flattened digitate branches, and a distinct short peduncle. The sponge attains a height of 1000 millim. and a breadth of 500 millim.; the branches measure 8 millim. in thickness. In large specimens the peduncle measures 50 millim. in length and 25 millim. in

thickness. The oscula, which are 2.5 millim. wide, are scattered over the surface of the sponge. *Skeleton-net* with meshes 0.26–0.033 millim. wide and fibres 0.053 millim. thick. *Spicules*: oxea, straight or slightly curved, 0.053–0.07 millim. long and 0.005–0.007 millim. thick; abundant in the fibres and also scattered in the soft parts of the sponge.

Chalinissa communis, var. **flabellum**, Lendenfeld.

Chalinissa communis, var. *flabellum*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 772 (1887).

Sponge with lamellar branches. The meshes of the skeleton-net measure 0.26 millim. in width, the fibres 0.053 millim. in thickness. *Spicules*: oxea, 0.053 millim. long and 0.007 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **PACHYCHALINA**.

Irregular, digitate, lobose Pachychalininæ, with conspicuous and numerous projecting oscula and abundant very stout spicules.

Pachychalina manus, Lendenfeld.

Pachychalina manus, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 777 (1887).

Hand-shaped sponges, with few short, erect branches, which lie in one plane, attaining a length of 200 millim. The digitate processes and the lamellar central part are 15 millim. thick. The surface is reticulate. *Skeleton-net* with meshes 0.26 millim. wide, and fibres 0.08 millim. thick. *Spicules*: oxea, strongly curved, 0.059 millim. long and 0.005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **CERAOCHALINA**.

Digitate, lobose Pachychalininæ, with well-developed surface-skeleton, thick fibres and small spicules, not exceeding 0.2 millim. in length. The spicules are not numerous, and confined more or less to the axes of the thicker main fibres.

Ceraochalina multiformis, Lendenfeld.

Ceraochalina multiformis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 783 (1887).

Lobose, digitate, reticulate sponges. The dry skeleton is very soft. Surface smooth. *Skeleton-net* with meshes 0.05–0.09 millim. wide, and fibres 10–16 millim. thick. *Spicules*: oxea, straight or slightly curved, pointed, 0.04–0.05 millim. long and 0.0009–0.005 millim. thick.

Ceraochalina multiformis, var. **dura**, Lendenfeld.

Ceraochalina multiformis, var. *dura*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 784 (1887).

Compressed, lobose, irregular sponges, which attain a maximum diameter of 100 millim. The lobose processes are about 30 millim. broad and 15 millim. thick. Oscula scattered over one face. Surface smooth. The sponge is pretty hard and elastic. *Skeleton-net* with meshes 0.3 millim. wide and fibres 0.05 millim. thick. *Spicules*: oxea, straight, 0.04 millim. long and 0.0009 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—New Zealand: Port Chalmers (*Parker*).

Group **PLACOCHALININÆ**.

Frondose Chalininæ with narrow meshes of the skeleton-net. Oscula, when present, confined to one side of the lamella.

Genus **ANTHEROCHALINA**.

Very thin lamellar Placochalininæ, with smooth surface and without apparent oscula. The skeleton consists of a dense network of fibres composed of styli or oxea, and appears somewhat renierid.

Antherochalina perforata, Lendenfeld.

Antherochalina perforata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 788 (1887).

Sponge elegantly flabelliform, attached by a long and slender peduncle 5 millim. thick, attaining a height of 140 millim., a breadth of 80 millim., and a thickness of 3 millim. Perforations are observed near the upper margin,

which measure 3 millim. in diameter. Surface quite smooth, without apparent oscula. Sponge soft and resilient in the fresh state, hard when dry. *Skeleton-net* with meshes 0.13 millim. wide and fibres 0.016 millim. thick. *Spicules*: oxea, 0.09 millim. long and 0.003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Broughton Island, Q. (*Ramsay*).

Antherochalina frondosa, Lendenfeld.

Antherochalina frondosa, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 787 (1887).

The sponge consists of an erect, longitudinally folded lamella, which attains a height of 300 millim., a breadth of 150 millim., and a thickness of 3 millim. The *skeleton-net* is composed of fibres which consist of abundant spicules, and only a small quantity of spongin. The fibres measure 0.033 millim. in thickness and the meshes are 0.13 millim. wide. *Spicules*: curved styli, 0.3 millim. long and 0.016 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Antherochalina dura, Lendenfeld.

Antherochalina dura, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 788 (1887).

Flabelliform pedunculate sponges, 170 millim. broad and 7 millim. thick. *Skeleton-net* with meshes 0.13 millim. wide and fibres 0.026 millim. thick. *Spicules*: styli, 0.2 millim. long and 0.02 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **PLACOCHALINA**.

Large, pedunculate, more or less cup-shaped, frondose Placochalininae, with a very uneven outer surface, which is covered with ridges. Inner surface smooth. No apparent oscula. Fibres of the skeleton-net stout.

Placochalina pedunculata, Lendenfeld.

Placochalina pedunculata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 791 (1887).

Large irregular, frondose or infundibuliform, pedunculate sponges, which attain a height of 180–250 millim., a breadth of 150–300 millim., and a thickness of 8–9 millim. Surface uneven. Sponges hard and inelastic. *Skeleton-net* with meshes 0·2–0·4 millim. wide, and fibres 0·003–0·046 millim. thick. *Spicules*: oxea, 0·05–0·067 millim. long, 0·003–0·004 millim. thick.

Placochalina pedunculata, var. **dura**, Carter.

Placochalina pedunculata, var. *dura*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher, Band ii. Seite 791 (1887).

Cavochalina bilamellata, H. J. Carter, "Descriptions of Sponges from the neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xvi. p. 287 (1885).

Frondose sponges with an inflated peduncle attaining a height of 180 millim., a width of 150 millim., and a thickness of 9 millim. Surface smooth on one side; the opposite face is covered with a reticulation of projecting ridges. *Skeleton-net* with meshes 0·4 millim. wide and fibres 0·033 millim. thick. *Spicules*: oxea, 0·053 millim. long and 0·003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Placochalina pedunculata, var. **pocula**, Lendenfeld.

Placochalina pedunculata, var. *pocula*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 792 (1887).

Elegantly cup-shaped, pedunculate sponges, with apparent zones of growth, attaining a height of 250 millim., a breadth of 300 millim., and a thickness of 8 millim. Surface as in the foregoing variety. *Skeleton-net* with meshes 0·3 millim. wide and fibres 0·046 millim. thick. *Spicules*: oxea, 0·053 millim. long and 0·003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North and East coasts of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Illawarra, N. S. W. (*Ramsay*); Torres Straits (*Macleay*).

Placochalina pedunculata, var. **mollis**, Lendenfeld.

Placochalina pedunculata, var. *mollis*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 792 (1887).

A lamella which is about 110 millim. high, 320 millim. broad, 10–12 millim. thick, and depressed in the centre. The surface is slightly undulating on the upper side, and covered with irregular rounded ridges on the lower.

Skeleton-net with meshes 0·2 millim. wide and fibres 0·04 millim. thick.
Spicules: oxea, 0·067 millim. long and 0·005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: St. Vincent's Gulf, S. A. (*Haacke*).

Group **SIPHONINÆ**.

Wide, tubular or cup-shaped, hollow, lacunose Chalininæ, with slender spicules.

Genus **PHYLOSIPHONIA**.

(= *Siphonochalina*, O. Schmidt, partim.)

Smooth, annulated, tubular Siphoninæ, with terminal præoscula. Skeleton with abundant and large spicules.

Phylosiphonia superba, Lendenfeld.

Phylosiphonia superba, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 798 (1887).

The sponge consists of a number of erect tubes, which grow out from a repent basal mass; it attains a height of 210 millim.; the tubes, which have a circular transverse section, are on an average 15 millim. wide. The terminally situated præoscula measure from 8–10 millim. in diameter. Surface smooth, undulating. Sponge pretty hard and elastic. The colour of the living sponge is light violet.

Skeleton-net with meshes 0·3 millim. wide and fibres 0·08 millim. thick.
Spicules. Megasclera: oxea, confined to the main fibres, measuring 0·09 millim. in length and 0·002 millim. in thickness. Spicules scattered in the ground-substance, of two kinds:—(1) Oxea similar to those in the main fibres, and (2) Toxea, which measure 0·03 millim. in length and 0·0007 millim. in thickness.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Phylosiphonia spiculifera, Lendenfeld.

Phylosiphonia spiculifera, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 799 (1887).

The sponge consists of erect anastomosing branches, which form a reticulation. It attains a height of 250 millim. and a breadth of 150 millim. The digitate

processes are 200 millim. long, 20 millim. thick, and irregularly cylindrical. The præoscula measure 20 millim. in diameter.

The *skeleton* consists of a network with meshes 0.26 millim. wide and fibres 0.067 millim. thick. *Spicules*: oxystromgyla 0.09 millim. long and 0.004 millim. thick are observed in the main fibres, but absent in the connecting-fibres. Oxystromgyla similar to those in the main fibres are also found scattered throughout the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Phylosiphonia intermedia, Ridley and Dendy.

Phylosiphonia intermedia, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 800 (1887).

Siphonochalina intermedia, S. O. Ridley and A. Dendy, "Preliminary Report on the Monaxonida collected by H.M.S. 'Challenger,'" Annals and Magazine of Natural History, ser. 5, vol. xviii. p. 331 (1887).

Siphonochalina intermedia, S. O. Ridley and A. Dendy, "Report on the Monaxonida," The Zoology of the Voyage of H.M.S. 'Challenger,' part 59, p. 30 (1887).

The sponge consists of erect, cylindrical, tubular branches, 200 millim. long, which are distally widened, and at the base 20 millim. thick; further up they attain a diameter of 35 millim. The terminal præosculum, which is surrounded by a kind of collar, is 15 millim. wide. The surface is smooth or uneven. The tube is here and there extended by irregular annular thickenings.

The *skeleton* is composed of a network of fibres 0.04 millim. thick, with meshes 0.3 millim. wide. In the axis of the main fibres a continuous bundle of spicules is observed. The *spicules* are much less numerous in the connecting-fibres; they are oxystromgyla, measuring 0.1 millim. in length and 0.006 millim. in thickness. Similar spicules are also observed scattered in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Phylosiphonia annulata, Ridley and Dendy.

Phylosiphonia annulata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 798 (1887).

Siphonochalina annulata, S. O. Ridley and A. Dendy, "Preliminary Report on the Monaxonida collected by H.M.S. 'Challenger,'" Annals and Magazine of Natural History, ser. 5, vol. xviii. p. 331 (1887).

Siphonochalina annulata, S. O. Ridley and A. Dendy, "Report on the Monaxonida," The Zoology of the Voyage of H.M.S. 'Challenger,' part 59, p. 31 (1887).

Small, slender, erect, slightly branched tubular sponges, which attain a height of 250 millim. A peduncle is generally observed which attains a length of 100 millim. The branches are 8 millim. thick, and distended at regular intervals by annular thickenings.

The *skeleton* consists of a network of fibres 0.033 millim. thick, with meshes 0.2 millim. wide. The spicules are very abundant, straight oxystromyloids, 0.08 millim. long and 0.0065 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Phylosiphonia stalagmitis, Lendenfeld.

Phylosiphonia stalagmitis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 799 (1887).

The sponge consists of branches which grow out from an extensive basal mass; these branches all lie in one plane, and frequently anastomose, so that the whole structure assumes a somewhat flabelliform appearance. The sponge attains a height of 140 millim. and a breadth of 100 millim. The tubular branches have a very uneven surface; they are 30 millim. thick. The terminal præosculum measures 18 millim. in diameter.

The *skeleton* consists of a network of fibres 0.067 millim. thick, with meshes 0.3 millim. wide. The *spicules* are straight oxystromyloids, 0.067 millim. long and 0.007 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Lendenfeld*).

Genus SIPHONOCALINA.

Large tubular Siphoninæ, with smooth inner and conulated outer surface.

Siphonochalina axialis, Lendenfeld.

Siphonochalina axialis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 805 (1887).

From a repent reticulate mass, upright branches arise which are simple or slightly branched, and which appear very irregular, in consequence of the

occurrence of irregular outgrowths. The surface is conulated. The conuli are higher and much more abundant at the distal ends of the branches than near the base. The upright branches attain a length of 300 millim. and a thickness of 20–30 millim. The conuli are about 5 millim. high. The vents are situated terminally.

The *skeleton* consists of a network of fibres 0.05 millim. thick, with meshes 0.5 millim. wide. The *spicules* form an axial bundle in the fibres; they are oxea 0.1 millim. long and 0.0009 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Siphonochalina laxa*, Lendenfeld.**

Siphonochalina laxa, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 803 (1887).

The sponge consists of a reticulate mass of tortuous, irregular tubes, 10 millim. thick; it attains a height of 200 millim. The surface is uneven, the conuli are not so pronounced as in other species. The terminally situated præosculum measures 7 millim. in diameter.

The *skeleton* consists of a network of fibres 0.067 millim. thick, with meshes nearly 1 millim. wide. The *spicules*, oxea, are pretty abundant, 0.1 millim. long and 0.002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Siphonochalina extensa*, Lendenfeld.**

Siphonochalina extensa, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 806 (1887).

The sponge consists of very wide, distally distended tubes, which are 120 millim. long, and at the end 135 millim. broad. The terminal vent measures 12 millim. in diameter. The surface is covered with abundant, sharp, and pretty high conuli which point upward.

The *skeleton* consists of a network of fibres 0.05 millim. thick, with meshes 0.4 millim. wide. The *spicules* are very abundant, and form a dense bundle in the axis of the fibres. They are oxea 0.067–0.074 millim. long and 0.0008–0.0016 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia; South coast of New Guinea (*Haacke*).

Siphonochalina typica, Lendenfeld.

Siphonochalina typica, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 804 (1887).

The sponge consists of a reticulate mass of tortuous, repent tubes, 12 millim. thick, from which simple, erect branches, 15–20 millim. thick, arise. The whole sponge attains a breadth of 500 millim. and a height of 300 millim. The upright tubes anastomose here and there, or they are joined by secondary tubes of smaller size. Scarce, sharp-pointed, and irregular conuli project from the surface.

The *skeleton* consists of a network of fibres 0.05 millim. thick, with meshes 0.5 millim. wide. The *spicules*, oxea, are scattered, 0.0087 millim. long and 0.0009 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Siphonochalina osculata, Lendenfeld.

Siphonochalina osculata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 807 (1887).

Large branched sponges, which attain a height of 200 millim. The branches are 20–25 millim. thick. The surface is covered with sharp, more or less abundant conuli. The præoscula are small, 2–8 millim. in diameter, and situated on the ends and sides of the tubes.

The *skeleton* consists of a network of fibres 0.08–0.01 millim. thick, with meshes 0.26–0.3 millim. wide. The *spicules*, oxea, are abundant, 0.08–0.93 millim. long and 0.0013–0.002 millim. thick.

Siphonochalina osculata, var. **macropora**, Lendenfeld.

Siphonochalina osculata, var. *macropora*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 807 (1887).

Tubular sponges, attaining a length of 300 millim. The tubes are 25 millim. thick, the vents 8 millim. wide; the conuli abundant and sharp.

The *skeleton* consists of a network of fibres 0.08 millim. thick, with meshes 0.26 millim. wide. The *spicules* occupy, in some parts, the whole of the fibre, and in others they appear as axial bundles; they are oxea, 0.093 millim. long and 0.0013 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Siphonochalina osculata, var. **micropora**, Lendenfeld.

Siphonochalina osculata, var. *micropora*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 807 (1887).

Very hard sponges which are composed of tubular branches 150 millim. long, 20 millim. thick. The surface is covered with pretty abundant, high, and slender conuli. The scattered oscula are 2-4 millim. wide.

The *skeleton* consists of a network with meshes 0.3 millim. wide and fibres 0.1 thick. The *spicules* occupy in dense masses the whole of the fibre; they are oxea 0.08 millim. long and 0.002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East and North coasts of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Torres Straits (*Macleay*).

Genus **SIPHONELLA**.

Wide, tubular Siphoninae, with rounded irregular excrescences on the outer surface but without conuli. Very soft and tender. The fibres of the skeleton are pretty thick. The main fibres contain very few and small spicules; the connecting-fibres are entirely free from spicules.

This genus is transitional between *Siphonochalina* and *Chalinopsilla*, and connects the Chalininae with the Horny Sponges (Fam. Spongidae).

Siphonella truncata, Lendenfeld.

Siphonella truncata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 808 (1887).

Tall, distally distended, somewhat calyciform tubes which attain a height of 220 millim. and a width at the upper end of 45 millim. The terminal præosculum is 25 millim. wide. The outer surface is covered with very abundant, irregular rounded excrescences. The dry skeleton is exceedingly tender, soft, and light.

The *skeleton* consists of a network with meshes 0.13 millim. wide and fibres 0.046 millim. thick. The *spicules* are very abundant: styli, 0.096 millim. long and 0.002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Siphonella communis, Lendenfeld.

Siphonella communis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 809 (1887).

Erect tubes, 200 millim. long and 30 millim. wide, with uneven, undulating surface, which, however, does not bear such high protuberances as that of the other species. The terminal præosculum is 16 millim. wide.

The *skeleton* consists of a network with meshes 0·3 millim. wide and fibres 0·04 millim. thick. *Spicules* are found in the main fibres only, where they are fairly abundant; they are chiefly oxea, 0·046 millim. long and 0·0013 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Group **HOPLOCHALININÆ**.

Massive or digitate Chalininæ, with exceedingly large, obliquely situated spicules, the ends of which project beyond the surface of the fibres, so that the latter appear very rough, uneven, and in some cases spiny.

Genus **HOPLOCHALINA**.

Digitate Hoplochalininæ with high conuli.

The species of this genus are imitated by the Aplysillidæ.

Hoplochalina dendrilla, Lendenfeld.

Hoplochalina dendrilla, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 823 (1887).

Digitate, branched sponges, with abundant, sharp-pointed conuli, 3 millim. high and 8 millim. apart. The sponge attains a height of 400 millim. The digitate branches are 15–30 millim. thick, and generally appear inflated below the distal, terminally rounded, end.

The *skeleton* consists of fibres which ramify in a dendritic manner, and the final branches of which are on an average 0·2 millim. thick. The *spicules* are very large, and situated obliquely, so as partly to protrude beyond the surface of the fibres; they are oxea, 0·5 millim. long and 0·013 millim.

thick. The ground-substance is opaque and quite untransparent; in this respect our sponge differs from all the other Chalinids.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Hoplochalina tenella, Lendenfeld.

Hoplochalina tenella, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 823 (1887).

Small, massive, or incrusting sponges, which attain a breadth of 30 millim. and a height of 20 millim. The surface is covered with small conuli.

The *skeleton* consists of dendritically ramifying fibres, the final branches of which are on an average 0.1 millim. thick. The *spicules* are very abundant obliquely situated oxea, 0.4 millim. long and 0.013 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

Hoplochalina renieroides, Lendenfeld.

Hoplochalina renieroides, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 823 (1887).

The sponge consists of straight digitate branches, which are pretty much branched, and on an average 20 millim. thick. The whole sponge attains a height of 200 millim.

The dendritic *skeleton* consists of fibres 0.067 millim. thick, which are charged with very abundant curved oxea 0.25 millim. long and 0.013 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia · St. Vincent Gulf, S. A. (*Haacke*).

Group **DACTYLOCHALININÆ**.

Chalininæ with regularly cylindrical, solid digitate processes. The spicules are slender and numerous. Main and connecting fibres well defined.

Genus **DACTYLOCHALINA**.

Dactylochalininæ with stout digitate processes. Skeleton-net with wide meshes.

Dactylochalina mollis, Lendenfeld.

Dactylochalina mollis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 812 (1887).

Soft and resilient digitate sponges, which attain a length of 50 millim. The branches are regularly cylindrical, and on an average 10 millim. thick. The surface is smooth; the oscula are situated terminally.

The *skeleton* consists of a network with meshes 0·3 millim. wide and fibres 0·03 millim. thick. The *spicules* are straight oxea, 0·09 millim. long and 0·002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Dactylochalina monilata, Ridley.

Chalina monilata, S. O. Ridley, "Report on the Sponges," Report on the Zoological Collections made during the Voyage of H.M.S. 'Alert,' p. 394 (1884).

Dactylochalina australis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 813 (1887).

Large, digitate sponges, with roughened surface and prominent oscula. The sponge attains a length of 300 millim. The cylindrical branches, which are repent and anastomose here and there, are 8–20 millim. thick; there are often so many of them that one transverse section would cut about 60 repent branches.

The *skeleton* consists of a network with meshes 0·3 millim. wide and fibres 0·03–0·08 millim. thick; the *spicules* are curved oxea, 0·06 millim. long and 0·002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits ('Alert'). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*). South coast of Australia: Port Phillip, V. (*Lendenfeld*).

Dactylochalina reticulata, Lendenfeld.

Chalina polychotoma, H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xvi. p. 284 (1885).

Dactylochalina reticulata, R. v. Lendenfeld, "Studies on Sponges.—IV. On two cases of Mimicry in Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. p. 571 (1886).

Dactylochalina reticulata, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 813 (1887).

A mass of anastomosing repent digitate branches, which form an irregular network. The whole sponge attains a length of 500 millim.; the cylindrical digitate parts are 10 millim. thick.

The *skeleton* consists of a network with meshes 0.4 millim. wide and fibres 0.03 millim. thick. *Spicules* very abundant oxea, 0.067 long and 0.003 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Dactylochalina cylindrica, Lendenfeld.

Dactylochalina cylindrica, R. v. Lendenfeld, "Studies on Sponges.—IV. On two cases of Mimicry in Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. p. 570 (1886).

Dactylochalina cylindrica, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 812 (1887).

Large, digitate, reticulate sponges, which attain a length of 500 millim. The digitate branches, which frequently anastomose, are 8 millim. thick. The oscula are not numerous, scattered, and very prominent; they measure 3 millim. in width.

The *skeleton* consists of a network with meshes 0.3 millim. wide and fibres 0.04 millim. thick. The *spicules* are scarce in the connecting-fibres and fairly abundant in the main fibres; they are straight, sharp-pointed oxea, 0.09 millim. long and 0.002 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **EUCHALINA**.

Dactylochalininæ with slender digitate processes. Skeleton-net with very fine meshes. Fibres thin; spicules abundant; oscula small.

Euchalina exigua, Lendenfeld.

Euchalina exigua, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 818 (1887).

Very thin, slender, ramified or simple, digitate, cylindrical branches grow out from a common basal plate; they are 300 millim. long and 4 millim. thick. The surface is quite smooth and slightly uneven. The oscula, 0.6 millim wide, are abundant and scattered over the whole of the surface

The *skeleton* consists of a network, with meshes 0·1 millim. wide and fibres 0·04 millim. thick. The *spicules* are straight oxea, 0·09 millim. long and 0·002 millim. thick.

I distinguish two varieties :—

Euchalina exigua*, var. *simplex, Lendenfeld.

Euchalina exigua, var. *simplex*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 818 (1887).

With simple, straight, and unbranched digitate processes.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Euchalina exigua*, var. *arborea, Lendenfeld.

Euchalina exigua, var. *arborea*, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 818 (1887).

With much branched and occasionally anastomosing digitate processes.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Queensland (*Ramsay*).

Genus **CHALINODENDRON**.

Dendritic Dactylochaliniæ, with conuli and abundant slender oxeote spicules.

Chalinodendron ramosum, Lendenfeld.

(PLATE IV. fig. 2.)

Chalinodendron ramosum, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 820 (1887).

Soft and resilient, branched, digitate, or lobose sponges, which attain a height of 300 millim.; the branches are 8 millim. thick. The surface is covered with small, sharp, and slender conuli. Oscula scarce, 1 millim. wide.

The *skeleton* consists of a network with meshes 0·3 millim. wide and fibres 0·03–0·06 millim. thick. The *spicules* are straight or slightly curved oxea, 0·11 millim. long and 0·005 millim. thick; fairly abundant in the fibres. Similar spicules are also scattered throughout the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*, *Lendenfeld*).

Chalinodendron dendrilla, Lendenfeld.

Chalinodendron dendrilla, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 820 (1887).

Branched, erect sponges, extending in one plane, which attain a height of 120 millim. The digitate processes are compressed, 10 millim. thick and 15 millim. broad. The surface is peculiarly porous. The oscula are 0.8 millim. wide, abundant and scattered.

The *skeleton* consists of a network with meshes 0.34 millim. wide and fibres 0.016–0.13 millim. thick. The *spicules* are strongyla, 0.13 millim. long and 0.006 millim. thick, fairly abundant in the fibres. Exceedingly fine strongyla, 0.13 millim. long and only 0.001 millim. thick, are observed in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Group **ARENOCHALININÆ**.

Chalininæ with foreign bodies in the main and spicules in the connecting-fibres.

Genus **ARENOCHALINA**.

Digitate Arenochalininæ, with foreign bodies in the main and proper spicules in the connecting-fibres.

Arenochalina mirabilis, Lendenfeld.

Arenochalina mirabilis, R. v. Lendenfeld, "Die Chalineen des australischen Gebietes," Zoologische Jahrbücher (Spengel), Band ii. Seite 821 (1887).

Small branched sponges, with compressed branches 12 millim. broad and 8 millim. thick.

The *skeleton* consists of a network of fibres, with irregularly rectangular meshes 0.4–0.8 millim. wide. The main fibres are charged with sand; the connecting-fibres are entirely filled with dense masses of spicules. The main fibres are knotty, 0.05 millim. thick; the connecting-fibres are perpendicular to the main fibres and about half as thick. The *spicules* are oxea, 0.02 millim. long and 0.004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*).

Familia SPONGIDÆ.

Cornacuspongiæ with small ciliated chambers under 0.05 millim. wide, without proper spicules, never clathriform.

The Spongidæ are allied to the Homorrhaphidæ. We may assume that they have been derived from them by the loss of the proper spicules.

Genus CHALINOPSILLA.

Ramified Spongidæ with digitate branches, with special surface-skeleton and smooth surface; imitating various species of Chalininæ. Supporting-skeleton forming a network with square meshes. Connecting-fibres mostly unbranched.

This genus was originally established by me under the name *Chalinopsis*.

Chalinopsilla australis, n. sp.

Repent incrusting or branched and reticulating sponges, with large conspicuous and protruding circular oscula. *Surface-skeleton* composed of primary and secondary fibres. *Supporting-skeleton* with narrow meshes 0.4 millim. wide and main fibres 0.2–0.35 millim. thick. The connecting-fibres are simple and 0.05–0.08 millim. thick. The skeleton is entirely free from foreign bodies. The central part of the reticulate variety and the basal part of the incrusting variety are lacunose, in consequence of the great size of the exhalant canals in these parts of the sponge.

Chalinopsilla australis, var. **reticulata**, nov.

Irregular, decumbent, reticulate sponges. The branches are much and irregularly curved, knotty, and of varying thickness; their transverse section is more or less circular; they ramify and anastomose with each other very frequently. The termini of the branches are situated at one end of the elongate, horizontally expanded, sponge. The sponge attains a length of 100 millim. and more, and rises 20–30 millim. over the base of attachment; it is attached at numerous points throughout the length of the digitate branches, which are 8–15 millim. thick. The oscula are conspicuous and very numerous on the upper side of the branches, but rare or absent on the lower side; they are circular, slightly raised over the surrounding surface, 1.5–3 millim. wide and 3–6 millim. apart. The distribution of the oscula is somewhat irregular; they often congregate in small groups of 5–15, and are, within these groups, very close together. The surface is smooth. The sponge is,

when alive, of a light greyish-brown colour. The skeleton is light chestnut-brown. The sponge is very soft and can be compressed between the fingers to the thickness of paper with ease. It is not very elastic.

The skeleton is destitute of foreign bodies. The *surface-skeleton* consists of a superficially extending network of stout fibres, which are 0.07 millim. thick and which connect the distal ends of the main fibres of the supporting-skeleton in straight lines. As most of the adjacent main fibres are thus connected a network with pretty regular triangular meshes is produced, which are on an average 0.8 millim wide. They are occupied by a very fine net of secondary fibres, which are perpendicular to the primary fibres and ramify to a certain extent. These secondaries are 0.02 millim. thick, and the rather irregular meshes which they form 0.16 millim. wide. Usually four or five primary fibres radiate from the end of each main fibre; sometimes, however, there are as few as two; very rarely six are observed, never more.

The *supporting-skeleton* consists of longitudinal main fibres, which are on an average 0.5 millim. apart in the interior of the sponge, but become more distant towards the surface, which they reach in graceful curves and on which they abut perpendicularly. The main fibres are 0.17 millim. thick; they are connected by mostly simple perpendicular connecting-fibres, which are 0.05 millim. thick and about as far apart as the main fibres, so that the meshes formed by the network of the supporting-skeleton generally appear more or less quadratic. The connecting-fibres are joined to the main fibres by wide trumpet-shaped extensions of their bases, so that the surface of the main fibre appears drawn out to form the connecting-fibres, and is thus rendered very irregular and uneven.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Queensland (*Ramsay*). New Zealand: Port Chalmers (*Parker*).

Chalinopsilla gracilis, Vosmaer.

Velina gracilis, G. Vosmaer, "Studies on Sponges.—I. *Velina gracilis*," Mittheilungen der Zoologischen Station in Neapel, Band iv. Seite 437 (1883).

Long, cylindrical, straight tubes, widened towards the upper end, in small bunches of 2-10, attached by a narrow base. These tubes are erect and generally coalesce in their lower portions for some distance. Their proximal part often appears solid and only the distal portion tubular. Exceptionally they attain a height of 400 millim. and a width of 40 millim. Ordinary specimens are about half that size. The terminal vent—a *præosculum*—occupies the whole of the terminal face, leaving only a narrow and sharp margin round it. The outer surface is smooth; the oscula are confined to the inner side—the wall of the central cavity. Alive the sponge is greyish purple; the dry skeleton

is light greyish yellow, elastic, very soft, and compressible. The interior appears lacunose.

The *surface-skeleton* consists of stouter primaries and very slender secondary fibres. The latter are on an average only 0.02 millim. thick. The meshes are 0.15–0.2 millim. wide.

The *supporting-skeleton* consists of a very regular network of horny fibres, which are entirely free from foreign bodies. Main and connecting-fibres have the same thickness—on an average 0.07 millim. The meshes are from 0.5–0.9 millim. wide, quadratic or triangular, with rounded corners.

(This description is based on the Australian specimens examined by me, and somewhat differs from Vosmaer's description.)

GEOGRAPHICAL DISTRIBUTION.—Mediterranean (*Vosmaer*).

North coast of Australia: Torres Straits (*Lendenfeld*).

Chalinopsilla radix, n. sp.

Forming a dense and low bushy mass of straight, erect, cylindrical branches, which grow out from the upper extended end of a short peduncle. The sponge attains a height of 70 millim. and a breadth of 60 millim.; the branches are 5 millim. thick, and rounded at the ends; they are occasionally slightly ramified, but never coalesce with each other, so as to form massive fan-shaped or reticulated structures. The surface is smooth. The oscula are small, circular, 1 millim. wide, and scattered over the whole of the surface; generally they are arranged in longitudinal rows, which may contain one or more series of oscula. The colour of the living sponge is light grey, with an orange tint; this tint is not always observed, and may be due to the presence of embryos, which are reddish. The skeleton is hard and cannot be compressed between the fingers more than one fourth or one third. The living sponge is softer.

The *surface-skeleton* consists of a network of simple, unbranched fibres connecting the termini of the main fibres. There are no secondary fibres. The fibres are, on an average, 0.03 millim. thick and widened at the ends, where they join the ends of the main fibres. The meshes in the network of the surface-skeleton are mostly triangular and, on an average, 0.2 millim. wide.

The *supporting-skeleton* is free from foreign bodies. The main fibres are 0.06 millim. thick and on an average only 0.25 millim. apart. The connecting fibres are very short, simple, and very regularly situated, always perpendicular to the main fibres; they are 0.035 millim. thick and 0.5 millim. apart. The meshes of the network are rectangular, 0.5 millim. long and 0.25 millim. broad; their longest diameter is situated longitudinally, parallel to the main fibres.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Chalinopsilla imitans, Lendenfeld.

Chalinopsis imitans, R. v. Lendenfeld, "Studies on Sponges.—IV. On two cases of Mimicry in Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. pp. 569, 570 (1886).

This large and elegant species imitates *Dactylochalina cylindrica* very closely. The sponge consists of a number of very regular digitate branches, which grow out from a short and stout stem, expanded below and firmly attached to the sea-bottom. It is about as long as thick, and tapers towards the upper end, from which the branches grow out. There are two or three branches which deviate at an angle of about 45° from the perpendicular. From the upper side of these laterally extending branches a number of upright processes are given off, which are only very slightly ramified, and which stand erect and are parallel to each other. When these vertical processes appear branched, the main branch does not deviate from its direction, although it is not thicker than the other branch. The upright processes are digitate, regularly cylindrical, and have a smooth surface; they are slightly bent in an undulating fashion, and taper terminally to a narrow conic end. The sponge attains a height of 600 millim., and the branches are 8 millim. thick. The stem has a thickness of 15–20 millim. The oscula are small and scattered over the whole of the surface; they measure only 0.6 millim. in diameter, and easily escape observation. The dry skeleton is light grey. The sponge is very hard and uncompressible.

The *surface-skeleton* consists of a network of primary superficial fibres, which are, on an average, 0.16 millim. thick; between these a network of secondary fibres 0.06 millim. thick is spread out.

The *supporting-skeleton* consists of longitudinal main fibres, with an average thickness of 0.4 millim., and unbranched connecting-fibres 0.35 millim. thick, which are perpendicular to the main fibres. In the main fibres of the supporting-skeleton, and also in the primary fibres of the surface-skeleton, scattered small foreign bodies (sand-grains, with an average diameter of 0.04 millim.) are met with.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Chalinopsilla dichotoma, Lendenfeld.

Chalinopsis dichotoma, R. v. Lendenfeld, "Studies on Sponges.—IV. On two cases of Mimicry in Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. p. 570 (1886).

The sponge is erect and branched, with digitate, more or less upright, and

regularly dichotomously dividing processes. It attains a height of 400 millim. The branches are cylindrical, on an average 12 millim. thick, and taper to conic sharp-pointed ends. From a stout stem, which is attached by a trumpet-shaped, extended base, and has a thickness of about 20 millim. and a length of 40 millim., three or four branches grow out. All the branches originate from the upper end of the stem and extend upward and slightly outward. They are dichotomously branched, exceptionally one of the branches is thicker than the other; as a rule, however, this is not the case. At the branching points they are much widened and compressed, particularly near their distal, often nearly flabellar ends. The oscula are scattered and numerous, slightly prominent, 2 millim. wide and 5–7 millim. apart, often situated in longitudinal rows. The surface, apart from the prominent oscula, is smooth and slightly undulating. The dry skeleton is light greyish brown; spirit-specimens are darker. When dry, the sponge is hard and resisting; in spirit, however, soft, elastic, and easily compressible between the fingers.

The *surface-skeleton* consists of a simple network, without a distinction of primary and secondary fibres. The *supporting-skeleton* is composed of main and connecting-fibres. The former extend longitudinally in the axes of the digitate processes, where they form occasional and irregular anastomoses. From these axial supporting fibres branches are given off, which extend towards the surface in a plumose fashion and enclose an angle of about 15° with the longitudinal axial fibres. They are slightly branched, but do not seem to form anastomoses, except close to their base. They are 0.2 millim. thick and 0.5 millim. apart. Thinner ones, however, are by no means rare, and the thin main fibres appear more approximated to each other than the thicker ones. The numerous ramifications of these main fibres and their varying thickness renders the whole structure more irregular than the skeleton of most other species. The connecting-fibres are, for the most part, simple connections of adjacent main fibres perpendicular to the latter; occasionally, however, they appear slightly branched. They are, on an average, 0.06 millim. thick and 0.5 millim. apart, and joined to the main fibres by trumpet-shaped extensions of their bases; the meshes accordingly appear well rounded off. All the fibres are charged with foreign bodies—siliceous spicules, sand, &c.; these form an axial thread in the main fibres of the supporting-skeleton, which is about half as thick as the fibre, and surrounded by a clear layer of spongin. At the joining-points of the connecting-fibres these columns of foreign bodies are drawn out to form conic points, which extend some distance into the connecting-fibres. In the connecting-fibres themselves an often interrupted series of foreign bodies is observed, which lies axially, and appears as a continuation of the conic protuberances on the columns in the main fibres above

mentioned. The foreign spicule-fragments in these fibres are situated nearly longitudinally; at the joining-points, however, their position is very irregular. The fibres of the surface-skeleton contain similar foreign bodies.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Chalinopsilla elegans*, n. sp.**

The sponge is erect, much branched, and appears reticulate, in consequence of the frequent anastomoses of the branches. It attains a height of 300 millim. The branches, which rise from a small base or from the upper end of a very stout and short peduncle, are irregularly cylindrical. The surface is uneven, undulating; the oscula are scattered, rather scarce, prominent, circular, 2.5 millim. wide. The branches average 15 millim. in thickness; they are terminally rounded off and, although in their main course erect, much and irregularly bent.

The dry skeleton is chestnut-brown and pretty hard, compressible between the fingers to about half its thickness.

The *surface-skeleton* consists of a simple network, in which primary and connecting-fibres cannot be distinguished.

The *supporting-skeleton* is composed of smooth main fibres and thin unbranched connecting-fibres, which join adjacent main fibres, and are perpendicular to them. The main fibres have an average thickness of 0.22 millim. and are 0.55 millim. apart; the connecting-fibres are 0.07 millim. thick, and about as far apart as the main fibres, so that a network with quadratic meshes is produced. In all the fibres foreign bodies of small size are found; these form a dense axial column about two thirds as thick as the fibre in the centre. The superficial portion of the fibre is free from foreign bodies. The building-material used by this sponge consists of a variety of things, among which tetraxon foreign spicules and sand-grains predominate.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

***Chalinopsilla arborea*, n. sp.**

Very irregular dendritic sponges, with a more or less developed peduncle and irregular lobose and short ramifications or slender digitate knotty and irregular branches.

The surface is undulating, uneven, but smooth. The oscula are always scattered and prominent; their size, however, is subject to great variations.

The sponge is pretty hard, fairly compressible, and very inelastic. The colour is lighter or darker brown in the living state; dry skeletons of *C. a. micropora* are yellowish, of other varieties dirty brown.

The *surface-skeleton* consists of a network of threads composed of foreign bodies (sand-grains), which are held together by a very small and hardly perceptible quantity of spongin. The fibres are 0.1 millim. thick and the meshes 0.5 millim. wide.

The *supporting-skeleton* consists of stout and knotty main fibres, which are, on an average, 0.2–1.6 millim. thick and 0.9–1.4 millim. apart; they are parallel, and extend longitudinally in the axis and central portion of the sponge, curving gracefully in a plumose fashion towards the surface. The connecting-fibres are 0.08 millim. thick, and on an average 1 millim. apart; they are perpendicular to the main fibres and scarcely at all branched; generally, however, divided at their bases of attachment into two or three roots. The foreign bodies forming the surface-skeleton are small sand-grains, about 0.05 millim. in diameter; they are packed very closely. In the main fibres of the supporting-skeleton scattered and large sand-grains are met with, on an average 0.25 millim. thick and 0.3 millim. apart, always situated axially. In the connecting-fibres very small monaxonid siliceous spicules are sometimes observed; these form a single axial row. They are often fragmentary, but sometimes also intact. Often they make the impression of proper spicules: oxea, 0.07 millim. long and 0.006 millim. thick, rather abruptly and sharp pointed. As, however, these entire spicules always occur together with broken fragments, I am inclined to consider them as foreign.

Chalinopsilla arborea imitates various species of Chalininæ, and the specimens always grow in close proximity to the sponges imitated. The spicules found in the connecting-fibres of the *Chalinopsilla arborea* varieties are very similar to those of the imitated Chalininæ, and I believe they derive their spicules from decayed specimens of the species they imitate.

Chalinopsilla arborea, var. macropora, Duchassaing & Michelotti.

Callyspongia tenerrima, Duchassaing et Michelotti, "Les éponges de la mer Caraïbe," p. 57 (1864).

Dactylia chaliniformis, H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xv. p. 309 (1885).

Dactylia palmata, H. J. Carter, *l. c.* p. 310.

Dendritic sponges attached by a stout stem, which attains a length of 50 millim. in some specimens, but appears quite short and rudimentary in others. The stem is generally about 15 millim. thick. From its upper end

irregular branches are given off; these are always very thick, generally compressed, more or less lamellar, terminating with wide, rounded, lobose ends, or tapering to irregular slender points. The whole sponge attains a height of 280 millim.; the breadth of the branches varies from 10–30 millim., their thickness rarely exceeds 8 millim. and is generally 6 millim. The surface is smooth and undulating. The concavities sometimes appear as transverse incisions in the branches, particularly in the bushy forms, which generally have rather more cylindrical processes. In the flabelliform specimens these concavities are not so deep and not nearly so well defined.

The oscula are scattered irregularly over the surface of the stem and the branches; sometimes they are particularly numerous on the margin of compressed branches, arranged in longitudinal rows, but scattered oscula are never absent on the flat faces of these flabellar branches. The oscula are slightly prominent, circular, and 1.7–3 millim. wide, those of one and the same specimen are all fairly of the same size.

The sponge is pretty hard and inelastic; thick branches can, however, in consequence of their size, be compressed between the fingers to one third of their diameter. The colour of the living sponge is, according to Carter, "buff, dark brown, or reddish orange"; according to Duchassaing and Michelotti, "jaune un peu rosé."

The *surface-skeleton* consists of a simple network of strings of foreign bodies, 0.1 millim. thick, with irregular polygonal meshes 0.5 millim. wide. The foreign bodies are small sand-grains, with an average diameter of 0.035.

The *supporting-skeleton* consists of knotty parallel main fibres, 0.6 millim. thick and 1.4 millim. distant, which contain large (0.25 millim.) scattered sand-grains, which are on an average 0.13 millim. apart. The connecting-fibres usually have two roots, but otherwise they are hardly at all branched; they generally contain an axial series of siliceous spicules, and are 0.08 millim. thick and 1 millim. apart. The spicules are longitudinally situated oxea, 0.07 millim. long and 0.006 millim. thick, intact or more or less fragmentary.

GEOGRAPHICAL DISTRIBUTION.—Gulf of Mexico: St. Thomas, Viecques (*Duchassaing & Michelotti*).

South coast of Australia: Port Phillip Heads, V. (*Wilson*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

New Zealand: Port Chalmers (*Parker*).

***Chalinopsilla arborea*, var. *micropora*, Carter.**

Dactylia chaliniformis, H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 309 (1885).

The sponge appears as an irregular, partly repent and partly erect branching structure; the branches grow out from one point and ramify in an irregular manner; they are irregularly curved and not parallel to each other. The whole sponge attains a length of 250 millim., and the branches are, on an average, 8 millim. thick. The surface is very uneven, so that the branches attain a knotty appearance. The oscula are situated in regular longitudinal rows; they are circular and small, less than 1 millim. wide, and do not project over the surface. The sponge is very hard and incompressible. The colour of the living sponge is light yellow.

The *surface-skeleton* consists of a simple network of fibres, 0.1 millim. thick, which are entirely composed of foreign bodies; the meshes between them are, on an average, 1.5 millim. wide. The foreign bodies are small sand-grains, with an average diameter of 0.05 millim.

The *supporting-skeleton* consists of knotty parallel main fibres, 0.6 millim. thick and 1.4 millim. distant, which contain large scattered sand-grains, with an average diameter of 0.25 millim.; these are about 0.13 millim. apart. The connecting-fibres usually have two roots, but are otherwise hardly at all branched; they generally contain an axial series of siliceous spicules, which appear longitudinally situated; these spicules are oxea, 0.07 millim. long and 0.006 millim. thick, intact or more or less fragmentary.

GEOGRAPHICAL DISTRIBUTION.—Mauritius (*Canterbury Museum*).

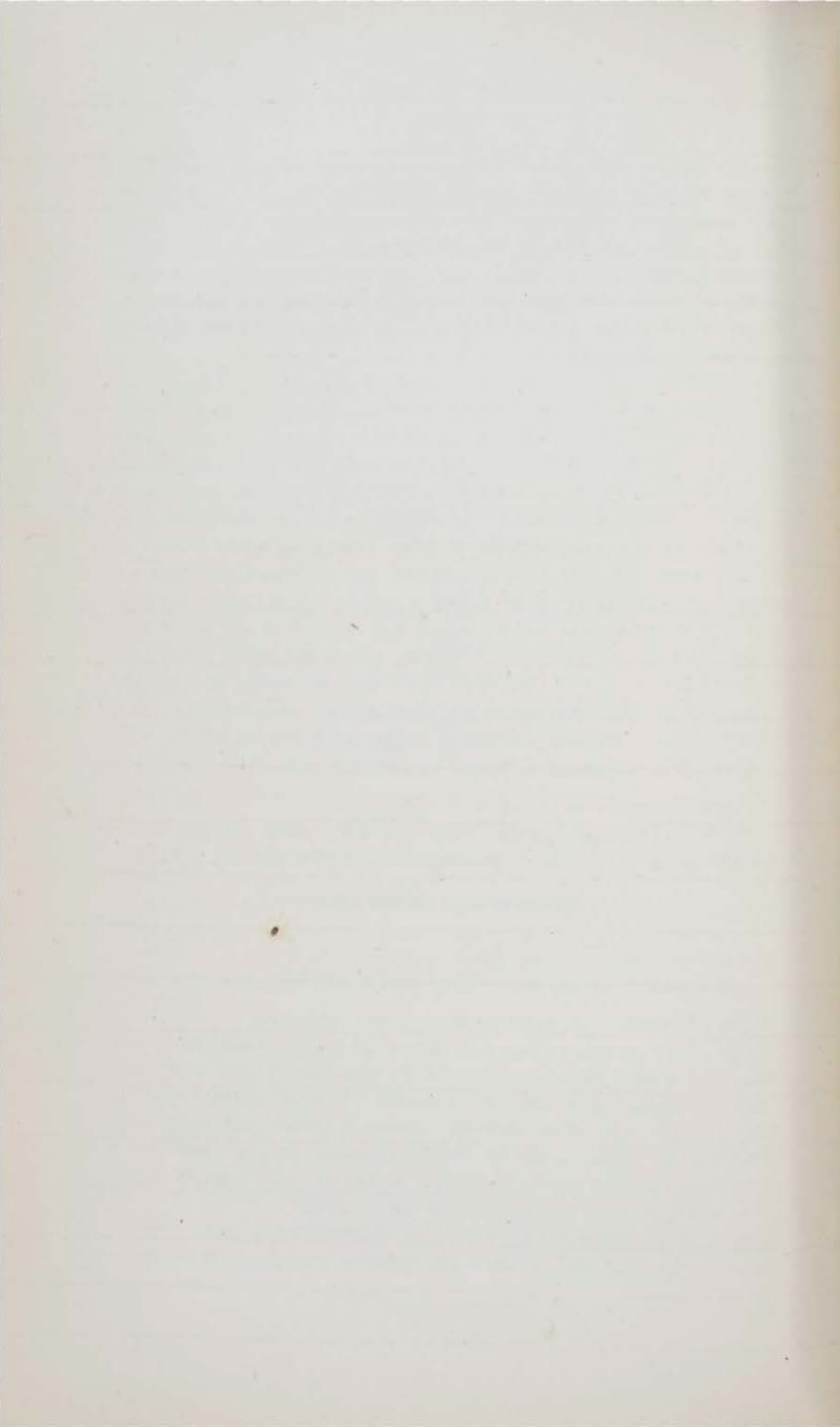
North coast of Australia: Torres Straits (*Macleay*). South coast of Australia: Port Phillip Heads, V. (*Wilson*). East coast of Australia: Queensland (*Ramsay*).

***Chalinopsis arborea*, var. *ramosa*, Marshall.**

Psammoclema ramosum, W. Marshall, "Untersuchungen über Dysideiden und Phoriospongien," Zeitschrift für wissenschaftliche Zoologie, Band xxxv. Seite 190 (1880).

Psammoclema ramosum, N. de Poléjaeff, "Report on the Keratosa," Reports on the Scientific Results of the Voyage of H.M.S. 'Challenger,' part xxxi. p. 43 (1884).

Irregularly branched cylindrical sponges, apparently more or less repent, and attached at several points along the side. The digitate branches are rounded at the ends; they do not form anastomoses; the central one is generally thicker, and appears as a stem. The sponge attains a length of 200 millim.; the branches are, on an average, 8 millim. thick, whilst the stem, the surface of which is not nearly so even as that of the branches, attains a thickness at some places of 20 millim. and more. The surface is quite smooth; the oscula are about 2.5 millim. wide and



uniformly scattered over it; where the surface is undulating the oscula are situated on the prominent parts of it. The sponge is greyish brown in spirit; in the dry state pretty soft, compressible, but not elastic.

The *surface-skeleton* consists of a regular network of bands of foreign bodies, which are 0.3 millim. broad; the polygonal meshes between them have a similar width. The *supporting-skeleton* consists of knotty longitudinal main fibres 0.5 millim. thick, and, on an average, 1.5 millim. distant; these are filled with foreign bodies, the clear spongin layer around them is only 0.05 millim. thick. No spicules have been observed in the connecting-fibres, which are, on an average, 0.05 millim. thick, and mostly unbranched.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Bass Straits; off East Monceour Island ('*Challenger*').

***Chalinopsilla impar*, Carter.**

Dactylia impar, H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 309 (1885).

The sponge consists of a number of branches, which grow up from a common centre. All these branches lie in one plane, and are laterally compressed in the same direction as the whole sponge; they coalesce in their proximal half to form a continuous plate, from the margin of which the distal, free portions of the branches project. The central lamella is irregular; the ends of the branches are all parallel and upright, and rounded at their distal ends. The whole sponge attains a breadth of 130 millim., a height of 120 millim., and a thickness of 6 millim. The free distal portions of the branches are somewhat irregular in shape, from 5–12 millim. broad, but never more than 6 millim. thick. The surface is uneven, undulating. The highly prominent oscula are arranged in longitudinal rows, which extend along the narrow margin of the branches, and centripetally from these in radial rows over the central lamellar part of the sponge; they are, on an average, 1.5 millim. wide, and project sometimes as much as 4 millim. over the surface. The sponge is very hard and scarcely compressible. The colour of the dry skeleton is orange-yellow.

The *surface-skeleton* consists of a network of fibres, composed of sand-grains of various size. The fibres are 0.2 millim. thick, and the irregular meshes between them 0.4 millim. wide. The sand-grains vary in size from 0.1–0.2 millim. The inhalant pores are situated in the membranes, which are expanded in the meshes; between them abundant scattered sand-grains, similar to those constituting the fibres of the surface-skeleton, are found. The *supporting-skeleton* consists of slightly uneven main fibres, which

are more branched than in most other species, 0·3 millim. thick, and 1–1·5 millim. apart; these fibres contain numerous scattered axially-situated sand-grains, which average 0·4 millim. in size. The connecting-fibres are unbranched and very scarce; they measure 0·1 millim. in thickness and are 1–2 millim. apart. There are no foreign bodies in the connecting-fibres.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip Heads, V. (*B. Wilson*).

Chalinopsilla repens, Selenka.

Ditela repens, E. Selenka, "Ueber einige neue Schwämme aus der Südsee," Zeitschrift für wissenschaftliche Zoologie, Band xvii. Heft 4 (1867), Seite 567.

Euspongia repens, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. part 3, p. 524 (1885).

Digitate, repent, and irregular incrusting sponges. The digitate parts occasionally coalesce to form lamellose extensions; usually, however, they remain isolated. They attain a length of 100 millim., are cylindrical, terminally rounded, and 12–20 millim. thick. The surface is slightly roughened by indications of conuli. No sand is found in the skin, which is protected by a dense tangential network of fibres. The oscula measure from 2 to 4 millim. in width, are circular, and occasionally slightly raised over the surface; they are situated terminally, but also occur on the sides, particularly of large and irregular digitate portions.

The skeleton is very tender and soft, and can be pressed between the leaves of a book like a flower. The colour of the sponge in spirit is yellow; the skeleton is grey, with a brownish hue.

The *surface-skeleton* is composed of a dense and uniform network, the fibres of which have an average thickness of 0·017 millim.; the meshes are 0·05 millim. wide and rather irregular. The main fibres of the *supporting-skeleton* extend in a longitudinal direction along the oscular tube, which occupies the central part of the hollow digitate processes. These fibres emit branches, which curve gracefully towards the surface and terminate in the superficial skeleton; they are on an average 1 millim. apart, measure 0·08 millim. in thickness, and are filled with sand-grains, which cause the surface of the fibre to become very knotty. In the interior of the sponge a very regular network of connecting-fibres is met with. These are differentiated into primaries and secondaries: the former are simple, straight or slightly curved,

very rarely branched, never bent at their joining-points with the secondaries, perpendicular to the main fibres, which they connect, and 0·015 millim. thick. The thickness of the secondaries varies from 0·0033–0·01 millim. The meshes of the network are irregularly rectangular, 0·27 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*F. Müller, Lendenfeld*).

Genus PHYLLOSPONGIA.

Frondose, caliculate, or branched, never massive, lamellar Spongiidæ; with smooth, granular, or grooved surface and numerous oscula. Ciliated chambers spherical, 0·02–0·04 millim. wide, with special efferent canals. Fibres of the supporting-skeleton slender.

Phyllospongia velum, n. sp.

The sponge has the shape of a curved lamella attached by a narrow base. From the base, and also from the concave side of the lamella, small, lobose or band-shaped fronds grow out. There are often anastomosing ridges on the concave face. The sponge attains a height of 200 and a breadth of 160 millim.; the average thickness is 3·5 millim. The main lamella together with the small fronds form an irregular cup more or less open on one side. The surface is smooth and slightly undulating. Oscula are scattered over the greater part of the inner side of the cup. On the outer surface oscula are also present, but not near so numerous, and always clustered in such places opposite which there are no oscula on the inner surface. It is therefore quite correct to say that the vents are distributed in a one-sided manner. The oscula are 1 millim. wide and 6 millim. apart. Spirit-specimens are soft, flexible, and elastic. Dry specimens which have not been washed out are pretty hard; the colour of dry specimens is whitish or light brown.

The *surface-skeleton* consists of a network of horny fibres, without foreign bodies. The termini of the main fibres of the supporting-skeleton, which abut on the surface, are connected by straight, stout, primary tangential fibres 0·06 millim. thick. Three to five, generally four, such primary fibres radiate from each main-fibre terminus. The wide interstices between these fibres are occupied by a fine network of secondary tangential fibres, which are much branched and continually anastomose; these are 0·03 millim. thick, and the meshes between them 0·15 millim. wide. In the dermal membrane abundant sand-grains and other foreign bodies are found between the fibres

of this tangential network; thus a thin but very tough cortex is formed. The main characters of the supporting-skeleton are the uniformity in thickness of main and connecting-fibres and the absence of foreign bodies in the fibres. All the fibres are about 0.04 millim. thick. The meshes of the supporting-skeleton are about 0.15 millim. wide. *Phyllospongia velum* imitates certain forms of *Placochalina*.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

***Phyllospongia elegans*, n. sp.**

This sponge has the shape of a large, horizontally expanded lamella, supported by a comparatively long and slender peduncle 30 millim. high, cylindrical, 12 millim. thick, and attached to the centre of the circular sponge. The margins of the lamella are much folded, curved upward, and drawn out, to form rounded upturned lobes. The sponge attains a diameter of 200 millim. From the upper surface a great number of lobes grow out, which cover the whole of it. These lobes are folded longitudinally, and on an average 25 millim. high; they coalesce here and there, and so an exquisitely flower-shaped structure is produced. The outer surfaces of the 1.8 millim. thick lamellæ are slightly roughened by the projection of the distal ends of the main fibres. The inner surfaces are deeply grooved (in the skeleton); these grooves ramify, and the numerous branch grooves radiate towards the margin. The basal portions of the main central grooves are about 2 millim. wide. The branches decrease rapidly in width as they approach the margin. These grooves appear, as described, in the skeleton only; in the living sponge they are occupied by lacunose tissue and covered with fine membranes, in which numerous oscula 0.8 millim. wide are situated. The mouths of the exhalant canals appear as conspicuous holes in the floor of the grooves. The sponge is hard, elastic, and not compressible; the colour is pinkish in the fresh state; the dry skeleton is light brown.

The *surface-skeleton* consists of a thin sand-cortex, which is supported by a network of fibres 0.02 millim. thick, with meshes 0.2 millim. wide. Primary and secondary connecting-fibres cannot be distinguished in the surface-net. The main fibres of the *supporting-skeleton* are only 0.05 millim. thick, and contain small, axially situated, scattered sand-grains; they are, on an average, 0.3 millim. apart: the connecting-fibres are slightly branched, free from foreign bodies, and 0.016 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*). East coast of Australia (*Ramsay*).

Phyllospongia foliascens, auct.

Carteriospongia radiata, N. de Poléjaeff, "Report on the Keratosa," Report on the Scientific Results of the Voyage of H.M.S. 'Challenger,' vol. xi. part xxxi. pp. 67, 68 (1884).

Carteriospongia otahitica, A. Hyatt, "Revision of the North-American Porifera: Part II.," Memoirs of the Boston Society of Natural History, vol. ii. p. 541 (1877).

Carteriospongia otahitica, N. de Poléjaeff, *l. c.* p. 69.

Carteriospongia vermifera, A. Hyatt, *l. c.* pp. 542, 543.

Carterispongia fissurata, S. O. Ridley, "Spongiida": Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' p. 386 (1884).

Cartérispongia lamellosa, S. O. Ridley, *l. c.* p. 386.

Carterispongia otahitica, S. O. Ridley, *l. c.* pp. 385, 595.

Halispongia stellifera, J. S. Bowerbank, "Contribution to a General History of the Spongiadae.—Part IV.," Proceedings of the Zoological Society of London, p. 298 (1874).

Halispongia ventriculoides, J. S. Bowerbank, *l. c.* p. 301.

Spongia elegans &c., Carolus Clusius, Exoticorum libri decem, lib. vi. cap. 11, p. 123, Antverpiæ (1605).

Spongia fissurata, J. de Lamarck, "Sur les Polypiers empâtés," Annales du Muséum d'histoire naturelle, tom. xx. p. 382 (1813).

Spongia foliascens, P. S. Pallas, Elenchus Zoophytorum, Hagæ, p. 395 (1766).

Spongia foliata aspera &c., J. Petiver, Petrigraphia Americana (1712).

Spongia infundibuliformis, J. Petiver, *l. c.*

Spongia infundibuliformis &c., J. Everard Rumphius, Amboynsche Rariteyt-kamer, Amsterdam, vi. p. 254 (1741).

Spongia lamellosa, E. Ehlers, Die Esper'schen Spongien in der zoologischen Sammlung der k. Universität Erlangen, p. 15 (1870).

Spongia lamellosa, E. J. Esper, Die Pflanzenthier, Theil ii. p. 270 (1794).

Spongia otahitica, J. S. Bowerbank, *l. c.* p. 303.

Spongia otahitica, E. J. Esper, *l. c.* Theil I., p. 209.

Spongia otahitica, J. de Lamarck, *l. c.* p. 382.

Cup-shaped or flabelliform, erect sponges, attached by a short and slender peduncle, which is generally simple, constricted near the centre, and expanded below to form a disk, by means of which it is attached. Sometimes the peduncle is divided below into three or four root-like parts. The lamellar upper part varies very much in shape: the simplest form is an irregularly fan-shaped circular lamella, which extends in one plane: the upper margin is generally irregular, often drawn out to form lobes of varying shape. Such

specimens grow to a height of 280 millim. and a breadth of 320 millim., and are 4-6 millim. thick.

A more complicated form is that of a pedunculate fan-shaped lamella, which is folded radially; the folds are irregular and not very deep. These specimens are much smaller, possibly young stages of the foregoing. In others the lamella is curved like a watch-glass, and from its concave side secondary lamellæ or ridges grow out, which for the most part extend radially. Forms of this kind lead to the more regularly calyciform specimens, which are much more frequent. The usual form is that of a slender, conical cup, slightly inflated at its lower end. These cups attain a height of 200 millim. and more. Most of the specimens, however, do not exceed 150 millim. in height. The margin of the cup is generally a very regular circle, which lies in a horizontal plane; its diameter is slightly smaller than the height of the sponge. The margin is very thin and sharp. Just below it the wall of the cup does not exceed 2.5 millim. in thickness; further down it becomes stouter, and near the peduncle attains a thickness of 4 millim. Longitudinal ridges, in some specimens, project from the outer surface of the cup.

However much the shape of the sponge may vary, the surface always possesses the same character. In dry specimens it is cut up by deep furrows into small square fields, and shows in the fresh state and in spirit-specimens irregular groups of very blunt, slightly projecting conuli, divided from each other by concave, perfectly smooth membranes, which correspond to the grooves of dry specimens. The groups of conuli are, on an average, 2 millim. broad and 3 millim. long, whilst the depressed membranes between them have a width of 1.5 millim. or less. There is no difference in the structure of the two sides of the lamella or cup-wall in this respect. The oscula are small: on an average, in the living sponge, 0.5 millim. wide, and always situated in the membranes which cover the grooves: they are confined to one side of the lamella; in the case of the caliculate forms they are always found on the inner surface.

The colour of the living sponge is bright red or flesh-colour; in spirit the colour darkens. Dry specimens are brilliantly white, in consequence of the sand-cortex forming a white skin over the sponge. Dry washed-out skeletons are of a dull light-brown colour. The sponge is soft and flexible in spirit and also when dry; washed-out specimens can be compressed between the fingers to two thirds.

From the inhalant pores, which are situated in small groups on the projecting conulous portions of the surface, the water passes into the narrow inhalant canals. The ciliated chambers are spherical, and measure 0.033 millim. in diameter. From each chamber a canal 0.014 millim. wide and 0.01-0.07 millim. long, arises, which opens into one of the wide and irregular

exhalant canals. The latter lead into the loose and lacunose tissue which occupies the grooves below the aconulous membranes. There are constrictions at the openings of the exhalant canals into these lacunæ. Apparently sphincters are situated here, which regulate the water-current. The grooves are traversed by fine membranes, perforated by large holes connecting the different cavities. All the lacunæ in the different parts of the sponge communicate with each other; and in particular it is important to note that the lacunæ in the grooves on both sides of the lamellar sponge are in communication, by means of large oblique canals perforating the sponge and leading from the grooves of the outer surface to those of the inner. These lacunæ finally open out into the oscula. There is no difference in the structure of the lacunæ in the grooves of the two sides.

The *skeleton* consists of a network of fibres in the interior and a dense sand-cortex on the surface. The former—the *supporting-skeleton*—is composed of main fibres 0·18 millim. thick, which radiate from the peduncle and extend to the margin of the lamella or cup. There is only a single layer of these fibres in the sponge, which occupies the centre of the lamella. The main fibres are continuously branched, the branches extend radially like the stems; they have an uneven surface, and are charged with large axially situated sand-grains, which lie so close together that they form a continuous column. Although these primary main fibres bend irregularly, they always extend, on the whole, radially. From these fibres, which constitute the main support of the sponge, branches are given off which curve towards the surfaces of the lamellæ and ramify in a penicillate manner. All the branches are curved so as to abut perpendicularly on the surface. They are, on an average, 0·12 millim. thick; stand pretty close together in the projecting conulous portions of the sponge, but are absent in the lacunose tissue of the grooves; they are similar to the central fibres above described, and like them contain an axially situated column of foreign bodies. Between these main fibres a network of connecting-fibres, 0·025–0·06 millim. thick, extends. These are entirely free from foreign bodies of any kind. They are branched and form a true network, the meshes of which are, on an average, 0·2 millim. wide and of varying shape. Also these connecting-fibres are principally found in the more solid conuliferous portion of the sponge and in the centre. Exceptionally, however, they extend also for some distance into the fine membranes, which are expanded in the lacunose tissue of the grooves. Such fibres are, however, very much thinner than the ordinary connecting-fibres, measuring only 0·01 millim. in thickness.

GEOGRAPHICAL DISTRIBUTION.—Otaheite (*Ellis*); Zanzibar (*Hyatt*); Glorioso Islands ('*Alert*'); Seychelle Islands ('*Alert*'); Amirante Islands ('*Alert*'); Admiralty Islands; off Wild Island ('*Challenger*'); Philippines (*British Museum*); Moluccas (*Wallace*).

North coast of Australia: Bird Island ('Alert'), Thursday Island ('Alert'), Torres Straits ('Alert'), Channel Rocks ('Alert'), off Wednesday Island, Cape York ('Challenger'), South coast of New Guinea (*A. B. Meyer*). West coast of Australia: Western Australia (*Baily*). South coast of Australia: Phillip's Island, Port Phillip, V. (*Hyatt*). East coast of Australia: Port Molle, Q. ('Alert'); Port Jackson, N. S. W. (*Lendenfeld*).
New Zealand: Port Chalmers (*Parker*).

Genus **LEIOSELLA**.

Compressed, cup-shaped, branched, or flabellar Spongidaë, with smooth surface, a very fine skeleton-net, and foreign spicule-fragments in the fibres. Without a continuous cortical sand-armour.

Leiosella compacta, Carter.

Euspongia compacta, H. J. Carter, "New Sponges: observations on old ones, and a proposed new Group," *Annals and Magazine of Natural History*, ser. 5, vol. x. p. 106 (1882).

Euspongia compacta, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," *Proceedings of the Linnean Society of New South Wales*, vol. x. p. 527 (1885).

Irregularly vase-shaped or thick frondose sponges, which attain a height of 100 millim. and a breadth of 110 millim. The free margins are rounded off, and the lamella has a very uniform thickness of 2 millim. The vase-shaped specimens are conic, with a slightly everted margin, and attached by a comparatively broad base, not pedunculate. The more irregular frondose or lobose specimens consist of a small basal mass, from which one or a few curved or slightly folded fronds arise. The oscula are small, measuring 0.5–1 millim. in width, and scattered over one face of the fronds; in the cup-shaped specimens they are found on the inner side. In dry skeletons very minute grooves are sometimes observed radiating from the oscula so as to render their appearance somewhat stellate; otherwise the surface is perfectly smooth. There is no shagreen-like structure in it, nor are there any conuli.

The living sponge is black. Dry skeletons are dark brown, stiff, but easily compressible, and not very elastic.

The *surface-skeleton* consists of fibres 0.007–0.012 millim. thick, which are free from foreign bodies, and form a network with irregular meshes 0.1 millim. wide. A few scattered sand-grains are also found in the skin. The main

fibres of the *supporting-skeleton* are 0·04 millim. thick and slightly knotty, cored with large, irregular, longitudinally disposed spicule-fragments. The connecting-fibres measure 0·01–0·02 millim. in thickness, are free from foreign bodies, and form an irregular network with irregularly polygonal, angular meshes, 0·03–0·1 millim. wide. There are also foreign spicule-fragments scattered in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.— West coast of Australia : Freemantle, W. A. (*Bowerbank*). East coast of Australia (*Jukes, Lendenfeld*).

.. **Leiosella levis**, Lendenfeld.

Euspongia levis, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 536 (1885).

Very irregular, ramified, horizontally extending sponges, which are composed of numerous compressed, irregularly curved fronds, the free margins of which are rounded and divided by broad incisions into lobose or digitate parts. These fronds grow out from an extended base attached at several points. The sponge attains a length of 200 millim., a breadth of 120 millim., and a height of 70 millim. The fronds are uniformly 8–10 millim. thick.

The surface is smooth. With a magnifying-glass a regular network of arenaceous ridges can be discerned in it. The oscula are chiefly situated on the free margins of the fronds, where they form an irregular row; a few are also found on the faces of the fronds. They are slightly elevated, and measure 1 millim. in width.

The living sponge is dirty greyish brown. Dry skeletons have a similar colour, but are of a lighter hue. The dry skeleton is hard, only slightly compressible, and elastic.

The shagreen-like surface consists, as mentioned above, of a network of ridges, chiefly composed of sand-grains and foreign spicule-fragments. These ridges are about 0·07 millim. broad and not very prominent. The rounded meshes are occupied by fine perforated membranes, which contain no foreign bodies, and in each of which one, two, or three oval inhalant pores, when dilated 0·02–0·03 millim. wide, are situated. Narrow canals 0·03 millim. wide lead, pervading the on an average 0·2 millim. thick skin, down from these into extensive subdermal cavities, which consist of a network of anastomosing tangential canals. The inhalants which arise from the floor of the subdermal cavities are perpendicular to the surface; their final ramifications measure 0·03–0·06 millim. in width, and extend for the most part longitudinally. The ciliated chambers measure 0·037 millim. in diameter, are spherical or pear-shaped, with a mouth 0·02 millim. wide, which leads into a

short, special, efferent canal. The exhalants join to form lacunose canals in the interior, which are pervaded by fine membranes, and which open into the irregularly radially disposed oscular tubes.

The *surface-skeleton* consists of a network of stout ridges composed of large sand-grains and spicule-fragments, which are held together by a small quantity of spongin cement. The spongin is here and there drawn out to form short and slender fibres connecting more distant sand-grains with each other.

The main fibres of the *supporting-skeleton* are joined to the surface-net by trumpet-shaped extensions at their distal ends. They are 0.07 millim. thick, knotty, or even spiny, and filled with very irregularly disposed abundant spicule-fragments and sand-grains. The connecting-fibres measure 0.018–0.027 millim. in thickness, are slightly curved, and free from foreign bodies; they form a very irregular network, with polygonal meshes 0.12–0.24 millim. wide. The variability of the thickness of the connecting-fibres is in co-relation with the variability in the size of the meshes.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Swan River, W. A. (*British Museum*). South coast of Australia: Tasmania (*British Museum*). East coast of Australia: Broughton Island (*Ramsay*); Port Jackson, N. S. W. (*Lendenfeld, Ramsay*).

Leiosella silicata, Lendenfeld.

Euspongia silicata, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 545 (1885).

Small, horizontally extended, lobose, and vertically compressed sponges. The largest specimens attain a length of 70 millim., a breadth of 40 millim., and a height of 20 millim. The lamellæ are on an average 14 millim. thick. The surface is perfectly smooth in the living sponge. There are, however, in hardened specimens, which are always slightly contracted, depressions between the termini of the main fibres in the skin; the latter then appear as conuli. The oscula are small and numerous, scattered irregularly over the surface, or arranged in rows; they are circular, measure 1 millim. in diameter, and slightly raised over the surface. The sponge is hard and elastic.

In the living state this species is of a greyish rose-colour; in spirit it becomes darker grey on the surface and lighter grey in the interior. The dry skeleton is light brown.

The inhalant pores measure, when dilated, 0.01 millim. in diameter, and are circular. There are always a great number of pores, often as many as 30 in one pore-sieve. The canals which lead down from the pores are oblique, and join to form larger tubes, which extend tangentially and open into the

subdermal cavity, composed of reticulating, irregular, tangential canals. These subdermal cavities measure on an average 0.14 millim. in width; some of them attain a diameter of 0.6 millim. The inhalants proper, which arise from the floor of the subdermal cavity, rarely exceed 0.2 millim. in width. The ciliated chambers are attached to the final ramifications of these canals; there are no special efferent canals. The small exhalants join to form large canals, which are irregular, sometimes attain a width of 0.7-0.9 millim., and open into the oscular tubes; the latter are perpendicular to the surface, about 1.2 millim. wide, straight, and circular in transverse section. As already mentioned, the oscula are about 1 millim. wide, so that the tubes appear contracted distally.

The histological structure of this species presents some very striking peculiarities. I cannot say to what extent these are due to the excellence of the material of this species at my disposal, and to what extent to specific peculiarities.

Granular amœboid wandering cells were observed in great abundance in the skin; these lie under the external epithelium, and also occur in the walls of the canals leading down into the subdermal cavities. Glandular elements are likewise very abundant in the skin; these are pyriform and filled with large, conspicuous, and highly light-refracting granules. Numerous transition forms between these amœboid and gland-cells are observed. In some of the glandular cells, particularly in those which possess very abundant and large granules, no nucleus is seen. It appears that the glandular cells are entirely converted into the secretion. My sections show that the ripe gland-cells, without nucleus, are expelled *in toto* from the sponge; they are often observed passing through the ectodermal epithelium or lying on its outer surface. The cells which are in this way expelled are replaced by amœboid wandering cells, and so it appears probable that gland-cells may be formed when an emergency occurs, and that they need not necessarily always be present. This may account for the fact that F. E. Schulze and others have failed to observe them.

The most interesting structures, however, are the highly developed sense-organs, the synocils. In my original description I stated (*loc. cit.*) that sensitive spindle-shaped cells had been seen by me. I failed, however, at that time to interpret correctly what I saw. In specimens hardened with osmic acid and stained with picrocarmin, irregular conic truncate protuberances are observed on the outer surface. These protuberances are broader than high. Below them highly colourable spindle-shaped cells are found in groups of four to eight, disposed in such a manner as to converge towards the low conical process in which they terminate. I do not doubt that this structure is similar to that observed in Calcareous sponges and described by me as a synocil. We find, namely, in hardened specimens of Calcareous sponges very often

similar low cones on the surface, with converging sense-cells. Professor Stewart's beautiful sections show that very long, high, conic, pointed protuberances are present on the surface of the living sponge, and there can be no doubt that the low cones are simply protuberances of this kind shrunk through the influence of the hardening reagents employed in preparing the sections. I consider myself justified, therefore, in assuming that also in *Leiosella silicata* the low cones are retracted synocils, entirely similar to those of Calcareous sponges. The synocils are in the living sponge probably 0.08 millim. long, and at the base 0.017 millim. thick; they are covered with very thin ectodermal pavement-cells, which appear drawn out to form curved plates. Nuclei can be discerned in these cells. In the synocil slender spindle-shaped sense-cells are found, which diverge below. The distal ends of these extend up into the summit of the synocil. Some of these cells are higher up in the synocil than others, so that their thickened centres, in which the very elongate oval nuclei are situated, do not lie at the same level. The proximal ends of these cells are probably in connection with ganglion-cells below. I have, however, failed to observe the latter. The sense-cells themselves differ from those found in the synocils of Calcareous sponges, inasmuch as they are slender and regularly spindle-shaped, and their two ends are similar. In the synocils of Calcareous sponges these cells are rather different, and often appear multipolar, somewhat pear-shaped, with one very long centrifugal process. I cannot say whether synocils are more widely distributed in this genus. I have not observed them in any other species.

The *skeleton of the surface* consists of scattered spicule-fragments and sand-grains, and a network of fibres 0.01 millim. thick, with polygonal, angular meshes, 0.15 millim. wide.

The main fibres of the *supporting-skeleton* are irregularly curved and often abruptly bent at the joining points of the connecting-fibres, so as to form a zigzag line; they are 0.04–0.066 millim. thick, knotty, and cored with irregularly disposed spicule-fragments and a few sand-grains. The connecting-fibres are 0.016–0.025 millim. thick, and contain comparatively abundant spicule-fragments in their axis. These are always disposed regularly longitudinally, and never render the surface of the fibres uneven, as they do in the main fibres. The meshes of the network formed by the connecting-fibres are irregularly polygonal, somewhat rounded, and on an average 0.09–0.18 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Northern Territory, S. A. (*Haacke*); Torres Straits (*Macleay*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld, Ramsay*).

Genus **EUSPONGIA.**

Massive Spongidae with distinct main and branched, continually anastomosing connecting-fibres. The meshes of the connecting-fibre-net are mostly under 0.04 millim. wide. The surface is conulated and destitute of a dense cortex. Vestibular spaces absent or small.

Euspongia officinalis, auct.

Euspongia officinalis, E. Graeffe, "Uebersicht der Seethierfauna des Golfes von Triest, nebst Notizen über Vorkommen, Lebensweise, Erscheinungs- und Fortpflanzungszeit der einzelnen Arten," Arbeiten aus dem zoologischen Institute der Universität Wien und der zoologischen Station in Triest, Band iv. Heft 2, Seite 3 (1882).

Euspongia officinalis, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 528 (1885).

Euspongia officinalis, N. de Poléjaeff, "Report on the Keratosa," Report on the Scientific Results of the Voyage of H.M.S. 'Challenger' during the years 1873-76: Zoology, vol. xi. part xxxi. p. 53 (1885).

Euspongia officinalis, S. O. Ridley, "Spongiida": Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' 1881-82, p. 379 (1884).

Euspongia officinalis, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien. VII. Mittheilung: Die Familie der Spongidae," Zeitschrift für wissenschaftliche Zoologie, Band xxxii. Heft 4, Seite 616 (1879).

Spongia officinalis, J. S. Bowerbank, A Monograph of the British Spongiadae, vol. i. p. 205, Ray Society (1864).

Spongia officinalis, H. J. Carter, "Some Sponges from the West Indies and Acapulco in the Liverpool Free Museum, described with general and classificatory remarks," Annals and Magazine of Natural History, ser. 5, vol. ix. no. 52, p. 270 (1882).

Spongia officinalis, E. Ehlers, Die Esper'schen Spongien in der zoologischen Sammlung der k. Universität Erlangen, p. 12 (1870).

Spongia officinalis, E. J. C. Esper, Die Pflanzenthier, Theil ii. p. 218 (1794).

Spongia officinalis, A. Hyatt, "Revision of the North-American Poriferae, with remarks upon foreign species.—Part II.," Memoirs of the Boston Society of Natural History, vol. ii. p. 511 (1877).

Spongia officinalis, C. v. Linné, Systema Naturæ (1758).

Spongia officinalis, P. S. Pallas, Elenchus Zoophytorum, p. 87 (1768).

(Other synonyms will be found in the descriptions of the varieties.)

In shape and size this species (the common bath-sponge) varies pretty much, but it is, as a rule, not difficult to assign any given specimen to it if it is a true *E. officinalis*. A glance at the figures given by F. E. Schulze (*loc. cit.*) will give an adequate idea of the range of form within this species.

The varieties *E. o. adriatica*, *E. o. mollissima*, *E. o. rotunda*, *E. o. lobosa*, and *E. o. dura* are massive, attached by a broad base, or pedunculate, erect, club- or cup-shaped. Cup-shaped forms are particularly frequent in the variety *E. o. mollissima*. *E. o. nitens* and *E. o. spinosa* are low incrusting forms. *E. o. irregularis* and *E. o. exigua* are irregularly lobose and branched; and *E. o. lamella* and *E. o. perforata* appear lamellar, frondose. The true bath-sponge does not grow to a very large size. The ordinary specimens measure 100–250 millim. in their largest diameter; the largest specimens I have seen are only 300 millim. broad. We never observe such gigantic specimens as in the various species of *Hippospongia*, which are also used for bathing-purposes.

The surface of the living sponge is covered with abundant small conuli, which are in most of the varieties on an average 1 millim. high and 3 millim. apart. They are generally broad, rounded, and blunt—often so much so that they appear as more or less semi-spherical protuberances; they never seem to be high and slender. The conuli are particularly small in *E. o. spinosa*. Although foreign bodies are generally pretty abundant in the skin, no special cortex is produced. In *E. o. spinosa* a superficial reticulation of arenaceous threads is observed. The appearance of the surface of dry skeletons is more varied. We generally observe the whole of it covered very uniformly with small conic, denticulate, villi-like processes, which are of uniform height and which terminate in a continuous surface. *E. o. rotunda*, *E. o. lobosa*, and *E. o. dura* are more smooth than the other varieties. Here the superficial villi are particularly low, in *E. o. lobosa* only 0.3 millim. high, and sometimes altogether absent in portions of the surface. The surface of *E. o. irregularis* appears knotty, uneven, and much more irregular; whilst that of *E. o. lamella* is rather irregular in consequence of the presence of concavities, about 5 millim. wide, into which the oscular tubes open. Grooves are sometimes observed on the surface of the skeleton, which, according to F. E. Schulze, correspond to large tangential canals belonging to the system of subdermal cavities; these are situated radially, and particularly well developed on the margin of the cup-shaped forms of *E. o. mollissima*.

The oscula are large and conspicuous in most specimens of the varieties *E. o. adriatica*, *mollissima*, and *rotunda*, in which they often attain (in skele-

tons) a diameter of 10 millim. In the other varieties the oscula rarely exceed 2 millim. in diameter. The oscula are confined to the upper surface or the inner side of cup-shaped forms in the three varieties above mentioned, in which the vents are large and conspicuous. In the other forms, *E. o. nitens*, &c., they are scattered more or less irregularly over the whole of the surface. In *E. o. lamella* concavities 4–6 millim. wide, into which oscular tubes of small size open, are met with on the surface. These depressions, which are surrounded by frills, are apparently homologous to the large oscular tubes of the first three varieties. Lipostomous forms without apparent oscula are rare: I have observed a few such in the variety *E. o. rotunda*. The number and distribution of the large oscula in *E. o. adriatica*, *E. o. mollissima*, and *E. o. rotunda* is subject to great variations. Sometimes a single large osculum, the oscular tube leading up to which is divided by septa, is observed in the centre of the upper surface. Often a few large and irregularly scattered oscula are found in the upper surface, scattered or in groups. In *E. o. rotunda* the oscula are very often arranged more or less regularly in longitudinal rows, which in some individuals become exceedingly regular, prominent, and conspicuous. In these the oscula in the rows are found not only on the upper surface, but also on the sides, of the sponge. These lateral oscula often appear (in the skeleton) very elongate, extended in the direction of the ridge on which they lie, and slit-shaped, 4–8 millim. broad and 10–25 millim. long. The oscula are surrounded by sphincter membranes, which are very muscular and assist in regulating the water-current.

The colour of the living sponge is dull. No bath-sponge has a bright colour. *E. o. adriatica* and *E. o. mollissima* are lighter coloured than *E. o. exigua* and *E. o. rotunda*, whilst the colour of *E. o. nitens* appears particularly variable. It varies from light yellowish brown in young individuals of *E. o. adriatica* to dark brown in the same variety when adult and in *E. o. mollissima*; and to black in *E. o. rotunda*. The upper surface is generally darker coloured than the lower, which difference is similar to that observed in the Chondrosidæ, and attributable to a photographic chemical effect of the daylight, which, illuminating the upper side more than the lower, turns this a darker hue than the other, which is always in the shade. The colour in the interior is lighter than on the surface, often yellowish, sometimes rust-red.

The dry skeletons are yellowish to dark brown; their colour depends to a great extent on the method of maceration. The bath-sponges in use are generally bleached artificially, and much lighter in colour than beach-worn or simply macerated skeletons. *E. o. irregularis* is conspicuous by the bright straw-colour of its dry skeletons. *E. o. rotunda* has also a light-coloured yellowish-brown skeleton. The other varieties have brown skeletons; that of *E. o. exigua* is particularly dark—dark brown or dirty grey.

The rigidity is subject to variations within certain limits. The skeletons of all varieties are more or less elastic, and rebound when thrown against a hard surface. The utility and commercial value of the varieties depend principally on their elasticity and tenacity. *E. o. mollissima* and *E. o. irregularis* are more elastic than the others. The least elastic form is *E. o. dura*. *E. o. rotunda* is much less tenacious than the other varieties. All the forms, with the exception of *E. o. dura*, are pretty soft and compressible. The last-named appears hard and resisting, and is useless for practical purposes.

In the concave fields between the low ridges which connect the conuli a network of bands composed of spindle-shaped, probably muscular, cells is observed; these radiate from the conuli, ramify, and are connected by numerous transverse bands. In the meshes of this primary network secondary reticulations are sometimes observed. The meshes are occupied by perforated membranes. Below these, large subdermal cavities, differently developed in the different varieties, are observed. They may appear nearly continuous, very extensive, and interrupted only by the stout columns of tissue which support the conuli and the narrow bands connecting the muscular trabeculæ in the skin with the internal tissue; or they may be reduced to mere extensions or inflations of the inhalant canal-stems, as in *E. o. spinosa*. The largest subdermal cavities are observed in *E. o. nitens*. The small grooves in the surface of the skeleton of certain forms, particularly *E. o. mollissima*, are occupied in the living sponge by very large canals, which belong to the system of subdermal cavities. From these subdermal cavities large inhalant canal-stems extend down into the interior of the sponge. In most of the forms these are large and conspicuous, on an average 0·5–1 millim. wide and 2 millim. apart. They show numerous annular constrictions, which divide them into series of more or less spherical inflations, so that the whole canal attains an appearance somewhat similar to that of the cæcum of a rabbit. The small inhalant branch canals originate from these inflations, and the entrances to them are often so abundant and close together that these parts of the canal-walls appear sieve-like. The final ramifications of these canals do not exceed 0·01 millim. in width; they open direct into the ciliated chambers, which are pear-shaped, 0·03–0·04 millim. wide, and constricted towards the efferent aperture, which leads into a small special efferent canal, having the appearance of a neck belonging to the chamber. F. E. Schulze is of opinion that there are several very small afferent pores leading from the final branches of the inhalant canals into the ciliated chamber. These pores are simple perforations in the convex aboral part of the ciliated chamber.

The necks of the ciliated chambers, the small special efferents, open into larger canals, which join to form oscular tubes 2–5 millim. wide. These

are sometimes pervaded by fine membranes. The latter are particularly highly developed in *E. o. exigua*, where they divide the peripheric part of the lacunose oscular tubes into small compartments. The central part of the oscular tube is, however, always free from these membranes, so that a clear passage is left in the middle. The oscular tubes are straight and regularly cylindrical in *E. o. adriatica*, *E. o. mollissima*, and *E. o. rotunda*; in the other varieties they are more curved, and often very irregular. The oscula are surrounded by sphincter membranes. F. E. Schulze says that the oscula are sometimes covered by *perforated membranes*. I do not believe that this occurs in this species, and am of opinion that this observation may refer to his variety *E. o. tubulosa*, which I do not regard as a form of *Euspongia* at all, but as a *Hippospongia*.

The *skeleton* consists of main and connecting-fibres. The former extend radially from the base upwards and terminate in the conuli. They are generally only slightly ramified. The branches are given off under very sharp angles, and soon attain a direction parallel to that of the stems. Only in *E. o. lobosa* the main fibres are much and irregularly branched. The main fibres are knotty or pretty smooth, and always contain foreign bodies; these are generally pretty scarce, scattered, and confined to the axis, more abundant in *E. o. dura* and in *E. o. lobosa* than in the other varieties. Those of *E. officinalis*, var. *spinosa*, contain large spicule-fragments and appear very spiny. The connecting-fibres are of comparatively uniform thickness. The thinner ones—not taking young fibres into account—are never less than half as thick as the thickest. They are always free from foreign bodies. The main fibres measure 0.04–0.2 millim. in thickness, in most of the varieties from 0.04–0.06 millim.; some of them are as much as 0.09 millim. thick in *E. o. exigua*. The very areniferous main fibres of *E. o. lobosa* and *E. o. dura* are 0.1–0.2 millim. thick. The thickness of the connecting-fibres is given by F. E. Schulze at 0.03–0.035 millim. Taking the young fibres into account, the measurements are, according to my own observations, 0.013–0.033 millim. In *E. o. nitens* a special surface-net of exceedingly slender fibres, measuring only 0.005–0.007 millim. in breadth, is described by O. Schmidt. The meshes of the network formed by the anastomoses of the connecting-fibres are rounded, polygonal, or elongate and irregular. In *E. o. lobosa* the meshes are sometimes rectangular. The thickest connecting-fibres (some attaining a breadth of 0.09 millim.) are observed in *E. o. exigua*. The thickness of the connecting-fibres and the width of the meshes are pretty uniform in the other varieties. The meshes measure 0.1–0.4 millim., on an average 0.2 millim., in width.

The histology of this species has been carefully studied by F. E. Schulze.

The species *Euspongia officinalis* was established in a somewhat similar sense to that which I give it by F. E. Schulze in 1879. Sponges belonging to it have been described first by Aristoteles, who distinguished three varieties of

the bath-sponge, one of which, *σπόγγια πυκνός*, belongs to this species. All the older authors refer to it. Linné established the name *Spongia officinalis*. O. Schmidt described a number of distinct forms which F. E. Schulze afterwards placed in this species. A. Hyatt attempted to classify all these forms, and also to take into account those described by Duchassaing and Michelotti. Hyatt's work is very cumbersome, and his species, subspecies, and varieties are evidently untenable and quite unrecognizable from his descriptions. With the aid of the excellent photographic plates which accompany Hyatt's work I have, however, been enabled to recognize a number of his forms, which are distributed among the varieties.

***Euspongia officinalis*, var. *mollissima*, O. Schmidt.**

Euspongia officinalis, var. *mollissima*, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—VII. Mittheilung. Die Familie der Spongidae," Zeitschrift für wissenschaftliche Zoologie, Bd. xxxii. Seite 616 (1879).

Spongia mollissima, O. Schmidt, Die Spongien des adriatischen Meeres, Seite 23 (1862).

Spongia officinalis, subspecies *mediterranea*, var. *mollissima*, A. Hyatt, "Revision of the North American Poriferæ.—Part II.," Memoirs of the Boston Society, vol. ii. p. 511 (1877).

Spongia officinalis, subspecies *mediterranea*, var. *zimocciformis*, A. Hyatt, l. c. p. 511 (1877).

GEOGRAPHICAL DISTRIBUTION.—Mediterranean (*O. Schmidt, F. E. Schulze*).

***Euspongia officinalis*, var. *dura*, Hyatt.**

Euspongia officinalis, var. *dura*, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 531 (1885).

Spongia lignea, A. Hyatt, "Revision of the North American Poriferæ.—Part II.," Memoirs of the Boston Society, vol. ii. p. 511 (1877).

Irregular, horizontally extended sponges, which show indications of the formation of conic processes on the upper surface, and attain a maximum diameter of 160 millim. The surface is continuous and pretty smooth, the oscula are scattered and small. The dry skeleton is hard, according to Hyatt (*loc. cit.*), like cork.

The *skeleton* is, according to Hyatt (*loc. cit.*), very dense, more so than that of any other sponge. This is, however, very much exaggerated. The main fibres are on an average 0.5 millim. apart, closer together than in any other

variety, and measure 0.12–0.2 millim. in thickness; they are completely filled with foreign bodies, chiefly sand-grains. The surface of the main fibre is slightly knotty. The connecting-fibres form a very regular network with rounded polygonal meshes, which are 0.1–0.3 millim., on an average 0.16 millim., wide. The fibres are straight and very abruptly angularly bent at the joining points; they are 0.025–0.033 millim. thick. I do not consider it necessary to divide this variety further, as Hyatt has done.

I am rather doubtful whether all the sponges which Hyatt places in his species *lignea* really belong to this variety, but it is not possible for me to decide this.

GEOGRAPHICAL DISTRIBUTION.—Bermudas (*Peabody Academy Coll.*). Mauritius (*Museum Comparative Zoology Coll.*). Pearl Island, Panama Bay (*Yale College Coll.*).

West coast of Australia: Western Australia (*Baily*). South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N.S. W. (*Philadelphia Acad. Coll.*).

***Euspongia bailyi*, Lendenfeld.**

Euspongia bailyi, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 535 (1885).

Large, erect, cup-shaped sponges, which are attached by a broad base. The sponge generally consists of a single, pretty symmetrical cup; sometimes, however, two cups may be fused to form a single sponge. The whole sponge attains a height of 200 millim. and a similar width. The cup is comparatively shallow, its depth being, in tall individuals, equal only to a third of the height. In those, however, which are low and broad the cup may be two thirds as deep as the whole sponge is high. In every case there is a very large, solid, basal mass, the upper part of which only grows out on its margin to form the cup. The cavity of the cup is semispherical. The margin is regularly circular.

The outer surface of the *skeleton* is very rough and uneven, covered with high, irregularly longitudinal ridges, from which high villi and other irregular outgrowths of varying shape arise. The inner side of the cup is comparatively smooth; here numerous round holes, averaging 3 millim. in diameter, the oscula, are situated. These are very abundant at the base of the cup, but absent near the margin. The dry skeleton is light brown, pretty soft, and elastic.

The main fibres are straight, on an average 0.7 millim. apart, and extend from the base upward and outward, terminating in the villi on the outer sur-

face of the cup. They measure 0.1 millim. in thickness, are smooth, and do not contain any foreign bodies. The connecting-fibres are straight, 0.03-0.04 millim. thick, and form a very regular network with angular, polygonal, meshes 0.5 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

***Euspongia pikei*, Hyatt.**

Stelospongos pikei, A. Hyatt, "Revision of the North-American Porifera.—Part II.," *Memoirs of the Boston Society*, vol. ii. p. 522 (1877).

Lamellar, lobose, somewhat branched sponges, which attain a height of 150 millim.; the compressed lobose processes or branches are 6-10 millim. thick. The oscula are situated on the rounded margin. The surface of the dry skeleton is comparatively smooth, covered only with very small villi. The dry skeleton is dirty brown, pretty soft, and very elastic.

The main fibres of the *skeleton* are irregular, flattened, and perforated—trelliswork-like. These perforated plates attain a maximum width of 0.25 millim. No foreign bodies are observed in them. The connecting-fibres of the internal skeleton are of somewhat variable thickness; most of them measure 0.008-0.012 millim., a few as much as 0.022 millim.

In the skin, and in the walls of the larger canals, a network of exceedingly fine fibres, only 0.005-0.007 millim. thick, is observed. The fibres in the interior are straight, and angularly bent at the joining points; the meshes polygonal, angular, 0.2 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—Mauritius (*Pike*).
East coast of Australia (*Ramsay*).

***Euspongia irregularis*, Lendenfeld.**

Euspongia irregularis, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," *Proceedings of the Linnean Society of New South Wales*, vol. x. p. 485 (1885).

The shape of the different varieties, and even of different individuals of one and the same variety of this species, varies very much. It is lobose or massive, but never digitate, sometimes bulbous and spherical. The lobes are always flattened and irregular, and measure about 8 millim. in thickness. Occasionally no massive central part is developed, but in any case the outgrowths or branches are compressed, so that the lobose character is retained.

The *skeleton* is elastic and not very hard. The colour is light brownish

yellow, but varies according to the size or age of the sponge. The largest specimens are very dark in colour, while smaller ones are of a light melange. In spirit, the colour is fairly well preserved, but becomes duller and lighter. Beach-worn skeletons differ very much in colour. Some varieties are dark dirty greyish brown; some have a remarkable orange-brown colour, similar to burnt sienna, and others are light yellow.

The surface of all the varieties has the same structure. It is covered with small, distally rounded conuli rather irregularly disposed, on an average 1 millim. high and 2 millim. apart. Often two adjacent conuli coalesce, whereby the irregularity in the configuration of the surface is much increased. Sometimes there are zones 3 millim. in breadth without conuli, running up one side of the digitate processes in a longitudinal direction. The oscula are scattered over the outer surface of the sponge in an irregular manner. In those specimens which possess aconulous zones, we always find the oscula in these zones. The oscula are circular, and measure from 1-4 millim. in width. Slightly magnified, the surface presents the appearance of a very regular network. The meshes of this network measure from 0.1-0.4 millim. in width. In *E. i. silicata* they are the largest (0.4 millim.), and in *E. i. jacksoniana* the smallest, measuring only 0.1 millim. This network is composed of a system of projecting bands on the surface, which are about as broad as the concave fields* between them. Generally an abundance of sand-grains and other foreign material is found in them, so that the whole structure attains the appearance of a very regular sand-net. Long siliceous spicules are found in it in great numbers; these are of course foreign, collected, and not produced, by the sponge. The depressed portions of the surface between this network are the pore-sieves—thin unprotected membranes perforated by the inhalant pores. The reticulate structure of the surface is developed in a similar manner in the fields between the conuli and in the aconulous portions, as also in the surface of the vestibular spaces. It is absent only in the surface of the true canals of the sponge, and consequently a structure very useful in determining which canals are true canals and which are vestibular.

The canal-system of all the varieties is the same. In each pore-sieve there are one or two large inhalant circular or oval pores, measuring on an average 0.03 millim. in diameter. Their size is variable, but I have never observed them entirely closed, although the strong muscular cells disposed in rings around them, which form true sphincters, can contract them to a quarter of their ordinary width. The largest pores observed by me measured 0.05 millim., the smallest 0.012 millim. From these pores narrow canals lead in an oblique direction down through the thick skin; these canals have an average width of 0.04 millim., which measurement corresponds to the measurement of the dilated pores as seen from the surface. The skin which

covers the subdermal cavities is on an average 0·06 millim. thick. The latter are formed by the repeated anastomosis of tangentially extending canals of circular transverse section, which undermine the skin throughout the entire surface. These canals vary very much in size; they measure from 0·25–1 millim. in diameter, and extend in the digitate and lobose processes mainly in a longitudinal direction. Very few and distant larger inhalant canals extend from these downward into the interior of the sponge, where they ramify very much and give rise to numerous cylindrical canals, which extend mainly in a longitudinal direction. These measure 0·05 millim. in diameter, and are surrounded by the ciliated chambers. The latter open into wider exhalant, likewise longitudinally disposed canals, which measure on an average 0·2 millim. in diameter. The latter coalesce to form wide, irregularly disposed tubes which lead, extending in a tangential direction, into the extensive lacunæ of the exhalant system.

It has been mentioned above that the oscula are usually surrounded by aconulous zones, which are destitute of horny fibres and represented in the skeleton by irregular grooves and depressions. These askeletous parts are occupied by an exceedingly lacunose tissue, with few chambers and very wide exhalant canals.

The structure of the *skeleton* of the different varieties agrees in the following points:—The main fibres are cored with foreign bodies, and are on an average 1 millim. apart. They are not much curved, extend radially from the base of the sponge upward and outward, and are branched in a penicillate manner. The connecting-fibres form a very regular network, when they are of uniform thickness, but when the thickness of the connecting-fibres varies the meshes become irregular. The network is more dense in the vicinity of the main fibres than elsewhere. The connecting-fibres are always free from foreign bodies.

***Euspongia irregularis*, var. *silicata*, Lendenfeld.**

Euspongia irregularis, var. *silicata*, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 495 (1885).

The main fibres contain abundant foreign bodies in their axis; these are chiefly siliceous spicules of other sponges, forming 90 per cent. of all the foreign bodies; the other 10 per cent. are Foraminifera—shells, &c., but there is hardly any sand. As the foreign bodies are only found in the axis, the surface of the main fibres is smooth. The main fibres generally have a circular transverse section, but occasionally they are flattened and form perforated plates. No foreign bodies are found in those portions of the main fibres which are converted into perforated plates. The thickness of the main fibres is

0·1 millim. The foreign spicule-fragments occasionally attain a length of 0·14 millim. The meshes of the connecting-fibre-net are of the same size in the vicinity of the main fibres as in intermediate parts of the sponge; they are occasionally very regular, and measure 0·23 millim. in width. The greater number, 70 per cent. of the connecting-fibres, are uniformly 0·04 millim. thick. There are places in the sponge where all the fibres are 0·04 millim. thick, whilst in others the thinner ones, which measure only 0·014 millim. in thickness, prevail; in these parts the network is more irregular.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: St. Vincent Gulf, S. A. (*Haacke*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*). Fiji (*Australian Museum*); Chatham Islands (*Parker*).

Genus HIPPOSPONGIA.

Spongidæ traversed by extensive vestibular lacunæ, with a skeleton the connecting-fibres of which form a network with meshes 0·1–0·4 millim. wide. The species with a wide-meshed skeleton-net are soft and elastic.

Hippospongia canaliculata, Lendenfeld.

Euspongia canaliculata, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 502 (1885).

Irregular, massive, spherical sponges, attached by a small, slightly protruding portion of the broad base, and bearing on the upper side numerous short hollow digitate processes.

The skeletons particularly, but to a certain extent also dry specimens, show deep and irregular, more or less longitudinally disposed grooves in the surface, which occasionally reach down to the internal cavities of the hollow digitate processes. The development of these grooves and digitate processes is different in the different varieties.

The *skeleton* is very elastic, but at the same time harder than that of *Euspongia officinalis*.

The surface is destitute of conuli and appears very smooth. With a magnifying-glass a very regular and uniform network can be discerned in it. There is no difference in the structure of the external surface and that of the extensive vestibular spaces in the interior. The network is similar to the one described above of *Euspongia irregularis*, being produced by lines raised over

the surface. The meshes of the network are 0.16 millim. wide, and the raised lines 0.08 millim. broad. The latter consist of sand-grains, which measure from 0.15–0.28 millim. In the meshes of this network the pore-sieves, each with 8–20 small pores, are situated. Corresponding to the grooves in the skeleton above described, there are askeletous portions of the sponge, mostly disposed in longitudinal lines, the surfaces of which are destitute of conuli, and often more or less retracted or collapsed; the small circular oscula, 1–2 millim. wide, are confined to these areas; they are disposed in lines, and on an average 10–15 millim. apart.

Circular vents are situated on the summits of the digitate processes, which closely resemble oscula, but are in reality the entrances to the system of vestibular lacunæ—the large cavities in the digitate processes. These lacunæ have a circular transverse section and measure 5 to 12 millim. in width; they are mostly upright, vertical, and here and there form anastomoses. About one half to two thirds of the whole sponge is occupied by these vestibular spaces, which are connected with the outer world only by the pseudoscula on the summits of the processes. No oscula open into these cavities, their walls are perforated only by inhalant pores, and so they appear as an outward appendage to the inhalant system—a vestibule.

The inhalant pores can be entirely closed at the option of the sponge. In consequence of this, the number in each pore-sieve found open and visible is very variable. The greatest number counted by me in one pore-sieve was 20. The pores are circular, and uniformly scattered over the whole of the pore-sieve. When fully dilated they measure 0.01 millim. in diameter. The pores on the inner surface open into the vestibule, those of the outer surface into the outer world. Below the pore-sieves extensive subdermal cavities are met with; these are larger below the inner surface than below the outer. The subdermal cavities below the inner vestibular surface are composed of irregular, tangential, and mostly longitudinal canals with an irregularly oval transverse section, which may attain 3 millim. in their largest diameter. Such immense subdermal cavities are rare. The subdermal cavities below the outer surface consist of similar irregular longitudinal canals, which, however, are very much narrower and more radially compressed, attaining a width of 1 and a height of 0.5 millim. Canals extend from these extensive cavities down towards the interior of the sponge; these have an average diameter of 0.1 millim., a circular or oval transverse section, and extend in a more or less longitudinal direction. They ramify continually, and the smallest final ramifications, which have the same shape as the larger canals, measure 0.02 millim. in width. The ciliated chambers form three fourths of spheres and measure 0.032 millim. in diameter. The exhalant canals are similar in shape, size, and direction to the inhalant ones, and join to form larger stems, which do not extend longitudinally, but curve towards the askeletous portions of the sponge, obtaining a more and

more transverse direction the larger they become. The askeletous portions of the sponge are much less dense than other parts, and occupied by a very loose lacunose tissue. These lacunæ communicate and open out into the short and wide oscular tube; they are on an average 0.6 millim. wide, and the membranes which separate them are in some places only 0.005 millim. thick. In portions also of this askeletous part, ciliated chambers are found, particularly in the depth; no chambers open directly into the large oscular tube, which measures 1-2 millim. in diameter. The skeleton is often interrupted throughout the entire thickness of the sponge-lamella between the vestibular space and the outer surface. In such cases the lacunose tissue formed by the congregation of the exhalant canals extends down to the vestibule.

The main fibres of the *skeleton* extend from the point of attachment outward and upward, mainly in a longitudinal direction, and branch in a more or less penicillate manner. They are distally joined to the arenaceous cortex, and it is clearly visible that the sand-core of the main fibres is a direct continuation of the sand in the skin. The main fibres curve in their distal portions gracefully outward, and all their ends abut on the *outer* surface. The main fibres grow just below the outer skin. It is very remarkable that no main fibres are joined to the *inner* surface—the cortex—on the vestibular side. The consequence of this is that the cortex on the inner side can readily be detached, whilst the cortex on the outer side appears firmly attached. In detail the main fibres, although always completely filled with foreign bodies, differ in the different varieties. The connecting-fibres form two systems. Thicker primary tangential, and thinner secondary radial connecting-fibres are usually distinguished. The mode of ramification varies in the varieties. The connecting-fibres never contain foreign bodies.

The skeletous part of the sponge is divided from the askeletous portion by a membrane, which extends down from the outer surface to the bottom of the groove. This membrane surrounds the part of the sponge occupied by the large exhalant lacunæ; it consists of radially disposed, parallel, elongate, spindle-shaped cells, which measure 0.032 millim. in length and in their centre 0.0015 millim. in thickness. The ends of these cells are very slender, forming extremely fine threads. The elongate oval nucleus is situated in the middle of the length, but not in the axis of the cell; it lies near the side and measures 0.0034 millim. in length and 0.0011 millim. in width. The cell is entirely filled with very granular and highly colourable protoplasm. The granules are remarkable for their large size, which may be estimated at 0.00025 millim. The ground-substance in which these granules are imbedded does not refract the light very much; the granules, however, are highly refracting. The ground-substance refracts the light simply, whilst the granules show when examined with the polarizer that they *refract the light doubly*, in a similar manner as the discs in the striated muscles of higher animals. These granules

are scattered throughout the cell in an irregular manner, but still they show a tendency to arrange themselves in transverse rows or discs. In this way the cells of the muscular membrane of our sponge may be regarded as a transition form between the simple undifferentiated contractile elements of sponges and the striated muscular cells of higher Coelentera. This membrane is perforated at the base by the exhalant canals, which lead from the more dense, skeletal portion of the sponge into the skeletal lacunæ.

This muscular membrane above described is thickened at its distal margin. In transverse sections through this distal thickening we find that no spindle-shaped cells take part in its formation, but that it is composed of a highly colourable granular mass, in which large nuclei are abundant. The latter are spherical and measure 0.002 millim. in diameter. From the sides of this structure granular threads extend in a tangential direction, and from its distal surface slender, straight or curved spindle-shaped cells arise. The distal parts of these reach the outer surface. The cells are curved in such a manner that the end is nearly perpendicular to the surface. These cells are 0.02 millim. long; at the ends 0.0005 millim. and in the middle 0.0015 millim. thick. They are filled with granular protoplasm, which imbibes staining fluids very readily and is turned dark brown by the action of osmic acid. In the central swelling an oval nucleus, 0.002 millim. long and 0.0006 millim. broad, is situated. I am of opinion that this structure should be considered an organ of sense, comparable to the ring-nerve of the craspedote Medusæ or the sensitive and ganglion-cells which form a circular zone in the entoderm of the manubrium of certain hydroid polyps. The distal thickening of the membrane consists of ganglion-cells the nuclei of which are apparent, the limits of which, however, remain indistinct. The spindle-shaped cells in the skin should be regarded as sensitive elements and their basal processes as nerves, which lead from the sensitive to the ganglion-cells below. The tangential granular threads represent tangential nerves, which lead from the ring-nerve to other parts of the surface.

Hippospongia canaliculata, var. dura, Lendenfeld.

Euspongia canaliculata, var. dura, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 502 (1885).

The main fibres are in this variety slightly and gracefully curved, 0.1 millim. thick and on an average 1.3 millim. apart; they taper towards the distal end, which supports the dermal sand-cortex. They are entirely filled with small foreign bodies, chiefly sand-grains. The connecting-fibres are clearly distinguished into primary tangential and secondary radial fibres. The former are

on an average 0·3 millim. apart, straight or gracefully curved, appearing like ropes suspended from the upright main fibres. They are not bent at the joining points with the secondaries, rarely divide into two roots where they join the main fibres, and are generally perfectly simple and not at all branched. They extend in a trumpet-shaped manner at the base, where they join the main fibres, and measure on an average 0·03 millim. in thickness. The thickness, however, is proportional to the length, inasmuch as the longer fibres are always thicker than the shorter ones.

Many of the secondary connecting-fibres are quite simple and connect, extending in a more or less radial direction, the primary connecting-fibres with each other. They are generally perpendicular to the primaries. Many are ramified, and they altogether form an irregular network of fibres of varying thickness, which connects the primaries. The thickness of the secondaries varies from 0·01 to 0·02 millim.; they are attached to the primaries by broad, trumpet-shaped extended bases.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

***Hippospongia canaliculata*, var. *elastica*, Lendenfeld.**

Euspongia canaliculata, var. *elastica*, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 502 (1885).

The main fibres are slightly and gracefully curved, and taper more abruptly towards their ends than in the foregoing variety. They have a smooth surface, measure 0·1 millim. in thickness, and are a little closer together than in other varieties. They contain axial foreign bodies, chiefly sand-grains, which, however, are not near so numerous as in *E. c. dura*.

The connecting-fibres are not so distinctly differentiated into primaries and secondaries as in the variety above described. The primaries are on an average 0·4 millim. apart and angularly bent at the joining points with the secondaries. They do not appear as graceful curves pendent between adjacent main fibres, but rather as broken lines, composed of longer or shorter, straight portions which are joined at angles approaching very closely to 180°. They measure 0·028 millim. in thickness. Also here we find those which extend between distant main fibres thicker than those which join main fibres more close together. The secondaries are rarely simple, they generally ramify and anastomose to form a regular network, the meshes of which are 0·3 millim. wide. The thickness of the secondaries varies from 0·005 to 0·025 millim.; the very thin ones are rare; the intermediate ones most numerous. As the primaries are bent at the joining points and the secondaries approach the thickness of

the primaries, the differentiation between primaries and secondaries becomes indistinct. This becomes particularly apparent between main fibres, which lie close together.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

***Hippospongia canaliculata*, var. *mollissima*, Lendenfeld.**

Euspongia canaliculata, var. *mollissima*, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 502 (1885).

The main fibres are on an average 0·9 millim. apart and 0·14 millim. thick. They contain foreign bodies, small sand-grains measuring only 0·014 millim., in great abundance. Their surface is roughened by a few small knobs. These fibres are never straight or gracefully curved, but appear irregularly bent and twisted, a peculiarity which characterizes the variety. The differentiation between primary and secondary connecting-fibres is still less clearly expressed than in the foregoing variety, although also in this one the two can be distinguished, at least in certain parts of the sponge. The primaries are composed of straight portions, which join at angles not so near to 180° as in the previous variety. Occasionally the portions between the joining points are slightly curved. The primaries are 0·4 millim. apart, and on an average 0·032 millim. thick; their thickness is, however, subject to unusual variations and not proportional to the length of the fibres, as in the other varieties. The secondaries form a very irregular network, and there are no simple unbranched ones at all. The meshes average a diameter of 0·2 millim. The secondaries vary very much in thickness, from 0·008 to 0·03 millim.; some of them are as thick as the primaries.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Hippospongia reticulata*, Lendenfeld.**

Euspongia reticulata, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 541 (1885).

A mass of reticulating folded lamellæ attaining a length of 350 millim. and a height of 200 millim. The vestibular spaces have an average width of 20 millim., the apertures on the surface which lead into them are 10-15 millim. wide, circular or irregular. The external surface is conulated,

that of the vestibular lacunæ smooth. The grooves on the surface of the skeleton are very irregular, 2–4 millim. wide. Dry skeletons are hard and elastic, dark dirty brown in colour.

The *skeleton* consists of smooth main fibres 0·058 millim. thick, which are cored with abundant small sand-grains (0·009 millim.), and between which a network of connecting-fibres 0·03 millim. thick is spread out, the irregularly polygonal meshes of which average 0·2 millim. in width.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson Wollongong, N. S. W. (*Lendenfeld*).

Hippospongia galea, Lendenfeld.

Euspongia galea, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. x. p. 543 (1885).

Cup-shaped sponges, attaining a height of 250 millim. and a breadth of 260 millim. The distal portion of the cup is cylindrical, the margin continuous and circular. Just below it the cup-wall is thin, but it increases rapidly as we approach the base, where it attains a thickness of 100 millim. The massive body is pervaded by extensive vestibular canals. The outer surface is irregular, covered with deep longitudinal grooves at varying intervals, whilst the inner surface appears more even. Both surfaces are perforated by numerous holes, 1–10 millim. wide, which are situated in close proximity to each other.

The dry skeleton is of a bright amber colour, hard and elastic.

The *skeleton* consists of main fibres 0·04–0·07 millim. thick, which are slightly knotty and cored with more or less longitudinally disposed fragments of foreign siliceous spicules. The connecting-fibres are much branched and continually anastomose to form a very fine network with polygonal meshes. Stouter and more slender connecting-fibres can be distinguished. The stouter ones form a wide-meshed network, in the meshes of which the slender fibres expand. The former, which measure on an average 0·027 millim. in thickness, can be regarded as primary connecting-fibres, and the latter, which are only 0·008 millim. thick, as secondary connecting-fibres. Both are free from foreign bodies.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Tasmania (*British Museum Coll.*) East coast of Australia (*Ramsay*).

Genus **THORECTA**, n. gen.

Spongidæ with a loose skeleton-net, with meshes 0·5–1·2 millim. wide; stout, simple or branched connecting-fibres, and a thick sand-cortex on the smooth surface. Without superficially extending oscular tubes and corresponding grooves in the skeleton.

Thorecta exemplum, n. sp.

Synonyms will be found below in the descriptions of the varieties.

In this species I combine some different varieties, which are connected with each other by abundant transition forms. All the sponges belonging to it are erect, attached, with a small base, or pedunculate. *T. exemplum*, var. *prima*, is lamellar, flabelliform, curved, with oscula 1·5–3 millim. wide, which are abundant on, and confined to, the concave side of the lamellar sponge. In *T. exemplum*, var. *secunda*, which is an elegant cup-shaped form, the margins of the curved lamella of *T. exemplum*, var. *prima*, have joined, and the lower part has formed a peduncle. The 2–3 millim. wide oscula are accordingly confined to the inner surface of the cup. A further development in this direction is presented by *T. exemplum*, var. *tertia*, a pedunculate, somewhat wedge-shaped sponge, on the upper surface of which one large 10–15 millim. wide central and several smaller 1–2 millim. wide scattered oscula are observed. Here the cavity of the cup has been filled up more or less, and nothing is left of it but the large central oscular tube.

The other variety, *T. exemplum*, var. *marginalis*, diverges in a different direction. It is pedunculate, erect, and compressed, more or less flabellar, and the 3–5 millim. wide oscula are situated marginally, in pretty regular rows on the crests of a number of longitudinal, regularly meridional, or more often slightly curved ridges.

It will be seen from this that in this species some of the frequent variations in the form of sponges are particularly forcibly illustrated, and I have named the species "*exemplum*" on account of this.

I have drawn attention to this sponge on account of its variability on a previous occasion*. Since then I have examined a great many other specimens, and the views expressed by me with regard to them (*loc. cit.*) have been confirmed.

The surface is, in most of the varieties, even or slightly undulating. Only in *T. exemplum*, var. *tertia*, it appears deeply pitted in consequence of the presence of high prominent ridges, which form a network, in the meshes of

* R. v. Lendenfeld, "A Monograph of the Horny Sponges.—Part VI. The Genus *Euspongia*," Proceedings of the Linnean Society of New South Wales, vol. ix. pp. 307, 308 (1885).

which the pit-like depressions are situated; these are sometimes 10 millim. deep and deeper. The surface is covered with a stout sand-cortex, which is perforated by round holes, 0.5–0.8 millim. wide and about 1 millim. apart. The cortex, which is composed of sand-grains, is 0.7–1 millim. thick, and covers the whole of the surface in a very uniform manner.

The sponges belonging to this species do not grow to a very large size. The tallest attain a height of 300 millim.

The colour of the living sponge is yellow-greenish or grey. The dry skeleton, destitute of the sand-cortex, appears light chestnut or greyish brown; it is soft, compressible, and elastic.

The main fibres of the supporting skeleton are 0.067 millim. (*T. exemplum*, var. *tertia*) to 0.13 millim. (*T. exemplum*, var. *prima*) thick, and slightly knotty. They are rarely (*T. exemplum*, var. *secunda*) free from bodies. Generally they contain scattered sand-grains &c. The connecting-fibres are 0.04 millim. (*T. exemplum*, var. *tertia*) to 0.1 millim. (*T. exemplum*, vars. *marginalis* and *prima*) thick, simple or slightly branched, and free from foreign bodies. The meshes are mostly square, 0.5–1.2 millim. wide.

The superficial layers of spongin in the fibres are very clearly stratified. In the axis of the connecting-fibres a pith-thread can be discerned.

In the perforations of the sand-cortex thin sieve-like membranes are spread out, in each of which fifteen to twenty-five oval inhalant pores, 0.07 millim. wide, are observed. From each pore-sieve a wide canal leads downwards. This opens directly into one of the 0.8 millim. wide, cylindrical, straight canals which extend perpendicularly to the surface down into the interior of the sponge. These large inhalant canal-stems are joined at their distal ends by tangential, not very wide canals, which undermine the sand-cortex. From the large perpendicular inhalant canal-stems small branches are given off which ramify irregularly. The final ramifications of the inhalant canal-system are not under 0.09 millim. wide. The ciliated chambers are 0.045 millim. wide, regularly spherical, and destitute of special efferent canals. They open direct into the final ramifications of the exhalant canal-system, which are 0.04–0.06 millim. wide. The larger exhalant canal-systems are pervaded by fine membranes, which partly divide them into separate compartments.

The wider oscular tubes are generally smooth and destitute of sphincter-membranes.

***Thorecta exemplum*, var. *prima*, nov.**

Lamellar, erect, curved sponges, which may attain a more or less cup-shaped form by the approximation of the lateral margins of the curved lamella. The sponge attains a height of 150 millim. and a breadth of 100 millim. The lamella is about 10 millim. thick. The free margin is pretty sharp, the lamella thinning out towards it.

The oscula are confined to the concave side of the lamellar sponge, 1.5–3 millim. wide, very abundant, and 2 millim. apart. The specimens from the Northern localities are more open, flabelliform; those from Port Jackson and Port Phillip more caliculate.

The dry skeleton is reddish brown and stiff.

The *skeleton* consists of smooth or uneven main fibres 0.13 millim. thick, which contain very few and scattered foreign bodies. They are about 1 millim. apart. The connecting-fibres are 0.1 millim. thick, simple, slightly branched, or attached to the main fibres by two roots. The meshes are irregular or mostly square, 0.8–1.2 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Northern Territory, S. A. (*Haacke*). South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Bellinger River, N. S. W. (*British Museum Coll.*); Broughton Island (*Ramsay*).

***Thorecta exemplum*, var. *secunda*, Hyatt.**

Spongelia rectilinea, var. *tenuis*, A. Hyatt, "Revision of the North-American Porifera.—Part II.," *Memoirs of the Boston Society of Natural History*, vol. ii. p. 537 (1877).

Stelospongia flabelliformis, var. *latus*, H. J. Carter, "Description of Sponges from the neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 305 (1885).

Pedunculate, regularly cup-shaped sponges, which attain a height of 250 millim. The peduncle is conical, extending above, and measures in large specimens at the base about 4 millim., and at the upper end 10 millim. in thickness.

The upper cup-shaped part, the body proper of the sponge, is generally broader than high, and attains a width of 250 millim. The margin of the cup is pretty regularly circular, even or undulating. The wall is very thick below, and thins out towards the margin. The cavity of the cup is very shallow. The outer surface is uneven, often pitted; the inner surface smooth. The oscula are 2–3 millim. wide and confined to the inner side of the cup. The largest are situated at the base, and they become smaller as we approach the margin. At the base the oscula are 10–20 millim., near the margin only 4–6 millim. apart.

The colour of the living sponge is pretty bright sulphur-yellow.

The dry skeleton is soft and compressible, light brown.

The *skeleton* consists of knotty and irregular main fibres 0.08 millim. thick, which are free from foreign bodies, and curved or straight connecting-fibres, about 0.6 millim. thick. The meshes are irregular, 0.5–1 millim. wide.

This sponge is mentioned by Carter (*loc. cit.*) "as a variety" of *Stelospongos flabelliformis*, "which might be termed *Stelospongos latus*."

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Northern Territory, S. A. (*Haacke*). West coast of Australia: Western Australia (*Baily*). South coast of Australia: Port Phillip Heads, V. (*B. Wilson*); Phillip Island, V. (*Boston Society Coll.*); Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); near Sydney, N. S. W. (*Philadelphia Society Coll.*).

***Thorecta exemplum*, var. *tertia*, Hyatt.**

Spongelia rectilinea, var. *erecta*, A. Hyatt, "Revision of the North-American Poriferæ.—Part II.," *Memoirs of the Boston Society of Natural History*, vol. ii. p. 537 (1877).

Stelospongos cribriformis, var. *stabilis*, A. Hyatt, *loc. cit.* p. 531.

Stelospongos cribrocrusta, H. J. Carter, "Supplement to the Descriptions of Mr. J. B. Wilson's Australian Sponges," *Annals and Magazine of Natural History*, ser. 5, vol. xviii. p. 371 (1886).

Pedunculate sponges which sometimes attain a height of 150 millim., but generally are only 100 millim. high. The peduncle is cylindrical, straight or curved, and of the nearly uniform thickness of 4 millim. throughout; it is generally short, about 20 millim. long, sometimes altogether undistinguishable, and in other cases as much as 200 millim. long. The body of the sponge itself appears massive, conical, irregular, widening above; it attains a largest horizontal transverse diameter of 50 millim.

The surface is in large specimens generally covered with a network of broad and high ridges, the interstices between which appear as polygonal or roundish pits, sometimes as much as 12 millim. deep. The oscula are confined to the upper surface. In smaller specimens generally a number of vents, 1–2 millim. wide, are observed, situated in irregular rows on the summits of low sharp ridges on the upper surface. Each osculum is slightly prominent. In large specimens there is generally one large osculum in the middle, which measures 10–15 millim. in diameter, and a number of scattered small oscula round it. The latter are not visible in dry specimens destitute of the sand-cortex. The surface is covered with a cortex 1 millim. thick, composed of sand-grains. This cortex is perforated by circular holes 0.7 millim. wide, which are 0.4–1 millim. apart.

The *skeleton* consists of slightly knotty main fibres, 0.067 millim. thick, which are about 1 millim. apart and joined by connecting-fibres 0.04–0.035 millim. thick. The main fibres are cored with an axial string of pretty large sand-grains and spicule-fragments. The connecting-fibres are straight or curved; some of them appear simple and unbranched, joining adjacent main

fibres, and perpendicular to them, whilst others give off a few branches. The branched connecting-fibres are more prevalent towards the surface than in the interior. The meshes are irregular, 0·7–1 millim. wide. In the stem the network appears more uniform; here the main fibres are 0·2 millim. thick and only 0·5 millim. apart. The connecting-fibres are 0·04–0·1 millim. thick, and the meshes irregular, 0·4 millim. wide.

The inhalant pores appear as circular or oval perforations, 0·07 millim. wide, in the thin membranes, which are spread out in the round meshes of the superficial cortical sand-net. Wide canals lead down from them, perforating the sand-cortex. These open directly into the large inhalant canal-stems, which are 0·8 millim. wide, straight and cylindrical, and extend perpendicularly from the surface down into the interior of the sponge. They are distally joined by a few, not particularly wide, tangential canals. The inhalant branch canals are often provided with annular constrictions; their final ramifications are about 0·09 millim. wide, twice as broad as the ciliated chambers. The latter are spherical and sessile on the (0·04–0·06 millim. wide) exhalants, that is to say there are no special efferent canals. The ciliated chambers are 0·045 millim. wide. The efferent pore is about half as wide as the chamber. The exhalants join to form canals 2–3 millim. wide, in which membranes are expanded, partially dividing them into series of compartments in open communication with each other by large holes in the dividing membranes.

In several specimens very regularly spherical bodies, measuring 0·5–2 millim., were observed in the ground-substance; these are composed of small round cells, which appear to bud inwardly from the wall. Near the surface—the margin in a section—these cells often stand in more or less regular radial rows, thus indicating that they bud from the wall. The interior of this body has not nearly so dense a structure as the wall. In it only scattered cells, similar to those in the wall, are observed. The whole structure is surrounded by an endothelial layer of flattened mesodermal cells. The round cells in these bodies measure 0·01 millim. and are regularly spherical; neither a nucleus nor a cell-wall can be demonstrated in them when detached from the wall, and their protoplasm is not affected by ordinary staining-fluids. Those cells which lie close to the wall, however, and which appear to be younger than the detached ones, are readily stained. I am rather inclined to regard this structure as a parasite or commensal of a vegetable nature. It seems that the vital cells of this parasitic organism are situated in the wall of the whole structure, and rapidly produce spores, which bud from the wall and finally lie detached in the interior.

This structure may be similar to that described by Poléjaeff* in his *Cacospongia levis* (*Stelospongia australis*).

* N. de Poléjaeff, Report on the Keratosa.—Reports on the Results of the Voyage of H.M.S. 'Challenger,' vol. xi. part 24, p. 56 (1884).

GEOGRAPHICAL DISTRIBUTION.—Key West (*Yale College Coll.*); Havana (*Museum of Comparative Zoology Coll., Cambridge, Mass.*).

South coast of Australia: Phillip Island, V. (*Boston Society Coll.*); Port Phillip Heads, V. (*B. Wilson*); Western Port, V. (*B. Wilson*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); New Zealand (*British Museum Coll.*).

***Thorecta exemplum*, var. *marginalis*, nov.**

Erect, very regularly shaped, often symmetrical, more or less pedunculate sponges, which attain a height of 150–300 millim. and a width of 30–50 millim. The sponge is compressed, often lamellar; it tapers towards the upper end, and also towards the narrow base or the short peduncle, and accordingly appears more or less fusiform.

Longitudinal, meridional, or slightly curved ridges are observed projecting from the surface; these are sometimes, particularly in large specimens, so highly developed that they appear as lamellar structures which may attain a width of 30 millim. and a thickness of 6–12 millim.

The oscula are 4 millim. wide and confined to the crests of these projecting ridges, where they are about as far apart as wide. These oscula-rows extend nearly down to the peduncle.

Smaller specimens are often very symmetrical, particularly those from the West coast of Australia. A radial quadrilateral symmetry is observed in them. The transverse section appears as an elongate square with projecting corners. This figure is perfectly symmetrical, and the same figure is produced by every transverse section, with the exception of those through the regularly cylindrical peduncle. The broad and the narrow sides of this sponge are concave, and the oscula situated in four regular meridional rows on the four meridional crests. They are in these smaller (only 100 millim. high) specimens 3 millim. wide and 6 millim. apart.

The dry skeleton is greyish brown and very soft.

The *skeleton* consists of very knotty main fibres, 0.07–0.1 millim. thick, which are cored with large sand-grains; and comparatively much branched connecting-fibres, 0.046 millim. thick, which occasionally form dense trellis-like reticulations in the vicinity of the main fibres. The larger meshes are irregular or square, 1 millim. wide.

The surface-skeleton consists of bands of sand-grains, 0.7 millim. broad, which form a dense network with more or less circular meshes 0.4 millim. wide. In the perforated membranes, which are spread out in them, spicule-fragments are abundant.

GEOGRAPHICAL DISTRIBUTION.—Mauritius (*Canterbury Museum Coll., Christchurch, N. Z.*).

West coast of Australia: Western Australia (*Baily*). South coast of Australia: St. Vincent Gulf, S. A. (*Haacke*). East coast of Australia: Illawarra, N. S. W. (*British Museum Coll.*); Port Jackson, N. S. W. (*Lendenfeld*).

***Thorecta gracillimus*, n. sp.**

Cup-shaped pedunculate sponges, which attain a height of 180 millim. and a width of 90 millim. The margin of the cup, which is a little broader than high, is regularly circular and lies in a horizontal plane. The wall of the cup is 14 millim. thick; it does not taper towards the margin, where it appears rounded off. From the bottom of the cavity of the cup a canal originates, which extends in the peduncle nearly down to the base. The whole structure thus becomes like a champagne-glass. The oscula are 2.5 millim. wide and confined to the inner side of the cup, where they are very abundant.

The dry skeleton is light brown, transparent, with a golden lustre, and stiff.

The main fibres of the *skeleton* are 0.1 millim. thick, very knotty, and cored with a single row of exceedingly large sand-grains 0.6 millim. apart. The connecting-fibres are curved and slightly branched, 0.04–0.05 millim. thick. The meshes are irregular, 0.6–0.9 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Fremantle, W. A. (*Bowerbank Coll.*). East coast of Australia (*Ramsay*).

***Thorecta squalidus*, n. sp.**

The sponge consists of a number of erect, more or less perpendicular, tubular parts, which coalesce for the greater part of their length. These tubes are generally situated in a row, so that the whole sponge attains a somewhat flabelliform appearance. Protuberances project from the upper margins, on the summits of which the oscula, 10–15 millim. wide, are situated. The whole sponge attains a height of 200 millim. The tubular parts are 40 millim. thick; they coalesce near the broad base of attachment to form a continuous wall 40–50 millim. in thickness.

The dry *skeleton* is hard, slightly compressible, and elastic. It is composed of main fibres 0.1 millim., and simple connecting-fibres 0.03–0.05 millim. thick. Both kinds of fibre are free from foreign bodies, and show a very distinct stratification of the spongin-layers.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*). North coast of Australia: Northern Territory, S. A. (*Haacke*). East coast of Australia: Port Jackson, N. S. W. (*Ramsay*). New Zealand: Port Chalmers (*Parker*).

Thorecta ramsayii, n. sp.

The sponge consists of a somewhat meandriform, irregularly folded lamella, with smooth surface. The skeleton is comparatively very dense and much harder than in other species. The oscula are conspicuous and situated chiefly on the margin and on the projecting folds of the lamella.

The *skeleton* consists of a network composed of main fibres 0·1 millim. thick, cored with abundant small sand-grains; and slightly branched connecting-fibres, 0·05 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **APLYSINOPSIS**, n. gen.

Spongidæ with a skeleton composed of pithed fibres, distinguished into main and simple or slightly branched connecting-fibres; with meshes of the skeleton-net 1·5–2 millim. wide; small ciliated chambers 0·03–0·035 millim. wide, and conuli on the surface.

Aplysinopsis elegans, n. sp.

The sponge consists either of a single pedunculate, cylindrical, or pyriform erect tube, with a terminal osculum 20 millim. wide, or of several such which grow out from a common peduncle. The whole sponge attains a height of 150 millim., and each tube is 40–80 millim. wide. The slender forms with cylindrical tubes are generally smaller than the pyriform ones. Longitudinal rows of blunt conuli are observed on the surface, these are more regular in the vicinity of the osculum than further down. The conuli are 1 millim. high and 3 millim. apart.

The colour of the living sponge is flesh-colour on the surface and yellowish white in the interior; the skeleton is light chestnut-brown, stiff, but compressible.

The main fibres of the *skeleton* are 0·18 millim. thick, and cored with an axial string of very small sand-grains. The connecting-fibres are slightly ramified, the branches are mostly given off at right angles. At the joining points, and particularly where the connecting-fibres are attached to the main fibres, they are very much distended in the direction of the fibre, which they join in a trumpet-shaped manner. In the middle the connecting-fibres are about 0·14 millim. thick. The meshes are square, 1·5 millim. wide.

A single layer of moderately sized sand-grains and a few scattered spicule-fragments are observed in the skin, forming a very regular reticulation com-

posed of bands 0·04–0·1 millim. broad. The meshes in this network are round, rather irregular, 0·03–0·08 millim. wide. The membranes spread out in these meshes are free from foreign bodies. In each two to four oval inhalant pores are situated, which are 0·01–0·03 millim. wide. When distended these pores occupy nearly the whole of the mesh, and then nothing remains of the sieve-membrane but a few fine threads between the pores.

From each mesh a canal, 0·08–0·1 millim. wide, leads down into a system of anastomosing tangential canals, which undermine the skin. The most slender of these are 0·06 millim. wide. They join to form larger stems, which converge and open into the upper ends of large perpendicular canals 1 millim. wide, which extend down into the interior of the sponge. These inhalant canal-stems are 2–3 millim. apart; annular strictures are observed in them. Slender branches are given off from these stems in great abundance. The ciliated chambers are somewhat irregularly spherical, 0·033 millim. wide, and destitute of special efferent canals.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Aplysinopsis digitata*, n. sp.**

(PLATE XII.)

Erect massive sponges, with large, regularly cylindrical, digitate processes. The whole sponge attains a height of 250 millim. The processes are straight, and uniformly 20–30 millim. thick. From the upper rounded end a cylindrical, about 15 millim. broad and 10–20 millim. long tube arises, which surrounds the osculum. On the summit of each of the three to six processes observed, one osculum 10 millim. wide is situated. A straight, regularly cylindrical tube—the oscular tube—extends downwards from each osculum; this is uniformly 10 millim. wide, and situated axially in the processes, so that the latter appear regularly tubular. Below, in the massive basal part of the sponge, these oscular tubes are continued in the shape of curved, somewhat tortuous canals, which do not anastomose, however.

The surface is covered with blunt conuli, 2·5 millim. high and 2–4 millim. apart.

The colour of the living sponge is light red on the surface and dirty grey in the interior.

The *skeleton* consists of main fibres 0·3 millim. thick, and simple connecting-fibres 0·16 millim. thick. Large sand-grains form an axial column in the former. In the latter pith-cylinders 0·1 millim. wide are observed.

The inhalant canal-system is similar to that of *A. elegans*. The large inhalant stems are perpendicular to the surface and terminate close to the wall of the central oscular tube. The exhalants have a more irregular course, and are

mostly cut transversely in radial longitudinal sections. The final ramifications of the inhalant canal-system are remarkably slender, only 0.02 millim. wide; they open by large, generally very conspicuous mouths, 0.01 millim. wide, into the slightly irregularly spherical ciliated chambers. The latter are 0.036 millim. wide, and destitute of special efferents. The final ramifications of the exhalant system are much wider than those of the inhalant system: the narrowest over 0.4 millim. wide; always wider than the chambers.

The ground-substance in the vicinity of the ciliated chambers is very granular and opaque.

Embryos in various stages of development have been observed in some specimens of this species. They do not appear confined to any particular region, but seem to be scattered throughout the whole of the sponge.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus LUFFARIA.

Spongidae with a skeleton composed of thick-walled pithed fibres, which are distinguished into longitudinal main fibres, stout reticulating primary connecting-fibres, and slender secondary connecting-fibres; the latter form a fine network in the polygonal meshes of the primaries.

Luffaria variabilis, Poléjaeff.

Luffaria variabilis, N. de Poléjaeff, Report on the Keratosa.—Reports on the Scientific Results of the Voyage of H.M.S. 'Challenger,' Zoology, vol. xi. p. 69 (1884).

Massive, lobose, or slender digitate sponges. The digitate forms are ramified; the cylindrical branches straight and pretty uniformly 8–12 millim. thick. They attain a length of 250 millim. and are distally rounded. The massive lobose forms are horizontally expanded, attached by a narrow base, and attain a height of only about 50 millim. In the digitate forms the cylindrical branches grow out from a small basal mass.

The surface is covered with small, sharp, and slender conuli, 1.2 millim. high, which are extended below. The conuli are about 2.5 millim. apart. The oscula are circular or oval, 2–3 millim. wide, and rather scarce; they are scattered irregularly over the surface. No oscula are found on the summits of the digitate processes. Aconulous patches are figured by Poléjaeff on the surface of the massive form.

The *skeleton* consists of main fibres and primary and secondary connecting-fibres. The main fibres are knotty, 0·2 millim. thick, 1·5–2 millim. apart, and cored with an axial string of sand-grains. The primary connecting-fibres are 0·067 millim. thick, and form by frequent anastomoses a network with polygonal meshes, 0·6–1 millim. wide. The secondary connecting-fibres are 0·01 millim. thick, and form reticulations which occupy the meshes of the network of the primaries. The meshes of this very fine reticulation formed by the secondaries are polygonal, and only 0·16 millim. wide. Poléjaeff gives a figure of this network (*loc. cit.* pl. ix. fig. 5). The pith-cylinder in the primary connecting-fibres is about half as thick as the fibre.

The surface is protected by abundant small sand-grains which are imbedded in it. The inhalant pores are situated in groups of ten to twenty. The groups are very distant; there are only one or two such groups of inhalant pores in each of the concave fields between the rounded and only slightly projecting ridges which connect the conuli. The subdermal canal-system is very highly developed. The subdermal cavity is continuous, 0·5–1 millim. wide, and divided into separate compartments by fine membranes and slender trabeculae, which are spread out in it. The canals in the interior are very narrow. The ground-substance contains abundant granules, and appears remarkably opaque and untransparent.

Poléjaeff (*loc. cit.*) has described this sponge. I have re-examined his types, and agree with him that the digitate and massive forms should not be described as distinct varieties.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*); off Api, New Hebrides ('*Challenger*'); on reefs off Tahiti ('*Challenger*').

Genus **APLYSINA**.

Spongidae with small ciliated chambers 0·025–0·035 millim. wide, and a skeleton composed of a loose network of pithed fibres, which are not clearly distinguished into main and connecting-fibres. The surface is conulated, and not protected by a thick cortex of sand.

Aplysina spiculifera, n. sp.

The sponge consists of a low incrusting mass, from the upper surface of which large and irregular, somewhat club-shaped, digitate processes arise, which attain a length of 100 millim., and a maximum thickness of 35 millim. A large circular osculum is situated on or near the summit of each branch.

Sometimes there are also smaller oscula on the sides of the digitate processes. The surface is covered with very large, pretty sharp, and very slender conuli, 10–14 millim. high and about 5 millim. apart.

The sponge is dull grey in spirit, the dry skeleton pretty soft and elastic.

The *skeleton* consists of longitudinal irregularly ramifying fibres, which are 0.1 millim. thick, and contain more or less abundant spicule-fragments. The branches are 0.04–0.08 millim. thick, contain fewer spicule-fragments, and anastomose to form a network with meshes about 1 millim. wide. The pith forms $\frac{7}{10}$ of the fibres.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia; Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Aplysina cacos*, n. sp.**

Cake-shaped sponges, attaining a breadth of 100 millim. and a height of 70 millim. From the upper surface digitate processes arise, on the summits of which the oscula are situated terminally. These processes are 10 millim. thick, and coalesce for the greater part of their length.

The *skeleton* consists of an exceedingly loose network of longitudinal areniferous fibres 0.5 millim. thick, and transverse fibres 0.14 millim. thick, which contain only few foreign bodies.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Aplysina crassa*, Hyatt.**

Aplysina fusca, H. J. Carter, "Report on the Sponges dredged up from the Gulf of Manaar," *Annals and Magazine of Natural History*, ser. 5, vol. vi. p. 458 (1880).

Aplysina fusca, H. J. Carter, "Contributions to our Knowledge of the Spongida," *Annals and Magazine of Natural History*, ser. 5, vol. viii. p. 105 (1881).

Aplysina fusca, S. O. Ridley, "Spongiida:" Report on the Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' p. 600 (1884).

Dendrospongia crassa, A. Hyatt, "Revision of the North-American Poriferæ.—Part I.," *Memoirs of the Boston Society*, vol. i. p. 402 (1874).

Digitate, solid, or hollow tubular sponges which attain a height of 150 millim. The digitate processes are cylindrical, curved, and about 25 millim. thick. The surface is covered with irregular conuli, 2 millim. high and 6 millim. apart. The oscula are large and scattered in the solid forms, and terminally situated in the tubular ones.

The colour of the sponge when preserved in spirit is dirty copper-red, somewhat similar to the colour of spirit-specimens of *A. aerophoba*. The dry skeleton is dark reddish brown, very hard and stiff, somewhat brittle.

The *skeleton* consists of fibres 0.5–0.7 millim. thick, which extend longitudinally upwards in the middle of the digitate branches in the case of the solid forms, or in the wall of the oscular tubes in the hollow ones. They are here pretty close together, 1–1.5 millim. only apart. From them dendritically ramifying branches are given off, which extend to the surface. The final ramifications of these terminate in the conuli. These fibres are of very varying thickness, some of them are nearly as thick as the longitudinal fibres in the interior. The most slender branches are about 0.16 millim. thick.

According to Ridley (*loc. cit.*) the fibres of the Seychelles specimen are not over 0.7 millim. thick, whilst according to Carter (*loc. cit.*) the fibres of his Australian specimen are over 1 millim. thick. The same is the case with Hyatt's *Dendrospongia crassa* from Nassau. I agree with Ridley in considering such distinctions insufficient to warrant the establishment of separate species.

The pith forms, in the specimen examined by me, $\frac{7}{10}$ of the fibre. In Hyatt's fig. 1 (*loc. cit.*) of *Dendrospongia crassa* an axial canal $\frac{4}{10}$ of the thickness of the fibre is represented. The width of these canals, which always make their appearance in the dry skeleton, often depends on the degree of desiccation, and cannot always be considered identical with the thickness of the axial pith-cylinder in the fibres of the living sponge. The width of the meshes of the network formed by the irregularly anastomosing fibres is 1–3 millim.

According to Carter (*loc. cit.*) the spongin cortex of the fibres consists of loosely-jointed, concentric, cylindrical layers, and *cells* are said by him to occur in the outermost layers. I have not seen any cells of this kind in the specimens examined by me. Ridley (*loc. cit.*) describes abundant granular cells in the skin. These measure 0.013 millim. and are colourless in the Australian specimens, and measure only 0.008 millim. and are brown in the specimen from the Seychelles Islands.

The ciliated chambers are very abundant in the interior and exceedingly small; they measure only 0.026 millim. in diameter.

This species shows in the structure of its skeleton some similarity with *Dendrilla*, a hollow-fibred sponge of another order. Particularly the dendritic mode of ramification of the fibres is similar to that of *Dendrilla*. The small spherical ciliated chambers, however, show clearly that it is a true *Aplysina*.

Why Hyatt (*loc. cit.*) has placed "*Aplysina aerophoba*, O. Schmidt, pars," as a synonym of *Dendrospongia crassa*, I do not know; they are very different.

GEOGRAPHICAL DISTRIBUTION.—Atlantic: Nassau (*Boston Society Coll.*).

Indian Ocean : Seychelles Islands ('Alert'); Gulf of Manaar (*Warren*).
 South-west coast of Australia (*Bowerbank Coll.*). West coast of Australia :
 Western Australia (*Baily*).

Genus **DYSIDEOPSIS**, n. gen.

Spongidæ with large spherical ciliated chambers 0·04–0·048 millim. wide, and a skeleton composed of a uniform network of areniferous fibres which are not clearly distinguished into main and connecting-fibres. With conuli on the surface.

Dysideopsis elegans, n. sp.

Erect, branched, digitate sponges which consist of a small bunch of upright, regularly cylindrical processes, 6 millim. thick, which grow out from a common basal mass. The whole sponge attains a height of 120 millim. The processes are distally rounded. The surface is covered with elegantly shaped conuli, 2–3 millim. high and 1–3 millim. apart. The slopes of the conuli are very concave, and so they appear very slender in their distal portions. The conuli are connected by prominent ridges, the height of which is inversely proportional to the distance of the conuli, which they connect. The oscula are scattered, rather scarce, 1 millim. wide.

The living sponge is very dark brown or nearly black on the surface, and dull brown in the interior. This colour is retained by spirit-specimens.

The *skeleton* consists of fibres 0·06–0·08 millim. thick, which are pretty smooth, and completely filled with small sand-grains. The fibres are straight, pretty sharply angularly bent at the joining points, and anastomose to form a network with irregular, more or less polygonal meshes, which are on an average 0·4 millim. wide. Main and connecting-fibres cannot be distinguished at all. The conuli are supported by a bundle of three or four radial fibres, which approximate distally and give off tangential branches.

The subdermal system is represented by large separate tangential canals, which are situated radially round the conuli, between the very stout muscular bands which radiate from them. The ciliated chambers are spherical, pear-shaped, on an average 0·048 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia : Port Denison, Q (*Ramsay*).

Dysideopsis digitata, n. sp.

The sponge consists of a small bunch of short, cylindrical, slightly curved, digitate processes, which are 12 millim. thick, and attain a length of 40

millim.; they are erect, grow out from an incrusting base, and appear slightly thickened distally, sometimes even club-shaped, and rounded at the end. The surface is covered with very slender and sharp-pointed conuli, 1 millim. high and 2-3 millim. apart. The oscula are 2 millim. wide, situated terminally on the digitate processes, and provided with sphincter-membranes. The sponge is light grey in spirit, very soft and compressible.

The *skeleton* consists of a uniform network of fibres 0.12 millim. thick, which are filled with large sand-grains. The meshes of the network are irregular, on an average 0.6 millim. wide. The ciliated chambers are spherical, pear-shaped, and very large, measuring 0.045 millim. in diameter.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Dysideopsis sulphurea, n. sp.

Small, incrusting, only 3 millim. high sponges. The surface is covered with conuli 3 millim. high and 4 millim. apart. The colour of the living sponge is bright sulphur-yellow.

The *skeleton* consists of a network of irregularly curved fibres 0.25 millim. thick, with meshes 1.8 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus HALME.

Spongidae which consist of reticulate lamellæ, with a skeleton composed of single rows of large sand-grains or arenaceous knotty main fibres joined by exceedingly fine connecting-fibres.

Halme simplex, Lendenfeld.

Halme simplex, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part V. The Auleninae," Proceedings of the Linnean Society of New South Wales, vol. x. p. 301 (1885).

Low incrusting sponges, which attain a height of 12-20 millim. and a horizontal extent of 100 millim. From a basal plate numerous lamellæ arise, which coalesce regularly in such a manner as to produce conic, honeycomb-like cells. There is no dermal lamella. The free margins of the septa are continuous, slightly undulating; their surface appears granular. The colour

of fresh, preserved, and dry specimens is dark brown or black. The sponge is resilient when fresh, brittle and friable in the dry state.

The *skeleton* is composed of main and connecting-fibres. The former appear as simple, uniserial, pretty straight columns of nearly spherical sand-grains 0·07 millim. in size, which are not invested by a conspicuous spongin coating, and held together by a minimum quantity of horny cement. The connecting-fibres are simple or slightly branched, 0·008 millim. thick; they do not anastomose to form a reticulation. The surface is protected by an arenaceous cortex.

GEOGRAPHICAL DISTRIBUTION.—Indian Ocean: Mauritius.

North coast of Australia: Torres Straits (*Macleay*); Northern Territory, S. A. (*Haacke*). South coast of Australia: Port Phillip, V. (*Lendenfeld*).

Halme globosa, Lendenfeld.

Halme globosa, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part V. The Auleninae," Proceedings of the Linnean Society of New South Wales, vol. x. p. 303 (1885).

Bulbous, more or less spherical sponges, attached by a small base, which attain a diameter of 30–60 millim. In the living state this sponge has a greyish-purple colour, which is subject to variations. The purple is always the same, but the grey varies, according to the nature of the foreign bodies in the dermal lamella, from light to dark grey. In spirit, if well preserved, the sponge retains its dull purple colour; dry specimens are brownish grey. The dermal lamella is a marginal thickening of the internal lamellæ, the distal parts of which appear wedge-shaped in sections. The contour of the pseudoscula, in the surface, is rounded; they measure on the surface 8 millim., and in the narrowest part below 5 millim. in width, and are about 7 millim. apart.

The *skeleton* consists of knotty main and reticulating connecting fibres. The wide inhalant canals are pervaded by numerous fine membranes, which contain a great number of highly colourable, amœboid wandering-cells.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia, St. Vincent Gulf, S. A. (*Haacke*); Port Phillip, V. (*Lendenfeld*).

Halme nidus vesparum, Lendenfeld.

Halme nidus vesparum, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part V. The Auleninae," Proceedings of the Linnean Society of New South Wales, vol. x. p. 288 (1885).

Holopsamma laminæfavosa (partim), H. J. Carter, "Descriptions of Sponges

from the Neighbourhood of Port Phillip Heads, South Australia (continued)," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 212 (1885).

The ordinary shape of this species is that of a more or less irregular bulb, from which excrescences often arise; these attain in some specimens a digitate shape: and sometimes the whole sponge consists entirely of digitate processes which vary in length from 70–120 millim.; these are cylindrical, 12–18 millim. thick, and have a circular transverse section. Rarely the sponge expands in the shape of a lamella, attached by a small base. The largest bulbous specimens attain a diameter of 60 millim. The sponge is grey, with a slight violet tinge when alive; in spirit and dry it is grey, and has the colour of the sand which forms its cortex.

The whole sponge consists of a honeycomb-like reticulation surrounded by a dermal lamella. The latter is the only portion visible from outside. It is perforated by numerous pseudoscula. The appearance of the otherwise smooth surface depends on the distribution, shape, and size of these apertures. In some specimens they are circular, 2 millim. wide, and 3–4 millim. apart; in others smaller and further apart, particularly in the basal portion of the sponge. Sometimes they are larger, quite close together, and polygonal. They rarely equal the cells in the honeycomb below in size. In this case there is no proper dermal lamella. These pseudoscula lead into the vestibular lacunæ—the cells of the honeycomb. The whole sponge can be compared to a honeycomb covered by a beehive, perforated by numerous apertures, which are in direct communication with the cells inside. The oscula are circular, and measure about 0·3 millim. in diameter. The oscular tubes are 0·4–1·5 millim. wide, and appear considerably constricted at their termination. The oscula are confined to the walls of the vestibular spaces; none are found on the external surface.

The *skeleton* consists of main and connecting-fibres. The main fibres extend from a basal horny plate upwards; distally they curve slightly outward, ramify in a penicillate manner, and coalesce to form a reticulation. They are on an average 0·3 millim. thick, and filled with a dense mass of large sand-grains. The outer spongin coating measures only 0·01 millim. in thickness, and consequently the surface of the fibres appears exceedingly uneven and knotty. These fibres are joined by connecting-fibres 0·02 millim. thick, which are very simple, mostly straight, perpendicular to the main fibres, and only slightly ramified. The connecting-fibres are free from foreign bodies. With a high power a very slender axial thread can be discerned in them, which swells to a little conic granular extension at the point where the connecting-fibre joins the main fibre. The cortex must be regarded as an integral part of the skeleton, as the main fibres are coalesced with it. The sand-grains of the cortex measure 0·1

millim. in diameter, and are cemented by spongin. The cortex has a thickness of about 0.35 millim. The canals leading into the vestibular lacunæ are short and circular, cylindrical perforations of the external lamella. In their walls the layer of sand-grains is only half as thick as on the outer surface. As we proceed downward, the size of the sand-grains and the thickness of the cortex decrease rapidly, until in the interior the sand-grains measure only 0.02 millim. in diameter and the cortex 0.05 millim. in thickness. We must assume that the sponge exerts some active influence on the selection and distribution of the sand-grains.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Port Stephens, N. S. W. (*Ramsay*).

Halme micropora, Lendenfeld.

Halme micropora, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part V. The Auleninæ," Proceedings of the Linnean Society of New South Wales, vol. x. p. 304 (1885).

Holopsamma laminæfavosa (partim), H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xv. p. 212 (1885).

Massive, irregular, globose, or cup-shaped sponges, which attain a breadth of 70 millim. and a height of 40 millim. The sponge consists of an irregular honeycomb-like reticulation. There is no dermal lamella, but the outermost cells of the honeycomb are distally closed by thin membranes, which are perforated by small holes. These membranes are concave, and occupy the depressed polygonal areas which lie between the network formed by the free margins of the lamellæ. There are also membranes in the very regular, radially situated cells of the honeycomb. The living sponge is bright yellow; preserved and dried specimens are light grey. The sponge is hard and incompressible, the surface is protected by an arenaceous cortex.

The supporting *skeleton* consists of irregular rows of sand-grains about 0.15 millim. in size, which are not in contact with each other, and appear connected by very fine unbranched spongin-fibres.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Halme villosa, Lendenfeld.

Aulena villosa, R. v. Lendenfeld, "A Monograph of the Australian Sponges. —Part V. The Auleninæ," Proceedings of the Linnean Society of New South Wales, vol. x. p. 309 (1885).

Massive, spherical, or oval sponges attached by a small base, but never pedunculate, attaining a height of 40 millim. and a breadth of 30 millim. The colour of the living sponge is yellowish grey, but seems to be subject to variations. In spirit and dry it appears dirty grey. The surface is covered with abundant cylindrical, terminally rounded conuli, which are about 2 millim. high, 0·8 millim. thick at the base, and 1·4 millim. apart. The direction in which these conuli protrude from the surface varies. They invariably radiate from a common centre; but this centre may be situated further up or lower down, as the case may be. In some specimens this centre coincides with the centre of the sponge, and the conuli stand perpendicular to the surface; in others, again, it lies near the base of the sponge, and then the conuli tend upward. It appears that the locality where the sponge grows has something to do with the position of the conuli. These conuli are soft and resilient, and move with the water-currents, so that the sponge appears villous. Between the conuli very fine, soft, and tender membranes, perforated by large circular pseudoscula, which lead into the system of vestibular lacunæ below, are spread out. These vents are circular, and situated in groups of 1–4; they measure 2–5 millim. in width. The difference between this and other species of *Halme* lies in the fact that in them the body consists of lamellæ, and in this species of cylindrical trabeculæ. Whilst in most species of *Halme* the vestibular lacunæ are simple empty spaces between the sponge-lamellæ, they are traversed by numerous fine membranes (which subdivide them into smaller, more or less spherical compartments) in *H. villosa*. These compartments are connected by large circular pores in the membranes which are spread out between them. It is apparent that by movements of these membranes the direction and force of the water-current can be greatly influenced. We find that there are nervous and muscular elements in these membranes, by the united action of which, no doubt, the water-current is regulated. The meshes of the network formed by the true body of the sponge measure 1–2 millim. in width; this is the extent of the vestibular lacunæ.

The compartments into which the vestibular spaces are divided are more or less spherical, and measure 0·2–0·5 millim. in width. This structure has a froth-like appearance, and fills the whole of the vacant space in the meshes. The thickness of the membranes is on an average 0·017 millim. The circular pores in them are situated in the middle of the fields, limited by the lines where the membranes join. They are pervaded by slender horny fibres which support them.

The canal-system is rather complicated. The inhalant pores are scattered all over the surface, on an average 0.2 millim. apart; they are circular, oval, and apparently very liable to change in shape and size; it seems that they can be dilated and contracted at the option of the sponge very considerably. Their average width is about 0.04 millim. They are covered outside by a fine and tender sieve-membrane, with numerous, about 20, circular pores. From the inhalant pores short, circular, and cylindrical canals, about 0.04 millim. long and as wide as the pores themselves, lead down into the subdermal cavity. The latter is not very highly developed, and consists of a system of wide, anastomosing, radially depressed canals extending tangentially and undermining the skin. The outer side is flat, and lies in a plane parallel to the outer surface. The floor is very irregular, forming wide, conic extensions which lead into the inhalant canals. The average width of the subdermal cavity is only 0.03 millim. The inhalant canals are much curved and only slightly ramified, more or less circular in transverse section, and average about 0.18 millim. in diameter; they are accordingly much wider than the subdermal cavity. Their ramifications are irregular. The exhalant canals are much more irregular in shape than the inhalant ones, and of similar average width. Also these are slightly and irregularly ramified, and join to form lacunose cavities—the oscular tubes. The average width of these tubes is 0.6–0.8 millim.; they are constricted just below the circular oscula, which are not raised over the surface and appear scattered irregularly. The width of the osculum is 0.12 millim. The ciliated chambers are spherical, and 0.04 millim. wide; they form a dense layer taking up the whole of the thickness of the lamellæ, which divide the inhalant from the exhalant canals.

The *skeleton* consists of a pretty regular network of fibres which do not contain any foreign bodies. Main and connecting-fibres cannot be distinguished. The fibres have a thickness of 0.006–0.02 millim., and form a pretty loose network. In the true body of the sponge the meshes average 0.2 millim., and in the vestibule-tissue 0.5 millim. in width. At the joining-points of the fibres, in the true body of the sponge, only sand-granules 0.14 millim. in size are situated, one in each joining-point. These sand-grains, which form an integral part of the skeleton, are enclosed in a spongin coating, which is about half as thick as the fibres; it is stratified, but the layers are not very clearly visible. There can be no doubt that these sand-grains are originally attached to the tips of the conuli, and from thence apparently wander centripetally, as they actually remain in the same place whilst the sponge grows, and the conuli extend beyond them.

This species is interesting for the development of the nervous elements which I have discovered in the membranes pervading the vestibular lacunæ.

Halme villosa, var. **auloplegma**.

Aulena villosa, var. *auloplegma*, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part V. The Auleninæ," Proceedings of the Linnean Society of New South Wales, vol. x. part 3, p. 318 (1885).

Halmopsis australis, R. v. Lendenfeld, *l. c.* p. 320.

Spherical sponges, with vents which are of uniform size and distributed over the whole of the surface.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Halme flabellum, Lendenfeld.

Aulena flabellum, R. v. Lendenfeld, "A Monograph of the Australian Sponges.—Part V. The Auleninæ," Proceedings of the Linnean Society of New South Wales, vol. x. p. 318 (1885).

Compressed, frondose, flabelliform sponges, attached by a short peduncle, generally growing erect. This species does not attain a large size. The specimens do not exceed 40 millim. in height, 50 millim. in width, and 5 millim. in thickness. The peduncle has a circular transverse section, and is about 8 millim. thick; it is very short, and constricted in the middle. The surface appears villous, because it is covered with cylindrical, distally rounded processes, 3 millim. long and 1 millim. thick; these stand very close together, and are arranged in longitudinal rows, extending from the peduncle to the upper margin of the lamella. All these processes are turned upward, and do not project radially. Pseudoscula, measuring 8 millim. in diameter, are sometimes observed on the upper margin of the lamella. These *Nardorus*-forms are, however, rare. The usual form is the *Auloplegma*.

The colour of living, preserved, and dried specimens is always pretty much the same, dirty grey. Fresh specimens are soft and resilient; dry skeletons compressible, inelastic, and friable.

Between the projecting conuli or villi perforated membranes are spread out, which divide the lacunar vestibule-spaces of the interior from the outer world. The true body of the sponge appears as a reticulation, the meshes of which are occupied by the vestibular spaces. The latter are traversed by muscular membranes which deflect and regulate the water-current by their movements. The trabeculæ are, like the spaces between them, about 1 millim. broad. On the surface of the true body of the sponge oscula and groups of small inhalant pores are observed, which open either direct into the outer water (on the projecting villi), or indiscriminately into the vestibular spaces (in the interior

of the sponge). The oscula are about 0.5 millim. wide. The canals are wide, and there is very little organized substance in the sponge compared with the quantity of foreign bodies in the skeleton and the voluminous vestibular lacunæ.

The *skeleton* consists of a rather irregular network of fibres, which vary in thickness from 0.003–0.018 millim. At the points of junction of the fine fibres, knots are formed. The longitudinal fibres, which are much thicker than the others—on an average 0.015 millim.—can be regarded as main fibres. Both the thick and slender fibres are charged with foreign bodies; the former to such an extent that they attain a knotty surface. Among these, foreign siliceous spicules are particularly prevalent. Sand-grains, on an average 0.12 millim. in size, are abundant in the thick, but absent in the slender fibres. The foreign bodies in the latter appear as an axial string of broken foreign siliceous spicules. These fragments are very uniform in size and on an average 0.06 millim. long. Some spicules appear intact: none seem, however, to be proper spicules.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Broughton Island (*Ramsay*).

Genus **STELOSPONGIA.**

Spongidæ with large ciliated chambers, wide subdermal cavities, and a skeleton-net with wide meshes, which is generally strengthened by longitudinal trellis-like fascicles of closely approximated fibres.

Stelospongia sarta, n. sp.

Lobose, massive, irregular sponges, which attain a maximum diameter of 160 millim. The continuous surface is covered with very small conuli 0.4 millim. high and 1.2 millim. apart. The oscula, which measure 1.4 millim. in width, are scattered chiefly over the prominent parts. Light brown colour, in spirit.

The *skeleton* consists of a network of fibres 0.018–0.03 millim. thick; these approximate here and there to form rather indistinct fascicles in which the meshes are 0.3 millim. wide. In the interstitial network the meshes average 1 millim. in width. At the joining-points of the fibres in the fascicles occasionally very large sand-grains are observed, which measure on an average 0.5 millim. in diameter; they may be single, or there may be two or three together in a cluster. The whole structure is exceedingly similar to the skeleton of certain species of *Halme*.

The canal-system is rather remarkable. The inhalant pores lead into a somewhat complicated system of tangentially extending, irregular canals with annular strictures; these finally open out into very wide, tangentially extending, irregularly cylindrical canals, which measure on an average 1 millim. in width. The narrow inhalants proper arise from these wide canals. The ciliated chambers are 0.041 millim. wide, regularly spherical, and provided with very short special efferents or opening directly into the wider exhalants.

Our sponge shows in many respects great affinity to *Halme*; it connects the genera *Halme* and *Stelospongia* both in respect to the large size of the subdermal canals, which might be regarded as vestibules, and in the structure of the skeleton.

GEOGRAPHICAL DISTRIBUTION.—New Zealand: Port Chalmers (*Parker*).

***Stelospongia mirabilis*, n. sp.**

Irregularly massive sponges which attain a maximum diameter of 70 millim. The *skeleton* is composed of flabelliform trelliswork-like bands 6 millim. broad. These consist of numerous main fibres 0.2 millim. thick, which are charged with fairly abundant foreign bodies. The connecting-fibres are very short and quite simple; they join adjacent main fibres, are 0.1–0.16 millim. thick, and contain hardly any foreign bodies.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Molle, Q. (*Ramsay*).

***Stelospongia canalis*, n. sp.**

The sponge consists of a number of digitate processes which grow out from a common basal mass. It attains a height of 210 millim. and a breadth of 170 millim. The digitate branches are straight and extend obliquely upwards; they are not perpendicular and parallel. These processes are regularly cylindrical in their basal portion, and appear conic, tapering to a narrow end distally. The transverse section is pretty regularly circular throughout. Near their base, where they are thickest, the digitate branches measure 30 millim. near the end, 18 millim. in diameter. On the surface of the skeleton grooves 10 millim. deep and about equally wide are observed, which extend regularly longitudinally up the branches, one on each digitate process. On the surface of the massive central part of the sponge these grooves are more irregular, and anastomose here and there. In the living sponge these grooves are covered with a fine membrane. The surface of the living sponge is covered with small broad conuli, 0.5 millim. high, which are on an average 1.5 millim. apart. In the membranes which cover the grooves in the skeleton there are, of course, no conuli. These membranes, which are more or less depressed,

appear therefore as very conspicuous, concave, longitudinally extending aconulous zones. In most cases oscula 5–8 millim. wide are observed on the summits of the digitate processes.

The living sponge is light purplish brown; the dry skeleton dark chestnut-brown, pretty stiff, and elastic.

The *skeleton* consists of simple main fibres, which are joined by simple or slightly branched connecting-fibres. The main fibres extend longitudinally upwards in the digitate branches of the sponge, closely following the inner side of the superficially situated oscular tube; they continually give off branches which extend upward and outward, and appear curved in a plumose manner. The main fibres have a slightly uneven, undulating surface, are 0.16–0.2 millim. thick, and on an average 0.8 millim. apart, except close to the oscular tube, where they stand closer together. They are free from foreign bodies and terminate in the surface with several slender, more or less pointed branches, in a somewhat pitchfork-like manner. The connecting-fibres are 0.04 millim. thick, pretty straight, and slightly angularly bent at the rare branching points; they are mostly transverse and simple, connecting adjacent main fibres. The meshes are mostly square, with pretty sharp corners, and 1 millim. wide.

The inhalant pores lead into irregular, tangential, radially compressed canals, about 0.1 millim. wide, in which no annular strictures are observed. These open out into longitudinally extending canals, 0.6–1 millim. wide, which lie just below the surface, and from the floor of which the inhalants proper arise. The ciliated chambers are spherical, 0.043 millim. wide, and destitute of special efferent canals. The exhalant canals join to form larger longitudinal canals, which extend upward below the floor of the 5–8 millim. wide oscular tubes which occupy the grooves in the skeleton. There is one such superficially situated oscular tube in each digitate process. The longitudinal exhalants, which form a kind of subdermal system below the floor of the oscular tube, open out into it by small constricted apertures. The membrane which covers the oscular tube outside is perforated, and appears very similar to the ordinary sieve-membranes, which are expanded over the entrances to the inhalant system. The pores in this fine membrane are round, on an average 0.1 millim. wide and about as much apart. In the trabeculæ between them stout bands of slender spindle-shaped muscular cells are observed. A terminal osculum may be present or absent. There can be no doubt that the water is expelled by the small pores in the membrane covering the oscular tube, and it appears very remarkable that the structure of this membrane should be so similar to that of a common inhalant pore-sieve.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia (*Gunn*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Stelospongia australis, n. sp.

The synonyms will be found below in the descriptions of the varieties.

Pyriform, erect, pedunculate, flabelliform, lobose, or low incrusting sponges, which attain a maximum height of about 300 millim. The varieties *S. a. canaliculata*, *S. a. villosa*, *S. a. conulata*, and *S. a. fovea* are erect, radially symmetrical, more or less pedunculate and pyriform, or club-shaped. Irregular colonies of pyriform individuals of these varieties occur, in which their distal ends remain distinct; sometimes, however, they may be entirely joined, as occasionally in *S. a. fovea*. In *S. a. levis* we meet with thick flabellar forms which appear as more or less laterally fused pyriform individuals distinct in their distal portions. *S. a. conulissima* is small, low, and incrusting.

The surface is covered with large conuli in all the varieties, with the exception of *S. a. levis*, the surface of which is partly smooth, and partly covered with small conuli. In the other five varieties the conuli are 1–5 millim. high and 1–4 millim. apart. The distal ends of the fascicles of main fibres which support these conuli project in the skeleton as tufts or villi 1.5–10 millim. over the surface. They are longer and more slender in *S. a. villosa* than in the other varieties. These projecting fascicle-termini are scattered uniformly over the surface, as, for instance, in *S. a. villosa*; or arranged in more or less regularly longitudinal rows, as particularly in *S. a. canaliculata*; or they are arranged in lines which form a very regular network with polygonal meshes in the surface, as in *S. a. fovea*. The oscula are always very large and conspicuous, 8–12 millim. wide and circular. In the pyriform varieties there is always one osculum only, and this is situated centrally on the summit of the sponge. In the colonies there is, of course, an osculum on the summit of each one of the fused individuals. In *S. a. levis* an osculum is observed on the side near the summit of each of the processes which rise from the margin of the flabelliform sponge. In *S. a. conulissima* the oscula are few in number, scattered over the surface, and surrounded by a funnel-shaped tube 8–18 millim. long, which is supported by longitudinal fascicles of main fibres. In skeletons these appear as very conspicuous frills round the oscula.

The colour of living specimens is brown, with a more or less distinct violet tinge, on the surface, and grey or yellowish in the interior. The dry skeletons are light to dark brown, stiff, but slightly compressible and elastic.

The main support of the *skeleton* consists of flattened, band-shaped, occasionally also cylindrical fascicles of main fibres, which extend upwards along the wall of the centrally situated oscular tube, and give off branches curving in a plumose manner outwards to the surface. The fascicles are 0.8–6 millim. wide. The most slender are observed in *S. a. conulata*, where they are cylindrical; and the widest in *S. a. fovea*, where they are exquisitely band-shaped, about 0.7 millim. thick, and here and there 6 millim. wide. These fascicles

consist of longitudinal main fibres, which are 0.1–0.28 millim. thick, and cored with a pretty slender axial string of foreign spicule-fragments. They are joined by short and simple transverse fibres 0.04–0.12 millim. thick, which are free from foreign bodies. The meshes in the fascicles are square, round, irregular, 0.2–0.6 millim. wide; or oval, 0.4–0.6 millim. long and 0.08–0.12 millim. broad. Such oval meshes are observed in *S. a. canaliculata*, *S. a. conulata*, and *S. a. villosa*. The interstices between these fascicles are occupied by a pretty loose network of fibres, 0.04–0.1 millim. thick, which are free from foreign bodies. The meshes formed by them are 0.6–1.5 millim. wide, irregular, or more often polygonal, with rounded corners.

The inhalant pores are oval, 0.04–0.06 millim. wide, and situated in small groups on the outer surface of the sponge. There are no inhalant pores at all in the walls of the wide central cavities, which are true oscular tubes. No small circumvallate oscula are situated on the surface. The inhalants lead into slender canals, which open into tangentially extending canals 1–1.5 millim. wide, from the floors of which large inhalant canal-stems originate, which are straight, cylindrical, and 0.8 millim. wide. These give off branch-canals 0.16 millim. wide. The stout stems are pretty regularly perpendicular to the surface, the branch-canals irregular. The ciliated chambers are spherical, 0.045 millim. wide, and destitute of special efferent canals; they open directly into the exhalants, which join to form larger stems 2–3 millim. wide, which extend upward and inward, and cross the fascicles of main fibres at nearly right angles. It is clear that in this case the direction of the main fibres is not parallel, or even adapted to that of the large canals, as it is generally assumed to be. The ciliated chambers have very small, under ordinary circumstances imperceptible, afferent pores. There are no large apertures connecting the inhalant canals with the ciliated chambers, as represented by Poléjaeff in plate v. fig. 3 of his 'Challenger' Report on Keratosa. The large exhalant stems open out into the wide centrally situated oscular tube, in which annular strictures are observed. These are particularly highly developed in *S. a. conulata*, where they often extend to form veritable sphincter-membranes. The oscular tube of *S. a. fovea*, on the other hand, is pretty smooth.

I have observed in the membranes dividing the canals of the subdermal system very abundant large granular cells, particularly in *S. a. conulata*. The ova mature in endothel-capsules, which are situated in the meshes of the fascicles of main fibres.

I divide this species, the conception of which in this extent is new, into six varieties, among which several sponges previously described by Carter, Hyatt, and Poléjaeff, as *Cacospongia* and *Stelospongos*, are distributed. To two of the varieties no previously described sponges appear referable. The species

has a wide range. It has been obtained from the West Indies, the South Atlantic, the Indian Ocean, and the Australian Seas. The centre of distribution lies in the latter, where some of the varieties are among the most common sponges.

***Stelospongia australis*, var. *conulata*, Hyatt.**

Stelospongos levis, A. Hyatt, "Revision of the North American Porifera.—Part II.," *Memoirs of the Boston Society*, vol. ii. p. 530 (1877).

Stelospongos levis, var. *rotundus*, A. Hyatt, *l. c.* p. 530.

Stelospongos levis, H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 303 (1885).

Pyriiform pedunculate sponges, which attain a height of about 150 millim. Specimens 200 millim. high are rare. The sponge is generally erect, radially symmetrical, with a perpendicular axis. Sometimes, however—probably in such cases where the sponge grows on an inclined plane—the lower attenuated portion, which is drawn out to form the peduncle, appears slightly curved. The greatest width, 50–80 millim., is observed just above the middle, about 60 millim. below the distal end. The sponge has a regularly circular transverse section. The peduncle is about 20 millim. thick, cylindrical, about 30 millim. long, and widened above. The surface is covered with pretty blunt conuli, which often terminate in several points, and are somewhat variable in size, 1–2.5 millim. high and 2–4 millim. apart. Hyatt (*loc. cit.*) distinguishes two varieties according to the size of the conuli; this distinction cannot, however, be upheld, as the conuli vary in one and the same individual as much as in Hyatt's varieties. The conuli are always much higher and further apart on the body of the sponge than on the peduncle; they are connected by slightly prominent ridges which surround concave, polygonal, rarely triangular fields. In the skeleton villi or tufts are observed on the surface which support the conuli of the living sponge. There is always one single osculum which is situated terminally on the summit of the sponge; it is circular, 8–12 millim. wide, and surrounded by a very thin wall, about 8 millim. high, which appears as a tubular outgrowth from the summit of the sponge. This tube is supported by longitudinal fascicles of main fibres which appear as a frill round the osculum in the skeleton. Carter's *Stelospongos levis* sometimes has more than one osculum. Occasionally several such pyriiform sponges are partially fused at their bases, and in such cases an osculum is, of course, observed on the summit of each individual of the colony. Such forms are, however, not so frequent in this as in some other varieties. Carter's polyoscular specimens are such colonies.

This sponge is perhaps the most common in Australian waters, but although hundreds of specimens have passed through my hands, yet I did not find a



very wide range of form. The specimens from warmer water—from the northern localities—are slightly rougher than those from the south.

The colour of the living sponge is violet-brown on the surface, greyish in the interior. Dry skeletons are light chestnut-brown, pretty stiff, and elastic.

The *skeleton* consists of more or less band-shaped fascicles which extend longitudinally up the middle of the pyriform sponge, following the oscular tube, and emitting branches which curve towards the surface in an elegantly plumose fashion. The fascicles are 0.8–1 millim. broad; the individual main fibres in them are 0.1 millim. thick, and cored with abundant and large spicule-fragments; they appear fused at intervals of about 0.4 millim., and are only 0.08 millim. apart. The meshes in the fascicles accordingly appear very elongate, oval; they are 0.08 millim. broad and 0.4 millim. long. The connecting-fibres are straight or slightly curved, 0.06 millim. thick. The meshes are irregular; the larger ones measure 1.5 millim. in width.

The inhalant pores are confined to the outer surface of the sponge, where they lie in small groups of four to eight. They are oval, distended, 0.04–0.06 millim. wide, and lead into slender irregular canals which open out into the wide subdermal cavities, which appear as irregularly tangentially extending canals 1–1.5 millim. wide. From the floors of these the particularly large and conspicuous inhalant stems, about 0.8 millim. wide, arise; they are straight, extend perpendicularly to the surface down into the interior of the sponge, and give off abundant branch-canals 0.16 millim. wide. The dermal layer is destitute of ciliated chambers. In the interior they are very abundant, spherical, 0.045 millim. wide, and not provided with special efferent canals. They open direct into the pretty narrow exhalant canals. The latter join to form larger stems, which extend obliquely upward and inward, and open out into the centrally situated vertical oscular tube, which is 8–10 millim. wide. The latter is provided with very conspicuous annular constrictions at short intervals, which often appear drawn out to form sphincter-membranes.

The membranes which separate the canals of the subdermal system are charged with very abundant oval granular cells. The ova mature in special endothel-capsules which are situated in the small meshes of the fascicle-bundles.

Whether the sponges mentioned as identical in the list of synonyms are really the same is quite certain only in the case of Carter's *Stelospongia levis*, the type of which I have re-examined. In identifying Hyatt's forms, I mainly relied on his photographic representations. It seems to me not improbable that Ridley's *Hircinia hispida* from Chili is a young specimen of this sponge.

GEOGRAPHICAL DISTRIBUTION.—Pacific Ocean (*United States Exploring Expedition*).

Australia (*Cumming*). North coast of Australia: Northern Territory, S. A.

(*Haacke*); Thursday Island, Torres Straits (*Lord Stanley*). South coast of Australia: King George's Sound, W. A. (*Lendenfeld*); Port Phillip, V. (*Lendenfeld*); Port Phillip Heads, V. (*Boston Soc. Coll., B. Wilson*); Tasmania (*Catten*). East coast of Australia: New South Wales (*Acad. Philadelphia Coll.*); Port Jackson, N. S. W. (*Lendenfeld*); Broughton Island (*Ramsay*); Swan River, Q. (*Brown, Jansen*).

New Zealand: Port Chalmers (*Parker*).

***Stelospongia australis*, var. *fovea*, Poléjaeff.**

(PLATE XI.)

Cacospongia amorphia, N. de Poléjaeff, Report on the Scientific Results of the Voyage of H.M.S. 'Challenger,' Zoology, vol. xi. Keratosa, p. 57 (1884).

Regularly radially symmetrical, pyriform, pedunculate sponges, which attain a height of 200 millim. The peduncle is distended below, to form a basal plate by which the sponge is attached, and constricted further up, measuring at the narrowest point about 20 millim. in diameter. It is regularly cylindrical in transverse section, and attains a length of about 25 millim. It widens above, and there is no clear limit between the peduncle and the true body of the sponge—it passes gradually into it. The body of the sponge itself is oval or fusiform, drawn out below to form the peduncle, and above to the slightly raised and large, centrally situated terminal osculum. The body has a regularly circular transverse section, and is in the middle about 80 millim. thick. More irregular or slightly compressed forms occur, but they are very rare. The surface is covered with large and conspicuous conuli, disposed in lines which form a network with very uniform polygonal meshes. In the skeleton this network—here formed by the distal ends of the band-shaped fascicles of main fibres—becomes still more apparent. The concave fields between the ridges are about 3 millim. deep. The conuli are higher in the joining-points of the ridges than elsewhere, and protrude over the ridges themselves 0.7–1.5 millim. They are smaller and closer together, and the polygonal fields between them less distinct, at the upper and lower ends of the sponge than in the middle. The measurements given above refer to the surface of the central part of the sponge. Longitudinal rows of concave fields are occasionally more or less fused. Sometimes two or more individuals coalesce to form a polyoscular colony. The oscula are generally situated on the summits of the distal distinct parts of the coalesced individuals, which are rarely fused throughout, in which case the oscula lie in the upper distended margin. The oscula are always surrounded by membranes—frills of longitudinal fascicles of main fibres in the skeleton—which are particularly conspicuous in those colonies which consist

of entirely fused individuals. Poléjaeff's *Cacospongia amorphia* from Bahia does not differ at all from some of the Australian specimens of this variety.

The living sponge is greyish yellow in the interior, and pretty light violet-brown on the surface. The dry skeleton is light chestnut-brown, stiff, compressible, and very elastic.

The *skeleton* consists of broad and thin band-shaped fascicles, which are joined by a loose network of connecting-fibres. The band-shaped fascicles extend towards the surface, where they measure 1-6 millim. in width. On the sides of the pyriform sponge they are very regularly disposed in such a manner as to form the sides of radially situated pyramids, the bases of which abut on the surface. The free terminal margins of the bands project, forming the exquisite reticulate structure characteristic of the variety. The sides of the pyramids, surrounded by fascicles, may consist of one single broad band, or they are composed of a number of parallel narrow bands, which stand *behind* each other, like the leaves of a book, and separated by intervals 0.5 millim. wide. The bands are expanded perpendicularly to the side of the pyramid, which, in the aggregate, they form. The individual main fibres in the fascicles are 0.12 millim. thick and 0.3 millim. apart, slender, knotty, and cored with small spicule-fragments. The transverse fibres are slightly branched, or more often simple and free from foreign bodies, 0.04-0.08 millim. thick. The meshes in the fascicles are round or irregular, on an average 0.2 millim. wide. The connecting-fibres which form the network between the fascicles are 0.08-0.1 millim. wide, gracefully curved, and free from foreign bodies. The meshes in this network are 1.4 millim. wide, polygonal, with rounded corners.

GEOGRAPHICAL DISTRIBUTION.—South Atlantic Ocean: Bahia ('*Challenger*'). Australia (*Cumming*). North coast of Australia: Northern Territory, S. A. (*Haacke*). West coast of Australia: Western Australia (*Baily*). South coast of Australia: Tasmania (*Majendie*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*); Broughton Island (*Ramsay*).

***Stelospongia australis*, var. *levis*, Poléjaeff.**

Cacospongia levis, N. Poléjaeff, Report on the Scientific Results of the Voyage of H.M.S. 'Challenger,' Zoology, vol. xi. part xxxi. Keratosa, p. 56 (1884).

Erect lobose massive sponges, composed of several separate individuals which stand side by side and are fused at the base. Thus a somewhat flabelliform structure, attached by a small base, or sometimes pedunculate, is produced. The shape of this variety is more variable than that of the others. The whole sponge attains a height of 150 millim., a breadth of 120 millim., and a thickness of 30 millim. The surface is quite smooth, except in some places where

it is rather roughened by the ascending primary fibres (Poléjaeff, *loc. cit.*). I do not quite understand this description. The type-specimens of Poléjaeff's *Cacospongia levis* are nearly smooth, only here and there indications of small conuli are observed in them. The surface of the skeleton is smooth. A circular osculum 8 millim. wide is situated close to the summit of each marginal process.

The dry skeleton is dark brown, pretty hard, slightly compressible and elastic. According to Poléjaeff, the outer surface of spirit-specimens is black, and the interior yellowish grey.

The *skeleton* consists of cylindrical or slightly compressed fascicles, 1 millim. thick and on an average 1.5 millim. apart. The main fibres in the fascicles are 0.24 millim. thick, cored with abundant spicule-fragments, 0.12 millim. apart, and joined by short transverse fibres 0.06 millim. thick. The meshes in the fascicles are square, with rounded corners; 0.4–0.6 millim. wide. The connecting-fibres are gracefully curved and very uniformly 0.04 millim. thick; the meshes between them are irregular and 1 millim. wide.

The specimens from the deep water off Barra Grande, described by Poléjaeff (*loc. cit.*) as *Cacospongia levis*, which is one of the only three horny sponges which have been procured from depths exceeding 250 fathoms, are in every respect identical with some of the numerous specimens of this variety dredged by me in shallow water on the Australian coast.

GEOGRAPHICAL DISTRIBUTION.—South Atlantic Ocean: off Barra Grande ('*Challenger*').

North coast of Australia: Northern Territory, S. A. (*Haacke*). West coast of Australia: Freemantle, W. A. (*Bowerbank Coll.*). South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Swan River, Q. (*British Museum Coll.*).

***Stelospongia australis*, var. *conulissima*, Hyatt.**

Stelospongia friabilis, A. Hyatt, "Revision of the North American Porifera.—Part II.," *Memoirs of the Boston Society*, vol. ii. p. 530 (1877).

Small, horizontally extended, incrusting sponges, which are only 14–18 millim. high. The surface is covered with conuli, 4 millim. high and 3 millim. apart. In the skeleton projecting band-shaped fascicles of main fibres are observed on the surface, which are 4 millim. long, 2.5 millim. broad, and 0.2 millim. thick; these are about 3 millim. apart, and stand in irregular longitudinal rows. On the upper surface one or a few oscula, 8–10 millim. wide, are observed, surrounded in the skeleton by frills of fibre-fascicles.

The dry skeleton is dirty dark brown, stiff, but compressible, and pretty elastic.

The *skeleton* consists of slightly compressed or cylindrical fascicles, about 1 millim. thick, which are 2–4 millim. apart and joined by a loose network. The main fibres in the fascicles are 0·2 millim. thick, and cored with spicule-fragments. The transverse fibres are on an average 0·08 millim. thick; the meshes rounded, square, or circular, 0·3 millim. wide. The connecting-fibres are curved, 0·06–0·08 millim. thick, and anastomose to form a network with irregular meshes, 1·2 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—Indian Ocean: Zanzibar (*Boston Society Coll.*, *Peabody Academy Coll.*).

Australian Seas (*British Museum Coll.*). East coast of Australia (*Ramsay*).

Stelospongia costifera, Lamarck.

Spongia costifera, J. de Lamarck, *Histoire des animaux sans vertèbres*, edit. 2, tom. ii. p. 555 (1836).

Large, very regularly cup-shaped sponges, attached by a broad, sometimes perforated base, and broader than high. The walls of the cup are very regularly convex, so that the whole sponge appears basket-like, semispherical. It attains a height of 250 millim. and a width of 400 millim. The free margin is quite continuous and circular, or oval. The wall of the cup is in large specimens about 18 millim. thick; it becomes slightly thinner towards the rounded margin. The surface is covered with longitudinal ridges, which are more marked on the outer side than on the inner. The ridges in the basal portion of the outer side are very high and appear somewhat irregular, because tuft-like excrescences arise from them. The adjacent tufts of different ridges sometimes coalesce, and thus the whole structure is rendered very irregular. Further up the tufts are smaller and more regularly situated in rows, forming conspicuous ridges, which are at the margin about 6 millim. apart. All the ridges appear serrated in consequence of the projection of small tufts at regular intervals. The ridges on the inner side are, in skeletons, of uniform character throughout, 5–8 millim. apart, 2–3 millim. broad, and raised only slightly over the surface. Near the margin they run parallel to each other longitudinally, and they do not anastomose in the marginal zone; further down, however, they reticulate, forming a network with polygonal meshes, which are 4–5 millim. wide and disposed in longitudinal rows.

The living sponge is dark red, nearly black—a colour which is retained by spirit-specimens. The dry skeleton is chestnut-brown, very stiff, slightly compressible, and elastic.

The *skeleton* consists of longitudinally disposed fascicles, which extend perpendicularly to the surface, and which are connected by a loose network of fibres. These bands are about 2 millim. thick and on an average 6 millim. apart;

they extend from the base to the margin of the cup-shaped sponge. Occasionally they are branched under very sharp angles, so that there is a much greater number of bands at the margin than at the base, and the interval between the bands remains fairly uniform throughout. The bands are composed of densely woven longitudinal main fibres, which are 0.2 millim. thick, on an average 0.3 millim. apart, and cored with a very slender axial thread of small longitudinally disposed foreign spicule-fragments. They are joined by connecting-fibres, which appear distended in the plane of the adjacent main fibres, and often fused to form perforated plates. They are 0.2–0.24 millim. thick, and free from foreign bodies. The meshes are 0.04–0.4 millim. wide and perfectly round. The connecting-fibres are straight or slightly curved, 0.12 millim. thick: the meshes between them are square or irregular, slightly rounded at the corners; the larger ones are on an average 1 millim. wide.

In the skin of well-preserved specimens small, conuli-like protuberances, 0.05 millim. high, are observed. In each of these a large granular cell with oval nucleus is situated. In the point of the conic process a small, very strongly refringent granule can generally be detected. I am rather inclined to regard these structures as sense-organs, although the granular cell in the little conulus does not differ essentially from the ordinary granular cells which are abundant in the skin.

GEOGRAPHICAL DISTRIBUTION.—American coast of North Atlantic: Bahamas (*Bowerbank Coll.*).

North coast of Australia: Darnley Island, Torres Straits (*Macleay*). Northern Territory, S. A. (*Haacke*). West coast of Australia: Western Australia (*Baily*). East coast of Australia: Port Molle, Q. (*Ramsay*).

***Stelospongia pulcherrima*, n. sp.**

(PLATE X.)

Elegant, cup-shaped, regularly conical sponges, attaining a height of 200 millim. and a width at the margin of 130 millim. The sponge is slender, higher than broad, and attached by a narrow base. The wall of the cup is about 8 millim. thick, and thins out towards the narrow, continuous, and regularly circular margin. The inner surface is covered with longitudinally disposed anastomosing ridges, which cover it with a network of meshes 15 millim. long and 2.5 millim. wide. The outer surface is covered with very much higher and more conspicuous, sharp and narrow ridges, which project about 4 millim. over the concave fields between them; they are on an average 9 millim. apart. In the upper half they extend regularly longitudinally and do not anastomose; in the basal half they form a very regular reticulation with polygonal meshes about 10 millim. wide. The limit is very clearly defined, parallel to the margin.

The dry skeleton is exceedingly hard, of a bright brown colour with a golden hue in transmitted light.

The *skeleton* consists of longitudinal band-shaped fascicles, radiating from the base to the margin of the cup-shaped sponge. These bands are situated perpendicularly to, and project very much beyond, the external surface; they are joined by a loose interstitial network. The main fibres in the fascicles are 0.16–0.4 millim. thick, on an average 0.5 millim. apart, and cored with abundant spicule-fragments. The transverse fibres in them are on an average 0.16 millim. thick, and contain scattered spicule-fragments. The meshes are square, with rounded corners, more or less quadratic, 0.3–0.8 millim. wide; the smaller they are the more circular do they become. The connecting-fibres are pretty uniformly 0.1 millim. thick, and curved; they anastomose to form a network with meshes 1 millim. wide. All fibres show a very distinct stratification, particularly towards the surface.

It is possible that Hyatt's *Hircinia campana*, var. *typica* *, may be identical with this sponge. The figure is somewhat similar, but there is no description.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Genus **HIRCINIA**.

Spongidaë with a skeleton composed of more or less fascicular main fibres, with meshes 0.5–3 millim. wide in the interstitial network, and filaments in the ground-substance.

Hircinia variabilis, F. E. Schulze.

Hircinia variabilis, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien," Zeitschrift für wissenschaftliche Zoologie, Band xxxiii. Seite 13 (1879).

Other synonyms will be found in the description of the variety.

Sponges of very variable shape. The simplest forms are incrusting. It appears that this shape, which appears common to the young stage of all forms of *H. variabilis*, is retained by some individuals throughout life. These then appear horizontally expanded, more or less cake-shaped. More often the sponge grows perpendicularly more rapidly than horizontally, and then attains an irregular globose form. Very frequently, however, different parts of the sponge grow with different rapidity, and then irregular rugose, tubercular, or even lobose and digitate forms are produced. But in any case the sponge

* A. Hyatt, "Revision of the North American Porifera.—Part II.," Memoirs of the Boston Society, vol. ii. pl. xv. fig. 12.

appears as a crust from the upper surface of which these processes arise. Sometimes the crust is much curved, raised in the centre, attached at the margin only, and perforated. According to the shape the following varieties can be distinguished:—Incrusting or thicker and somewhat cake-shaped, *H. v. hirsuta*; massive, globose, with circumvallate oscula, *H. v. flavescens*; massive, globose, without circumvallate oscula, *H. v. typica*; digitate, branched, *H. v. dendroides*; lamellar, raised in the centre, attached at the margin, and perforated, *H. v. galea*; thick, flabelliform, erect, *H. v. lingua*; with conic outgrowths, on each of which a terminal osculum is situated, *H. v. mammillaris*; and, finally, irregular, with rows of crateriform oscula, *H. v. oros*. The surface is covered with rather blunt conuli, 1–2 millim. high, which are 1–3 millim. apart. The dimensions and the shape of these conuli are often subject to as great variations on the surface of one and the same individual as on individuals of different varieties. Living sponges of this species appear to have lower conuli than specimens preserved in spirit, and the method of preservation seems greatly to influence their appearance. The oscula are always large and conspicuous. They are, in the case of the massive and incrusting forms, scattered over the upper surface, but always appear to be situated on the summits of the protuberances of those varieties which have an uneven surface. In the flabelliform *H. v. lingua* the oscula are situated marginally, and in *H. v. oros* in rows on the summit of ridges which project from the surface. The oscula are often circumvallate, and lie at the base of concave aconulous depressions in the surface; this is particularly pronounced in *H. v. flavescens*. In certain forms of this variety—*Hircinia dilobes*, O. Schmidt—groups of oscula are often observed in these depressions. The oscula are 1–5 millim. wide.

The colour of the living sponge varies from light to dark brown. This colour is confined to a superficial layer 2 millim. thick.

The *skeleton* is in all the varieties the same. The stouter main fibres attain a thickness of 0·2 millim., are 1–2 millim. apart, and radiate from the base. They are for the most part simple, but in places dissolved into a trelliswork-like structure composed of slender fibres. Here and there they are flattened; but this peculiarity has, according to F. E. Schulze, not such an importance as some authors, particularly Carter, who established a special group—*Platyfibra*—for the horny sponges with flattened fibres, attach to it. The main fibres are cored with foreign bodies, chiefly spicule-fragments, which are not very abundant, and irregularly scattered. The connecting-fibres are generally slightly branched, and attached to the main fibres by two or more roots; very scarce scattered foreign bodies are found in them here and there. The connecting-fibres are on an average 0·05 millim. thick; the larger meshes of the network which they form are about 1 millim. wide, and irregularly polygonal. The filaments are, according to F. E. Schulze, 4–8 millim. long, and in the centre 0·006 millim. thick; towards the ends they gradually taper to 0·003

millim., and end with a terminal pyriform swelling 0.006–0.01 millim. thick—the terminal knot. F. E. Schulze has studied the filaments of this species very carefully. They consist of an axial thread, surrounded by a pith-like substance, which forms the bulk of the structure. The outermost layer is very hard and resisting, and forms a kind of cuticle on the surface of this pith-cylinder. In the terminal knots concentric layers are observed in the superficial part, and often large granules in the interior. Occasionally similar knots are situated in the course of the fibre, and then it may happen that three or four fine threads issue from one such knot. The amount of nitrogen in the filaments has been calculated by Maly at 9.2 per cent., whilst the percentage of nitrogen in the spongin-fibres is over 16 per cent. The filaments are generally more abundant on the surface than in the interior.

The inhalant pores are pretty uniformly scattered over the surface. They are about 0.04 millim. wide, and lead into special perpendicular canals of similar dimensions, which penetrate the skin and open into the subdermal cavities, 0.1–0.3 millim. wide, which undermine the skin. These appear as anastomosing, irregular tangential, radially compressed canals with an oval transverse section. The inhalant canal-stems proper, which arise from the floor of this subdermal cavity, are on an average only 0.1 millim. wide, and show very marked annular strictures. The ciliated chambers are 0.04 millim. wide, pyriform, and provided with very short special efferent canals. The afferent pores leading from the final ramifications of the inhalant system into the chambers are small. There appear to be several afferent pores to each chamber. The ova and developing embryos are surrounded by special capsules, compared by Schulze to *membrana propria*. The collar-cells are confined to the aboral portion of the chamber. Most of the specimens examined by F. E. Schulze were females. In one, however, he observed sperm-balls besides ova. He assumes therefore that in this species not male and female, but hermaphroditic and female individuals can be distinguished. In a superficial layer, 2 millim. thick, abundant dark brown spherical structures 0.01 millim. in size have been observed by F. E. Schulze, which he regards as parasitic Algæ. He has observed stages of fission, but no further development. These structures are probably not so much parasitic as symbiotic. They were regarded by Kölliker and Poléjaeff as young stages of the filaments—not so, however, by F. E. Schulze.

I distinguish eight varieties of this species for the reception of a number of species described by O. Schmidt and other forms. These varieties are by no means well defined, but appear as sections in the continuous series of changing forms met with in this species. In choosing the limits of the sections of these series to be distinguished as varieties, I have adhered to F. E. Schulze's views.

Hircinia variabilis, var. **dendroides**, O. Schmidt.

- Hircinia dendroides*, O. Schmidt, Die Spongien des Adriatischen Meeres, Seite 32 (1862).
- Hircinia dendroides*, O. Schmidt, Die Spongien der Küste von Algier, Seite 5 (1868).
- Hircinia variabilis*, pars, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—VIII. Die Gattung *Hircinia*, Nardo, und *Oligoceras*, n. gen.," Zeitschrift für wissenschaftliche Zoologie, Bd. xxxiii. Seite 12 (1879).

Sponges with branched, long and slender, digitate processes, which arise from an incrusting base. The branches anastomose here and there. Orange-yellow or red on the surface. The main fibres are more split up to form trellis-like fascicles in this than in the other varieties. The filaments are very abundant, 0.0023 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—Mediterranean: Adriatic, Quarnero, coast of Dalmatia (*O. Schmidt*). Coast of Algiers, La Calle (*Lacaze-Duthiers*).

Indian Ocean: Mascarene Islands, Providence Reef ('*Alert*').

North coast of Australia: South coast of New Guinea (*Haacke*); Isle of Pines, Torres Straits (*British Museum Coll.*).

Hircinia campana, Lamarck.

- Hircinia campana*, O. Schmidt, Grundzüge einer Spongienfauna des Atlantischen Gebietes, Seite 31 (1870).
- Hircinia campana*, var. *fixa*, A. Hyatt, "Revision of the North-American Porifera.—Part II.," Memoirs of the Boston Society, vol. ii. p. 546 (1877).
- Hircinia campana*, var. *typica*, A. Hyatt, *l. c.* p. 546.
- Polytherses campana*, Duchassaing et Michelotti, Spongiaires de la mer Caraïbe, p. 68 (Haarlem, 1864).
- Spongia campana*, J. B. de Lamarck, "Sur les Polypiers empâtés; Éponges," Annales du Muséum d'Histoire Naturelle, Paris, tom. xx. p. 385 (1813).
- Spongia campana*, J. B. de Lamarck, Histoire des animaux sans vertèbres, tom. ii. p. 553 (1816).
- Stematumenia scyphus*, J. S. Bowerbank, "Observations on the Spongidæ, with Descriptions of some new Genera," Annals and Magazine of Natural History, ser. 1, vol. xvi. p. 407 (1845).

Large, flabelliform, cup-shaped, or pedunculate, lamellar or also horizontally

expanding sponges, which attain a height of 300 millim. Specimens are often met with which consist of an irregular erect basal mass, the margin of the upper surface of which is extended horizontally or obliquely upwards so as to form a disc or cup with very thick walls which thin out towards the sharp margin. The basal mass is in other specimens much reduced in size, and appears as a stout peduncle only; such forms, however, are rare. More often it happens that the whole sponge consists of a thin, curved, frondose, irregularly flabelliform plate, which is attached by a long line at the base. The lateral margins of this curved ear-shaped frond may meet and coalesce to form an irregular calyculate structure. In these forms, which are usually large, the walls of the cup are only 8–12 millim. thick, and much thinner and more regular than in those of the first-mentioned series of forms in which a central basal mass is observed. The surface is covered with conuli, arranged in more or less regular longitudinal rows which appear as projecting ridges. The conuli are larger on the outer convex than on the inner concave surface of the lamellar parts, and also exhibit a diminution in number and corresponding increase in size towards the base of the sponge. The longitudinal ridges are 2–3 millim. apart, the conuli 0.5–2 millim. high—according to their position—and, in the ridges, on an average 1 millim. apart. The oscula are generally confined to the inner surface, occasionally also found on the margin, but never on the outer convex surface of the sponge; they are 1–2 millim. wide, and scattered over the concave surface, or arranged in groups of about 20, extending over an area 10–15 millim. wide. The colour of the living sponge is dark dull red on the surface, and lighter, more yellowish in the interior. The dry skeleton is dark brown and hard.

The *skeleton* consists of radially situated columns of pretty closely packed foreign bodies 0.2 millim. thick, attached to each other partly by continuous masses of spongin cement, or by small isolated short and slender fibres, which are on an average 0.03 millim. thick. These more or less perforated, or even trellis-like main fibres are on an average 3 millim. apart, and joined to each other by connecting-fibres 0.04 millim. thick. The latter form trellis-like structures extending in the plane in which the main fibres lie, to which they are attached. Halfway between the main fibres the connecting-fibres form slender bundles, within which they approximate each other very closely, being about 0.06–0.1 millim. apart. Between these bundles roundish meshes, 2–4 millim. wide, intervene. Towards the main fibres the connecting-fibres diverge, the most diverging of the one extending to the joining-point of the most diverging connecting-fibres of the next bundle. The filaments are very abundant throughout the whole of the sponge; they are 0.01–0.014 millim. thick, and densely covered with brown spots on the surface. Bowerbank's representation of these filaments (*loc. cit.*) is very good.

Pretty abundant foreign bodies are found in the skin. The subdermal

cavities are comparatively small, but the exhalant canal-stems are often distended to form irregular lacunar spaces 1-3 millim. wide in the interior of the sponge.

GEOGRAPHICAL DISTRIBUTION.—North Atlantic: Bahamas; Cuba; St. Thomas (*British Mus. Coll.*; *Duchassaing and Michelotti*); Couch Reef, Florida (*Boston Soc. Coll.*).

East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Hircinia australis, n. sp.

Massive sponges with lobose or digitate processes, which are generally erect and more or less branched. The whole sponge attains a height of 200 millim.; the branches are generally slightly compressed, on an average 20 millim. broad, 12 millim. thick, and 30 millim. long. The surface is covered with conic, sharp-pointed conuli 2-3 millim. high, which are about 4 millim. apart. The oscula are 2-4 millim. wide, and scattered over the prominent parts of the sponge. The colour of the living sponge is pale red on the surface and dirty white in the interior; these colours are retained by spirit-specimens.

The *skeleton* consists of very dense longitudinal fascicles of simple main fibres in which an irregular row of scattered sand-grains is observed. These fascicles do not exceed 0.3 millim. in width. In some places they are condensed to a single main fibre, 0.1 millim. thick. These longitudinal main fibres or fascicles are about 1 millim. apart, and joined by simple or more or less fascicular connecting-fibres. Some of the simple connecting-fibres attain a thickness of 0.08 millim. in the middle, and extend where they join the main fibre to 0.02 millim. More slender connecting-fibres, attached by several roots, and measuring only 0.05 millim. in width, are more frequent. The meshes between the fascicles are square, with rounded corners, 0.8-1.2 millim. wide. The filaments are 0.006 millim. thick, and generally covered with brown spots.

The inhalant canal-stems are very large and abundant, on an average 0.3 millim. wide, and just below the surface 0.5 millim. apart. The ciliated chambers measure 0.033 millim. in width.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Hircinia calyculata, n. sp.

Elegantly cup-shaped sponges, which attain a height of 250 millim. In some specimens the cup is about as broad as deep; in others much shallower. The margin is always turned outward, and often slightly recurved, so that the whole structure becomes vase-shaped. The wall of the cup is 30 to 40 millim.

thick at the base, and thins out toward the sharp margin. The cup grows out from a basal mass of varying size. On the inner surface conuli 2-3 millim high are observed, situated in rows, which form irregular ridges on the surface, often anastomosing to form a network with irregular polygonal meshes. The outer surface is covered with irregular, short, digitate processes 10 millim. thick, which are rather irregularly distributed, and often coalesce to form lamellar outgrowths with sharp margins. The whole of the outer surface is covered with very small conuli 0.5 millim. high. The oscula are 3 millim. wide, and scattered over the outer surface of the cup-shaped sponge. The colour of the living sponge is dark reddish brown on the surface, and intensely orange-yellow in the interior. These colours are retained by spirit-specimens.

The *skeleton* consists of longitudinal fascicles of fibres, in which large sand-grains are contained, chiefly at the joining points of the slender fibres which form the trellis-like fascicles. The connecting-fibres are mostly simple, 0.07-0.1 millim. thick, and attached to the main fibres by numerous diverging roots, which are about 0.05 millim. broad. The longitudinal fascicles are 0.8 millim. broad, and the individual fibres uniformly 0.04-0.07 millim. thick. The meshes are 2-3 millim. wide, roundish. The filaments are very abundant, smooth, and hyaline, 0.004-0.007 millim. thick; on the surface of some of them brown spots are observed. The terminal knots are oval, 0.008 millim. broad.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Bailey*). East coast of Australia: Illawarra, Port Jackson, N. S. W. (*Lenzenfeld*).

***Hircinia arenosa*, n. sp.**

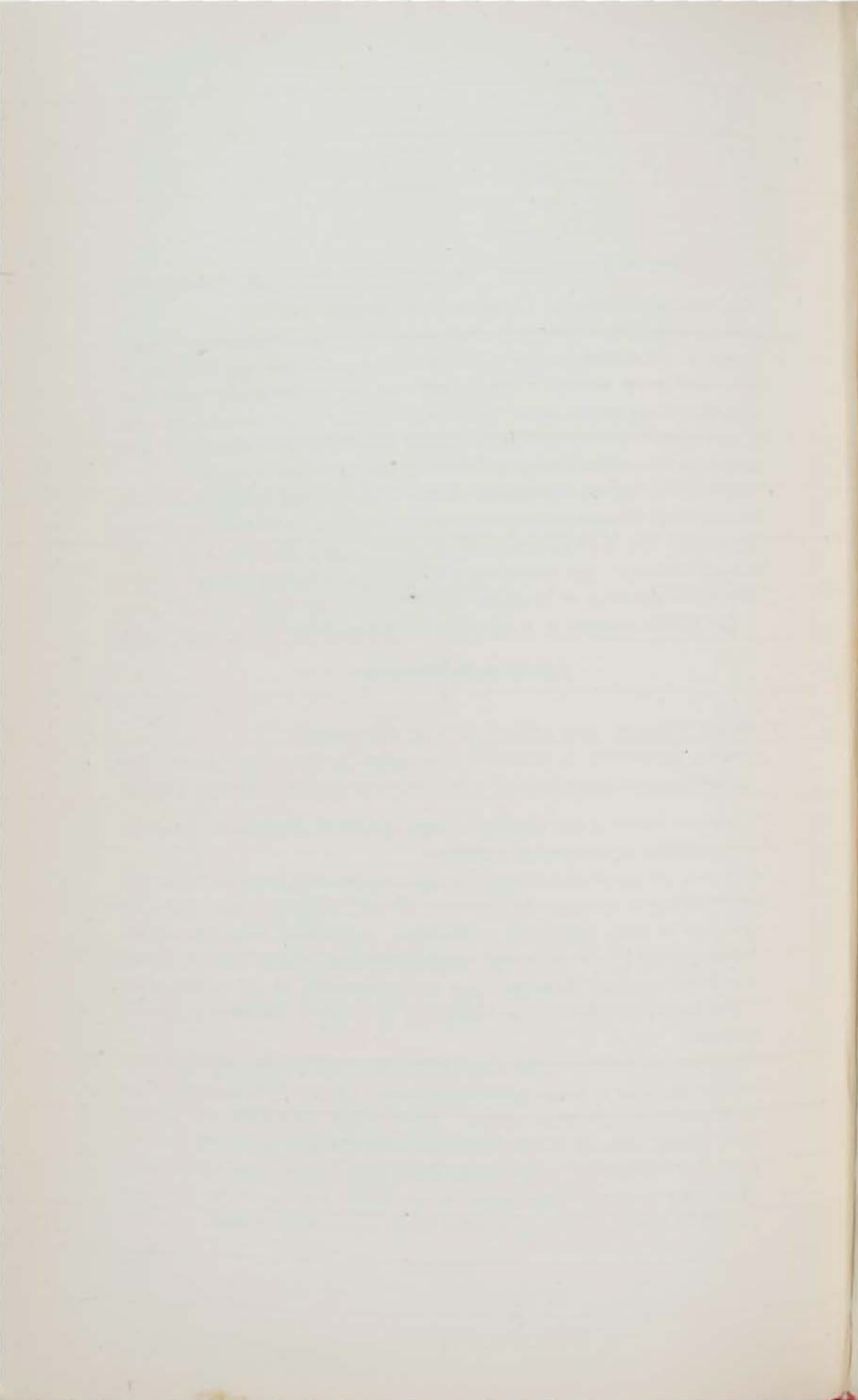
Cup-shaped, more or less pedunculate sponges, which are either tall and slender, much higher than broad, or low and flat, extended horizontally. In every case the cup-shaped part of the sponge is very regularly conic. The tall and slender specimens attain a much larger size than the others, being often 250 millim. high. The peduncle is short, cylindrical, and distended above, so that it does not appear clearly distinguished from the upper cup-shaped portion of the sponge. The wall of the cup is in large specimens very uniformly 12 millim. thick. In the smallest I have seen the wall measured 8 millim. The free margin is pretty regularly circular, and lies in a plane perpendicular to the axis of the sponge. The tall specimens with a peduncle are particularly regular in shape. Those, however, which are not pedunculate, and also the smaller horizontally extending ones, are more irregular; in these the margin is uneven, slightly undulating. The free margin is rounded off. The surface of smaller specimens is always perfectly smooth, and also the largest have a perfectly smooth inner surface. On the outer surface of very large specimens

indications of irregular rugæ or gyriform protuberances are observed, which are often arranged in transverse rows. The oscula are small, 0.5–1.5 millim. wide, and confined to the inner surface of the cup-shaped sponge; they are larger and more numerous near the margin of the cup than further down.

The colour of the living sponge is brownish pink. Dry specimens are grey or white, according to the nature of the foreign bodies which form the stout cortex on the surface. Dry skeletons are very hard and incompressible.

The *skeleton* consists of knotty and irregular main fibres, 0.2 millim. thick, which extend longitudinally upward from the base of attachment to the margin of the cup. These fibres contain a continuous series of large sand-grains, and appear, in fact, as a single column of large sand-grains cemented together by spongin. The main fibres form two layers parallel to the surface of the cup, which are equally distant from the surfaces and from each other, so that the wall of the cup is divided by them into three distinct layers of nearly equal thickness—an inner layer and two superficial ones. From these main fibres slender branches, 0.05 millim. thick, are given off at frequent intervals. Most of these branches extend in an irregular plumose manner to the surface, and pervade the superficial layers on either side. In the cortical layer only very few and distant branches are observed. The branches in the superficial layers form a network with polygonal meshes 1–1.5 millim. wide. Large sand-grains are frequently observed in their joining points. The distal ramifications of these fibres enter the sand-cortex on the surface, which is 0.5 millim. thick. The filaments are hyaline and smooth, in the middle 0.002–0.0025 millim. thick. The terminal knots are 0.004 millim. broad. The filaments are pretty abundant, and appear uniformly distributed throughout the sponge; they do not join to form bundles to any large extent.

The inhalant pores are 0.002 millim. wide, oval, and scattered over the outer and inner surface of the cup-shaped sponge. They lead into slender canals which penetrate the sand-cortex. These are much and irregularly curved, wending their way through the dense mass of large sand-grains which form the cortex. The subdermal cavities into which they lead are represented by tangential canals, 0.1–0.3 millim. wide, with annular strictures at frequent intervals, which are pervaded by numerous exceedingly fine membranes. Small groups of such subdermal canals converge to give birth to inhalant canal-stems, 0.3 millim. wide, which lead perpendicularly down from the surface into the interior of the sponge. These inhalant canal-stems never extend into the central askeletous layer of the sponge. Abundant slender branch-canals arise from their sides and supply the whole of that portion of the sponge which lies outside the main fibres. The ciliated chambers are strictly confined to these layers, none being found in the central layer. The ciliated chambers are 0.033 millim. wide, and provided with short special efferent canals leading into the exhalant branches, which are mostly about



0.1 millim. wide, and join to form larger canals with irregular annular strictures. These lead from the outer layers of the sponge into the central layer, and there open out into one of the oscular tubes, 0.5–1 millim. wide, which extend longitudinally upwards in this layer, then bend abruptly round and open out by the oscula on the inner surface. These oscular tubes show very distinct annular strictures at pretty frequent intervals. The two superficial layers, the one below the inner and the other below the outer surface, have the same structure.

The ground-substance in the vicinity of the ciliated chambers is charged with pretty abundant granules. The ground-substance in the central layer, however, which lies in the vicinity of the oscular tube, contains alike no ciliated chambers, no small canals, and no granules. Cells appear to be scarce in this tissue. Stellate elements are observed at long intervals. Just below the surface of the oscular tubes circular muscles are observed; these are particularly well developed in the annular strictures.

Some specimens of this sponge are rather similar to *Phyllospongia vasiformis*.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*). South coast of Australia: Port Phillip Heads, V. (*B. Wilson*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Hircinia halmiformis, n. sp.

The sponge consists of a meandrically folded lamella, 15–30 millim. thick, and attains a breadth of 75 millim. and a length of 85 millim. The surface is perfectly smooth. The oscula are 2 millim. wide, scattered over the whole of the surface, and on an average 5 millim. apart. They lead into a system of anastomosing lacunose oscular tubes in the interior of the sponge, which might perhaps be considered as vestibular cavities of the exhalant system, being rather similar to the exhalant vestibular spaces of certain species of *Halme*.

The *skeleton* consists of a pretty uniform network of loose columns of large sand-grains, 0.8 millim. thick. The meshes formed by this network are elongate, oval, on an average 2 millim. long and 0.8 millim. broad. The sand-grains in the column are on an average 0.2 millim. apart, and connected by short, straight, and unbranched spongin-fibres, 0.03–0.05 millim. thick. Each sand-grain is enveloped by a thin coating of spongin.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Hircinia gigantea, Ridley.

Cacospongia irregularis, N. de Poléjaeff, Report on the Scientific Results of the Voyage of H.M.S. 'Challenger,' Zoology, vol. xi. Keratosa, p. 63 (1884).
Hircinia horrens, S. O. Ridley, "Spongiida": Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' p. 387 (1884).

Massive, globose, more or less regularly spherical sponges, which are attached by a broad base and attain a very large size. Most of the specimens have a diameter of about 300 millim., but I have seen one which measured nearly half a metre across and weighed about a hundredweight. The surface is covered with blunt and irregular, often truncate conuli, about 4 millim. high, which are on an average 8 millim. apart. The oscula are circular, 15 millim. wide, and confined to the upper side of the sponge. Besides these, a few other holes, 5-15 millim. wide, are found in the surface, leading down into extensive lacunæ 10-15 millim. wide, which pervade the whole of the sponge. These are so numerous that septa only 5-15 millim. thick are left between them. They are inhabited by great numbers of small Decapods. The living sponge is pretty soft and compressible; large specimens partly collapse when taken from the water. The dry skeleton is stiff and elastic. The colour of the living sponge is dull orange-red on the surface, and lighter in the interior. The upper surface is more intensely coloured than the lower.

The *skeleton* consists of longitudinal, irregular, cylindrical, dense fascicles 1-1.5 millim. thick, 1-3 millim. apart, and connected at intervals of 3 millim. by transverse fascicles, which taper from both trumpet-shaped extended ends to the centre, where they are only about 0.4 millim. thick. The trumpet-shaped basal extensions are nearly 1 millim. wide. The fascicles are composed of fibres 0.04 millim. thick, which are about 0.02 millim. apart and frequently fused or joined by short and stout transverse fibres. Towards the surface of the fascicle the fibres are closer together than in the interior: here two or three are often fused for a considerable length. The filaments are arranged in very remarkable band-shaped bundles, about 0.06 millim. thick, which extend principally longitudinally in the walls of the small canals. The filaments are 0.0015 millim. thick, and covered with brown spots; their terminal knots are oval, 0.0025 millim. broad.

The inhalant pores are 0.02 millim. wide, and lead into very short canals which penetrate the thin skin. No foreign bodies, or only very few, are contained in the latter. Below it subdermal canals, 0.3-0.7 millim. wide, extend, from which the inhalant canal-stems, 0.2-0.4 millim. wide, originate. The branches of the inhalant system are very wide, measuring on an average 0.1-0.2

millim. in diameter. The ciliated chambers are 0.022 millim. wide, and destitute of special efferent canals. The exhalant branches are 0.1–0.2 millim. wide. All the canals are destitute of annular strictures. The ground-substance is pretty transparent; in some specimens I have observed a great many small, highly light-refracting bodies of varying shape, which are 0.0006–0.0012 millim. in size, and may possibly be identical with the “spores” and “dumbbell-shaped” bodies described by Poléjaeff in some other species.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Lat. 9° 49' S., Long. 139° 42' E., Torres Straits (*‘Challenger’*); Prince of Wales Channel, Torres Straits (*‘Alert’*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Familia **HETERORRHAPHIDÆ.**

Cornacuspongiæ with very little spongin. Megasclera of various forms. Microsclera commonly present, but never chelæ. Marine, without gemmulæ.

Subfamilia **STYLOTELLINÆ.**

Heterorrhaphidæ without differentiated microsclera, and without a hard spicular rind.

Genus **STYLOTELLA**, Lendenfeld.

Heterorrhaphidæ of very soft texture. Megasclera styli, in bundles and scattered. No microsclera.

Stylotella digitata, n. sp.

Irregularly branching sponges, with cylindrical, digitate processes tapering towards the distal end. Oscula small, scattered, and inconspicuous. Surface smooth. In the living state intensely orange-coloured.

The *skeleton* consists of irregular, often flattened and band-shaped, longitudinal fibres, which have an average thickness of 0.12 millim., and often approximate each other so closely that hardly any space is left between them. The sponge, in fact, appears occupied entirely by a dense mass of longitudinally disposed spicules. Besides these also irregularly scattered transverse spicules are found. The *spicules* are styli, generally straight, sometimes slightly curved,

particularly at the truncate end. They are on an average 0.25 millim. long and 0.004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*). East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

New Zealand: Nelson (*Canterbury Museum, Christchurch, N. Z., Coll.*); Lyttleton (*Haast, Lendenfeld*).

***Stylotella polymastia*, n. sp.**

(PLATE IV. fig. 1.)

Massive sponges with numerous, irregular, mostly fistular processes arising from the upper surface. The sponge is attached by a broad base and attains a maximum diameter of 300 millim. The oscula are situated terminally on the summits of the processes.

The *skeleton* consists of a somewhat irregular network of fibres in the central part of the body and of longitudinal fibres in the processes. The fibres are about 0.2 millim. thick, and composed of irregularly situated spicules. The meshes of the skeleton-net are on an average 0.3 millim. wide. Besides these, abundant spicules are scattered irregularly in the ground-substance. The *spicules* are straight or very slightly curved styli, which attain a length of 0.7 millim. and a thickness of 0.22 millim. The pointed end is pretty sharp. The spicule itself appears somewhat fusiform, the thickest portion lies nearer the truncate than the pointed end. Towards the simply rounded truncate end the spicule tapers considerably to about one half of its maximum thickness. Similar smaller and more slender spicules are found together with these in abundance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

***Stylotella rigida*, n. sp.**

Erect sponges, attached by a broad base with cylindrical digitate processes, which terminate with rounded dome-shaped ends, on the summits of which the circular oscula are situated. The size of the oscula varies from 1–3 millim.

The *skeleton* consists of slightly branched slender fibres, which extend upward and outward in a plumose manner. They are on an average 0.03 millim. thick. The meshes between them are 0.2 millim. wide, and filled with dense masses of irregularly scattered spicules. These scattered spicules are so numerous as often to obliterate the fibres altogether. The *spicules* are straight or slightly curved styli, attaining a length of 0.2 millim. and a thickness of 0.006 millim. They are cylindrical, pretty abruptly, but not very sharp-pointed

at one end, and simply rounded at the other; they hardly taper at all towards the rounded end. The thickest part of the spicule lies nearer to the pointed than to the blunt end; the latter often appears slightly thickened and divided from the body of the spicule by a hardly perceptible constriction.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Stylotella aplysilloides*, n. sp.**

Small and incrusting sponges, which extend horizontally to a length of 150 millim. and attain a height (thickness) of 5 millim. From the upper smooth surface conic protuberances arise, on the summits of which the circular oscula are situated, which measure 2–4 millim. in width. Vertical oscular tubes lead down from them into the body of the sponge.

The *skeleton* consists of a network composed of spicule-bundles. The fibres, which extend longitudinally and which are to be considered as main fibres, are composed of pretty regularly situated and closely packed parallel spicules. The bundles which connect them are not so pronounced, and it is often difficult to say whether these main fibres are connected by secondary fibres or whether they are only held together by the spicules scattered abundantly in the ground-substance. The *spicules* are straight or very slightly curved styli, 0.13 millim. long and 0.06 millim. thick. They are perfectly cylindrical, of uniform thickness throughout; one end is sharp and abruptly pointed, the other simply rounded off.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Subfamilia **PHLÆODICTYINÆ.**

Heterorrhaphidæ which consist of body and fistulæ, with a stout spicular rind. Megasclera oxea or strongyla. Microsclera absent or when present sigmata.

Genus **RHIZOCHALINA.**

Massive Heterorrhaphidæ with hollow roots and fistulæ. Spicules in bundles.

Rhizochalina ramsayi, n. sp.

(PLATE III.)

Large spherical massive sponges, attaining a diameter of 250 millim., attached by stout roots, arising from the lower side, to the mud of the sea-bottom. These roots attain a length of 300 millim. and are repeatedly branched. From the upper surface and the sides numerous fistular tubes, with an average width of 4 millim. and a height of 35 millim., arise, which stand close together and are parallel, all tending upwards. From the centre of the upper surface 2-5 much wider and shorter tubes, 20 millim. wide and only 25 millim. high, originate, the cavities of which are occupied by a reticulate structure. Both the large and the small tubes are oscular tubes, and their terminal apertures oscula. The surface is, apart from these highly prominent oscula, quite smooth. The colour of the living sponge is yellow.

The *skeleton* consists of a network of spicule-bundles with regular oval meshes. The ground-substance contains very few scattered spicules. The fibres are on an average 0.12 millim. thick, and the meshes 0.14 millim. wide and 0.35 millim. long. The spicules forming the fibres are regularly longitudinally disposed and closely packed. The *spicules* are not very sharp-pointed, generally slightly curved, oxystrongyla, 0.15 millim. long and 0.007 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Rhizochalina petrosia, n. sp.

Massive lobose sponges, with smooth surface and scattered oscula, which are on an average 2 millim. wide.

The *skeleton* consists of bands of longitudinally disposed spicules. These bands are irregular, 0.1-0.3 millim. thick. The *spicules* are very slightly curved, cylindrical oxea, 0.7 millim. long and 0.015 millim. thick, with sharp-pointed ends.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Subfamilia GELLINÆ.

Megasclera oxea or strongyla. Microsclera always present—sigmata. No rind or fistulæ.

Genus **GELLIODES**.

Heterorrhaphidæ of erect habit and well-defined form. Fibres distinct and compact. Spicules smooth—oxea and stigmata.

Gelliodes poculum, Ridley & Dendy.

Gelliodes poculum, Ridley & Dendy, "Preliminary Report on the Monaxonida collected by H.M.S. 'Challenger,'" *Annals and Magazine of Natural History*, ser. 5, vol. xviii. p. 334 (1886).

The sponge consists of a thin incrusting lamella, from which large funnel-shaped calices arise. Colour in spirit brownish yellow. Texture soft, spongy, but very tough and fibrous. Surface uneven, but fairly smooth.

Skeleton: (a) Main, a reticulation of stout horny matter, sparsely cored by uniseriably arranged spicules; (b) Dermal, a closer reticulation of stout horny fibre, with few axial spicules, but echinated abundantly by tufts of outwardly projecting spicules. *Spicules*: Megasclera short, fusiform oxea, sharp-pointed, slightly curved, measuring 0.2×0.014 millim.; microsclera large slender sigmata, measuring 0.12×0.004 millim.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. ('*Challenger*,' *Lendenfeld*).

Genus **GELLIUS**.

Heterorrhaphidæ with very little horny matter in the skeleton, which is chiefly composed of rods and sigmata.

Gellius panis, n. sp.

The sponge consists of irregularly curved lamellæ, attached by a small base. The lamellæ are tender and transparent, measuring about 4 millim. in thickness, and often perforated so that the whole structure appears very loose. The sponge attains a height of 80 millim. The surface is smooth, the oscula are somewhat irregular and scattered.

The *skeleton* consists of a rather loose network of spicules, in which fibres can hardly be distinguished. The meshes of this network are, for the most part, enclosed either by single spicules or by irregular and very loose bundles containing 2–5 series of them. The megasclera are oxea, slightly curved, sharp-pointed, and cylindrical in the middle. They are on an average 0.2 millim. long and 0.007 millim. thick. Microsclera: sigmata, 0.03 millim. long

and 0.003 millim. thick, of very variable shape. The sigmata either form simple curves or spirals. They are very numerous and found in all parts of the sponge. On the surface where the megasclera are more abundant the sigmata are not so numerous as in the interior.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Gellius raphidiophora, n. sp.

Massive sponges which are attached by a broad base and attain a height of 50 millim. With large and conspicuous oscula, which are generally situated on the summits of the irregular elevations which protrude from the upper surface of the sponge.

The *skeleton* consists of loose spicule-bundles connected by single spicules. The megasclera are oxea, straight or slightly curved, cylindrical in the middle, with sharp and rather abruptly pointed ends, on an average 0.24 millim. long; their thickness is exceedingly variable, from 0.002–0.006 millim. Microsclera sigmata, scattered in the ground-substance, not numerous and very small, on an average 0.018 millim. long and 0.0001 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Subfamilia **TEDANIINÆ**.

Megasclera styli, oxea or tylota. Microsclera long hair-like trichites.

Genus **TEDANIA**.

Heterorrhaphidæ with smooth megasclera and the trichite microsclera.

Tedania rubicunda, n. sp.

Massive sponges with smooth surface, from the upper surface of which digitate processes arise. These are at the base 30–40 millim. thick, 50 millim. long, conic, tapering rapidly towards their distal ends. On the summits of these conical processes the oscula are situated. The sides of the distal portions of these processes are excavated by deep longitudinal grooves, which reach nearly down to the central oscular tube. The sponge is, in the living state, of a bright orange-red colour. This colour is more pronounced and intense on the surface than in the interior.

The *skeleton* consists of irregular bands of spicules which extend longitudinally. These are connected by numerous single spicules, scattered irregularly in the ground-substance. The spicules are so abundant that they appear as dense masses in thin sections. The *spicules* are straight or slightly curved, usually S-shaped tylota. They are of uniform thickness throughout. The rounded end is often divided from the body of the spicule by a slight constriction. The spicules attain a length of 0.3 millim. and a thickness of 0.005 millim. Besides these also styli and oxea of similar dimensions and trichites are met with; these, however, are rare.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Tedania laxa, n. sp.

The sponge consists of irregular branches growing out from a central, more or less spherical mass, attached by a small base. These processes converge above and stand close together. The whole sponge attains a height of 200 millim. and a thickness of 150 millim. The branches are very irregular, slender and knotty, on an average 3 millim. thick. Generally there is a spherical swelling at the distal end, similar to the annular thickenings or knots which are observed further down. The surface is smooth. The oscula are not apparent. The colour of the living sponge is bright brick-red.

The *skeleton* consists of irregular longitudinal bands of spicules, which are connected by single spicules, very abundantly scattered in the ground-substance. Although the spicules are so numerous, the sponge is very soft. The megasclera are styli, tylota, and oxea. The styli are prevalent; they are on an average 0.3 millim. long and 0.005 millim. thick. Trichites rare.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Tedania rubra, n. sp.

Massive sponges, attached by a broad base; from the upper surface processes arise; those nearest the centre of the sponge are dome-shaped. The surface is smooth. The oscula are inconspicuous, circular, 2–3 millim. wide, and particularly abundant on the summits of the processes. The sponge attains a height of 80 millim. and a width of 120 millim.

The *skeleton* consists of frequently branched and anastomosing longitudinal fibres. In the meshes of this network dense masses of irregularly scattered spicules are observed. The fibres consist of regularly longitudinally disposed spicules, and are on an average 0.025 millim. thick. The *spicules* are styli, tylota, and oxea. The prevalent styli are generally slightly curved, and on an

average 0·3 millim. long and 0·006 millim. thick, cylindrical, abruptly pointed. The rounded end often appears slightly thickened. Very thin and irregularly curved hair-like spicules are pretty abundant, particularly in the surface.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

***Tedania tenuispina*, n. sp.**

Small, elegantly branched, erect sponges, attached by a small base, and attaining a height of 60 millim. The branches grow up in one plane, are angularly bent, and appear somewhat antler-shaped. The surface is roughened by projecting spicules. The oscula measure 1 millim. in diameter, are circular, numerous, and scattered. The colour of the living sponge is bright orange-yellow.

The *skeleton* consists of a network of spicule-bundles, 0·03 millim. thick, the meshes of which are occupied by dense masses of irregularly scattered spicules. The *spicules* are chiefly styli, a few tylota and oxea are also found. The styli are abruptly pointed at the one, and not thickened at the other, blunt end. They are on an average 0·22 millim. long and 0·006 millim. thick. Besides these a few large spirally curved spicules, equal in size to the styli, are also found.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Familia **SPONGELIDÆ.**

Cornacuspongiæ with large sac-shaped ciliated chambers, a clear ground-substance, and a supporting-skeleton composed of solid horny fibres which are destitute of proper spicules.

Subfamilia **PHORIOSPONGINÆ.**

Spongeliidæ with proper spicules, sigmata, or rods in the ground-substance.

Genus **PHORIOSPONGIA.**

Spongeliidæ with a skeleton composed of abundant large scattered sand-grains, which are partly joined by slender fibres; with rod-shaped spicules and large sigmata in the ground-substance.



Phoriospongia levis, n. sp.

Large irregular or lamelliform, short and stout sponges, with digitate processes, which attain a height of 120 millim. and a thickness of 12 millim. The surface is roughened by the projection of short, stout, cylindrical, terminally rounded conuli. Circular pseudoscula, about 7 millim. wide, are found in a row on the margin of the frondose and on the summits of the processes of the digitate forms. The lacunose spaces in the intervals of the reticulation of the more solid sponge-tissue are circular canals, on an average 2 millim. wide, pervaded by fine membranes. The sponge is in all conditions sand-grey. Dry specimens are soft and friable. When alive the sponge is pretty tough and slightly elastic.

The *skeleton* consists of a rather irregular reticulation of fibres 0.01 millim. thick. In the body of the sponge, but not in the membranes pervading the vestibular lacunæ, roundish sand-grains, 0.2–0.3 millim. in size, are scattered. These are on an average 0.5 millim. apart, surrounded by a layer of spongin, and attached to each other by the fibres of the skeleton-net. Siliceous spicules of two kinds are scattered throughout the sponge. These spicules are not in connection with the supporting skeleton-net. The spicules are (*a*) strongyla, 0.1 millim. long and 0.0012 millim. thick, and (*b*) curved sigmata, which are very slender and 0.03 millim. long.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Phoriospongia reticulum, Marshall.

Phoriospongia reticulum, W. Marshall, "Ueber Dysideiden und Phoriospongien,"
Zeitschrift für wissenschaftliche Zoologie, Band xxxv. Seite 124 (1880).

Massive, horizontally extending, cake-shaped sponges, with irregular or polygonal depressions on the surface between a reticulation of curved and irregularly anastomosing ridges. The oscula are 1.5–4 millim. wide, and scattered or arranged in rows in the circumference of the upper surface. Dry skeletons are soft and friable.

The *skeleton* consists of an irregular network of tortuous bands, 0.6–1 millim. broad, composed of loosely scattered sand-grains, which do not appear to be at all connected with each other. The sand-grains are on an average 0.2 millim. broad and about equally far apart. The meshes between these bands of sand-grains are 1–3 millim. wide. In the surface a layer, 0.5 millim. thick, of similar isolated sand-grains is observed. Spicules are very abundant in the ground-substance; these are sigmata, 0.05 millim. long, and uniformly scattered throughout the whole of the sponge. According to Marshall, styli and tylostyli are present. The inhalant pores are confined to the depressions

in the surface, where they form small groups; they are, according to Marshall (*loc. cit.*), 0.04 millim. wide. Slender canals lead down from them to the subdermal cavities penetrating the sand-cortex. The subdermal cavities, which undermine it, are 0.2–0.3 millim. wide, and appear in the shape of irregular tangential canals. At intervals of about 1.5 millim., inhalant trunks, 0.3 millim. wide with annular strictures, arise from them; these are irregularly curved and follow in their course the centres of the meshes formed by the arenaceous bands. Small inhalant branch-canals, which are about 0.09 millim. wide, radiate from them; also in these, annular strictures are observed. The ciliated chambers are oval, nearly 0.1 millim. long, and about 0.06 millim. broad; they open with very wide apertures into the smooth-walled exhalant branch-canals, about 0.08 millim. wide, which lead into the tortuous oscular tube; transverse membranes are often observed in it.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Bass Straits (*Marshall*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Phoriospongia lamella, n. sp.

Erect, lamellar, generally irregularly flabelliform sponges, attached by a narrow base. The lamella is uniformly 10–15 millim. thick, and more or less curved. Specimens in which the lamella is radially folded are not infrequent, but more often the lamella is simple. The free margin is rounded, continuous, undulating, or lobose. In large specimens often secondary lamellæ are observed growing out from the primary one. Pedunculate specimens with perfectly continuous free margin occur but rarely, and have only been obtained at Broughton Island. The whole sponge attains a height of about 100 millim. and a breadth of 220 millim. The surface is perfectly smooth and shiny in the living sponge, and also in spirit-specimens; in dry specimens it appears rather granular or wrinkled. Oscula are very conspicuous and prominent, 2–4 millim. wide, scattered over one face of the lamella in some specimens and absent in others. I establish two varieties for these accordingly, which, however, differ in no other respect from each other than in this.

The colour of the living sponge is greyish pink on the surface, dull grey in the interior. Spirit-specimens are grey, but occasionally they retain a slight pinkish hue. Dry specimens are light brownish grey—the colour depending on the nature of the foreign bodies which form the skeleton. In the living state and in spirit the sponge is pretty tough, but inflexible; it can easily be broken. Dry specimens are more or less friable.

The *skeleton* consists of isolated sand-grains, 0.4–0.8 millim. in size, which form single interrupted series, which anastomose to an irregular network with rounded meshes about 1 millim. wide. The surface is protected by a



cortex 0·8 millim. thick, composed of large, loosely scattered sand-grains, similar to those in the interior. Abundant spicules are observed in the ground-substance; these are of three kinds: (a) very numerous and uniformly distributed, strongly recurved sigmata, 0·047 millim. long; (b) rather scarce sigmata, 0·01 millim. long, in the walls of the larger inhalant canals; and (c) rather scarce and irregularly scattered strongyla, 0·1 millim. long and 0·003 millim. thick. The outermost layer of the superficial cortex is composed of small foreign bodies, intermingled with both kinds of sigmata.

The subdermal cavities are represented by narrow tangential canals, groups of which converge towards large irregularly spherical cavities, about 1 millim. wide, situated below the cortex at intervals of 2–3 millim. From these local distentions of the subdermal cavities the inhalant canal-stems arise. The latter are about 0·3 millim. wide, provided with annular strictures, and irregularly curved, following the centres of the meshes formed by the sand-grain series. The ciliated chambers are comparatively long and slender, measuring on an average 0·08 millim. in length and 0·03 millim. only in width. The exhalant canals join to form proper oscular tubes only in *P. lamella*, var. *osculata*, but open direct by numerous vents, about 0·3 millim. wide, in the other variety.

Phoriospongia lamella, var. **panis**, nov.

Lamellar, erect, more or less flabelliform sponges, with a continuous or slightly undulating margin. Without any conspicuous prominent oscula. The exhalant canals open by vents 0·3 millim. wide, which are scattered over both faces of the lamellar sponge.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Genus **SIGMATELLA**, n. gen.

Spongeliidæ with a supporting-skeleton composed of a network of very areniferous fibres, with rod-shaped and often sigmata microsclera.

Sigmatella australis, n. sp.

(The synonyms will be found in the description of the varieties.)

Large, tubular, erect sponges, which often attain a height of 200 millim. The whole sponge may consist of a single, irregularly cylindrical, upright tube, as in the case of some specimens of *S. a. tubaria*; or more frequently of a bunch

of slightly curved tubes, which grow up from a common base. These tubes attain a maximum width of about 40 millim. a little way over the base, and taper from thence gradually towards the upper end, which rarely exceeds 15 millim. in thickness, and on the summit of which the circular osculum, 6–8 millim. wide, is situated terminally. This is the most frequent form assumed by *S. a. tubaria*. It may, however, occur that these tubes arrange themselves in one perpendicular plane and coalesce for the greater part of their length, thus producing a stout flabelliform structure on the undulating or lobed free margin, of which the oscula are situated in a row. For these forms the variety *S. a. flabellum* has been established. The surface is pretty smooth, or slightly granular, shagreen-like. The oscula are 6–8 millim. wide, and confined to the summits of the cylindrical tubes or the margins of the flabellar forms, where they always occupy the summits of the processes in case the margin is lobed or dentate.

The specimens referable to *S. a. tubaria* are dull orange-yellow when alive, those of *S. a. flabellum* pink. In the dry state and in spirit they all appear grey. There is no difference between the two varieties, except in their shape and colour, so that the following anatomical description applies equally to both. *Sigmatella australis* is comparatively tough and can be compressed without breaking when alive, but it is fragile and more or less friable in the dry state.

The *skeleton* consists of a network of fibres, composed of dense masses of sand-grains, uniformly 0.03 millim. in size, which are held together by a very small quantity of spongin. These sand-grains are so well packed that the surface of the fibres appears smooth. From the base of the sponge longitudinal fibres, on an average 0.1 millim. thick, extend upwards parallel to the large oscular tubes, which terminate in the vents above described. None of these fibres approach the outer surface or the wall of the oscular tube; they are confined to the intermediate part of the sponge, and are about 0.5 millim. apart. They are connected by simple transverse fibres, 0.04–0.08 millim. thick. From the main fibres branches of similar dimensions are given off towards the outer surface, and also in the direction of the oscular tube. These repeatedly anastomose and form a network with very irregular meshes, about 0.3 millim. wide. The outer surface is protected by a cortex, 0.1 millim. thick, of densely packed sand-grains, which are similar to those in the fibres. A single layer of small sand-grains underlies the wall of the oscular tube. There do not appear to be any scattered sand-grains in the interior, although such have been described by Marshall, who gives a somewhat different account of the structure of the skeleton. The ends of the fibres of the supporting-skeleton are joined to the cortex. Proper spicules are observed in the ground-substance; these are of two kinds:—A. Rods: rather scarce, and apparently confined to the superficial layer, 0.12 millim. long and 0.002 millim. thick. Most of these are rounded at both ends—strongyla, but styli and tylota are also occasionally

met with. All these spicules are pretty straight. B. Sigmata: exceedingly abundant throughout the whole of the sponge, particularly in the canal-walls, very small and slender, only 0.01 millim. long. Neither Marshall nor Carter mention any proper picules.

The cortex is not continuous, but appears as a reticulation of arenaceous bands of varying breadth, the meshes between which are irregular, rounded, and on an average 0.2 millim. wide. Fine membranes, which are free from foreign bodies and which contain small spicules, chiefly small sigmata, are spread out in them. In each of these membranes a single inhalant pore, or a small group of two to five pores, is observed. The pores are 0.04–0.1 millim. wide and mostly circular. They lead into pretty wide canals, which penetrate the sand-cortex and open out into the subdermal cavities, which are very narrow, only about 0.04 millim. wide. Inhalant canal-stems, 0.08 millim. wide, with annular strictures, arise from the subdermal cavities. These are ramified, but do not give off numerous narrow branch-canals, their branches being nearly as wide as the trunks. The ciliated chambers are supplied direct from them. They are oval, about 0.07 millim. long, 0.04 millim. broad, and open with wide mouths into the exhalant canals, the narrowest of which are over 0.08 millim. wide. The exhalants join to form canals which extend longitudinally, 0.3 millim. wide, and often traversed by prominent strictures in their walls. They bend round abruptly at a nearly right angle, and open by a circular mouth, 0.4 millim. wide, into the central oscular tube. It may perhaps appear doubtful whether the mouths of the exhalant stems should not be considered as the true oscula, and the large vents on the surface as præoscula. The mouths of these exhalant stems are about 1 millim. apart, and pretty uniformly distributed over the wall of the oscular tube. The oscular tubes themselves are cylindrical, and extend from the superficial vent right down to the base of the sponge. They have a uniform width of 6–8 millim. throughout, appear regularly cylindrical, and follow the curvatures of the tubes in *S. a. tubaria*, but always appear perfectly straight in *S. a. flabellum*.

***Sigmatella australis*, var. *tubaria*, Marshall.**

Dysidea tubulosa, H. J. Carter, "Some Sponges from the West Indies and Acapulco," *Annals and Magazine of Natural History*, ser. 5, vol. ix. p. 275 (1882).

Psammascus decipiens, W. Marshall, "Ueber Dysideiden und Phoriospongien," *Zeitschrift für wissenschaftliche Zoologie*, Band xxxv. Seite 93 (1880).

The sponge consists of an irregular upright cylindrical tube, or more frequently of a bunch of such tubes, which grow up from a common base. These tubes attain a length of 200 millim.; they are thickest a little way above the

base, and taper from thence gradually towards the upper end. On the summit a circular vent, 7 millim. wide, is situated terminally. The tubes attain in their lower portion a maximum thickness of 40 millim., but rarely exceed 15 millim. in width at the upper end. The colour of the living sponge is dull orange, spirit-specimens are dark grey. In the structure of the surface and the general anatomy this variety does not show any distinctive features.

Carter states that his *Dysidea tubulosa* may be identical with *Terpios jania*, Duchassaing and Michelotti. According to Carter (*loc. cit.*), our sponge lives symbiotically with a Coralline, *Jania*. No *Janice* were observed by me in the Australian specimens.

Marshall (*loc. cit.*) has given a detailed description of this sponge. Although this does not tally very well with the observations made by me, I am inclined to consider his sponge identical with mine, and that the discrepancy is to a great extent due to the bad state of preservation of Marshall's specimens.

GEOGRAPHICAL DISTRIBUTION.—Coast of North America: Nassau (*C. Warren*).

South coast of Australia: Bass Straits (*Marshall*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Sigmatella australis*, var. *flabellum*, nov.**

Large, erect, flabelliform sponges, which attain a height of 200 millim., a breadth of 140 millim., and a maximum thickness of 40 millim. The free margin is rounded, undulating, or divided by incisions into short and stout digitate marginal lobes. The lamellæ are composed of a number of radiating tubes, 8 millim. wide, which lie in one plane and terminate with vents 6–8 millim. wide, situated on the margin of the lamella. The walls of these tubes are fused throughout their entire length, except in those specimens the margins of which are serrated, in which the distal portions of the tubes remain isolated. The colour of the living sponge is pinkish grey; dry and spirit-specimens are grey. In the structure of the surface and the general anatomy this variety does not show any distinctive features.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Sigmatella macropsamma*, n. sp.**

Flabelliform sponges with radial longitudinal ridges on the surface, attaining a height of 80 millim., a breadth of 70 millim., and a thickness of 17 millim. The ridges are 5–15 millim. thick at the base, and have a sharp free margin.

The colour of the living sponge is greyish brown. The oscula are 1 millim. wide, scarce, and scattered.

The fibres of the *skeleton* are composed of large sand-grains. Microsclera *strongyla*, 0.26 millim. long and 0.003 millim. thick, very abundant.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Sigmatella corticata, n. sp.

(The synonyms will be found below in the descriptions of the varieties.)

The range of form assumed by different specimens of this species, which I have grouped in the five varieties *papillosa*, *mammillaris*, *elegans*, *flabellum*, and *serrata*, is certainly a very wide one, as, indeed, might be expected, considering that this species is one of the most common sponges in Australian waters. Large adult specimens never appear to be incrusting or massive, although such forms are often assumed by small ones of *S. c. papillosa*. Larger specimens of this variety possess more or less fused lobose or digitate processes. Large semispherical protuberances are observed on the surface of the otherwise pretty massive variety of *S. c. mammillaris*. The other three varieties are distinctly lamellar. *S. c. elegans* consists of a much folded, somewhat flower-shaped plate about 8 millim., thick; the other two varieties are expanded in one plate, and appear flabelliform. *S. c. flabellum* is thick, abruptly cut off at the margin with a special marginal face; *S. c. serrata* is thinner. The margin of this variety appears serrate or dentate, in consequence of the projection from it of digitate processes which are of uniform size and situated radially. The surface is smooth or shagreen-like in all the varieties, except in *S. c. papillosa* and *S. c. flabellum*. In the variety *S. c. papillosa* the surface is always uneven, rugose, tubercular, or covered with a regular network of slightly projecting ridges. The faces of the lamella in *S. c. flabellum* bear low and irregular projections. The arrangement of the oscula is a very definite one in this variety. In *S. c. papillosa*, *mammillaris*, and *serrata* the oscula are few in number, large and conspicuous, and situated terminally on the summits of the processes, or scattered irregularly over the surface in small specimens which have no processes. In *S. c. elegans* the oscula are small, slightly prominent, and scattered over one face of the lamellæ; in *S. c. flabellum* they are confined to the marginal face, and are variable in size and pretty abundant.

The colour of the living sponge is always yellow or red; particularly *S. c. papillosa* appears very bright brick-red, whilst the other varieties are more or less orange-coloured. All the varieties are always grey on the surface in the dry state, but often retain the yellow colour in the interior. In the fresh state

these sponges are pretty soft and compressible and quite inelastic; dry, fragile and friable.

The *skeleton* consists of a network of fibres composed entirely of foreign bodies, spicule-fragments, sand-grains, &c., cemented by a very small quantity of spongin. These fibres are, on an average, 0.2 millim. thick; they extend from the base of attachment longitudinally upward, and are joined by simple unbranched fibres of equal dimensions. Thus a network with irregularly square meshes, about 0.6 millim. wide, is formed. The surface is protected by a sand-cortex 0.3–0.5 millim. thick, to which the superficial fibres of the supporting skeleton are attached, often by trumpet-shaped extensions. This cortex is not continuous, but consists of a network of arenaceous bands with meshes 0.5–1 millim. wide; the bands themselves are about as wide as the meshes which they surround. In the ground-substance proper spicules of two kinds are met with:—A. Rods: these are not equally abundant in different specimens, and often much more frequent in one part of the sponge than in another. They are 0.17 millim. long and 0.03–0.04 millim. thick. Most of them are blunt on both ends (*strongyla*), but *styli* and *oxea* also occur. B. Sigmata: these are exceedingly small and rare, so that one often fails to find any in a given specimen. I have never been able to observe them in dried specimens, but have, on the other hand, always found them in the specimens properly preserved by myself. Neither Carter nor Marshall, nor any of the other authors, have recorded the presence of proper spicules. The sigmata are only 0.005 millim. long and uniformly curved.

Marshall gives a most extraordinary description of the structure of the canal-system of his *Dysidea favosa*, which I believe to be identical with *S. c. papillosa*. According to this author the inhalant pores are situated in the membranes which expand in the meshes between the superficial reticulation of projecting arenaceous bands. Below each of these membranes a large cavity is supposed to be situated, from which exceedingly slender canals lead down to the immensely large sac-shaped ciliated chambers, which are also connected with each other by slender transverse canals. A lateral connection of ciliated chambers with each other by special canals is altogether unprecedented in sponges, and my own observations by no means confirm Marshall's statement, the incorrectness of which is probably due to the bad state of preservation of the specimens at his disposal.

According to my own observations, three to ten inhalant pores 0.02 millim. wide are situated in each of the membranes which occupy the meshes of the dermal reticulation. These lead into subdermal cavities about 0.5 millim. wide, which expand below these perforated plates, and are pervaded by numerous trabeculæ and membranes, dividing them into smaller compartments. The cavities under different pore-sieves are in communication with each other by large apertures. From the floor of each cavity several inhalant canal-stems

0.2 millim. wide originate, which are provided with annular strictures. These are themselves branched, but do not appear to give off secondary ramifications. They supply direct the ciliated chambers, which are 0.07 millim. long and about 0.04 millim. broad. The exhalant canals are about as wide as the inhalants, and join to form larger stems, which open out into the large and conspicuous oscular tubes. These are curved and tortuous in the massive and lobose varieties, but appear straight and radiating from the base to the marginally situated oscula in *S. c. flabellum* and *serrata*. Only in *S. c. elegans* the oscula are small and inconspicuous.

Carter states that *Spongiophaga pottsii* occurs in his *Dysidea kirkii*. Although I have often found filaments in sponges with an arenaceous skeleton somewhat similar to that of *Sigmatella*, I have never found them in any true Spongeliid.

The ciliated chambers of all the sponges which contain filaments are small, spherical, pyriform; and probably Carter had true Hirciniæ before him. Symbiotic oscillarians are also recorded by Carter in the same sponge. He compares them to the oscillarians discovered by F. E. Schulze, where they already occur in the embryo, and confounds them, by an oversight, with the filaments.

***Sigmatella corticata*, var. *papillosa*, Marshall.**

Dysidea argentea, W. Marshall, "Ueber Dysideiden und Phoriospongien, Zeitschrift für wissenschaftliche Zoologie, Band xxxv. Seite 107 (1880).

Dysidea callosa, W. Marshall, *l. c.* p. 104.

Dysidea favosa, W. Marshall, *l. c.* p. 98.

Dysidea favosa, S. O. Ridley, "Spongida:" Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert,' p. 388 (1884).

Dysidea granulosa, H. J. Carter, "Supplementary Report on the Specimens dredged up from the Gulf of Manaar," Annals and Magazine of Natural History, ser. 5, vol. vii. p. 376 (1881).

Dysidea kirkii (partim), H. J. Carter, *l. c.* p. 374.

Dysidea kirkii (partim), H. J. Carter, "Description of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xv. p. 216 (1885).

Holopsamma laminæfavosa (partim), H. J. Carter, *l. c.* p. 212.

Spongelia kirkii, A. Hyatt, "Revision of the North-American Poriferæ.—Part II.," Memoirs of the Boston Society, vol. ii. p. 539 (1877).

Irregularly massive incrusting sponges, which are when young horizontally expanded, cake-shaped, and attached by a broad base. Larger specimens appear erect, and possess irregular, lobose, or even digitate tortuous processes, which rise from the upper surface to a varying height. These may coalesce

laterally, and thus very irregular forms are produced. The surface is always irregular, rugose, tuberculated, or covered with a network of slightly projecting ridges, in the meshes between which fine perforated membranes are observed. The extreme forms are different enough, but they are connected to such an extent by transitions that no distinction can be drawn, particularly as different parts of the surface of one and the same specimen often exhibit a very different appearance. I believe that these differences are to a certain extent also due to differences in the mode of preservation of the specimens; but I have observed that the structure of the surface is also in the case of living specimens subject to great variations. I have for this reason found it advisable to combine three species of *Dysidea*, distinguished by Marshall chiefly on account of the difference in the structure of the surface, into this one variety, to which also a number of the specimens in the British Museum labelled *Dysidea kirkii* and *Holopsamma laminæfavosa* by Carter, belong. However, by no means all sponges so named by Carter belong to it.

The oscula are large, conspicuous, and few in number. They are always situated on the summits of the processes in the lobose and digitate specimens, and occupy prominent positions in the irregularly massive ones. In the small cake-shaped specimens the oscula are irregularly scattered over the surface, and not prominent. They appear to increase in size with the specimens. The oscula of small specimens are only about 2 millim. wide, whilst those of the largest attain a diameter of 8–12 millim.

The colour of the living sponge is bright brick-red on the surface, dull orange in the interior. Dry specimens are light grey on the surface, but often to a certain extent retain the yellow colour in the interior.

The anatomical structure of this variety does not present any distinctive features. The description of the canal-system given by Marshall of his *Dysidea favosa*, which strongly challenges criticism, is discussed above in the description of the species.

GEOGRAPHICAL DISTRIBUTION.—European coast: coast of Suffolk (*W. B. Clarke*).

Coast of Africa: Algoa Bay (*Bowerbank Coll.*).

Indian Ocean: Mauritius (*Canterbury Museum*).

North coast of Australia: Port Darwin ('*Alert*'). South coast of Australia: St. Vincent Gulf, S. A. (*South Australian Institute*); Tasmania (*Bowerbank Coll.*); Bass Strait (*Marshall*); Phillip's Island, Port Phillip, V. (*Boston Soc. Coll.*); Port Phillip Heads, V. (*B. Wilson*); Port Phillip, V. (*Lendenfeld*); Western Port, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld, Ramsay*).

New Zealand (*British Museum Coll.*).

Sigmatella corticata, var. **flabellum**, nov.

Erect flabelliform sponges with a broad, perfectly continuous free margin. The sponge attains a height of 200 millim., a breadth of 300 millim., and a thickness of 20–40 millim. It is attached by a narrow base, and the lamella increases in thickness towards the margin, where it appears cut off very abruptly. A special terminal face is thus formed, which extends all along the margin. Near the base it is narrow, but gradually widens above, where it attains a maximum width of 40 millim. The sides of the lamella are roughened by low and irregular projections. Sometimes one or a few small lamellæ grow up from the same base by the side of the large one, but these never appear to coalesce with the main lamella further up. The surface is, apart from the slight projections on the faces, pretty smooth, somewhat shagreen-like. The oscula are confined to the marginal face, where they are abundant and arranged in several irregular rows. They are rather variable in size, from 3–8 millim. wide. In very large specimens a slight depression in the central line of the marginal face divides the latter into two slightly projecting parts, on which the oscula are then arranged in two distinct zones. In smaller specimens there is no indication of such a depression, and the oscula are arranged in a single row. Straight cylindrical oscular tubes, which converge towards the base of attachment, extend down from the marginal oscula.

The colour of the living sponge is bright orange-yellow. Dry specimens are very light grey.

There are, apart from the radial arrangement of the oscular tubes, no distinctive anatomical structures to be recorded in this variety. The external shape it assumes is a very remarkable one, and without precedent in other sponges.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip Heads, V. (*B. Wilson*); Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Sigmatella corticata, var. **serrata**.

Dysidea kirkei (partim), H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," *Annals and Magazine of Natural History*, ser. 5, vol. xv. p. 216 (1885).

Regularly shaped, erect, flabelliform, lamellar sponges, attached by a narrow base or pedunculate, attaining a height of 170 millim., a breadth of 220 millim., and a thickness of 15 millim. From the upper semicircular free margin radially situated digitate processes arise, which are situated at equal intervals, so that the margin attains a regular serrated appearance. These digitate pro-

cesses are regularly cylindrical, about 30 millim. long and 15 millim. thick; they are distally rounded or cut off abruptly—truncate. The surface is smooth. On the summit of each of the digitate processes which crown the upper margin a circular osculum 4 millim. wide is situated. The colour of the living sponge is dull yellowish. Dry specimens are grey.

The oscular tubes are perfectly straight, cylindrical, and of uniform width throughout; they extend right down to the base of the sponge, from whence they radiate to the margin, where they terminate in the oscula on the summits of the digitate processes.

There are no other anatomical peculiarities of a distinctive nature to be recorded in this variety.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Philip Heads, V. (*B. Wilson*); Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Subfamilia SPONGELINÆ.

Spongeliidæ without proper spicules in the ground-substance.

Genus **HAASTIA**, n. gen.

Spongeliidæ the skeleton-fibres of which are sheathed with a dense layer of minute oval siliceous spicules.

Haastia navicularis, n. sp.

The sponge consists of a bunch of erect, cylindrical, digitate processes, about 15 millim. thick, which grow up from an extensive basal incrusting mass. The whole sponge attains a height of 150 millim. The surface is covered with uniformly distributed conuli, 1 millim. high, which are 1.5–2 millim. apart. The oscula are confined to the summits of the digitate processes. The colour of the living sponge is pinkish grey. In spirit it is light grey. The sponge is soft, resilient, compressible, and pretty elastic.

The *skeleton* consists of a very loose network with irregularly square meshes 2 millim. wide. Main and connecting-fibres can be distinguished. The main fibres are 0.4 millim. thick, knotty, and completely filled with foreign bodies. The connecting-fibres are simple, unbranched, irregularly curved, and about 0.2 millim. thick; they do not contain so many foreign bodies as the main fibres. A sheath of oval siliceous bodies surrounds the fibres.

GEOGRAPHICAL DISTRIBUTION.—New Zealand: Port Lyttelton (*Haast*, *Lendenfeld*).

Genus **PSAMMOPEMMA**.

Spongelidæ with a skeleton composed of abundant large sand-grains, which are partly joined by slender spongin-fibres. Without proper spicules.

Psammopemma rugosum, n. sp.

Erect lamellar sponges, which attain a height of 150 millim. and a thickness of 20 millim. The surface is covered with irregular longitudinally extending rugose protuberances, on an average 5 millim. broad and 3 millim. high. The oscula are 3-4 millim. wide, and confined to the prominent parts of the sponge; they are not very numerous. The living sponge is dull brick-red; dry specimens are dirty brown, pretty hard, but friable.

The *skeleton* consists of longitudinal bands of large sand-grains, 1 millim. thick, which are connected by transverse arenaceous fibres 0.003 millim. thick, in which the amount of spongin is comparatively great. The sand-grains in the longitudinal bands are for the most part isolated, although some of them appear cemented by a very small quantity of spongin where they come in contact with each other. A very remarkable and uniform network of fibres, 0.006 millim. thick, with meshes 0.06 millim. wide, pervades the whole of the ground-substance. I am rather doubtful about the nature of this reticulation. The fibres do not seem to consist of spongin, but are somewhat granular. It may possibly be the result of shrinkage, as the specimens at my disposal were not well preserved.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **SPONGELIA**.

Spongelidæ with a skeleton composed of areniferous fibres; without proper spicules.

Spongelia spinifera, F. E. Schulze.

Spongelia spinifera, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—VI. Die Gattung *Spongelia*," Zeitschrift für wissenschaftliche Zoologie, Band xxxii. Seite 152 (1879).

Spongelia spinifera, var. *parviconulata*, N. de Poléjaeff, Reports on the Scien-

tific Results of the Voyage of H.M.S. 'Challenger,' Zoology, vol. xi. Keratosa, p. 41 (1884).

Small, incrusting, massive, cake-shaped, or upright lamellar sponges, which attain a thickness of 30 millim. The surface is covered with large conuli, which in large adult specimens attain a height of 6 millim. and are 6-10 millim. apart. In small, young specimens the conuli are only 4 millim. wide. I believe that the 'Challenger' sponges described by Poléjaeff as *Spongelia spinifera*, var. *parviconulata*, were young specimens of this species. There is generally only one osculum, 10 millim. wide, in a large specimen. In smaller specimens there are generally several oscula 2-3 millim. wide. The colour of the living sponge is greyish violet. Spirit-specimens are generally dirty greyish yellow in colour. The sponge is soft and resilient.

The *skeleton* consists of a number of separate dendritically ramified fibres which are not connected with each other by any transverse fibres. These dendritic fibres consist of an axial column of sand-grains and spicule-fragments, which is surrounded by a stout layer of stratified spongin. The final ramifications of these fibres, which terminate in the conuli—about four conuli are in large specimens supplied with the branches of one fibre—are 0.05 millim. thick. At the base the stems often attain a thickness of 0.8 millim. and more.

From the conuli twenty-five to thirty stout bands radiate, which ramify and anastomose to form a very conspicuous network of prominent ridges with meshes 1-1.5 millim. wide in the surface. These are traversed by secondary bands which divide the large primary meshes into secondary ones, 0.3 millim. wide. In each of these eight or ten inhalant pores, 0.04 millim. wide, are situated. The subdermal cavities are larger in this than in the other species, and traversed by irregular membranes and trabeculæ. The inhalant trunks are 0.25 millim. wide and numerous; they are only slightly branched themselves, but give off numerous little branchlets which supply the ciliated chambers. The latter are oval, and most of them measure 0.08 millim. in length and 0.055 millim. in width. There are, however (at least in the Australian specimens examined by me), a few much larger chambers of similar shape, which are 0.12 millim. long and 0.067 millim. broad. The exhalant canals extend downwards and open out into irregular lacunæ extending at the base of the sponge, from which the oscular tubes arise.

GEOGRAPHICAL DISTRIBUTION.—Adriatic: Lesina, Dalmatian coast (*F. E. Schulze*).

South coast of Australia: Port Phillip (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. ('*Challenger*,' *Lendenfeld*).

Spongelia elastica, F. E. Schulze.

Spongelia pallescens, subspecies *elastica*, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—VI. Die Gattung *Spongelia*," Zeitschrift für wissenschaftliche Zoologie, Band xxxii. Seiten 150, 154 (1879).

(Other synonyms will be found below in the description of the variety.)

The different varieties of this species differ to a great extent in shape. *S. e. massa* is incrusting or massive, horizontally expanded, cake-shaped, without processes of any kind, whilst *S. e. lobosa* is erect, attached by a narrow base, and generally possesses lobose processes which arise from the upper surface. *S. e. stellidermata* is a long and narrow flabelliform sponge, which thins out towards the serrated margin. The surface is covered with conuli 1.5–3 millim. high, which are 1.5–3.5 millim. apart. The conuli are smaller and closer together in *S. e. massa* than in the other two varieties. The oscula are 3–10 millim. wide, scattered over the upper surface in *S. e. massa*, confined to the summits of the lobes in *S. e. lobosa*, and arranged in a row along the margin in *S. e. stellidermata*. The colour of the living sponge is greyish blue in *S. e. massa*, brick-red in *S. e. stellidermata*, and violet in *S. e. lobosa*. The dry skeletons of all the varieties are light greyish brown, pretty soft, compressible, and elastic; but *S. e. massa* appears more elastic than the other varieties, and approaches in elasticity the bath-sponge.

The *skeleton* consists of knotty main fibres, 0.2 millim. thick, which are 1.5–3 millim. apart. They are closer together in *S. e. massa* than in the other varieties, and appear as columns of pretty densely packed large foreign bodies, which are cemented by a small quantity of spongin. The connecting-fibres are 0.04–0.06 millim. thick, and mostly free from foreign bodies. They are generally much branched, and anastomose to form a network with irregular meshes, on an average 0.2 millim. wide. Only in the tubular parts of the sponge the connecting-fibres appear more simple. Here they are often unbranched, and the meshes between them square. The skeleton-net does not pervade the whole of the sponge in a uniform manner, but appears, particularly in *S. e. lobosa*, confined to the septa of more dense tissue, 1–3 millim. thick, which divide the lacunose tracts from each other. These are often situated radially, and so the skeleton attains a somewhat honeycomb-like appearance, which is particularly well developed in the Australian specimens of this variety. In some of the Adriatic specimens, for which O. Schmidt established the species *Spongelia perforata*, similar but more irregularly arranged askeletal lacunose tracts are observed. The subdermal cavities are pretty highly developed; the ciliated chambers are rather irregular, sac-shaped, on an average 0.08 millim. long and 0.06 millim. broad. The final ramifications of the inhalant canals are

much narrower than the ciliated chambers, whilst the branches of the exhalant system, into which the ciliated chambers open with wide apertures, are always much larger than the chambers themselves. Sperm-balls and embryos were observed in *S. e. massa* by F. E. Schulze. The most highly developed embryos observed in the body of the mother were elongate, cylindrical, convex at one end and concave at the other. The embryo consists of a single layer of very slender and long ectoderm-cells on the surface, and it is filled with a hyaline substance, in which numerous cells are imbedded. The nuclei of these cells are much larger than the nuclei of the ectoderm-cells. These cells of the interior possess numerous fine processes, which anastomose with each other and apparently also with the thread-like centripetal ends of the ectoderm-cells. The whole of the embryo is colourless, with the exception of the ectoderm-cells which clothe the concave depression at the end. An *Oscillaria*, which F. E. Schulze names *O. spongelia*, is nearly always found in the Mediterranean specimens of this species, and already occurs in the embryo. I have found the same or a very similar alga in the specimens dredged by me on the east coast of Australia, and am inclined to think that it lives symbiotically with the sponge.

***Spongelia elastica*, var. *lobosa*, O. Schmidt.**

Spongelia fistularis, O. Schmidt, Zweites Supplement zu den Spongien des Adriatischen Meeres, Seite 28 (1866).

Spongelia pallescens, H. J. Carter, "Descriptions and Figures of Deep-sea Sponges and their Spicules," Annals and Magazine of Natural History, ser. 4, vol. xviii. p. 232 (1876).

Spongelia pallescens, subspecies *elastica*, var. *lobosa*, F. E. Schulze, "Untersuchungen über den Bau und die Entwicklung der Spongien.—VI. Die Gattung *Spongelia*," Zeitschrift für wissenschaftliche Zoologie, Band xxxii. Seiten 150, 154 (1879).

Spongelia perforata, O. Schmidt, Die Spongien des Adriatischen Meeres, Seite 28 (1862).

Large, erect, massive or lobose sponges, which are attached by a narrow base and attain a height of 300 millim. The surface is covered with conuli, on an average 2.5 millim. high and 2.5–3.5 millim. apart. The oscula are 4–10 millim. wide, and scattered over the prominent parts of the sponge. The colour of the living sponge is violet on the surface and greyish in the interior. Dry skeletons are pretty stiff, but compressible and very elastic.

The *skeleton* is confined to the septa which divide the radial lacunose tracts from each other, so that it appears more or less honeycombed with cells 3–8 millim. wide. F. E. Schulze made a slight confusion in establishing this variety. He calls it, in the place where it is mentioned for the first time, *ramosa* (*l. c.*

p. 150, second line from below). But in all other places it is named *lobosa*. I take the former to be a misprint.

This variety seems to be particularly often inhabited by *Stephanocyphus mirabilis*, Allman, a Hydroid, the perisarc of which was erroneously regarded as an essential part of the sponge by O. Schmidt, who based his species *Spongelia fistularis* on the presence of these perisarc-tubes.

GEOGRAPHICAL DISTRIBUTION.—Adriatic (*F. E. Schulze*). Spalato, Lesina, Lissa, Dalmatian coast (*O. Schmidt*). North Atlantic ('*Porcupine*').

South coast of Australia: Port Phillip, V. (*Lendenfeld*). East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

***Spongelia ramsayi*, n. sp.**

Irregular, meandrically-folded lamellar sponges, which attain a maximum diameter of 140 millim. The sponge is very hard. The oscula, which measure 2 millim. in diameter, are situated on one face only of the lamella.

The main fibres of the *skeleton* are very knotty and charged with sand-grains, which are on an average 0.25 millim. in size; the connecting-fibres contain scattered foreign bodies, and are 0.1 millim thick.

GEOGRAPHICAL DISTRIBUTION.—Indian Ocean, Mauritius (*Canterbury Museum, Christchurch, N. Z., coll.*).

New Zealand (*Lendenfeld*), Chatham Islands (*Parker*).

***Spongelia cacos*, n. sp.**

The sponge consists of a mass of irregularly curved, digitate processes, which are on an average 20 millim. thick.

The *skeleton* is composed of a network of smooth fibres 0.16 millim. thick, which are charged with abundant small foreign bodies. The meshes of the network are irregular or oval, on an average 1.5 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

***Spongelia sagum*, n. sp.**

Perfectly smooth incrusting sponges, with a lobose outline, attaining a thickness of 3 millim. and a horizontal diameter of 50 millim. The living sponge is brick-red, and has a peculiar lustre, which makes it appear very similar to certain Chondrosidæ.

The *skeleton* consists of a network of fibres charged with particularly large

sand-grains. The fibres measure 0·3 millim. in thickness, and the polygonal or square meshes of the network are 1·2 millim. wide.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Familia **DESMACIDONIDÆ.**

Cornacuspongiæ with a supporting skeleton composed of spiciferous, often echinated fibres. Generally with chelæ in the ground-substance. If chelæ are absent, the fibres are echinated by projecting spicules.

Subfamilia **ESPERELLINÆ.**

Fibres not echinated.

Genus **SIDERODERMA.**

Desmacidonidæ with mammiform projections and a dense external rind of closely packed tangentially disposed megasclera. Soft in the interior. Megasclera smooth. Microsclera isochelæ, trichites, and (usually) sigmata.

Sideroderma navicelligerum, Ridley & Dendy.

(PLATE II. fig. 2.)

Sideroderma navicelligerum, S. O. Ridley and A. Dendy, "Preliminary Report on the Monaxonida collected by H.M.S. Challenger," *Annals and Magazine of Natural History*, ser. 5, vol. xviii. p. 348 (1886).

Hemispherical, sessile sponges, with a hard and dense rind about 1 millim. thick, composed of closely packed tylota. The surface is covered with numerous papillæ, some of which bear terminal vents. Colour in spirit pale yellow.

Spicules:—(1) Tylota with a long cylindrical shaft and an oval head at each end, length 0·28–0·595 millim., diameter in middle of shaft 0·0063–0·0126 millim.; (2) very fine long trichites, in bundles measuring about 0·45 by 0·17 millim.; (3) sigmata: (*a*) large, measuring 0·06 by 0·0047 millim., and (*b*) small, measuring 0·0189 by 0·015 millim.; (4) tridentate isochelæ, length 0·019 millim.; (5) very minute isochelæ of peculiar form, shaft much expanded laterally all along, so as to become oval and flattened, and notched in front in



the centre, with one small oval tooth at each end, sharply curved, length 0.01 millim.

GEOGRAPHICAL DISTRIBUTION.—Off New Guinea ('*Challenger*').
East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Sideroderma zittelii, n. sp.

Incrusting sponges, which attain a thickness of 15 millim. and a horizontal extent of 60 millim. From the surface peculiar tubercles and digitate processes arise, which may attain a height of 15 millim; these processes have a circular transverse section, and are at the base 6 millim. thick. The surface is continuous, shining. The colour of spirit-specimens is light brown on the surface, greyish in the interior. The rind is very dense, the interior lacunose and soft.

The *skeleton* consists of spicule-bundles and scattered spicules in the interior, and a stout cortex on the surface. The cortex consists of two layers—an outer, composed of trichites mostly perpendicular to the surface and chelæ; and an inner layer, which consists of tangentially disposed styli and oxea. The spicule-fibres in the interior form a loose network. Of particular interest are very conspicuous spicule-bundles 0.3–0.5 millim. thick, which extend longitudinally upward in the digitate processes. They lie just below the cortex, and are situated at regular intervals of 0.1–0.2 millim. In each process there are twelve to fourteen such longitudinal spicule-fibres. The *megasclera* are styli and oxea, measuring 1×0.016 millim. The former are more numerous; they sometimes exhibit slight indications of annular thickenings at intervals of 0.08 millim. The oxea are slightly curved, and equally sharp-pointed at both ends. The *microsclera* are trichites and chelæ. The former measure $0.15\text{--}0.2 \times 0.005$ millim.; the latter are very small isochelæ, with a notch in the middle.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Genus **ESPERELLA**.

Desmacidonidæ with small megasclera. Microsclera: palmate anisochelæ, and sometimes sigmata.

Esperella ridleyi, n. sp.

Dendritically ramifying sponges, which attain a large size. The shape is subject to extensive variations, according to which I divide the species into several varieties.

The *skeleton* consists of a network of horny fibres, in which abundant longitudinally disposed spicules are contained. These fibres form a network with oval longitudinally-situated meshes. The fibres are, on an average, 0.12 millim. thick, and the meshes 0.3 millim. wide. The spicules are so abundant in the longitudinal main fibres as to render the horny substance hardly visible. In the transverse connecting-fibres, however, which are of the same thickness as the main fibres, the spicules are confined to the axial portion of the horny fibre. These supporting spicules of the fibre-net are styli. They are, on an average, 0.22 millim. long and 0.05 millim. thick, cylindrical and abruptly pointed, the blunt end simply rounded off. They are often irregularly curved, sometimes even S-shaped. In the ground-substance between the fibres, particularly just below the surface of the sponge, abundant scattered *microsclera* are met with. These are of four kinds:—(1) spicules similar to those in the fibres; (2) diancistra, 0.2 millim. long and 0.009 millim. thick, with very sharp recurved points; these are rare and confined to the surface; (3) irregularly curved spicules which are pointed at each end, and which may be regarded as an irregular form of toxea; (4) chelæ, 0.03 millim. long, with unequal ends.

Esperella ridleyi, var. **robusta**, nov.

(PLATE VI.)

Stout dendritic sponges, which attain a height of 500 millim., attached by a small base, from which the cylindrical, erect, simple branches arise. These branches attain a thickness of 30 millim., and are terminally rounded; they consist of a reticulate structure. The sponge is exceedingly hard and incompressible.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Esperella ridleyi, var. **intermedia**, nov.

Incrusting sponges, from the upper side of which cylindrical erect processes arise, which are on an average 25 millim. thick and attain a height of 200 millim. These processes are generally slightly ramified, and consist of a similar reticulate structure as those of the foregoing variety.

The fibres of the *skeleton* are thinner than in *E. r. robusta*, and the spicules are not so abundant in them. In consequence of this, the sponge is much softer and more elastic.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Esperella serpens, n. sp.

The sponge consists of a reticulation of branched and often anastomosing cylindrical and digitate parts, which have an average thickness of 4 millim., and which form an irregular horizontally expanded cake-shaped structure, attached by a broad base.

The *skeleton* consists of longitudinal spicule-bundles which are on an average 0.03 millim. thick, 0.15 millim. apart, and connected by single spicules. Besides these there are spicules scattered irregularly in the ground-substance. All the *spicules* are uniform in shape: styli, 0.22 millim. long and 0.005 millim. thick. They are cylindrical in the centre, and very abruptly pointed at the sharp end. Towards the blunt end they taper slightly to an inconspicuous constriction which divides the somewhat knob-shaped blunt end from the body of the spicule. In the ground-substance microsclera of two kinds are found:—1, sigmata; 2, chelæ. The sigmata are simple curves with abruptly bent, pointed ends, clasp-shaped, 0.02 millim. long, and pretty scarce; the chelæ are anisochelæ, 0.018 millim. long, and the curved palmate portion on one end is about twice as long as that on the other.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Esperella penicillium, n. sp.

The sponge is composed of anastomosing branches, on an average 7 millim. thick. The surface is covered with small, sharp, and slender projections which stand very close. The oscula are scattered, 2 millim. wide. Alive the sponge is of a deep orange-yellow colour.

The *skeleton* consists of a network of spicule-bundles, which extend upwards, are frequently branched, and form numerous anastomoses, so that longitudinally disposed elongate meshes are formed. There are no transverse connecting-fibres, nor many spicules scattered in the ground-substance. The *spicules* forming the fibres of the supporting skeleton are styli and strongyla, 0.35 millim. long and 0.006 millim. thick. The two ends of the strongyla are equal and similar to the blunt end of the much less frequent styli, which occur only exceptionally, and have an abruptly pointed sharp end. These spicules are straight, or rarely slightly curved, cylindrical in the centre and tapering slightly towards the blunt end, which consists of a slight thickening, and appears somewhat knob-shaped. There are microsclera of two kinds—sigmata and chelæ. The sigmata are pretty rare, their ends are unequal or equal, inasmuch as both or only one may be abruptly recurved and sharp-pointed. They are 0.045 millim. long. The chelæ are anisochelæ, 0.033

millim. long. The palmate extension on one end is about two thirds as long as that at the other. These chelæ are mostly situated in groups 20 or more together; the ends with the smaller palmate extension of all the chelæ of one group are attached to each other, so that the chelæ radiate from a common centre, forming spherical clusters.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Subfamilia ECTYONINÆ.

Fibres echinated by laterally projecting spicules.

Genus MYXILLA.

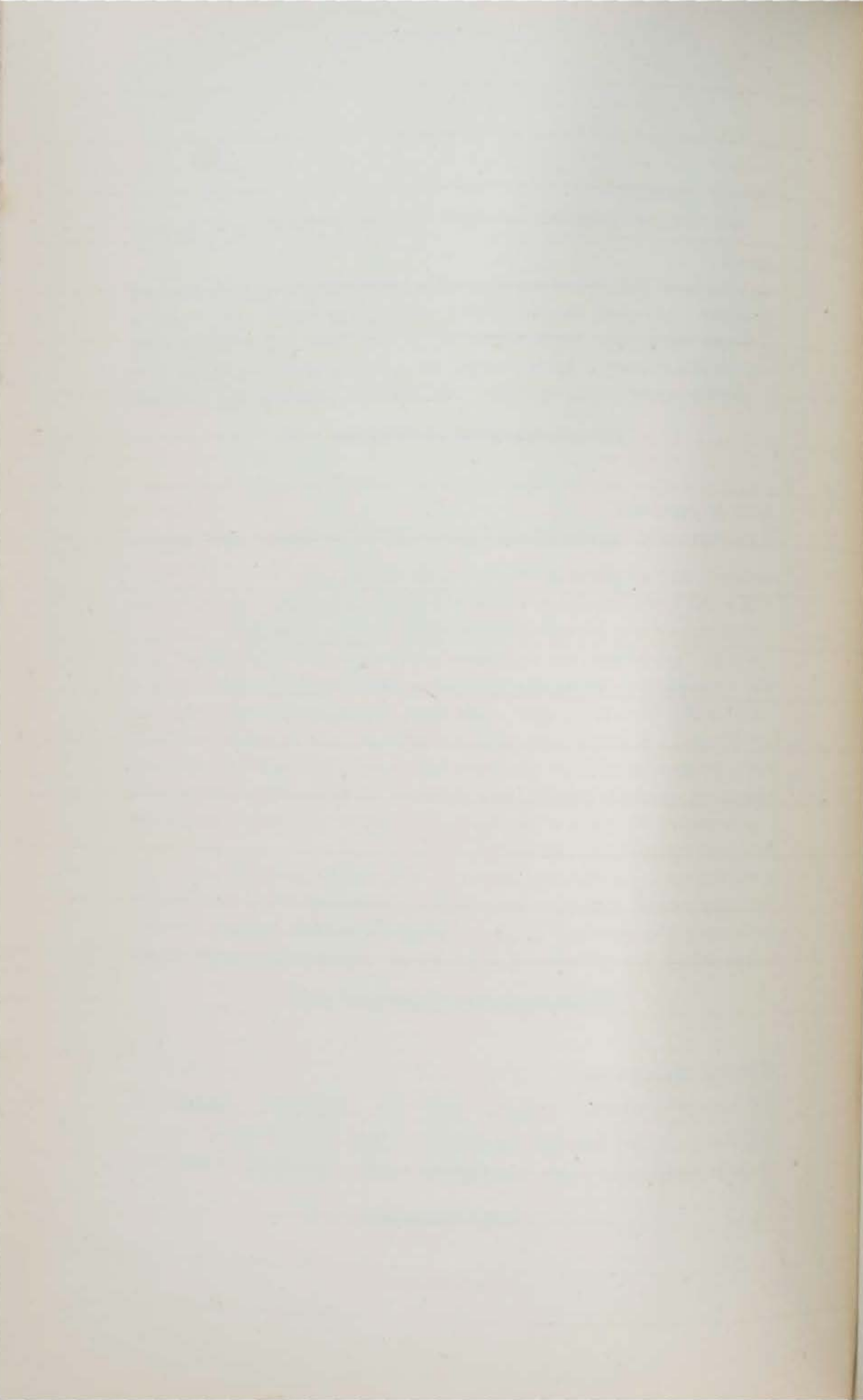
Desmacidonidæ the magasclera of which are usually spined styli; with comparatively little spongin in the fibres. Microsclera: tridentate chelæ.

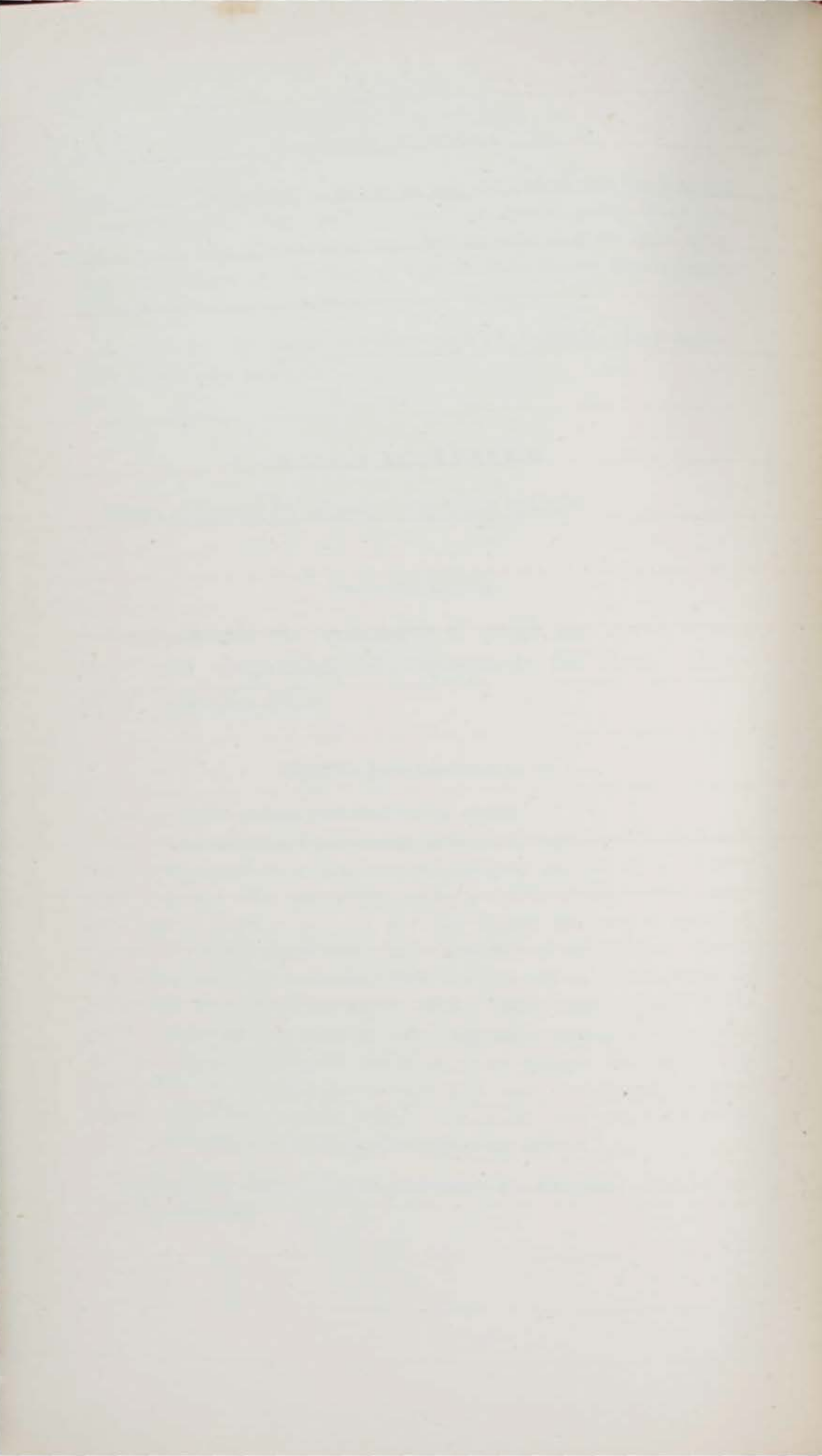
Myxilla jacksoniana, n. sp.

Massive, lobose sponges with conspicuous oscula.

The *skeleton* consists of a very regular network of single spicules, which only here and there combine to form loose and irregular bundles of two or more series of spicules. The supporting *spicules* are styli, slightly curved, sharp, and abruptly pointed at one end, and very slightly thickened at the other; they attain a length of 0.2 millim. and a thickness of 0.007 millim. Besides these also a few tylota are found, which, however, are very scarce; these are 0.2 millim. long and 0.004 millim. thick. Their ends are very slightly thickened, some of them might in fact be regarded as strongyla. Microsclera are very abundant throughout the whole of the sponge; these are sigmata and chelæ. The sigmata are prevalent and have very abruptly recurved pointed ends; they are on an average 0.04 millim. long and 0.002 millim. thick. The chelæ are about a third as large as the sigmata.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson N. S. W. (*Ramsay*).





Genus **CLATHRIODENDRON**, n. gen.

Desmacidonidæ with exceedingly large tylostylote megasclera scattered in the ground-substance. The spongin-fibres of the supporting skeleton contain only few spicules. Echinating spicules spined styli.

Clathriodendron arbuscula, n. sp.

The sponge has the shape of a tree all the branches of which are slightly compressed and flattened, 12 millim. broad, of uniform thickness throughout, and tending upwards. The surface is conulated, and bears numerous sharp and slender projections, which are on an average 2.5 millim. high. The oscula are scattered and very small.

The *skeleton* consists of a network of horny fibres, 0.05 millim. thick. The meshes are elongate, longitudinally disposed, on an average 0.5 millim. long and 0.3 millim. broad. In the axis of the horny fibres large styli are found which attain a length of 0.35 millim., a thickness of 0.12 millim., and which form a single series in the fibre. The fibres are echinated by abundant blunt and somewhat club-shaped styli, 0.084 millim. long and 0.011 millim. thick at the base. The spines are numerous, stout, and about 0.004 millim. high. The echinating styli are attached at an angle of 50° to the surface of the fibre; only a very small part of the spicule is imbedded in the fibre. In the ground-substance styli similar to those in the fibres are met with.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Clathriodendron irregularis, n. sp.

Sponges which consist of a few stout branches, arising from a small base and tending upwards. These branches are 25 millim. thick, and consist of an irregular reticulation, being perforated by oval holes and canals in every direction. The whole sponge attains a height of 150 millim. The surface is very irregular; the skeleton and spiculations are similar to those of the foregoing species.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Clathriodendron nigra, n. sp.

The sponge consists of a mass of very slender branches arising from a small base. These are somewhat compressed, and on an average 4 millim. thick. They ramify in an irregular dichotomous manner, and appear slightly thickened at their distal ends.

The *skeleton* consists of bundles of straight or slightly curved styli, which are 0.7 millim. long and 0.017 millim. thick. These fibres are disposed longitudinally and transversely, and form a network with square meshes. They are 0.07 millim. thick, and the meshes 0.05 millim. wide. Here and there these fibres are also connected by single spicules, similar to those within the fibres. There is hardly any horny substance visible. The fibres are echinated by styli 0.1 millim. long and 0.01 millim. thick, with very small spines. These are comparatively very scarce, and stand singly at long intervals, projecting at an angle of about 45 degrees from the spicule-bundles which form the fibre.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Genus **KALYKENTERON**, nov. gen.

Exceedingly hard and tough cup-shaped Desmacidonidæ, with a skeleton composed of very thick spicule-bundles which are echinated by spined strongyla.

Kalykenteron elegans, n. sp.

A very elegant, conical, cup-shaped sponge attaining a height of 220 millim. The margin of the cup is circular and has a diameter of 120 millim. Both surfaces are very irregular and covered with numerous projections of varying shape and size. The outer surface is somewhat rougher than the inner. The small circular oscula are confined to the latter.

The *skeleton* consists of a dense network of exceedingly thick fibres. The main fibres, which extend longitudinally from the base to the margin of the cup, are 0.2 millim. thick. The connecting transverse fibres have an average diameter of 0.07 millim. The meshes of the network are 0.48 millim. wide. The fibres consist of dense masses of oxea which are all parallel and disposed longitudinally. These oxea are curved in the middle, on an average 0.27 millim. long and 0.012 millim. thick, not very sharp, and rather abruptly

pointed. The fibres are echinated by spined strongyla 0·09 millim. long, and 0·011 millim. thick at the stouter end, which is attached to the fibre, and 0·006 millim. thick at the free projecting end. Both ends are slightly thickened. The body of the spicule is nearly cylindrical and bears numerous short and stout spines, so as to attain more a rough than a spined appearance.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Western Australia (*Baily*).

Kalykenteron silex, n. sp.

The sponge consists of a meandriform lamella which grows up from a small base of attachment; it is somewhat flower-shaped, often caliculate. The whole sponge attains a height of 120 millim. The lamella is pretty uniformly 6 millim. thick and rounded at the margin.

The *skeleton* consists of spicule-bundles 0·2 millim. thick, composed of large and stout styli. There is hardly any spongin discernible. The fibres are echinated by spined styli 0·09 millim. long and 0·008 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Molle, Q. (*Ramsay*).

Genus **CLATHRISSA**, n. gen.

Desmacidonidæ with a skeleton composed of dense bundles of slender oxea, with very little spongin; echinated by spined styli.

Clathrissa arbuscula, n. sp.

(PLATE V. fig. 2.)

Small, irregular, lobose or digitate sponges, with erect processes, attaining a height of 150 millim. The living sponge is very soft and resilient, orange-red in colour. Spirit-specimens are brownish grey. The whole of the surface is covered with densely situated villous, distally rounded or thickened outgrowths, which are about 1·5 millim. thick and from 2–8 millim. long.

The *skeleton* consists of longitudinal, much-branched main fibres, 0·04 millim. thick, and on an average 0·2 millim. apart, composed of dense masses of spicules which are straight, cylindrical oxea, 0·18 millim. long and 0·007 thick. The horny substance which binds these spicules together is only very slightly developed and difficult to observe. The fibres are echinated by spined conic, mostly straight or slightly curved styli 0·12 millim. long, and at their

thickened proximal end 0·009 millim. thick, which stand very steep, often nearly perpendicular.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Clathrissa elegans, n. sp.

Tree-shaped branched sponges of large size and elegant shape, consisting of a short vertical stem about 15 millim. thick, from which numerous more slender branches grow out. These tend upwards and are curved in such a manner as to become perpendicular in their distal portions. Fresh sponges of this species are soft and resilient. Alive, in spirit, and dry it is dark brown in colour.

The *skeleton* consists of a network of spicule-bundles 0·027 millim. thick, and on an average 0·025 millim. apart. These consist of densely packed straight oxea 0·2 millim. long and 0·004 millim. thick; some of them attain a much larger size. Occasionally styli are observed. The fibres are echinated by spined styli, which are more numerous towards the surface than in the interior. These styli are on an average 0·09 millim. long and 0·06 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Clathrissa pumila, n. sp.

Small, incrusting, conulated sponges, of a light rose-colour in the fresh state and grey when preserved in spirit. The conuli are on an average 2 millim. high and 4 millim. apart. Small oscula 0·8 millim. wide are scattered irregularly over the surface.

The *skeleton* consists of perpendicular fibres 0·09 millim. thick, which terminate in the conuli. They are composed of styli and oxea, cemented by a small quantity of spongin. The ends of the spicules often protrude beyond the surface of the fibre. They measure on an average 0·2 millim. in length and 0·005 millim. in thickness. These fibres are echinated by densely packed perpendicularly situated, spined styli, which are on an average 0·11 millim. long, and at the base 0·007 millim. thick. The chelæ scattered in the ground-substance are very abundant, 0·012 millim. long. Besides these there are also spicules similar to those in the fibres, scattered in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson N. S. W. (*Ramsay, Lendenfeld*).

Clathrissa pumila, var. **rubra**, nov.

Massive or incrusting sponges with small conuli about 1 millim. high, which are very close together. The largest specimens attain a height of 20 millim. The colour of the living sponge is bright scarlet.

The *skeleton* is similar to that of the species.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **ECHINONEMA**.

Desmacidonidæ with fibres which are so excessively echinated that the dense masses of echinating spicules hide the fibre from view.

Echinonema anchoratum, Carter.

Echinonema anchoratum, H. J. Carter, "Supplementary Report on the Specimens dredged up from the Gulf of Manaar, together with others from the vicinity of Bass Rocks and from Bass Straits respectively," &c., *Annals and Magazine of Natural History*, ser. 5, vol. vii. p. 378 (1881).

Digitate, irregularly branched sponges, which are generally very hard.

The *skeleton* consists of a more or less dense network of horny fibres, which are cored with siliceous spicules, and in the different varieties from 0.04–0.07 millim. thick. The spicules form an axial thread in their centre. They are situated longitudinally and pretty abundant: oxea in the different varieties from 0.1–0.27 millim. long and from 0.004–0.006 millim. thick. The fibres are densely echinated by spined styli. The spines are very numerous, high, and sharp. The styli are in the different varieties from 0.074–0.095 millim. long, and 0.006–0.01 millim. thick at the base, which is inserted in the clear cortical spongin-layer of the fibre. The chelæ in the ground-substance are isochelæ, with long and sharp marginal teeth, and small rounded central lobes; they are 0.014 millim. long and much curved.

Echinonema anchoratum, var. **ramosa**, nov.

Small, erect, digitate sponges with irregular and high processes all over the surface.

The *skeleton* is composed of a dense network of fibres 0.04 millim. thick. *Spicules*: oxea 0.16 millim. long and 0.004 millim. thick, abundant in the

axis of the fibres. Fibres densely echinated by spined styli, which are straight, conical, or slightly curved, 0.074 millim. long, and at the base 0.006 millim. thick. Chelæ abundant in the ground-substance, 0.014 millim. long.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Echinonema anchoratum*, var. *dura*, nov.**

Very hard dendritic sponges, in the living state light yellow.

The *skeleton* consists of a loose network of fibres 0.07 millim. thick, cored with abundant longitudinally disposed oxea, which are 0.2–0.27 millim. long and 0.006 millim. thick, densely spined with conic styli 0.095 millim. long, and at the base 0.01 millim. thick. Chelæ scarce.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

***Echinonema anchoratum*, var. *lamellosa*, nov.**

Frondose, flabelliform, lamellar sponges.

The *skeleton* consists of a close reticulation of fibres 0.04 millim. thick, which are cored by dense masses of oxea, 0.1 millim. long and 0.004 millim. thick, and echinated by not quite so abundant spined styli, which are on an average 0.08 millim. long, and at the base 0.009 millim. thick. Chelæ scarce.

GEOGRAPHICAL DISTRIBUTION.—New Zealand: Port Chalmers (*Parker*).

***Echinonema levis*, n. sp.**

Large, digitate, or lobose erect sponges, which have a perfectly smooth and continuous surface. Smaller specimens appear more massive, whilst larger ones are generally composed of digitate, distally rounded, cylindrical processes. Some of the specimens are lamellar, flabelliform or frondose, with slightly irregular serrated margin. The sponge attains a height of 200 millim. Colour in the living state and in spirit grey.

The *skeleton* consists of irregularly curved, for the most part longitudinally extending fibres, 0.03 millim. thick, which contain abundant straight or slightly curved styli, 0.27 millim. long and 0.007 millim. thick. The fibres are densely echinated by spined conical styli, 0.08–0.1 millim. long, and at the base 0.007 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Echinonema rubra, n. sp.

Large, erect, digitate or dendritic, sometimes flabelliform or irregularly frondose sponges, attaining a height of 300 millim. The processes or branches are cylindrical and distally rounded. The sponge is in the living state of a bright scarlet colour, which is sometimes retained by spirit-specimens. The surface is irregularly grooved.

The *skeleton* consists of fibres 0·07 millim. thick, which form a pretty wide-meshed network. These fibres are cored by bundles of slightly curved styli 0·2 millim. long and 0·005 millim. thick, and pretty densely echinated by very spiny, somewhat cylindrical styli, 0·7 millim. long and 0·009 millim. thick. The thickness of the cortical layer of spongin, free from longitudinal spicules, in the fibres is a very conspicuous feature of this species.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **CLATHRIA**.

Desmacidonidæ with a skeleton composed of bundles of spicules invested by spongin from which spined styli protrude.

Clathria macropora, n. sp.

Irregular, massive, lobose sponges, attaining a height of 200 millim. The sponge appears more or less upright, higher than broad. The surface is rather irregular, undulating or grooved. The oscula are very conspicuous, and scattered over the whole of the surface; they are on an average 5 millim. wide and fairly abundant.

The *skeleton* consists of a network of mostly longitudinally disposed fibres 0·13 millim. thick, which contain an axial bundle 0·07 millim. thick of slender oxea and styli, the former being more numerous. These spicules are 0·14 millim. long and 0·004 millim. thick. The fibres are echinated by exceedingly spiny styli, which have a length of 0·09–0·012 millim. The spines are recurved, and confined to the lower two thirds of the spicules. The spined styli are at the base 0·01 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Stephens, N. S. W. (*Ramsay*). New Zealand: Nelson Bay (*Canterbury Museum, Christchurch, N. Z., coll.*).

Clathria pyramida, n. sp.

Massive sponges with rough surface, covered with regularly pyramidal processes, attaining a maximum diameter of 150 millim., and attached by a broad base. The living sponge is of a dark violet colour.

The *skeleton* consists of fibres 0·09 millim. thick, which contain an axial bundle 0·04 millim. thick, of slender straight styli 0·26 millim. long and 0·004 millim. thick. They are echinated by rather scarce spined styli, which are distributed in a more or less verticillate manner, 0·1 millim. long, and covered with low spines, particularly in their basal portion, and there 0·008 millim. thick. Abundant spicules of two kinds are scattered throughout the ground-substance:—(1) styli, similar to those in the fibres; (2) chelæ, 0·02 millim. long.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Clathria australis, n. sp.

Flabelliform sponges with irregular, more or less circular outline. The lateral margins are continuous, simply convex; the upper margin is slightly undulating. The two faces of the lamellar sponge are covered by longitudinal, radially disposed grooves which extend from the broad base of attachment to the upper margin. In some specimens two or more such lamellæ are joined by a transverse piece. The sponge attains a height of 150 millim., and the lamella is 30 millim. thick.

The *skeleton* consists of a network of fibres, which can be distinguished into main and connecting-fibres. The main fibres are entirely filled with spicules, and on an average 0·1 millim. thick. The connecting-fibres are 0·03 millim. thick, and free from spicules. The spicules of the main fibres are straight styli, 0·015 millim. long and 0·006 millim. thick. The main fibres are echinated with scarce, spined styli, 0·1 millim. long and 0·007 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—South coast of Australia: Port Phillip, V. (*Lendenfeld*).

Genus **THALASSODENDRON**, n. gen.

Desmacidonidæ with a supporting skeleton composed of horny fibres partly without spicules in the interior, and echinated by scarce, pretty smooth styli.

Thalassodendron digitata, n. sp.

The sponge consists of a mass of stout digitate processes, which are more or less upright and grow out from a broad basal mass. The processes are inflated at the base, conic, tapering towards the abrupt end, which bears a terminal osculum. The surface of the skeleton appears peculiarly villous.

The *skeleton* consists of spiculiferous main fibres and aspicious connecting-fibres. The former are 0.05 millim. and the latter 0.03 millim. thick. The spicules in the former are slender, terminally thickened, straight or irregularly curved, strongyla 0.2 millim. long. The main fibres are echinated by smooth and stout, blunt styli, 0.1 millim. long, and at the base 0.01 millim. thick. The echinating styli are often confined to the distal surface of the fibres.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*).

Thalassodendron typica, n. sp.

Horizontally expanded, broad, irregularly caliculate or flabelliform and curved sponges. The free margin of the cup is pretty narrow, and generally incised at one place, so that the whole structure does not appear radially symmetrical. The sponge attains a height of 200 millim. The margin of the cup measures in large specimens 250 millim. in diameter. The surface is covered with radially situated, longitudinal ridges which are about 8 millim. apart. The wall of the cup has an average thickness of 12 millim.

The *skeleton* consists of main and connecting-fibres. The former are 0.11 millim. thick, and filled with spicules; the latter 0.05 millim. thick, and aspicious. The spicules in the former are straight styli, 0.2 millim. long, and 0.005 millim. thick. They are slightly echinated by styli, scarce, stout, smooth or slightly spined, 0.03–0.07 millim. long, and at the base 0.008 millim. thick, often entirely imbedded in the horn-substance of the fibre.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Thalassodendron rubens, n. sp.

Large, branched, erect sponges, which consist either of a bunch of digitate processes, or which appear more flabelliform. The branches are about 6 millim. thick. The surface is slightly grooved.

The *skeleton* consists of a network of fibres, 0.08–0.2 millim. thick, which contain somewhat irregularly disposed styli, 0.15–0.25 millim. long and 0.004–

0.007 millim. thick. They are echinated by rather scarce, rough, or slightly spined styli, 0.06–0.07 millim. long and 0.006 millim. thick.

Thalassodendron rubens, var. dura, nov.

Large, branched, erect sponges, which attain a height of 700 millim. and a breadth of 500 millim., consisting of a bunch of numerous digitate, here and there compressed and laterally, particularly at the branching points, distended processes. The surface is slightly grooved.

The *skeleton* consists of a pretty dense network of exceedingly thick fibres. The irregular rounded meshes measure 0.1–0.3 millim. in width. The fibres are on an average 0.2 millim. thick, and approximate in some places to form perforated plates. Abundant, somewhat irregularly disposed, cylindrical styli, 0.15–0.25 millim. long and 0.004–0.007 millim. thick, are observed in the fibres. These are more numerous in the longitudinal than in the transverse fibres. The fibres are echinated by rough or slightly spined styli, on an average 0.07 millim. long and 0.006 millim. thick. The echinating styli are not abundant.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Thalassodendron rubens, var. lamella, nov.

(PLATE VII.)

Large, erect, branched sponges, composed of a number of compressed, laterally distended branches, extending in one plane, which anastomose occasionally. The surface is slightly grooved.

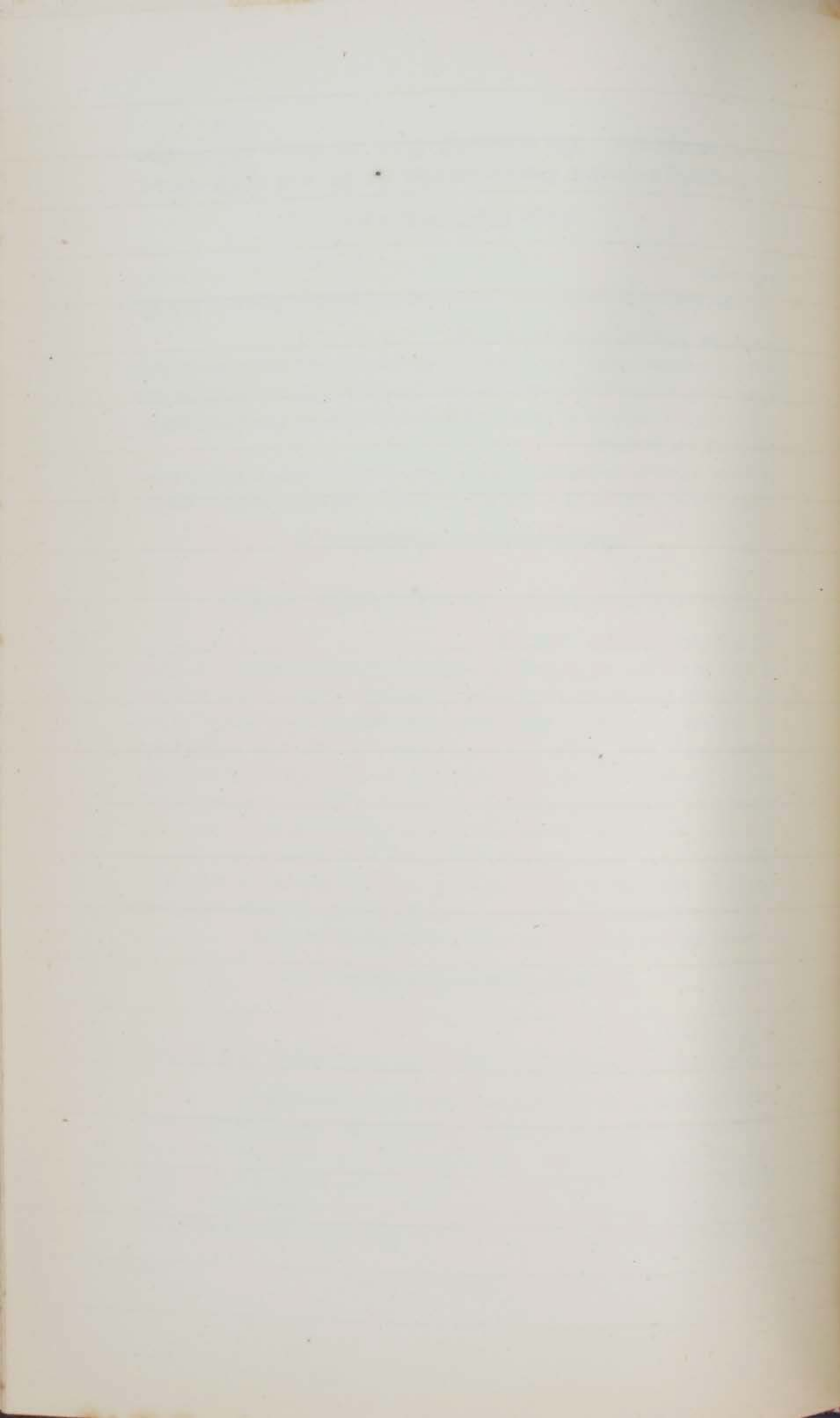
The *skeleton* consists of a network of irregularly curved fibres, on an average 0.08 millim. thick, which contain very irregularly disposed styli, 0.16 millim. long and 0.006 millim. thick. The fibres are echinated by slightly spiny and blunt styli, 0.06 millim. long and 0.006 millim. thick. These are pretty scarce.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay, Lendenfeld*).

Thalassodendron paucispina, n. sp.

Large, irregular, digitate sponges, the processes of which are branched, compressed, and expanded more or less in a plane, so that the whole sponge attains a somewhat flabelliform appearance.

The *skeleton* consists of longitudinal main fibres 0.1 millim. thick, which are on an average 0.26 millim. apart, and joined by mostly simple transverse connecting-fibres 0.07 millim. thick. In both pretty abundant and rather



irregularly disposed styli, 0·3 millim. long and 0·011 millim. thick, are observed; these are more abundant in the main than in the connecting-fibres. The fibres are echinated by two kinds of spicules:—(1) smooth styli, 0·1 millim. long and 0·007 millim. thick; (2) spined styli, 0·08 millim. long and 0·006 millim. thick. Both kinds are scarce. Very abundant spicules, similar to those in the fibres, are found scattered throughout the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Thalassodendron brevispina*, n. sp.**

Large branched sponges, with very irregular digitate processes.

The *skeleton* consists of mostly longitudinally disposed irregular main fibres, 0·07–0·15 millim. thick, which are joined by short and simple connecting-fibres, 0·05 millim. thick; in some places they approximate and coalesce to form perforated plates. In the main fibres a very regular axial bundle, 0·03 millim. thick, of spicules is observed. There are no spicules in the connecting-fibres. The spicules in the main fibres are styli, 0·02 millim. long and 0·009 millim. thick. Small rough styli, 0·05 millim. long and 0·005 millim. thick, are observed protruding at right angles from the axial spicule-bundle. These are evidently homologous to the echinating spicules of other species, but most of them do not protrude beyond the surface of the spongin-cortex of the fibres, which are not echinated accordingly.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

***Thalassodendron viminalis*, n. sp.**

The sponge consists of a number of pretty regularly cylindrical upright branches, which are not much branched. The surface is rough or slightly conulated, but not grooved.

The *skeleton* consists of mostly longitudinally disposed fibres, 0·08 millim. thick, which contain rather scarce, slightly curved, blunt styli, 0·14 millim. long and 0·006 millim. thick. The fibres are echinated by very scarce smooth styli, 0·5 millim. long and 0·005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Genus **PLECTISPA**, n. gen.

Elegantly reticulate Desmacidonidæ, the fibres of which contain only few spicules. The superficial fibres are always echinated on

the distal surface by smooth styli. The fibres in the interior are often not echinated at all.

Plectispa elegans, n. sp.

The sponge consists of a reticulate mass of regularly cylindrical digitate branches, which are on an average 5 millim. thick. The surface is pretty smooth.

The *skeleton* consists of main and connecting-fibres. The former measure 0.2 millim. in thickness and contain abundant styli, 0.16 millim. long and 0.006 millim. thick. The connecting-fibres form a dense network with rounded meshes 0.03–0.15 millim. wide; they are on an average 0.07 millim. thick, and contain scattered spicules similar to those in the main fibres. The superficial fibres are echinated on the distal surface by fairly abundant smooth styli, 0.07 millim. long and 0.005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Plectispa arborea, n. sp.

Dendritically ramifying sponges, which attain a height of 300 millim. The stem, which is clearly defined, is attached by an extensive basal plate, slightly compressed, and about 8 millim. thick. The surface is rough.

The *skeleton* consists of an exceedingly dense network of fibres. The longitudinal fibres are on an average 0.1 millim. thick; the others, which can be regarded as connecting-fibres, measure 0.02–0.05 millim. The latter form a network with polygonal meshes, 0.14 millim. wide. The longitudinal fibres contain styli, 0.08 millim. long and 0.004 millim. thick, which are not very abundant. Scattered spicules are also found in the connecting-fibres. The fibres are echinated by very scarce smooth styli, 0.05 millim. long and 0.004 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Plectispa macropora, n. sp.

Small and tender reticulate honeycomb-like sponges, which appear massive or incrusting and attain a height of 40 millim. The meshes of the honeycomb are very uniformly 3 millim. wide and regularly polygonal.

The *skeleton* consists of a network of fibres 0.05 millim. thick, which are filled with slender straight or curved styli, 0.2 millim. long and 0.004 millim.

thick. The fibres are pretty abundantly echinated by slightly spined or rough styli, 0.07 millim. long and 0.006 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—North coast of Australia: Torres Straits (*Macleay*).

Genus **CLATHRIOPSAMMA**, n. gen.

Desmacidonidæ with a sand-cortex and a skeleton composed of horny fibres, charged with foreign spicule-fragments and echinated by smooth styli.

Clathriopsamma lobosa, n. sp.

Irregularly ramified, exceedingly hard sponges, with a smooth surface. The branches are cylindrical, and often terminally thickened and rounded at the end; they attain a thickness of 25 millim.

The *skeleton* consists of longitudinal main fibres 0.1 millim. thick, and simple transverse connecting-fibres 0.03 millim. thick. Abundant foreign bodies are found in both. The fibres are echinated by spined styli, 1.05 millim. long and 0.006 millim. thick, which are fairly abundant.

The position of this species appears somewhat doubtful; it shows affinities to the genus *Aulena*.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Clathriopsamma reticulata, n. sp.

Repent sponges, which consist of a reticulate mass of smooth cylindrical processes about 5 millim. thick.

The *skeleton* consists of a network of fibres 0.12 millim. thick, with meshes on an average 0.3 millim. wide. The fibres contain irregularly disposed styli of varying dimensions. They are echinated by very spiny and stout styli, 0.05 millim. long and 0.009 millim. thick, which are fairly abundant.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia (*Ramsay*).

Familia **AULENIDÆ**.

Reticulate Cornacuspongiæ with a skeleton composed of stout fibres, which form a network with small meshes. Ciliated chambers small, spherical. Ground-substance transparent. Without

proper spicules in the ground-substance, but sometimes with echinating spicules on the superficial fibres.

Genus **AULENA**.

Aulenidæ which consist of a honeycomb-like folded lamella. The fibres of the skeleton are charged with foreign bodies and form a dense network. The superficial fibres are echinated on the distal surface. With sand-cortex.

Aulena laxa, Lendenfeld.

Halme laxa, R. v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, p. 847 (1886).

Irregular, decumbent, and horizontally expanded or massive and erect sponges, with irregular upright digitate processes, which are about 30 millim. thick and 200 millim. high. These processes are rounded at their distal ends, or cut off abruptly. The smaller, more or less incrusting forms attain a length of 60 millim. and a height of 20 millim. The sponge consists of a very loose honeycomb structure, the meandriform lamellæ of which are 1-2 millim. thick. The cells of the honeycomb are of varying size, 10-20 millim. wide. There is no central cavity. The surface of the lamellæ which appear slightly thickened distally, that is in the outer surface of the sponge, is pretty smooth.

The *skeleton* is composed of a network of fibres in the interior. The main fibres contain large scattered sand-grains and are 0.2 millim. thick; the connecting-fibres measure 0.02-0.03 millim. The reticulation is very dense, the meshes measuring only 0.2 millim. in width. From the outermost main fibres, which form a tangential reticulation, echinated fibres extend to the surface. The fibres of the tangential network are likewise echinated on their distal surface. No spicules are attached to the fibres in the interior. These echinating spicules are styli, 0.06-0.067 millim. long and 0.0048-0.006 millim. thick. The surface itself is protected by a layer of sand 0.1 millim. thick. The superficial echinated fibres appear to be connected with the sand-cortex.

Aulena laxa, var. **minima**, Lendenfeld.

Halme laxa, var. *minima*, v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales," vol. x. part 4, p. 847 (1886).

Small, incrusting, horizontally expanded sponges. From the upper surface irregular lobose processes may arise, which are never higher than broad. The network of the sponge-lamella is dense. The lamellæ are on an average 1 millim. thick, and the cells of the honeycomb 10 millim. wide. The surface is smooth. Small oscula measuring 0.5 millim. in width are scattered sparsely over the whole of the surface. The colour of fresh specimens is yellowish grey. In spirit and dry they appear darker brown. The living sponge is very soft and resilient; dry skeletons are hard and inelastic.

The *skeleton* of the interior consists of slightly knotty main fibres 0.2 millim. thick, containing large scattered sand-grains, and connecting-fibres 0.028 millim. thick, which are free from foreign bodies. The outermost main fibres are echinated on their external side. Perpendicular fibres 0.027 millim. thick extend from them to the surface; these contain no foreign bodies, and are echinated by very irregularly disposed styli, which are straight, cylindrical, abruptly pointed, and measure 0.067 millim. in length and 0.0048 millim. in thickness. There are no spicules scattered in the ground-substance. The surface is protected by a sand-cortex, on the lower side of which the echinated fibres abut perpendicularly with trumpet-shaped extensions.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Aulena laxa*, var. *digitata*, Lendenfeld.**

Halme laxa, var. *digitata*, R. v. Lendenfeld, "Second Addendum to the Monograph of Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, pp. 847-848 (1886).

This sponge attains a height of 300 millim. and a breadth of 70 millim. The digitate processes which arise from the basal massive portion of the sponge attain a length of 200 millim. and a thickness of 30 millim. The surface is uneven, undulating. The distal ends of the branches are rounded or cut off abruptly. The meshes of the honeycomb have a width of 20 millim., and the lamella itself is 2 millim. thick. The surface is smooth; the scattered oscula measure 0.5 millim. in diameter. The colour of the fresh sponge is light grey or white. Fresh specimens are soft and resilient, dry skeletons hard and inelastic. Just below the outer surface, canals 0.11 millim. wide are observed, which appear to communicate; these represent the subdermal cavity. In the interior the canals measure 0.08 millim. in diameter.

The internal *skeleton* is composed of main fibres, 0.07 millim. thick, which are pretty smooth and contain axially scattered sand-grains. The connecting-fibres are 0.008 millim. thick. The tangential net of main fibres below the

surface is composed of fibres 0·09 millim. thick, which are different from the main fibres in the interior, inasmuch as conic projections arise from their outer side, which are about half as high as these fibres are thick. These conic protuberances are densely echinated, and on an average as far apart as they are high. There are no spines in the spaces between them. From these tangential fibres, perpendicular echinated fibres extend to the surface. The latter contain foreign bodies—sand-grains, which, however, are smaller than those in the main fibres of the interior. The perpendicular fibres, which abut with trumpet-shaped extensions on the dermal sand-cortex, are slightly branched, 0·0067 millim. thick, and very densely and regularly spined. The spicules are straight, abruptly pointed, cylindrical styli, 0·067 millim. long and 0·006 millim. thick. There are no spicules scattered in the ground-substance.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Aulena gigantea*, Lendenfeld.**

Halme gigantea, R. v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, p. 847 (1886).

The varieties of this species differ from each other only in their external appearance. They consist of a basal mass, which may have a diameter of 100 millim., attached by a broad base. It varies very much in height, forming sometimes half or more of the whole sponge, and reduced at other times to a low lamella. Digitate processes grow out from the upper side of the basal mass; these are either irregular with bulbous outgrowths, or slender and conic, or also regularly fusiform, thickened in the middle. These processes attain a length of 400 millim., and a greatest width of 60 millim. The whole sponge is hollow, so that the digitate processes appear tubular, closed at the ends. The central cavity is about as wide as the wall is thick. The latter consists of an exquisitely honeycombed structure; it is perforated by large polygonal canals, which lead from the outer surface to the central tube, and which in their course extend centripetally downwards. These tubes are, in the variety *micropora* 3 millim., in *intermedia* 5 millim., and *macropora* 7 millim. wide. The septa between these tubes are formed by lamellæ only 1 millim. thick; they terminate in the surface in a regular reticulation with polygonal meshes. The free margin is slightly thickened, so that the superficial holes which lead into these tubes are smaller than the tubes are wide. These marginal thickenings are about 2 millim. wide. The colour of all the varieties in spirit and when dry is dark brownish grey. In the

fresh state the sponges are soft and resilient, in the dry state hard and inelastic. The tubes which lead from the surface to the central cavity, together with the latter, are to be considered as vestibular lacunæ. On the surface of the honey-comb-like lamellæ groups of inhalant pores and oscula are scattered indiscriminately. The inhalant pores lead into irregular subdermal cavities, which appear as tangential canals 0·12 millim. wide. The inhalant and exhalant canals are, on an average, 0·05 millim. wide. The ciliated chambers are spherical, 0·025 millim. wide, and open direct into the exhalant canals. The efferent pore is about one fourth as wide as the chamber.

Dermal skeleton: siliceous spicules are scattered irregularly in the skin; 0·2 millim. below it a network of stout fibres extends parallel to the surface. The fibres forming this network are on an average 0·1 millim. thick, and cored with an axial series of large sand-grains. They contain no siliceous spicules, and are not echinated. From their outer side short fibres arise which extend perpendicularly to the surface, and appear to consist of fragments of foreign siliceous spicules, cemented by a small quantity of spongin. These fibres are generally slightly branched, the branches tending upwards and abutting perpendicularly on the surface. They are 0·03 millim. thick, and echinated by projecting styli, which are given off at an angle of about 45°, and point outward. The supporting skeleton consists of a network of longitudinally-extending, irregular, and much curved anastomosing main fibres, which are 0·12–0·14 millim. thick, and, similarly to the fibres of the tangential network, cored with a single series of sand-grains. The connecting-fibres are 0·04–0·06 millim. thick, and generally extend, without branching, from one main fibre to another. In the interior of the sponge no spicules of any kind are found. Those scattered in the surface are partly foreign, like those which are found in the axes of the echinated fibres. Among them strongyla, 0·14 millim. long and 0·002 millim. thick, are frequent. The spicules which echinate the fibres are conical styli 0·07–0·09 millim. long, and at the base 0·02–0·03 millim. thick.

This species resembles certain forms of Ectyoninæ, particularly of the genus *Clathriopsamma*, so closely that I do not hesitate to consider them closely allied.

***Aulena gigantea*, var. *macropora*, Lendenfeld.**

Halme gigantea, var. *macropora*, R. v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, p. 850 (1886).

Holopsamma laminafavosa (partim), H. J. Carter, "Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia," Annals and Magazine of Natural History, ser. 5, vol. xv. p. 212 (1885).

This sponge attains a height of 250 millim. The digitate processes are fusiform, centrally thickened; at the distal and proximal ends 30 millim., and in the centre 60 millim. thick. The largest holes in the surface are 7 millim. wide. Spicules in the echinated fibres of the surface very abundant.

GEOGRAPHICAL DISTRIBUTION.—West coast of Australia: Freemantle, W. A. (*Bowerbank Coll.*). East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*). South coast of Australia: Port Phillip Heads, V. (*B. Wilson*).

Aulena gigantea*, var. *intermedia, Lendenfeld.

Halme gigantea, var. *intermedia*, R. v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, p. 849 (1886).

This sponge consists of a low incrusting basal mass, from which irregular digitate processes arise. These possess irregular thickenings, so that their surface appears undulating. They attain, in large specimens, a thickness of 100 millim. and a length of 300 millim. The meshes in the honeycomb reticulation are 5 millim. wide. The central tube is not quite so wide as the walls are thick. The spicules forming the spines of the echinated superficial fibres are comparatively scarce. The colour of the living sponge is bright yellow.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Broughton Islands (*Ramsay*).

Aulena gigantea*, var. *micropora, Lendenfeld.

Halme gigantea, var. *micropora*, R. v. Lendenfeld, "Second Addendum to the Monograph of the Australian Sponges," Proceedings of the Linnean Society of New South Wales, vol. x. part 4, p. 849 (1886).

This sponge consists of an erect lamellar basal portion, from the upper margin of which four or five digitate processes, which all lie in one plane, grow up. These are upright, conic, 60 millim. broad at the base, regularly circular in transverse section, and taper towards the distal end, which is only 10 millim. thick. The whole sponge attains a height of 250 millim. The meshes of the honeycomb are 3 millim. wide. The echinated fibres of the surface-skeleton are very short, only about twice as long as the spicules.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Illawarra, N. S. W. (*Ramsay*).

Genus **HYATTELLA**, n. gen.

Aulenidæ of reticulate, not honeycombed structure, with extensive vestibular cavities, which are wider than the septa between them. The thicker connecting-fibres exceed 0·03 millim. The meshes of the skeleton-net are about 0·2 millim. wide. The fibres contain only a small quantity of foreign material. Without proper spicules of any kind.

Hyattella clathrata, Carter.

Hircinia clathrata, H. J. Carter, "Report on the Sponges dredged up from the Gulf of Manaar, together with others from the sea in the vicinity of Bass Rocks and from Bass Straits respectively, presented to the Liverpool Free Museum by Capt. H. Cawne Warren," *Annals and Magazine of Natural History*, ser. 5, vol. vii. p. 366 (1881).

Irregularly ramified or cup-shaped sponges, which consist of a network of stout, compressed, band-shaped trabeculæ. The sponge appears in the form of a massive incrustation, from the upper surface of which short and thick processes arise. These may remain isolated or (and this is the rule in large specimens) they coalesce in many places, thus forming an irregular reticulation. Very often they join along the whole length to form a continuous wall surrounding a central cavity, and thus producing a cup-shaped form. The sponge attains a height of 200 millim. and more, and a breadth of 180 millim. These sponges are generally erect, much higher than broad, and extending distally, in the case of the caliculate forms, to produce the irregularly lobose margin of the cup, which is always deeper than broad. The digitate branches of the ramose forms are 15–20 millim. thick, and the wall of the cup of the caliculate specimens has a similar thickness. The trabeculæ which compose the sponge are 2–5 millim. thick, and the elongate oval holes in the fairly continuous surface, which are disposed longitudinally, measure 2–5 millim. in breadth and 10–20 millim. in length. The vestibular canals which lead down from these holes have similar dimensions. The free margins of the lamellæ are not thickened but simply rounded. The branches or the cup-wall are hollow. The central cavity is continuous and uninterrupted, the trabeculæ being confined to the external surface. These central cavities are about one third as wide as the parts in which they lie. It will be seen from this that *Hyattella clathrata* resembles *Aulena gigantea* in the structure of its vestibular system very much. The surface is conulated. The conuli are small, about 0·8 millim.

high in the skeleton and 1.5 millim. apart. The dry skeleton is dark chestnut-brown, very hard and only slightly compressible.

The *skeleton* consists of a very dense network. The main fibres are 0.1 millim. thick, 0.4 millim. apart, and contain very little sand in the axis. The connecting-fibres measure 0.042 millim. in thickness, are straight and thickened at their base, so that the meshes, which are 0.3 millim. wide, appear rounded, polygonal, or more or less circular.

GEOGRAPHICAL DISTRIBUTION.—Atlantic: St. Domingo (*British Museum Coll.*).

Indian Ocean: Ceylon, Trincomalee (*Warren*); Aden (*British Museum Coll.*).

West coast of Australia: Western Australia (*Baily*). East coast of Australia: Port Denison, Q. (*Ramsay*).

Familia **AXINELLIDÆ**.

Cornacuspongiæ with large subdermal cavities and a skeleton composed of a dense axial column of reticulating fibres, from which distant branches extend in a plumose manner to the surface. Megasclera chiefly styli. Microsclera rarely present; never chelæ.

Genus **AXINELLA**.

Axinellidæ with oxeote and stylote megasclera; without microsclera. Sponges generally ramified, bush-like. Ramification usually dichotomous.

Axinella hispida, Montagu.

Dictyocylindrus hispidus, J. S. Bowerbank, A Monograph of British Sponges, vol. ii. p. 108 (1866).

Spongia hispida, G. Montagu, "An Essay on Sponges, with Descriptions of all the Species that have been discovered on the coast of Great Britain," Memoirs of the Wernerian Society, vol. ii. (1812).

Sponge pedicelled, arborescent; branches long and slender, dividing dichotomously or trichotomously. Surface smooth, somewhat hispid. Oscula and pores inconspicuous. Dermal membrane pellucid, aspiculous.

Skeleton: spicules large and long styli, and spined oxea. Dermal spicules same as those of the internal skeleton. Microsclera styli and oxea, long and very slender, in bundles (trichites).

***Axinella hispida*, var. *gracilis*, nov.**

The sponge consists of a small bunch of cylindrical digitate processes, which are slightly ramified. It attains a height of 120 millim. The cylindrical branches have a regularly circular transverse section, and are about 4 millim. thick.

The spicules of the supporting skeleton are 0.14 millim. long and 0.005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Axinella hispida*, var. *tenella*, nov.**

Small, soft, and resilient sponges, which appear as bushes of slightly compressed digitate branches, ramifying in an irregularly dichotomous manner, and attaining a height of 40 millim. They are slightly widened distally, and appear truncate.

The spicules of the supporting skeleton are chiefly styli, 0.2 millim. long and 0.005 millim. thick.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

***Axinella aurantiaca*, n. sp.**

(PLATE V. fig. 1.)

Large and pretty stiff sponges, which are branched in a regularly dichotomous manner. The branches are regularly cylindrical, and taper towards their ends, in some cases so much so that they appear pointed. The surface is smooth, not velvet-like as in most of the other species. The processes are on an average 8–10 millim. thick, and not so frequently branched as in other species. The whole sponge attains a height of 200 millim. It is, in the living state, of a bright orange colour. In spirit it becomes pale.

The *skeleton* consists of a dense network of slightly curved styli, measuring 0.29×0.007 millim., pervaded by fibres 0.1 millim. thick, composed of similar spicules, in the axis. In the lacunose superficial layer, which is about 1 millim. thick, no scattered spicules are observed. This part of the sponge is pervaded only by the plumose fibres, which abut on the surface with trumpet-shaped extensions. Microsclera absent.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*, *Lendenfeld*).

Axinella inflata, n. sp.

Exceedingly soft and resilient ramifying sponges, with cylindrical terminally inflated branches. The whole sponge has the shape of a bush, which attains a height of 100 millim.

The *skeleton* consists of scattered styli measuring 0.1×0.006 millim., and bundles of similar spicules in the axial and plumose spiculiferous fibres in the superficial part of the sponge.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Ramsay*).

Axinella obtusa, n. sp.

Small dichotomously-branched sponges, attaining a height of 60 millim. The branches are slightly flattened, and about 5 millim. thick; they become more compressed towards their distal ends, where they are only 1–2 millim. thick, 8 millim. broad, and appear truncated. The branches are mostly situated in one plane, so that the whole sponge attains a decidedly flabelliform appearance.

The *skeleton* consists of a dense mass of slightly curved styli, measuring 0.12×0.006 millim., pervaded by bundles of similar spicules 0.02 millim. thick in the axial part of the sponge. In the superficial lacunose portion no scattered spicules are observed. The plumose spiculiferous fibres abut on the surface with trumpet-shaped extensions, and their terminal spicules protrude beyond it, rendering its appearance velvet-like.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

Genus **SPIROPHORELLA**, n. gen.

Axinellidæ with abundant spiral microsclera*.

Spirophorella digitata, n. sp.

Irregular massive sponges of small size, with large prominent oscula. The colour of spirit-specimens is light grey.

The *skeleton* consists of radial main and simple unbranched transverse

* This genus appears very similar to the genus *Spiretta*, above described (p. 42), which belongs to the order Chondrospongiae. I am not in a position to decide the question whether this similarity is due to relationship or converging development.

connecting-fibres. All the fibres are charged with abundant oxea. In the outer surface and also in the canal-walls abundant spiral microsclera of small size are observed. Similar spicules are also found in the ground-substance. Below the outer surface these spicula form a true cortex.

GEOGRAPHICAL DISTRIBUTION.—East coast of Australia: Port Jackson, N. S. W. (*Lendenfeld*).

KEY

TO THE

AUSTRALIAN GENERA OF SPONGES

DESCRIBED IN THIS CATALOGUE.

-
- | | | | |
|-----|---|---|------------------|
| 0 | { | With skeleton composed of calcareous spicules. (Calcarea.) | 1 |
| 0 | { | With skeleton composed of siliceous spicules, horny fibre, or foreign bodies; or without skeleton. (Silicea.) | (2), p. 240. |
| 1 | { | Without distinct chambers. (Asconidæ.) . . | 3 |
| 1 | { | With sac-shaped chambers. (Syconidæ.) . . | (4) |
| 1 | { | With spherical chambers. (Leuconidæ.) . . | (5) |
| 3 | | With triactine spicules only | Ascetta, p. 2. |
| (4) | { | Superficially projecting spicules, when present, uniformly distributed over the surface. Spicules diact, triact, and tetract | Sycandra, p. 3. |
| (4) | { | Distant spines on the surface, composed of bunches of diacts. Sponge thin-walled . . | Grantessa, p. 5. |
| (5) | { | With triactine spicules only | Leucetta, p. 6. |
| (5) | { | With triact and diact spicules | Leucortis, p. 8. |
| (5) | { | With diact, triact, and tetract spicules | Leucandra, p. 9. |
| | { | With triaxon, monact to hexact siliceous spicules, slightly developed mesoglœa, and large sac-shaped or irregular chambers. (Hexactinellida.) | |
| | { | Without siliceous spicules; with a skeleton | |

- | | | | |
|--|--|--|---|
| | | composed of pithed horny fibres without foreign bodies, sometimes also with triaxon horny spicules, or without any skeleton at all. Chambers large, oval, sac-shaped, or branched. Ground-substance hyaline and transparent. (Hexaceratina.) | 6 |
|--|--|--|---|
- | | | | |
|-----|---|---|--------------|
| (2) | { | With a skeleton composed of tetract or monact siliceous supporting-spicules, or rarely without a skeleton. Microsclera, when present, stellate or spiral. Chambers small, usually spherical, rarely oval. Canals narrow. The spicules are never cemented by spongin. Sponges frequently corticate. (Chondrospongiae.) | (7), p. 241. |
|-----|---|---|--------------|
- | | | | |
|--|--|---|--------------|
| | | With a supporting-skeleton composed of monaxon siliceous spicules cemented by spongin, or of horny fibre with or without proper spicules or foreign bodies; or of scattered foreign bodies. Microsclera never stellate. Megasclera never tylostylote. Sponges never corticate. (Cornacuspongiae.) | (8), p. 242. |
|--|--|---|--------------|
- | | | | |
|---|---|---|---|
| 6 | { | With triaxon horn-spicules. (Darwinellidæ.) | |
| | | Without triaxon horn-spicules | 9 |
- | | | | |
|---|---|---|------|
| 9 | { | With horny fibres. (Aplysillidæ.) | 10 |
| | | Without skeleton. (Halisarcidæ.) | (11) |
- | | | | |
|------|---|--|---------------------------|
| (10) | { | With cells in the spongin-wall of the fibres . . | Ianthella , p. 22. |
| | | Without cells in the spongin-wall of the fibres | 12 |
- | | | | |
|----|---|---|---------------------------|
| 12 | { | Sponges lamellar, generally incrusting. Skeleton composed of numerous isolated slightly ramified fibres | Aplysilla , p. 26. |
| | | Sponges erect, massive. Skeleton composed of one or a few stout horny stems, from which numerous branches originate | Dendrilla , p. 27. |
- | | | | |
|------|---|---|-------------------------|
| (11) | { | Chambers regular sac-shaped; subdermal cavity occupied by a network of trabeculae . | Bajalus , p. 30. |
|------|---|---|-------------------------|

- (7) { Supporting - spicules tetract and monact.
 (Tetraxonia.) 13
- { Supporting - spicules exclusively monact.
 (Monaxonia.) (14), p. 242.
- { No supporting-spicules. (Oligosilicina.) (15), p. 242.

- 13 { Spicules irregular, articulating. (Lithistidæ.)
- { Spicules regular, not articulating 16

- 16 { Supporting-spicules tetract and monact 17
- { Supporting-spicules chiefly monact (18)

- 17 { With spherical spicules (sterrasters) in the
 cortex. (Geodidæ.) 19
- { Without spherical spicules (sterrasters), with
 stellates or small rod-shaped microsclera.
 (Stellettidæ.) (20)
- { Without microsclera. (Ancorinidæ.) (21)
- { With sigmate, spiral, or rod-shaped micro-
 sclera. (Tetillidæ.) (22)

- 19 { Oscula in a group at the bottom of a depres-
 sion; ectochonæ shallow **Geodia**, p. 33.
- { Oscula scattered; ectochonæ deep **Isops**, p. 34.
- { Oscula similar to the inhalant pores; with re-
 curved spicules, ejected on touch, on the
 surface **Cydonium**, p. 36.

- (20) { With stellate microsclera; without sand **Stelletta**, p. 37.
- { With sand in the cortex **Psammastra**, p. 38.
- { Without stellates or sand, with rod-shaped
 microsclera inserted perpendicularly in the
 surface **Thalassomora**, p. 40.

- (21) With cortex **Ancorina**, p. 41.
- (22) With abundant, small, spiral microsclera **Spiretta**, p. 42.
- (18) Without microsclera **Tethyopsilla**, p. 45.

- | | | | |
|------|---|--|--------------------------------|
| | { | With stellate microsclera. (Tethydæ.) | 23 |
| | { | Without microsclera, with chonæ. (Sollasel-
lidæ.) | (24) |
| (14) | { | With spined, spiral or irregular microsclera.
(Spirastrellidæ.) | (25) |
| | { | With smooth sigmate microsclera. (Subera-
matidæ.) | |
| | { | Without microsclera and without chonæ.
(Suberitidæ.) | (26) |
| 23 | { | With stellates only | Tethya , p. 46. |
| | { | With stellates and small rods | Tethyorrhaphis , p. 52. |
| (24) | | Sponges digitate | Sollasella , p. 56. |
| | { | Sponges massive, solid, with pretty smooth
surface | Spirastrella , p. 57. |
| (25) | { | Sponges cavernose, with tubercles on the sur-
face. Microsclera stout spined strongyla.. | Papillina , p. 58. |
| | { | Sponges regularly honeycombed | Raphyrus , p. 60. |
| | { | Sponges very cavernose, with tubercular pa-
pillæ on the surface. Microsclera very
abundant; slender spined oxea | Papillissa , p. 64. |
| | { | Sponge massive or digitate | Suberites , p. 65. |
| (26) | { | Sponge reticulate | Plectodendron , p. 66. |
| | { | Sponge lives in tubular cavities excavated in
shells | Cliona , p. 67. |
| (15) | { | With stout stellate microsclera | Chondrilla , p. 68. |
| | { | Without spicules of any kind | Chondrosia , p. 72. |
| (8) | { | Freshwater sponges with gemmulæ. (Spon-
gillidæ.) | 27 |
| | { | Marine sponges without gemmulæ | (28), p. 243. |
| | { | Gemmulæ surrounded by spined oxea | Spongilla , p. 74. |
| 27 | { | Gemmulæ surrounded by amphidiscs with
unequal terminal discs | Tubella , p. 75. |
| | { | Gemmulæ surrounded by amphidiscs with
equal terminal discs | Meyenia , p. 76. |

- (28) { Skeleton uniform 29
- { Skeleton forming an axial stem composed of a dense network of spicule-bundles, from which distant fibres extend in a plumose manner to the surface. Subdermal cavities very large. (Axinellidæ.) (30), p. 249.
- { Supporting-skeleton composed of cemented, usually oxoote spicules, without microsclera. Skeletal fibre never echinated. (Homorrhaphidæ.) 31
- { Supporting-skeleton composed of solid or pithed horny fibre or scattered foreign bodies, without proper spicules of any kind. Ground-substance granular. Chambers spherical and small. (Spongidæ.) (32), p. 246.
- { Supporting-skeleton composed of cemented spicules, usually with sigmate or other microsclera. Without chelæ. Skeletal fibres never echinated. The supporting-skeleton of the forms without microsclera consists usually of strongylote or stylote spicules. (Heterorrhaphidæ.) (33), p. 247.
- 29 { Supporting-skeleton composed of solid horny fibre, usually very rich in foreign material; or of scattered foreign bodies. Without proper spicules in the fibres. Microsclera, when present, sigmata or rods. Chambers larger, oval. Ground-substance hyaline and transparent. (Spongelidæ.) (34), p. 247
- { Supporting-skeleton composed of cemented spicules. Microsclera chelæ, to which others may be added. When chelæ absent, skeletal fibres echinated by proper spicules. (Desmacidonidæ.) (35), p. 248.
- { Supporting-skeleton composed of horny fibre, with or without foreign bodies. Without proper spicules in their axis. The superficial fibres may be echinated by proper spicules. Microsclera absent. Chambers small and spherical. Sponges hard, reticulate. (Aulenidæ.) (36), p. 249.

- 31 { Without distinct horny fibre 37
 { With distinct horny fibre (38)
- 37 { Spicules singly form a network with triangular
 meshes. Sponge soft, fragile **Reniera**, p. 77.
 { Skeleton composed of a dense network of stout
 spicule-bundles. Sponge hard **Petrosia**, p. 80.
 { Skeleton composed of a loose network of
 spicule-bundles. Sponge massive, soft **Halichondria**, p. 80.
 { Skeleton composed of a network of spicule-
 bundles. Amount of spongin comparatively
 great. Sponge thin, lamellar, flower-shaped,
 and pretty elastic **Reniochalina**, p. 82.
- (38) { Sponges massive, irregular. Fibres thin.
 Spicules slender 39
 { Hard, irregularly digitate or lamellar sponges,
 with very thick fibres (40), p. 245.
 { Frondose sponges with narrow meshes of the
 skeleton-net (41), p. 245.
 { Tubular or cup-shaped sponges with slender
 spicules (42), p. 245.
 { Massive or digitate sponges with large
 obliquely situated and partly protruding
 spicules (43), p. 245.
 { Sponges with solid, slender, cylindrical, regular
 digitate processes. Spicules slender and
 numerous. Main and connecting-fibres
 well defined (44), p. 245.
 { Digitate sponges with foreign bodies in the
 main and proper spicules in the connecting-
 fibres (45), p. 245.
- 39 { Spicules abundant 46
 { Spicules scarce (47), p. 245.
- 46 { Sponge massive, meshes of the skeleton-net
 wide **Cacochalina**, p. 83.
 { Sponge lobose 48

- 48 { Oscula large and conspicuous. Meshes of the skeleton-net often irregular, over 0·5 millim. wide **Chalinopora**, p. 84.
- 48 { Oscula not conspicuous. Skeleton-net regular. Meshes under 0·4 millim. wide **Cladochalina**, p. 85.
- (47) Fibres slender **Chalinella**, p. 86.
- (40) { Spicules abundant. Oscula conspicuous, but not prominent **Chalinissa**, p. 86.
- (40) { Spicules abundant. Oscula prominent **Pachychalina**, p. 88.
- (40) { Spicules scarce. Fibres thick **Ceraochalina**, p. 88.
- (41) { Sponge-lamella under 5 millim. thick. Surface smooth **Antherochalina**, p. 89.
- (41) { Sponge-lamella over 10 millim. thick. Surface irregular **Placochalina**, p. 90.
- (42) { Spicules abundant. Surface smooth, usually annulated **Phylosiphonia**, p. 92.
- (42) { Spicules abundant. Surface conulated **Siphonochalina**, p. 93.
- (42) { Spicules very scarce. Surface covered with irregular outgrowths **Siphonella**, p. 97.
- (43) With high conuli **Hoplochalina**, p. 98.
- (44) { Surface smooth 49
- (44) { Surface covered with small conuli (50)
- 49 { Digitate processes stout, over 8 millim. thick. Meshes of the skeleton-net wide **Dactylochalina**, p. 99.
- 49 { Digitate processes slender, usually under 5 millim. thick. Meshes of the skeleton-net very small **Euchalina**, p. 101.
- (50) Dendritically ramifying sponges **Chalinodendron**, [p. 102.
- (45) Pretty soft and compressible sponges **Arenochalina**, p. 103.

- Meshes of the skeleton-net small, usually about 0·3 millim. wide. Fibres solid, simple, not forming trellis-like structures. Without filaments. Sponges not honeycombed. 51
- (32) {
 - Meshes of the skeleton-net usually larger, readily visible with naked eye. Fibres solid or pithed. Simple or fascicular. Sometimes replaced by foreign bodies. The forms with small meshes of the skeleton-net honeycombed. Filaments present or absent (52)
- Sponges not cavernose, with smooth or grooved surface 53
- 51 {
 - Sponges solid or cavernose. Usually conulated; the cavernose forms sometimes with smooth surface and a sand-cortex (54)
- Sponges usually with digitate branches and smooth surface, without cortex. Connecting-fibres simple, unbranched **Chalinopsilla**, p. 104.
- 53 {
 - Frondose, caliculate, or branched sponges with smooth or grooved surface, or protected by a cortex. When the surface is smooth the lamella is barely 1 millim. thick **Phyllospongia**, p. 115.
 - Compressed, usually lamellar sponges, with a smooth surface without cortex, with branched connecting-fibres and a very fine skeleton-net **Leiosella**, p. 120.
- (54) {
 - Vestibular cavities absent or small; surface conulated **Euspongia**, p. 125.
 - Vestibular cavities wider than the intervening septa. Surface conulated, or protected by a sand-cortex and smooth **Hippospongia**, p. 135.
- (52) {
 - Without filaments 55
 - With filaments (56), p. 247.
- 55 {
 - With smooth cribriform cortex of sand **Thorecta**, p. 142.
 - Surface usually conulated, sometimes irregular, never smooth 57

- 57 {
 - Fibres pithed 58
 - Fibres solid (59)

- 58 {
 - Main and connecting-fibres distinguished. The former contain foreign bodies; the latter are simple. **Aplysinopsis**, p. 149.
 - Main and connecting-fibres distinguished. The latter of two kinds: primaries and secondaries. The primaries form a loose network, the meshes of which are occupied by a reticulation formed by the slender secondaries **Luffaria**, p. 151.
 - Main and connecting-fibres not distinguished; skeleton-net uniform **Aplysina**, p. 152.

- (59) {
 - Fibres simple; skeleton very rich in sand .. 60
 - Main fibres fascicular, generally without much foreign material. (61)

- 60 {
 - Surface conulated. Skeleton composed of a uniform network of strings of sand-grains. **Dysideopsis**, p. 155.
 - Surface irregular, sometimes honeycombed. Main and connecting-fibres distinguished. Skeleton very areniferous, sometimes replaced by large scattered sand-grains, more or less attached to each other by slender fibres **Halme**, p. 156.

- (61) Surface conulated **Stelospongia**, p. 163.

- (56) Fibres usually fascicular **Hircinia**, p. 175.

- (33) {
 - Without microsclera and without a hard spicular rind or fistulæ. Megasclera styli .. **Stylotella**, p. 185.
 - Without microsclera; with a rind and fistulæ. Megasclera oxystromgyla **Rhizochalina**, p. 187.
 - Microsclera present 62

- 62 {
 - Microsclera sigmata. Spongin highly developed **Gelliodes**, p. 189.
 - Microsclera sigmata. Very little spongin .. **Gellius**, p. 189.
 - Microsclera trichites **Tedania**, p. 190.

- (34) {
 - With sigmate or rod-shaped microsclera 63
 - Without sigmata or rods (64), p. 248.

- 63 { Supporting-skeleton composed of large sand-grains. Large sigmata always present .. **Phoriospongia**, p.192.
- 63 { Supporting-skeleton horny. Microsclera small sigmata or rods..... **Sigmatella**, p. 195.
- (64) { Supporting-skeleton horny. Fibres invested by a sheath composed of small spindle-shaped siliceous bodies **Haastia**, p. 204.
- (64) { Supporting-skeleton composed chiefly of large sand-grains ; without a fibre-sheath..... **Psammopemma**, [p. 205.
- (64) { Supporting-skeleton horny; without a fibre-sheath **Spongelia**, p. 205.
- (35) { Fibres without echinating spicules 65
- (35) { Fibres with echinating spicules..... (66)
- 65 { With rind. Microsclera isochelæ, trichites, and usually sigmata **Sideroderma**, p. 210.
- 65 { Without rind. Megasclera palmate anisochelæ, and sometimes sigmata **Esperella**, p. 211.
- (66) { Echinating spicules spined styli 67
- (66) { Echinating spicules spined strongyla (68), p. 249.
- (66) { Echinating spicules smooth styli (69), p. 249.
- 67 { Megasclera in the fibres spined styli **Myxilla**, p. 214.
- 67 { Megasclera in the fibres large smooth styli .. **Clathriodendron**, [p. 215.
- 67 { Megasclera in the fibres small and slender smooth oxea and sometimes styli 70
- 70 { The supporting-skeleton is composed of horny fibres with axial bundles of spicules, from which the not numerous echinating spicules protrude **Clathria**, p. 221.
- 70 { The supporting-skeleton consists of dense bundles of spicules with very little spongin, from which the fairly numerous echinating spicules protrude **Clathrissa**, p. 217.
- 70 { The supporting-skeleton consists of spicule-bundles. The echinating spicules are so numerous as completely to hide the fibre to which they are attached **Echinonema**, p. 219.

- (68) Sponge cup-shaped; fibres stout **Kalykenteron**, p. 216.
- (69) { Without foreign bodies in any of the fibres.. 71
 { With foreign bodies in some of the fibres .. (72)
- 71 { Sponge erect, lamellar or branched, solid .. **Thalassodendron**,
 [p. 222.
 { Sponge honeycomb-like **Plectispa**, p. 225.
- (72) With sand-cortex **Clathriopsamma**,
 [p. 227.
- (36) { With echinating spicules on the superficial
 fibres and abundant foreign bodies in the
 skeleton **Aulena**, p. 228.
 { Without echinating spicules, and with only
 few foreign bodies in the fibres **Hyattella**, p. 233.
- (30) { Without spiral microsclera **Axinella**, p. 234.
 { With abundant spiral microsclera **Spirophorella**, p. 236.

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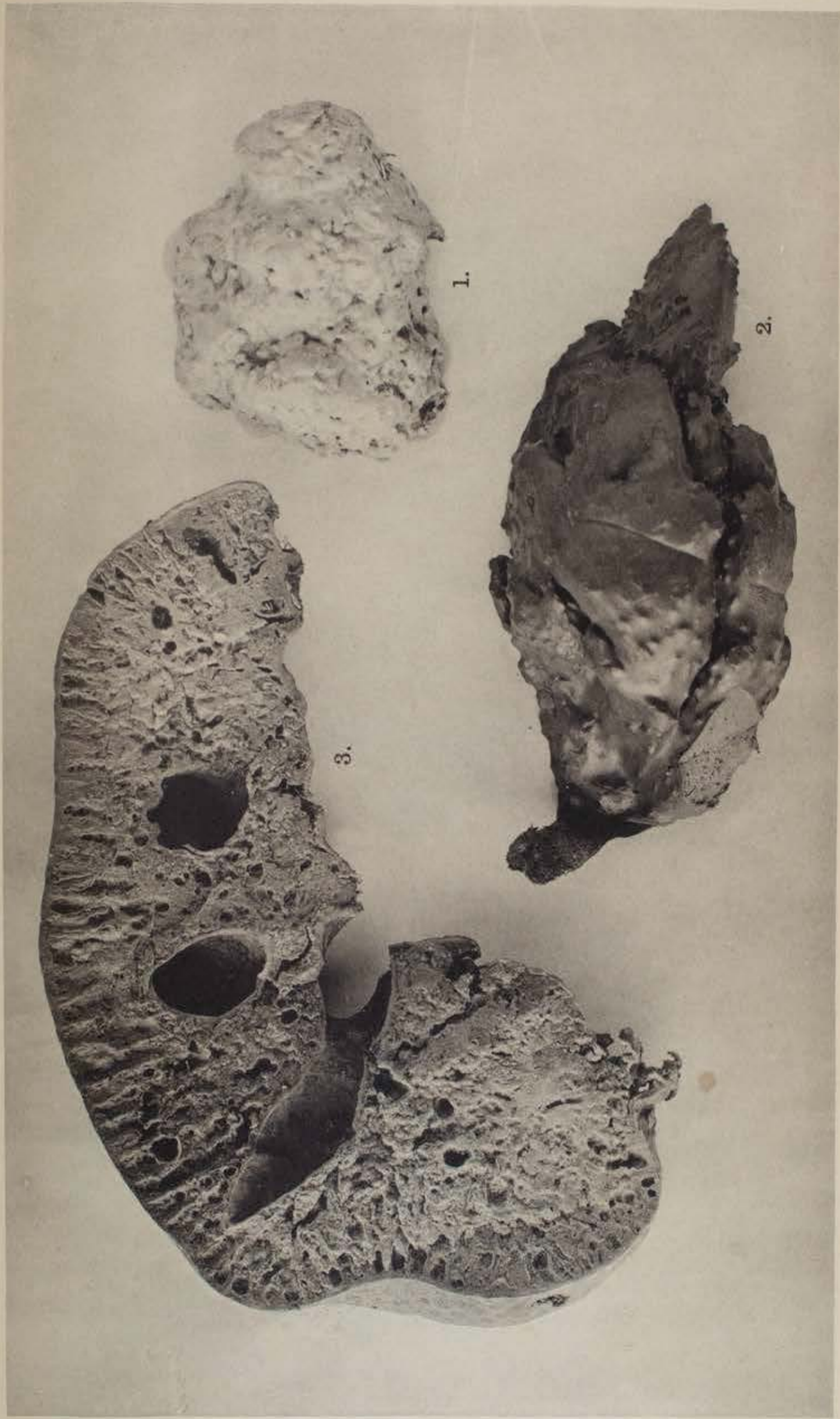
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THE END.



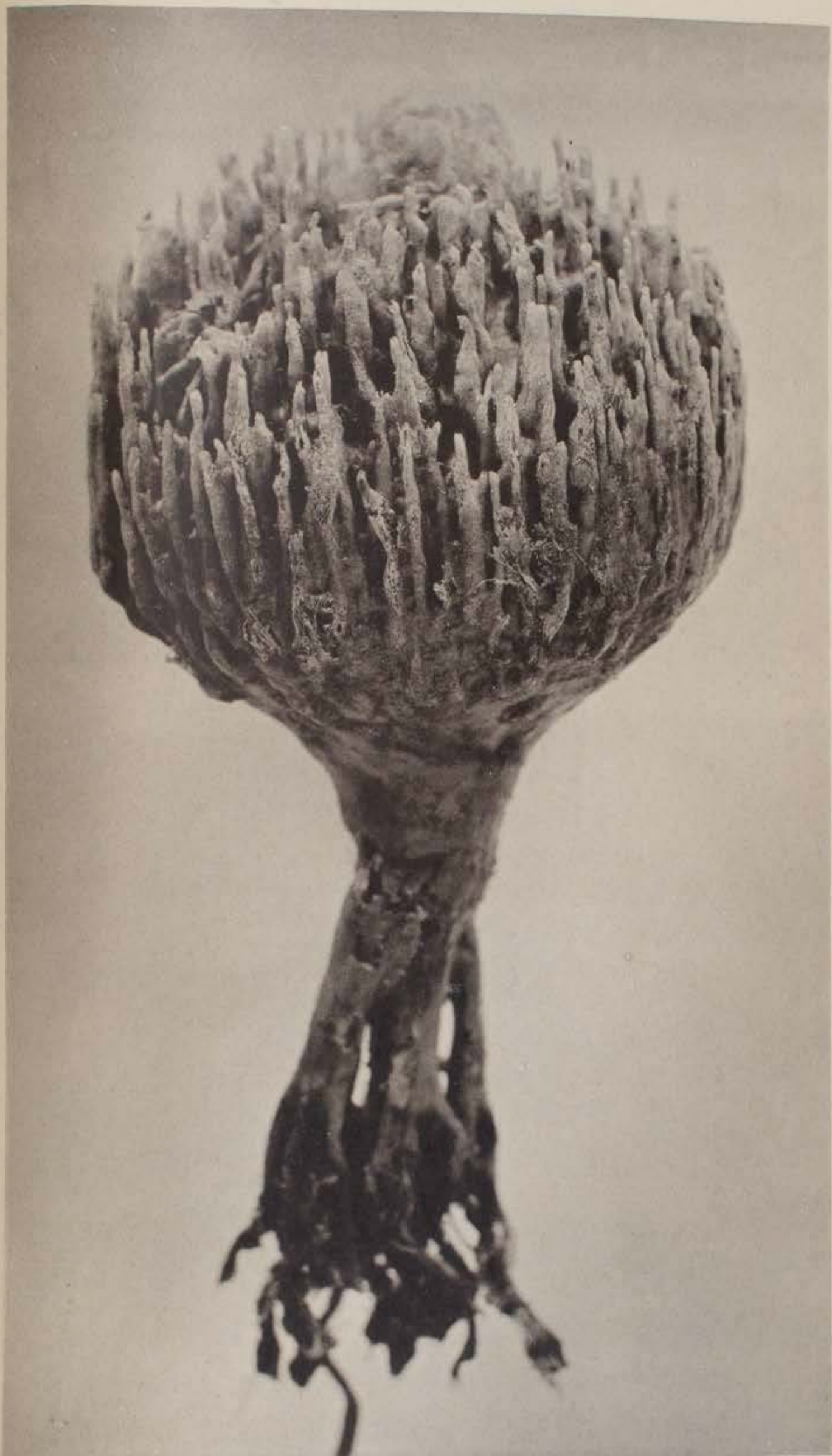


1. 2. *Papillina panis*. — 3. *Raphyrus hixonii*.



1. *Halichondria rubra* var. *digitata*. —

2. *Sideroderma navicelligerum*.



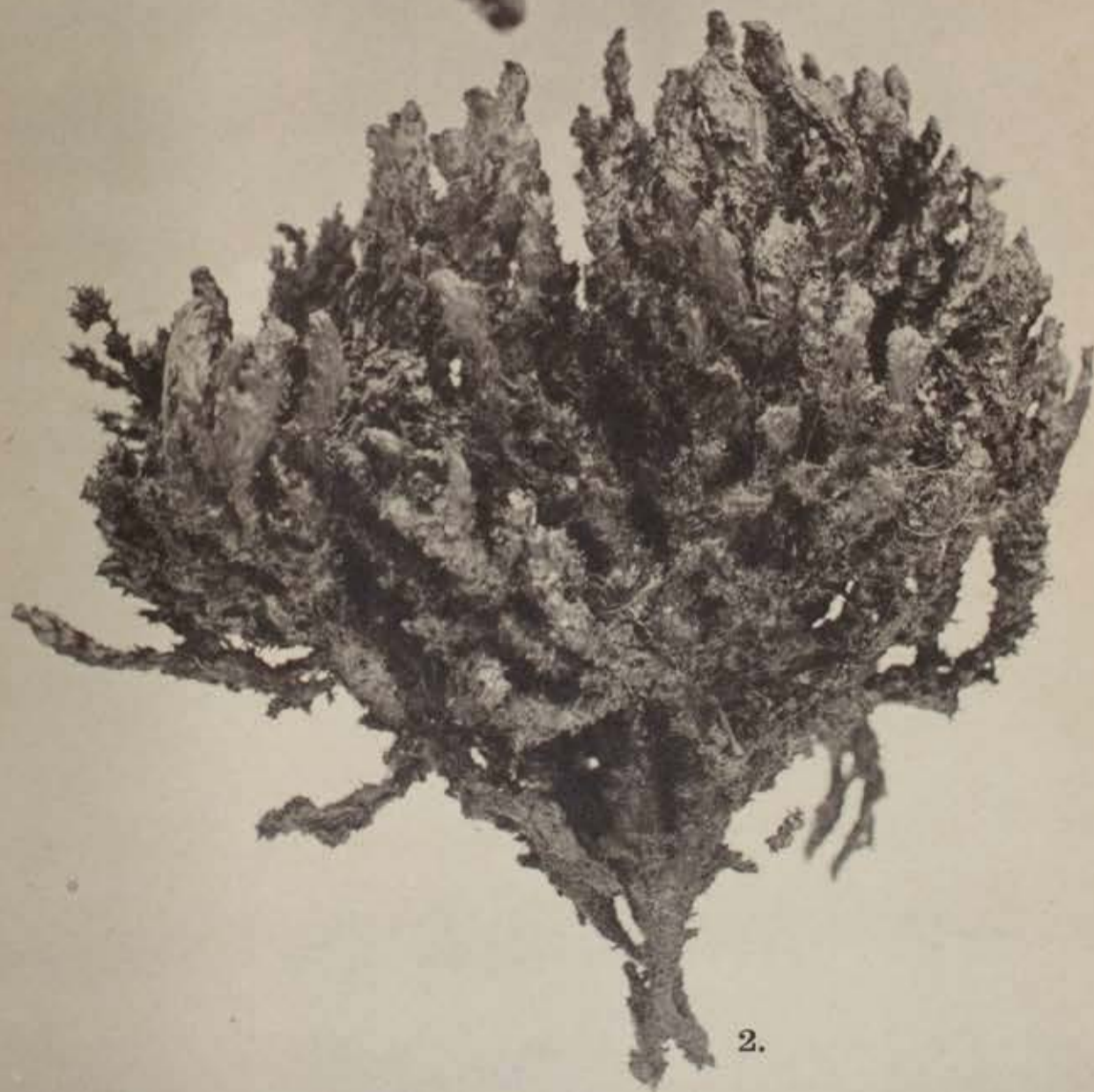
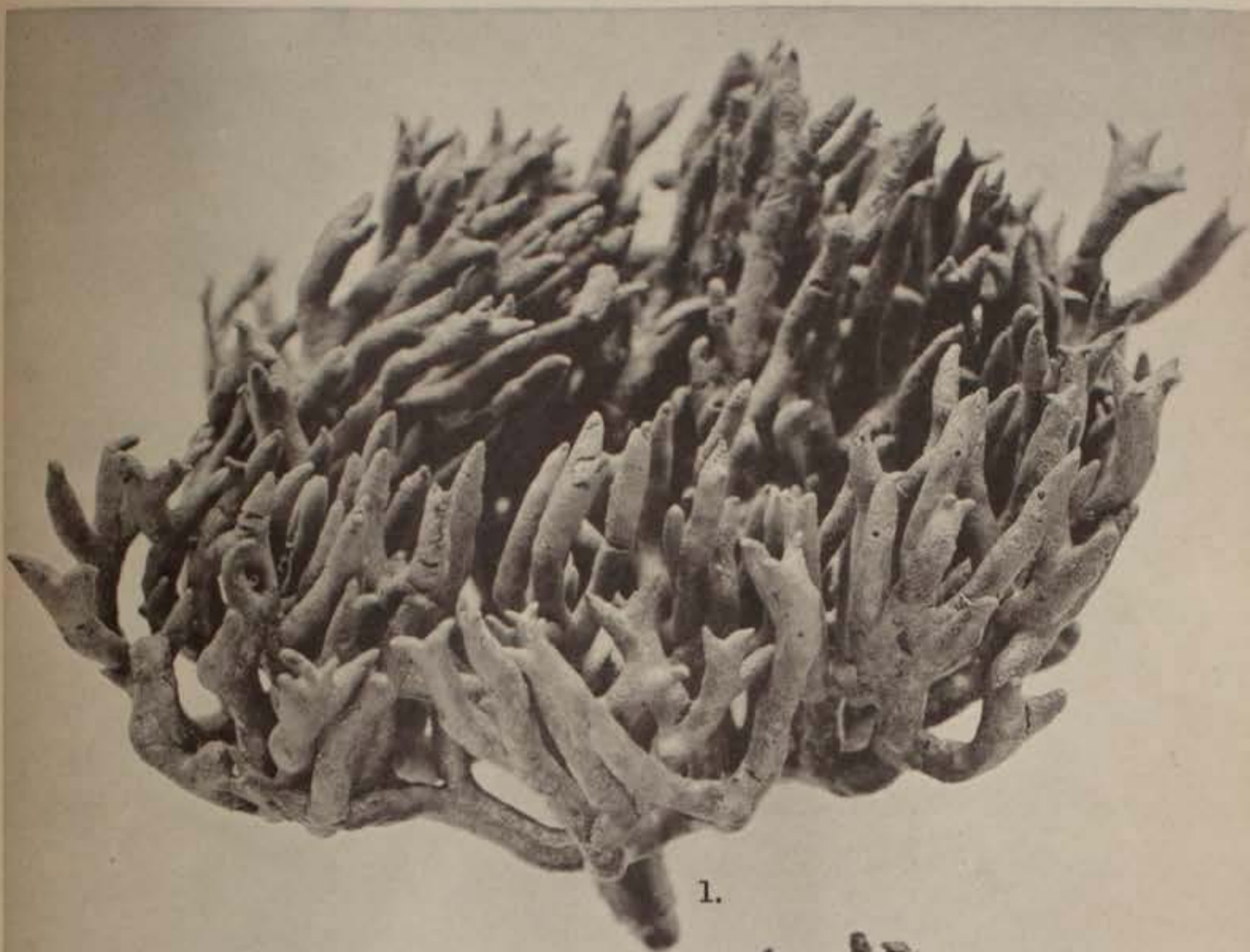
Rhizochalina ramsayi.



2.



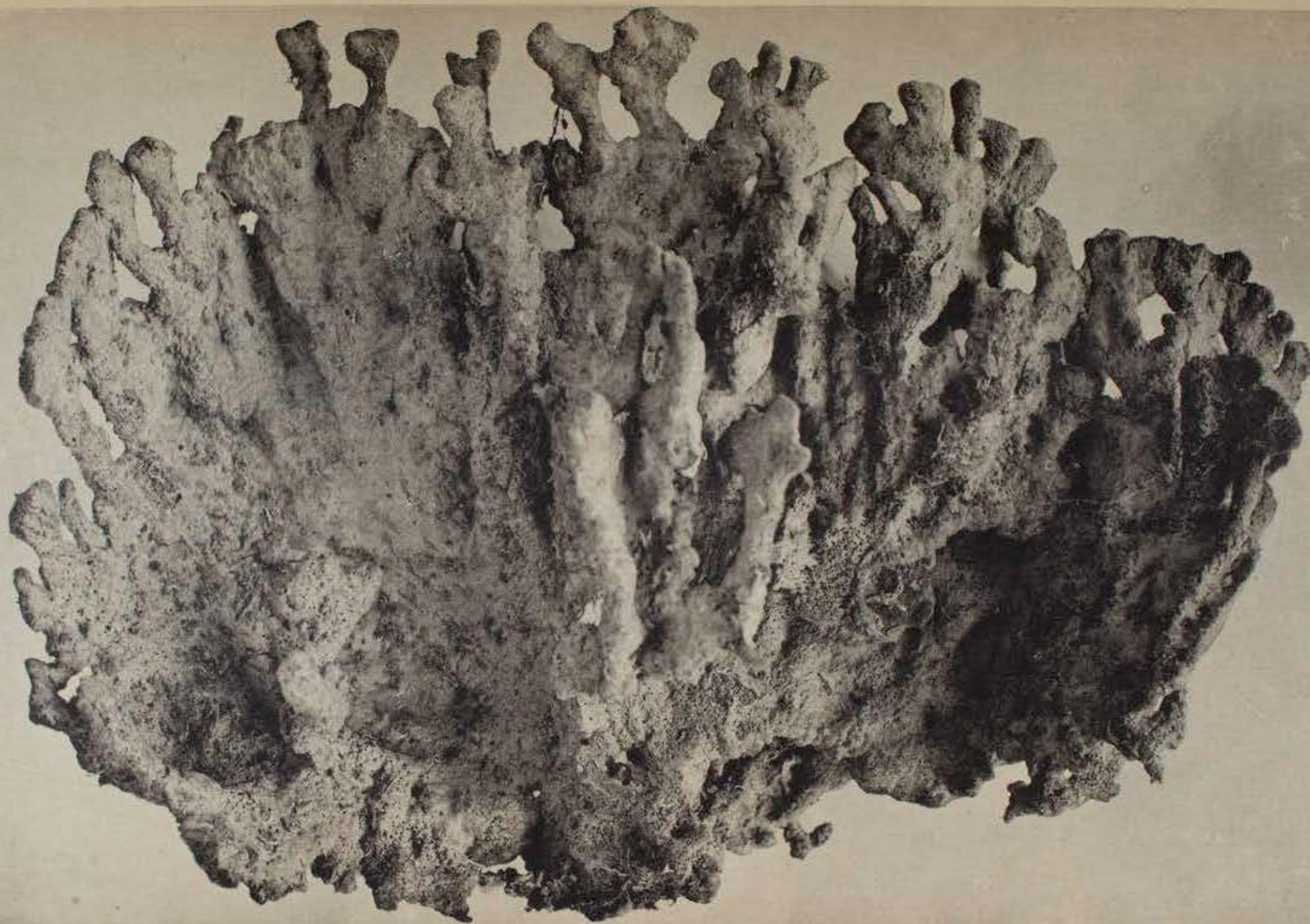
1.



1. *Axinella aurantiaca*. — 2. *Clathrissa arbuscula*.



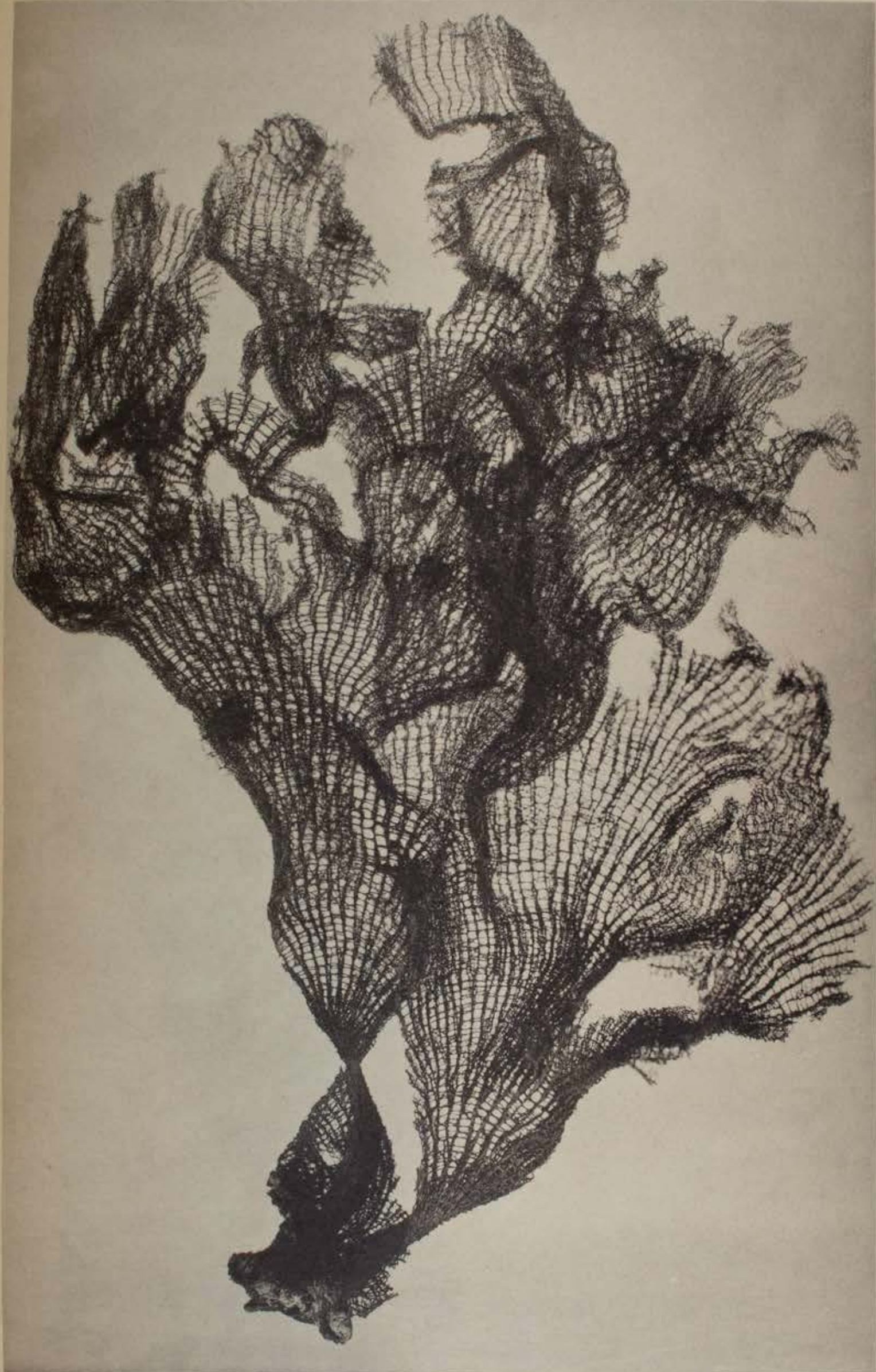
Esperella ridleyi var. *robusta*.



Thallassodendron rubeus var. *lamella*.



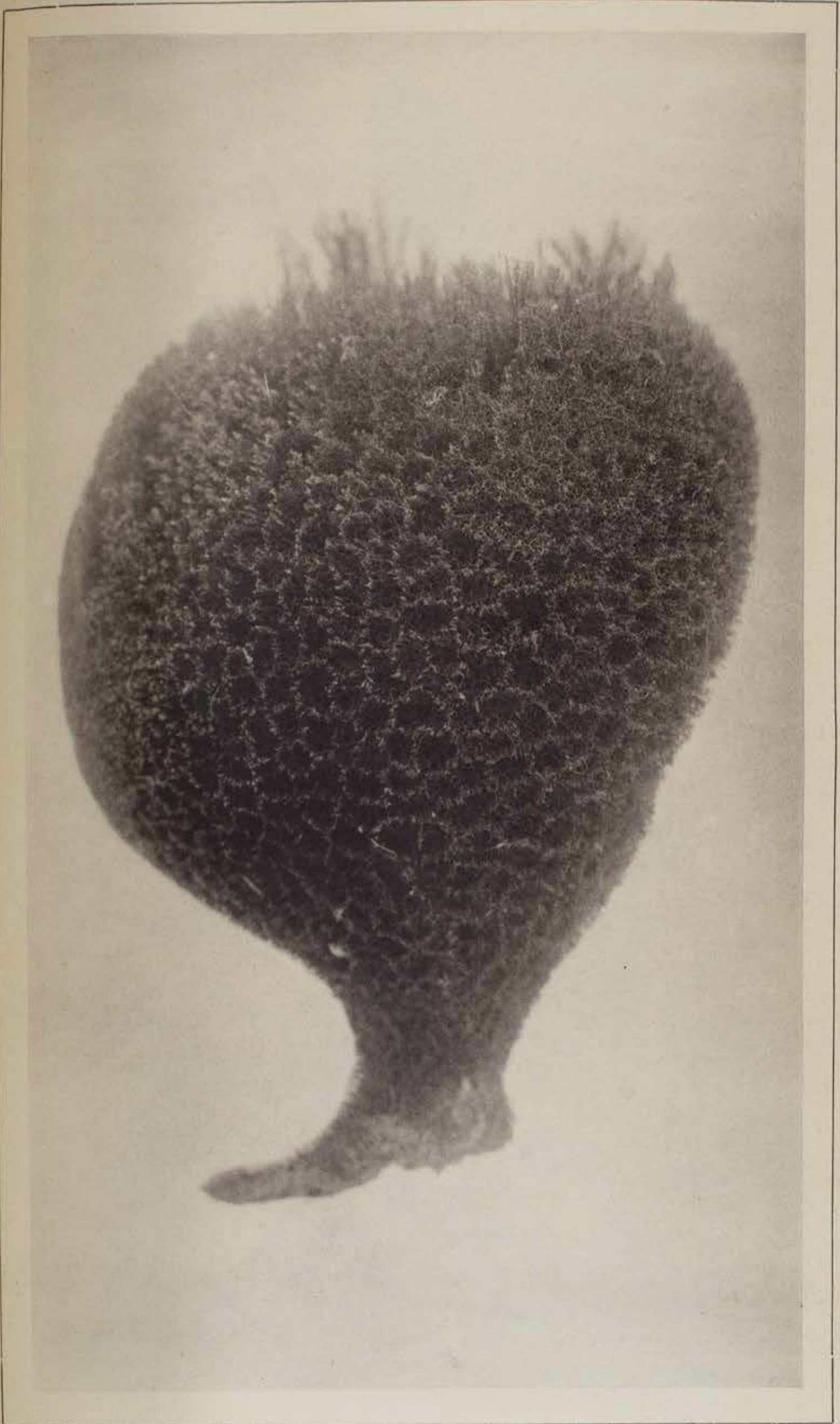
Chalinissa communis.



Janthella basta.



Stelospongia pulcherrima.



Stelospongia australis var. *fovea*.



Aplysinopsis digitata.



