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Report on the Calcarea obtained by the Hamburg
South-West Australian Expedition of 1905.

By

Zoölogisch Museum
Amsterdam

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AND

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Report on the Calcarea obtained by the Hamburg
South-West Australian Expedition of 1905.

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(With Plates XIX — XXI and 17 Text-figures)

(Received Sept. 10, 1931)

The Calcareous sponges collected by the Hamburg South-West Australian Expedition of 1905 were originally examined by Mr. HAROLD ROW of the King's College of London University.

After his untimely death in February 1919 the second author of the present paper was asked to undertake the continuance of the work by the late Professor DENDY of the same college. It was in November 1921 and while he was staying in London that the material thus fell into his lot.

The collection contains a large number of specimens belonging to 43 named species, which have been assigned to 12 genera and 7 families. Of the species 16 are now described for the first time, and the remaining 27 are those previously known. No new genera are here described.

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There have now been made a considerable number of collections of calcareous sponges from various parts of Australia, and amongst them there occur some of the most important collections ever obtained.

The following may be mentioned as of great interest at once.

From the Torres Straits, a few species obtained by the Challenger Expedition and reported on by POLÉJAEFF in 1883.

From the East Coast, a fairly large collection obtained and reported on by VON LENDENFELD in 1885.

From the vicinity of Melbourne, (1) a large number of species described by CARTER (1885-1886); (2) a still larger collection reported on by DENDY (1892), and used by him as a foundation for his revision of the classification of the group.

From New Zealand, about a dozen species were described formerly by KIRK, and recently 22 species were recorded by BRØNDSTED (1926).

From the western coast of Australia there have been known about ten species only, described by DENDY and FREDERICK (1924), and thus our knowledge of the Calcarea fauna of that locality is very meagre.

The present collection has, however, most thoroughly supplied that want, and we have now a really good knowledge of the calcareous sponge fauna of the whole of the southern half of the coast of Australia.

Family Homocoelidae DENDY

Genus LEUCOSOLENIA BOWERBANK

1. *Leucosolenia lucasi* DENDY

Leucosolenia lucasi, DENDY, 1891, p. 45, Pl. I, fig. 1; Pl. IV, fig. 1; Pl. IX, fig. 1; TOPSENT, 1907, p. 539; KIRK, 1893, p. 178, Pl. XXII, figs. 2 a-f; DENDY and ROW, 1913, p. 723; BRØNDSTED, 1926, p. 298, fig. 1.

Leucosolenia bella, DENDY and ROW, 1913, p. 721.

This extremely pretty species is represented in the collection by five specimens (AJ₂, AJ₃, AZ_{1a}, Z₁₇, AW₂).

Specimen AW₂ is small and consists of about half a dozen of Ascon-tubes arising from a creeping stolon, which is somewhat branched, and from which all individual persons arise separately. Each of the persons is about 1 mm. high and 0.5 mm. in diameter and each ends in a widely open osculum.

Specimen AJ₂ is attached to sea-weed and forms a dense bushy mass of about 13 mm. diameter and about 8 mm. high. The colony belongs to DENDY's section Simplicia of the genus (DENDY, 1891), and consists of a mass of Ascon-tubes which frequently branch, but

never anastomose, save possibly very occasionally in the lowest parts of the colony. The individual tubes are of small size, though they vary to some extent, measuring from 1 to 4 mm. in length and 0.3 to 1 mm. in diameter. Each of the full-grown tubes possesses an osculum at its distal end of nearly the same width as the tube itself.

Specimen AJ₃ is larger than AJ₂ but is nearly the same in general appearance and in minor structure.

Each of the remaining two specimens (AZ_{1a}, Z₁₇) forms a small bushy colony consisting merely of 8 or 10 Ascon-tubes.

As stated above, this species is very variable in form, either being composed of solitary Ascon-tubes arising from creeping stolon or forming dense bushy masses. The shape of the oxea projecting from the sponge-surface also varies greatly. They are sometimes long and slender and sometimes shorter, thicker and straight with rather bluntly pointed ends.

Previously known Distribution.—Outside Port Phillip Heads (DENDY); Cook Strait, N. Z. (KIRK); Pegasus Bay, Stewart Island, N. Z. (BRØNDSTED).

Localities and Register Nos. of Specimens.—Geraldton District (Station 31), AJ₂, AJ₃, AZ_{1a}, Z₁₇; Albany District (Station 63), AW₂.

2. *Leucosolenia clathrata* (CARTER)

Leucetia clathrata CARTER, 1883, p. 33, Pl. I, figs. 13-17.

Clathrina tripodifera var. *gravida* CARTER, 1885-1886, p. 507.

Leucosolenia tripodifera var. *gravida*, DENDY, 1891, p. 68.

Leucosolenia intermedia KIRK, 1895, p. 208, Pl. IV, fig. 2.

Leucosolenia clathrata, DENDY and ROW, 1913, p. 724.

This extremely interesting species is comparatively common in the collection, and has been obtained from several localities, while the specimens vary in size from minute, almost Olynthus-like individuals, to masses 100 mm. long and 30 mm. wide.

The colour of a very small specimen is invariably perfectly white, but in older examples the sponge usually takes on a more or less deep tinge of yellow or even brown, due to its having, in the course of its growth, incorporated in itself a considerable quantity of the mud or sand that may be near it. The texture of the large specimens is always comparatively firm, much more so than is the case with most

Leucosolenias, and the denseness of the sponge enables it to retain its shape even under some pressure. The surface is always quite smooth.

The species is always found growing on some support, usually an alga or Polyzoan, firmly attached by a considerable surface in the older specimens, and by a slender stalk in very young ones.

This species was first described by CARTER (1883) as *Leucetia clathrata*, and in the description which he gave on the sponge he refers to its general appearance in the following words:—

“Small, flat, sessile, cake-like in form, more or less subcircular, slightly convex...consisting of a fibro-clathrous-spicular structure, which, spreading upwards from a continuous layer adherent to the frond of the foliaceous corraline on which it has grown, terminates above in a free surface that presents a solid vermiculo-reticulation in prominent relief.”

In dealing with the spiculation, he lays considerable stress upon the very striking “tripod” spicules that form a dermal layer on the surface of the sponge.

Later, (1885-1886), he described *Clathrina tripodifera*, now the type of the genus *Dendya*, and, undoubtedly misled by the great similarity of the dermal spicules in the two species, decided to sink the earlier name, and to consider *Leucetia clathrata* merely as a variety of *Clathrina tripodifera*, i. e., var. *gravida*, in which position it has remained until now. However, between *Dendya tripodifera* and *Leucosolenia clathrata* there are a number of very important differences, the chief being the general shape of the sponge-colony and the type of canal system. The quotation from CARTER's original description shows that his specimens were individuals of the ordinary “Clathrinid” type, forming a low-lying reticulation of Ascon-tubes, and totally different to the erect “radiate” colony of *Dendya*, and that the two species have been so long confounded must undoubtedly be put down to the fact that *Leucosolenia clathrata* has never been recognized since CARTER first described it until now. The species is, however, represented by a considerable number of specimens of all sizes in the present collection, and we have been enabled to make a complete re-investigation of its characters, and in particular of the canal system, which presents certain very curious resemblances to that of *Dendya*, not referred to

by CARTER. We think, however, that the description of the canal system given below will show that these resemblances are not evidences of close relationship, but merely due to convergence.

In the youngest specimens in the collection there is a central gastral cavity with a single osculum, while two or three small tubes ramify and anastomose on the wall, apparently opening into the gastral cavity at both ends. No specimen occurs actually in the Olynthus condition, but such specimens as the one above described are obviously but little removed from it, and specimens are present in the collection of all intermediate sizes between this and the largest.

In examples of about 5 mm. in diameter, when the sponge is usually in the form of a small, compact cushion, there is nearly always an irregular, but well marked central cavity, undoubtedly corresponding to the central gastral cavity of the smaller forms, and around this spreads a close network of branching and anastomosing Ascon-tubes, without any orientation whatsoever in the sponge. At this stage the specimen forms a very typical "Clathrina", save for the central gastral cavity, and this condition characterizes almost all the specimens in the collection. In the largest specimens, however, the external part of the colony shows a remarkable tendency to take on a radial arrangement, so much so that the whole of the tubes here lie parallel, with the blind end pointing outwards. Internal to these radially arranged tubes there occurs the usual irregular network, but without any central cavity, which has apparently been entirely obliterated by the invasion of the tubes. The external surface of these specimens, therefore, is somewhat different in character to that of smaller individuals. In the latter the surface is composed of the lateral walls of the anastomosing tubes, while in the former case it is made up of the terminal portions of radially arranged tubes, more or less fused together by mesenchyme, in such a way as to form a surface-reticulum very similar in appearance to the surface of the others. A further distinction between the two cases is that the openings on the surface of the larger specimens are true intercanals, lying between and parallel to the surrounding tubes, while in the smaller specimens their relationship to the sponge tubes is entirely irregular and haphazard.

Further, there can be no doubt that these large specimens belong to the same species as the smaller individuals, as some of these latter

show distinct indications of this radial arrangement in the superficial parts of the colony, indications which show that these specimens are just initiating this new type of growth; indeed, in some cases there can be distinguished traces of this radial arrangement throughout the colony, though in most no signs of it can be seen save in the most superficial regions. As stated above, the earlier tubes undoubtedly do not develop as radial outgrowths.

It is hardly necessary, though perhaps advisable, to say that CARTER's statement that the tubes are solid is quite incorrect.

These peculiarities of the canal system have rendered it very difficult to assign the species satisfactorily to either *Leucosolenia* or *Dendya*. The central gastral cavity found in all but the largest specimens, and the radial arrangement of a portion of these specimens, point very clearly to the genus *Dendya*, while the other characters exhibited by the sponge make it quite impossible to place it therein, at any rate as the genus is at present constituted. Another equally difficult point to determine is whether the *Dendya*-like characters are primitive or secondary, as the central gastral cavity, which is well marked in the young specimens, is completely obliterated in older individuals, while it is only in these latter that the radial arrangement of the Ascon-tubes becomes completely developed.

To place it in the genus *Dendya* would therefore necessitate a very considerable alteration in the accepted diagnosis of this genus; to erect a new genus for it seems also somewhat inadvisable, since the genus *Leucosolenia*, as diagnosed by DENDY and ROW (1913), will receive it without any alteration of the diagnosis. The genus contains forms with very varying canal systems; to add another type to the list will make but little difference, and it certainly seems a wiser procedure to wait until we know about the species to erect a special genus for it.

Skeleton.—The skeleton consists of triradiate spicules only, but of these two very distinct kinds can be distinguished, one being a perfectly regular triradiate, which occurs throughout the sponge in the walls of the Ascon-tubes, and the other a very characteristic "tripod" spicule, which only occurs on the outer surface. The dermal skeleton is thus very clearly differentiated from the central, but there is no variation whatsoever between the skeleton of the radially arranged

tubes and the skeleton of the clathroid portion of the sponge.

Owing to the considerable thickness of the wall of the tubes the spicules are arranged in several rather irregularly disposed layers. The skeleton of the dermal surface consists of a single layer of the tripod spicules on the surface itself, immediately beneath being a dense mass of the ordinary triradiates covering the ends of the radially arranged chambers, or, in specimens which have not reached that stage of development, the normal skeleton of the wall of the tubes.

Spicules.—The ordinary triradiate is quite regular in shape, being both equiangular and equiradiate. All the rays are cylindrical, rather slender, though stouter at the base than at any other point, and they taper gradually and uniformly then to a point near the apex. Here the tapering becomes much more abrupt and the end of the spicules is usually obtusely, or even bluntly pointed.

The average length of the rays is $100\ \mu$, with a maximum of $110\ \mu$, and the thickness of the rays at the base is usually $10\ \mu$.

Very occasionally specimens can be found with an extremely rudimentary fourth ray present, but not in more than one in a thousand specimens.

Tripod spicules which cover the surface are very easily distinguished from the above both by their shape and by their much greater stoutness of ray. Seen in the facial plane, they are very markedly sagittal, with the paired rays frequently lying in the same straight line, the true oral angle being indicated only by a slight notch. Even when there is an obvious oral angle less than 180 degrees, the rays often immediately come to lie in a straight line, and then gradually and uniformly curve towards each other again, and away from the basal ray. Other spicules, however, can be found with the three angles at the centre very nearly equal, and sometimes even with the oral angle less than the other two, though this latter is very rare, and some of the spicules can only be classed as irregular. Seen in profile, the three rays form a tripod, with the centre steeply raised, while the distal ends of the rays are curved till they lie flat on the surface for some portion of their length.

Owing to the peculiar curvature of the rays, measurements of length are somewhat difficult to determine, and the following are taken in a straight line from the centre of the spicule to the tip. Basal

ray, $130\text{--}150\ \mu$ long and $30\ \mu$ thick at base; oral rays, $90\text{--}130\ \mu$ long and $30\ \mu$ thick at base.

All the rays are cylindrical, and taper fairly uniformly from base to apex; frequently, however, the rays are somewhat irregular in outline. The rays are almost always quite blunt at their extremities.

Previously known Distribution.—S. W. coast of Australia (CARTER); Near Port Phillip Heads, Westernport (Victoria), Kent Islands (Bass Strait) (DENDY); Cook Strait (KIRK).

Localities and Register Nos. of Specimens.—Geraldton District (Station 31), AG_3 , $AH_3\beta$, $AJ_3\gamma$, $AJ_3\delta$, $AJ_3\epsilon$, $Z_1\delta$, $Z\theta$; Fremantle Bay (Station 45), BG ; Bunbury Bay (Station 56), $AZ_4\beta$.

3. *Leucosolenia coriacea* (MONTAGU)

Spongia coriacea, MONTAGU, 1818, p. 116.

Grantia coriacea, JOHNSTON, 1842, p. 183, Pl. XXI, Fig. 9.

Leucosolenia coriacea, BOWERBANK, 1864, Vol. II, p. 34; GRAY, J. E., 1867, p. 556; CARTER, 1877, p. 42; HANITSCH, 1895, p. 206; BREITFUSS, 1897, p. 211; (3) 1898, p. 12; (7) 1898, p. 20; 1927, p. 28; DENDY, 1905, p. 226, Pl. XIII, fig. 8; DENDY and ROW, 1913, p. 725.

Clathrina sulphurea, CARTER, 1871, p. 279.

Clathrina coriacea, RIDLEY, 1881, p. 132; MINCHIN, 1896, p. 359.

Acetta coriacea HAECKEL, 1872, Bd. II, p. 24, Taf. 3, Taf. 5, Figs. 2a-2c; HANITSCH, 1890, p. 232; ARNESEN, 1900, p. 10.

Two small specimens have been assigned to this species, the identification having been determined solely on account of the character of the skeleton arrangement and spiculation in every instance, as both specimens were too small to enable one to judge satisfactorily of the character that the colony would assume when it grew larger, nor was either of the two large enough for successful detailed investigation.

In this regard it must be noted that the absence of large and therefore characteristic specimens of *Leucosolenia coriacea* renders it at least possible that the above individuals are really only very young forms of some other species, in which the distinctive characters of the species have not yet appeared, but the whole of the other species represented in the collection have such definite characters that this seems at least unlikely.

Previously known Distribution.—Cosmopolitan: Arctic Ocean; Atlantic Coast of Europe; Mediterranean Sea; Pacific Ocean; Indian

Ocean; West Australia, Fremantle.

Localities and Register Nos. of Specimens.—Geraldton District (Station 31), AAy; Shark's Bay District, B₂.

4. *Leucosolenia primordialis* (HAECKEL)

Acetta primordialis, HAECKEL, 1872, p. 16, Taf. 1, 2; Taf. 5, Figs. 1 a-1 i; VON LENDENFELD, 1891, p. 11, Taf. VIII, Fig. 1; Taf. IX, Figs. 23-26.
Clathrina primordialis, MINCHIN, 1896, p. 359; CARTER, 1896, p. 510.
Leucosolenia primordialis, LACKSCHEWITSCH, 1886, p. 299; BREITFUSS, 1897, p. 212; (3) 1898, p. 12; (7) 1898, p. 21; DENDY and ROW, 1913, p. 726.

Only a single specimen could be assigned to this very well known species, which might have been expected to occur in much greater numbers. The example in question is of rather small size, approximately flask-shaped, and apparently with a single osculum at the small end. The larger end, which is flattened and considerably damaged, is undoubtedly the base, by which it was attached to some foreign body, though no portion of its support still remains. It consists of a lax mass of fairly large tubes which branch and anastomose freely to form the usual clathrous colony, and whose average individual diameter is about 0.3 mm. The whole colony measures about 15 mm. high, and 5 mm. across at the base. In the general structure of the tubes, and in the arrangement of its skeleton and spiculation it corresponds very closely indeed to HAECKEL's original description.

Previously known Distribution.—Cosmopolitan: Mediterranean Sea; Atlantic Ocean, Red Sea, Indian Ocean, Coast of Australia, Pacific Ocean.

Locality and Register No. of Specimen.—Shark's Bay (Station 3), AU₁.

5. *Leucosolenia psammophila*, n. sp.

(Pl. XIX, Fig. 1; Text-fig. 1)

This somewhat unsatisfactory species is represented in the collection by a single large individual, which is flat and biscuit-like in shape, and of circular outline (Spec. AO., Pl. XIX, Fig. 1). The complete specimen measures 38 mm. in diameter across the top, and is 8 mm. thick. It consists of a dense mass of small and thick-walled tubes, and the whole sponge is heavily loaded with enormous quantities of

sand, whence is derived its specific name.

The specimen was not attached to any foreign objects, nor was there any mark on the surface where such attachment might have been, and this, together with the presence of the sand in the sponge, makes it seem likely that the species lives free on a sandy bottom, probably more or less completely buried.

No oscula were distinguishable on the sponge-surface, but the reticulation of tubes forms a very definite "pseudoderm", and the oscula may have been merely overlooked owing to their similarity to the "pseudopores", or they may have completely closed when preserved in spirit. The "pseudoderm" is pierced by considerable numbers of very small "pseudopores", which do not measure more than 0.3 mm. in diameter as a general rule, though of course larger examples can occasionally be found. There is no "pseudogaster" or "pseudosculum".

The colour of the sponge in spirit was yellowish grey, appearing more clearly yellow according as more sand was removed. When dissolved in caustic potash (for spicule preparation), it caused the fluid to become a clear golden yellow, quite different to the previous colour of the specimen.

The texture of the sponge is fairly fine, though brittle, and easily broken under pressure and rather liable to crumble. The central parts of the sponge were almost completely filled with tissue or sand, there being practically no interspaces until the sand was washed out.

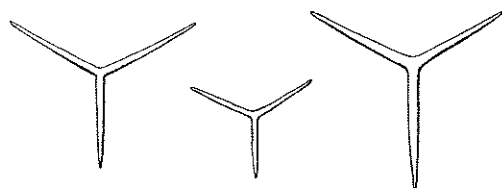
These rather curious characteristics render it at least possible that the specimen represents an abnormal condition; in several ways it seems to be fairly similar to *Leucosolenia coriacea* (MONTAGU), especially in the form of the spicules, and in fact, at first we had decided to include it in that species but further consideration has caused us to think it advisable to erect it into a separate species, in view of the undoubted differences that do occur between the two, which, if they are normal, would remove it immediately from *L. coriacea*. Presumably, if the sponge is actually abnormal, the abnormalities must have been produced by crushing or possibly continued pressure, but against this is the probability that the sponge lived free in sand, as stated above, a position in which crushing is very unlikely.

Structures.—The canal system proved to be rather difficult to investigate, owing to the presence of the large quantities of sand

within the sponge, which very seriously interfered with section cutting. The principal characteristic of the canal system that could be made out was a great increase in the thickness of the mesogloea, so that the walls of the tube were at least as thick as the diameter of the cavity of the tube, and sometimes even exceeded this. Also the tubes themselves were frequently choked up with debris so that the structure, presuming that there was a definite structure present, could not be made out. Otherwise the canal system is not specially noteworthy.

The whole skeleton is composed of triradiates, all similar and all small. They occur in enormous numbers throughout the sponge, lying many layers deep in the mesogloea of the tube-wall; they are quite unoriented, and there is no difference between the spicules on the outside of the sponge and those within it.

Spicules (Text-fig. 1).—Spicules are all of the same kind, and



Text-fig. 1. *Leucosolenia psammophila*, n. sp.
Triradiates of Ascon-tubes. (All $\times 110$)

are perfectly regular in shape, with cylindrical rays slightly thicker at the base than at any other point. From the base the rays taper very slightly for about seven-eighths of their length, while in the distal portion the diameter very rapidly diminishes to a somewhat blunt point. In a few cases spicules occur with sharply pointed rays, but these are very rare indeed. The average length of the rays of a fully grown spicule is 140μ , and their thickness at the base 13μ , but a few specimens seem to exceed these measurements and the maximum length is not less than 160μ . Enormous numbers of smaller spicules are present in all parts of the sponge, but these are all apparently young forms, as all intermediate sizes may be found, nor is one size more frequently met with than another. In the very young examples the ends of the rays are usually sharply pointed.

Locality and Register No. of Specimen.—Fremantle District (Station 35), AO.

6. *Leucosolenia stipitata* DENDY

Leucosolenia stipitata DENDY, 1891, p. 51, Pl. I. Figs. 4, 5, 6; Pl. IV, Fig. 2; Pl. IX, Fig. 5; DENDY and Row, 1913, p. 727.

A single specimen of this species occurs in the collection, and while the individuals of this species are according to DENDY's original description always small, the one now obtained is smaller even than those from Victoria. We have, however, been able to examine some of the type specimens, and have compared them carefully with this one, both as to general appearance and skeleton and spiculation, and the agreement is so close in all essential details that we think there can be no doubt whatsoever that the identification is correct. The specimen now under consideration consists of a small clathrous mass of anastomosing Ascon-tubes, situated at the summit of a short stalk, which is itself an Ascon-tube, the whole person being about 5 mm. in height and 3 mm. in diameter through the head, while the diameter of the stalk does not exceed 1.5 mm. At the summit of the colony is a small single osculum, a point upon which some stress was laid by DENDY in his original description of the species.

The skeleton is exactly similar to that of the type specimen, though some of the spicules seem to be slightly more sagittal in shape in the present case than in the type, and to have a slightly larger oral angle between the paired rays; but by far the larger proportion of the spicules agree in all details with DENDY's description. Further, the same difference between the spicules on the surface of the sponge and those in the interior was clearly noticeable in this specimen as well. The measurements of the spicules correspond exactly. We found it impossible to determine the position of the nucleus in the collared cells satisfactorily.

Previously known Distribution.—Near Port Phillip Heads (DENDY).

Locality and Register No. of Specimen.—Geraldton District (Station 31), Z17.

7. *Leucosolenia vitraea*, n. sp.

(Pl. XIX, Fig. 2; Text-fig. 2)

This species is represented in the collection by a single specimen only, in the form of a rather elongated spherical cushion, measuring 15 mm. long, 10 mm. wide, and 10 mm. high, growing on the stem of a water-plant (Pl. XIX, Fig. 2). The whole sponge consists of an elaborate network of Ascon-tubes, which branch and anastomose repeatedly. The sponge-surface thus appears to be pierced by a very large number of circular holes, which are really the gaps between the Ascon-tubes and which average 0.5–1 mm. in diameter. On cutting away a portion of the colony, it is seen that the interior of the sponge presents exactly the same appearance as the outside, so that there cannot be said to be any true pseudoderm, though, as we shall see presently, there is a definite "pseudocortical" skeleton in the walls of the outer tubes.

No oscula could be distinguished on the sponge-surface; either owing to the contraction of the sponge having completely closed them, or to their being indistinguishable from the gaps between the Ascon-tubes.

The colour of the sponge is dead white and it is so glass-like as to be almost transparent, whence the specific name. In texture it is soft, but fairly tough and not very easily torn, principally owing to the presence of the special "pseudocortical" skeleton. Its surface is perfectly smooth.

Structure. — For some reason or other this sponge was in a much worse state of preservation than most of the others in the collection, and but little could be made out concerning the canal system. The cells were only distinguishable in small patches here and there and their true distribution could not be ascertained. It is of course possible that they are only present in these rare patches, but this seems very unlikely, and I think that it is much more probable that the dense "pseudocortical" skeleton prevented the preservation fluid from penetrating the interior of the sponge, and thus the patches of collared cells now visible would be those round the prosopyles, the only spots where the spirit could reach them quickly enough to prevent maceration. The general arrangement of the canal system does not call for

any special comment.

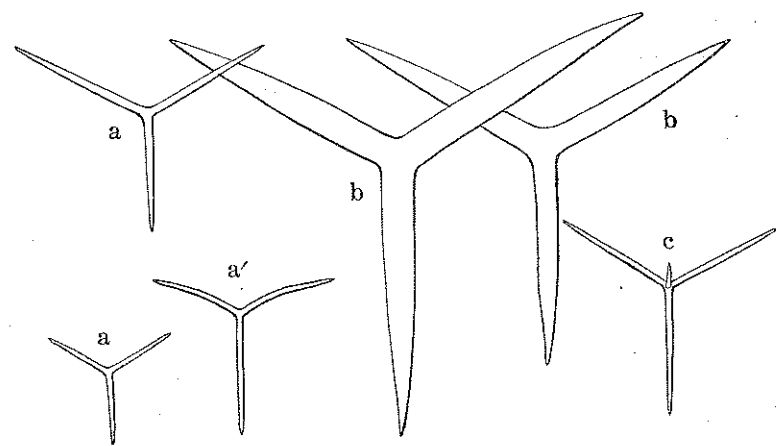
The skeleton consists almost solely of triradiates, with a very occasional quadriradiate intermingled with them from time to time.

Two very different types of triradiate, however, occur, one, the larger, being confined to the outermost parts of the sponge-colony, while the smaller forms the whole of the skeleton of the rest of the sponge. These latter are slender, delicate spicules, not more than half the size of the "pseudocortical" spicules, which form a definite and dense layer covering the whole of the outer surface of the exterior tubes. In this way these tubes have developed a special skeleton of their own, which we have called a "pseudocortical" skeleton; it must, however be remembered that this special skeleton is developed strictly in the walls of the Ascon-tubes, and not in a special development of mesogloal tissue, as it is in those sponges among the more highly specialized members of the group which possess a true cortex, such as *Grantia*, for example. Immediately beneath this special layer of large triradiates comes a layer of the ordinary small triradiates, forming, as it were the true skeleton of the tube wall. Neither the large nor the small triradiates are definitely oriented in any part of the sponge.

Quadriradiates, when they occur, are merely triradiates to which an apical ray has been added; they are not to be distinguished from them in any other way, and both large and small triradiates can be found possessing this additional ray.

Spicules (Text-fig. 2). — Small triradiates (a). — These are in almost all cases quite straight, cylindrical rays which taper uniformly from their base almost right up to the apex, the tapering being very slightly more abrupt for about the distal tenth of their length. Very rarely spicules are found with two of the rays slightly curved, so that the spicules come to present a faintly alate appearance (a'). The average length of the fully formed spicule is 135μ and its diameter at the base, where it is thickest, averages 10μ , but specimens can occasionally be found which considerably exceed these measurements, some of them attaining a maximum length of 160μ , and a diameter of 12μ .

Large triradiates (b). — Like the small triradiates, these spicules also are regular, equiangular and equiradiate, but they can be immediately distinguished by their much larger size. They show somewhat greater range of measurement than do the small spicules, ranging

Text-fig. 2. *Leucosolenia vitrea*, n. sp.

a, Small triradiates. a', Small alate triradiate. b, Large triradiates. c, Quadri-radiate. (All $\times 110$)

from twice to three times as long and wide as the latter. All the rays are quite straight and cylindrical being almost the same diameter for the proximal two-thirds of their length. The distal third is tapered much more rapidly up to a point close to the apex of the spicule, which is, however, usually blunt and even rounded. The rays are $248-370 \mu$ long, and $25-31 \mu$ thick at the base.

Quadri-radiates (c). — As stated above, the only difference between these spicules and the triradiates is the presence of a small apical ray, which very rarely exceeds 50μ in length and 10μ in thickness of base. These apical rays may be developed on large and small triradiates alike.

Locality and Register No. of Specimen. — Albany District (Station 64), Bp.

Family Leucascidae DENDY

Genus LEUCASCUS DENDY

8. *Leucascus simplex* DENDY

Leucascus simplex, DENDY, 1892, p. 77; 1913, p. 9, Pl. I, fig. 5; Pl. IV, fig. 1; KIRK, 1897, p. 313; DENDY and Row, 1913, p. 731.

This species is represented in the collection by five comparatively

large specimens and one very small specimen. All are irregular and massive and form spreading crusts of greater or less extent attached to the stems of sea-weeds. The largest crust measures about 30 mm. long and 15 mm. wide, but is very thin, though in most of the other specimens the sponge attains a thickness of about 5 mm. All the specimens possess several oscula scattered about indiscriminately over the surface.

The species has been very fully described by DENDY (1892 and 1913), so that no further details are necessary.

Previously known Distribution. — Near Port Phillip Heads; Bass Straits and Watson's Bay, Port Jackson (DENDY, 1892); New Zealand (KIRK, 1897); Providence, Indian Ocean (DENDY, 1913).

Localities and Register Nos. of Specimens. — Shark's Bay District (Station 15), M; Geraldton District (Station 31) AC β ; Fremantle District (Station 34), AM $_1$, AM $_2$, AU $_2$; Bunbury District (Station 56), AZ $_1\beta$.

9. *Leucascus clavatus* DENDY

Leucascus clavatus, DENDY, 1892, p. 78; DENDY and Row, 1913, p. 731; BRØNDSTED, 1926, p. 300.

A single extremely small specimen was assigned to this species on account of the character and shape of the oxea. The specimen is almost in the Olynthus condition, and it is with considerable hesitation that we have ventured to assign any definite name to it. Certainly it would be impossible to say for certain that the identification was a correct one, but the oxea are in this species of very striking and peculiar shape, and no other species is known, so far as we can determine, with oxea exactly similar. It seems very possible, then, at any rate that the specimen may be a very young individual of this species, and as such we have considered it.

Previously known Distribution. — Near Port Phillip Heads (DENDY); Halfmoon Bay, Stewart Island N. Z. (BRØNDSTED).

Locality and Register No. of Specimen. — Geraldton District (Station 31), Z $_1\epsilon$.

Genus *LEUCETTA* HAECKEL (emend.)10. *Leucetta insignis*, n. sp.

(Pl. XIX, Fig. 3; Text-fig. 3)

One specimen only of this species occurs in the collection, and this specimen itself is only a fragment of a probably much larger sponge (Spec. AE from Station 31). It now consists of a massive, approximately square piece, measuring about 30 mm. by 35 mm. showing a large area at each end where the rest of the sponge has broken away, and varying in height from 15 mm. to 20 mm. Apparently the perfect sponge takes the form of an elongated crust, whose upper surface is traversed by a series of more or less parallel ridges, and it probably presents a more or less close resemblance to *Leucetta prolifera* as regards external appearance.

The specimen now being described possesses parts of three of these ridges, and on their summit occur the oscula, which number 10 in all. Like the sponge, two of the ridges are incomplete at each end. Each osculum (except two), is about 2 mm. in diameter, and on looking down it into the interior of the sponge there can be seen the opening of numerous exhalant canals, which approach from all directions to meet together immediately below the osculum. Two of the oscula, however, are much smaller, probably due to contraction when the sponge was preserved, as they only measure 0.5 mm. in diameter. The sponge is greyish white in colour, its surface is quite smooth, and its texture firm though easily cut.

Structure.—On the surface of the sponge there is an extremely thin and delicate dermal membrane, pierced by multitudes of minute pores, which covers over a series of irregular subdermal cavities from which inhalant canals run down into the interior of the sponge. These cavities and canals are sometimes quite large lacunae. The canal system is of leuconoid type but the flagellate chambers are more or less elongated and are arranged under the syllebid condition, approaching a condition with elongated and more or less radially arranged flagellate chambers as in the genus *Leucascus*. The position of the nucleus in the collared cells is basal.

The main mass of the skeleton is composed of small triradiates and quadriradiates, which occur in great numbers and fill up the

sponge body. The spicules lie entirely without orientation in the sponge, and both kinds of spicules are mixed up together quite indiscriminately, and occur in all parts. The quadriradiates are frequently found in the walls of the exhalant canals with their apical rays projecting into their cavity.

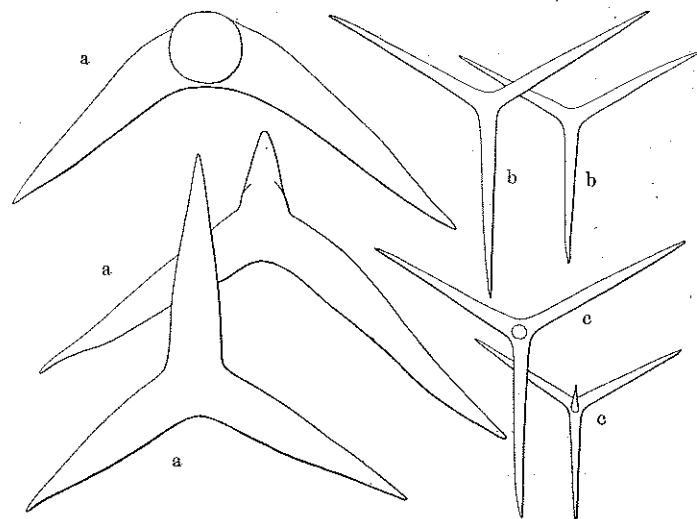
On the dermal surface of the sponge there occur triradiates of very large size, appearing almost colossal in comparison with other spicules of the sponge. They are only sparsely scattered over the surface, but form undoubtedly the beginning of a special cortical skeleton, such as we see developed to a very high extent in many species of the family Leucaltidae. A considerable extent of the sponge surface was examined, but no specimen of these large triradiates was found possessing an apical ray.

There is no special oscular skeleton.

Spicules (Text-fig. 3).—Large dermal triradiates (a) are markedly of tripod shape, and thus form obvious prominences on the surface of the sponge. They are probably all quite regular, though when seen in boiled-out preparations they frequently appear to be more or less sagittal, owing to the fact that tripod spicules always appear distorted unless seen in the actual facial plane. They possess very stout rays, which are usually quite straight, though sometime slightly irregular in outline, and which are of the same diameter for about half their length, sometimes even being slightly thicker in the middle than at the base, and thence sharply tapering to the very blunt point. Rays measured 200–260 μ in length and 30–60 μ in thickness of base.

Smaller triradiates which form the main mass of the skeleton (b) are quite regular, equiangular and equiradiate, with cylindrical straight rays, which taper uniformly from the base close up to the apex, though for the distal one-tenth of the length of the ray the diminution of thickness is somewhat more accentuated. The apex itself is sharply pointed in almost every case, but occasional spicules can be found in which the rays end bluntly. The rays are 70–130 μ long, and 10–16 μ thick at the base.

Quadriradiates of the main skeleton (c) are exactly similar in size and appearance to the triradiates of the same, only differing from them in the presence of an apical ray. The apical ray is always very slender and is uniformly tapered from the base to the sharp point.

Text-fig. 3. *Leucetta insignis*, n. sp.

a, Large dermal triradiates seen from various directions. b, Triradiates of the main skeleton. c, Quadriradiates of the same. (All $\times 200$)

It is usually straight but frequently somewhat bent or even wavy in shape. It is $30-40 \mu$ long and $4-6 \mu$ thick at the base.

Quadriradiates of the exhalant canals are quite similar to the above, differing only in having longer and stouter apical rays measuring $40-170 \mu$ long and $6-12 \mu$ thick at the base.

Locality and Register No. of Specimen.—Geraldton District (Station 31), AE.

11. *Leucetta microraphis* HAECKEL

Leucetta primigenia, var. *microraphis*, HAECKEL, 1872, Vol. II, p. 119, Taf. 21, Figs. 10-17.

Leucetta microraphis, RIDLEY, 1884, p. 482; VON LENDENFELD, 1885, p. 1117; DENDY and ROW, 1913, p. 734; DENDY and FREDERICK, 1924, p. 482.

Leuconia dura, POLÉJAEFF, 1888, p. 65.

Leucandra microraphis, DENDY, 1892, p. 104.

Leucandra primigenia var. *microraphis*, ROW, 1909, p. 186.

This extremely well-known species is represented in the collection by numerous specimens, one or two of them being very large, and most of the others seeming to be fragments broken off still larger

individuals. All are typical, irregular masses which frequently appear to take the form of more or less clearly defined ridges and prominences, and usually with very numerous oscula, though these are not visible in all the specimens. This species is so well known that there is no need to give any further description of it.

Previously known Distribution.—Australia? (HAECKEL); North Coast of Australia, Torres Straits (RIDLEY, POLÉJAEFF); East Coast of Australia, Port Jackson; South Coast of Australia, Near Port Phillip Heads (LENDENFELD, DENDY); Red Sea (ROW); Off Bermudas (POLÉJAEFF); Abrolhos Islands, Western Australia (DENDY and FREDERICK).

Localities and Register Nos. of Specimens.—Shark's Bay District (Station 1 and 15), C₁E₁, E₂, O; Geraldton District (Station 32), AL₁, AL₂, AL₃, AL₄, AL₇; Bunbury District (Station 56), BB.

12. *Leucetta prolifera* (CARTER)

Teichonella prolifera, CARTER, 1878, pp. 35-40, Pl. II, figs. 1-5; DENDY, 1891, Pl. I, fig. 6.

Leucilla prolifera, DENDY, 1892, p. 115.

This species is represented by four specimens in the collection. They differ somewhat in size from each other, but are nearly similar in both the external appearance and the internal structure.

The description of the species is fully given by CARTER, therefore we do not feel the necessity to add further details to it.

Previously known Distribution.—Near Port Phillip Heads and Fremantle District (CARTER).

Localities and Register Nos. of Specimens.—Geraldton District (Station 31), AC; Fremantle District (Station 43), AV₁, AV₂; Albany District (Station 64), BR.

13. *Leucetta infrequens*, n. sp.

(Pl. XIX, Fig. 4; Text-fig. 4)

In the collection there exist six specimens of this new species which were obtained at Station 43 in the Femantle District.

The specimen (Spec. No. AT₁; Pl. XIX, Fig. 4), which served as the type, forms an irregularly shaped mass of rather small size measur-

ing about 10 mm. in height and about 10 mm. in greatest breadth. The surface is uneven and provided with two small naked oscula, both measuring about 0.5 mm. in diameter. The colour in alcohol is greyish and the texture is firm and compact.

Structure. — The canal system is of the leuconoid type. The flagellated chambers which are rather closely packed in the chamber layer and among inhalant and exhalant canal systems are oval or nearly spherical with maximum diameter of $130\ \mu$. The collared cells are rather thinly distributed in the wall of the flagellated chambers.

The skeleton of the dermal cortex is rather poorly developed and is not clearly distinguished from that of the chamber layer. It is made up chiefly of small triradiates placed tangentially in several confused layers and there may be added some larger triradiates disposed tangentially. The skeleton of the chamber layer consists in the main of small triradiates, which are thickly set together without any definite order.

The oscular margin is deprived of any peculiar skeleton.

Spicules (Text-fig. 4). — Larger dermal triradiates (a) equiradiate and equiangular. All rays straight, gradually and sharply pointed, $300\text{--}440\ \mu$ long and $40\text{--}70\ \mu$ thick at base.

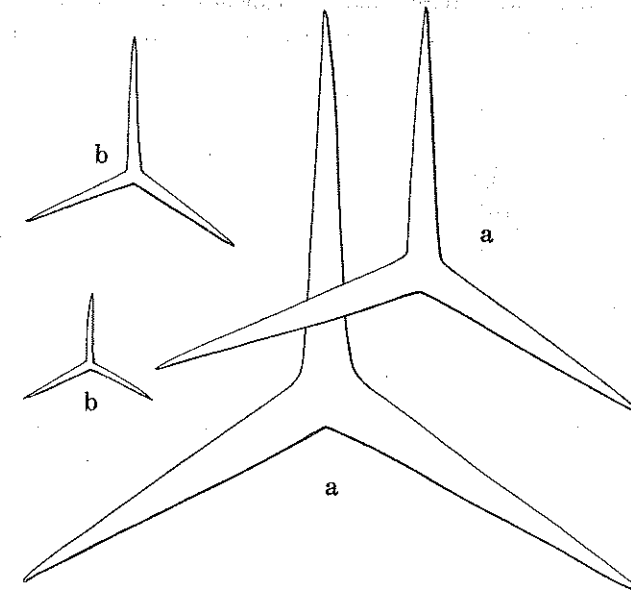
Smaller dermal triradiates (b) equiradiate and equiangular. All rays straight and gradually sharp-pointed, measuring $80\text{--}130\ \mu$ long by $10\text{--}20\ \mu$ thick at the base.

Triradiates of the chamber layer exactly the same as the smaller triradiates of the dermal cortex.

Remarks. — This species closely resembles *Leucetta chagosensis* DENDY¹⁾ but may be distinguished from it in not having a distinct system of subdermal cavities which lie in the rather thick gelatinous ectosome and in the absence of smaller oscular triradiates with two of the rays bent sharply back near their bases until they come to extend nearly at right angles to the third ray.

Locality and Register Nos. of Specimens. — Fremantle District (Station 43), AT₁, AT₃, AT₄, AT₅, AT₆, AT₇.

¹⁾*Leucetta chagosensis*, DENDY, 1913, p. 10, Pl. 1, Fig. 6; Pl. 4, Fig. 2.



Text-fig. 4. *Leucetta infrequens*, n. sp.
a, Larger dermal triradiates. b, Smaller dermal triradiates. (All $\times 100$)

14. *Leucetta expansa*, n. sp.

(Pl. XIX, Fig. 5; Text-fig. 5)

This new species is represented in the collection by two specimens which came from Station 25 in Shark's Bay.

The larger specimen (Spec. No. Y₃) is taken as the type on which to base further descriptions and is represented in Plate XIX, Fig. 5.

The external form is massive and irregular, the surface being provided with scattered oscula of various sizes, the largest measuring about 4 mm. in diameter. It measures about 35 mm. in length by 25 mm. in breadth and 20 mm. in greatest thickness.

The colour in alcohol is brownish, probably stained by other substances. The texture is fairly compact and firm but friable.

The canal system is typically leuconoid. The flagellate chambers are fairly thickly packed in the chamber layer. Each of the oscula leads into an exhalant canal which is first very thick but becomes gradually thinner as it penetrates deeper into the sponge body, by

sending off on its way many smaller branches distributing among the flagellate chambers. There exists no common central gastral cavity.

The skeleton of the dermal cortex consists chiefly of several confused layers of large and small triradiates placed tangentially. To these spicules may be added a large number of microxea in dense and irregular distribution.

The chamber layer contains the skeleton consisting of large triradiates thickly and irregularly scattered. The wall of the larger exhalant canals are sustained by small quadriradiates with their apical rays projecting into the canal.

Spicules (Text-fig. 5).— Large dermal oxea (a) equiangular and approximately equiradiate. All rays stout, tapering gradually to fairly sharp points and measuring 300–500 μ long by 40–60 μ thick.

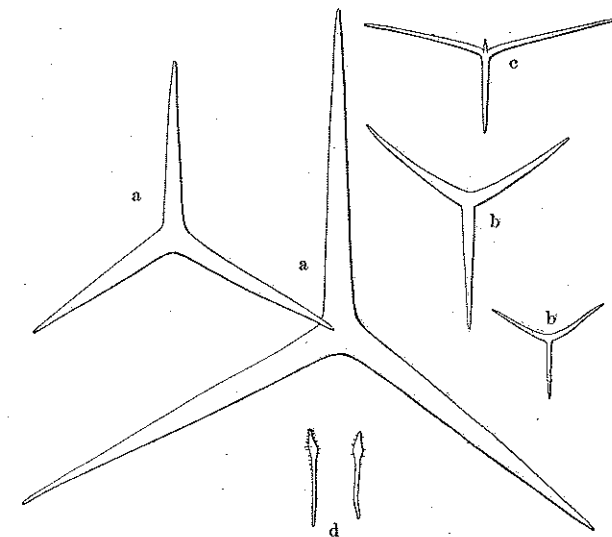
Small dermal triradiates (b) slightly sagittal. All rays are of nearly equal length and of equal thickness, tapering gradually to fairly sharp points. Basal ray straight, 100–230 μ long and 14–20 μ thick at base. Paired rays slightly curved forwards making an oral angle wider than the paired angles, 100–250 μ long and 14–20 μ thick at the base.

Large triradiates of the chamber layer are exactly similar to those of the dermal cortex.

Quadriradiates of the larger exhalant canals (c) are strongly sagittal. All rays slender, nearly equally thick through their greater length. Basal ray straight, distinctly shorter than paired rays, sharply pointed at end. Paired rays very widely diverging, nearly straight except for a slight curvature near the base. Apical ray shorter and thinner than either the paired rays or basal ray. It is slightly curved. In a typical case the basal ray measures about 150 μ by 16 μ ; the paired rays about 250 μ by 16 μ , and the apical ray about 70 μ by 8 μ .

Microxea (d) are almost straight, proximally tapering to a sharp point, distally terminating with a lance head which is provided with a sharp apex. The distal half of the spicule, especially the head, is covered with very fine spines. These spicules are about 40 μ in length and 4 μ in thickness.

Remarks.— This species can not be identified with any species already known of the genus. The presence of microxea and not of large oxea appears to be characteristic to it.



Text-fig. 5. *Leucetta expansa*, n. sp.

a, Large dermal triradiates. b, Small dermal triradiates. c, Quadriradiate of the larger exhalant canal. d, Dermal microxea. (a–c $\times 60$; d $\times 300$)

Locality and Register Nos. of Specimens.— Shark's Bay (Station 25), Y₂, Y₃.

Family Leucaltidae

Genus LEUCETTUSA HAECKEL (emend.)

15. *Leucettusa dictyogaster*, n. sp.

(Pl. XIX, Fig. 6; Text-fig. 6)

This new species is represented by five specimens in the collection and they were all obtained at Station 56 in Bunbury Bay. To base the further description on, I have selected the largest specimen (Spec. No. BC) as the type and it is shown in Pl. XIX, Fig. 6.

It consists of two anastomosing tubes provided with a common osculum at the upper end. The surface is uneven showing some convexities and concavities, but is nearly smooth though it is finely punctate in appearance. The total length of the specimen is about 50 mm. and the breadth is about 32 mm. at the broadest part.

The osculum is oval with the larger diameter of 9 mm. and is

surrounded by a distinct collar 1.5 mm. high. Looking down the osculum into the interior of the sponge there can be seen the opening of numerous exhalant canals which are distributed on the wall of the rather shallow central gastral cavity. The colour in alcohol is greyish white and the texture is, in outer surface, fairly rigid but is soft inside.

Structure. — The canal system is of the leuconoid type. The wall of the sponge is composed of three distinct layers, namely, a dermal cortex, a chamber layer and a gastral cortex. The dermal cortex is nearly uniformly thick measuring about 1 mm. The chamber layer is of very variable thickness, even attaining a thickness of up to 10 mm. It is formed of trabeculae which bear the flagellate chambers and are separated by very wide, irregular exhalant lacunae. The flagellate chambers vary in form from oval to spherical with a diameter of 80–150 μ . The gastral cortex is very thin and membranous lying in the wall of the central gastral cavity which is rather narrow, being only about 10 mm. deep by 12 mm. broad.

The dermal cortex is furnished with a strongly developed cortical skeleton which is made up of tangential triradiates and microxea. The triradiates are arranged in several layers without any definite orientation but leaving some spaces in an irregular mesh-like manner for inbalant canals. The microxea occur chiefly in the outer part of the cortex and are rather thinly distributed. In regard to the orientation they are tangential; otherwise there exists no regularity.

The gastral cortex is provided with a skeleton formed of tangential quadriradiates in nearly a single layer with their apical ray projecting into the gastral cavity.

The thin oscular margin bears a special skeleton which contains some triradiates differing somewhat in shape from that of the dermal cortex.

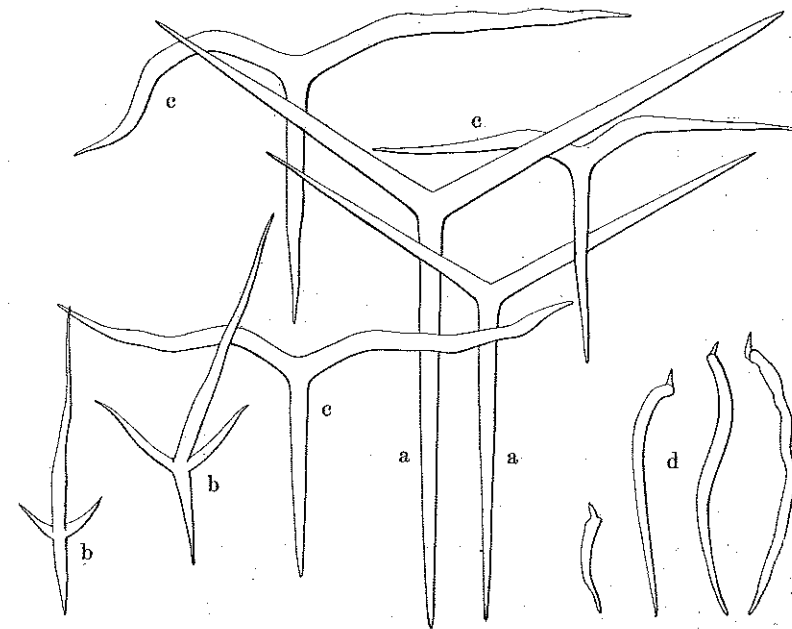
Spicules (Text-fig. 6). — Dermal triradiates (a) regular, rather slender-rayed. All rays straight and gradually sharply pointed, 380–580 μ long and 30–50 μ thick at the base.

Gastral quadriradiates (b) sagittal. Basal ray straight, broad in basal part but becoming narrower rather suddenly towards the sharply pointed end, 30–50 μ long by about 8 μ thick. Paired rays slightly shorter and thinner than basal ray, a little curved forwards in basal part and finely pointed at the end, 20–40 μ long and about 6 μ thick

at base. Apical ray very strongly developed, nearly equally thick as basal ray but exceedingly longer than the latter. It is somewhat crooked and very finely pointed at the end, 100–120 μ long by about 8 μ thick.

Triradiates of oscular margin (c) sagittal. All rays are nearly equally long and equally thick. Basal ray nearly straight, gradually and sharply pointed. Paired rays strongly divergent, showing an angular curvature at a short distance from the base, and either nearly straight or curved in distal part ending in a sharp point. In a typical example of the spicule the rays measured about 320 μ long by 30 μ thick.

Dermal microxea (d) cylindrical, more or less undulating, provided at one end with a short pointed head making an angle with the main body of the spicule, while the other end is solely sharp-pointed. As a whole, each spicule gives somewhat a snake-like appearance. They are 30–130 μ in length and 6–10 μ in thickness.



Text-fig. 6. *Leucettusa dictyogaster*, n. sp.
a, Large dermal triradiates. b, Gastral quadriradiates. c, Triradiates of the oscular margin. d, Dermal microxea. (a, c $\times 75$; b, d $\times 300$).

Remarks.—The name of the present species appeared first in the paper of DENDY and ROW, which was published in 1913. In that paper a very brief account of the canal system of the species was dealt with. But since that time no fuller description which is sufficient to define the species has been given till the present time.

It is not difficult to distinguish the present species from the other members of the same genus by the presence of characteristic microxea in the dermal cortex.

Locality and Register Nos. of Specimens.—Bunbury Bay (Station 56), BC, BD₁, BD₂, BD₃, BD₄.

Family Sycettidae

Genus SYCON RISSO (emend.)

16. *Sycon boomerang* DENDY

Sycon boomerang, DENDY, 1892, p. 82; 1893, pp. 169, 191, Pl. 10, figs. 7, 8; DENDY and ROW, 1913, p. 745.

We have identified a single specimen in the collection with this species.

It differs from the typical *Sycon boomerang* only in the much smaller size and in the absence of a narrow stalk.

The total height of the specimen is 15 mm., the greatest breadth being about 6 mm. The thickness of the sponge wall measured 2 mm. in the thickest part.

Previously known Distribution.—Near Port Phillip Heads (DENDY).

Locality and Register No. of Specimen.—Geraldton District (Station 31), AF.

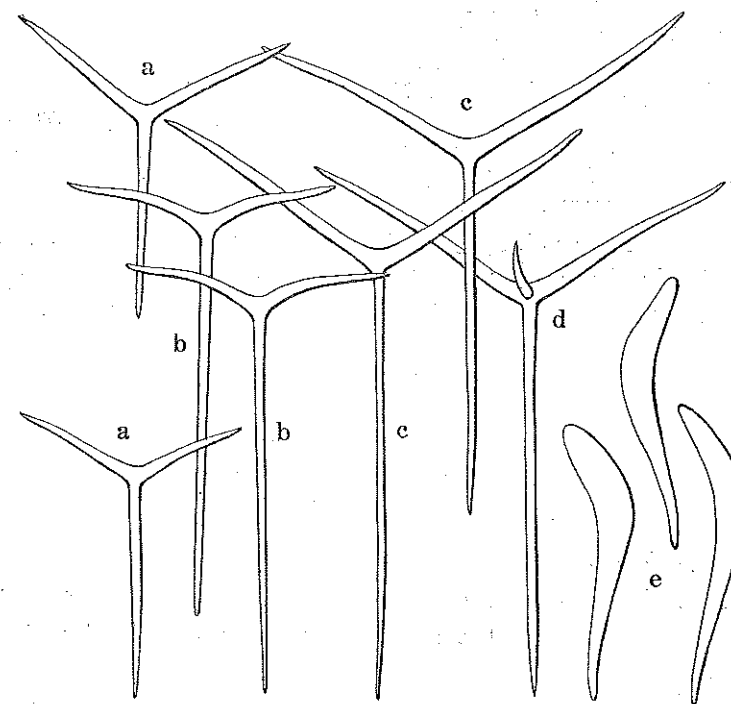
17. *Sycon carteri* DENDY

(Pl. XX, Fig. 7; Text-fig. 7)

Sycon carteri DENDY, 1892, p. 79; DENDY and ROW, 1913, p. 745.

There are present in the collection three large colonies of this very beautiful species, all growing on the stem of water-plants. In the lower portion of the colony there is much branching, but distally the tubes are undivided, thus producing the appearance of a mass of small individuals crowded together. A photograph of the external form of the largest colony (Spec. AX₂) is given in Pl. XX, Fig. 7.

This is one of the most primitive species of the genus *Sycon*; it is, in fact, very close indeed to *Sycetta*, for the flagellated chambers are short and wide, and their walls are but little fused together. In fact, many of the characters are quite free from their neighbours, and in surface view they can be seen standing out quite separately from the wall of the gastral cavity. The inhalant canals are large and numerous, but owing to the separation of the flagellated chambers, they are not clearly defined.



Text-fig. 7. *Sycon carteri* DENDY.

a, Tubar triradiates. b, Subgastral triradiates. c, Gastral triradiates. d, Gastral quadriradiate. e, Oxea. (All $\times 300$)

The nucleus of the collared cells is apical in position.

No drawings of the individual spicules have ever been given, and we therefore append them here (Text-fig. 7), but in other details the description given of the species by its author (DENDY, 1892) is very full, and needs no amplification.

Previously known Distribution.— St. Vincent's Gulf, S. Australia (DENDY).

Localities and Register Nos. of Specimens.— Geraldton District (Station 31), AJ₁; Bunbury District (Station 56), AX₂, AY.

18. *Sycon ciliatum* (FABRICIUS)

Spongia ciliata, FABRICIUS, 1780, p. 448.

Grantia ciliata, JOHNSTON, 1842, p. 176, Pl. XX, Figs. 4, 5; Pl. XXI, Figs. 6, 7; GRAY, 1867, p. 554.

Sycon giganteum HAECKEL, 1870.

Sycocystis oviformis HAECKEL, 1870.

Sycodendrum ramosum HAECKEL, 1870.

Sycon ciliatum, SCHMIDT, 1870, p. 74; BREITFUSS, 1897, p. 216; (3) 1898, p. 18, Taf. I, Figs. 9-12; p. 23; 1927, p. 29; DENDY and ROW, 1913, p. 745.

Sycandra ciliata, HAECKEL, 1872, p. 296, Taf. 51, Figs. 1 a-t; Taf. 58, Fig. 9; ARNESEN, 1900, p. 16.

A single very small specimen has been assigned to this species.

Previously known Distribution.— Nearly cosmopolitan: Arctic Ocean; North Atlantic coast of Europe and North America; Adriatic Sea.

Locality and Register No. of Specimen.— Geraldton District (Station 31), AC δ .

19. *Sycon enciferum* DENDY

(Pl. XX, Fig. 8)

Sycon enciferum DENDY, 1892, p. 81; DENDY and ROW, 1913, p. 746.

This species is represented by a single specimen in the collection. A photograph of the external form of the specimen is given in Pl. XX, Fig. 8.

It is of an ovoid shape, measuring 12 mm. in length and 6 mm. in the greatest breadth. It is strongly compressed laterally and markedly constricted in the middle region. The osculum at the upper end is surrounded by a feebly developed collar about 0.4 mm. high.

The canal system and the skeletal arrangement, as well as the spiculation are exactly similar to those of the type specimen. We would only mention that the apical rays of the gastral quadriradiates seem to be slightly shorter and thinner in the present case than in the type specimen.

Previously known Distribution.— Near Port Phillip Heads (DENDY), *Locality and Register No. of Specimen.*— Bunbury Bay (Station 56), X₁.

20. *Sycon gelatinosum* (BLAINVILLE)

Alcyoncellum gelatinosum, BLAINVILLE, 1834, p. 529; GRAY, 1867, p. 557.

Sycidium gelatinosum, HAECKEL, 1870, p. 245.

Sycandra alcyoncellum var. *gelatinosa*, HAECKEL, 1872, Bd. II, p. 334.

Sycandra arborea, HAECKEL, 1872, Bd. II, p. 331, Taf. 53, Figs. 1 a-t; Taf. 58, Fig. 7.

Sycon gelatinosum, DENDY, 1892, p. 83; BREITFUSS, 1897, p. 217; DENDY and ROW, 1913, p. 746; DENDY and FREDERICK, 1924, p. 483.

This well-known species is represented in the collection by 17 specimens; all of which are comparatively small. With the exception of two specimens, each of which forms a colony, the majority are of single person.

In the collection there are no such examples as were figured by HAECKEL in his monograph. There is, however, no doubt about the identification, they all being quite typical in both external appearance and internal structure, and thus agreeing in every detail with the specimens from Australia in the collection of the late Professor DENDY, with which they have been carefully compared.

Previously known Distribution.— Indian Ocean; Java (HAECKEL); Australia; Port Jackson; Port Phillip; Watson's Bay; Bass Straits; St. Vincent's Gulf; Wooded Isle; Sandy Isle (various authors and collections); Albolhos Islands, Western Australia (DENDY and FREDERICK).

Localities and Register Nos. of Specimens.— Shark's Bay District (Station 3), F; (Station 7), A₁₂; (Station 8), Aq_I, Aq_{II}, Aq_{III}, A₁₁; (Station 10), A₁₇; (Station 12), H₁, R; (Station 14), J; (Station 15), K. (Station 25), X₂, X₃. Geraldton District (Station 31), AH₁, Z₁; (Station 32), AK₂. Bunbury District (Station 56), A₅₇.

21. *Sycon lendenfeldi*, n. sp.

(Pl. XX, Fig. 9; Text-fig. 8)

In 1885 VON LENDENFELD described a sponge, under the name of *Homoderma sycandra*, as the type and only known species of a new group of the Ascones, (or Homoccela), characterized by a general

structure similar to that of *Sycon*; but with the central cavity lined throughout by collared cells. He emphasised with considerable care the fact that this distribution of the collared cells made it necessary to place the sponge in the section Homocoela, (if then existent diagnoses were to be retained), and since he himself considered the "Homodermic character more important than the Asconic", he was bound to separate his species very widely indeed from *Sycon*. As the sponge was also obviously very different from any previously known Homocoele species, he was obliged to erect a new family for its reception.

DENDY (1891), in his Monograph of the Victorian Sponges, Part I, was inclined to accept the author's position for the species, but stated that he considered that the characters of the sponge needed re-investigation, as the publication was somewhat scanty in view of the great peculiarities stated to occur in its structure.

Since that time we have come to consider the line of demarcation much less definite between the Homocoele and Heterocoele sponges than was formerly considered to be the case, and, as stated briefly in their work on the calcareous sponges, (DENDY and ROW, 1913), Professors DENDY and ROW no longer consider *Homoderma sycandra* to be anything but a somewhat aberrant *Sycon*. Then, however, the matter was only very cursorily referred to, and now it seems advisable, in view of the presence in the collection now being reported on of a very similar species, to restate the considerations which led to the relegation of VON LENDENFELD'S species to the genus *Sycon*.

Firstly, the occurrence of collared cells in the central gastral cavity of Heterocoele sponges is not merely no impossibility, but actually occurs in the life of every individual, at any rate presumably, for all spongologists now consider that all calcareous sponges start their independent existence in the form of an "Olynthus", and at that stage the whole of the gastral cavity is lined by collared cells. Of course, VON LENDENFELD showed conclusively that his sponge was not a young individual, but definitely adult, as far as reproduction was concerned, but there was no certain evidence to show that the sponge had really reached its full growth, even though it was sexually mature. Even supposing, however, that the sponge was fully adult in every way, and that no further changes were to be looked for during the

remainder of its life, there is yet no question of the presence of a new character, but merely the existence in the adult individuals of a character present in them while young. And to show that even this persistence is not really extraordinary or unusual, we need only refer to the well known fact that in several of the simpler *Sycons* collared cells are known to occur lining that part of the gastral cavity above the topmost row of flagellate chambers, and just below the oscular rim. As far as collared cells are concerned, therefore, the difference between VON LENDENFELD'S *Homoderma* and *Sycon* is merely that they persist more in the gastral cavity in the former case than they ever do in the latter, and is not a radical difference of principle at all.

Secondly, when we come to compare the other features of *Homoderma* and *Sycon*, we find that almost all the more important ones are identical in the two genera. For instance, the general arrangement of the canal system is identical as is also the skeleton arrangement. And the skeleton is, as in all *Syconoid* sponges, of considerable complexity and specialization. There is a definite gastral skeleton, a complex tubar skeleton, and a similar tuft of oxea at the distal ends of the chambers in each case, the principal types of spicule occurring in various parts of the sponge are almost exactly comparable, (if anything, *Homoderma* is provided with a more elaborate spiculation than most *Sycons*), the external forms of the two genera are identical, in fact, the only difference is that, already referred to, of the distribution of the collared cells.

The only other character distinguishing *Homoderma* from *Sycon*, is the presence in the former of a creeping stolon, but although this is an unusual feature to find in a *Sycon*, it is by no means incompatible with our knowledge of *Syconoid* sponges, and on the whole *Homoderma* is nothing but a somewhat primitive *Sycon*, without any characters sufficiently distinctive to warrant even generic rank.

In the present collection very numerous specimens occur of another species of *Sycon* which show the same persistence of the collared cells in the central gastral cavity, and we have therefore named it after the author of *Homoderma sycandra*. Between *Sycon sycandra* and *Sycon lendenfeldi* there are, however, several distinguishing points, such as the larger size of the individual, the absence of stolon, the presence of a much more obvious and better defined stalk in the

latter, and many skeletal spicular differences. Numerous differences of a less important type also occur, as will be seen from the description of *S. lendenfeldi* below.

The largest specimens are about 20 mm. high, the average height being approximately 15 mm., of which 7 or 8 mm. is occupied by the stalk. The average diameter of the sponge is 2 mm. with 2.5 mm. as maximum, and the diameter of the stalk is usually about 0.5 mm. An oscular fringe 1 mm. to 2 mm. high is present, surrounding a terminal osculum 1 mm. or thereabout in diameter.

The various individuals often grow together in groups, sometimes connected by their stalks, but there is never a creeping stolon. Most of the specimens in the collection are unattached, but one or two are still attached to water-plants. Owing to the fact that the dermal tufts of oxea tend to gather large quantities of debris about the surface of the sponge, the colour of most of the specimens is rather a dirty yellow, or yellowish white, but one or two of the individuals have apparently been situated in a position where they did not acquire this coat of debris, and they are quite white. The stalk is always perfectly white. In texture the sponge is always very delicate and fragile, due to the comparative thinness of the sponge-wall.

The sponge surface is finely, but very densely hispid; the stalk is also slightly hispid, but the hispidation in this case is so fine as not to be visible, without a lense. A photograph of the external form of the specimen AS₂ is given in Pl. XX, Fig. 9.

Structure.— There is a large central gastral cavity measuring from 0.8 mm. to 1 mm. in diameter, into which from 30 to 40 rows of short, conical flagellated chambers open. At the summit of the sponge is a single wide osculum, as wide, or even wider than the gastral cavity itself. The flagellated chambers are of rather irregular shape, and are irregularly arranged; they measure about 0.6 mm. to 0.9 mm. in length, and 0.2 mm. to 0.3 mm. in diameter. At the points where their sides come in contact they are fused together, but there is no dermal membrane covering over the inhalant canals. Distally each chamber ends in a more or less elongated cone, quite unconnected to the neighbouring chambers.

There is a definite oscular rim extending 0.6 mm. beyond the topmost row of flagellated chambers. The stalk is hollow, its cavity

extending throughout its length, and surrounded by very thick walls, so that it does not measure more than 0.15 mm. in diameter at any point.

Collared cells line the whole of the oscular rim and the cavity of the stalk, and they also occur scattered about in groups throughout the gastral cavity, between the openings of the flagellated chambers, but these groups are very variable both in their number and extent, though they have been found in every specimen examined. It will be seen from this that the persistence of those cells in the gastral cavity is not so complete as in *Sycon sycandra*, so that this species forms a connecting link between that and the typical Sycons.

Inhalant canals of irregular shape and disposition occur between the flagellated chambers. They are frequently comparatively large, and often of triangular section.

The flagellated chambers are not provided with definite exhalant canals, but the collared cells extend right up to the mouth of the chamber, which is very wide.

The nuclei of the collared cells are apical in position.

Surrounding the osculum is a prominent fringe of oxea, in which the spicules are of two quite distinct kinds. Those composing the inner ring are long, silky and hair-like, and they are so set in the oscular rim that they do not diverge appreciably from each other, but form a fairly well defined tube of the same diameter at the osculum itself. Outside these there occurs another row in which the oxea are much stouter and shorter, and more sparsely distributed, and in which they are set much more obliquely, so that they diverge widely. Their proximal ends lie deeply embedded in the sponge tissue.

Immediately below these oxea occur two distinct bands of quadriradiates, each band consisting of three or four rows of spicules close together, so that the bands occupy but a very short region of the oscular rim. The two bands are quite distinct, being separated from each other by a distance of 0.3 mm. The spicules in these bands are all oriented in the usual way, with the two oral rays toward the osculum, and encircling the gastral cavity, the basal ray directed toward the base of the sponge, and the apical ray pointing into the gastral cavity. They are quite different in both size and shape from the gastral quadriradiates in the rest of the sponge.

Below these quadriradiates the oscular rim is provided with a horizontal oscular collar or "Corona", formed of small slender oxea arranged in a dense but thin fringe. These oxea are much smaller than the others occurring in the oscular region of the sponge.

Below these, again, comes another layer of quadriradiates, this time evenly and sparsely scattered over the whole of the wall. These are exactly similar to the quadriradiates found lining the gastral cavity throughout the sponge.

There is a thin gastral cortex in which occur three or four layers of radially placed triradiates, among which are interspersed numerous gastral quadriradiates. All these spicules are oriented in the usual way, with their paired rays pointing towards, and their basal ray away from, the osculum.

The skeleton of the flagellated chambers, or tubar skeleton, is articulate, and consists of six or eight joints, or less, according as the chamber has or has not attained its full growth. The proximal joint is composed of spicules slightly different in appearance and size from those of the other joints, being provided with a large basal ray and somewhat shorter paired rays. At the distal ends of the tubes the triradiates are supplemented by considerable numbers of oxea, which form a widely divergent crown to the chamber and project some way from the surface. A few of the subgastral triradiates possess apical rays, thus becoming quadriradiates; this apical ray never projects into the gastral cavity but lies like the paired rays, in the gastral cortex.

In the upper part of the stalk the main mass of the skeleton is composed of triradiates, which lie in many layers quite filling up the thick wall. These spicules are very markedly sagittal, being provided with an extremely long basal ray directed towards the base of the stalk, and two comparatively short oral rays which encircle the stalk. This part of the sponge does not seem to be provided with quadriradiates, as none of these could be found in any of the specimens examined, nor do apical rays project into the stalk-cavity. Between these triradiates, however, there lie large numbers of oxea of two kinds, the first large and very long, the others delicate and hair-like. The large oxea lie more or less parallel to the basal ray of the triradiates, but project considerably from the surface. Their ends point more or less towards the base of the stalk. The smaller oxea

are arranged radially, with their free ends projecting from the sponge-surface, and they occur in enormous numbers.

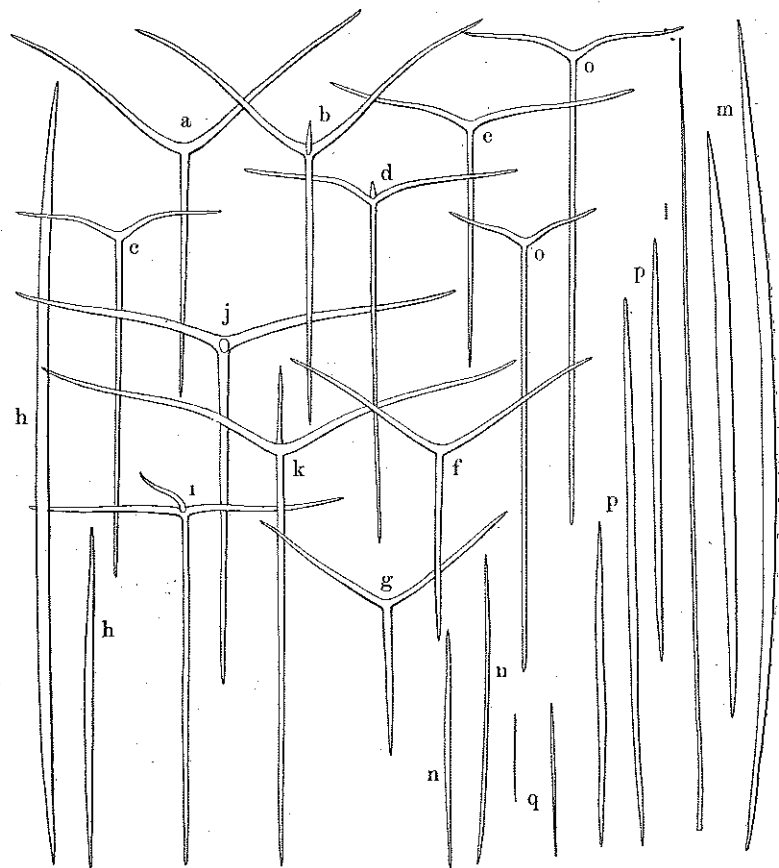
Spicules (Text-fig. 8).—Triradiates of the gastral cortex (a) are regular, or subregular, with long, slender rays usually all of the same length, though sometimes the basal ray can be distinguished from the oral rays by its greater length as well as by its position. Nearly all the spicules are oriented in the usual way, with their basal rays pointing away from the osculum. The rays are all cylindrical in shape, and taper uniformly from base to apex. The average length of a ray of a fully grown spicule is 132μ , and its diameter 6μ .

Quadriradiates of the gastral cortex (b) nearly the same as the triradiates of the same except in the presence of an apical ray. Basal ray $160-190\mu$ long and $4-6\mu$ thick. Paired rays $100-140\mu$ long and about $4-6\mu$ thick. Apical ray $30-80\mu$ long and about 4μ thick.

Subgastral tubar triradiates (c) sagittal in shape, and usually provided with a much elongated basal ray and short oral rays. The basal ray is slender, thicker at the base than at any other point of its length; it tapers slightly for a short distance from the base, then for the greater part of the rest of its length it is of the same diameter, while the actual apex is abruptly but sharply pointed. The paired rays are also slender, much shorter than the basal ray, and strongly curved so that the spicule is clearly alate in shape. They lie buried in the gastral cortex, between the tangential triradiates. The true oral angle is only rarely more than 120 degrees, but owing to the above mentioned curvature of the oral rays, which commences very close indeed to the base of the ray, the angle frequently appears to be very much larger. It is, however, to be noticed that these subgastral triradiates never become so decidedly alate as do the other spicules of the tubar skeleton. Basal ray $150-290\mu$ long by $4-6\mu$ thick; paired rays $53-80\mu$ long and $4-6\mu$ thick at the base.

Subgastral tubar quadriradiates (d) are exactly similar to the triradiates save for the presence of the apical ray, which is usually quite small, and scarcely ever exceeds 20μ in length, or 4μ in diameter.

Tubar triradiates of the distal joints (e) are somewhat stouter than the subgastral spicules, but their basal rays are longer than those of the former group. The basal ray is, as usual, straight, but the paired rays are so curved that they come to lie very nearly in the same

Text-fig. 8. *Sycon lendenfeld*, n. sp.

a, Triradiate of the gastral cortex. b, Quadriradiate of the same. c, Subgastral tubar triradiate. d, Subgastral tubar quadriradiate. e, Tubar triradiate of the distal joint. f, Tubar triradiate of the most distal joint. g, Triradiate of the distal end of the chamber. h, Oxea at the distal end of the chamber. i, Quadriradiate of the oscular rim which forms the band nearest the osculum. j, Quadriradiate of the oscular rim composing the second row. k, Quadriradiate in the lower portion of the oscular membrane. l, Oxea of the inner oscular fringe. m, Oxea of the outer oscular fringe. n, Oxea of the corona. o, Triradiates of the stalk. p, Larger oxea of the stalk. q, Smaller oxea of the stalk. (All $\times 150$)

straight line in most cases. The true oral angle of the spicule is about 150 degrees, and the bending of the paired rays occurs close

to the base. All the rays taper continuously, and more or less uniformly from the base to the apex, which is sharply pointed. Basal ray 150–170 μ long and 6–8 μ thick; paired rays 95–120 μ long and 6–8 μ thick.

Triradiates of the most distal joint of the tubar skeleton (f) are rather smaller than those of the other joints, and are approximately regular in shape, with comparatively short, stout rays. The rays taper evenly towards the apex, which is less sharply pointed than in the above spicules. Basal and paired rays are about 100 μ long; both about 6 μ thick at the base.

Triradiates of the distal end of the chamber (g). At the summit of the chamber occur a few triradiates with their basal rays forming part of the dermal spicule-tuft, and their paired rays placed astride of the end of the chamber. The true oral angle is similar in these spicules to that of the rest of the tubar triradiates, but the paired rays curve towards each other, following the outline of the end of the chamber, so that they have a quite different appearance to any of the other tubar triradiates. In an example of the spicule, the basal ray measured 130 μ in length and 6 μ in thickness, while the paired rays were 110 μ long by 6 μ thick.

Oxea at distal end of flagellate chamber (h) generally slightly curved, sharply pointed at both ends, 200–470 μ long and 6–10 μ thick.

Quadriradiates of the oscular rim which form the band nearest the osculum (i) possess a straight basal ray, directed away from the osculum, which is long, slender, and gradually and uniformly tapered from base to apex. Its actual point is extremely fine and sharp. The paired rays lie from their very commencement in the same straight line, so that the oral angle is 180 degrees. Seen at right angles to the facial plane, these rays appear straight, but in reality they are curved to follow the curvature of the oscular margin in which they lie. The apical ray is rather short; and still more slender than the other rays; its proximal part lies perpendicular to the facial plane and projects directly into the osculum, but about 20 μ from the base it becomes abruptly curved to point towards the osculum. It tapers gradually and uniformly from base to point. Basal ray 150–170 μ long and 5 μ thick; paired rays 70–90 μ long and 5 μ thick; apical ray 55–70 μ long and 3 μ thick.

Quadriradiates of the oscular rim composing the second row (j), that is the row immediately below the one above described, are somewhat different. The paired rays are considerably longer in comparison with the basal ray, all the rays are rather stouter, and the spicule is not so strikingly sagittal. The basal ray is straight, thickest at the base, and tapering thence gradually and more or less uniformly to the sharply pointed apex. Occasionally spicules can be found with their points blunt, but these are only a small minority. The paired rays usually enclose an oral angle not much, if any, greater than 120 degrees and usually they are sharply curved so that the spicule is decidedly alate in shape. The paired rays are slender, thickest at the base, and taper very gradually to the apex itself, which is usually somewhat blunt. The apical ray is usually short, (though they vary enormously in length in different spicules), comparatively stout, steeply curved throughout its length, so that, although it lies perpendicular to the facial plane at its origin, yet its distal portion points directly towards the osculum. It is conical in shape, tapering more or less uniformly from base to apex, which is sharply pointed. Basal ray 110-200 μ long and about 5 μ thick. Paired rays 110-120 μ long and 5 μ thick. Apical ray 10-25 μ long and 5 μ thick.

Quadriradiates in the lower portion of the oscular membrane (k), that is below the corona, are very similar in shape and size to those of the gastral cortex proper, the main differences being that the rays of the true gastral quadriradiates do not seem to reach quite so large a size as those of the oscular margin, which is especially the case with the basal ray, and that the apical rays of the gastral spicules are rather stouter. Basal ray 170-260 μ long and about 4-6 μ thick. Paired rays about 130 μ long and 4-6 μ thick. Apical ray about 70 μ long and 4 μ thick.

Oxea of the inner oscular fringe (l) are hair-like trichoxea, of great length in proportion to their width, and of approximately the same diameter throughout their length. The exact maximum length is extremely difficult to determine, owing to the fact that the great delicacy of the spicules renders them very liable to break. The average depth of the oscular fringe, however, is in most specimens about 1 mm., with a few spicules reaching 1.3 mm. in length. The actual diameter varies considerably, even in the same specimen, and

thick and thin spicule lie side by side. The average diameter varies in this way from 1-3 μ . The distal ends of these spicules are nearly always broken, but when present are seen to be sharply pointed, as are the inner ends.

Oxea of the outer oscular fringe (m) are of very different appearance, these being shorter, very much stouter, and spindle-shaped. They taper gradually from the centre to each end. Their average length is 350 μ , but specimens can be found as long as 500 μ . Their average diameter is 12 μ .

Oxea of the corona (n) are small trichoxea, not exceeding 250 μ in length or 2 μ in diameter. They are of the same diameter for the greater part of their length, only tapering away at their ends, which are sharply pointed.

Triradiates of the stalk (o) are very strikingly different from all the other triradiates that occur in this sponge, owing to their extreme sagittal form. The basal ray is much elongated, and the paired rays are considerably shorter than in the other spicules of this group. The basal ray is straight, of the same diameter for about two-thirds of its length, then gradually tapered to a point close up to the apex, whence the ray tapers abruptly to the point, which is blunt or even rounded. Sometimes there occurs a widening in the middle parts of the ray. The paired rays are short, the true oral angle between them is usually 120 degrees, but the rays bend outwards sharply about halfway through their length, so that they assume an alate appearance; in fact, the bending is frequently so pronounced that the rays come to lie in the same straight line. They are tapered gradually the whole distance from base to apex, but more rapidly near the apex than near the base. All the rays terminate in sharp points. Basal ray 250-270 μ , and paired rays 30-70 μ long; both 4-5 μ thick.

Larger oxea of the stalk (p) are spindle-shaped, extremely variable in length, which varies from 190 μ to 750 μ , and about 4-6 μ in diameter, though this is also variable. They taper from the centre evenly toward each end.

Smaller oxea of the stalk (q) are extremely slender hair-like trichoxea, not averaging more than 100 μ in length, or 2 μ in thickness.

Embryology.—In two of the specimens of this species that were microscopically examined after staining, embryos were found in large

numbers in the cavities of the flagellate chambers. As far as could be ascertained these embryos are typical amphiblastulae, and though full details of their structure could not be made out, owing to the method of preservation employed, yet enough was seen to render it certain that if there are differences between the embryos of this species and the typical amphiblastula, they are so slight as to be quite unimportant.

The presence of these embryos is of great interest from the point of view of the canal system. It has been previously pointed out that the presence of collared cells in the gastral cavity is of no importance in an immature specimen, and the discovery of embryos, both by VON LENDENFELD in *Sycon sycandra*, and in this species, is of great importance as showing that the sponge is fully adult.

Localities and Register Nos. of Specimens.—Fremantle District (Station 36), AP, AQ₅; (Station 37), AS₂ I, AS₂ II, AS₃. Albany District (Station 61), A₇; (Station 64), A₂.

22. *Sycon minutum* DENDY

(Pl. XX, Fig. 10)

Sycon minutum, DENDY, 1892, p. 80; DENDY and ROW, 1913, p. 747.

This species is represented in the collection by two specimens.

The first specimen (No. A₁₃; Pl. XX, Fig. 10) forms a small colony of four *Sycon* individuals, each of which was attached to a sea-plant. The largest individual measures about 6 mm. in total length by about 2 mm. in diameter. Its terminal osculum is provided with an oscular fringe about 0.5 mm. high. It has also a well-distinguished stalk for attachment.

The second specimen (No. AW₅) consists of numerous *Sycon* individuals, each of which was also attached to a sea-plant as in the case of the first specimen. The *Sycon* individuals are very variable in size, the larger measuring 8 mm. in length and 2.5 mm. in breadth while the smaller is only 1 mm. long and 1 mm. broad. The osculum is sometimes naked and sometimes provided with a fringe of spicules. Their form also varies greatly from an elongate cylinder supported by a short stalk to an oval sac without stalk.

In respect to the canal system, skeletal arrangement and spiculation, these two specimens are exactly identical with the type specimen.

Previously known Distribution.—Watson's Bay, Port Jackson (DENDY).

Localities and Register Nos. of Specimens.—Fremantle District (Station 45), A₁₃; Albany District (Station 63), AW₅.

23. *Sycon raphanus* O. SCHMIDT

Sycon raphanus, O. SCHMIDT, 1862, p. 14, Taf. 1, Figs. 2-2 d; 1864, p. 32; POLÉ-JAEFF, 1883, p. 40; TOPSENT, 1894 (1), p. 37; DENDY, 1893, p. 80; BREITFUSS, 1896, p. 428; (3) 1898, p. 17; (4) 1898, p. 93; (5) 1898, p. 110; (6) 1898, p. 217; 1927, p. 29; LACKSCHEWITSCH, 1886, p. 302; ROW, 1909, p. 185; DENDY and ROW, 1913, p. 748.

Grantia raphanus, GRAY, 1867, p. 554.

Sycarium vesica, HAECKEL, 1870, p. 238.

Sycandra raphanus, HAECKEL, 1872, Bd. II, p. 312, Taf. 53, Fig. 4 a-t; Taf. 60, Fig. 7; F. E. SCHULZE, 1875, p. 247, Taf. XVIII-XXI; VON LENDENFELD, 1885, p. 1093; 1892, p. 246.

This very well known species is represented in the collection by two small individuals, apparently young. Each of them possesses the usual characteristics of the sponge, and the skeleton and spiculation are exactly like the type, when allowance is made for the smaller size, but it must be noted that with these young specimens, which very rarely present any very definite and distinctive characters, there is always a strong tendency to allocate them to known species on too slight grounds, especially when that species is not only common but also unmarked by any very distinctive characters. There is, however, a very strong argument in favour of this course; it is obviously better to assign the doubtful specimen to a species already known to occur in that region, and to whose characters it bears a more or less obvious resemblance, than to erect a new species on account of characters that may very possibly be due to immaturity. Thus, although no specimens of *Sycon raphanus* of large and characteristic size are present in this collection, we prefer to place these two individuals in that species on account of their very close general resemblance to it, rather than to leave them unidentified. To provide a new species on such slender grounds as lack of size would obviously be impossible.

Previously known Distribution.—Cosmopolitan:—White Sea; Murman Coast; Barents Sea; Greenland; Bergen; Coast of Portugal; Tristan da Cunha; Minorca; Gulf of Gabes; Mediterranean Sea;

Red Sea; Ceylon; Java; Gulf of St. Vincent; Port Phillip Heads; Bass Strait; King Island; Ternate; Phillippine Islands; Japan.

Localities and Register Nos. of Specimens.—Fremantle District (Station 36), AQ^d; Albany District (Station 63), AW³⁷.

24. *Sycon setosum* O. SCHMIDT

Sycon setosum O. SCHMIDT, 1862, p. 15, Taf. 1; POLÉJAEFF, 1883, p. 24; DENDY, 1892, p. 81; DENDY and ROW, 1913, p. 748.

Grantia setosa, GRAY, 1867, p. 554.

Sycon setosa, HAECKEL, 1870, p. 239.

Sycandra setosa, HAECKEL, 1872, Bd. II, p. 322; Bd. III, Taf. 53, Figs. 3 a-t; Taf. 60, Fig. 11; LENDENFELD, 1891, p. 73, Taf. XI, Fig. 60; Taf. XII, Figs. 85-92

Only a single specimen (Spec. No. A₁₄ from Station 14) in this collection could be assigned to this species.

It is oval in shape with a terminal osculum which is provided with a well-developed fringe and a corona. The sponge measures about 4 mm. long and 2.5 mm. broad across the middle part. The oscular fringe is about 2 mm. high.

In the general appearance, and in the skeleton arrangement and spiculation it corresponds very closely to the descriptions of this species made by the previous authors. The only difference exists in the comparatively shorter apical rays of the gastral quadriradiates.

Previously known Distribution.—Mediterranean Sea (O. SCHMIDT, HAECKEL, LENDENFELD); Near Port Phillip Heads (DENDY).

Locality and Register No. of Specimen.—Shark's Bay (Station 14), A₁₄.

25. *Sycon verum*, n. sp.

(Text-fig. 9)

In this collection the present species is represented by ten specimens of varying sizes. The largest specimen (Spec. No. AZ_{4a} from the Station 56) was taken as the type.

It is a pear-shaped sac with a narrowed base attached to seaweed. It measures 20 mm. in height and 9 mm. in diameter at the widest part, which is about 8 mm. below the summit. The greatest thickness of wall is about 2 mm. The osculum at the summit is oval with

greater diameter of 2.5 mm. It is provided with a feebly developed fringe of small oxea. The surface of the sponge is rather smooth shows an extremely regular pattern, caused by the alternation of the flagellate chambers and the inhalant canals, both of which are approximately square in cross-section and of subequal size. The gastral surface is uniformly perforated by numerous apertures of exhalant canals of up to 0.3 mm. diameter. The colour is greyish white and the texture is delicate.

Structures.—The gastral cavity is large but is narrowed toward the base. The flagellated chambers in the middle portion of the sponge body are long and comparatively wide. They occasionally branch near the gastral cavity. Those situated near the oscular rim and the sponge base are much smaller and are rather irregularly arranged. The position of the nucleus in collared cells is apical.

The tubar skeleton is composed of triradiates and quadriradiates arranged in numerous joints, the first joint being formed by the basal rays of subgastral triradiates. The apical rays of the quadriradiates, which project into the cavity of the flagellate chamber, are directed slightly towards the exhalant aperture of the latter. At the distal ends of the flagellate chambers are set a considerable number of small oxea projecting some way from the surface.

The gastral skeleton is made up of triradiates, quadriradiates and the paired rays of subgastral triradiates. The former two kinds of spicules are rather thickly distributed around the gastral apertures, their basal rays being directed downwards and their apical rays projecting into the gastral cavity.

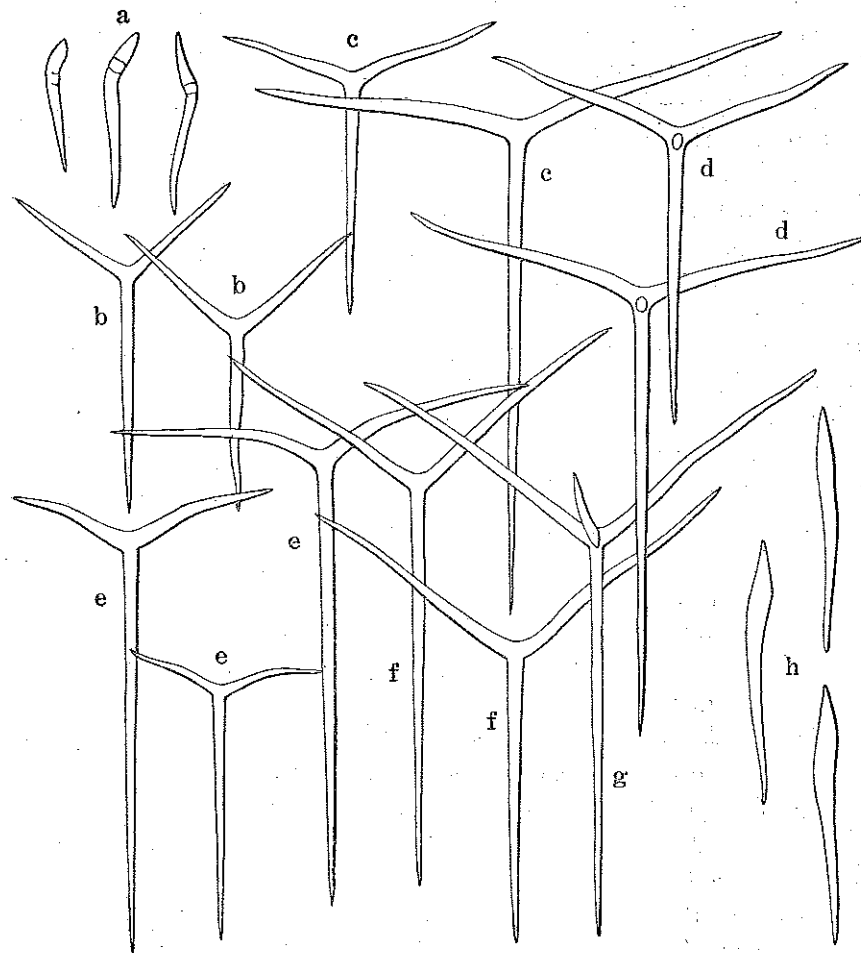
The oscular margin is rather thick being composed chiefly of small oxea equally distributed on both the inner and the outer surfaces.

Spicules (Text-fig. 9).—Oxea at the distal ends of flagellate chambers (a) short, more or less club-shaped, usually with the thicker distal portion bent marking an angle with the narrowed proximal portion. At the distal portion a fully developed ring-like thickening is noticeable. They are about 70 μ long and about 8 μ thick at the distal portion.

Tubar triradiates of the most distal joint (b) are rather smaller than those of the other joints. They are nearly regular or slightly sagittal with rays gradually and sharply pointed. Basal ray straight,

about $80\ \mu$ long and $6-8\ \mu$ thick at the base. Paired rays curved following the curvature of the outer surface of the flagellate chamber. They are about $70\ \mu$ long and $6-8\ \mu$ thick at the base.

Tubar triradiates (c) sagittal. Basal ray straight, longer and slightly thinner than the paired rays, tapering from base to sharp point, $100-$



Text-fig. 9. *Sycon verum*, n. sp.

a, Oxea at the distal end of flagellate chamber. b, Tubar triradiates of the most distal joint. c, Tubar triradiates. d, Tubar quadriradiates. e, Subgastral triradiates. f, Gastral triradiates. g, Gastral quadriradiate. h, Oxea of oscular rim. (All $\times 300$)

$180\ \mu$ long and $6-8\ \mu$ thick at the base. Paired rays widely divergent, either simply curved forwards or doubly curved first backwards and then forwards, ending in sharp points, $60-110\ \mu$ long and $8-10\ \mu$ thick at the base.

Tubar quadriradiates (d) exactly similar to the tubar triradiates with the addition of a short apical ray. Apical ray slightly curved and sharply pointed, $30-40\ \mu$ long and about $8\ \mu$ thick at the base.

Subgastral triradiates (e) sagittal. All rays are regular in contour and nearly equally thick. Basal ray longer than paired rays, quite straight, gradually tapering to a sharp point, $70-180\ \mu$ long and $6-8\ \mu$ thick at the base. Paired rays strongly divergent, curved rather angularly in the middle parts, $40-90\ \mu$ long and $6-8\ \mu$ thick at the base.

Gastral triradiates (f) sagittal. Basal ray slightly longer than paired rays, quite straight, tapering from base to the sharp point, $70-160\ \mu$ long and $6-8\ \mu$ thick at the base. Paired rays nearly equal in length, slightly curved forwards, $60-120\ \mu$ long and $6-8\ \mu$ thick at the base.

Gastral quadriradiates (g) exactly similar to the gastral triradiates save for the presence of an apical ray. Apical ray short but stout, straight and uniformly thick for about $\frac{2}{3}$ of its length, then bending slightly upwards and tapering more suddenly to a sharp point, $40-60\ \mu$ long and about $6-8\ \mu$ thick at the base.

Oxea of oscular rim (h) are nearly similar to those found at the distal cones, but not strongly curved and more elongated, about $90\ \mu$ long and $8\ \mu$ thick.

Localities and Register Nos. of Specimens. — Geraldton District (Station 31), AF₁, AH₂, AH₅; Bunbury Bay (Station 56), A₅ α , A₅ β , A₅ γ ; AX₁, AZ₁ α , AZ₁ β , AZ₁ γ .

Family Heteropiidae DENDY

Genus GRANTESSA VON LENDENFELD

26. *Grantessa hirsuta* (CARTER)

Hypograntia hirsuta, CARTER, 1886, p. 41.

Grantessa hirsuta, DENDY, 1892, p. 106; DENDY, and ROW, 1913, p. 752.

This species is represented by eight specimens in the collection.

They are either oval or elongate sac-shaped in form, provided with a terminal osculum. The largest specimen (Spec. No. BL from Station 64) measures 8 mm. wide in the broadest part and about 15 mm. long excluding the oscular fringe about 3 mm. high. The sponge surface is strongly hispid from the projecting oxea. The smallest specimen (Spec. No. AZ₂ from Station 56) measures about 6 mm. in length and 4 mm. in greatest breadth.

The specimen (Spec. No. BM from Station 64) has a surface which seems comparatively smooth, being deprived of strongly echinating oxea, and also has the osculum almost naked. But it is quite obvious that the above features were artificially produced during the treatment of the specimen.

Previously known Distribution.—Near Port Phillip Heads (CARTER, DENDY); King Island; Hobart, Tasmania (DENDY).

Localities and Register Nos. of Specimens.—Bunbury Bay (Station 56), AZ₂; Albany District (Station 64), BK₁, BK₂, BL, BM, BN₁, BN₂, BO.

27. *Grantessa polyperistomia* (CARTER)

Heteropia polyperistomia, CARTER, 1886, p. 47.

Grantessa (?) *polyperistomia*, DENDY, 1892, p. 109.

Grantessa polyperistomia, DENDY and ROW, 1913, p. 753.

The collection contains three specimens of this species.

The first specimens (Spec. No. AK₁ from Station 32) is a small colony of irregularly anastomosing tubes, the individuality of which is indicated only by the number of oscula. There are seven oscula of which some are surrounded by a feebly developed fringe of oxea while the others are naked. The whole colony measures 15 mm. in length, about 6 mm. in greatest breadth and 0.6 mm. in thickness of wall. The dermal surface appears more or less rough from the projecting large oxea. The gastral surface is smooth without any projecting spicules.

The remaining two specimens (Spec. No. AJ₃ β from Station 31 and Spec. No. BE from Station 56) are much smaller than the first but are of nearly equal appearance.

In the anatomical structures these three specimens represent nearly the same features as shown in the descriptions made by CARTER.

The canal system is syconoid, though not in a very typical way. The flagellate chambers which are radially arranged around the gastral cavity are rather short, and are not quite straight, being more or less crooked. They usually branch once or twice.

Previously known Distribution.—Near Port Phillip Heads (CARTER).

Localities and Register Nos. of Specimens.—Geraldton District (Station 31 and 32), AK₁, AJ₃ β ; Bunbury Bay (Station 56), BE.

28. *Grantessa sacca* LENDENFELD

Grantessa sacca, LENDENFELD, 1885, p. 1098, Figs. 41, 42; DENDY, 1891, p. 106;

DENDY and ROW, 1913, p. 753.

Hypograntia sacca, CARTER, 1886, p. 42.

There exists a single specimen of the species in the collection (Spec. No. BH₁ from Station 64). It is a solitary person of an irregularly bent tubular shape. The osculum at the upper end is surrounded by a well-developed fringe of oxea. Total length of body about 30 mm., greatest breadth about 4 mm., and the wall less than 1 mm. thick. The circular osculum measures about 3 mm. in diameter.

The canal system is of the syconoid type and the flagellate chambers, as DENDY pointed out, branch repeatedly, each branch running usually parallel with the others.

Previously known Distribution.—Port Jackson (LENDENFELD); Near Port Phillip Heads (CARTER, DENDY).

Locality and Register Nos. of Specimen.—Albany District, S. W. Australia (Station 64), BH₁.

26. *Grantessa intusarticulata* (CARTER)

Hypograntia intusarticulata, CARTER, 1886, p. 45.

Hypograntia medioarticulata, CARTER, 1886, p. 46.

Grantessa intusarticulata, DENDY, 1892, p. 108; 1893, pp. 181, 201, Pl. XIII, Fig. 18; DENDY and ROW, 1913, p. 753; HÔZAWA, 1916, p. 14, Pl. I, figs. 4,

5; Pl. II, fig. 13. Text-fig. 3; 1929, p. 318; BRØNDSTED, 1926, p. 308.

Grantia intusarticulata, BREITFUSS, 1897, p. 219.

There are three specimens of this species in the collection. They were all collected at Station 31, and are solitary tubular individuals.

The first specimen (Spec. No. AH₁) is a fragment of an oscular tube without the basal part. It measures about 8 mm. in length and

4 mm. in greatest breadth. The osculum at the terminal end is nearly circular, measuring 1.5 mm. across. It is surrounded by a feebly developed fringe of oxea.

The second specimen (Spec. No. $Z_2\alpha$) is also fragment of an oscular tube, the basal portion of which is torn off. It is 7 mm. long and 3.5 mm. broad in the broadest part. The osculum is nearly naked and circular in outline with a diameter of 1 mm.

The third specimen (Spec. No. $Z_2\beta$) represents an irregularly cylindrical person which has budded out three much smaller persons near the middle region.

The mother person measures about 17 mm. in length by 2.5 mm. broad at the widest part. The terminal osculum is circular with a diameter of about 1 mm. and is provided with a fringe of oxea about 0.5 mm. high.

The species has been fully recorded by previous authors, so that no further details are necessary to be added here.

Previously known Distribution.—Near Port Phillip Heads (CARTER, DENDY); Watson's Bay, Port Jackson (DENDY); Sagami Sea, Japan (HÔZAWA); Island Bay, Wellington, N. Z. (BRØNDSTED).

Localities and Register Nos. of Specimens.—Geraldton District, S. W. Australia (Station 31), AH₄, $Z_2\alpha$, $Z_2\beta$.

Genus HETEROPIA CARTER (emend.)

30. *Heteropia glomerosa* (BOWERBANK)

Leuconia glomerosa, BOWERBANK, 1873, p. 17, Pl. IV, Figs. 1-6.

Heteropia glomerosa, DENDY and ROW, 1913, p. 754; DENDY, 1915, p. 83, Pl. I, Figs. 3, 3 a, 3 b; Pl. II, Figs. 8 a-8 g.

Heteropia simplex, ROW, 1913, p. 754.

There exist seven specimens of this species in the collection.

This species was first described by BOWERBANK in 1873 and afterwards fully recorded by DENDY in 1915.

The specimens in the collection are of much smaller size than those described by DENDY and the mode of branching of the individual tube is more simple than in the latter. But in anatomical structure they show no difference.

Previously known Distribution.—Port Elizabeth, South Africa

(BOWERBANK); Near Okhamandal Point; S. W. Coast of Beyt Island, India (DENDY).

Localities and Register Nos. of Specimens.—Shark's Bay District, S. W. Australia: (Station 1) A₆; (Station 14), A₁₆; (Station 15), L, S₂III; (Station 16), A₈II, P; Bunbury Bay (Station 56), A₁₀.

Genus VOSMAEROPSIS DENDY

31. *Vosmaeropsis dendyi*, n. sp.

(Pl. XX, Fig. 11; Text-fig. 10)

This new species is represented in the collection by two specimens of closely similar appearance. To base further description on, I have selected one of the above specimens labelled AQ₆ α (Pl. XX, Fig. 11).

The sponge is a solitary person of an irregularly bent and slightly laterally compressed tubular shape. It measures about 10 mm. in total length and 2 mm. in greatest breadth, the wall reaching about 1 mm. in thickness. The osculum at the upper end is surrounded by a well-developed fringe of oxea about 1 mm. high. The dermal surface is fairly hispid, due to projecting oxea. The gastral surface is also more or less rough on account of the projecting apical rays of the gastral quadriradiates and is perforated by irregularly distributed circular or oval exhalant apertures, up to 0.3 mm. wide.

The colour in alcohol is greyish white and the texture is moderately firm.

Structure.—The canal system is of the leuconoid type. The chamber layer is strongly lacunar owing to the wide inhalant and exhalant canals. Between the inhalant and exhalant canal systems the flagellate chambers are fairly thickly distributed. They are ovoid or spherical with a diameter of 50-100 μ .

The dermal skeleton is composed chiefly of triradiates which are placed tangentially with the basal ray pointing downwards. In addition to these spicules there occur in the skeleton a few tangential quadriradiates and paired rays of subdermal pseudosagittal triradiates. The quadriradiates are placed tangentially with the basal ray directed downwards and the apical ray imbedded in the chamber layer. A number of large oxea and trichoxea placed perpendicularly or somewhat obliquely to the dermal surface, project to some extent beyond

the surface, their proximal parts being imbedded in the chamber layer. Microxea are thinly distributed on the dermal surface.

The skeleton of the chamber layer is composed of apical rays of dermal quadriradiates, basal rays of subdermal pseudosagittal triradiates, triradiates in two or three irregular layers and the basal rays of subgastral quadriradiates.

The gastral skeleton is made up of a thin layer containing the paired rays of subgastral quadriradiates as well as of gastral quadriradiates. The basal rays of the gastral quadriradiates point downwards in most cases, while the apical rays project into the gastral cavity.

The skeleton of the oscular margin is composed of trichoxea, triradiates and quadriradiates, all placed densely together. The trichoxea run longitudinally and parallel with one another. The tri- and quadriradiates have their basal rays directed regularly downwards.

Spicules (Text-fig. 10).—Dermal triradiates (a) slightly sagittal. All rays nearly equally thick and gradually sharp pointed. Basal ray straight, usually longer than paired rays, 160–300 μ long and 12–16 μ thick at the base. Paired rays slightly curved forwards, 140–200 μ long and 12–16 μ thick at the base.

Dermal quadriradiates (b) exactly similar to dermal triradiates, differing only in the presence of an apical ray. Apical ray nearly straight, standing at right angles with facial rays, about 120 μ long and 12 μ thick at the base.

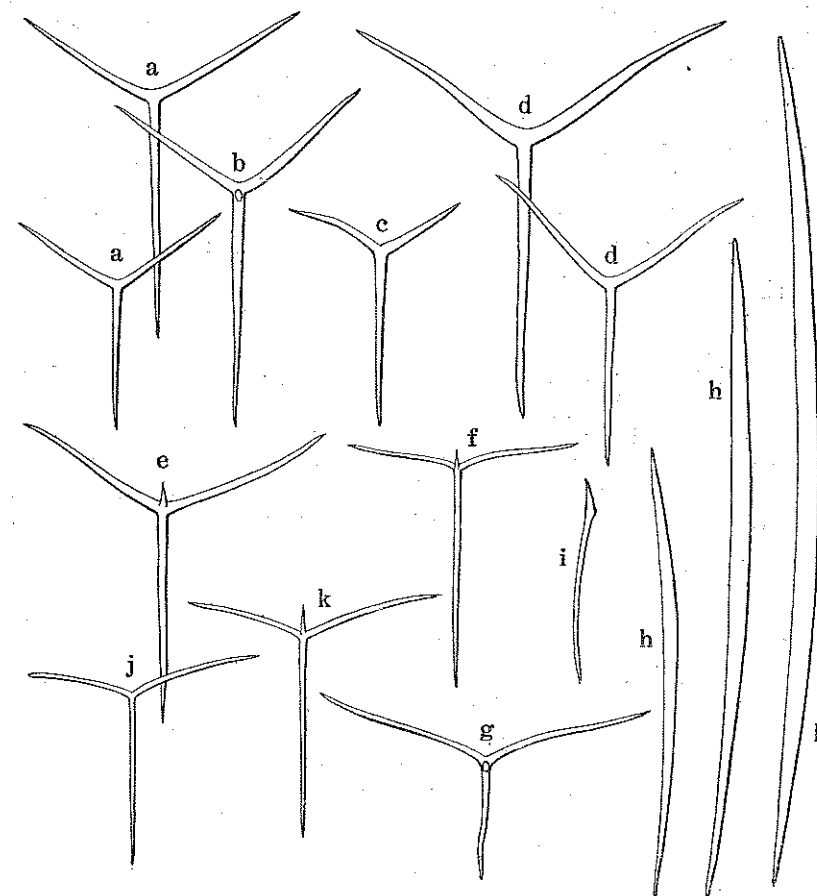
Subdermal triradiates (c) pseudosagittal. All rays nearly equally thick, gradually tapering to a sharp point. Basal ray longer than the paired rays, nearly straight, about 200 μ long and 16 μ thick at the base. The longer of the paired rays slightly bent in the middle part, 140 μ long and 16 μ thick at the base. The shorter of the paired rays nearly straight, 120 μ long and 16 μ thick at the base.

Triradiates of chamber layer (d) sagittal. All rays nearly equally thick, often irregular in outline. Basal ray straight, usually slightly longer than paired rays, 200–300 μ long and 16–24 μ thick at the base. Paired rays in most cases recurved, first forwards and then slightly backwards, 200–280 μ long and 16–24 μ thick at the base.

Quadriradiates of the larger exhalant canals (e) sagittal, nearly like the triradiates of the chamber layer, but with an apical ray. Apical ray much shorter and thinner than facial rays, slightly curved

and sharply pointed. In an example of the spicule, basal ray 260 μ long, paired rays both 200 μ long by 14 μ thick; apical ray 50 μ long and 8 μ thick.

Subgastral quadriradiates (f) sagittal, with sharply pointed facial rays of nearly equal thickness. Basal ray longer than paired rays, nearly straight, about 260 μ long and 10 μ thick at the base. Paired



Text-fig. 10. *Vosmaeropsis dendyi*, n. sp.

a, Dermal triradiates. b, Dermal quadriradiate. c, Subdermal triradiate. d, Triradiates of chamber layer. e, Quadriradiate of larger exhalant canal. f, Subgastral quadriradiate. g, Gastral quadriradiate. h, Oxea projecting from dermal surface. i, Microxea of dermal cortex. j, Triradiate of oscular margin. k, Quadriradiate of oscular margin. (a–h, j, k \times 100; i \times 300)

rays strongly diverging and usually recurved first backwards and then forwards, about $140\ \mu$ long and $10\ \mu$ thick at the base. Apical ray much shorter and slightly thinner than facial rays, measuring about $50\ \mu$ long and $6\ \mu$ thick at the base. It stands at right angles from the centre of the facial rays.

Subgastral triradiates almost similar to the quadriradiates of the same, differing only in the absence of the apical ray.

Gastral quadriradiates (g) sagittal. Basal ray usually shorter than paired rays and more or less irregularly curved, about $120\ \mu$ long and $10\ \mu$ thick at the base. Paired rays widely diverging, nearly uniformly thick and gently curved backwards in the greater part of their length and either straight or slightly curved forwards in the terminal parts, gradually tapering to sharp point, about $180\ \mu$ long and $10\ \mu$ thick at the base. Apical ray shorter than both basal and paired rays, measuring up to $100\ \mu$ in length. It is slightly curved upwards and finely pointed.

Oxea projecting from dermal surface (h) usually slightly curved, nearly uniformly thick in the greater part of their length though tapering at the ends which are fairly sharply pointed, 0.6 – 1.2 mm. long and 24 – $32\ \mu$ thick at the thickest part.

Trichoxea projecting from dermal surface straight or slightly curved, generally with the free end broken off and sharply pointed at the inner end. An example of the spicule measured $260\ \mu$ long and $3\ \mu$ thick.

Microxea of dermal cortex (i) slightly curved, tapering proximally to a sharp point, distally terminating with a lance-head which is distinguished from the body by its knob-shaped neck. An example of the spicule measured $160\ \mu$ long and $3\ \mu$ thick.

Triradiates of oscular margin (j) sagittal. Basal ray usually longer and more slender than the paired rays, sharply pointed at the end, about $140\ \mu$ long and $6\ \mu$ thick at the base. Paired rays strongly diverging, slightly and gently curved backwards, equally thick for the greater part of their length and rather bluntly pointed at the end, about $130\ \mu$ long and $8\ \mu$ thick at the base.

Quadriradiates of oscular margin (k) exactly similar to triradiates of the same, but with an apical ray which is shorter and thinner than the facial rays. In an example of the spicule, the basal ray is $260\ \mu$

long and $6\ \mu$ thick, and the paired rays $160\ \mu$ long and $8\ \mu$ thick at the base.

Trichoxea of oscular margin straight or slightly curved, uniformly thick throughout the entire length excepting the sharply pointed ends. They are variable in length and thickness. A small example of the spicule measured $500\ \mu$ long and $2\ \mu$ thick, while a large one measured over 1 mm. long by $4\ \mu$ thick.

Locality and Register Nos. of Specimens.—Fremantle District, S. W. Australia (Station 36), AQ₆^a, AQ₆^b.

Family *Grantiidae* DENDY

Genus *GRANTIA* FLEMING (emend.)

32. *Grantia genuina*, n. sp.

(Pl. XX, Fig. 12; Text-fig. 11)

Only a single specimen of this new species exists in the collection (Pl. XX, Fig. 12). It is of an elongate ovoid shape, measuring 7 mm. in length and about 2 mm. in greatest breadth. The thickness of wall measures about 1 mm. in the middle parts of the body. The outer surface of the sponge is hispid, owing to the presence of oxea projecting from it. The osculum at the upper end is circular and is provided with a fringe about 0.8 mm. high.

Structure.—The canal system is of the typical syconoid type. The flagellate chambers are cylindrical, nearly equally wide in the greater parts, unbranched or very slightly branched. They attain about 1 mm. in length and 0.15 mm. in diameter. The dermal skeleton consists of a few layers of triradiates which are tangentially, but otherwise rather irregularly, placed. Among these spicules occur quadriradiates in sparse distribution with their basal rays pointing downwards and with apical rays protruding into the sponge wall. Large oxea project perpendicularly or somewhat obliquely from the dermal surface, their proximal parts being deeply imbedded in the sponge wall.

The tubar skeleton is of the 2 or 3-jointed articulated type and is made up of triradiates. There may be added the basal rays of subgastral triradiates.

The gastral skeleton forms a thin layer consisting of the paired rays of subgastral triradiates and of quadriradiates with the basal ray

generally pointing towards the base of the sponge and the apical ray projecting into the gastral cavity in oblique inclination towards the osculum. The skeleton of oscular margin is composed of oxea and quadriradiates. The oxea are arranged longitudinally and the basal rays of the quadriradiates are directed downwards.

Spicules (Text-fig. 11).—Dermal triradiates (a) strongly sagittal. Basal ray straight, sharply pointed, distinctly shorter and a little thicker than paired rays, 30–60 μ long and 6–8 μ thick at the base. Paired rays slightly curved, standing nearly at right angles to basal ray, 120–170 μ long and 4–6 μ thick at the base.

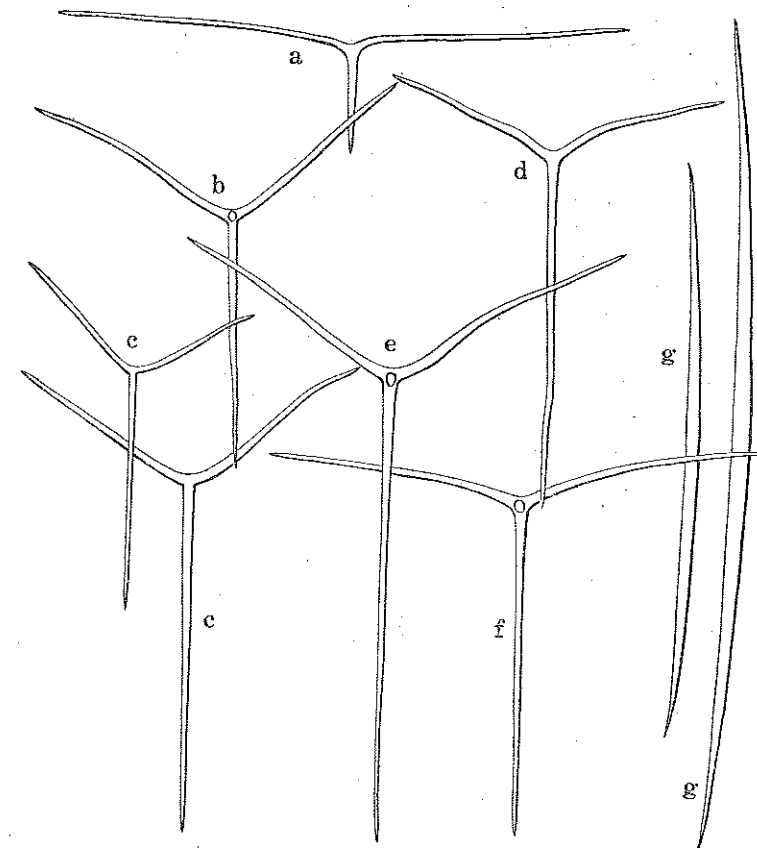
Dermal quadriradiates (b) sagittal. Basal ray straight, sharply pointed, longer than paired rays, about 170 μ long by 8 μ thick. Paired rays a little shorter than basal ray, curving first forwards and then backwards, about 130 μ long and 8 μ thick at the base. Apical ray straight in the basal parts and slightly curved in the distal parts ending in a very finely pointed end, about 120 μ long by 8 μ thick.

Tubar triradiates (c) sagittal, more or less varying in size and shape. Basal ray straight, gradually sharp-pointed, much longer and slightly thicker than paired rays, 150–200 μ long and 8–10 μ thick at the base. Paired rays slightly curved forwards in basal parts and nearly straight or weakly curved backwards in the remaining parts, 70–100 μ long and 6–8 μ thick at the base.

Subgastral triradiates (d) sagittal. Basal ray nearly straight, longer and thicker than paired rays. Paired rays very widely extended, curved at a point nearer the base than the sharply pointed end. In a typical example of the spicule the basal ray measured 200 μ by 10 μ and the paired rays about 150 μ long by 8 μ thick.

Gastral quadriradiates (e) sagittal. Rays nearly equally thick, gradually tapering to a sharp point. Basal ray straight, longer than paired rays. Paired rays slightly doubly curved, first forwards then backwards. Apical ray much shorter than facial rays, slightly curved upwards, ending in a sharp point. In a typical case the basal ray measures about 300 μ by 10 μ ; the paired rays about 150 μ by 8 μ , and the apical ray about 70 μ by 6 μ .

Quadriradiates of the oscular collar (f) very strongly sagittal. Basal ray straight, longer than paired rays, gradually and finely pointed. Paired rays very widely diverging and curved backwards, gradually



Text-fig. 11. *Grantia genuina*, n. sp.

a, Dermal triradiate. b, Dermal quadriradiate. c, Tubar triradiates. d, Subgastral triradiate. e, Gastral quadriradiate. f, Quadriradiate of oscular collar. g, Large oxea projecting from the dermal surface. (All $\times 200$)

and sharply pointed. Apical ray very short. In an example of the medium sized spicule, the basal ray measured 200 μ long by 6 μ thick and the paired rays 160 μ long by 6 μ thick.

Large oxea (g) nearly straight or slightly curved, either fusiform or nearly uniformly thick throughout the greater length and sharply pointed at both ends, about 500–900 μ long and 8–15 μ thick.

Remarks.—The present species gives the second example in the presence of apical rays in the tangential dermal radiates and thus reminds us of the starting point for the family Amphoriscidae. The

first example of this case is seen in *Grantia intermedia* THACKER¹⁾.

Locality and Register No. of Specimens.— Shark's Bay District (Station 3) AI.

Genus GRANTIOPSIS DENDY (emend.)

33. *Grantiopsis cylindrica* DENDY

Grantia (Grantiopsis) cylindrica, DENDY, 1892, pp. 90-92; 1893, pp. 173, 194, 232, figs. 11, 52-57.

Grantiopsis cylindrica, DENDY and ROW, 1913, p. 763; DENDY and FREDERICK, 1924, p. 485, Pl. 25, figs. 5, 6, 7, 8; Pl. 26, fig. 7.

This interesting species is represented by a single specimen in the collection. It is in the form of a cylindrical tube which is slightly curved and provided with a single terminal osculum of about 1 mm. diameter. The total length is about 13 mm. and the greatest breadth is about 4 mm.

Previously known Distribution.—Near Port Phillip Heads (DENDY); Abrolhos Islands, Western Australia (DENDY and FREDERICK).

Locality and Register No. of Specimen.—Geraldton District (Station 31), AH_s.

Genus SYNUTE DENDY

34. *Synute pulchella* DENDY

Synute pulchella, DENDY, 1892, pp. 1-6; DENDY, 1892, p. 96; DENDY and ROW, 1913, p. 764.

Grantia (Synute) pulchella, DENDY, 1893, pp. 176-177, 196-197, 233-234.

In this collection exist two specimens of this remarkable species. They are quite different in external appearance but are entirely the same in internal structure.

Smaller specimen is cylindrical in form and is irregularly curved. It is narrow near the attachment base and becomes broader towards the upper rounded end where the oscula are located. The oscula are six in number and are of variable sizes measuring 0.25-0.6 mm. in diameter. The specimen attains a length of about 28 mm. and a maximum diameter of about 5 mm.

¹⁾*Grantia intermedia*, THACKER, 1908, pp. 770-771.

The larger specimen is irregular fan-shaped in form being narrow at the base and broadening towards the upper end. The surface is not even, being provided with many ridges of variable breadth and height which arise at the upper end and converge towards the base. The upper end forms a meandering ridge and is provided with a number of small oscula in a rather irregular arrangement. Each of the oscula is circular with a diameter less than 1 mm. and is not surrounded by an oscular fringe but is raised on an indistinct papilla. The specimen is about 38 mm. in greatest breadth, 30 mm. in length and 3-8 mm. in thickness.

We have nothing to add to the description of this remarkable sponge which was fully given by DENDY.

Previously known Distribution.—Near Port Phillip Heads (DENDY).

Locality and Register Nos. of Specimens.—Bunbury Bay (Station 56), BA and BF.

Genus LEUCANDRA HAECKEL (emend.)

35. *Leucandra meandrina* VON LENDENFELD

Leucandra meandrina, VON LENDENFELD, 1885, pp. 1128-1129, Pl. 67, figs. 43, 44; DENDY and ROW, 1913, p. 771.

The collection contains a single specimen of this species. The sponge is in the form of a rather thick-walled and slightly curved cylindrical tube about 40 mm. long, broadest in the middle parts and becoming narrower towards the base and the upper end. Maximum breadth of body is about 15 mm.

The terminal osculum is 3 mm. in maximum diameter and is surrounded by a feebly developed fringe. The sponge wall is about 3 mm. thick at the broadest part of the body.

Previously known Distribution.—East coast of Australia, Port Jackson (VON LENDENFELD).

Locality and Register No. of Specimen.—Fremantle District (Station 37), AR.

36. *Leucandra minima*, n. sp.

(Pl. XXI, Fig. 13; Text-fig. 12)

This new species is found on the strength of a single specimen in

the collection (Pl. XXI, Fig. 13). The sponge is in the form of a rather short cylindrical tube, broadest at about the middle and gradually narrowed towards the attachment base and upper osculum. The total length of body is about 8 mm. and the greatest breadth is about 3 mm. The osculum measures less than 1 mm. in diameter and is not surrounded by a conspicuous fringe. The wall of the tube is about 1 mm. in thickness. The gastral cavity is of a habitus corresponding to that of the entire specimen and is comparatively narrow, measuring about 1 mm. in greatest diameter. The dermal surface is slightly hispid, due to the projecting oxea. The gastral surface appears more or less rough from the apical rays of the gastral quadriradiates.

Structure.—The canal system is of the leuconoid type. The flagellate chambers are of a sac-like shape, circular or oval in cross-section with a diameter of 50–100 μ . The apertures by which the exhalant canals open into the gastral cavity measure up to 150 μ across.

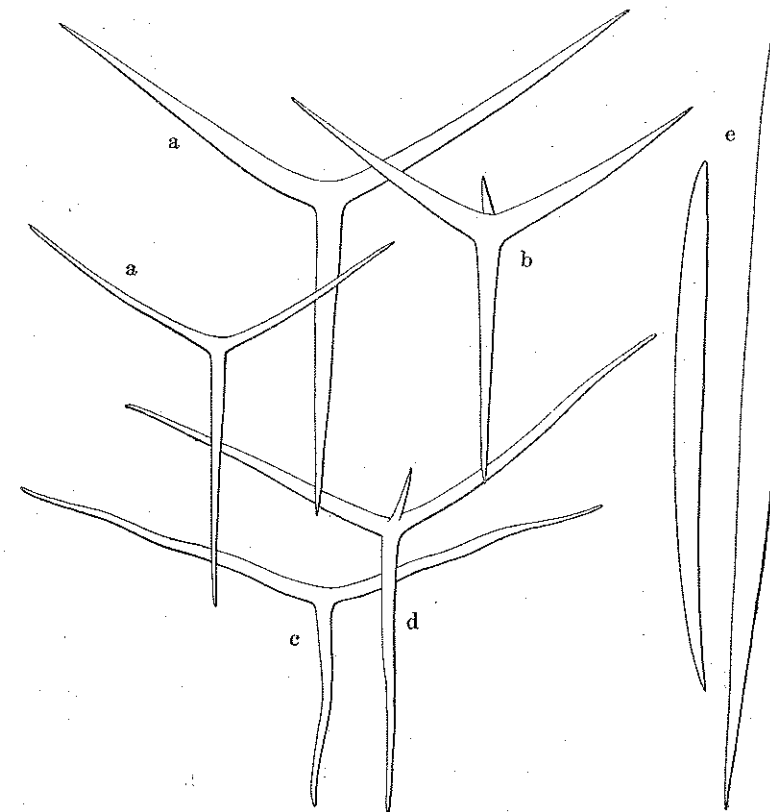
The dermal skeleton is composed of triradiates, trichoxea and large oxea. The triradiates are placed tangentially in a few layers, with their basal rays pointing more or less downwards. The trichoxea are rather scarce and lie at varying angles to the dermal surface. They have the tendency to be grouped into small tufts. The long oxea, which occur here and there in nearly vertical disposition in the sponge wall, project outwards on the dermal side to some extent.

The tubar skeleton is made up of triradiates and quadriradiates of various sizes. They are irregularly scattered through the chamber layer.

The gastral skeleton is thin, consisting of triradiates and quadriradiates both fairly closely set and disposed parallel to the gastral surface in a few layers but without definite orientation.

Spicules (Text-fig. 12).—Dermal triradiates (a) slightly sagittal with rays of nearly equal length and thickness and tapering from base to sharp point. Basal ray straight, measuring 220–280 μ in length and 14–28 μ in thickness at the base. Paired rays either gently curved forwards or irregularly curved, 170–300 μ long and 14–28 μ thick at the base.

Triradiates of the chamber layer are almost like the dermal triradiates.



Text-fig. 12. *Leucandra minima*, n. sp.

a, Dermal triradiates. b, Quadriradiate of the chamber layer. c, Gastral triradiate. d, Gastral quadriradiate. e, Dermal oxea. (All $\times 150$)

Quadriradiates of chamber layer (b) similar to the triradiates of the same, except in the presence of an apical ray. Apical ray much shorter and slightly thinner than the facial rays, slightly curved and gradually tapering to a sharp point, 60–100 μ long and 14–20 μ thick at the base.

Gastral triradiates (c) sagittal, rather slender-rayed. All rays are nearly equally thick and are more or less irregular in outline. Basal ray irregularly curved and is in most cases shorter than paired rays, about 200 μ long and 8 μ thick at the base. Paired rays widely diverging and slightly curved forwards at the base, about 280 μ long

and $8\ \mu$ thick at the base.

Gastral quadriradiates (d) almost like gastral triradiates with the addition of an apical ray. Apical ray much shorter and thinner than the facial rays, slightly curved and ending sharply, $100\text{--}200\ \mu$ long and $10\text{--}16\ \mu$ thick at the base.

Dermal oxea (e) cylindrical, usually slightly curved, rather irregular in outline, sharply pointed at the outer end and more acutely pointed at the inner, $450\text{--}700\ \mu$ long and $20\text{--}40\ \mu$ thick in the middle.

Dermal trichoxea hair-like, straight, generally with the free end broken away, $2\text{--}3\ \mu$ thick.

Locality and Register No. of Specimen.—Shark's Bay District (Station 16), A.S.I.

37. *Leucandra pallida*, n. sp.

(Pl. XXI, Fig. 14; Text-fig. 13)

A single specimen (Pl. XXI, Fig. 14) in the collection has served as the type of this new species.

The sponge is a solitary person of oval shape, being broad at the base and superiorly narrowed. Total length of body about 10 mm., greatest breadth about 7 mm., wall about 2 mm. thick in the thickest part. The osculum at the upper end is about 1.5 mm. in major diameter and is provided with a fringe of oxea about 1 mm. high. The dermal surface is slightly hispid due to the projecting oxea. The gastral surface is also more or less rough on account of the projecting apical rays of the gastral quadriradiates and of the projecting tufts of microxea.

The colour in alcohol is greyish white; the texture is delicate.

Structure.—The canal system is of the leuconoid type. The dermal skeleton is composed of the following elements: 1) triradiates which are tangentially arranged in a few layers with their basal rays mostly pointing downwards, 2) quadriradiates which are found among the triradiates above mentioned with their apical rays protruding into the chamber layer to some extent. 3) large oxea which occur in the sponge-wall projecting outwards on the dermal side, 4) microxea in sparse distribution standing nearly vertically to the dermal surface.

The skeleton of the chamber layer consists chiefly of triradiates of

variable sizes and of an irregular arrangement. Along the larger exhalant canals there occur some quadriradiates with their apical rays projecting into the canal.

The gastral skeleton is fairly well distinguishable from that of the chamber layer. It is composed of a thin layer of tangential quadriradiates with an apical ray projecting into the gastral cavity and of microxea which are grouped into tufts and occur here and there all over the gastral surface.

The skeleton of the oscular margin is a close interlacement of triradiates, quadriradiates and trichoxea. The tri- and quadriradiates have very strongly divergent paired rays and a downwardly directed basal ray. The oxea are arranged longitudinally.

Spicules (Text-fig. 13).—Dermal triradiates (a) slightly sagittal, with rays of nearly equal length and thickness. Basal ray straight and paired rays slightly curved forwards near the base. In an example of the spicule, the basal ray measures $200\ \mu$ by $20\ \mu$ and the paired rays measure $230\ \mu$ by $20\ \mu$.

Dermal quadriradiates (b) exactly similar to the triradiates above mentioned, differing only in the presence of an apical ray. Apical ray straight, gradually and sharply pointed, standing vertically at the centre of the facial rays, about $250\ \mu$ long and about $20\ \mu$ thick at the base.

Triradiates of chamber layer (c) subregular or slightly sagittal, slightly irregular in outline. All rays are of subequal thickness. In a large example of the spicule, the rays measured $350\ \mu$ long and $30\ \mu$ thick.

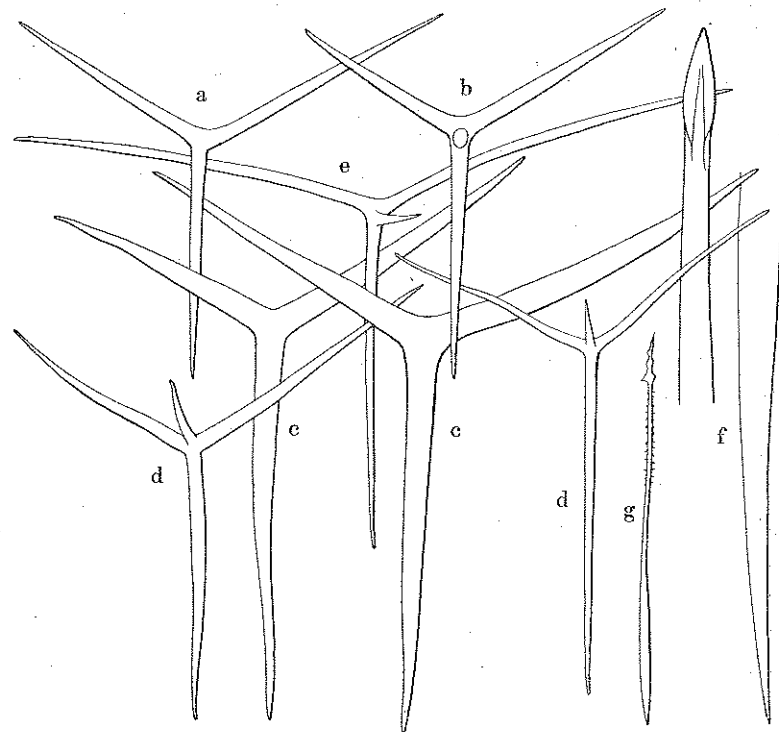
Quadriradiates of the exhalant canals (d) sagittal. Basal ray straight, longer than paired rays. Paired rays curved around the exhalant canal. Apical ray much shorter than facial rays, very slender, slightly curved. The dimensions vary fairly considerably. In a typical case the basal ray measures $300\ \mu$ by $16\ \mu$; the paired rays about $200\ \mu$ by $16\ \mu$, and the apical ray about $150\ \mu$ by $10\ \mu$.

Gastral quadriradiates (e) strongly sagittal. Paired rays widely divergent, gently curved backwards, about $320\ \mu$ by $14\ \mu$; basal ray straight, about as thick as, and usually somewhat shorter than, the paired rays, about $220\ \mu$ by $14\ \mu$; apical ray thorn-like, usually slightly curved, finely pointed, much shorter than the facial rays, about

20 μ long.

Oxea (f) very large, cylindrical, usually gently curved, provided with a lance-head at the outer end and simply sharply pointed at the inner; they vary in size and measure up to about 2.75 mm. by 40 μ thick.

Microxea of the dermal and gastral cortices (g) are either straight or slightly curved. They are thicker at the point nearer the inner end than at the outer and taper towards both ends. The inner end is solely sharply pointed while the outer is provided with a pointed lance-head. The distal half of the spicule is beset with fine spines on its side and they are directed inwards. An example of the spicule measures about 150 μ in length and 4 μ in thickness at the



Text-fig. 13. *Leucandra pallida*, n. sp.

a, Dermal triradiate. b, Dermal quadriradiate. c, Triradiates of chamber layer. d, Quadriradiates of the larger exhalant canals. e, Gasteral quadriradiate. f, Large oxea. g, Microxea. (a-f $\times 150$; g $\times 300$)

thickest part.

Locality and Register No. of Specimen.— Shark's Bay District (Station ?), B.

38. *Leucandra phillipensis* DENDY

Leucandra phillipensis, DENDY, 1892, p. 100.

The collection contains four specimens (Q, S₁, S₂IV, T) of this species. The largest specimen (Spec. No. Q) which was obtained at Station 19 in Shark's Bay is flask-like in form, being broad in the basal half and becoming narrower rather suddenly in the distal half and terminating in an open osculum. It measures about 70 mm. in total length and about 25 mm. in greatest breadth. The outer surface is uneven and is moreover thickly coated with projecting oxea. The osculum is almost circular surrounded by a thin oscular margin. The sponge-wall is about 7 mm. thick in the basal parts of the body and becomes gradually thinner towards the osculum. The colour in alcohol is greyish white and the texture is moderately firm and elastic. The remaining three specimens are much smaller and are less conspicuous in hispidity than the first specimen.

Previously known Distribution.— Near Port Phillip Heads (DENDY).

Localities and Register Nos. of Specimens.— Shark's Bay District (Station 19), Q; (Station 15), S₁, S₂IV; (Station 21), T.

39. *Leucandra thulakomorpha*, n. sp.

(Pl. XXI, Fig. 15; Text-fig. 14)

This new species is represented by an unique specimen in the collection (Spec. BH from Station 64).

It (Pl. XXI, Fig. 15) is tube-like but is strongly deformed presenting a peculiar appearance. It is split along one of its sides and hence most of the gastral surface is observable from the outside through the fissure. It is obvious that the said deformation is produced by some accidental injury and may not be considered as natural.

The total length of the sponge including the oscular fringe is about 70 mm. and the greatest breadth is about 35 mm. The thickness of the wall is about 8 mm. measured at the thickest part but it becomes

gradually thinner towards the osculum and both edges along which the sponge is split.

The oscular fringe is well-developed and measures about 8 mm. high.

The outer surface of the sponge is strongly hispid, owing to the presence of large oxea projecting from it. The gastral surface is perforated by numerous round apertures of varying sizes. They are rather thickly placed and measure up to 3 mm. in diameter.

The colour in alcohol is grey; the texture is rather soft.

Structure.—The canal system is of the leuconoid type. The chamber layer is strongly lacunar being traversed by thick inhalant and exhalant canals. The flagellate chambers are spherical or oval in shape with a diameter of 70–120 μ .

The dermal skeleton is made up of tangential triradiates and quadriradiates arranged in a few layers. The apical rays of the latter kind of spicule penetrate to some extent into the chamber layer. The large oxea and the hair-like oxea which occur very thickly and in nearly vertical disposition in the sponge wall project out on the dermal surface. The skeleton of the chamber layer consists chiefly of triradiates with an admixture of a few quadriradiates which are chiefly arranged along the wall of the larger exhalant canals. Some of the triradiates of the chamber layer take the subdermal position. The gastral skeleton is rather thin, being composed of quadriradiates in a few layers. The apical rays of these spicules project either into the large exhalant canals or into the gastral cavity. The skeleton of the oscular fringe is a close interlacement of triradiates and quadriradiates, both of which have strongly divergent paired rays and a downwardly directed basal ray. There may be found in addition some large oxea and hair-like oxea placed longitudinally.

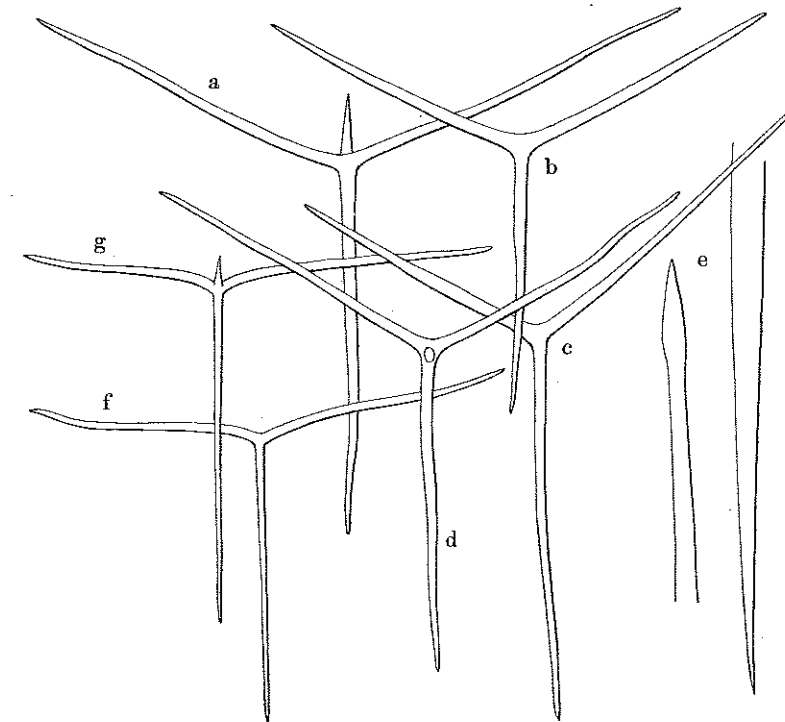
Spicules (Text-fig. 14).—Dermal quadriradiates (a). Facial rays more or less sagittal, rather slender and fairly sharply pointed, measuring about 300 μ by 16 μ . Apical ray directed centripetally, protruding into the chamber layer to some extent, and shorter than the facial rays measuring up to about 250 μ .

Dermal triradiates (b) nearly the same as the dermal quadriradiates except for the absence of an apical ray.

Triradiates of the chamber layer (c) more or less sagittal, rays rather slender, equally thick and not strongly differentiated in length. Basal ray nearly straight and the paired rays slightly curved forwards. Size variable, rays measuring about 330 μ by 16 μ .

Gastral quadriradiates (d) more or less sagittal. Facial rays rather slender, nearly equally thick. Basal ray nearly straight and the paired rays slightly curved forwards. Facial rays measuring about 350 μ by 16 μ . Apical ray rather strongly developed, curved and gradually sharp-pointed, nearly straight in basal portion and slightly curved in the apical, sometimes as long or longer than the facial rays, attaining the length of 400 μ .

Large oxea projecting from dermal surface (e) straight or slightly



Text-fig. 14. *Leucandra thalakomorpha*, n. sp.

a, Dermal quadriradiate. b, Dermal triradiate. c, Triradiate of chamber layer. d, Gastral quadriradiate. e, Large oxea projecting from dermal surface. f, Triradiate of the oscular margin. g, Quadriradiate of the same. (All $\times 150$).

curved, and nearly uniformly thick in the greater part of their length, tapering at the ends. The outer end is provided with a feebly developed lance-head while the inner is solely sharply pointed, 3-9 mm. long and 30-40 μ thick at the thickest part.

Hair-like oxea nearly straight and uniformly thick with both ends sharply pointed. The free end is usually found broken off. A medium sized example of the spicule measured 2.4 mm. long and 5 μ thick.

Triradiates of the oscular margin (f) strongly sagittal. Basal ray straight, finely pointed, slightly longer and thinner than paired rays. Paired rays strongly diverging, nearly uniformly thick except for the sharply pointed end, slightly curved backwards in basal parts and slightly curved forwards in the remaining parts. In a typical example of the spicules the basal ray measured about 450 μ by 12 μ and the paired rays about 360 μ by 12 μ .

Quadriradiates of the oscular margin (g) exactly similar to the triradiates of the same except for the presence of an apical ray. Apical ray short, much shorter than the facial rays, usually slightly curved and gradually sharp-pointed.

Locality and Register No. of Specimen. — Albany District (Station 64), BH₂.

Remarks. — Of this new species, the presence of dermal quadriradiates with apical rays protruding though not very deeply into chamber layer remind us that it has a close affinity to some members of the genus *Leucilla* of the family Amphoriscidae.

Family Amphoriscidae DENDY (emend.)

Genus LEUCILLA HAECKEL (emend.)

40. *Leucilla australiensis* (CARTER)

Leuconia johnstonii var. *australiensis*, CARTER, 1886, p. 133.

Leucilla australiensis, DENDY, 1892, p. 115; DENDY and ROW, 1913, p. 783.

We have identified with this species two specimens in the collection.

The first specimen (AW₁^a) represents a small solitary person of oval form, showing at the upper end a circular osculum which is naked. It is nearly 4 mm. broad and 3 mm. high. The osculum measures 0.6 mm. in diameter. The sponge-wall is comparatively thick, measuring about 1 mm.

The second specimen (AW₁ ^{β}) is of nearly equal appearance with the first, but is more or less thinner, measuring 4 mm. in breadth and 1.5 mm. in height. It is also provided with an oval osculum which is 0.6 mm. in the greater diameter.

Previously known Distribution. — Near Port Phillip Heads (CARTER and DENDY).

Locality and Register Nos. of Specimens. — Albany District (Station 63), AW₁^a, AW₁ ^{β} .

41. *Leucilla lanceolata*, n. sp.

(Pl. XXI, Fig. 16; Text-fig. 15)

A single specimen of this new species exists in the collection (Spec. BQ from Station 64).

It (Pl. XXI, Fig. 16) is a solitary person of an elongate oval shape, showing a convex curvature on one side. It is about 15 mm. in length and about 7 mm. in greatest breadth.

The outer surface is strongly hispid owing to the presence of large oxea projecting from it. The osculum at the upper end is oval with a greater diameter of 2 mm. and is surrounded by a rather well-developed collar of about 1.5 mm high. The sponge-wall is thickest in the basal parts (about 1 mm. thick) but becomes gradually thinner towards the oscular margin. The gastral surface is perforated by numerous circular or oval apertures of exhalant canals of up to 300 μ diameter. It is also rough from the projecting apical rays of the gastral quadriradiates.

The colour in alcohol is greyish white and the texture is moderately elastic.

Structure. — The canal system is of the leuconoid type. Both the inhalant and exhalant canals are very wide running deep into the wall. The flagellate chambers are densely and irregularly arranged between inhalant and exhalant canals. They are either spherical or ovoid, measuring 50-160 μ across. Diaphragm is present at each apophyle.

The skeleton of the dermal cortex consists mainly of the facial rays of subdermal quadriradiates. The large oxea which occur fairly thickly in the sponge-wall project out on the dermal surface. The trichoxea also project from the dermal surface, their proximal parts

being imbedded in the chamber layer.

The skeleton of the chamber layer is made up of the apical rays of subdermal quadriradiates, triradiates arranged in several confused layers with their basal rays in most cases pointing centrifugally and the basal rays of subgastral triradiates. Along the larger exhalant canals there occur some quadriradiates with apical ray projecting into the canal.

The skeleton of the gastral cortex is composed of tangentially placed quadriradiates and of the paired rays of subgastral triradiates.

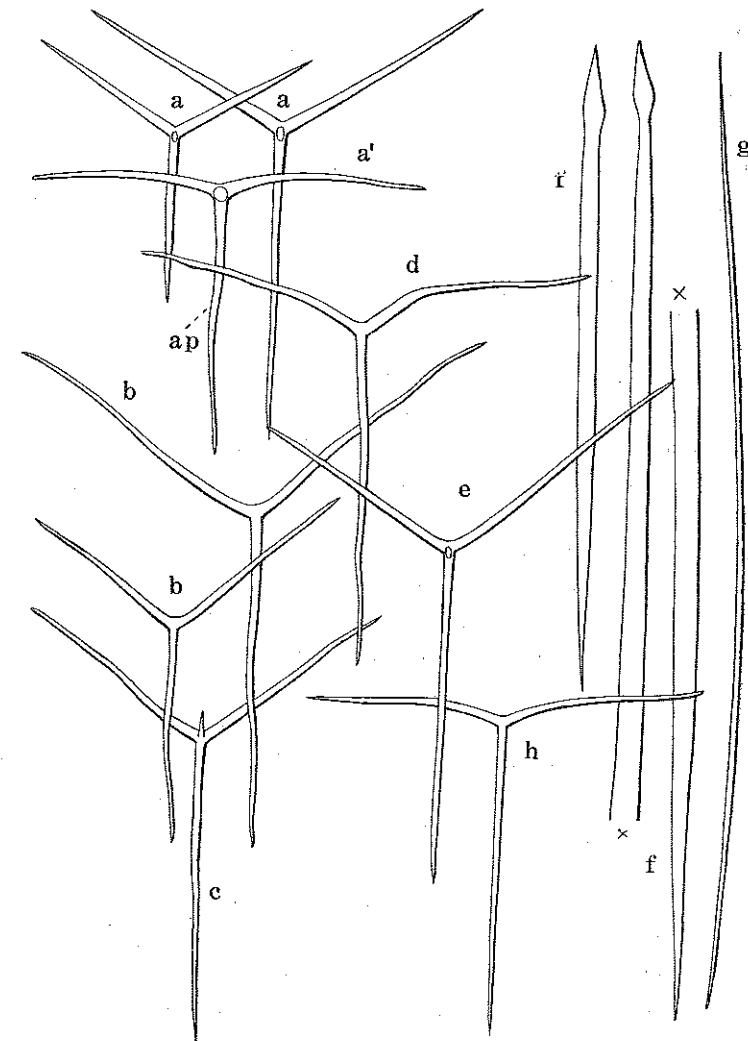
The skeleton of the oscular margin is a close interlacement of triradiates and quadriradiates, both of which have strongly divergent paired rays and a downwardly directed basal ray. There may be found in addition some large oxea disposed parallel to the long axis of the sponge.

Spicules (Text-fig. 15).—Subdermal quadriradiates (a) slightly sagittal in most cases. Basal ray generally longer than the paired rays, nearly straight, gradually and sharply pointed, 260–340 μ long and 14–16 μ thick at the base. Paired rays nearly as thick as basal ray, almost straight except for the slight curvature at the base, gradually and sharply pointed, 200–300 μ long and 14–16 μ thick at the base. Apical ray nearly as long as paired rays, straight or slightly curved, sharply pointed at the end, 200–340 μ long and 14–16 μ thick at the base.

Triradiates of chamber layer (b) slightly sagittal. Rays rather slender and more or less irregular in outline. Basal ray longer than paired rays, usually straight but sometimes more or less crooked, 300–440 μ long and 10–14 μ thick at the base. Paired rays nearly as thick as the basal ray, slightly doubly curved, forwards in basal parts and backwards in the remaining parts, 240–360 μ long and 10–14 μ thick at the base.

Quadriradiates of the larger exhalant canals (c) exactly similar to the triradiates of the chamber layer except in the presence of an apical ray. Apical ray much shorter and slightly thinner than the facial rays, slightly curved and gradually and sharply pointed, 60 μ long and about 8 μ thick at the base.

Subgastral triradiates (d) sagittal, nearly similar to the triradiates of the chamber layer but with oral angles much wider. Basal ray



Text-fig. 15. *Leucilla lanceolata*, n. sp.

a, Subdermal quadriradiates. a', The same showing the apical ray (ap). b, Triradiates of chamber layer. c, Quadriradiate of the larger exhalant canal. d, Subgastral triradiate. e, Gastral quadriradiate. f, Large oxea projecting from dermal surface. g, Trichoxea projecting from dermal surface. h, Triradiate of oscular margin. (All $\times 110$)

slightly longer than paired rays, straight or slightly crooked, finely pointed at the end, about 440 μ long and 14 μ thick at the base.

Paired rays as thick as basal ray, strongly diverging, more or less angularly curved at a point a short distance from the base, about $300\ \mu$ long and about $14\ \mu$ thick at the base.

Gastral quadriradiates (e) slender rayed, slightly sagittal. Facial rays not strongly differentiated in length and of nearly equal thickness. Basal ray nearly straight, finely pointed, about $400\ \mu$ long and $12\ \mu$ thick at the base. Paired rays subequal in length, usually doubly curved, first forwards and then backwards, sharply pointed at end, about $340\ \mu$ long and $12\ \mu$ thick at the base. Apical ray nearly as thick as the facial rays but slightly shorter. It is slightly curved and sharply pointed, $200\text{--}300\ \mu$ long and about $12\ \mu$ thick at the base.

Large oxea projecting from dermal surface (f) straight or slightly curved, nearly uniformly thick throughout their greater length, provided with a lance-head at the distal end and solely sharply pointed at the proximal end. A small example of the spicule measured 1 mm. long and $20\ \mu$ thick; a large one 3.5 mm. long by $40\ \mu$ thick.

Trichoxea projecting from dermal surface (g) straight or slightly curved, and nearly uniformly thick in the greater part of their length, though tapering at the ends which are finely pointed. A large example of the spicule measured 1 mm. long and $4\ \mu$ thick.

Triradiates of oscular margin (h) sagittal. Basal ray usually longer and thinner than paired rays, straight, very finely pointed at the end. Paired rays strongly diverging, nearly uniformly thick for their greater length and sharply pointed at the end. They are slightly and gently curved backwards in their basal parts and either straight or slightly curved forwards in the remaining parts. In an example of the spicule, the basal ray measured $400\ \mu$ long and $10\ \mu$ thick at the base, and the paired rays $240\ \mu$ long and $12\ \mu$ thick.

Quadriradiates of the oscular margin are like the triradiates of the same, except in the presence of an apical ray. Apical ray much shorter than the facial rays, never attaining so great a length as in the gastral quadriradiates.

Large oxea of the oscular margin exactly the same as those projecting from the dermal surface.

Locality and Register No. of Specimen.—Albany District (Station 64), BQ.

42. *Leucilla princeps*, n. sp.

(Pl. XXI, Fig. 17; Text-fig. 16)

This new species is based on five specimens in the collection.

The first specimen (AQ₂ α from Station 36) which is herewith made the type of the species, is a single person of a somewhat curved elongate cylindrical form, broadest at a part a little below the middle. The total length is about 40 mm. and the greatest breadth is about 5 mm. Thickness of the wall, as measured in the broadest part is about 1.5 mm. It becomes thinner towards the osculum. The osculum at the upper end is circular, with a diameter of about 2 mm. It is surrounded by a thin oscular margin but is deprived of a well-defined fringe of oxea. The dermal surface is more or less hispid due to the projecting oxea. The gastral cavity is deep and extends throughout the entire length of the sponge. The gastral surface is rough from the projecting apical rays of the gastral quadriradiates.

The colour in alcohol is greyish white and the texture is fairly firm.

The second specimen (AQ₄ α from Station 36; Pl. III, Fig. 17) is much smaller than the type-specimen, measuring about 22 mm. in length and 4 mm. in greatest breadth. The osculum is oval with the greater diameter of 1.5 mm. and is provided with a well-developed fringe of oxea of about 2 mm. high.

Structure.—The canal system is of the leuconoid type. The chamber layer is strongly lacunar, being traversed by well-developed inhalant and exhalant canals. Between these canals are thickly packed together ovoid spherical flagellate chambers of $50\text{--}140\ \mu$ diameter.

The dermal skeleton is composed of triradiates, the facial rays of subdermal quadriradiates, large oxea and trichoxea. The triradiates lie tangentially in a very thin layer in a rather confused arrangement. The facial rays of the subdermal quadriradiates are tangentially placed without any definite orientation. The large oxea which occur here and there in the sponge-wall project out on the dermal surface at varying angles. Those spicules found near the osculum run almost parallel to the long axis of the sponge. The trichoxea which are rather sparsely distributed project nearly vertically from the dermal surface.

The skeleton of the chamber layer is made up of the apical rays of subdermal quadriradiates as well as of quadriradiates in a few irregular layers. The basal rays of the latter point centrifugally and the apical rays project into the exhalant canal. The basal rays of subgastral quadriradiates may be added to the skeleton.

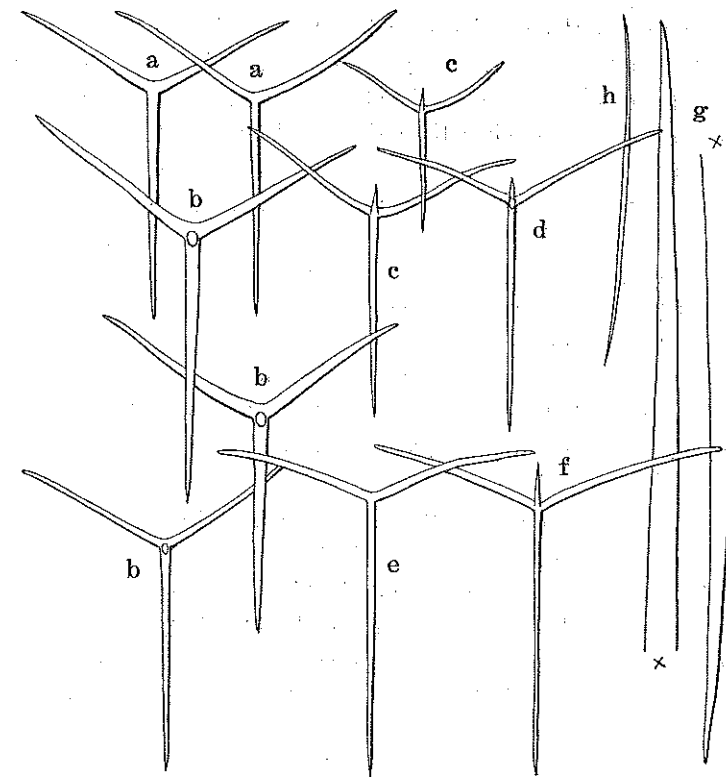
The skeleton of the gastral cortex forms a thin layer consisting of gastral quadriradiates with apical rays projecting into the gastral cavity. In addition to the quadriradiates there occur in the layer the facial rays of subgastral quadriradiates.

The skeleton of the oscular margin is an interlacement of trichoxea, triradiates and quadriradiates. The trichoxea are arranged longitudinally; the basal rays of the tri- and quadriradiates are directed regularly downwards.

Spicules (Text-fig. 16).—Dermal triradiates (a) slightly sagittal with basal ray a little longer than the paired rays. All rays are of equal thickness. Paired rays slightly curved forwards, often somewhat crooked, sharply pointed, about $200\ \mu$ long and $12\text{--}16\ \mu$ thick at the base. Basal ray straight, gradually and sharply pointed, about $240\ \mu$ long and $12\text{--}16\ \mu$ thick at the base. These spicules become much more sagittal towards the oscular margin.

Subdermal quadriradiates (b) almost like the dermal triradiates with the addition of an apical ray, but on the whole stouter. Basal ray slightly longer than paired rays, straight, gradually tapering, sharply pointed, about $260\ \mu$ long and $12\text{--}20\ \mu$ thick at the base. Paired rays slightly curved forwards, gradually and sharply pointed, about $180\ \mu$ long and $10\text{--}20\ \mu$ thick at the base. Apical ray not strongly differentiated in length from the facial rays, nearly straight, often somewhat crooked, gradually and sharply pointed, $180\text{--}280\ \mu$ long and $12\text{--}20\ \mu$ thick at the base.

Quadriradiates of chamber layer (c) slender. Facial rays sagittal in most cases. Basal ray longer than paired rays, nearly straight, often more or less crooked, gradually sharp-pointed, $200\text{--}260\ \mu$ long and $12\text{--}18\ \mu$ thick at the base. Paired rays nearly equally as thick as the basal ray, usually curving first forwards and then slightly backwards, $120\text{--}200\ \mu$ long and $12\text{--}18\ \mu$ thick at the base. Apical ray much shorter than the paired rays, straight or slightly curved, sharply pointed, $40\text{--}60\ \mu$ long.



Text-fig. 16. *Leucilla princeps*, n. sp.

a, Dermal triradiates. b, Subdermal quadriradiates. c, Quadriradiates of chamber layer. d, Gastral quadriradiate. e, Triradiate of oscular margin. f, Quadriradiate of the same. g, Large oxea projecting from dermal surface. h, Trichoxea projecting from dermal surface. (All $\times 110$).

Subgastral quadriradiates nearly similar to the quadriradiates in the chamber layer, differing only in having a wider oral angle.

Gastral quadriradiates (d) slender-rayed. Facial rays slightly sagittal in most cases, the basal ray being longer than paired rays. Basal ray straight, fairly sharply pointed, $140\text{--}230\ \mu$ long and $10\text{--}12\ \mu$ thick at the base. Paired rays widely diverging, gently curved backwards, $100\text{--}200\ \mu$ long and $10\text{--}12\ \mu$ thick at the base. Apical ray generally longer than both the basal and paired rays, slightly curved, nearly uniformly thick through its greater length and sharply pointed at the end, $180\text{--}450\ \mu$ long and $8\text{--}12\ \mu$ thick at the base.

Triradiates of the oscular margin (e) sagittal. Basal ray straight, nearly uniformly thick for its greater length, sharply pointed, about $360\ \mu$ long and about $10\ \mu$ thick at the base. Paired rays usually slightly shorter and thicker than the basal ray, slightly curved backwards, strongly diverging, nearly uniformly thick for the greater of their length and sharply pointed at the end, about $200\ \mu$ long and $12\ \mu$ thick at the base.

Quadriradiates of oscular margin (f) exactly similar to the triradiates of the same but with a short apical ray about $50\ \mu$ long and $6\ \mu$ thick at the base.

Large oxea projecting from the dermal surface (g) elongate spindle-shaped, usually slightly curved, sharply pointed at both ends. A medium-sized example of the spicule measured 1.8 mm. long and $40\ \mu$ thick.

Trichoxea projecting from the dermal surface (h) straight or slightly curved, $300\text{--}600\ \mu$ long and $2\text{--}4\ \mu$ thick.

Trichoxea of oscular margin nearly like those projecting from the dermal surface. The free end is found broken in the type-specimen.

Locality and Register Nos. of Specimens.—Fremantle District (Station 36), AQ_2^a , AQ_4^a , AQ_4^b , AQ_4^c ; (Station 37), AS_1 .

43. *Leucilla oblata*, n. sp.

(Pl. XXI, Fig. 18; Text-fig. 17)

This new species is based on five specimens in the collection.

The first specimen (Spec. N_2 from Station 15), which we make the type of the species, forms an irregularly shaped mass of branching and anastomosing tubes with a height of 35 mm., breadth of 55 mm. and thickness of about 35 mm. Some of these tubes are blind while the others are provided with an osculum at their free end. One of the medium-sized tubes measured about 6 mm. in diameter and about 1.5 mm. in the thickness of the wall. The osculum is naked and circular or elliptical in outline. It is surrounded by a very thin wall. The dermal surface of the sponge is smooth; the gastral surface is perforated by numerous exhalant apertures which are irregularly distributed and are of varying sizes, measuring 0.3–0.8 mm. across.

The colour in alcohol is white with a somewhat greyish tint. The texture is rather compact and pretty hard.

The second specimen (Spec. N_1 from Station 15) consists of a main tube and several smaller secondary tubes which budded out from the first. The main tube is irregularly curved and slightly laterally compressed. It measures about 45 mm. long by 8 mm. broad at the middle part where the wall is about 1.5 mm. thick. The terminal osculum is irregular in outline measuring about 2.5 mm. across. The secondary tubes are partly blind and partly provided with an osculum at the free end. They measure from 4 to 9 mm. in length and from 2 to 5 mm. in breadth.

The remaining three specimens (Spec. Nos. B_3 , S_2II , U) are nearly the same in external features, each of them being a solitary person of more or less curved and laterally compressed tubular shape. The osculum exists at the upper end of the tube. They are much smaller than the specimens above mentioned and are under 10 mm. in length. The following descriptions refer to the type-specimen.

Structure.—The canal system is of the leuconoid type. Both the inhalant and exhalant canals are very wide and extend through the greater part of the wall thickness. The flagellate chambers vary in shape and size, from those of spherical shape measuring about $100\ \mu$ in diameter to others of elongate sac-like configuration, say, $200\ \mu$ by $100\ \mu$ in dimension. They are rather loosely set in the chamber layer between the inhalant and exhalant canals.

The dermal skeleton consists of triradiates, facial rays of subdermal quadriradiates and hair-like oxea. The triradiates lie parallel to the dermal surface and are arranged in a few layers without any definite orientation. The facial rays of the subdermal quadriradiates also lie parallel to the dermal surface but in rather confused orientation. A few hair-like oxea lie in the dermal cortex at nearly a vertical angle to the external surface, beyond which their outer portions freely project to a certain extent.

The skeleton of the chamber layer is formed by the centripetal apical rays of subdermal quadriradiates and of the centrifugal basal rays of subgastral triradiates to which there may be added a small number of the centrifugal basal rays of subgastral quadriradiates.

The gastral skeleton is made up chiefly of the paired rays of subgastral triradiates and the gastral quadriradiates, to which a small number of the facial rays of subgastral quadriradiates may be added.

The gastral quadriradiates are tangentially placed without definite orientation and are arranged in a few layers. The short apical rays project into the gastral cavity.

The oscular margin is composed of very closely set triradiates, which have very strongly divergent paired rays. There may be added some number of hair-like oxea running longitudinally and parallel with one another.

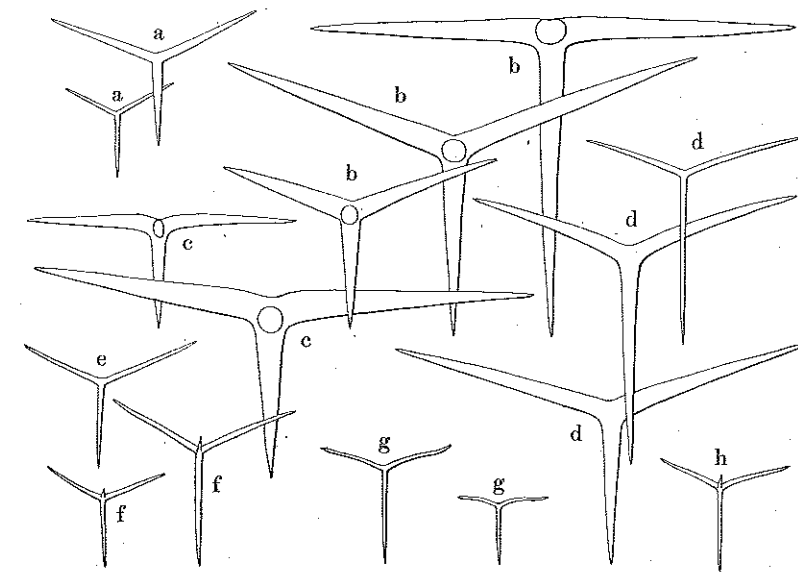
Spicules (Text-fig. 17). — Dermal triradiates (a) generally slightly sagittal, the oral angle being greater than in the paired ones. All rays are of equal thickness. The basal ray is, as usual, slightly shorter than the paired rays, quite straight, gradually and sharply pointed, 160–200 μ long and 10–18 μ thick at the base. The paired rays are nearly equal, 200–300 μ long and 10–18 μ thick at the base.

Subdermal quadriradiates (b) large and very stout, with gradually and sharply pointed straight rays of nearly equal thickness. The oral angle is greater than in the paired angles. The basal ray is shorter than the paired rays, being 300–500 μ long and 40–60 μ thick at the base. Paired rays generally equally long but sometimes slightly differentiated in length, 480–700 μ long and 40–60 μ thick at the base. Apical ray usually longer than either of the basal or paired rays, 600–800 μ long and 40–60 μ thick at the base.

Subgastral quadriradiates (c) large and stout. All rays are of nearly equal thickness and gradually sharp-pointed. Basal ray straight, generally shorter than the paired rays but sometimes nearly equally as long as they, 260–380 μ long and 40–80 μ thick at the base. Paired rays subequal, slightly curved at the base and nearly straight in the remaining portion, very widely diverging and standing out almost at right angles from the basal ray, 350–660 μ long and 40–80 μ thick at the base. Apical ray nearly as long as the facial rays.

Subgastral triradiates (d) slightly sagittal, the oral angle being wider than in the paired ones. All rays equally thick, but often slightly irregularly contoured and gradually tapering to a sharp point. Basal ray nearly straight, 300–500 μ long and 20–60 μ thick at the base. Paired rays subequal in length, slightly curved backwards, 260–640 μ long and 20–60 μ thick at the base.

Gastral triradiates (e) slightly sagittal. All rays rather slender, not strongly differentiated in length, equally thick, often slightly



Text-fig. 17. *Leucilla oblata*, n. sp.

a, Dermal triradiates. b, Subdermal quadriradiates. c, Subgastral quadriradiates. d, Subgastral triradiates. e, Gastral triradiate. f, Gastral quadriradiates. g, Triradiates of oscular margin. h, Quadriradiate of the same. (All about $\times 50$)

irregular in outline, tapering to a sharp point. Basal ray straight, about 250 μ long and 20 μ thick at the base. Paired rays nearly straight or slightly curved forwards, about 280 μ long and 20 μ thick at the base.

Gastral quadriradiates (f) similar to the gastral triradiates, differing only in the presence of an apical ray. Apical ray much shorter and thinner than the facial rays, tapering and sharply pointed, slightly curved, 30–60 μ long and 8–14 μ thick at the base.

Triradiates of the oscular margin (g) sagittal. Basal ray usually longer and thinner than paired rays, quite straight, sharply pointed, 120–240 μ long and 8–12 μ thick at the base. Paired rays strongly divergent, slightly curved backwards in basal parts and either straight or slightly curved forwards in the remaining parts, nearly uniformly thick for the greater part of their length, more or less irregular in outline, 100–180 μ long and 10–14 μ thick at the base.

Quadriradiates of the oscular margin (h) nearly similar to the

triradiates of the same but with a short apical ray. Apical ray slightly curved and sharply pointed.

Hair-like oxea of the oscular margin straight or slightly curved, about 280 μ long and 2 μ thick.

Hair-like oxea of the dermal cortex rather short and seeming to be intermediate between the microxea and trichoxea.

Locality and Register Nos. of Specimens. — Shark's Bay District (Station ?), B₈; (Station 15), N₁, N₂, S₂II; (Station 21), U.

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EXPLANATION OF THE PLATES.

PLATE XIX.

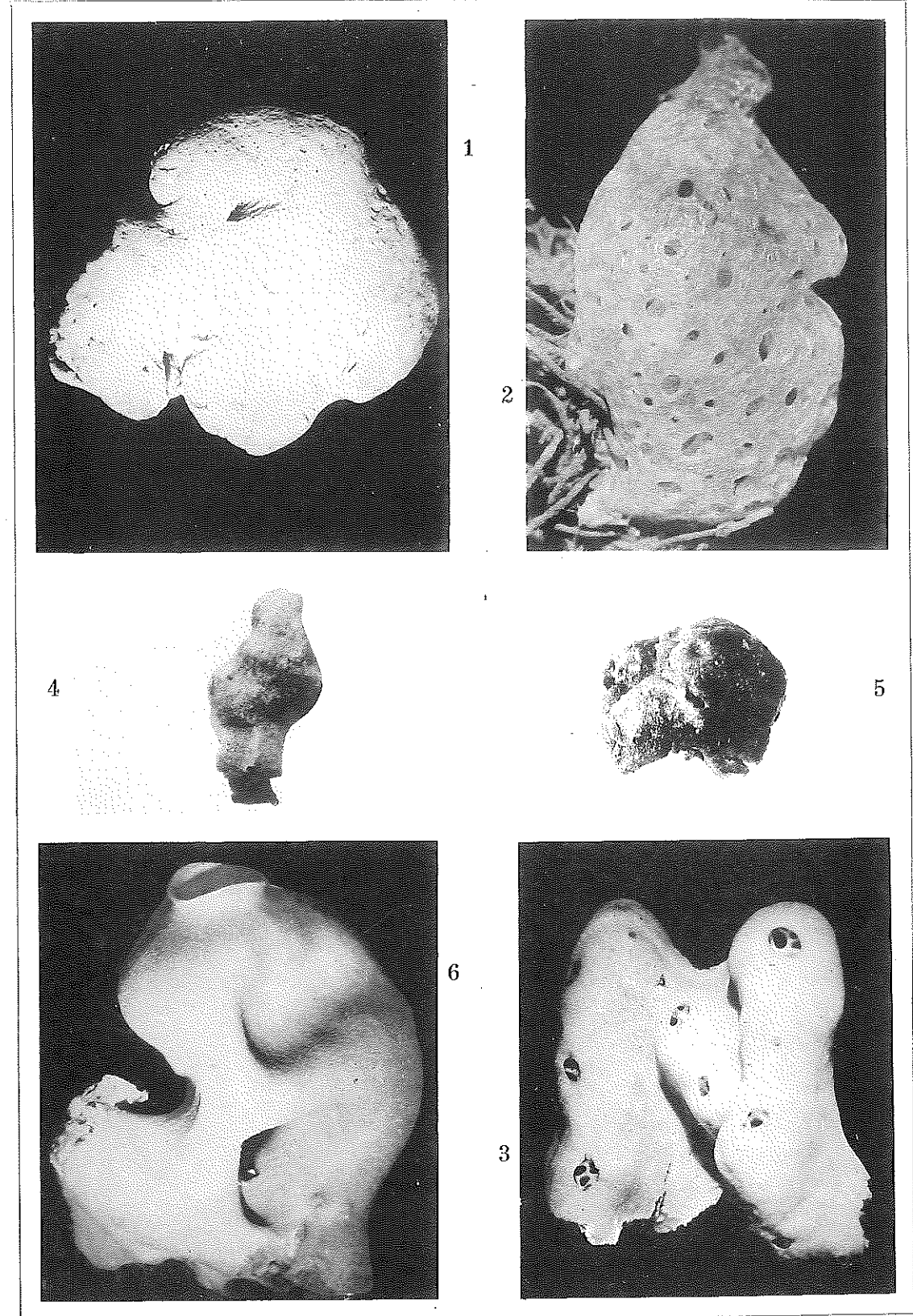
- Fig. 1. *Leucosolenia psammophila*, n. sp. about $\times 1$.
- Fig. 2. *Leucosolenia vitraea*, n. sp. about $\times 5$.
- Fig. 3. *Leucetta insignis*, n. sp. $\times 1\frac{1}{2}$.
- Fig. 4. *Leucetta infrequens*, n. sp. $\times 2$.
- Fig. 5. *Leucetta expansa*, n. sp. $\times 1$.
- Fig. 6. *Leucettusa dictyogaster*, n. sp. $\times 1\frac{1}{2}$.

PLATE XX.

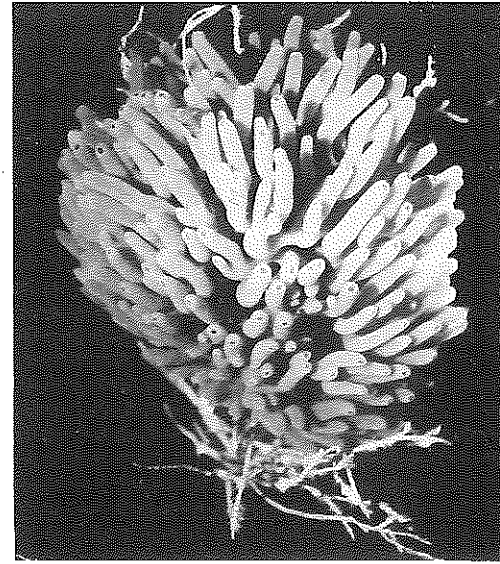
- Fig. 7. *Sycon carteri* DENDY about $\times 2$.
- Fig. 8. *Sycon enciferum* DENDY $\times 5$.
- Fig. 9. *Sycon lendenfeldi*, n. sp. $\times 5$.
- Fig. 10. *Sycon minutum* DENDY $\times 5$.
- Fig. 11. *Vosmaeropsis dendyi*, n. sp. $\times 7$.
- Fig. 12. *Grantia genuina*, n. sp. $\times 5$.

PLATE XXI.

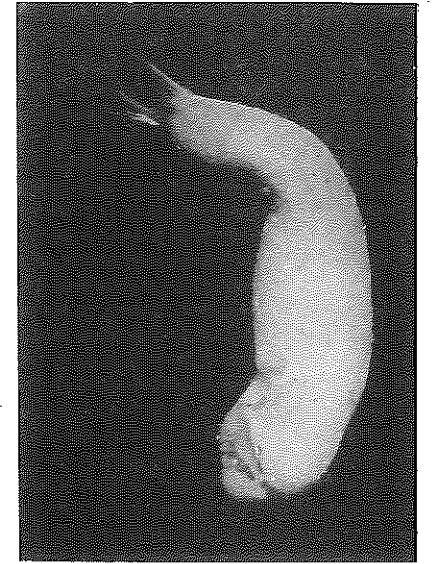
- Fig. 13. *Leucandra minima*, n. sp. $\times 5$.
- Fig. 14. *Leucandra pallida*, n. sp. $\times 3$.
- Fig. 15. *Leucandra thulakomorpha*, n. sp. $\times 1$.
- Fig. 16. *Leucilla lanceolata*, n. sp. $\times 3\frac{1}{2}$.
- Fig. 17. *Leucilla princeps*, n. sp. $\times 5$.
- Fig. 18. *Leucilla oblata*, n. sp. $\times 4$.



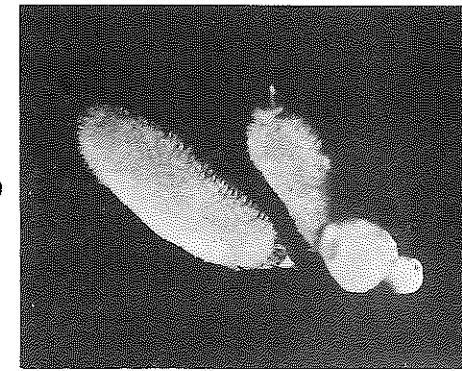
Row and HÔZAWA: Calcareous of South-western Australia.



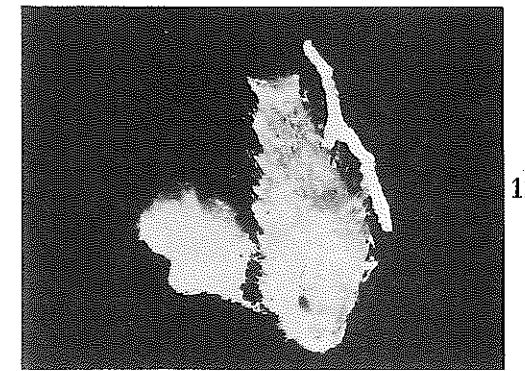
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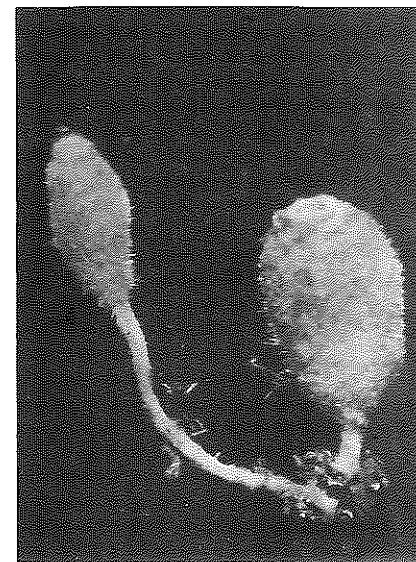
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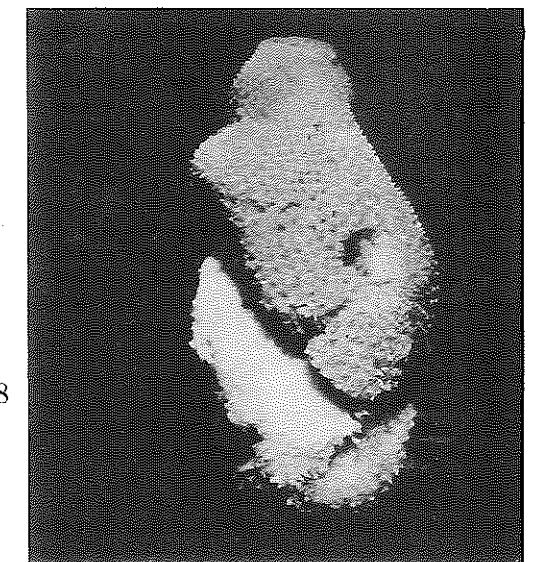
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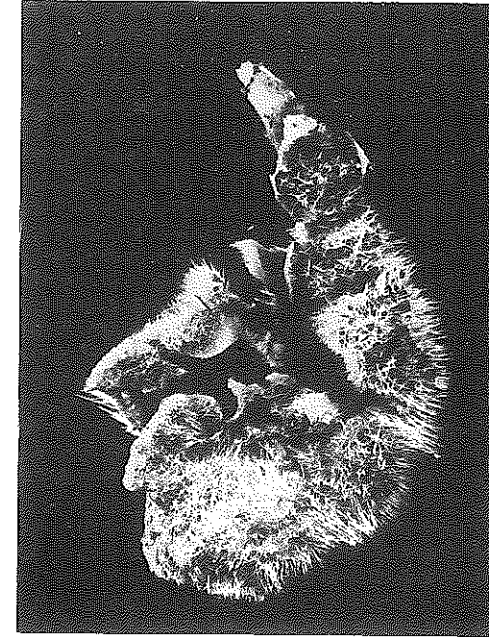
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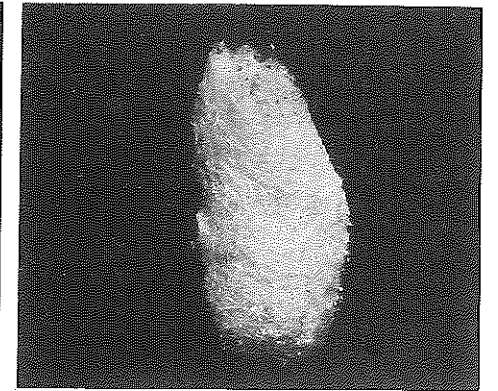
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Row and HÔZAWA: Calcareia of South-western Australia.

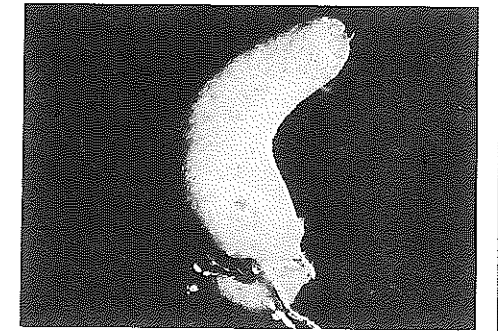
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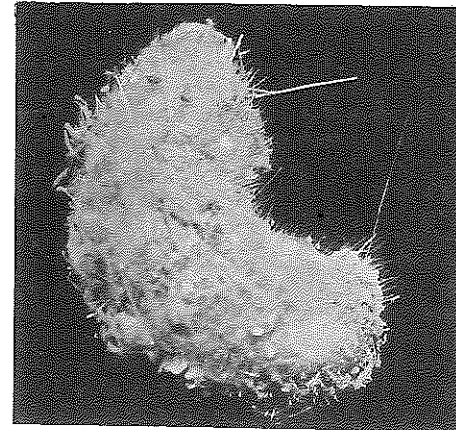
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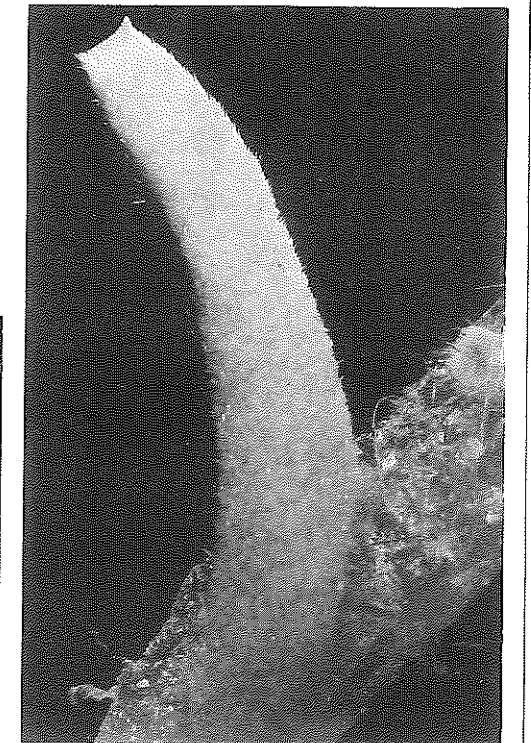
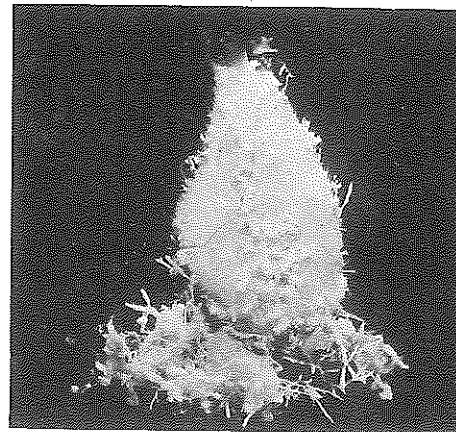


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Row and HÔZAWA: Calcareia of South-western Australia.