A REVISION OF THE MONAXONID SPECIES DESCRIBED AS NEW IN LENDENFELD'S "CATALOGUE OF THE SPONGES IN THE AUSTRALIAN MUSEUM." Part iii.

By E. F. Hallmann, B.Sc., Linnean Macleay Fellow of the Society in Zoology.

(Plates xv.-xxiv.)

Familia DESMACIDONIDÆ.

Subfamilia Esperellinæ.

Under this subfamily, Lendenfeld describes four new species, one of which—wrongly named *Sideroderma zittelii*—is found to belong elsewhere; the other three, he correctly assigned to the genus *Esperella*. In addition, he records *Sideroderma navicelligerum* R. & D., from Port Jackson; but, for reasons stated in connection with my remarks on *Sideroderma zittelii*, I consider this record too doubtful for acceptance. One of these species of *Esperella* (or *Mycale*, as it is now called), namely *E. penicillium*, belongs to the small group of related species for which Dendy(**15**) has proposed the genus *Paresperella*. Concerning the necessity for this genus, there is room for difference of opinion; and Hentschel(**20**), the only author who has since had occasion to deal with a *Paresperella*-species, does not recognise nor even mention it. I propose to take a middle course, and to regard *Paresperella* as a subgenus of *Mycale*. As the species of *Mycale* number considerably over one hundred, and comprise a wide diversity of forms, it is much to be hoped that a subdivision of the genus, into a number of subgenera, will be found possible. One other group, at least, which seems deserving of subgeneric rank is that comprising the species characterised by the possession of pore-grooves, viz., *M. lingua* Bow., *M.*

*artica** Frstdt., *M. placoides* Cart., *M. murrayi* R. & D., and *M. dendyi* Row; and for this group, of which *M. lingua* would be considered the type, the name *Raphiodesma* Bow.(1) stands available. Also it is probable, in virtue of the peculiarities of their chelæ, that *M. parasitica* Cart., and the closely related *M. ancorina* Whtlg.(57),—for the former of which Carter(8) introduced the genus *Pseudoesperia*—are entitled to subgeneric distinction. A figure of a chela, that undoubtedly came from a *Pseudoesperia*-species, is given in Bowerbank's Monograph (Vol. i., fig.135) with the information, "from a circular group on the interstitial membranes of an undescribed species of *Hymeniacidon*, from Fremantle, Australia." For this undescribed sponge, although known to him only from a single spicule, Gray(17) proposed the generic name *Grapelia;* and this, being of older date than *Pseudoesperia,* would perhaps require to be employed if the subgenus were adopted. Another possibly admissible subgenus of *Mycale* is *Protoesperia,* proposed by Czerniavsky (10) for certain species from the Black Sea; and, as I have lately made known (18), it was for a species of *Mycale,* of somewhat divergent type, that Lendenfeld introduced the genus *Arenochalina.*

In the event of its being considered advisable to establish other subgenera, the possible validity of certain names proposed by Gray (e.g., *Corybas* for *M. lobata*, *Aegagropila* for *M. aegagropila*, and *Carmia* for *M. macilenta*) should receive consideration.

I might here record the fact that *Cladorhiza waitei* Whtlg.(57) belongs to the genus *Mycale.*

* *M. lingua* Bow., var. *artica* Fristedt, which, as it differs from *M. lingua* in the dimensions of its spicules, must be an independent species according to Lundbeck(31a).

† I am acquainted with a species from Port Phillip (provided, like *M. ancorina*, with anisochele-rosettes of *two* kinds) which I formerly believed to be *M. parasitica*, having assumed that the non-mention of the occurrence of rosettes of a second kind in Carter's and in Dendy's account of that species was due to an omission. But recently Hentschel(20) has described, from Western Australia, *Mycale parasitica* var. *arenosa*, in which, also, rosettes of one kind only are said to be present. It is possible, therefore, that *M. parasitica* has been correctly described in regard to its spiculation, and that the species above referred to is a new one.

Sideroderma zittelii. (Pl.xv., fig.6).

The description of this sponge, which atttributes to it a unique combination of the spicular characters, proves to be erroneous in two vital particulars; the trichites, mentioned therein as forming the cortical skeleton, are, in reality, small tylostyli, and chelæ are absent; also, there are no oxea present, though some of the principal megascleres are so narrowed at the base as closely to resemble oxea. The general characters of the species are, in fact, distinctly those of the genus *Polymastia;* and this, it would appear, was subsequently discovered by Lendenfeld himself, for, among the fragments received from the British Museum, there are two of this species, one labelled actually *Polymastia zittelii,* the other bearing the MS. name *"Polymastia australis."* There is only one specimen (Pl. xv., fig. 6) of the species in the Australian Museum, the claim of which to be considered the type-specimen rests on the fact that it is labelled, in Lendenfeld's handwriting, with the manuscript name *"Zittelia digitata,"* the published equivalent of which is given in the key-list as *Sideroderma zittelii;* and on the fact that, except in the mentioned particulars and in some minor points in relation to the dimensions of the spicules, it corresponds in every way exactly with the description. One can only suppose that the chelæ, mentioned by Lendenfeld as occurring in the outer layer of the cortex, were foreign; and the other errors are explicable on the supposition that the spicules were examined and measured only *in situ.*

The species is nearly related to *P. insidis* Thiele(**42**), and perhaps also to *P. affinis* Thiele(**42**), both of which it resembles in this respect, namely, that the largest or fibre-forming spicules frequently exhibit bulbous dilatations of their shaft. The following brief account of the spiculation, taken along with Lendenfeld's description of the external features and (*vide infra*) his figure of the sponge (**27**, Pl. ii., fig. 2), will be sufficient to enable one to identify the species.

Spicules.—These are: (1) Elongated, fusiform styli; forming the fibres and also scattered between; frequently polytylote; sharp-pointed at the apex; narrowing much (sometimes almost pointed), at the base; with a maximum diameter of $22\,\mu$, and a length which, usually exceeding 900μ, ranges from (rarely less than) 500μ up to 1200μ (ii) Small tylostyli; composing the cortical skeleton and scattered in the choanosome; as a rule, slightly curved; 85 to 135μ long, and seldom as much as 4·5μ in diameter. (iii) Larger tylostyli; occurring only in the choanosome; closely resembling the preceding in shape, and possibly connected with them by intermediate forms; 145 to 210μ in length, and up to 7μ in diameter.

It remains to be mentioned, that the type-specimen of *Polymastia zittelii* bears a likeness so extremely close to the figure given in the Catalogue (Pl. ii., fig. 2), with the title *Sideroderma navicelligerum* R. & D., as to enable one to say, with the utmost positiveness, that the original of the figure actually was a specimen of *P. zittelii.* Moreover, I am inclined to doubt, on the evidence available, whether Lendenfeld really had a specimen of *Sideroderma navicelligerum* at his disposal. The only specimen in the Australian Museum bearing Lendenfeld's label certifying it to be one identified by him as such, namely, a specimen labelled *"Desmacidon polymastia"* (which name is given in the key-list as the MS. synonym of *S. navicelligerum*), is found to be an example of a new species of *Histoderma—H. actinioides* (*vide* Appendix). This exhibits so many analogies with *S. navicelligerum* as to render quite possible its having been mistaken for that species, at any rate by so careless an observer as Lendenfeld was at the time of writing the Catalogue; and, moreover, there is reason to believe that Lendenfeld did not examine his *"Sideroderma navicelligerum"* very critically, since his description of it, practically word for word, even to the minutest details regarding the spicule-measurements, is copied from Ridley and Dendy's preliminary account of *S. navicelligerum*(**34**). But most remarkable to relate, in connection with this specimen, labelled *"Desmacidon polymastia,"* is the fact that it is figured in the Catalogue (Pl. iv., fig. 1) as an example of *Stylotella polymastia!*

Taking everything into consideration, I think we are justified in regarding Lendenfeld's *Sideroderma navicelligerum* as a synonym of *Histoderma actinioides.*

Ridley and Dendy (**34a**), in their remarks on *Sideroderma,* refer to the fact of their having been enabled "through the kindness of Dr. R. v. Lendenfeld, to examine a second species (of the genus) which occurs in his large collection of Australian sponges." Probably this species has generally been thought to be *Sideroderma zitelii,* but one must now conclude that it has never been described.

ESPERELLA RIDLEYI. (Text-fig.13.)

Introductory.—The species is represented in the collection by two specimens, one of which is that figured in the Catalogue in illustration of the variety *robusta,* while the other is labelled as the type of the variety *intermedia.* As the two are exactly alike in all but details of shape, it would seem as if the latter were incorrectly labelled—for, according to description, the variety *intermedia* should be distinguished by a much softer and more elastic consistency, due to its fewer spicules and finer fibres; however, a British Museum specimen, labelled as belonging to this same variety, is (at any rate in its spiculation) likewise precisely similar to the variety *robusta.* Under the circumstances, and in view of the fact also that the only stated differences between them are insufficient as a basis for distinction, we may reasonably and safely assume that the two so-called varieties are identical.

A British Museum specimen labelled with the MS. name *"Esperella ridleyi* var. *mollis"* (and, indeed, bearing a certain degree of outward resemblance to the present species, due to its trabecular structure) proves to belong to a species of *Echinochalina,* with spiculation similar to that of *Echinochalina intermedia* Whitelegge (*vide* **18**).

Of the several errors needing correction in the original description, there is one that calls for special mention. This is the statement that, among the microscleres, diancistra occur, which are rare and confined to the surface. The occurrence of diancistra along with anisochelæ—of which we have no instance except in the very doubtful case of Schmidt's *Vomerula tibicen*—would be of great interest as affording conclusive evidence of a relationship between the genera *Mycale* and *Hamacantha.* After the most thorough search, however, I have failed to find any such spicules, and am confident, therefore, in the assertion that those observed by Lendenfeld must have been of foreign origin. In support of this also is the fact of the very close correspondence in spiculation between *M. ridleyi* and certain other species of *Mycale,* which we well know to be without diancistra.

Both specimens are dry, and bear every appearance of having undergone complete maceration; here and there only, they show the faintest traces of what was probably a continuous and well-defined dermal membrane. The specimens were in this same condition, no doubt, when Lendenfeld described them—as may be judged from the figure he has given of the type-specimen. Accordingly, in relying upon that figure and the following description of external features of the species as aids to its identification, one must allow for the possibility that the therein indicated trabecular structure of the sponge may be wholly internal, and, in the undamaged specimen, concealed from view by the dermal membrane.

Description.—The sponge, which is probably semi-encrusting or submassive at the outset of its growth, grows up into one or several, usually branching, stout stems, which may attain a height of 500 mm. These stems (and their branches) are made up of anastomosing trabeculæ. The latter are roughly circular in cross-section, and measure from 3 mm. to (rarely) 7 mm. in diameter; their surface (in the absence of dermal membrane) is highly rugose. In the more central portion of the stems, especially in the older parts of the sponge, the trabeculæ become more or less fused together, thus to a great extent losing their individual outline, and tending in some measure to give rise to a solid axis; the (simple or branched) superficial trabeculæ, for the most part, project separately outwards, in an obliquely upward direction. The characteristic appearance of the sponge is well portrayed in the figure which Lendenfeld has given of the type-specimen. This, which is much less stoutly proportioned than the second specimen, measures 380 mm. in height, and has attached to it, near the top, three large bivalve shells, over the surface of which it has formed a thin crust.

The main skeleton is a very irregular, small-meshed reticulation of stout, spicular fibre, of diameter often exceeding 100 mm. The spicules of the fibres are closely packed together side by side, while the spongin-cement, which unites them, is inconspicuous on account of its pale colour, and, only in connection with the slenderer connecting fibres, forms a visible sheath. Owing to the washed-out condition of the specimens, scarcely any interfibral substance

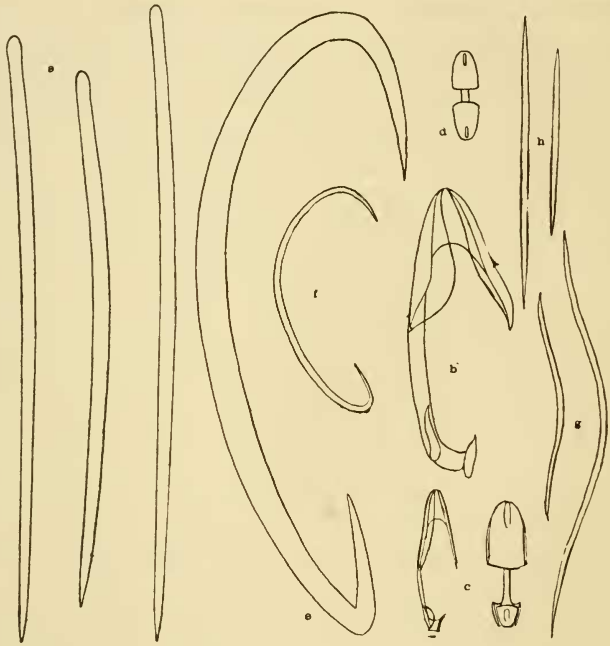

Fig. 13.—*Mycale ridleyi.* *a*, Styli. *b*, Larger anisochelæ. *c*, Smaller anisochelæ. *d*, Isochelæ. *e*, Larger sigma. *f*, Smaller sigma. *g*, Toxa. *h*, Microxea (trichites).

remains; but what little there is, serves to show that, in all probability, microscleres were abundantly scattered everywhere through the tissues. The dermal skeleton is a more or less confused, somewhat lattice-like, reticulation, formed by the branching and anastomosing of strands of loosely associated subtylostyli similar to those of the main skeleton; also, there occur, in the dermal membrane, microscleres in great abundance, and the most numerous of these are the smaller anisochelæ, the isochelæ, and the smaller sigmata, while the larger sigmata are the rarest.

Spicules.—(*a*) Subtylostyli; with elongated oval heads, narrower than the middle of the shaft; typically straight, though often, in slight degree, variously curved; gradually sharp-pointed; slightly fusiform, with the apical half of their shaft of greater average stoutness than the basal. Length, 250 μ to 305 μ; maximum stoutness, 9 or 10 μ.

(*b*). Larger anisochelæ; 40-45 μ long, 13-17 μ wide;* 15-18·5 μ broad; occurring singly and in rosettes. The upper alæ and palm are of equal length, approximately one-half that of the spicule; the upper tuberculum is 7·5-11 μ long, and about one-fourth of this in breadth; the distance between the free ends of the two palms is about 15 μ. Rosettes appear to be rare and always composed of comparatively very few chelæ; they were found only in the dermal membrane, and the greatest observed number of spicules composing any one of them was eight.

(*c*). Smaller anisochelæ; 18-22·5 μ long, 6-7·5 μ wide, 4·5-8 μ broad; occurring singly. The upper alæ and palm are about equal in length, which is approximately three-fifths that of the spicule; the distance between the free ends of the palms is about 3·5 μ.

(*d*). Isochelæ palmatæ; 7·5-12 μ long, at most 3 μ wide, and 3-3·5 μ broad. These are the most abundant of the microscleres, at any rate in the dermal membrane.

(*e*). Larger sigmata; 72 μ to (rarely) 20 μ in length from bend to bend; and, at most, slightly over 6 μ in stoutness.

(*f*). Smaller sigmata; very slender; varying in length from 15 μ to 35 μ.

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* In using, for convenience' sake, the ordinarily synonymous terms *wide* and *broad* in order to express the two principal transverse dimensions of a chela, I imply by the former the maximum cross-measurement of the spicule as seen in profile, or, more precisely, the distance from the free or distal end of the (in case of anisochelæ, major) palm to the posterior edge of the shaft; and by the latter, the maximum cross-measurement of the spicule as seen from the front.

(*g*). Slender toxa, 30-63 μ long; occurring singly and in dragmata.

(*h*). Slender microxea, 20-35 μ long; occurring in dragmata, and also singly.

Loc.—Western Australia.

Remarks.—*M. ridleyi* is the fifth species of the genus known to possess isochelæ, the other four being *M. plumosa* Carter, *M. parishi* Bowk., *M. isochela* Hentschel(**20**), and *M. pectinicola* Hentschel(**20**); an undescribed sixth is represented in the British Museum by a specimen labelled (by Lendenfeld) with the MS. name "*Esperella australis.*" On the assumption that the toxa observed by Ridley(**33**) in Bowerbank's preparations of *M. pectinicola* were proper, all these species likewise agree in the possession of toxa, besides showing a very close correspondence (with each other) in the remaining features of their spiculation.

ESPERELLA SERPENS. (Pl.xxiv., fig.6; and text-fig.14).

Description.—The single type-specimen (as also a fragment labelled *Esperella serpens* from the British Museum) corresponds satisfactorily to Lendenfeld's description of the species. It is a cake-shaped sessile sponge, measuring 80 mm. in length, 50 mm. in breadth, and about 25 mm. in height, the visible external portion of which is formed by confusedly anastomosing irregular lax processes, usually more or less round in cross-section and averaging 2 or 3 mm. in diameter. On cutting through the specimen, the more compact—and, at first sight, seemingly solid—interior is found to have a structure affording reason for believing it to have resulted through the very complete and intimate fusion of what originally were similar processes. In alcohol (perhaps largely owing to imperfect preservation) the consistency is soft, almost pulpy; and the whole sponge is exceedingly fragile. The colour is a dull faintly yellowish pale grey. The dermal membrane is thin and delicate. Oscula were not observed.

The main skeleton is exceedingly reduced, being composed almost entirely of sparsely and quite irregularly scattered slender tylostyli. The dermal skeleton, although much better developed, is also comparatively scanty; it consists of ramifying spicular fibres, seldom more than 20 μ broad, which here and there are partially connected by loose spicule-bundles. The dermal megascleres are similar to those of the interior. Scattered microscleres—anisochelæ, sigmata, and trichodragmata—are comparatively scarce; the chelæ do not form rosettes. In the dermal membrane, chelæ and sigmata are more frequent than in the choanosome, and trichodragmata apparently do not occur.

Scattered through the sponge are small patches of foreign material, comprising sand-grains, spicule-fragments, foraminifera, etc.; and immediately surrounding each of these patches there occur a few fibres and spicule-bundles such as elsewhere are seldom met with except in the superficial (*i.e.*, the dermal) skeleton. These patches presumably occupy spaces (*lacunæ relictæ*) originally due to, and now almost obliterated by, the fusion of once separate processes of the sponge, as suggested above—or, in other words, are, strictly speaking, external to the sponge—and, on this view, the spicule-bundles and fibres referred to, that occur seemingly within the sponge, are really portions of the dermal skeleton. To a misconception arising from the presence of such fibres and bundles in the preparations examined by him, was probably due Lendenfeld's incorrect description of the main skeleton as consisting of "longitudinal spicule-bundles,* which are on an average . . . . 0·15 mm. apart," etc.

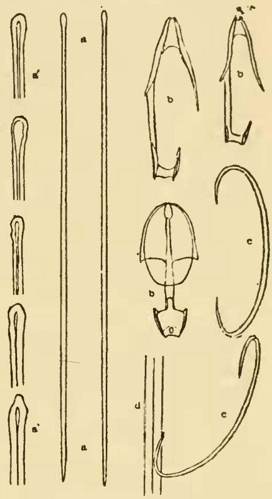

Fig. 14.—*Mycale serpens.* *a*, Tylostyli. *a'*, Basal ends of tylostyli. *b*, Anisochelæ. *c*, Sigmata. *d*, Trichites.

Spicules.—(*a*) The tylostyli are straight or (less frequently) variously curved, gradually sharp-pointed, slender spicules with a well-developed elongated phyma; the shaft is slightly narrower

* By "spicule-bundles," Lendenfeld always (in the "Catalogue") means "fibres composed solely of spicules"; this is most clearly shown in his description of *Sideroderma zittelii.*

towards the base than at the middle. They measure from 220 μ to 295 μ in length and are seldom as much as 5 μ in diameter.

(*b*) The anisochelæ are of the ordinary form; they are variable in stoutness and range in length from 18 to 27 μ.

(*c*) The sigmata are very slender, seldom much more than 1 μ in diameter; they are simple and contort, and vary from 18·5 to 29 μ in length, measured from bend to bend.

(*d*) The trichodragmata are 12 to 25 μ long, and usually less than 5 μ in stoutness. The trichites composing them are sometimes partially fused, so that the dragma remains intact even after boiling in nitric acid, and are sometimes differentiated into separate microxea. Microxea also occur scattered singly, but as such are extremely rare.

Embryos.—The examined portion of the sponge teems with aspiculous embryos of approximately spherical form, the largest of which measured 150 μ in diameter.

Loc.—Port Jackson.

Remarks.—The species that seems most closely related to *M. serpens* is *M. fistulifera* Row(**35**). In the latter, trichodragmata have not been observed and the processes bear each an osculum at the summit. If similarly located oscula occur in *M. serpens*, they must be extremely small; but I am unable to say positively they are absent, owing to the poor preservation and pulpy condition of the specimen.

ESPERELLA PENICILLIUM. (Pl.xxiv., fig.1; and text-fig.15).

Introductory.—As the specimen which I take to be the type of this species is not entirely in agreement with the description of the species, I might mention that its claim to be so considered is proven, both by the fact that it is labelled in Lendenfeld's handwriting with a manuscript name—"*Esperia incrustans*"—which according to the key-list stands for *Esperella penicillium*—and by the fact, also, that it agrees in all essential respects with a British Museum specimen labelled *Esperella penicillium.* The species belongs to the subgenus *Paresperella* and is related to *P. moluccensis* Thiele(**41**), *P. bidentata* Dendy(**15**), *P. repens* Whitelegge(**57**), and *P. dichela* Hentschel(**20**)—apparently more closely to the two last mentioned, because like them and unlike the others (as described), it possesses smaller, scattered anisochelæ in addition to those which form rosettes.

The type-specimen consists of only a few ill-preserved scraps attached to pieces of shell and other débris. This condition of the specimen would lead one to suppose that the species is of encrusting habit, and the manuscript specific name "*incrustans*" implies the same. According to Lendenfeld's description, however, the sponge is "composed of anastomosing branches on an average 7 mm. thick." One might conclude, therefore, that the sponge is variable in habit; but, for the present, I think it would be as well to disregard altogether what has been stated concerning the outward features of the species, and, for its identification, to rely solely upon skeletal characters.

Unfortunately, owing to the fragmentary condition of the specimen, several points in connection with the skeleton, of possible diagnostic value, have not admitted of elucidation; among other things, it could not be determined whether, as Lendenfeld's description implies, the reticulate character of the skeleton results simply through the interosculation of dendritically branching longitudinal fibres, or whether it is due to the union of longitudinal by means of transverse fibres.

Description.—The main skeleton is a loose reticulation of spicule-fibres devoid of spongin, the stoutest of which exceed 150μ in diameter. Close beneath the surface, the outwardly-running fibres subdivide each into a number of divergent strands, whose penicillately outspread extremities support the dermal membrane. The dermal skeleton is a wide-meshed, somewhat lattice-like reticulation, the meshes of which, formed by interconnecting, branched, paucispicular fibres, are, as a rule, sparingly subdivided by independent short spicule-strands, and single spicules. There are also present in the dermal membrane a few scattered microscleres of the same three kinds as occur interiorly.

Spicules.—(*a*). The megascleres in general agree exactly in form with those of *P. bidentata*(15); in rare cases, however, the small apical tines are wanting, and the spicule is then a subtylostrongyle. These tines are usually two in number, occasionally three : when one only is developed, it is situated not centrally, *i.e.*, not in continuity with the axis of the spicule, but laterally. The spicules are from 325 to 410 μ long by 8 μ at most in diameter.

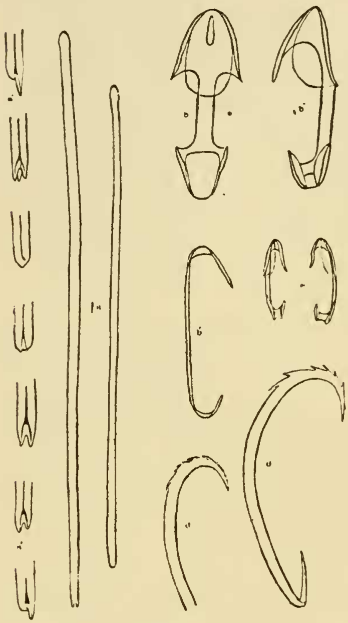

Fig. 15.
Mycale (*Paresperella*) *penicillium*. *a*, Subtylostyli. *a'*, Apical ends of subtylostyli. *b*, Larger anisochelæ. *b'*, Developmental form of preceding. *c*, Smaller anisochelæ. *d*, Sigmata.

(*b*) Larger anisochelæ, occurring fairly abundantly in rosettes, and in lesser number scattered singly; they closely resemble in form those of *P. bidentata*, but are larger, measuring from 34 to 39 μ in length.

(*c*). Smaller, scattered anisochelæ, in form much like the preceding, measuring from 18 to 22·5 μ in length; they are about as numerous as the scattered larger chelæ.

(*d*). Sigmata, similar to those of *P. bidentata*; fairly abundant; measuring 44 to 48 μ long from bend to bend, by at most 3 μ thick in the middle.

Loc.—Port Jackson.

Remarks. — From the same locality as *P. penicillium*, comes *P. repens* Whitelegge. The latter, judging from its description—for I have been unable to find any specimen or mounted slide of it - differs from *P. penicillium* in quite a number of points, but the differences are of degree rather than of kind, and may be due to nothing more than individual variation. Whether this is so, it is not yet possible to decide, since both species are known only from single specimens.

The several species, *P. penicillium*, *P. moluccensis*, *P. bidentata*, *P. repens*, and *P. dichela*—enumerating them in the order in which they were described—are obviously so closely related that they might be ranked as varieties of a single species. The second and third mentioned, however, according to their descriptions, are lacking in the smaller chelæ found in the others; if this be so, one might regard these two as varieties of one species, *P. moluccensis*, and the remaining three as varieties of a second species, *P. penicillium*.

Subfamilia Ectyoninæ.

With the exception of *Lissodendoryx jacksoniana*, described below, all the species which I have so far succeeded in identifying of the Ectyoninæ described in the Catalogue have already been dealt with, at least sufficiently to render possible their identification, in my former paper. The fuller treatment of such of them as require further description, I propose to defer until a suitable opportunity offers itself of my undertaking a general revision of the Australian *Desmacidonidæ*.

It is necessary here to refer, however, to certain alterations which a knowledge of additional facts has led me to consider advisable in the conclusions I expressed regarding the four species, *Echinonema levis, E. rubra, Clathria macropora,* and *C. australis.* As already stated, the specimens labelled as the types* of the first-mentioned three (as also the specimens representing them in the British Museum) are examples of a single variety of *Crella incrustans,* while those of the fourth species belong to another variety of the same—the variety *arenacea* Carter; and thus, although corresponding exactly—except (in one important particular) those of *Clathria macropora*—with the descriptions of the species they respectively purport to represent as regards external features, they are all rather considerably at variance therewith in the matter of spiculation. Nevertheless, except in the case of *Clathria australis* (which is described as possessing only *scarce* acanthostyles) the latter discrepancies are such as might conceivably be

* They are labelled as the types by Mr. Whitelegge. Their original labels in Lendenfeld's handwriting bear only the MS. names "*Clathria levis*," "*Clathria rubra*," "*Clathria macropora*," and "*Clathria flabellum*" respectively.

due to carelessness of observation; and hence I decided to accept as correctly labelled the ostensible specimens of *Echinonema levis* and *E. rubra,* and to reject as bogus those of *Clathria macropora* and *C. australis.* It is now my opinion that the descriptions of *E. levis, E. rubra,* and perhaps also *Clathria australis* combine each a description of the outward characters of one species with one of the inward characters of another—the former of which species is alone represented by the specimens; and that the chief ground of my rejection of the specimens labelled '*Clathria macropora*—namely, the unlikeliness of Lendenfeld's having mistaken for oscula, holes produced by crustaceans—is untenable, inasmuch as such mistakes actually have since been found to have been made by him in connection with *Cliona hixoni, C. lutea,* and apparently also *Tedania rubra.* Consequently, as synonyms of the sponge which I described in my previous paper as *Crella incrustans* var. *levis*, I would now write *Clathria macropora*, *Echinonema levis* (? pars), and *Echinonema rubra* (? pars); and should a Port Jackson species possessing the skeletal characters ascribed by Lendenfeld to *Echinonema levis* prove to be existent, I think it would be preferable to give to the former sponge the name *Crella incrustans* var. *macropora*, and to employ the specific name *levis* for the latter.

Those of the remaining species not yet identified are: *Clathrissa elegans, Clathriodendron irregularis, Plectispa macropora* (the type of *Plectispa*), *P. elegans, Thalassodendron typica* (the type of *Thalassodendron*), *T. digitata,* and, lastly, the three which through some misconception Lendenfeld described as varieties of *Echinonema anchoratum* Carter. The last mentioned are nominally represented in the Australian Museum by specimens which, while labelled with the names that the key-list indicates to be the MS. synonyms of their published names, accord neither in external nor internal features with their descriptions;—the variety *ramosa* being represented by an imperfect example (labelled "*Ceraospina arbuscula*") of *Clathriodendron arbuscula,* and the two varieties *dura* and *lamellosa* by specimens (labelled "*Antherospongia dura*" and "*Ceraospina flabellum*") of the species which(18) I have named respectively *Clathria indurata* and *C. spicata*. Also, *Plectispa elegans* is falsely represented by a specimen of *Echinoclathria arborea*.* But with these exceptions no example labelled with the name of any of the species enumerated above is to be found either in the Australian Museum or among the fragments from the British Museum. Occurring among the latter, however, there is an unattached label inscribed with the name *Clathriodendron irregularis*, so that this species is in all probability represented by an example in the British Museum.

MYXILLA JACKSONIANA. (Text-fig.16).

Introductory.—As the type of this species I take the sponge representing it in the British Museum, which agrees fairly closely with the original description; the ostensible type-specimen in the Australian Museum is mislabelled, being in reality an example of a species of *Gellius*, closely related to *G. raphidiophora*. Having only a small fragment at my disposal I am unable to say anything concerning the outward characters of the species. The original description states in reference thereto merely that the sponge is massive, lobose, and provided with conspicuous oscula; but it may be that this statement is incorrect, since it is one that would apply very well to the false type-specimen.

Description.—The skeleton is a renieroid reticulation with for the most part quadrangular and triangular meshes, the sides of which are formed each of one to three (or rarely more) spicules; the spicules have a not very orderly arrangement, and in many places, as a consequence, the reticular pattern is ill-defined. Definite fibres are apparently not developed, and spongin is indiscernible. The spicules of the mesh-work are styli, together with a very appreciable proportion of shorter and stouter stronglya which undoubtedly are derivatives of the styli. Occurring scattered

*That my identification of this species with Lendenfeld's *Plectispa arborea* is correct, is supported by the fact that the MS. synonym of *Plectispa arborea* is, according to the key-list, "*Plectochalina halme*"—a name which would be more appropriate in its application to *Echinoclathria arborea* (owing to the species' resemblance in reticulate structure to *Halme nidus-vesparum*) than to any other species described in the Catalogue.

are very few tylota and moderately abundant chelæ and sigmata, the last-mentioned predominating. The microscleres are most numerous surrounding the canals. The dermal skeleton appears to be developed interruptedly, but this may be in consequence of the

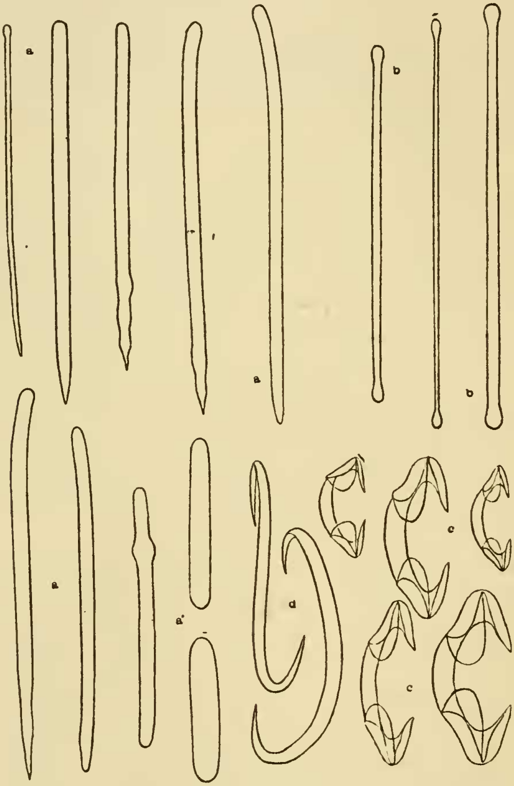

Fig. 16.—*Lissodendoryx jacksoniana*. *a*, Principal styli. *a'*, Strongyliform modifications of principal spicules. *b*, Auxiliary tylota. *c*, Isochelæ arcuatæ. *d*, Sigmata.

abrasion of portions of the original surface; here and there, in patches, closely-arranged short strands of tylota occur, disposed vertically to the surface; while in the relatively broad intervals between these groups of strands the main skeleton extends almost or quite to the surface, and in the outermost layer a few scattered tylota only, mostly more or less vertically directed, are to be seen.

Spicules.—(*a*) The principal megascleres are smooth styli and strongyla, the former being about ten times as numerous as the latter. The styli, which vary from (rarely less than) 140 to about 185 μ in length, and very seldom exceed 7 μ in diameter, are straight or slightly curved (more especially near the basal end), often very faintly dilated at the base, nearly cylindrical throughout the greater part of their length, and, as a rule, gradually sharp-pointed; the pointed end almost invariably exhibits irregularities such as are commonly shown by spicules of the Axinellidæ, and in extremely rare cases is provided with a few minute spines, less rarely an odd spine is to be observed on other portions of the shaft. The slenderest forms are tylostyli, which are equal in length to the fully-grown spicules. The strongyla range in length from about 50 to upwards of 160 μ, and their maximum stoutness, which is attained only by the shorter spicules, is 9·5 μ; they not infrequently show a deformity in the shape of a bulbous swelling. Spicules of intermediate form between the longest strongyla and the styli occur, but are rather rare.

(*b*) Straight tylota, with nearly cylindrical shaft (often slightly narrower at one end), and well-developed oval heads; measuring from 155 to 195 μ long and at most 5·5 μ in stoutness.

(*c*) Isochelæ arcuatæ of ordinary shape; with well curved shaft, slightly antero-posteriorly compressed; varying in length from 12 to 23 μ. Individuals of medium length are rare in proportion to those of greater and of lesser length.

(*d*) Sigmata; simple and contort; measuring between 19 and 36 μ in length from bend to bend, and up to 3 μ in stoutness.

Embryos.—Deeply brownish-tinted embryos of oval shape, the largest measuring 320 by 270 μ, were present, and most of them contained spicules. The spicules were always of three kinds, viz., straight or (very often) flexuous slender tylota, exceedingly slender sigmata, and developmental chelæ. Usually the tylota, like the microscleres, were scattered; but in a few instances they were arranged in a radiating bundle placed towards one end of the embryo.

Remarks.—Lundbeck has noted the embryonic spiculation in quite a number of Myxillinæ, but in every case observed by him, contrary to what happens in the present species, the basical megascleres make their appearance in advance of the auxiliary. In reference to *Grayella pyrula* and *Grayella gelida*, Lundbeck(**31b**, p. 33), says: "It is worthy of notice that the first occurring spicules here are the spined dermal spicules, while elsewhere in the Myxilleæ it is the skeletal spicules which occur first." These exceptions, however, are only apparent, since, as I have previously pointed out(**18**), the dermal spicules of *Grayella* undoubtedly correspond morphologically to the skeletal spicules of normal Myxillinæ, and *vice versâ*.

L. jacksoniana is probably most nearly related to the species recorded from Port Phillip by Carter(**7**) as *Halichondria isodictyalis* and by Dendy(**13**) as *Myxilla isodictyalis*; but it is hardly likely that the two are identical, since in the case of the latter no mention has been made of the occurrence of strongylote modifications of the skeletal spicules. The original *Lissodendoryx isodictyalis* Carter(**5**), comes from Puerto Cabello, Venezuela, and probably is not identical with the Port Phillip sponge.

Familia AXINELLIDÆ.

Under this, the final family dealt with in the Catalogue, Lendenfeld describes six species, five of which are referred to the genus *Axinella*, and one to a new genus *Spirophorella*. Each of these, with the exception of the last-mentioned, is (nominally) represented in the Australian Museum by a specimen duly labelled in Lendenfeld's handwriting, but only in the case of one, *Axinella aurantiaca*, is it possible to reconcile the specimen with the description. It seems quite beyond doubt, however, that the descriptions of two of the species—namely, those designated varieties of *A. hispida* Montagu—are erroneous, the probability being that each is made up of portions of the descriptions of two entirely different species. For in the diagnosis introductory to these descriptions, we are told that the spiculation is composed of "large and long styli and spined oxea," together with "microsclera" in the form of "styli and oxea, long and very slender, in bundles (trichites)"; whereas in the descriptions themselves, in contradiction to this, we find it stated, in the case of one variety, merely that "the spicules of the supporting skeleton are 0·14 mm. long and 0·005 mm. thick," and in the case of the other, that "the spicules of the supporting skeleton are chiefly styli, 0·2 mm. long and 0·005 mm. thick. Nor are these contradictory statements the only indication of error; the diagnosis referred to is clearly only an intended copy, with a few alterations in terms, of the description of *Dictyocylindrus hispidus* given by Bowerbank(2), yet, in Bowerbank's description, no mention is made of "spined oxea," but only of spined styli, and no warrant is to be found for the statement that the "styli and oxea, long and very slender" occur in bundles It is unaccountable also why Lendenfeld calls the last-mentioned spicules microsclera, especially since he states, in his definition of *Axinella,* that the genus is without microsclera. Because of these anomalies, and as the specimens left by Lendenfeld to represent his varieties of *Axinella hispida* agree in some measure with the descriptions so far as external features are concerned, and actually are examples of species of *Raspailia,* I have thought it proper to regard them as the types. I consider the specimens to be representative of two distinct species to be designated *Raspailia gracilis* and *R. tenella* respectively.

AXINELLA HISPIDA, var. GRACILIS. (Pl. xxiii., fig.1; Pl. xxii., fig.7; and text-fig.17).

Description.—Sponge erect, arborescent; with dichotomous and polytomous branches, seldom uniting by anastomosis. The branches are short, stiff, cylindrical, or slightly tapered, and sometimes sharply pointed at their end. Surface hispid with spicules, which project 1 mm. or so beyond it. Oscula apparently absent. Colour in spirit pale grey, for the most part with a faint tinge of purple. Consistency fairly tough, compressible, and resilient.

The single specimen (Pl. xxiii., fig. 1), 80 mm. in height, is attached to a stone by an expanded disc-like base, from which two short stalks, each about 5 mm. in diameter, and each with its own "head" of branches, arise independently. The stoutest branches are 4 to 5 mm. in diameter; the slenderest, about 2 mm.

The skeleton, as seen in section, presents quite different aspects according as the mounting medium is balsam or glycerin. In the latter medium, the spicules being thereby rendered almost indiscernible, it appears as if mainly consisting of a small meshed irregular reticulation of colourless, or (in older parts of the sponge) faintly yellowish-tinted, spongin fibres, of diameter seldom exceeding 50 or 60μ; the reticulation, which is not more condensed in the axial than in the peripheral region of the branches, and in pattern bears a certain slight resemblance to that of the skeleton of *Euspongia,* is formed by longitudinal main fibres pauciserially cored by principal spicules and by a network of connecting fibres which are without contained spicules.

On the other hand, in sections mounted in balsam, the spongin fibres are difficult to perceive, and may even be quite invisible; and the skeleton then shows itself as a lattice-like interlacement of longitudinally-running (or, if near to the surface, slightly outwardly-trending), mostly paucispicular, loose strands of principal spicules, interspersed between which, in comparatively small number, are single spicules likewise with a generally longitudinal orientation. In addition, isolated single spicules constantly occur, which are disposed transversely to the prevailing direction, and are consequently very noticeable even although comparatively few. The interlacing spicule-strands are constituted partly by the spicules which core the main spongin-fibres and partly by spicules which lie extra-fibrally; some of the latter are directed with their apex pointing to the contrary direction, *i.e.,* towards the base of the sponge Echinating acanthostyli occur only sparsely and irregularly upon the fibres of the interior; and since (in balsam) the fibres themselves are not readily perceived, these acanthostyli appear at first sight as if scattered. On the other hand, in connection with the superficial fibres (comprising not only those situated most externally, *i.e.,* in immediate juxtaposition to the dermal layer, but usually also most of the longitudinal fibres running near to the surface) acanthostyles are abundantly developed; these superficial acanthostyles are located entirely upon the external aspect of the fibres supporting them, and are thus directed perpendicularly to the surface with their apices outwards.

In the outermost region of the main skeleton, a considerable proportion of the short spongin-fibres, whose disposition is more or less at right angles to the surface, ensheathe each the basal portion of one or several of the outwardly-projecting long tylostyli to which is due the already-mentioned hispidity of the surface. The dermal skeleton proper consists of scattered clusters and bundles of styli and oxea (auxiliary spicules), which are mostly directed more or less parallel to the surface, and, contrary to what usually is the case in *Raspailia*, are never disposed in outwardly-directed divergent tufts situated around the points of exit of the long projecting spicules.

Spicules.—(a) The principal megascleres are styli and tylostyli and intermediate forms, together with relatively very few oxea. The styli and tylostyli (the latter of which are the more numerous) are sharp-pointed and more or less curved spicules, typically with the curvature most pronounced in, and often restricted to, their basal moiety; the very slenderest are not infrequently flexuously curved (flagelliform). They range from about 420 to 1580 μ in length, and attain a maximum diameter of 15 μ. The two forms, styli and tylostyli, show some degree of differentiation from each other, but not sufficient to admit of their separation into two groups. The styli are, in general, the shorter and relatively stouter spicules (being rarely less than 11 μ in diameter), and, unlike the tylostyli, are usually a trifle stouter towards the middle of their length than at the base. The tylostyli, which usually have only a slightly developed phyma, are very variable in stoutness (the slenderest of them being less than 3 μ in diameter), and are seldom below 800 μ, and rarely, if ever, below 500 μ in length. The slenderest spicules are usually not expanded at the extreme base, but at some short distance above it, and then not as a rule bulbously, but elongately and somewhat irregularly; and a consider-

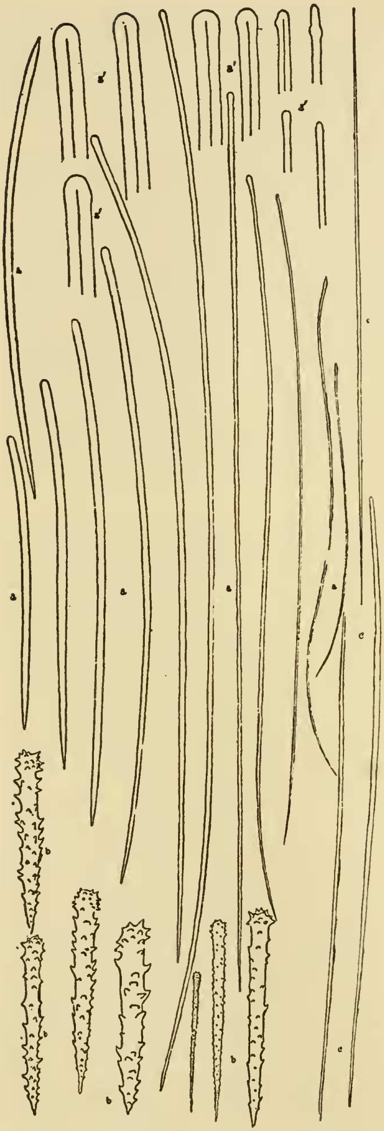

Fig. 17.—*Raspailia gracilis*. *a*, Principal spicules; styli, subtylostyli, and scarce oxea. *a'*, Basal ends of principal spicules. *b*, Acanthostyli. *c*, Auxiliary styli and oxea.

able proportion of them exhibit no basal enlargement at all. It is to be noted that styli are unrepresented among the spicules which project from the surface, while they comprise almost all of those spicules abovementioned which are disposed transversely to the longitudinal direction.

The oxea are curved fusiform spicules varying in length from 430 to 1040 μ, and in diameter from (seldom less than) 7 up to 12 μ. At a rough estimate, they number somewhere between one and five per cent. of the principal megascleres.

(*b*) The acanthostyles, when fully developed, are conical spicules with recurved spines (about 3 μ high), measuring from 65 μ to 102 μ in length, and at their base 10 μ in diameter exclusive of spines; the spines are scattered uniformly and pretty closely over the whole surface. A considerable number of immature acanthostyles also occur—of only slightly lesser length than the fully developed—which are usually provided with a slight basal knob and are more and more minutely spined in proportion as they are slender.

(*c*) The auxiliary spicules are straight or slightly curved oxea and styli (together with intermediate forms), which are approximately equal in size and number,—the styli being, if anything, somewhat the stouter and more numerous. They measure from 260 to about 410μ in length, and, at most, 3·5μ in diameter. The longest of the styli are scarcely, if at all, distinguishable from certain of the shortest and slenderest of the principal spicules. The auxiliary spicules are chiefly confined to the dermal layer, where, as previously stated, they are disposed in bundles; in the interior they lie scattered, either singly or (more usually) in pairs.

Loc.—Port Jackson.

AXINELLA HISPIDA, var. TENELLA. (Pl. xxiii., figs.2, 3; Pl. xxii., fig.6; and text-fig,18).

Description.—Sponge erect, ramose, stipitate; of small size; with the branches disposed in one plane or in overlapping planes. Branches compressed in the plane of branching, and usually increasing in breadth upwards; stalk relatively very slender, and cylindrical or only slightly compressed. Surface hispid with spicules, which often project more than 1 mm. beyond it. Oscula apparently absent. Colour in spirit pale grey. Consistency firm, tough and elastic.

Of the two type-specimens, the larger and more robust (Pl. xxiii., fig. 2) measures 60 mm. in height and 1·5 mm. in diameter of stalk, and for the most part has only slightly compressed branches, which spread in the one plane. The slightly smaller, and more profusely-branched specimen (Pl. xxiii., fig. 3) has the branches very much flattened, and in consequence of the bifurcation of the stalk, is biflabellate; as, also, the branches are somewhat curled, it assumes a slightly aborescent form. Both specimens are (in alcohol) of a light yellowish-grey colour.

The main skeleton is composed in exactly the same way as in *R. gracilis,* but the longitudinally-directed extra-fibral spicules are more numerous in the present species, and they thus (unless the sections examined be fairly thin) tend to obscure the lattice-like pattern due to the interlacement of the spicule-strands. The spongin-fibres are colourless and (in balsam) quite invisible.

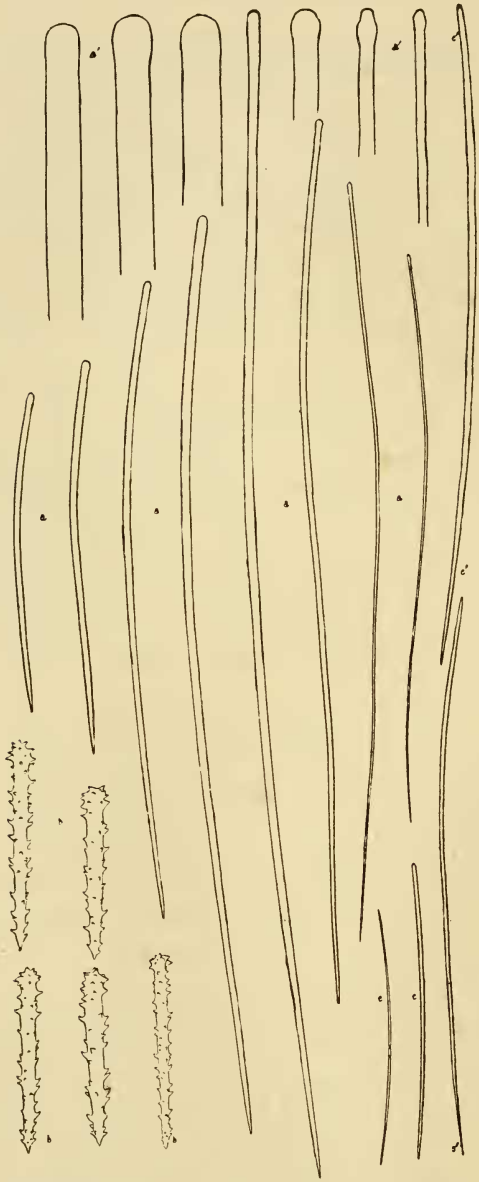

Fig. 18.—*Raspailia tenella*. *a*, Principal spicules; styli and subtylostyli. *a′*, Basal ends of principal spicules. *b*, Acanthostyli. *c*, Auxiliary oxea and styli; *c′*, the same, drawn to a larger scale.

The dermal skeleton, on the other hand, is quite different from that of *R. gracilis* and very closely resembles that of *R. viminalis* as depicted by Pick (**32**, Pl. iii., fig. 1). Externally to the fibres and the spicules of the main skeleton is a soft-tissued dermal layer, usually not less than 300 μ in thickness, and almost entirely free from scattered spicules; and this layer, which is crossed by the deeply-embedded long tylostyli which project beyond the surface, gives support superficially to elegantly radiate projecting tufts of auxiliary spicules. These tufts occur not only at the points of emergence of the tylostyli, but also between them.

Spicules.—(*a*) The principal megascleres are exclusively styli and tylostyli, which are similar in form and about equal in stoutness to the corresponding spicules of *R. gracilis,* and, like them (though to a less appreciable extent), exhibit some degree of differentiation into two groups; they range in length from about 380 to 1970 μ and obtain a diameter of 18 μ.

(*b*) The acanthostyles, when full-grown, are conically or slightly basally-knobbed spicules, with recurved spines (about 3 μ high), measuring 63 to 85 μ in length, and at their base 8 μ at most in diameter; the spines are scattered uniformly and pretty closely over the entire surface. The slender immature spicules range in length from less than 30μ to upwards of 60μ; the slenderest have almost invisibly minute spines, and are provided with a well-developed basal knob.

(*c*) The auxiliary spicules are styli and oxea; intermediate forms between these are rare or absent. The styli, which are by far the more abundant, are straight or (more usually) slightly curved, and taper towards the base; they vary between 280 and 410μ in length, and attain to 4·5μ in diameter. The oxea are shorter and slender, being very rarely more than 340μ in length, or more than 3μ in diameter. Apparently the latter occur only as single and paired scattered spicules in the interior; while the styli are found both in the interior (nearly always in pairs) and in the dermal tufts.

Loc.—Port Jackson.

Axinella aurantiaca. (Pl. xxii., fig.1; and text-fig.19).

Introductory.—Fortunately Lendenfeld has furnished us with a figure of this species, and the actual specimen from which the figure was taken is extant. Otherwise, owing to a mistake in the original description,—wherein the spicules are stated to be styli, instead of oxea (with only occasional styli) and flexuous strongyla —the species in all probability could never have been identified. But, with this exception, the description is fairly appropriate; and the omission from it of any mention of strongyla is attributable to the fact that these spicules are sometimes sufficiently scarce to be easily overlooked. The inaccuracies in this case, therefore, are to be explained as due to careless observation, and not to the commingling of the descriptions of two different species.

Description.—Sponge arborescent, erect, stipitate; with cylindrical pointed branches, which multiply by frequent dichotomy and occasionally anastomose at points of contact. The branches increase in stoutness towards the base, and may there attain a diameter of 12 mm. The surface is minutely granular, owing to the impingement upon it at very close intervals of outwardly running skeletal fibres. There is present a very thin, but well-defined dermal membrane, which remains intact when the sponge is carefully macerated with caustic potash solution. Small oscula, about 1 mm. in diameter, occur scattered at rather distant intervals. The canals leading into the oscula,—not only the main canals which open into the oscula, but also their chief tributaries—run for some distance immediately beneath the dermal membrane, and are faintly discernible through it. The specimen of Lendenfeld's figure measures 120 mm. in height, and is in an unusual degree profusely branched; large specimens may attain a height of 200 mm. The colour in life, according to the original description, is bright orange; spirit specimens are yellowish-grey, and those preserved in the dry state whitish. Except for a soft superficial layer about 1·5 mm. in thickness, the consistency is in alcohol very firm and tough, particularly in the older portions of the sponge. Dry specimens vary in consistency and texture, and present a very different appearance, according to the extent to which the fleshy substance has been removed. Those dried without previous maceration are slightly shrunken, have a rough, granular, usually uncracked surface, and are hard and brittle; on the other hand, well macerated and washed-out specimens, which are moderately flexible, show in each of the branches a dense core, and from this numerous short fibres stand out like bristles, producing an appearance not unlike that of a worn-down bottle-brush. The skeleton consists (i.) axially, of a stout, densely spicular, core occupying the whole interior of the branches to within about 1·5 mm. of the surface; and (ii.) extra-axially, of non-plumose, sometimes slightly wispy multispicular fibres, which, issuing in an obliquely upward direction from the core, run outwards at fairly regular distances apart, gradually curving on the way, to meet the surface almost at right angles. These fibres, which are composed of oxea held together by a barely discernible amount of spongin, usually remain unbranched, and are not connected by transverse fibres. Scattered spicules occurring between the fibres are extremely rare in the more superficial, canal-traversed, region of the sponge, but become more numerous in proximity to the core, and are there sometimes rather abundant. It is apparently owing to the gradual addition to the core, as growth proceeds, of the innermost of these spicules, (oxea) lying circum-

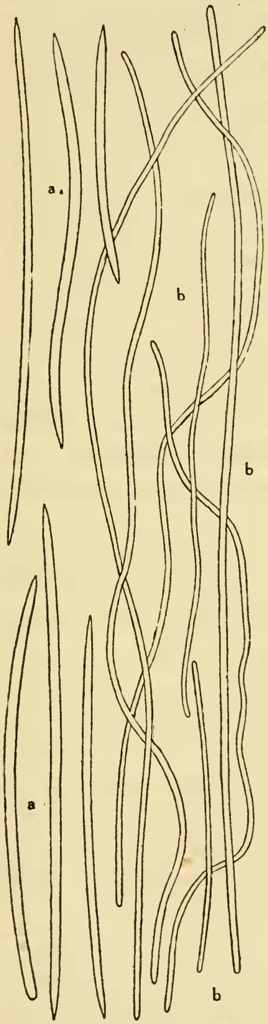

Fig. 19—*Axinella aurantiaca.* *a*, Oxea and occasional styli. *b*, Strongyla.

jacent to it, that the core becomes stouter with age; for one finds, in the older portions of the sponge, that the core consists of an outer (secondarily formed) layer composed of fairly closely packed oxea, and of an axial region which is differently constituted. In spite of the increase in size of the core, no appreciable reduction occurs in the width of the layer extending between it and the surface, nor does there seem to be any marked diminution in the number of the scattered spicules. The axial or first-formed region of the core, as seen in sections of an appropriate thickness, exhibits a structure very similar to that figured by Vosmaer(52) in illustration of the skeleton of the type-species of *Axinella.* It consists of: (i.) numerous longitudinally-running, and interlacing, multispicular fibres ("funicles"), which are similar in character to the already mentioned fibres that run out to the surface, and form a kind of reticulation with narrow elongated meshes; (ii.) intermingled with these, numerous slenderer diffuse strands, likewise composed of oxea, and usually more or less oblique to the axial direction; and (iii.) singly-occurring elongated flexuous strongyles,* which are interwoven with the fibres.

Spicules.—In different specimens, one finds differences in the sizes of the spicules, more particularly of the oxea, the differences being chiefly in stoutness and in average length. The maximum length, both of the oxea and the strongyla, appears to be fairly constant; but the relative number of spicules which attain to this varies considerably, and may sometimes be extremely small. The spicules which, throughout the description, have been referred to simply as oxea, include also a number of styli; these styli are usually rare, but, in one of several slides prepared from different parts of the type-specimen, they were met with rather frequently. Variability is shown also in the relative abundance of the

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* Whitelegge(54) says regarding the arrangement of the strongyles that they are "usually disposed at right angles to the columns of oxeote spicules in the main fibres." On the contrary, it seems to be the rule that, like almost all the other spicules composing the core, they have a more or less longitudinal disposition.

strongyles, which, always far fewer than the oxea, are sometimes very scarce. The characters of the spicules are as follows:—

(*a*) The oxea (and occasional styli) are in general slightly curved; are cylindrical to within a short distance (at most 40 μ) of their extremities; and taper, either evenly or somewhat irregularly, to usually sharp points. They range in length from about 220 to 500μ, occasionally to as much as 600μ; in some specimens, relatively very few exceed 400μ. The stoutest are sometimes not more than 12μ in diameter, and even so may be comparatively scarce; but, in other cases, spicules exceeding 12μ in stoutness are quite plentiful, and a diameter of as much as 17 μ may be attained. Spicules of all degrees of stoutness down to 2μ, and even less, are present.

(*b*) The strongyla are cylindrical and, in general, variously and irregularly flexuous. They vary in length, independently of diameter, from about 300 to upwards of 900μ; the longest observed in any specimen measured 1120 μ. The maximum stoutness is usually between 6 and 8 μ, but in occasional specimens may reach 11 μ. According to Whitelegge's measurements, the strongyla may attain a length of 1500 μ, but apparently this is an overstatement.

Loc.—Port Jackson and neighbourhood.

Axinella inflata.

I have failed to find, either in the collection of the Australian Museum or among the fragments received from the British Museum, any species which—in skeletal characters, at any rate—conforms to the description of *Axinella inflata* even in a remote way. An ostensible type-specimen (labelled "Dictyocylindrus inflata") does, indeed occur, and, in certain outward features, it exhibits points of agreement with the description; thus it is of "ramifying" habit, attains approximately to "a height of 100 mm.," and is also of "soft and resilient consistency"; but these resemblances are clearly only accidental, inasmuch as the branches are not "cylindrical," but more or less compressed, and are not terminally inflated, but, on the contrary, are much flattened at the extremities. The specimen (Pl. xxiii., fig. 5), which possesses a sparse reticulate skeleton of slender horny fibres cored with small strongyla, is identically similar to a fragment from the British Museum labelled *Chalinodendron dendrilla,*—and to that species it undoubtedly belongs.

For the identification of *Axinella inflata,* accordingly, one will have to depend solely on the scanty description of the species. If this description is correct, the species does not belong to *Axinella* in the strict sense, but to a new genus apparently possessing affinity with *Axinosia* (vide p.349). Until it is rediscovered, however, and its precise nature known, and while the genus *Axinella* still remains "a receptacle for all Axinellidæ which do not belong to more clearly defined genera," the species perhaps had better remain known, for the present, by its original name.

Axinella obtusa.

The same remarks apply to this species as have been made above in the first sentence and concluding paragraph of my remarks in reference to *Axinella inflata,* to which species *A. obtusa* appears, from its description, to be very closely related. A specimen labelled in Lendenfeld's handwriting, *"Dictyocylindrus obtusa,"* the MS. name corresponding to *A. obtusa,* according to the key-list—occurs in the Australian Museum, but neither in external nor internal features does it comply with the description of the species; it belongs to an undescribed species of *Raspailia,* similar to *R. tenella,* in the size and form of its spicules, and also in the possession of radiate tufts of dermal spicules, but approaching rather to *R. gracilis* in the precise pattern of its skeleton. In its external shape, however, irrespective of its relatively small size and slender proportions, the specimen exhibits a very considerable degree of correspondence with the description; and it is just possible, therefore, that the outward description of *A. obtusa* was based upon a much larger and more stoutly proportioned specimen of the same Raspailia species. Consequently, if, as seems not unlikely, this species should be found to grow to the size to which *A. obtusa* is stated to attain, there would be justification for regarding the latter species as synonymous partly with the former (which would then have to be called *Raspailia obtusa*) and partly with *Axinella inflata.*

Spirophorella digitata.

In the absence of a type-specimen, it is impossible to speak with certainty regarding this species; but there are peculiar circumstances surrounding it, which justify the suspicion that some serious mistake in connection therewith has been made. In the first place, one is at a loss to understand why a new genus was introduced for its reception, for, apart from the fact that Carter had some years previously proposed the genus *Trachycladus* for a species with essentially similar spiculation, Lendenfeld, in his paper on the Australian Chalininæ—published just immediately in advance of the Catalogue—had himself already proposed a genus *Spirophora,* whose definition and that of *Spirophorella* are virtually identical. Besides this, the identity of *Spirophora* with *Trachycladus* had been pointed out by Dendy, in his criticism of the paper above referred to, prior to the publication of the Catalogue. If it be suggested, in explanation, that Lendenfeld must have considered the slight differences to be of generic value which he ascribed to the species respectively assigned by him to *Spirophora* and to *Spirophorella,* the further question needs to be answered as to why he referred the two genera to different families, and having done so, why he has omitted, in his remarks on the latter, to make any reference whatsoever to the former, while yet deeming it of sufficient importance to observe that *Spirophorella* "appears very similar to *Spiretta,*"—a Tetractinellid genus having no other special point of agreement with the genus in question than the possession of spiral microscleres. One cannot suppose that the idea of a relationship between his species of *Spirophora* and *Spirophorella* did not occur to Lendenfeld, since evidently the one generic name is coined from the other; and, furthermore, it would seem as if he shortly afterwards decided to regard the two genera as identical, for in his paper(28) published but a year later than the Catalogue, in which a complete classification of the sponges is proposed, only one of these genera, viz., *Spirophorella*, receives mention. Hence one would have thought that, as a precaution, in view of the possibility of its becoming necessary later to unite the genera, the author would have avoided using similar specific names in the two cases; yet we find that the first-described of the two species of *Spirophora* and the single species of *Spirophorella* are both designated *digitata*, a name which moreover, is altogether inappropriate as applied to the latter, since the species is, according to description, "irregular, massive." The explanation of these anomalies, I think, must in some way be connected with the fact that the manuscripts of the Catalogue and of the paper on the Chalininæ were in course of preparation at one and the same time. It is possible that Lendenfeld, having at first intended to refer the the genus *Spirophora* to the Gelliinæ, and having described two species of it for inclusion in his paper on the Chalininæ, afterwards decided to refer the genus to the *Axinellidæ*, and to introduce it in the Catalogue, but through an oversight omitted to delete the paragraphs relating thereto from the manuscript of the former paper; hence, that *Spirophorella* is merely another spelling for *Spirophora*—preferred perhaps on account of the similarity between the names *Spirophora* and *Spiriphora;* and that *Spirophorella digitata* is nothing more than *Spirophora digitata* wrongly described in respect of its external characters. Support to this suggested explanation is provided by the fact that, in the key-list of Lendenfeld's manuscript names, *Spirophora digitata* is written as the MS. synonym of *Spirophorella digitata.*

Several specimens labelled *Spirophora digitata,* in Lendenfeld's handwriting, occur in the Australian Museum, and these I regard as correctly representing that species, which must now be called *Trachycladus digitatus.* Contrary to Lendenfeld's description, however, the megascleres are not styli, but almost exclusively oxea, and the microscleres are of two kinds, spirulæ and microstrongyles. A description of this, and of some other species of *Trachycladus,* will be given in my next paper.

APPENDIX.

Hemitedania, gen.nov.

Tedaniinæ in which the skeleton is a reticulation of spiculo-spongin fibre, and the only megascleres are smooth oxea or tornota. The raphides are spinulous, and are typically provided, near one extremity, with a bulbous dilatation.

The raphides of *Amorphina anonyma*, I find, exhibit characters which render it certain that the species is closely allied to *Tedania*, and particularly to such species as *T. pectinicola* and *T. fuegiensis* Thiele(**42**); and as its possession of well-defined sponginous fibres is additional reason against the inclusion of this species in the genus *Rhaphisia*, to which Dendy referred it (and which, by the way, Lundbeck(**31**) with some justification regards as a synonym of *Gellius*), I accordingly propose for its reception a new genus, *Hemitedania.*

Spinulous raphides—or onychetæ, as Topsent(**48**) has termed them—peculiar in having a subterminal bulb, occur also in two undescribed species (represented by specimens in the Australian Museum) in which the megascleres are styli and strongyla, and which, in skeletal structure, differ markedly both from typical species of *Tedania* and from each other. One of these species, for which a new genus will certainly be required, is remarkable in possessing peculiar acanthostyle-like spicules, which undoubtedly are derivatives of onychetæ, but attain a size of 115 by 6 μ; they have a slightly roughened surface, a subfusiform shape, and an abruptly truncated base provided with a central mucro and a circumferential whorl of minute spines. Another species, which I consider to be related to *Tedania*, and for which a new genus is probably necessary, is that described by Kirkpatrick(**24**) under the name *Oceanapia tantula.*

Concerning the systematic position of *Tedania* and its allies, there is not yet agreement of opinion, though generally they are placed along with the genera formerly included in the subfamily Dendoricinæ; Dendy, however, has always favoured the recognition of a subfamily Tedaniinæ which he would include in the *Haploscleridæ.* In view of the difficulty in classification occasioned by the genus *Hemitedania,* it seems to me advisable, if not necessary, to retain the family Tedaniinæ, though, at present, I am unable to form an opinion as to whether it should be placed under the *Haploscleridæ* or the *Desmacidonidæ.* A very considerable resemblance certainly exists between *Trachytedania* and certain Myxilline genera like *Lissodendoryx*, but inasmuch as no form of spicule, affording evidence of an homology with the onycheta, is known in any of these genera, there is no sufficient warrant for regarding the resemblance as other than the result of convergent evolution.

HEMITEDANIA ANONYMA Carter. (Pl. xviii., fig.4; Pl. xix., figs.1-5; Pl. xxiv., figs.3-5; and text-fig.20).

1886. *Amorphina anonyma;* Carter(**7**), p.49.
1895. *Rhaphisia anonyma;* Dendy(**12**), p.256.
1888. *Reniera pandæa*(partim); Lendenfeld(**27**), p.79.
——. *Halichondria rubra*(partim); Lendenfeld(**27**), p.81.
——. *Halichondria rubra* var. *digitata*(partim); Lendenfeld(**27**), p.81; not Pl. ii., fig.1(= *Raspailia agminata*, sp.n.).
1901. *Rhaphisia rubra;* Whitelegge(**54**), p 77.
1902. *Rhaphisia pandæa;* Whitelegge(**56**), p.281.

The material at my disposal comprises some twenty specimens from Port Jackson and neighbouring localities; a specimen from Port Phillip; and a slide-preparation of *Rhaphisia anonyma*, presented to the Australian Museum by Prof. Dendy.

Description.—In the simplest form, the sponge is an irregularly digitate cluster of stout branch-like parts (Pl. xix., figs.1-4), which are united below, forming a sessile base; the branches are tubular, with a single osculum at the summit, are cylindrical and slightly tapered, may attain to a length of 200 mm. or more, and, while ordinarily not much less than 20 mm. in diameter, vary in stoutness in different specimens from 10 to 30 mm. More usually, however, a formation into separate tubes is only partially effected, and the sponge accordingly consists, in part, of more or less flabellate portions with marginal oscula (Pl. xix., fig.5). Finally, the branching habit is often almost entirely suppressed, and the sponge is then lobose, semi-massive, as a rule more or less compressed, with the oscula situated on the uppermost and prominent parts. The surface is free from characteristic inequalities, and, in general, is smooth and even; a dermal membrane is present, and, though thin, is usually well-defined. The oscular tubes, whose diameter varies from 3 to (rarely) 10 mm., are lined by a stouter and tougher membrane, which also forms numerous diaphragm-like dissepiments stretching across their lumen. Concerning the life-colour, which is known with certainty only in the case of Port Phillip specimens, Dendy states that "orange is the prevailing tint and there are no very great deviations from this"; the colour in spirit ranges from dull yellowish-white to a pale brown. Well preserved specimens are of firm, sometimes slightly cartilaginous, moderately tough consistency, and are brittle rather than flexible; but apparently the sponge readily undergoes some amount of maceration, with the result that, as a rule, spirit-specimens are comparatively soft, compressible, and resilient. The consistency depends to some extent upon the degree of coarseness of the fibres, which is variable. Specimens dried in the ordinary way (without previous removal of the sarcode) are light, open, and somewhat bread-like in texture, and, considering their horny fibrous skeleton, are somewhat brittle. The fibrous reticulate skeleton, obtained by treatment with caustic potash, presents certain constant features, but, in different specimens, varies greatly in the closeness of its texture and in elasticity, and to some extent also in colour and pattern. A dense irregular network of stouter (primary) fibres bounds each of the oscular tubes, and from this—taking the (simple) case of a separate branch - dendritically branching, secondary fibres run out (in a slightly upward direction) to the surface; these secondary fibres, which to within a short distance of their outer extremities are connected together by (usually plexus-forming) cross-fibres, are disposed in such a way that the skeleton, viewed from the exterior, presents a very imperfectly honeycomb-like structure. The colour of the skeleton varies from yellowish-white to golden-yellow, according to the degree of development of spongin.

As seen in section under the microscope, the skeleton-reticulation is of a very irregular pattern, and the fibres are of very varying stoutness; the latter are composed of roughly parallel spicules cemented by spongin, which usually forms a distinct sheath, but sometimes is barely more than sufficient in quantity to hold the spicules together. The primary fibres attain a diameter ranging in different specimens from about 80 to 130 μ, while the slenderest of the connecting fibres are but two or three spicules broad; single connecting spicules also occur. In the meshes of the reticulation, megascleres are scattered in some abundance, together with a few raphides; in the canal-traversed soft tissues occupying the wider interstices of the skeleton, on

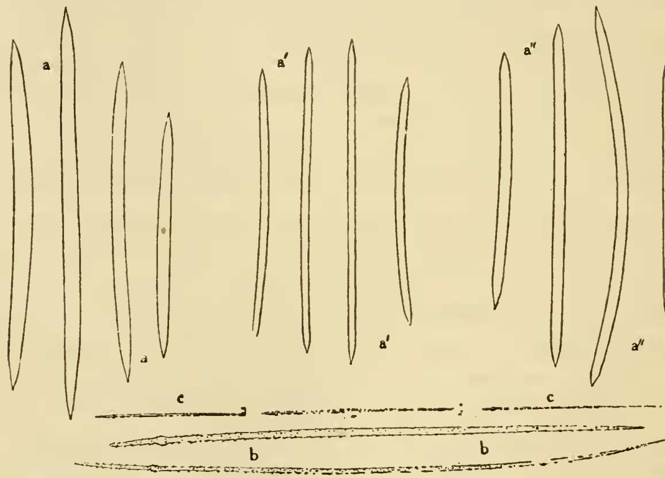

Fig. 20.—*Hemitedania anonyma.* *a*, Oxea, from each of three different specimens. *b*, Onychetæ.

the other hand, it is the raphides which are the more numerous. In addition to the fibres which compose the reticulation, separate strands of loosely associated parallel spicules, free from spongin, occur, sometimes consisting of oxea alone, more frequently of oxea and raphides in variable proportion, and apparently sometimes of raphides alone. The raphides also occur in dragmata, but these are sometimes extremely scarce. The dermal skeleton consists of vertical tufts of megascleres projecting slightly beyond the surface, and usually so disposed in linear series as to produce a more or less distinctly reticulate pattern; these tufts, for the most part, are the outer ends of radiating spicule-strands into which the outwardly running (secondary) fibres of the main skeleton break up on nearing the surface.

Spicules.—(*a.*) The oxea are mostly straight or nearly so, and abruptly sharp-pointed (tornotiform); among them, rare individuals occur, which are more or less rounded off at one extremity (stylote). Their maximum size in different specimens is fairly constant as regards length, but variable as regards stoutness: in Dendy's slide of *Rhaphisia anonyma*, they measure from 155 to 265 μ in length by at most 6 μ in diameter; in the type-specimen of *Reniera pandæa*, 165 to 245 by 8 μ; in the type-specimen of "*Halichondria rubra*," 160 to 230 by about 7 μ; and in another specimen, of unusually cartilaginous consistency, 150 to 275 by 12 μ.

(*b.*) The raphides are straight, slightly fusiform, asymmetrical with regard to opposite extremities; they taper gradually to a very fine point at one extremity, are abruptly truncated and produced into a minute extra-axial mucro at the other, and, at a distance of between one-sixth and one-tenth their length from the latter end, exhibit a small bulbous dilation. The spinules are very minute, are most pronounced at the basal end of the spicule, and, gradually diminishing in size, finally become indiscernible somewhere about the middle of the spicule. The spicules are of two sizes, the larger being the more numerous. The smaller occur plentifully in Dendy's slide of *R. anonyma*, but, in all the other specimens examined, including the one from Port Phillip, they are rather rare and in some cases apparently absent. In the two Port Phillip examples, the longer raphides measure from 135 to 175 μ, while in the Port Jackson examples, with one exception (viz., the specimen with oxea 12 μ in diameter), they are shorter, having a maximum length varying between 138 and 150 μ; their maximum stoutness varies in different specimens, proportionately with that of the megascleres, from less than 1 μ to about 2 μ. The smaller raphides are extremely slender, and seldom more than 40 or 50 μ long.

Locs.—Port Jackson and neighbourhood; Port Phillip.

HISTODERMA ACTINIOIDES sp.nov. (Pl. xxii., fig.3; and text-fig.21).

1888. *Stylotella polymastia* (err.), Lendenfeld(**27**), Pl. iv., fig.1.

——. *Sideroderma navicelligerum* R. et D. (err), Lendenfeld(**27**), p.210.

The sponge is of massive rounded form, and apparently grows attached by a narrow base. From the surface, over its entire extent, arise numerous longer or shorter digitiform, tapering, lax tubular processes (with thin membranous wall), which somewhat resemble the tentacles of a sea-anemone. Between the processes, the surface is smooth, and either even or much wrinkled. Oscula appear to be absent. The colour in alcohol is pale yellowish-grey within, and more whitish on the surface. The consistency is firm, compact, moderately tough and compressible, yet brittle rather than elastic. The dermal layer does not form a noticeable rind, but is thin and closely adherent to the underlying tissue.

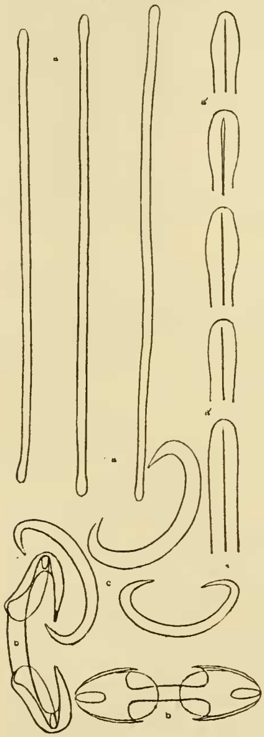

Fig.21.
Histoderma actinioides. *a*, Tylota. *a′*, Extremities of tylota. *b*, Isochelæ arcuatæ. *c*, Sigmata.

The single example*(Catalogue, Pl. iv., fig.1), which is a half-specimen, would, when complete, measure about 100 by 80 by 55 mm., in its three principal diameters. The tubular processes vary in length up to about 20 mm., and are 2 to 4 mm. wide at the base.

The main skeleton consists of non-reticulating fibres running in various directions without regular course, and, scattered between these, of plentiful single spicules, and spicules aggregated in bundles and strands. The fibres

* Another specimen of the species has since been found among a collection of sponges belonging to the Department of Biology, Sydney University, and is figured in the present paper.

are of very variable stoutness, occasionally attain to 100 μ in diameter, and are composed of roughly parallel spicules usually not very compactly arranged. Spongin appears to be entirely absent. The microscleres are scattered chelæ and sigmata, the former rare except in the outermost layer of the dermis, the latter fairly abundant and occurring only in the choanosome. The dermal layer, which is never much more than 100 μ in thickness, is provided with moderately abundant single spicules disposed horizontally in several layers and crossing one another in various directions. In the fistulæ, however, the dermal skeleton (which is there the only skeleton) undergoes a gradual alteration in its arrangement, and towards their extremities becomes a reticulation of stout fibres. The meshes of this reticulation are tympanised by a thin membrane, which is perforated with numerous rounded pores varying from 15 to upwards of 80 μ in diameter.

Spicules.– (*a.*) The megascleres, which vary in form from tylota to strongyla, the tylota being the more numerous, are nearly or quite straight and scarcely, if at all, stouter at the middle than towards the ends. The end-swellings of the tylota are elongate and oblongish in shape, and, as a rule, are more pronounced in the stouter spicules than in the slenderer. The very slenderest (developmental) spicules are invariably strongyla, and usually taper slightly from one end to the other. The maximum size of the megascleres is 430 by 10 μ, and their length seldom falls below 320 μ.

(*b.*) Isochelæ arcuatæ, 12·5 to 18 μ long, with the distal end of the alæ pointed and abruptly incurved, and apparently with a tooth-like prolongation of the tubercula.

(*c.*) Simple and contort sigmata, 33 to 42 μ long from bend to bend, and at most 3·5 μ stout.

Embryos.—A few embryos of oval shape, the largest measuring 900 by 600 μ, were observed, most of which were provided with spicules in the form of equal-ended tylota of size rarely exceeding 190 by 2 μ. The spicules were usually scattered throughout the entire body of the embryo, but, in a few cases, were chiefly collected in a loose bundle situated near one end. The largest embryo without spicules measured 700 by 500 μ, but others, of smaller size than this, were present, which contained quite abundant spicules.

Loc.—Port Jackson.

Raspailia agminata, sp.n (Pl. xxiii., fig.4; and text-fig.22).

1888. *Halichondria rubra* var. *digitata* (err.) Lendenfeld(**27**), Pl. ii., fig.1.

Description.—Sponge a compact tussock-like sessile cluster of erect tapered branches, which combine below into gradually fewer and stouter stems ultimately proceeding from a narrow area of attachment. An adequate idea of the outward form is conveyed by the figure of the single specimen (Pl. xxiii., fig.4), which measures 95 mm. in height. The surface is smooth, or in places minutely pustulate; and is sparingly hispid with spicules which project about 1 mm. beyond it. The colour in spirits is greyish-white, and the consistency fairly tough, compressible, and resilient.

The main skeleton, which is not condensed in the axial region, consists: (i.) of an irregular wide-meshed reticulation of pale slender spongin-fibres echinated, as a rule unilaterally, by moderately closely-spaced acanthostyles, the principal fibres of which are cored by pauciserial tylostyli, while the (usually plexus-forming) connecting fibres are with rare exceptions aspiculous; and (ii.) of, for the most part, longitudinally-directed styli and tylostyli lying between the fibres. In sections mounted in balsam, the spongin is scarcely or not at all discernible, and the by no means dense skeleton appears as if composed solely of spicules. An outermost layer of the sponge, which is sometimes as much as 0·5 mm. in width, though usually much narrower, is comparatively or quite free from spicules, excepting that it is crossed by the long styli, which hispidate the surface and give support superficially to tufts of small (auxiliary) spicules surrounding the points of exit of these styli. Auxiliary spicules also occur, in very small number, and usually not singly, but in pairs, scattered through the interior.

Spicules.—(*a.*) The principal megascleres are partially differentiated into groups, styli and tylostyli, the latter of which are almost invariably sharp-pointed, while the former are often more or less rounded off at the apex and occasionally pass into more or less abbreviated strongyla; both kinds are (usually not much) curved, especially in their basal moiety. The tylostyli, which are seldom, if ever, less than 950 μ long, are of very varying stoutness, and have the bulb less pronounced in proportion as they are stouter; between tylostyli and styli of the same length, there are all intermediate gradations. The styli are always proportionately stouter than the tylostyli, and range in length from about 450 to 2800 μ; their maximum diameter is 28 μ.

(*b.*) The acanthostyles are straight, conical spicules, measuring at most 12·5 μ in stoutness, and varying from 80 to upwards of 190μ, though rarely exceeding 150 μ in length. The spines are recurved, generally between 2 and 4 μ in height, and nearly always are more or less reduced in number over portion of the basal half of the spicule.

(*c.*) The auxiliary spicules are styli and asymmetrically-ended oxea, straight or slightly curved, the latter comparatively few in number and, on the average, shorter and slenderer than the styli. They measure from 245 to about 400μ in length, and seldom as much as 6 μ in stoutness.

Loc.— Port Jackson.

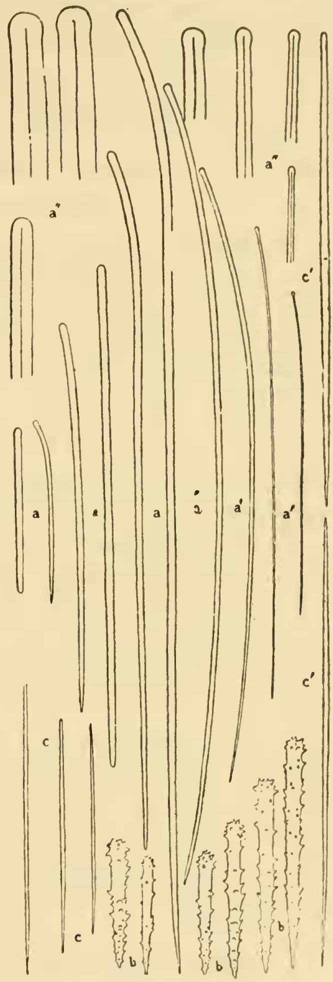

Fig.22.

Raspailia agminata. *a*, *a′*, Principal spicules, styli and tylostyli with occasional substrongyla. *a″*, Basal ends of principal spicules. *b*, Acanthostyli. *c*, Auxiliary oxea and styli. *c′*, The same drawn to a larger scale.

Remarks.—The occurrence, as in this species, of auxiliary spicules in pairs – in incipient dragmata, as it were—is perhaps not uncommon in the genus *Raspailia*; although, as far as I am aware, no mention of it has hitherto been made. I have observed it not only in the three species of this genus described in the present paper, but also in *R. atropurpurea* (Carter) Whitelegge(54), and in the allied genus *Clathriodendron*(18).

AXIAMON, gen.nov.

Axinellidæ(?), typically of ramose or flabellate habit, and with conulose or lamelliferous surface, in which the characteristic megasclere is an oxea with spinose extremities, and the skeleton is a lattice-like reticulation of fibres formed of these spicules (and admissibly also of derivatives of them) cemented and ensheathed by spongin. Microscleres are absent.

The nearest approach I know of to the type of skeleton-reticulation typical of this genus, I have observed in an undescribed sponge from New Zealand; but, in the latter—which thus belongs to an unnamed genus—the fibres are cored by smooth styli, and echinated by rare distally spined rhabdostyli. I have also observed a somewhat similar type of skeleton in an undescribed species of *Trikentrion* from North-west Australia. As it seems highly probable that the New Zealand sponge is generically related to *Trikentrion* (but distinguished in having *stylote* instead of oxeote megascleres and cladose acanthostyli with only *one basal actine* instead of several), I am inclined to think that *Axiamon* also is related to *Trikentrion*, and thus of "Ectyonine" origin. Since, however, the genus is lacking in any character that would warrant its inclusion in the *Desmacidonidæ* as at present defined, the only course open seems to be to place it in the *Axinellidæ*.

In the form of its spicules, the type-species, *A. folium*, sp.nov., shows analogies, probably indicative of relationship, with *Axechina raspailioides* Hentschel(21); and it also presents points of agreement with *Thrinacophora funiformis* Ridley & Dendy.

A species, which, I believe, will be found to belong to *Axiamon*, has been described by Carter(6), from Australia(?), under the name

Ptilocaulis rigidus. But there is perhaps equal justification for the view expressed by Thiele(**39**), that this species should be included in the genus *Phycopsis*; and it is quite likely that *Phycopsis* and *Axiamon* are closely allied.

Axiamon folium, sp.nov. (Pl. xviii., figs.2, 3; Pl. xxiv., figs 7, 8; and text-fig.23).

1902. *Reniochalina stalagmites*(err.) + *Reniochalina lamella*(err.), Whitelegge(**56**), p.283.

Two specimens only are at hand – those which Whitelegge very briefly and not quite accurately described as the types respectively of *Reniochalina stalagmites* and *Reniochalina lamella*; and as these differ to some extent in certain external features, and may thus be varietally distinct, it is advisable to mention that I choose, as the typical specimen, that which Whitelegge took to be *R. stalagmites*.

Description.—Sponge flabellate, stipitate; the lamina entire, or palmato-digitate, or deeply dissected into branch-like parts. Surface ornamented with longitudinal close-set septiform ridges, usually either deeply notched at short intervals or segmented into separate languettes; between the ridges, the lamina is exceedingly thin except in the region of the stalk. Consistency in the dry state, dense, hard, tough, flexible within limits; colour greyish-brown.

The digitate typical specimen (Pl. xviii., fig.2), which is incomplete below, measures 250 mm. in height, and is provided with highly segmented ridges averaging 3 mm. in height, and set at a distance apart of from 2 to 3 mm. The second specimen (Pl. xviii., fig.3), 145 mm. in height, has continuous though deeply crenate ridges, averaging 1·5 mm. in height and 1 to 2 mm. in distance apart.

The main skeleton is a compact lattice-like reticulation with, for the most part, rhomboidal meshes, composed of spongin-ensheathed spicules arranged (somewhat confusedly) in pauci-serial fibres; the sides of the meshes are of about a spicule's length. Better defined primary fibres are sometimes observable running longitudinally and gradually trending outwards; but, as a rule, no distinction between main and connecting fibres can be drawn. Spongin is developed only in relatively slight amount in the younger parts of the sponge, but later comes to form well-defined fibres (up to 60 μ in diameter) enclosing the spicules and rounding off the angles of the meshes. Many spicules, however, remain uncovered by spongin; and, on the other hand, a small

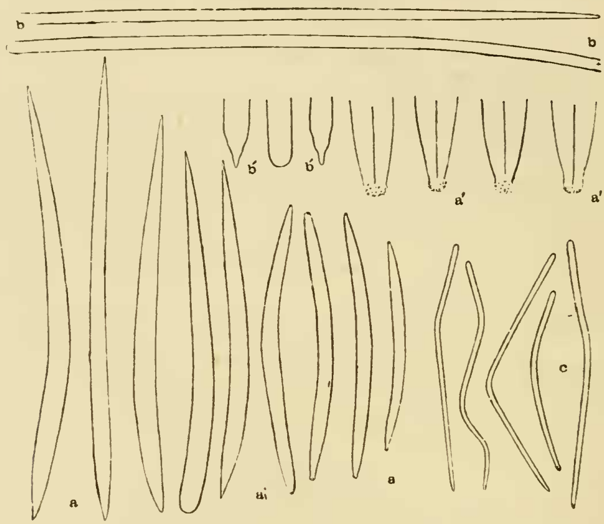

Fig. 23.—*Axiamon folium.* *a*, Principal oxea, anisoxea, and styli. *a'*, Extremities of principal spicules. *b*, Interstitial stylus. *b'*, Basal extremities of interstitial styli. *c*, Dermal styli.

proportion of short fibres are to be found composed entirely of spongin. The spiculation consists almost entirely of the characteristic oxea and of unequal-ended derivatives of these (anisoxea); but here and there, in some parts of the sponge at least, a long slender stylus may be met with; and, in the most superficial layer of the sponge, a very few small dermal spicules occur, lying scattered. The surface is rendered hispid by anisoxea projecting singly or in twos or threes, for three-fourths or more of their length, usually in an obliquely upward direction.

Spicules.—(*a.*) The oxea and anisoxea, which range from 180 to 420 μ in length, and up to 21 μ in stoutness, are moderately (and, as a rule, slightly angulately) curved, the oxea symmetrically so, the anisoxea only in their basal moiety. The shortest and slenderest spicules are invariably oxea, the longest and stoutest, anisoxea; those of intermediate dimensions include both oxea and anisoxea, and all possible gradations between them. Many of the slenderest oxea are (gradually) sharp-pointed at both ends, and most of the anisoxea are (somewhat abruptly) either sharp-pointed or more or less bluntly rounded off at the basal end; but, with these exceptions, the extremities of the spicules are almost invariably surmounted by a cap of minute spinules. Occasional spicules are stylote.

(*b.*) Exceedingly rare, long, slender styli, tapering very gradually to a fine point at the apex, sometimes abruptly somewhat pointed at the base, and measuring from about 550 to 1200 μ in length by 7 to 12 μ in stoutness.

(*c.*) Small dermal styli, straight or variously bent or flexuous, either gradually or more or less abruptly sharp-pointed, and, in the latter case, usually provided near the apex with a few minute spines; measuring 190 to 280 μ in length by 3 to 5 μ in stoutness.

Loc.—Western Australia.

Remarks.—In the British Museum, in addition to a specimen of this species (labelled "*Reniochalina stalagmites*"), there occur two further examples of the genus *Axiamon*, labelled respectively "*Reniochalina spiculosa* Port Jackson," and "*Reniochalina arborea*, New Zealand." These have oxeote and anisoxeote megascleres of almost or quite identically the same size and form as those of the type-species, but they appear to be entirely lacking in the other kinds of spicules. The former, of which I have seen only a small fragment, is apparently not widely different in surface-features from the typical specimen of *A. folium*; but the latter—which is represented also in the Australian Museum, by an almost complete specimen—has a peculiar densely conulose surface, and is obviously a quite distinct species.

For Reference List of Literature, see *antea*, pp.310-313.

EXPLANATION OF PLATES XV.-XXIV.

Plate xv.

Fig. 1.—*Sollasella digitata* Lendenfeld; ($\times \frac{2}{3}$).

Fig. 2.—*Sollasella digitata* Lendenfeld, from the type; ($\times \frac{2}{3}$).

Fig. 3.—*Donatia fissurata* Lendenfeld; (slightly reduced).

Fig. 4.—*Donatia phillipensis* Lendenfeld; surface-section showing the dermal reticulation, the primary meshes of which are subdivided (by lines of tylasters) into smaller meshes, each enclosing a pore; ($\times$ 18).

Fig. 5.—*Spirastrella*(?) *australis* Lendenfeld; a flabellate example; ($\times \frac{1}{2}$).

Fig. 6.—*Polymastia zitteli*, from the type of *Sideroderma zittelii* Lendenfeld; (nearly nat. size). The specimen is in a fragmentary condition.

Plate xvi.

Fig. 1.—*Cliona* (*Papillissa*) *hixoni*, from the type of *Raphyrus hixonii* Lendenfeld; portion of the exterior, showing the character of the surface-areolation; ($\times \frac{3}{4}$).

Fig. 2.—*Cliona* (*Papillissa*) *hixoni*; showing the skeleton (after maceration by means of caustic potash) of a thick slice of a small specimen; (nat. size).

Figs. 3-4.—*Cliona* (*Papillissa*) sp., allied to *Cliona hixonii*; portions of the concave and convex surfaces respectively of a specimen having the form of a thick, curved plate, showing the character and arrangement of the surface-papillæ; ($\times \frac{3}{4}$).

Plate xvii.

Figs. 1, 2.—*Cliona* (*Papillissa*) *lutea*, from the types of *Papillissa lutea* Lendenfeld; ($\times \frac{1}{2}$).

Fig. 3.—*Spirastrella*(?) *australis* Lendenfeld; showing the skeleton (as prepared by maceration by means of caustic potash) of the specimen illustrated in Pl. xv., fig. 5; ($\times \frac{1}{2}$).

Fig. 4.—*Amorphinopsis megarrhaphea* Lendenfeld; dermal skeleton; ($\times$ 8).

Fig. 5.—*Amorphinopsis megarrhaphea* Lendenfeld; pattern of the skeleton as shown in portion of a moderately thin section ($\times$ 10 approximately).

Fig. 6.—*Tedania digitata* var. *rubicunda*, from the type of *T. rubicunda* Lendenfeld; ($\times \frac{1}{2}$).

Plate xviii.

Fig. 1.—*Caulospongia elegans*, from the type of *Plectodendron elegans* Lendenfeld; ($\times \frac{3}{7}$).

Fig. 2.—*Axiamon folium*, sp. nov.; ($\times \frac{4}{9}$).

Fig. 3.—*Axiamon folium* (var.?); ($\times \frac{4}{9}$).

Fig. 4.—*Hemitedania anonyma* Carter; from a specimen of somewhat cartilaginous consistency, and with coarse-fibred skeleton; ($\times \frac{1}{2}$).

Plate xix.

Fig.1.—*Hemitedania anonyma* Carter, from a specimen labelled as the type of *Halichondria rubra* Lendenfeld; ($\times \frac{3}{4}$).

Fig.2.—*Hemitedania anonyma*; from a macerated, coarse-fibred specimen; ($\times \frac{1}{2}$).

Figs.3, 4, 5.—*Hemitedania anonyma*; illustrating various forms assumed by examples of this species; ($\times \frac{1}{2}$ approximately).

Plate xx.

Fig.1.—*Chalina finitima* Whitelegge (non Schmidt); an incomplete specimen.

Fig.2.—*Phlœodictyon ramsayi*, from one of the co-types of *Rhizochalina ramsayi* Lendenfeld; illustrating a specimen of irregular shape provided with *many* root-like processes.

Fig.3.—*Phlœodictyon ramsayi* var. *pyriformis* (var.nov.) ; portion of the upper surface showing the sieve-like area formed by the closely apposed oscula; ($\times \frac{2}{3}$)

Figs.4-5.—*Phlœodictyon ramsayi*; tangential sections close beneath the surface, showing the pattern of the reticulation formed by fibres of the bast-layer in the wall of the fistula and in between the fistulæ respectively; ($\times$ 10).

Plate xxi.

Figs.1, 2, 3, 4.—*Stylotella agminata* Ridley, from type-specimens of *Stylotella digitata* Lendenfeld, and of *Tedania laxa* Lendenfeld; ($\times \frac{1}{2}$ approximately).

Fig.5.—*Stylotella agminata* Ridley; further illustrating the variable habit of the species.

Plate xxii.

Fig.1.—*Axinella aurantiaca* Lendenfeld; longitudinal median section taken at the extremity of a thin branch; ($\times$ 15).

Fig.2.—*Stylotella agminata* Ridley; longitudinal section taken at the extremity of a branch; ($\times$ 12).

Fig.3.—*Histoderma actinioides*, sp.nov.; ($\times \frac{2}{5}$ approximately).

Fig.4.—*Phlœodictyon ramsayi* Lendenfeld, var. *pyriformis* (var.nov.); inner surface of longitudinally bisected specimen, showing disposition of oscular canals; ($\times \frac{2}{5}$).

Fig.6.—*Spirastrella*(?) *ramulosa* Lendenfeld; showing the skeleton which remains after maceration by means of caustic potash; ($\times \frac{3}{5}$).

Fig.6.—*Raspailia tenella* Lendenfeld; longitudinal median section taken at the extremity of a branch; ($\times$ 12).

Fig.7.—*Raspailia gracilis* Lendenfeld; longitudinal section of a branch; ($\times$ 9).

Plate xxiii.

Fig. 1. *Raspailia gracilis*, from the type of *Axinella hispida* var. *gracilis* Lendenfeld; (× $\frac{3}{4}$).

Figs. 2-3.—*Raspaila tenella*, from the types of *Axinella hispida* var. *tenella* Lendenfeld; (× $\frac{3}{4}$ approximately).

Fig. 4.—*Raspailia agminata*, sp. nov.; from the specimen wrongly figured in the Catalogue (Pl. ii., fig. 1) in illustration of *Halichondria rubra*, var. *digitata* Lendenfeld; (× $\frac{3}{4}$).

Fig. 5.—*Chalinodendron dendrilla* Lendenfeld; (× $\frac{4}{5}$).

Plate xxiv.

Fig. 1.—*Mycale* (*Paresperella*) *penicillium* Lendenfeld; dermal skeleton; (× 18).

Fig. 2.—*Tedania digitata* var. *rubicunda* Lendenfeld; dermal skeleton; (× 18).

Figs. 3, 4, 5.—*Hemitedania anonyma* Carter; dermal skeleton; (× 18).

Fig. 6.—*Mycale serpens* Lendenfeld; dermal skeleton.

Figs. 7, 8.—*Axiamon folium*, sp. nov.; pattern of the skeleton as shown in moderately thin sections. Fig. 7, (× 10).