

Shell.	Station.	Distribution.	Remarks.
Acanthopleurus spiniger, Sow. [piceus, Gmel.].	Frequent (teste Carp.).	Pacific and Philippine Islands. [Darney I., Torres Straits, Port Jackson, West Indies.]	ceedingly both in number and in strength. There may be points of distinction which can be advanced, but at present I cannot separate these specimens from piceus, Gmel., a common West-Indian shell. The girdle, in particular, in each set of shells is studded with exactly similar ivory-white tusk-like moss. Springer, Sow., seems a different species altogether.
Toncia suezensis, Reeve .. Acanthochites coarctatus, Sow. — scutigera, Ad. & Reeve [discrepans, Brown].	Not frequent. One specimen. Rare.	Philippines. .....	There are half a dozen specimens, which I cannot separate from Mediterranean specimens of discrepans, Brown; they correspond in the minutest particular. Scutigera is said by Reeve (Conch. Ic.) to be described in the 'Samarang;' but although there are two Chitons figured on pl. xii., no reference to them is made in the letterpress, nor is there any key to the plates.

[To be continued.]

XXVII.—Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued. By H. J. CARTER, F.R.S. &c.

[Continued from vol. xv. p. 321.]

FOR ready reference I will also here insert a tabular view of my arrangement of the order RHAPHIDONEMA, as I shall take this (probably my last) opportunity of offering such revisionary remarks on it as my experience since it was published in 1875 seems to dictate. It is as follows:—

Order IV. RHAPHIDONEMA.

Families. Groups.

- 1. *Chalinida* ..... { 1. Digitata.  
2. Palmata.  
3. Reptata.  
4. Spinifera.  
5. Tubulodigitata.  
6. Aculeata.  
7. Subaculeata.
- 2. *Cavochalinida* ..... { 8. Ciliata.  
9. Bivalvata.  
10. Compladata.  
11. Plicata.
- 3. *Acervochalinida* ..... { 12. Solida.  
13. Clathrata.  
14. Dictyalia.
- 4. *Pseudochalinida* ..... { 15. Digitifera.  
16. Fistulodigitata.

The diagnosis which I have given for this order—viz. "Possessing a skeleton composed of horny fibre with a core of proper spicules. Form of spicule chiefly simple acerate and chiefly confined to the interior of the fibre,"—is too short and indefinite to lead the student to the more useful or distinguishing characters of that kind of sponges which the order is intended to comprise, whose typical structure, to which I shall hereafter more particularly allude, may be taken from that of *Chalina polychotoma*, Esper. What this type is we learn from Johnston, who, with a specimen of the British species before him, identified it with Esper's "*Spongia polychotoma*, tab. xxxvi." (Johnston, Hist. Brit. Sponges, &c. p. 94, pl. iii.).

The name given by Johnston to this sponge is "*Halichondria oculata*," which Dr. Bowerbank changed to "*Chalina oculata*" (Mon. Brit. Spongiadae, vol. ii. p. 361), accompanied

by the statement that Dr. Grant, in his 'Tabular View of the Animal Kingdom' (1861, p. 76), had established the genus "*Chalina*" for sponges possessing the structure of Johnston's *Halichondria oculata* (Mon. vol. i. p. 209); so this is how we came by the term "*Chalina*."

But Johnston had previously identified his *foregoing* species, viz. *Halichondria palmata* (*op. cit.* p. 92, pl. ii. fig. 1), with Esper's *Spongia oculata*, "tab. i.," and also with Ellis's *Spongia palmata* (Ellis & Solander, p. 189, pl. lviii. fig. 6). Now all three of their illustrations represent the oscules as projecting (pustuliform) and scattered over the frond; while in Grant's illustration of *Spongia oculata* (Edinb. New Phil. Journ. 1826, vol. ii. p. 140, pl. ii. fig. 22), as well as in Johnston's *Halichondria oculata*, they are, as Johnston stated, "mostly disposed along the margin," that is on opposite sides of the cylindrical branch (*op. cit.* p. 95), which was probably the case in Esper's *Spongia polychotoma* (tab. xxxvi.), as they are not represented on the *surface* of the branches of his illustration. Hence it is evident that Esper's *Spongia oculata*, so far as appearance goes, is Johnston's *Halichondria palmata*.

But the latter is also stated by Johnston to be the "Mermaid's Glove" of the Shetlanders, which Bowerbank calls "*Isodictya palmata*" (Mon. vol. ii. p. 311, and vol. iii. pl. liii.), adding very properly to the simple skeletal acerate of this sponge in his illustration an equianchorate, which, on microscopic examination, I find to be so *peculiar* in shape, that the "flesh-spicule" in this instance becomes a distinguishing character, whereby I have been enabled to identify it with Johnston's *type* specimen of his *Halichondria palmata* in the British Museum\*. Hence also Esper's *Spongia oculata* and Ellis's *Spongia palmata*, if they possessed this distinguishing character, become Dr. Bowerbank's "*Isodictya palmata*."

Be this as it may, however, the structure and skeletal spicule of Johnston's *type* specimen of *Halichondria palmata* are so like those of *Chalina polychotoma* that I have not hesitated, in opposition to Dr. Bowerbank's view, to change his generic term "*Halichondria*" to *Chalina palmata*, as may be seen by my description and illustration of the latter in the 'Annals' of 1882 (vol. x. p. 109, woodcut, fig. 1), where I have fully gone into the subject, therefore need not repeat any more of it here.

Why Johnston should have designated his sponge "*oculata*" after having identified it with Esper's "*polychotoma*" I am

\* Schmidt's only instance of this is in the *inequianchorate* of his *Esperia sentinella* (Spong. Küste v. Algier, p. 30, Taf. v. fig. 11).

unable to conceive, unless he considered that both were only variations of the same sponge, which I think very likely, especially as the form of "*polychotoma*" very often runs into that of "*oculata*;" and Johnston himself, as before noticed, has placed them together, that is one after the other, in his 'British Sponges.' But then neither "*oculata*" nor "*polychotoma*" possesses a flesh-spicule, which *Chalina palmata* does, and Johnston did *not* know this; so something else must have influenced him in using this designation, probably the designation "*palmata*," which Ellis used for the sponge that Johnston considered to be his "*Halichondria palmata*;" still, as before stated, unless it could be proved that Ellis's sponge contained the *peculiarly* formed anchorate to which I have alluded, it is quite as likely, as just stated, that his sponge was a mere variety in form of *Chalina polychotoma*.

So much for confusion in nomenclature when names are based on mere resemblances; but it should be remembered that all this took place before the achromatic microscope had been invented, after which distinctions on minute differences which then came into view were rendered comparatively easy. We know, however, now that Johnston's *Halichondria palmata* differs in possessing the peculiarly-formed anchorate, to which I have above alluded, from all the other Chalinida, and that the species is identical with the "Mermaid's Glove."

The chief distinguishing characters of the order RHAPHIDONEMA, in addition to the diagnosis above mentioned, are their easily yielding to pressure and corresponding resiliency, from the keratose element of the fibre predominating, the spicular element more or less scanty, the structure loose, and, as Ellis noticed in 1786 (*op. cit.* p. 185), "the gelatinous part of the flesh [the sarcode] is so tender that when it is taken out of the water it soon dries away." In structure the deeper part is generally less dense than the circumference, which is also generally the opposite in the following order, viz. the ECHINONEMA; hence the former are for the most part easily compressible, while the latter are generally much less so, and often even absolutely hard. In spiculation there is generally only one form of spicule, and that is the simple or commonest form of acerate, viz. smooth, curved, fusiform, and sharp at both ends; while in the ECHINONEMA there is generally *more* than one form, of which one is generally acute, that is an acerate with one end obtuse. In the RHAPHIDONEMA the skeletal is seldom accompanied by a flesh-spicule, while in the ECHINONEMA it is seldom without one. The spicule in the RHAPHIDONEMA is generally confined to the fibre, hence its

comparatively smooth surface; while in the ECHINONEMA, as the name indicates, more or less of the pointed end always extends beyond it, echinatingly or in tufts. The oscules or vents are conspicuous in the RHAPHIDONEMA, while in the ECHINONEMA they are generally inconspicuous, from the excretory systems in the latter being generally smaller and thus more numerous, in accordance with their greater density of structure.

Thus I have contrasted the RHAPHIDONEMA with the ECHINONEMA because in many instances their forms otherwise are so much alike; but the structural characters of the RHAPHIDONEMA run throughout the order so uninterruptedly that, different as the forms may be (which have chiefly led to the grouping), they will be found to be so constant that, although the order contains a number of species, they may easily be found out under the arrangement I have made, which, for the same reason, requires very little revisionary remark.

When I inserted the group "Palmata," which is the second on the list, I had not seen Bowerbank's specimen of the "Mermaid's Glove," now in the British Museum, nor had I identified it with Johnston's type specimen of *Halichondria palmata* there, by finding that the latter possessed the same peculiar form of anchorate; so for the present this group can be considered to be represented by only one species, viz. *Chalina palmata*.

There are three other forms, in all of which the skeletal acerate is accompanied by the same kind of equianchorate flesh-spicule; but this is of the common navicular shape, and all come from the neighbourhood of the Cape of Good Hope, as will be more particularly noticed hereafter.

Of the groups in the third family, viz. the Acervochalinida, I can state nothing decisive, excepting that there are solid forms of RHAPHIDONEMA, but their massive condition, aided only by the characters afforded by their structure and spiculation, so far have not enabled me to identify one in particular; while the "footnote" to the group "Dictyalia" in my classification (*op. et loc. cit.* p. 143), whose purport is as follows, adds still more to the difficulties, viz.:—"In some instances the predominance of the keratine element in the RHAPHIDONEMA is exchanged for the predominance of the spicular one in the order HOLORHAPHIDOTA, when the same species must be placed in one or the other, as the case may be, while the group 'Isodictyosa' in the latter chiefly offers the species with which those of the RHAPHIDONEMA are most likely to be confounded." But such difficulties are inseparable from a classification made by man to aid his memory, and which nature ignores!

Thus, while the facts may be still fresh in the memory of those who have read my report on the collection of marine sponges from Japan &c. ('Annals,' 1885, vol. xv. p. 387), it might be observed that the polychotomous *Chalina* there referred to (p. 402), although possessing the same form of spicule as a similar species from the Mauritius, is a *bonâ fide* solid, branched, and stipitate Chalinoid form characteristic of my group "Digitata," while that from the Mauritius is an Isodictyal Chalinoid form, in which the skeletal spicule is not only larger, but accompanied by a minute acerate flesh-spicule. Hence, while the latter retains the proposed designation, viz. "mauritianus," the former, for distinction's sake, might be designated "japonica." (This, however, must be considered as an *ex post facto* statement, since I was not made aware of the presence of the flesh-spicule until after I had first written the passages to which I have referred.)

Now the Mauritius specimen (that Mr. B. W. Priest kindly submitted for my examination, which, with a true *Chalina*-like form, consisted only of a fragment about 3 inches long and half an inch in diameter), presents on one side a flat surface by which it had adhered to a mass of *Nullipore* on which it had been growing; and thus the specimen bears the same relation in this respect to a solid, digitate, erect *Chalina* of the British seas, that is *C. polychotoma*, that the latter does to our British *Halichondria simulans*, Johnston (pl. viii.), = *Isodictya simulans*, Bk. (Mon. vol. iii. pl. li. figs. 5 and 6), which, although occasionally rising up more or less into a *Chalina*-like branched stem, as frequently creeps in this form over the surface of the rocks on which it may be growing (see Johnston's illustrations, *l. c.*); but in the Mauritius specimen, as before stated, the skeletal is accompanied by a flesh-spicule. In short the spiculation of the Mauritius specimen consists of a large sausage-like form with several smaller ones in various stages of development chiefly about the angles of its reticulated structure; and a minute, sharp-pointed, fusiform, acerate flesh-spicule, chiefly arranged like a row of swallows on a telegraph-wire, along the course of the large spicule or spicular reticulation; while also, as before stated, the Japan specimen only presents one form, viz. the sausage-shaped one, which is much smaller, as may be seen by my illustrations ('Annals,' *l. c.* pl. xiv. figs. 12 and 13).

Again, in Dr. Bowerbank's representations of his *Chalina oculata* (Mon. vol. iii. pl. lxvi.) and that of his "*Isodictya varians*" (*ib.* pl. lxxxviii.), the former from a specimen from the open sea in the English Channel off Hastings, and the latter from one from the mouth or estuary of the Mersey at

Liverpool, close to the entrance of a *freshwater* tributary, the only difference that I can see, for I have specimens of both in my possession, amounts to the simple modification that arises from a predominance of keratine, whereby the open-sea specimen is tougher and more resilient than the estuary one, which, being the reverse, is softer and more fragile, the spicules being much the same in size and shape in both.

How far the general form and the sausage-shaped spicule of the freshwater sponge *Uruguayia corallioides*, Bk., which equally agrees in these respects with both *Chalina japonica* and *Chalina mauritiana*, may favour the view of those who would refer *Uruguayia* to a marine origin, I am not able to say; or to come to the conclusion of Dr. W. Dybowski that, because *Lubomirskia baicalensis*, viz. the solid, caulescent, branched, chaliniform freshwater sponge of Lake Baikal, in Central Asia, is identical in general structure and in the form and nature of its spicule with a similar but *marine* one which his brother sent him from the shores of Behring's Island, in the Kamtschatka Sea,—the former is necessarily the latter living in fresh water ("Die Behringsschwämme weichen weder in ihrer Struktur noch in der Gestalt und Beschaffenheit der Spiculen von denen der Baikalschen Exemplare ab, so dass alle diese, obgleich aus so sehr verschiedenen Fundorten herkommenden Schwämme, als vollkommen identisch anzusehen sind," Sitzungsbericht d. Dorpater Naturforscher-Gesellschaft, Jahrg. 1884, p. 45), although geologically considered it is as easy to infer that the sea, when receding from the interior of continents, might have left saltwater lakes there, which have become as fresh as the marine formations beside them, in which there is now not a particle of salt left. But as yet, if neither *Uruguayia* nor *Lubomirskia baicalensis* has been found to possess statoblasts, so neither have they been found in an ovigerous condition—conditions, especially of the latter, which can *only* be maintained for home-demonstration by being at once preserved in some aqueous medium, such as spirit and water; *i. e.* on the spot.

I have entered more at length into this subject here than I had an opportunity of doing in my report on the Japan sponges, chiefly because the Mauritius sponge is, according to my view, a *Chalina* (*C. mauritiana*), and its spiculation so peculiar that it is deserving of special mention.

Lastly, for my observations on the fourth or concluding family of the order RHAPHIDONEMA, viz. the Pseudochalinida, I must refer the reader to the species described in the 'Annals' of 1882 (vol. ix. p. 280), and 1885 (vol. xv. p. 319).

Returning to the first family, viz. the Chalinida, it might be observed that this was, as before noticed, the name given by Dr. Grant to the third order of his PORIFERA (Tab. View An. Kingdom, 1861, p. 76, Walton and Maberly) for the purpose of including sponges "possessing the structure of Johnston's *Halichondria oculata*," which is our *Chalina polychotoma* = *Spongia polychotoma*, Esper, = *Chalina oculata*, Bk.; and it may also be observed in the "Key to my Classification of the Spongida" (*Op. et loc. cit.* p. 193) that I have given this as the *type* of group No. 1, viz. the "Digitata," whose "typical structure," to which I have before alluded only in a general way, may be more particularly stated as follows:—"A stipitate bunch of caulescent cylindrical stalks, more or less ramosely dividing dichotomously and polychotomously, more or less interuniting on their way to their termination in rounded ends. Easily yielding to pressure, but still very resilient. Colour, when dry, light sponge-yellow, often retaining traces of purple, which appears to be its original colour, at all events in many instances. Surface uniformly smooth, which is not the case in the ECHINONEMA. Vents chiefly in single lines, opposite to each other, on each side of the cylindrical stalk. Structure internally open, where the sarcode, which is very thin (as Ellis noticed), has disappeared, as is usually the case in dried specimens; more compact towards the surface, where the dermal structure is finer and closer than that which is below it. Fibre predominantly keratose; spicule acerate, curved, fusiform, smooth, sharp-pointed, variable in size, which is chiefly small, often minute. General form also variable."

As regards the latter character, viz. the variability in form, I cannot do better than refer the reader to Miklucho-Maclay's paper (Mém. de l'Acad. de St. Pétersb. vii. s. t. xv. no. 3, 1870) on the varieties of his "*Veluspa polymorpha*," which is an estuary specimen of *Chalina polymorpha*, as may be seen by reference to the typical form (Taf. i. fig. 1), among which the Baikal freshwater sponge *Lubomirskia baikalensis*, Pallas, is introduced as No. 11 (Taf. i. fig. 5).

This brings us to the consideration of the specimens of RHAPHIDONEMA in Mr. Wilson's collection from the neighbourhood of Port Phillip Heads, Victoria Col., S. Australia, which, although very numerous, belong to only three groups: viz. the Digitata, the Tubulodigitata, and the Bivalvata respectively, but mostly to the first, under which *Chalina polychotoma* and its varieties will presently be mentioned, followed by a single species of Tubulodigitata and the same of



Bivalvata. In all the spicule is of the same form, viz. acerate, smooth, curved, fusiform, and sharp-pointed, but for the most part very small and often minute, *i. e.* not exceeding 7-6000ths in. in length, with almost immeasurable thinness, combined with great thickness of keratine in the fibre, which, as before stated, leads to great toughness and resiliency. In my British specimens of *Chalina polychotoma*, obtained from the English Channel opposite this place (Budleigh-Salterton), the spicule is about 30 by  $2\frac{1}{4}$ -6000ths inch in its greatest dimensions.

Fam. 1. **Chalinida.**

“*Char.* Digitations solid, vertical or procumbent.”

Group 1. **DIGITATA.**

*Chalina polychotoma*, Esper.

Of this species in Mr. Wilson's collection there are several specimens, whose characters having already been mentioned, need not be repeated here. Largest specimen 2 feet long. Depth not mentioned. Neither the colour when fresh nor the depth of the dried specimens is stated.

*Chalina polychotoma*, var. *trichotoma*.

Described in the ‘Annals’ for 1885 (vol. xv. p. 115). This variety only differs from the foregoing in most of the ends of the branches being more or less expanded and trichotomously divided. 19 inches long. Presented to the British Museum in the name of J. Bracebridge Wilson, Esq., M.A., F.L.S. Dried specimen.

*Chalina polychotoma*, var. *compressa*.

Where the stem becomes more or less expanded and compressed at the commencement of the branches, or where the latter becomes expanded towards their ends spatuliform (*spatulata*). Vents scattered over the expanded portions, chiefly on one side, comparatively small and not projected. Two wet specimens:—viz. 1, wholly compressed; colour, when fresh, “purple-slate;”  $5\frac{1}{2}$  in. long. 2, subcompressed; colour, when fresh, “pale buff-brown;” 13 in. long. Depth of both 19 fath.

*Chalina polychotoma*, var. *oculata*.

Stems thick, more or less irregular in form, *i. e.* more or less irregularly expanded and united together in their whole length, flabelliform, proliferous. Colour dark-brown reddish.

Surface smooth. Vents large, circular, projected pustuliformly, scattered over the surface generally, or, where the branch is expanded, chiefly on one side.

*Obs.* Here I should be inclined to place Esper's *Spongia oculata* (tab. i.) and Ellis's *Spongia palmata* (tab. lviii. fig. 6), if, as before stated, they were not possessed of the peculiar anchorate of *Chalina palmata*, Johnston.

*Chalina polychotoma*, var. *robusta*.

In which the stems are few, thick, and large, with smallish vents on one side chiefly. Wet specimen. Colour, when fresh, “orange-buff.” 11 in. long. Depth 20 fath.

*Chalina polychotoma*, var. *angulata*.

Stem nodosely angulated, zigzag instead of being uniformly cylindrical; presenting a knotted appearance, in which the nodose portion may be slightly prolonged branch-like on each side, so as to give the stem an alternately jointed zigzag aspect. Colour dark black-brown on the surface, light brown interiorly, or light brown throughout. Surface soft, velvety from the fineness and compactness of the dermal tissue. Vents of two sizes, large and small, scattered over the nodose portions irregularly. Fibre and structure finer and more compact than in *C. polychotoma*, accompanied by more remains of the sarcode. Size of largest specimen, which is wet, 15 in. long. Colour, when fresh, not given. Depth 19 fath.

*Chalina polychotoma*, var. *moniliformis*.

Stems successively inflated more or less regularly. Colour light brown. Surface velvety. Vents scattered over the bullate inflations. Texture, *i. e.* the fibre and structure, as in the foregoing variety, viz. “*angulata*.”

*Obs.* This comes in as a sequence of very common occurrence, but not represented in Mr. Wilson's collection, although there are several large specimens in the British Museum which come from the south coast of Australia.

I have briefly enumerated these varieties in form, not only because they are chiefly present in Mr. Wilson's collection, but still more because they are of general occurrence: that is, the stalks, originally smooth and cylindrical in the typical form, viz. *Chalina polychotoma*, may become partially flattened; then expanded and more or less united laterally either at the com-

mencement or at the extremities; then expanded and united generally into a flabellate more or less proliferous plane; lastly, jagged or irregularly moniliform; while the vents may be comparatively small and linearly arranged opposite to each other on the cylindrical branch in the typical species, scattered in the compressed forms, and projected pustuliformly in the oculate specimens. The colour may vary from light sponge-yellow to dark sponge-brown, more or less mixed with red, and often to reddish purple; but, of course, this is useless for specific distinction.

Fam. 3. *Cavochalnida*.

"Tubular, vasiform, aculeated, patulous or compressed flabellately; plane and frondose or dactyloid."

Group 3. TUBULODIGITATA.

*Patuloscula procumbens*, Carter ('Annals,' 1882, vol. ix. p. 365).

Short, thick, thumb-shaped, cylindrical, bullate, hollow, erect processes, growing side by side on a common expanded base, spreading in a branched form horizontally. Consistence resilient. Colour, when fresh, "purple-slate," now sponge-yellow brown. Vent terminal, cloacal, circular at the end of the process, contracted, but still enormously large. Spicule acerate, as before. Size of specimens, of which there are two, varying from 2 to 6 in. high, and 6 x 4 horizontally.

Depth 7 to 14 fath.

(*Obs.* This is also a West-Indian sponge and appears to have been noticed and illustrated by De Fonbressin and Michelotti under the name of "*Callyspongia bullata*" ('Spongiaires de la mer Caraïbe,' Harlem, 1864, p. 56, pl. x. fig. 5). I have already given the name to some beautiful specimens of it, brought home from the West Indies by the Rev. H. H. Higgins, now in the Liverpool Museum, in one of which the bullate processes, successively inflated, are extended upwards separately for 3 or 4 inches. A specimen of these was also presented to the British Museum in the month of March 1877. It is not the *Spongia bullata* of Lamarck = *Sp. tubulosa*, Esper, tab. 54, since the vents here are *ciliated*, as D. et M. have noticed, which allies it to their genus "*Tuba*," that is typical of our groups *Aculeata* &c. (see my "Classification," l. c. "Key," p. 194; and for the genus "*Tuba*," generally, 'Annals,' 1882, vol. ix. p. 277 *et seq.*, West Indian and Acapulco sponges).

*Patuloscula procumbens*, var. *flabelliformis*.

In this variety the successively dilated bullate tubes or

processes, which are very long comparatively, are united laterally throughout into a fan-shaped form, rising from a single stem, the large circular vents being arranged serially on the margin. Largest specimen about 8 in. high by 8 x 1 in. horizontally. Colour, when fresh, "buff-grey."

Depth 20 fath.

Group 9. BIVALVATA.

*Cavochalina bilamellata*, Lam.

Stipitate, placentiform, doubled up like a bivalved shell with a stem, *i. e.* vasiform compressed; infundibular below as the head approaches the stem, which is long and hard, ending in a root-like expansion, expanding, in the contrary direction, into a flabelliform bilamellar head above. Consistence leathery. Colour, when fresh, "pale pinkish brown," now mouse-brown. Surface externally wrinkled, rugosely reticulated in high relief, nodose; inside even, smooth, concentrically lined. Vents small, scattered over the inner surface. Structure compact, fine, composed of short-jointed keratose fibre, scantily charged with the usual form of small spicule, *viz.* acerate, smooth, curved, fusiform, sharp-pointed, about 14 by  $\frac{2}{3}$ -6000ths in. in its greatest dimensions. Size very variable, apparently increasing with the age of the specimen; the largest, of which there are several dry, but only one wet specimen, about a foot each way, including the stem, which may be 3 or 4 in. long, with a thickness of the head towards the stem about one inch where the nodular excrescences are most prominent, becoming gradually thinner in the opposite direction, that is towards the border, where the nodular processes ceasing leave a narrow smooth strip about one sixth of an inch in thickness.

Depth 19 fath.

*Hab.* Marine.

*Loc.* Port Phillip Heads, south coast of Australia.

(*Obs.* This seems to me to be the species briefly described by Lamarck (1st ed. t. ii. p. 366, no. 61), so I have given it his designation. There are several dry specimens in Mr. Wilson's collection, but only one wet one. From the great number which I have seen it must be very plentiful under all forms on the south coast of Australia, but all modifications of that above mentioned; whilst its leathery imperishable nature and great toughness arising from the quantity of keratine in the composition of its fibre, scanty and small spiculation, and compact structure, render it as durable almost as the sole of a shoe. It is subject to considerable variety in form, being



sometimes expanded horizontally and proliferously foliated or cabbage-like.

#### Group 11. Plicata.

Although not in Mr. Wilson's collection, but coming from hard by, viz. the neighbourhood of the Cape of Good Hope, and therefore probably represented on the south coast of Australia, I would here insert the following description of the specimen, which is intended to typically illustrate the species for which this group was instituted, as although promised in my Classification, it has not hitherto been given.

#### *Textiliforma foliata.*

Large mass of cloth-like, flat, very thin and expanded frondose portions, rising from a contracted short stem, apparently independent of each other, but, in fact, all continuous, although so interfolded and deeply indented at the margin as to present a plurality of separate disseminations; or, in a large, single, semicircular, stipitate, frondose form, more or less proliferous. Consistence firm, resilient. Colour, now in its dried state, pale yellow-brown, with traces of the original sarcode, which was purple. Surface uniformly even on both sides. Vents, in little groups, petaloid, rosette-like, scattered plentifully over the surface; each group about 1-24th in. in diameter and 1-12th in. apart; but while confined to one surface only this depends upon the position of the fold, so that on one part they may be on one side and on the other on the other; hence they are in patches, that is not continuous throughout the same side of the frond, in the interfolded or plicate form; while, of course, in the other form, where there is no plication, they are all on one side. Internal structure compact, tough, formed of short-jointed keratose fibre charged with the usual form of acerate spicule internally, and surrounded by sarcode equally charged with the same spicule together with a number of equianchorates or flesh-spicules. Skeletal spicule curved, smooth, fusiform, sharp-pointed, about 28- by  $2\frac{1}{2}$ -6000ths in. in its greatest dimensions. Flesh-spicule, a navicular shaped equianchorate with rather obtuse ends when viewed in front, about 6-6000ths in. long. Size of largest specimen 17 in. high by 12 in. broad; wall of the frond or lamina  $\frac{1}{8}$  in. thick.

*Hab.* Marine.

*Loc.* Cape of Good Hope and its neighbourhood.

*Obs.* There are several specimens of this sponge in the British Museum (all dry, of course), viz. No. 60, registered 71. 5. 12. 1, &c. from Port Elizabeth; and No. 509, registered 40. 9. 28. 27, from "the Cape;" together with two other

forms from "the Cape," presenting a similar structure and spiculation, viz. *Chalina compressa*, which has already been described in the 'Annals' of 1882 (vol. x. p. 112), and might be relegated to the group "Palmata" for the present, as representing the "Mermaid's glove" at the Cape; and a third, which from its form might be relegated to the "Digitata" and termed "*Chalina polychotoma*, var. *anchorata*," as its skeletal acerate is also accompanied by an equianchorate flesh-spicule; but in the two latter the navicular anchorate is pointed at the ends instead of being round or obtuse; although in all three instances belonging to that kind which from its boat- or shuttle-like shape I have termed navicular.

These are the specimens from the "neighbourhood of the Cape of Good Hope" to which I have alluded, at p. 280, as possessing the same kind of naviculiform anchorate.

#### *Ovigerous Specimens.*

In the ovigerous specimens, of which there are a great many in Mr. Wilson's collection, not only of the RHAPHIDONEMA, but of all the other orders, the form and position of the ova remain; but the same astringent effect of the spirit which has kept them thus has contracted their contents into a cheesy consistence which defies all attempt at further elucidation. In short, to do anything with the soft parts of a sponge in the microscopical or more minute way it is absolutely necessary to examine them immediately after they have been taken from their native habitats, that is while they are living. Much may be done by putting them into spirit and water at once and examining them a few days after they have been thus preserved; but the longer they remain after this the more these parts become chemically altered by the methylated spirit and rendered unfit for anything but a display of the larger parts of which they are composed, from the change especially in the contents of the ova and the sperm-cells, to which I have above alluded; and the development of calcareous crystallizations in the general tissue.

#### Order V. ECHINONEMA.

For the reasons above mentioned I shall also insert here a tabular view of my arrangement of this order in 1875 (*op. cit.*), viz. :—



Families.	Groups.
1. <i>Ectyonida</i> .....	<ul style="list-style-type: none"> <li>1. Pluriformia.</li> <li>2. Plumohalichondrina.</li> <li>3. Microcionina.</li> <li>4. Echinoclathrata.</li> <li>5. Baculifera.</li> <li>6. Multiformia.</li> <li>7. Durissima.</li> </ul>
2. <i>Axinellida</i> .....	

And here I would observe that this order is by far the most difficult of any that I have had to contend with; not so much probably in the first family, viz. the Ectyonida, as in the second, viz. the Axinellida; hence in both they are headed with a group *provisionally* named, which has thus been indefinitely given for the purpose of enabling the spongiologist to supply its place with a plurality of groups that of course must vary in amount, name, and description as more extended observation may dictate, which, judging from the enormous number of species and varieties from all parts of the world, represented by the dried and beach-specimens in the collection of the British Museum, almost tempts one to exclaim, "Where is this to end?" and as one species so often resembles another in one or more points, to ask "What character is there in one species which is not to be found in another?" But probably similar observations were made at the commencement of the study of conchology &c.; still it seems to me certain that, as in other branches of natural history, the class, orders, and families may be restricted to a few simple characters for leading to the groups and genera, but *nothing but a combination of characters* will lead the student to the *species*, which is the great thing after all, and those it is desirable, for practical purposes, to limit as much as possible to what can be seen with the commonest microscope, otherwise the distinctions become one for the rich man only who has plenty of leisure and can easily afford to purchase a fine instrument; which, of course, is also desirable; but then this cannot be for the many, but for the scientific, or, as it may be termed, *esoteric* few. Hence "equality" is as utopian, as *inequality* is absolutely necessary for progress in all human affairs. Such knowledge can only come to the poor *through* the rich.

The diagnosis of the order ECHINONEMA, viz. :—"Possessing a skeleton composed of horny fibre cored with proper spicules internally and echinated with proper spicules externally. Form of spicules chiefly acuate," so far as the first family, viz. the Ectyonida, goes, cannot be more practically

useful, for I know of no exception to it. But it does not apply so satisfactorily to the second family, viz. the Axinellida; neither does the special diagnosis of *this* family, viz. :—"Echinated with proper spicules projecting from the *interior* of the fibre," suffice for all, since it may be the case to a certain extent with species of the RHAPHIDONEMA; but by adding the words :—"Structure increasing in density *inwards* or towards the first-formed parts, that is the axis," which for the most part is a *peculiarity* common to the whole order, although not needed in the diagnosis of the first family, that of the second family is rendered almost equally useful.

It will be observed by referring to the above "table" that each of the families commences with a "group," whose name etymologically has the same signification, viz. "Pluriformia" and "Multiformia," which, as before stated, were *provisionally* instituted, because the specimens which appeared to belong to them respectively were at the time of classification so numerous as to be quite overwhelming; therefore all that I could do under the circumstances, that is with little or no literature for my guidance, was to keep them together, as I have before observed of the Psammonemata, under the families mentioned, for subsequent division into groups when their species, by individual description from undried and entire specimens, should be typically determined. It was this to which my dear old friend Dr. J. E. Gray alluded when he said :—"The greatest contributor to our knowledge and advancement of spongiology in its present state will be he who correctly describes and illustrates most species."

#### Fam. 1. Ectyonida.

##### Group 1. PLURIFORMIA.

In the "key" to my classification (*l. c.* p. 195) I have given the names of several kinds of sponges which I then thought might become types of the subdivisions of this group, and during the last ten years which have elapsed since that was published I have occasionally been able to substantiate it thus :—"Ectyon sparsus" has led to the formation of the group "Ectyonina" or "Ectyones" ('Annals,' 1883, vol. xii. p. 310, &c.); "Echinonema typicum" to one for which I would propose the name of "Echinonematina" (*ib.* 1881, vol. vii. p. 378, &c.); "Dictyocylindrus ramosus, Bk.," &c. to that of "Dictyocylindrina" (*ib.* 1879, vol. iii. p. 295); and "Spongia muricata, Pallas, = *Tricentron muricatum, Ehlers*,"



to that of the group "Trichentrionina" (*ib.* 1879, vol. iii. p. 293, &c.).

Groups 2, 3, and 4 of the Ectyonida, viz. Plumohalichondrina, Microcionina, and Echinoclathrata, I must leave as they are, merely observing that "*Halichondria seriata*," Johnston, = *Ophlitospongia* (olim *Chalina*) *seriata*, Bk., unfortunately does not illustrate the group *etymologically*, on account of being solid instead of clathrate; but then it was, as it is now, the only species of the group that had been publicly described, so that I had no option, but will now endeavour to supply this apparent discrepancy by adding the description of a dried foreign species, equally remarkable for its clathrate character, which is solidly *cellular* throughout rather than *simply* solid, and thus resembles the nidamental mass of a whelk or a bee's honeycomb rather than a sponge:—

*Echinoclathria favus*, n. sp.

Massive, lobed, sessile or contracted towards the base, or divided digitately from this upwards into a bunch of coalescent cylindrical stems, dichotomously and polychotomously branched, like a digitate *Chalina*. Consistence now in its dried state soft and resilient. Colour reddish brown or yellowish. Surface even. Structure composed of a thin fibro-reticulate lamina, continuous in itself, but partitionally separating vermicular cavities, which are equally continuous throughout, thus producing a uniformly clathrous mass which, on the surface, presents a honeycomb appearance, in which the cells, which are irregular in outline, are about 3-12ths in. in diameter more or less. Fibre both cored and echinated with proper spicules. Core- or skeletal spicule very thin, subpin-like, smooth, fusiform, constricted towards the head, about 45-6000ths in. long. Echinating spicule smooth, also subpin-like, fusiform, and constricted towards the head, which is less in diameter than the shaft, about 15 by 1½-6000ths in. in its greatest dimensions. Size of specimens variable.

*Hab.* Marine.

*Loc.* South coast of Australia.

*Obs.* This sponge is so striking in its honeycomb algaoid appearance and soft though resilient consistence that it can hardly be mistaken for any other excepting the *areniferous* variety of the same sponge, which will be described hereafter in the new family which I propose to call "Pseudoechinonemida."

There are several specimens of it in the British Museum, mostly under 4 inches in their greatest diameter, of which nos. 554 and 555, each registered 59. 10. 7. 106, may be

mentioned as massive forms, and no. "208 bis," registered 37. 5. 13. 36 &c., as more or less digitate forms somewhat like those of *Chalina polychotoma*; so that it appears to be by no means common, although it is so remarkable in structure.

Again, in group 5, viz. the Baculifera, the echinating spicule is not spined, but its hammer-shaped or crutch-like head is imbedded in the surface of the fibre, together with a like form in its interior, which, combined with its cork-like consistence, unmistakably defines this type.

HIGGINSINA, new group.

Lastly, to this family I must add the group above mentioned, viz. "Higginsina," for sponges in which the apparent analogue of the spined echinating spicule is not club-shaped, but acerate, that is fusiform and sharp-pointed, and *not* echinating, but *loose* in the tissue; for a typical species of which I must refer the reader to the West-Indian sponge "*Higginsia coralloides*" and its varieties described and illustrated by Mr. Thomas H. Higgin, F.L.S., in the 'Annals' for 1877 (vol. xix. p. 291 &c. pl. xiv. figs. 1-5). Called after the Rev. H. H. Higgins.

To this I will add the following description of a Cape variety of this sponge, in which the *unattached* position of the echinating spicule is not so evident, and an *acuate* is added to the acerate skeletal spicule.

*Higginsia coralloides*, var. *natalensis*, n. var.

Flabelliform, erect, stipitate, ridged on each side prolificously; ridges thin, ragged, and in strong relief, radiating and branching from the stem to the circumference. Consistence tough, firm, in the dry state, with hard inspissated sarcode and compact structure. Colour orange. Surface uneven, hispid. Spicules of three forms, viz.:—1, skeletal, thick, smooth acuate, 70 by 3-1800ths in. in its greatest dimensions; 2, subskeletal, thin, smooth acerate, about 50 by ½-1800ths in.; 3, echinating spicule, a spinous acerate rather bent than curved in the centre, about 8 by ½-1800th; no. 1 is arranged in tufts surrounded by no. 2 in great numbers, among which is no. 3, all projecting outwardly, as they successively and together emanate from the fibre. Size variable, the largest specimen 5½ in. broad by 2½ in. high.

*Hab.* Marine.

*Loc.* Port Elizabeth, Cape of Good Hope.

*Obs.* Of this species, whose spiculation is somewhat diffe-

rent, although evidently belonging to the genus *Higginsia* in other respects, there are several dry specimens in the British Museum, of which No. 18 is the largest. No. 40 is an elkhorn-shaped, rat-tailed, flat, branched variety, and Nos. 16, 17, and 19, all more or less like that above described, and all registered 71. 5. 12. 1 &c.

*Gen. obs.* In many of the Ectyonida there are flesh-spicules, viz. equianchorates, bihamates, or tricurvates, and these may be alone or combined. The anchorate is generally of that kind termed navicular from its boat-like form, *i. e.* sharp at each end; the bihamate a small simple C- or S-shaped one; and the tricurvate also small and simple. In one instance, however, the anchorate is "angulate," that is, the shaft is bow-shaped and turned up at the ends (see Bowerbank's illustration, Mon. Brit. Spong. vol. i. pl. vi. fig. 143), characterizing the Plumohalichondrina; but in the rest the flesh-spicules do not seem to be of much specific value, on account of the sameness of their form. One more observation I would add here, viz. that the curve of the acute skeletal spicule in the ECHINONEMA is so generally on one side the middle, and towards the obtuse end, that when I see this I feel almost confident that the sponge from which it came belongs to this order.

[To be continued.]

XXVIII.—Remarks on a Paper by Prof. E. D. Cope on the Reptiles of the Province Rio Grande do Sul, Brazil. By G. A. BOULENGER.

PROF. COPE'S "Twelfth Contribution to the Herpetology of Tropical America"\*, contains a list of Reptiles and Batrachians from the Province Rio Grande do Sul, collected by the "Naturalist Brazilian Exploring Expedition." Having lately been engaged in naming large series of specimens from the same country, transmitted to the Natural-History Museum by the zealous Dr. H. von Ihering, and which have afforded material for several contributions published in these 'Annals' †, I am able to present a few critical remarks on Prof. Cope's identifications and new species. Besides, the nomenclature adopted by the American herpetologist differs in so many

\* Proc. Amer. Phil. Soc. xxii. pp. 167-194; April 1885.

† March, April, and August numbers, 1885.

points from that followed by me, that it will be useful to place side by side the names used by us. The following is the list of the species as enumerated by Cope, with the names used in my previous "Lists." Species not contained in my Lists are preceded by an asterisk.

## REPTILIA.

### LACERTILIA.

COPE.	=	BOULENGER.
1. Anops Kingii, <i>Bell.</i>	=	Anops Kingii.
2. Amphibæna trachura, <i>Cope</i> ,	=	Amphibæna Darwinii.
sp. n.		
3. Aporarchus prunicolor, <i>Cope</i> ,	=	Amphibæna Darwinii.
g. and sp. n.		
4. Pantodactylus bivittatus, <i>Cope</i> ,	=	Pantodactylus Schreibersii,
Cope.		<i>Wieg.</i>
5. Acrantus viridis, <i>Merr.</i>	=	Teius teyou, <i>Daud.</i>
6. Tejus teguixin, <i>L.</i>	=	Tupinambis teguixin.
7. Opheodes striatus, <i>Wagl.</i>	=	Ophiodes striatus.

### OPHIDIA.

8. Phalotris melanopleurus, <i>Cope</i> , sp. n.	=	Elapomorphus lemniscatus, <i>D. &amp; B.</i>
9. Ophiomorphus dorsalis, <i>Prts.</i>	=	Liophis Jaegeri, <i>Gthr.</i>
10. — fuscus, <i>Cope</i> , sp. n.	=	— cobella, <i>L.</i>
11. — meleagris, <i>Shaw.</i>	=	— Merremii, <i>Wied.</i>
12. Aporphis conirostris, <i>Gthr.</i>	=	— almadensis, <i>Wagl.</i>
13. — cyanopleurus, <i>Cope</i> ,	=	Dromicus melanostigma, <i>Wagl.</i>
sp. n.		
*14. Tachymenis hypoconia, <i>Cope.</i>		
15. Thamnodynastes Nattereri, <i>Mik.</i>	=	Thamnodynastes Nattereri.
*16. Drymobius pantherinus, <i>Merr.</i>		
17. Herpetodryas carinatus, <i>L.</i>	=	Herpetodryas carinatus.
18. Philodryas Schottii, <i>Fitz.</i>	=	Philodryas Schottii.
*19. — Olfersii, <i>Fitz.</i>		
20. Tropidodryas æstivus, <i>D. &amp; B.</i>	=	— æstivus.
*21. Leptognathus Catesbyi, <i>D. &amp; B.</i>		
22. Oxyrhopus rhombifer, <i>D. &amp; B.</i>	=	Oxyrhopus petalarius, <i>L.</i>
*23. — plumbeus, <i>Wied.</i>		
24. Lystrophis d'Orbignyi, <i>D. &amp; B.</i>	=	Heterodon d'Orbignyi.
*25. Xenodon rhabdocephalus, <i>Boie.</i>		
*26. — Neovidii, <i>Gthr.</i>		

121. *Pterothysanus atratus*, sp. n. (Pl. VIII. fig. 3.)

Primaries above smoky brown; a large spot near the base of interno-median area; a second larger spot within the end of the cell, two small spots beyond the cell; two spots, well separated, beyond the middle of the costal border; an oblique subapical *j*-shaped marking, a spot at outer third of second median interspace, and a large excised patch crossed by the first and second median branches, all white; a marginal series of irregular angular pink spots: secondaries white; base, costal margin, an irregular angulated band, widest at inner margin, crossing the wing before the middle, and the external third (the inner edge of which is acutely incised and undulated) smoky brown; five rather small submarginal white spots; a marginal series of irregular angular pink spots. Body orange-ochreous, spotted with black; venter black, with two parallel series of small white spots. Expanse of wings 74 millim.

Near Assam.

Apart from differences of pattern this species is readily separable from *P. laticilia* by the pink marginal spots, in which respect it shows some relationship to *P. pictus*.

**Lasiocampidæ.**122. *Spalyria testacea*.

*Dreata testacea*, Walker, Cat. Lep. Het. iv. p. 906. n. 9 (1855).  
*Eupterote testacea*, Butler, Ill. Typ. Lep. Het. v. p. 67, pl. xvii. fig. 1 (1881).

Near Assam.

123. *Eupterote lucia*, sp. n. (Pl. VIII. fig. 4.)

♀. Nearest to *E. amæna* from Java; of about the size of the largest specimens of that species; of a more brilliant chrome-yellow colour; all the wings crossed by three central or nearly central purplish-brown lines, dentate-sinuate on the primaries and zigzag on the secondaries, the third line partly bounded externally by a nearly straight band of the same colour, followed at a short distance by a series of dots on the veins, which towards costa of primaries are united by an undulated brown line, forming the inner edge of three imperfect confluent rings, the lower two of which enclose brown spots; the outer edge of the rings commences as an ill-defined sinuated submarginal line; costa of primaries irrorated with brown towards apex; markings below less perfect, but widening towards costa of primaries, chocolate-coloured. Expanse of wings 95 millim.

Near Assam.

Readily distinguished from all females of *E. amæna* by the entire absence of the purplish-rufous undulated bands on the basal area, of the black spots across the disk, and of the marginal suffusion.

**Euschemidæ.**124. *Euschema excubitor*.

*Euschema excubitor*, Moore, P. Z. S. 1878, p. 846.

Near Assam.

125. *Euschema militaris*.

*Phalena Attacus militaris*, Linnæus, Syst. Nat. ii. p. 811. n. 12.

Near Assam.

**Phylloididæ.**126. *Lygniodes hypoleuca*.

*Lygniodes hypoleuca*, Guénee, Noct. iii. p. 125. n. 1500.

Near Assam.

**Hypopyridæ.**127. *Spirama retorta*.

*Phalena-Noctua retorta*, Cramer, Pap. Exot. ii. p. 29, pl. cxvi. F (1779).

♀. Near Assam.

Of the moths in this collection only one specimen of each species was captured.

**EXPLANATION OF PLATE VIII.**

Fig. 1. *Prothoë regulis*.

Fig. 2. *Terias heliophila*.

Fig. 3. *Pterothysanus atratus*.

Fig. 4. *Eupterote lucia*.

XXXII.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued.* By H. J. CARTER, F.R.S. &c.

[Continued from p. 294.]

**Family 2. Axinellida.****Group 6. MULTIFORMIA.**

We now come to the second family of the ECHINONEMA, viz. the Axinellida, whose diagnosis, as above extended, would stand thus:—

"Echinated with proper spicules projecting from the *interior* of the fibre. Structure increasing in density *inwards*, or towards the first-formed parts, *i. e.* the axis." And applying the same remarks to this group as to the Pluriformia in the first family, I would observe, with reference to the sponges mentioned in the "key" to my Classification (*op. et l. cit.* p. 196), that the caulescent branched species termed by Schmidt "*Axinella verrucosa*" (Spongien Adriat. Meeres, Taf. vi. fig. 3), but of course without the parasitic polyp, might form the type of a group named "Axinellina," in which all the species of the genus "*Axinella*" that Schmidt has described (*op. cit.*) might be inserted, together with others from Mr. Wilson's collection, which will be mentioned hereafter, in most of which the branched caulescent characters being more marked will afford a still better typical illustration. Here also might be inserted *Dictyocylindrus rugosus*, Bk., and not "*hispidus*," as stated in the "key" to my Classification (*l. c.*), since the latter has a spinous club-shaped, echinating spicule and the former has *not* (see Bowerbank, Mon. Brit. Spong. vol. iii. pls. xvii. and xx. figs. 1,1, respectively); thus Schmidt has stated of *D. rugosus* that it has "das Ansehen von *Axinella cannabina*" (*op. cit.* II. Suppl. p. 15). The only difference between most of the arboresecent Dictyocylindrina and the Axinellina is the presence of the echinating spicule in the former and its absence in the latter. Again, *Acanthella*, Sdt., might also come in here under a group named "Acanthellina," of which the finest specimen that I have seen is among Mr. Wilson's dried sponges from the south coast of Australia, presented to the British Museum through myself in 1884, now bearing the register no. "84. 10. 10. 2," and described at length in the 'Annals' of 1885 (vol. xv. p. 114); while *Halichondria ventilabrum*, Johnst., = *Phakellia ventilabrum*, Bk., of which I have described a branched form in the 'Annals' of 1883 (vol. xii. pp. 316 and 318) under the name of *P. ramosa*, might be relegated to a group called "Phakellina."

To these also might be added two other groups of more or less caulescent, branched, stipitate forms, with hirsute or ragged surfaces, under the names of "Phycopsina" and "Ptilocaulina," for the typical species respectively of *Phycopsis fruticulosa* and *Ptilocaulis gracilis*, described for this purpose in the 'Annals' of 1883 (vol. xii. pp. 319 and 321); if the former has not been based upon washed-out beach specimens, which I begin now to doubt, for one can never be certain of the original form of such contributions: also *massive* forms, under the generic name of "*Leucophlæus*" (*ib.* p. 323), of

which a group might be created under the name of "*Leucophlæina*"—each of which has been *advisedly* selected as respectively typical of some of the groups which it has appeared to me, after my experience with the specimens in the British Museum, to be most desirable to record at once, or as soon as I had the time. Doubtless there are many others, but *non possumus*.

Looking over my notes and sketches of Multiformia in the British Museum when my Classification was made (for I still possess the MS. volumes in which illustrated descriptions of all the species and most of the specimens in the collection were recorded), I find that by far the greater part are branched and stipitate, some flabelliform, a few vasiform, and still fewer massive. The branched forms, again, may be shrubby with the branches cylindrical, dichotomously divided, and smooth like those of *Axinella verrucosa*, in which they very much resemble a digitate *Chalina*; or they may be cylindrical and ragged, *i. e.* proliferously processed all round as in *Ptilocaulis gracilis*; or rough and shaggy as in *Phycopsis hirsuta*; or the caulescent branches may be compressed and arranged side by side flabelliformly, that is dichotomously dividing on the same plane, when, by interuniting and throwing out a thorny growth from the surface on both sides, with sarcode tympanizing the intervals, the Acanthelline form may be produced, or by growing together erect and laterally united into a group massively, they may assume the form of *Leucophlæus massalis*. But, as I have before stated, there appears to me to be no limit to the varieties of form which the sponges in every order may assume, and the *same* forms in every order which, so long as they were indiscriminately mixed together under the universal name "Spongia," as in Lamarck's 'Histoire Naturelle des Animaux sans Vertèbres,' was comparatively an easy matter; but since a minute examination of their structure and spiculation under the microscope has necessitated their separation by an almost individual nomenclature, that which was an "easy matter" under a universal term has become most perplexing. Hence, as one series of forms does for the whole class, I have given a tabulated view of these in the 'Annals' of 1875 (vol. xvi. p. 7, pl. iii.), to which I must refer the reader for further information on this subject.

As regards the last group of the Axinellidæ, viz. the *Durissima*, I can state no more than at the time I made it, which I did chiefly for such species as had a very rigid skeleton, in which the fibre was very thick and the dried sarcode hung about it, more or less tympanizing the interstices of the



reticulation like dry glue, scantily cored with thin acerate spicules, but denuded of everything else, apparently from long washing in the waves of the beach off which they had been gathered for preservation—characters which sufficed for my Catalogue of the specimens in the British Museum, but are of no practical utility for general purposes; hence, I cannot insist upon its being retained under any other circumstances. There were only three of these specimens, and unless future observation of them in an un mutilated and fresh state should justify their separation from the rest of the Multiformia, the group “Durissima” had better be abolished.

Fam. 3. *Pseudoechinonemida*, new fam.

Lastly, it becomes necessary to add this third family to the order ECHINONEMA for the Areniferous species, as pointed out under the head of “fam. Pseudohircinida” in ‘Annals,’ 1885, vol. xv. p. 319, where my reasons for so doing have been given at length, so I need not repeat them here. As an illustration of this family I will at once briefly state the characters of the fragment in my possession, to which allusion has already been made in the “Obs.” to *Echinoclathria favus*, before going to the species in Mr. Wilson’s collection.

*Echinoclathria favus*, var. *arenifera*, n. var.

Fragment cylindrical, round at the free extremity, where there is a contracted, circular, cloacal aperture corresponding with the hollow interior; broken off at the other end. Identical in structure and spiculation with the species *Echinoclathria favus*. Consistence fragile, friable. Colour now, in its dry state, grey-brown, sand-like. Fibre cored with foreign objects in addition to its natural spiculation, together with arenaceous fibre *alone*; many more foreign objects adhering to the outside of the fibre than are situated in its interior. Size of fragment 10 in. long by about  $\frac{3}{4}$  in. in diameter; cloacal canal about  $\frac{2}{3}$  in. in diameter.

*Hab.* Marine.

*Loc.* Unknown. ? South coast of Australia.

*Obs.* This variety of *Echinoclathria favus* seems to have been occasioned by its having grown in the midst of sand, which, as just stated, seems to be much more plentiful in and around the outside of the fibre than in its interior.

Our Classification so far therefore would now stand thus:—

Order V. ECHINONEMA.

Families.	Groups.
1. <i>Ectyonida</i> .....	1. Pluriformia. a. Ectyonina. b. Echinonematina. c. Dictyocylindrina.
	2. Plumohalichondrina.
	3. Microcionina.
	4. Echinoclathrina*.
	5. Baculifera.
	6. Higginsina (new group).
	7. Multiformia. a. Axinellina. b. Phakellina.
2. <i>Axinellida</i> .....	c. Acanthellina. d. Phycopsina. e. Ptilocaulina.
	f. Leucophloeina.
3. <i>Pseudoechinonemida</i> (new family).	a. Echinonematina arenacea. b. Plumohalichondrina arenacea.

Having premised the revision of my Order V., viz. ECHINONEMA, which time and experience up to now show to me to be desirable, I will describe the sponges which Mr. Wilson has kindly sent to me, under the groups to which they seem respectively to belong, briefly, it is true, but sufficiently for our present purpose. In this description it should be understood that we are concerned now with these specimens alone, and therefore that, where there are no representatives of any of the groups mentioned in the Table last given (as, for instance, the Ectyonina or Ectyones), this must be inferred, as it will not be further noticed.

As all the specimens come from the sea in the neighbourhood of “Port Phillip Heads,” Victoria colony, south coast of Australia, the “depth” alone will be inserted. Again, the granulations on the surface, which are respectively composed of tufts of the spicules of the species that thus terminate the ends of the fibre and are often hispid, frequently serve to distinguish the ECHINONEMA from the RHAPHIDONEMA, which, on the other hand, from their spicules being for the most part confined to the fibre, do not present this echinated appearance. The pores, too, which are situated in the dermal membrane between the “tufts,” are often unnoticed because not often seen, although they may always be inferred to exist in the position mentioned.

All the measurements of the spicules are given in 6000ths

\* Echinoclathrata has been changed to Echinoclathrina for uniformity only.

of an inch (the value of that division of my micrometer-eye-piece) for comparison, and they are intended to represent the greatest dimensions longitudinally and transversely of the average largest kinds approximately, as they very often vary in this respect, not only in different specimens but in different parts of the same specimen. When spined or differently formed from the common type of both acerates and acuates, this will be mentioned.

Fam. 1. Ectyonida.

Group 1 b. ECHINONEMATINA.

1. *Echinonema flabelliformis*.

Stipitate flabelliform, like a clam-shell in general shape, moderately thin, stem short. Consistence firm. Colour, when fresh, "pale terra cotta," now brown. Surface even, smooth, consisting of a minutely reticulated dermis spread over a reticulated, cancellous, fibrous structure beneath. Pores in the interstices of the reticulation. Vents in the margin corresponding to the terminations of branched, radiating, linear depressions on the surface, which originate towards the stem. Spicules of three forms, viz. :—1, skeletal, acute, 55 by 1-6000th in. ; 2, echinating, clavate, spined throughout, 12 by 1-6000th in. including the spines; 3, a small acute in tufts confined to the surface, 25 by  $\frac{3}{4}$ -6000th in. Structure uniformly compact throughout, hardening generally towards the stem, but not axially in any part. Size of specimen  $6 \times 6 \times \frac{1}{2}$  in.

Depth 19 fath.

2. *Echinonema caespitosa*.

Massive, sessile, spreading, with irregular proliferous cauliflower surface; proliferous portions rising above the common level into most irregular and jagged processes, great and small, of variable size. Consistence firm, resilient. Colour, when fresh, "brick-red," now sponge-colour. Surface uniformly granulated, supporting a smooth dermis. Vents on the lobular projections. Spicules of three forms, viz. :—1, skeletal, acerate, cylindrical, nearly straight, almost immeasurably thin, chiefly confined to the fibre, 45-6000ths long; 2, echinating, acute, spined throughout, 20-6000ths long; 3, flesh-spicule equianchorate, naviculiform, bent upon itself,  $3\frac{1}{2}$ -6000ths in. long. Structure columnar, compact, radiating upwards. Size of specimen,  $1\frac{1}{2}$  in. high by  $5 \times 4$  in. horizontally.

Depth 19 fath.

3. *Echinonema pectiniformis*.

Flabelliform, circular, stipitate; margin almost even; stem short; proliferous processes at the base. Consistence hard, compact. Colour, when fresh, "pale terra-cotta red;" now the same internally, but dermis pale brown. Surface even, here and there presenting small elevations. Vents on the elevations, also indicated although not actually seen, on the margin, by branched depressions marking the course of sub-jacent excretory canals running towards it. Spicules of two forms, viz. :—1, skeletal, acute, 60 by 1-6000th; 2, echinating, clavate, spined throughout, 9 by 1-6000th. Structure uniformly compact. Ovigerous. Size of specimen 8 by 7 in., thickness  $\frac{1}{4}$  in.

Depth 20 fath.

Obs. This and *E. flabelliformis* appear to be the same species.

4. *Echinonema incrustans*.

Massive, incrusting, thick, covering the whole of a *Pecten*. Consistence firm, resilient. Colour, when fresh, "brick-red," now rich orange. Surface uniformly granulated. Pores not seen. Vents numerous, large, scattered over the surface. Spicules of three forms, viz. :—1, skeletal, slightly fusiform, abruptly pointed, chiefly in the fibre, 105 by  $1\frac{1}{2}$ -6000th; 2, echinating, acute, clavate, spined throughout, 18-6000ths long; 3, flesh-spicule, equianchorate, naviculiform, 4-6000ths long. Structure compact, sarcode orange-yellow. Size of specimen  $2 \times 3\frac{1}{2}$  in.,  $\frac{3}{4}$  in. thick.

Depth 11 fath.

Group 1 c. DICTYOCYLINDRINA.

5. *Dictyocylindrus pinnatifidus*.

Stipitate, compressed, bunch of cylindrical stalks of various lengths, often divided polychotomously as well as dichotomously, terminating in long and short lengths and in sharp points which are sometimes bifid, proliferously plumose or pinnate in two lines opposite each other, feather-like, for some distance up the branch. Consistence soft, hirsute or velvety on the surface. Colour, when fresh, "dark brown," the same now. Surface uniformly granulated, hispid, the latter more particularly where the dermis has been abraded. Pores and vents not conspicuous. Spicules of three forms, viz. :—1, skeletal, long, setaceous, acute, 255 by 3-6000ths; 2, subskeletal, acute, smooth, averaging 75-6000ths long;

3, echinating, acute, clavate, spined throughout, 17-6000ths long. All congregated together and when projecting from the superficial ends of the fibre producing the granulations and hirsute character of the surface. No. 2, in great abundance, separate or together leaf-like, round the lower part of no. 1. Structure soft and hirsute on the surface, hard towards the axis, very like *Axinella setacea* (p. 359), which, but for the absence of the echinating spicule (which, however, is often so scarce in this kind of sponges as to pass unnoticed without prolonged examination), would have been placed in the group Dictyocylindrina. Size of specimen 12 in. long.

Depth 5 fath.

Obs. By "compressed" is meant more or less in the same plane.

#### 6. *Dictyocylindrus cacticutis*.

Stipitate, somewhat compressed head of branches inter-united after the first division into irregular compressed lobes, proliferously covered with radiating, ragged, thorn-like ridges and points. Consistence soft on the surface, harder towards the axis. Colour, when fresh, "black," now black-brown. Surface scattered over with thorn-like elevations, cactus-like, covered by a smooth dermis. Vents chiefly on the margins of the compressed lobes. Spicules of two forms, viz.:—1, skeletal, subpinlike, curved, smooth, 65 by 2<sup>1</sup>-6000ths, chiefly confined to the fibre; 2, echinating, acute, spined, 25 by 3-6000ths, including the spines. Structure compact, chiefly towards the axis, but not distinctly hard in the centre. Size of specimen 3 × 3 × 3 in. including the stem, which is short and thick.

Depth 19 fath.

#### 7. *Dictyocylindrus piniformis*.

Stipitate, massive head of proliferous lobes; lobes compressed, thick, expanded, united together in the centre; irregularly and reticulately nodose over the surface and margins. Consistence resilient externally, becoming dense towards the axis. Colour, when fresh, "drab," now sponge-drab. Pores and vents not conspicuous. Spicules of three forms, viz.:—1, skeletal, acerate, curved, smooth; 2, also skeletal, but acute, curved, and smooth, both about the same size, viz. 35 by 1/2-6000th; 3, echinating, acute, clavate, spined throughout, 12-6000ths long. Structure compact externally, becoming denser towards the axis. Size of specimen 5 in. high including the stem, head 3 × 3 in. horizontally.

Depth not stated.

### Group 2. PLUMOHALICHONDRINA.

#### 8. *Plumohalichondria mammillata*.

Massive, sessile, with mammilliform erect lobes. Consistence soft, resilient when wet, hard when dry. Colour, when fresh, "venetian red," the same now inside, but paling towards the dermis. Surface even, uniformly but largely granulated; dermis reticulated over the granulations or elevated parts. Vents large, scattered irregularly over the mass, none at the ends of the mammilliform lobes. Spicules of four forms, viz.:—1, skeletal, acute, curved, spined generally, about 35 by 1-6000th; 2, the "tibiella," acerate, almost straight, slightly fusiform and abruptly pointed, about 44 by 3/4-6000th; 3, echinating, smaller, acute, spined all over, 12-6000ths long; 4, flesh-spicule, equianchorate, angulate, 4 1/2-6000ths long. The tibiella is chiefly confined to the axis of the fibre. Nos. 1 and 3 echinating, and no. 4 confined to the sarcode. Structure open resilient, soft generally, no axial condensation. Size of specimen 5 in. high, 6 × 3 in. horizontally.

Depth 3 fath.

Obs. Very like the British species, viz. *Plumohalichondria plumosa* = *Hymeniacidon plumosa*, Bk. (Mon. Brit. Spong. vol. ii. p. 195), and *Microciona plumosa*, Bk. (*ib.* vol. iii. pl. xxiv. fig. 7, &c.), but different from the Cape species, wherein the large spinous acute is mixed up with the tibiella in the axis of the fibre. The Cape species, which might be termed "*P. capensis*," is the finest of all that I have seen, and as yet has been undescribed, although it appears to be as abundant as it is remarkably fine. There are many specimens of it in the British Museum from Port Elizabeth, especially those bearing my running no. 74, registered 71. 5. 12. 1, &c.

### Group 4. ECHINOCLATHRINA.

#### 9. *Echinoclathria tenuis*.

Stipitate, compressed, very thin and leaf-like, lobed all on one side of the stem, like a one-sided lobed leaf; lobes irregularly denticulated on the margin. Consistence firm. Colour, when fresh, "venetian red," now brown. Surface minutely and uniformly granulated. Spicules of three forms, viz.:—1, skeletal, subpinlike, fusiform, curved, smooth, 45 by 1 1/2-6000th, chiefly confined to the fibre; 2, subskeletal, also subpinlike, very fine, thin, and long, 20 by 3/4-6000th, tending

by its projection to give the surface a hispid or villous character; 3, echinating, also subpinlike, but *smooth*. Structure rather open and reticulated on the surface, becoming more compact towards the centre of the lamina. Size of specimen  $7 \times 7$  in. and  $\frac{1}{8}$  in. thick.

Depth 20 fath.

10. *Echinoclathria nodosa*.

Stipitate, caulescent, branching, small specimen growing on and over an Ascidian; branches nodulated, interuniting. Consistence soft, resilient. Colour, when fresh, not mentioned, now brown sponge-colour. Surface of branches irregularly nodose, uniformly granulated over all. Vents in the sulci between the nodulations. Spicules of two forms, viz.:—1, skeletal, acute, smooth, 35 by 1-6000th; 2, echinating, also acute and smooth, 25 by  $1\frac{1}{2}$ -6000th; the former confined to the interior, the latter chiefly to the granulations on the surface. Structure very compact throughout, but not axially condensed or hardened. Size of specimen  $3\frac{1}{2}$  in. high by  $3 \times 2$  in. horizontally.

Depth 5 fath.

11. *Echinoclathria subhispidia*.

Stipitate, compressed bunch of stalks with short stem; stalks cylindrical at first, then dividing at short distances dichotomously and polychotomously, finally terminating in flat, expanded, round ends more or less bifid. Consistence firm. Colour, when fresh, "venetian red," now rich brown. Surface uniformly granulated, subhispid. Pores and vents not seen. Spicules of two forms, viz.:—1, skeletal, acute, smooth, 30 by  $1\frac{1}{4}$ -6000th, chiefly confined to the fibre; 2, echinating, also acute, smooth, small, thin, about 20-6000ths long. Structure consisting of short-jointed tough fibre more or less compact, becoming denser towards the axis. Size of specimen 5 in. high by  $5 \times \frac{1}{2}$  horizontally.

Depth 11 fath.

12. *Echinoclathria gracilis*.

Stipitate, caulescent, branches long, very slender, irregularly cylindrical, about  $\frac{1}{2}$  in. in diameter, dichotomously and polychotomously divided near the stem, afterwards ending in long stalks terminating in round ends. Consistence hard. Colour, when fresh, "dark red," now dark brown. Surface even, minutely granulated. Vents apparently few and scattered. Spicules of two forms, viz.:—1, skeletal, acute, smooth, comparatively small, 25 by 1-6000th; 2, echinating, small, acute, fusiform, with slightly and terminally spined

head, 17 by 1-6000th. Structure hard, compact, firm throughout, not condensed axially. Size of specimen 6 in. long.

Depth 20 fath.

Group 6. HIGGINSINA (new group).

13. *Trachycladus laevispirulifer*, Carter ('Annals,' 1879, vol. iii. p. 343, pl. xxviii. fig. 1).

*Obs.* There are two specimens of this sponge whose cylindrical branches dichotomously divided only once or twice are 12 in. long by  $\frac{2}{3}$  in. in diameter, diminishing towards the points. They are chiefly remarkable for their bright colour, said, when fresh, to be "brilliant scarlet," now but little faded. This colour is owing to the presence of an apparently ? symbiotic oscillatorian Alga, varying under 4-6000ths in. long, and in its largest form consisting of four cells, of which the terminal one at one end is conical or pointed. It is so abundantly present and so much larger than the flesh-spicules, which are again very small, that without close examination the latter are apt to pass unnoticed.

Depth 19 fath.

*Obs.* It is a short oscillatorian Alga which gives the red and other bright colours to the Red Sea; also the cærulean cobalt tint to the cærulean Suberitic sponge of this coast; and sometimes living symbiotically with *Spongelia pallescens*, where Dr. F. E. Schulze has actually found it to be present in plurality in the ciliated *embryo* (Zeitschrift f. wiss. Zool. Bd. xxxii. Taf. v. fig. 7), of which he kindly sent me a preparation.

14. *Higginsia coralloides*, Higgin ('Annals,' 1877, vol. xix. pl. xiv. fig. 1, &c.).

*Obs.* Of this species there are two or three specimens, with a variety, which may be described as follows:—

15. *Higginsia coralloides*, var. *massalis*.

Sessile, massive, lobate, contracted towards the base, convex above. Consistence firm, resilient. Colour, when fresh, "dull purple," now light mouse-colour. Surface uniformly covered with meandering sulci separating correspondingly, formed round linear elevations or ridges supporting a smooth dermis. Vents small, very numerous, following the meandering lines of the sulci between the ridges. Spiculation like that of *Higginsia coralloides*, only here and there the acerate is acuated.

*Obs.* All the specimens of *Higginsia* come from about the same place or depth, viz. 11 fath., and all are stated to have



been of a "dull purple" colour when fresh. The occurrence of the *acuates* in the variety "*massalis*" causes it to resemble in spiculation *H. natalensis*, before described, of which the type is in the British Museum.

16. *Higginsia lunata* (provisional).

Sessile, globular, massive, with a small mammilliform process-growth over the surface. Consistence soft. Colour, when fresh, "dark slate," which is the colour of the surface now, but interiorly sponge-colour. Surface smooth, uniformly covering the small processes, which are conulated and accompanied by an unusually thick, firm, reticulated dermis in the intervals. Vents large, scattered over the surface. Spicules of three forms, viz.:—1, skeletal, acerate, smooth, curved; and 2, also skeletal, but acuate, smooth, curved, both about the same size with gradationary forms between them; all about 120 by 2-6000ths; 3, flesh-spicule, acerate, much curved, often to a lunate form, microspined, often in groups parallel to each other, simulating the development of a tricurvate, about 9 by  $\frac{1}{3}$ -6000th; the former chiefly confined to the fibre, the latter to the sarcode. Size of specimen 1 in. high by 3 x 3 horizontally.

Depth 19 fath.

*Obs.* The thick slate-coloured dermal layer is very characteristic of this species, and its spiculation comes nearest to *Higginsia*, unless the microspined flesh-spicule should be nothing but a spined tricurvate, when the resemblance would be so much less that for the present I can only consider its "seat" as undetermined.

Fam. 2. Axinellida.

Group 7 a. AXINELLINA.

17. *Axinella chalinoides*.

Stipitate, caulescent, dichotomous, cylindrical, branches of different lengths, rather compressed, slightly diminishing in size from the stem, which is short and thick, to the extremities, which are round. Consistence firm, resilient. Colour, when fresh, "dull brick-red," now brown. Surface uniformly but minutely granulated, and minutely hispid, often rendered rather uneven by the presence of subjacent excretory canals. Vents on the branches in two rows opposite to each other, often accompanied by stelliform radiation, owing to the presence of subjacent but superficial excretory canals. Spicules of one form only, viz. a small, smooth, acuate, about 20 by

1-6000th, in the fibre, and forming tufts (the granulations) on the surface. Structure tough, dense, and compact. Size of specimen 10 in. long, branches about  $\frac{3}{8}$  in. thick.

Depth 19 fath.

*Obs.* The subhispid character of the surface, the stelliform venation around the vents formed by collapse of the dermal sarcode over the subjacent excretory canals, and the compact dense structure of the tissue generally, at once points out the difference between this sponge and a caulescent-branched *Chalina*.

18. *Axinella chalinoides*, var. *glutinosa*.

Stipitate, caulescent, cylindrical, branched, the latter chiefly divided towards the terminations, which are comparatively short and pointed. Consistence soft on the surface, dense towards the axis. Colour, when fresh, "chocolate," now brownish mouse-colour. Surface smooth, even, hispid where the dark glutinous sarcode of the exterior has sunk down upon the long acerate spicules during desiccation. Vents chiefly in two lines opposite to each other on the cylindrical stalks. Spicule of one form only, viz. acuate, but of different sizes, the largest and longest 135 by 2-6000ths. Structure loose, soft, and gelatinous on the surface from the thickness of the dermis, becoming dense and hard towards the axis. Size of specimen 8 in. long, larger branches about  $\frac{1}{2}$  in. in diameter.

Depth 20 fath.

19. *Axinella setacea*.

Stipitate, much compressed bunch of numerous branches, radiating dichotomously and polychotomously from a short stem; branches cylindrical, terminating in sharp points, simple and bifid at the ends respectively. Consistence soft, resilient. Colour, when fresh, "dark yellowish brown," now dark brown. Surface granular, hispid. Vents not seen. Spicules of one form only, viz. acuate, curved, smooth, of different sizes, chiefly confined to the fibre, in and projecting through it; the largest and longest which gives the setaceous character 210 by 4 $\frac{1}{2}$ -6000ths; another set but much smaller and shorter, gathered together sheaf-like round the base of the long setaceous one from the granulations on the surface. Structure rather loose and soft externally, becoming compact towards the axis. Size of specimen 4 $\frac{1}{2}$  in. high by 4 $\frac{1}{2}$  x  $\frac{1}{2}$  in. horizontally.

Depth 7 fath.

20. *Axinella atropurpurea*.

Stipitate, somewhat compressed bunch of dichotomously

and polychotomously divided cylindrical branches, more or less interuniting clathrously, terminating elkhorn-like or polychotomously, with obtuse rounded ends. Stem short and thick. Consistence soft on the surface, hard in the axis. Colour when fresh "dark purple," the same now, as this is one of the few species which retain their colour, for it has now been in spirit for upwards of a year and a half without being the least altered in this respect, which may be owing to the colouring-matter being contained in rather *tough* transparent cells, where it exists in the form of several large black-purple granules. Surface even, granulated, with granular tufts of spicules. Vents small, here and there on the surface. Spicules of one form only, viz. acute, sub-pinlike, or slightly inflated at the base, but of different sizes, the longest and largest 300 by  $7\frac{1}{2}$ -6000ths, around which, towards the proximal end, a number of others of the same shape are gathered sheaf-like, varying under 90 by  $1\frac{1}{2}$ -6000ths. Structure soft on the surface, hard towards the axis. Size of largest specimen, for there are three of this beautiful sponge,  $2\frac{1}{2}$  in. high, including the stem, by  $3\frac{1}{2} \times 1\frac{1}{2}$  in. horizontally.

Depth 19 fath.

#### 21. *Axinella stelliderma*.

Stipitate, compressed bunch of dichotomously and polychotomously divided cylindrical branches, more or less amalgamating and interuniting on their way to the terminations, which are conical and pointed singly or bifidly. Consistence soft, resilient. Colour when fresh "purplish maroon," yellowish white now. Surface even, granulated, granules smooth and round on the summit, stellately radiating towards each other in reticulated lines of the fibrous dermis which are thus arranged. Vents not seen. Spicules of one form only, viz. acute of different sizes, the longest and largest about 180 by 2-6000ths, projecting from the summit of the granule and surrounded at its base sheaf-like by a number of shorter ones. Differing from the following variety, viz. *Axinella stelliderma*, var. *acerata*, only in the form of the spicule, which is acute instead of acerate. Structure soft on the surface, hard and compact towards the axis. Size of the largest specimen, for there are two, 7 in. high by  $7 \times \frac{1}{2}$  horizontally.

Depth 10 fath.

#### 22. *Axinella stelliderma*, var. *acerata*.

Stipitate, compressed bunch of short, thick, cylindrical, dichotomously and polychotomously divided branches, more

or less interuniting and amalgamated; simple or bifid at the ends, which are conical. Consistence soft, resilient. Colour when fresh "dull purple," now yellowish white, opaque. Surface even, largely granulated; granules smooth, radiating star-like, the rays being part of the dermis, interuniting with each other reticulately between the granules. Vents not seen. Spicule of one form only, viz. acerate, fusiform, smooth, finely pointed, 75 by 1-6000th. Structure soft on the surface, becoming compact and hard towards the axis. Size of specimen  $3\frac{1}{2}$  in. high by  $4 \times 1\frac{1}{2}$  in. horizontally.

Depth 20 fath.

#### 23. *Axinella villosa* (dry specimen).

Stipitate bunch of caulescent dichotomous branches, rising from a short, thick, round stem, spread out at the base for attachment; branches cylindrical, dividing near the stem, diminishing in size towards the extremities, which are bifid and pointed. Consistence soft on the surface, hard in the axis. Colour when fresh not stated, now brown-grey. Surface now, in its dried state, roughly reticulated and shaggy, from the subsidence of the sarcode between the subjacent spiculiferous tissue, which thus appears clotted together like that of *Dictyocylindrus rugosa*, Bk. Spicules of one form only, viz. acerate, curved, smooth, about 78 by  $2\frac{1}{2}$ -6000ths. Structure loose on the surface, becoming condensed and hard towards the axis. Specimen 7 in. high by  $3 \times 3$  in. horizontally; branches about  $\frac{2}{3}$  in. in diameter.

Depth not stated.

The above species being branched and caulescent are very much like those of the group *Dictyocylindrina*, differing only, as before stated, in the absence of the echinating spicule.

#### 24. *Axinella flabellata*.

Stipitate, compressed expanded, thickish, lobate; margin irregular; stem short, angular and thick. Consistence firm, resilient. Colour when fresh "brown-grey," now dark sponge-colour. Surface even, minutely granulated. Vents not seen. Spicules of three forms, viz. :—1, skeletal, acute, 70 by 2-6000ths, chiefly confined to and projecting through the fibre; 2, "trichites," loose and in sheaf-like bundles, about 12-6000ths long; 3, flesh-spicule, bihamate, C- and S-shaped, simple and contort, 4-6000ths long, both the latter abundant and confined to the sarcode. Structure compact, becoming more condensed and hard towards the axis. Size of specimen  $3\frac{1}{2}$  in. high by  $4\frac{1}{2} \times 1\frac{1}{2}$  in. horizontally.

Depth 18 fath.

*Obs.* This specimen has a piece of *Darwinella australiensis* about an inch in diameter growing upon its flat surface.

25. *Axinella pilifera*.

Massive, lobed, contracted towards the base, lobes more or less compressed. Consistence soft. Colour when fresh "orange-brown," now light brown. Surface covered with conuli, from the summit of each of which projects a coarse single filament of the fibre charged with the spicules of the species, giving the whole a hairy appearance. Vents small, scattered here and there over the lobes. Spicules of one form only, viz. acerate, 65 by 2-6000ths, chiefly confined to and projecting through the fibre. Structure rather loose generally. Specimen 3 in. high by  $3\frac{1}{2} \times 1\frac{1}{4}$  in. horizontally.

Depth 20 fath.

26. *Axinella meloniformis*.

Massive, globular, sessile, ridged meridionally like a melon, with a depression on the summit. Consistence firm. Colour when fresh "orange," now pale yellow. Surface uniformly granulated, covered by a smooth dermis. Spicule of one form only, viz. acerate, 150 by 4-6000ths. Structure compact, hard, rough. Presenting immediately under the dermis a layer of large ? epithelial, nucleated, and granular cells, chiefly elliptical in form, and about 10-6000ths in the longest diameter, accompanied by a layer of much smaller ones in the dermis, ? the real epithelial cells. Size of specimen  $1 \times 1 \times 1$  in.

Depth 11 fath.

*Obs.* The presence of these large circular and elliptical nucleated and granular cells, such as are found in several sponges (ex. gr. *Dercitus niger*, &c., 'Annals,' 1871, vol. vii. pl. iv. fig. 6, &c.), also in the Australian "new species" of Luffarida (? *Dendrilla rosea*, Lendenfeld) to which I have alluded as probably a new species in the 'Annals' of 1885, vol. xv. p. 202, &c., is interesting because they are underneath the fibrous dermis which is covered on the immediate surface with much smaller, ? the real epithelial cells, while the larger ones can hardly be considered to be ova, as they are confined to the position mentioned. They are pigment-cells in *Dercitus niger*.

27. *Axinella solida*.

Sessile, spreading, thick, cork-like mass. Consistence soft. Colour when fresh "orange," now sponge-colour. Surface undulating, cauliflower-like, consisting of short pointed granu-

lations. Pores and vents not seen. Spicules of one form only, viz. acute, about 100 by 3-6000ths, situated in the interior of and projecting through the fibre. Structure columnar, composed of erect plumosely-tufted filaments in juxtaposition, ending in the granulations of the surface. Size of specimen  $\frac{1}{2}$  in. high by  $2 \times 2$  in. horizontally.

Depth 11 fath.

Group 7 b. PHAKELLINA.

28. *Phakellia flabellata*.

Substipitate, contracted towards the base, expanding into a flabellate form with irregularly undulating round border. Consistence resilient. Colour when fresh "yellow-buff," much the same now. Surface undulating, uniformly granulated. Pores and vents not conspicuous. Spicules of two forms, viz. one acute, the other acerate, both about the same size, viz. 40 by  $1\frac{1}{2}$ -6000ths, chiefly confined to the fibre, which, ending on the surface in spiculiferous tufts, produces the granulated character. Structure compact, hardening towards the central plane, from which the fibre curves upwards and outwards to the surface on each side. Size of specimen 2 in. high by  $4 \times \frac{1}{2}$  in. horizontally.

Depth 20 fath.

29. *Phakellia crassa*.

Stipitate, flabellate, winged proliferously, thickish; margin round, irregularly undulating. Consistence firm, resilient. Colour when fresh "wax-yellow," now yellowish brown. Surface uniformly covered with papillary elevations about 4-12ths inch apart, supporting a granulated dermis. Vents small, stelliform, on the summits of the papillary elevations. Spicules of one form only, viz. acute, small, stout, about 60 by  $2\frac{1}{2}$ -6000ths. Structure plumose, fibre curving upwards and outwards from the central plane, where it is condensed, to the surface on each side, where it is loose, and ends in tufts of spicules which form the granules. Size of specimen 6 in. high by 5 in. horizontally; lamina 5-12ths in. thick.

Depth 20 fath.

30. *Phakellia brassicata*.

Stipitate, vase-like rosette head, dividing at once from a longish stem into several short, somewhat compressed flabellate branches, which expand into still more compressed, thin, leaf-like divisions, about 1-8th in. thick; alate, proliferous, and



wavy, interunit with each other, tending to a foliate arrangement, but well separated, terminating in denticulated margins. Consistence hard. Colour when fresh "orange-red," now brown. Surface smooth, with a finely reticulated dermis, supported on short hispid fibre. Spicules of one form only, viz. acerate, 60 by  $1\frac{1}{2}$ -6000ths. Structure loose on the surface, hardening towards the axis. Size of specimen  $5\frac{1}{2}$  in. high, including the stem, which is  $2\frac{1}{2}$  in. long,  $4\frac{1}{2} \times 3\frac{1}{2}$  horizontally across the brim.

Depth 19 fath.

Group 7c. ACANTHELLINA.

31. *Acanthella cactiformis*, Cart. ('Annals,' 1885, vol. xv. p. 114, pl. iv. fig. 6).

Obs. Of this there are two specimens, viz. one dry, that to which I have alluded, and the other wet, which is much smaller and of which the depth was 19 fath.

32. *Acanthella hirciniopsis*.

Flabellate, with denticulated border and thorn-like irregularly conulated surfaces. Consistence soft outside, covering an extremely dense and compact massive skeletal frame. Colour when fresh "venetian red," now mouse-colour. Surface most irregular in growth, especially on one side, covered with prominent conuli, most irregularly distanced; each conulus smooth over the point where it is covered with a beautifully reticulated dermis, which, descending to the interconular spaces in a radiating form, becomes continuous with that of its neighbours, very much like that of a *Hircinia*. Epithelial cells, if any, very small, inconspicuous. Pores in the interstices of the dermal reticulation. Vents here and there, chiefly on the border. Spicules of one form only, viz. long, acerate, of various sizes under 110 by  $1\frac{1}{2}$ -6000ths. Structure of the dermal reticulation soft, composed of fusiform fibrillæ, without foreign substances; epithelial cells small and inconspicuous. Structure of the interior soft towards the surface, becoming densely compact towards the centre, which, when a portion is macerated, comes forth as a fenestrated skeleton composed of an intensely tough hard condensation of horny sarcode and the spicules of the species amassed together. Size of specimen, which is only part of the original, from which it has been cut off, 6 in. high by  $4\frac{1}{2} \times 1$  in. horizontally.

Depth 19 fath.

Obs. There are two specimens of this sponge, both of which appear to have been cut off from much larger specimens, too large probably in their entirety to be put into the opening of the tin case in which they were sent, so that my description has been taken from that which appears to afford the most characteristic features; the other is much larger and more ragged, that is irregularly grown over on the surface, which thus in some places gives it a thickness of 3 inches. Its colour when fresh is stated to be "buff-brown, with tints of red." The conuli where uniformly distributed are 2-12ths in. apart, but where irregularly scattered sometimes 5-12ths in. apart, with great prominence and depth between them, which, being filled up by the dermal reticulated fibrous structure, at first sight, as before stated, gives them very much the aspect of a sponge belonging to the conulated *Hircinida* or *Aplysinida*, excepting that there are no foreign substances in the fibre and very small epithelial cells in the dermis. Depth of both specimens 19 fath.

33. *Acanthellina parviconulata*.

Sessile, erect, tall, lobate, fenestrated, more or less regularly covered with short thorn-like conuli. Consistence soft on the surface, dense in the interior. Colour when fresh "grey, tinged with terra-cotta red," now grey only. Surface extremely irregular and jagged from the presence of proliferous growths, covered with short thorn-like conuli supporting a fibro-reticulated dermis which conceals their points, thus rendering them round, and fills up the depressed intervals between them, very much like that of a *Hircinia*, only the conuli are much smaller and more numerous than in the foregoing specimen; hence the designation "*parviconulata*." Vents numerous and large, especially over one of the erect lobes. Spicules of two forms, but very much alike in size, viz. one acute and the other acerate, the latter abruptly pointed, each averaging about 60 by 2 to 3-6000ths. Structure soft on the surface, where the dermis, although of finer texture, is otherwise the same as that described under *Acanthella hircinopsis*, covering the same kind of densely-packed spiculiferous white skeletal framework. Size of specimen 6 in. high by  $2 \times 1\frac{1}{2}$  in. horizontally.

Depth 18 fath.

34. *Acanthellina rugolineata*.

Somewhat compressed, massive, sessile, contracted towards the base, furrowed and correspondingly ridged with rough linear elevations. Consistence extremely soft. Colour when



fresh not stated, now light whitish yellow. Surface cactiform, covered by a reticulated dermis. Pores in the interstices of the dermal fibro-reticulation. Vents here and there along the upper part. Spicules of two forms, viz. acute and acerate, both about the same size, viz. 80 by  $2\frac{1}{2}$ -6000ths, and both merging into each other by gradational variation, chiefly confined to the interior of the fibre and projecting through it. Structure soft on the surface, condensed to hardness internally, thus forming a solid skeletal mass of spicules and sarcode like that of the foregoing species. When dry the dermal structure, by its dark brown translucent gluey appearance and nature, contrasts strongly with the opaque white skeletal fabric beneath, as in *A. cactiformis*. Size of specimen about  $2 \times 2 \times 2$  in.

Depth not stated.

Group 7 f. LEUCOPHLÆINA.

35. *Ciocalypa penicillus*, Bk. (Mon. B. S. vol. iii. pl. xiii. fig. 2, &c.), var. *aciculata*.

*Obs.* The only difference between this and Dr. Bowerbank's specimen is that the spicule is sub-pinlike, with fusiform shaft, instead of simply acute. Depth 9 fath.

36. *Ciocalypa Tyleri*, Bk. (Proc. Zool. Soc. 1873, pl. iv. fig. 9).

*Obs.* Of this there are two specimens, depth 19 and 11 fath. respectively.

37. *Leucophlæa massalis*, Cart. ('Annals,' 1883, vol. xii. p. 323, pl. xiv. fig. 15).

Depth 19 fath.

Fam. 3. Pseudoechinonemida.

ECHINONEMATINA ARENACEA.

38. *Wilsonella australiensis*.

Flabelliform, stipitate, wavy, undulating in lines radiating from the base to the circumference; stem short. Consistence firm, resilient. Colour when fresh "white," much the same now. Surface areniferous, scattered over uniformly with papillary elevations about 5-12ths in. apart, on the summit of each of which is a large vent defined by a circular thin mar-

gin. Spiculation that of *Echinonema anchoratum* ('Annals,' 1881, vol. vii. p. 379), viz.:—1, smooth acute, 25 by  $\frac{2}{3}$ -6000ths, chiefly confined to the centre of the fibre, with grains of sand and foreign objects; 2, echinating spicule, a spiniferous acute, 16 by 1-6000th; 3, flesh-spicule a naviciform equianchorate confined to the sarcode,  $3\frac{1}{2}$ -6000ths. Structure compact throughout, without axial or central condensation. Size of specimen, which is wet, 7 in. high by  $7 \times \frac{1}{2}$  in. horizontally.

Depth 6 fath.

*Obs.* There is also a dry specimen of this species 10 in. high by  $9 \times 5$  in. horizontally, composed of a large group of flabelliform plicated lobes of different sizes below the single one above mentioned, more or less proliferous and twisted in form, some of which are anything but like the typical one above described, yet all evidently modifications of the same plan, rising and spreading into a great group florally from a contracted sessile base, about  $2\frac{1}{2}$  in. in diameter.

It is this specimen which I have briefly described in the 'Annals' of 1885 (vol. xv. p. 320) under the above name, and of which there are several others of a like kind in the British Museum, all of which come from the south coast of Australia, and bear my running no. "128." As sponges on being dried generally shrink up to half their natural size, the dried one just mentioned must originally have been twice that above stated, so that when fresh it must have been a still more magnificent specimen than it is at present. The genus has been named after Mr. J. Bracebridge Wilson, M.A., F.L.S., of the Church of England Grammar School, Geelong, Victoria colony, South Australia, to whom, as before stated, I am indebted for all these sponges, both wet and dried.

PLUMOHALICHONDRINA ARENACEA.

39. *Plumohalichondria arenacea*.

Irregularly club-shaped, sessile, massive, lobed, tall, high, enclosing shells and sand at the base, which is contracted. Consistence tough, firm, resilient. Colour when fresh not mentioned, now pale yellow throughout. Surface uniformly granulated, covered by a minutely reticulated dermis. Vents rather small, scattered over the surface generally. Spicules of three forms, viz.:—1, skeletal acerate (the tibiella) nearly straight, 40 by  $1\frac{1}{2}$ -6000ths, chiefly confined to the centre of the fibre, with grains of sand and foreign objects; 2, spined acuates more or less bent, of different sizes under 32-6000ths

long, chiefly echinating the fibre *in great abundance*; 3, *angulated* equianchorate, about 3-6000ths long, confined to the sarcode. Structure throughout uniformly compact, tough, and firm, without axial condensation. Size of specimen 11 in. high by  $2\frac{1}{2}$  in. in diameter in its widest part.

Depth 6 fath.

*Obs.* This is evidently a *Plumohalichondria* which, in addition to its self-made or proper spicules, has taken in foreign substances for the axial support of its fibre.

P.S.—The general forms of the specimens respectively above given can only be taken *cæt. paribus* as characteristic of the species, since the growth of sponges is so frequently more or less influenced in their form by the environment, that unless a great number of specimens of the same species have been seen it is impossible to determine this accurately.

[To be continued.]

XXXIII.—*On an Example of Polymorphism in the Amphipoda.* By CHARLES CHILTON, M.A. (New Zealand).

[Plate X.]

SEVERAL instances of dimorphism in the Crustacea are already known. Fritz Müller, who seems to have been the first to call attention to examples of it in this group, has given two, one in the Isopoda (*Tanais*)\* and one in the Amphipoda (*Orchestia*)†; in each of these cases there are two forms of the male to one of the female. Mr. G. M. Thomson has recorded a similar example from the terrestrial *Orchestia* of New Zealand‡. From the examination of a large number of specimens of *Orchestia* gathered from several different localities in New Zealand he comes to the conclusion that they all belong to one variable species, *Orchestia sylvicola*, the "males of which have at least two forms of the gnathopoda." Another example is found in *Mæra subcarinata*, Haswell (*M. Petriei*, G. M. Thomson); but here the two forms of the males only differ very slightly from one another. In specimens taken by Mr. Thomson at Stewart Island, New Zealand, the males had "the whole lower surface [of the propodos of the posterior gnathopoda] very densely fringed

\* 'Facts for Darwin,' p. 20.

† *L. c.* p. 24.

‡ 'Transactions New-Zealand Institute,' vol. xiii. p. 212.

with two rows of long simple hairs," and specimens taken by myself in Sydney agree exactly with this description, while those from Lyttelton Harbour differ in that these long simple hairs are entirely absent, and in having the palm more distinctly defined and more uneven, and the dactylos more rounded at the end\*.

As Fritz Müller says, "the occurrence of two kinds of males in the same species may perhaps not be a very rare phenomenon in animals in which the males differ widely from the females in structure. But only in those which can be procured in sufficient abundance will it be possible to arrive at the conviction that we have not before us either two different species or animals of different ages"†. In view of this danger I would like to point out that I have not as yet had a sufficient number of specimens of *Mæra subcarinata* to make me feel quite sure that the two forms are not simply animals of different ages. I am the more doubtful in this case because Mr. Walter Faxon has recently shown that what were considered to be dimorphic forms of the male in certain species of *Cambarus* are really "alternating periods in the life of the individual, the 'first form' being assumed during the pairing-season, the 'second form' during the intervals between the pairing-seasons"‡.

In many genera of the Amphipoda, such as *Mæra*, *Melita*, *Paranænia*, *Podocerus*, &c., the females of different species are often much more alike than the corresponding males, which usually have some of their limbs abnormally developed; hence if a supposed case of dimorphism or polymorphism occurs in these genera it is more than usually difficult to decide whether we have several species of which the females are alike, or nearly so, or one species with several forms of the male to one of the female. I have, however, an instance to bring forward from the genus *Microdeuteropus*, and, though I have hesitated for a long time, I think I have now sufficient evidence to show that we have here a widely dispersed species which has three forms of the male and only one of the female.

In 1879 Mr. G. M. Thomson described a species of *Microdeuteropus* from Dunedin Harbour, giving it the name of *M. maculatus*; at the same time he recorded the existence of *Aora typica* in New Zealand, the species having been originally obtained at Valparaiso§. In a subsequent paper he

\* 'Transactions New-Zealand Institute,' xv. p. 82; 'New-Zealand Journal of Science,' ii. p. 230; and 'Proceedings Linnæan Society N. S. W.' vol. ix. part 4, p. 1039.

† 'Facts for Darwin,' p. 24.

‡ 'American Journal of Science,' vol. xxvii. p. 42.

§ Ann. & Mag. Nat. Hist. ser. 5, vol. iv. p. 331.