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tened and setose above, cylindrical below; palpi castaneous, with the terminal article black banded with white, flattened and setose; falces piceous, castaneous at the base and above, with the basal half densely covered with white pilosity; movable claw tipped with reddish castaneous; teeth apparently as in the preceding species; maxillæ and labium olivaceous, with whitish anterior borders; pectoral shield black, with a few appressed white hairs, heptagonal. Length (including cephalothorax) 11 millim., of lateral anterior abdominal processes $1\frac{1}{2}$ millim.

East coast of Madagascar.

EXPLANATION OF PLATE VI.

- Fig. 1.* *Cærostris ecclesiigera* ♂, natural size.
Fig. 1a. Abdomen (from behind), of twice the natural size.
Fig. 1b. Palpus.
Fig. 1c. Tarsal claws of first pair of legs.
Fig. 2. *Cærostris ecclesiigera* ♀, natural size.
Fig. 2a. Abdomen (from behind), natural size; 2 *b*, profile.
Fig. 2c. Tarsal claws of first pair of legs.
Fig. 3. *Cærostris extrusa* ♀, natural size.
Fig. 3a. Caput, showing eyes and tubercles.
Fig. 3b. Tarsal claws of first pair of legs.
Fig. 4. *Cærostris Cowani* ♀, natural size.
Fig. 4a. Tarsal claws of first pair of legs.
Fig. 5. *Cærostris excellens* ♀, natural size.
Fig. 5a. Tarsal claws of first pair of legs.
Fig. 6. *Cærostris retorta* ♀, natural size.
Fig. 6a. Profile view.
Fig. 6b. Tarsal claws of first pair of legs.

XII.—*New Sponges, Observations on old ones, and a proposed New Group.* By H. J. CARTER, F.R.S. &c.

Order III. PSAMMONEMATA.

Fam. 1. Bibulida.

Group 1. EUSPONGIOSA.

Euspongia compacta, n. sp.

Thin, horizontal or vertical, extending concentrically from a pedunculated or contracted irregular base, terminating at the circumference in an irregularly-fissured round margin. Consistence that of very compact felt. Colour dark fawn when fresh, light fawn or grey after exposure when dry; der-

mal sarcode colourless. Surface uniformly plane on both sides, interrupted only by the pedunculated attachment; minutely reticulated in relief from the subsidence of the dermal sarcode upon the subjacent fibrous structure, which terminates in little tags, each of which bears a sand-thread. Vents numerous, small, circular, each provided with an annular diaphragm of the dermal sarcode; disposed singly or in scattered groups on one side, more plentiful and more or less in juxtaposition on the other; when single and isolated, presenting a stelliform arrangement of the superficial branches of the excretory canal-system, but when on the margin running in straight lines towards the latter. Pores in the interstices of a soft fibrous reticulation in the dermal sarcode which tympanizes the interstices of the subdermal fibrous reticulation. Internal structure composed of fine keratine fibre, densely reticulated, whose interstices are tympanized by the internal sarcode, here and there presenting a sand-thread, which terminates in the "tags" on the surface; traversed plentifully by the branches of the excretory canal-systems that finally end in the vents. Size of specimen about 8 by 5 inches in its longest diameter, and $\frac{3}{4}$ inch thick.

Hab. Marine.

Loc. South Australia, "off Darien Island;" Woolongong and Port Fairy.

Obs. This sponge, from its composition and structure, is evidently a very compact form of the officinal kind, too compact, indeed, if not thin, to be of any use for domestic purposes. Although I am at present in possession of several specimens, my description is chiefly taken from one belonging to the British Museum, which has been preserved in spirit and bears a label with "J. B. Jukes. Off Darien Island" on it, together with "J. 121." in the corner; from which I infer that it was obtained at least from the south coast of Australia, as two of the other but dried specimens bear labels respectively on which "Woolongong" and "Port Fairy" are written. In the absence of any register-number, I make this inference because a great number of both wet and dry specimens of sponges from these localities in the British Museum bear the well-known name of the late Mr. J. B. Jukes; and I cannot find out where "Darien Island" is or if there be such a place. My running-number on the label is 619.

I have already alluded to the world-wide occurrence of the group Euspongiosa under different forms ('Annals,' 1882, vol. ix. p. 273), which has been made the first in my order Psammonemata because it contains the *least* quantity of sand-thread (fibre axiated with foreign bodies), while the second, viz.

Paraspongia, only differs from the first group in presenting a larger and more evident quantity, which, of course, deteriorates the quality of the sponge. So scanty is the sand-thread in the officinal sponges that, in preparing them for the market, the little tags on the surface containing it are frequently washed off, when it becomes difficult to find their continuation internally; and thus its existence may be doubted. However, it is always present in the *fresh* specimen, which has been preserved in spirit from the commencement. The dermal sarcode on *Euspongia compacta* is colourless, not black or purple, as it is on the officinal sponges, which accounts for Aristotle's observation, made on the latter *circa* 330 B. C. ! viz. :—" When alive, before they are washed, they are black " (Hist. of Animals, B. v. chap. xiv. p. 119, Engl. transl. Richard Cresswell, M.A., Bohn, 1862).

Fam. 2. Hircinida.

Group 4. CALLHISTIA.

Taonura * *flabelliformis*, n. sp.

Fan-shaped, thick, stipitate, more convex on one side than the other (such as a cast of the interior of a clam-shell would be), thinning out to the circumference, which is circular, with an obtuse margin. Consistence soft, resilient. Colour yellow-amber. Stem short, thick, hard, gnarly, sometimes branched and naked for a short distance before the flabellate expansion begins. Surface rendered more or less smooth, probably by the dermal sarcode, when fresh; now largely irregular by a succession of depressions, becoming smaller and more numerous towards the circumference, presenting the appearance of imbrication, probably caused by the once projection of the feathered ends of the subdivided branches. Vents large, arranged linearly along the margin, Pandean-pipe-like. General structure radiating, so that when held up to the light the lines may be observed to extend from the stem to the circumference, where they are found to mark the intervals between the main canals of the excretory system, which take the same direction and end in the vents there. Minute structure fibrous, reticulated, forming a soft fine keratine tissue, in which the vertical fibre is axiated with foreign bodies and the lateral branches simple. Size of specimen about 1 foot broad by 6 inches high and $1\frac{1}{2}$ inch thick near the base; sometimes longer than broad.

* *ταῶς*, peacock, *οὐρά*, tail.

Hab. Marine.

Loc. South Australia, Illawarra, &c.

Obs. This sponge is described from the washed-out skeleton, of which there appear to have been a great number of specimens on the south coast of Australia, most of which, I suppose, have now been picked up for preservation. I have placed them in the fourth group of the Psammonemata, viz. the Callhistia, on account of their beautiful texture; but, like most of the groups in the family of Hircinida, they all have the same kind of psammonematous fibre, differing only in its amount, the rigidity of the fibre itself, its peculiar structure, and the general form of the specimen; how many of which may be varied forms of the same species I am unable to state, as almost the whole family have been grouped together from the *skeletons alone*, which form a great part of the collection in the British Museum, and appear to have been chiefly obtained from the south coast of Australia. Thus, much here being empiric, much will have to be supplied hereafter before the Hircinida can be satisfactorily distinguished and classified. Meanwhile this form furnishes a typical example of the group Callhistia, promised in the third part of my "Notes," &c. There are several specimens of *Taonura* in the British Museum which bear my running number 66, registered 44. 9. 13. 3, 6, 7, 4, and 13, which apparently were collected by Mr. J. B. Jukes.

Order IV. RHAPHIDONEMATA.

Fam. 1. Chalinida.

Group 2. PALMATA.

Chalina palmata, Crtr.

(= *Halichondria palmata*, Johnst., = *Isodictya palmata*, Bk.)

The palmate form of this sponge, being often like a hand (whence the name "Mermaid's Glove" in Shetland at the present day), has caused it to be recognized for nearly a century, commencing with Ellis and Solander's illustration in 1786 (Nat. Hist. of Zoophytes, p. 189, tab. lviii. fig. 6), designated *Spongia palmata*. Finally, after having received many different names, Dr. Bowerbank, in 1866, placed it in his genus *Isodictya* (Mon. Brit. Spong. vol. ii. p. 311), and in 1874 gave a figure of it under the form of the "Mermaid's Glove" and the name *Isodictya palmata* (ib. vol. iii. pl. lii.), having made the following observation in his earlier description (*l.c.*), viz:—"This sponge is, I believe, the Mermaid's Glove of the

Orkney fishermen ;" but if we are to be influenced by the form only, since he does not add, as in many instances, that it has been identified with the type specimen, then it is necessary to look at Johnston's illustration (Brit. Spong. pl. ii. fig. 1), where we shall find nothing but a common branched sponge, without any likeness whatever to a hand or glove. I myself also have a straight branch about 6 inches long and 1 inch in diameter at the base, which is somewhat contracted, wherein the vents are confined to a line on both sides in the way noticed by Fleming (Brit. Animals, p. 523), and the specimen so little compressed that it is almost identical in form with a similar growth of *Chalina rubens*; but feeling almost certain that it was a genuine specimen of *Chalina palmata*, since, although of a grey colour from being a washed-out portion, traces of the peculiar anchorate first described and illustrated by Dr. Bowerbank (*l. c.*) still exist in it, I sought the comparison which Bowerbank seems not to have done, viz. microscopic examination of the type specimen labelled *Halichondria palmata*, no. 2, registered 47. 9. 7. 1, now in the Johnstonian collection at the British Museum, and found that this also is not only a washed-out one and grey in colour, like my own, but also now contains only towards the axis of the branch, some of the characteristic anchorates (not like that in the Bowerbank collection, which is the aforesaid "Mermaid's Glove" form, with the sarcode on, and of a brown colour, charged abundantly with the anchorate). Thus Dr. Bowerbank's specimen becomes identified with the type specimen in the Johnstonian collection. It requires some time, however, to find out the anchorate in the latter, even with the aid of soaking in liq. potassæ, wherefore, perhaps, it is not figured in my first and rather hurried examination made several years ago; and it is just possible too that this accounts for Dr. Bowerbank's silence on the point.

As regards change of nomenclature, it might be observed that, when we find Johnston placing this sponge next before his *Halichondria oculata* and *H. cervicornis* (op. cit.), which were rightly designated by Dr. Bowerbank "*Chalinæ*" (B. S. vol. ii. pp. 361 and 364), and that Dr. Bowerbank's diagnosis of *Isodictya* (ibid. p. 9) begins thus:—"Skeleton without fibre, composed of a symmetrical network of spicula," &c., type specimen "*Isodictya palmata*," while that of his "*Chalina*" (ibid. p. 13) commences with "Skeleton fibrous. Fibres keratose, solid, cylindrical, and interspiculate" [? introspiculate], type specimen "*Chalina oculata*," it will not be considered unreasonable, as the specimens in the Johnstonian collection and my own also would, in their "washed-out"

state, have had no existence but for their keratose chalinoid fibre (see Bowerbank's illustration, *l. c.* fig. 2), that I also should propose the generic term "*Chalina*" instead of "*Hali-chondria*" for this sponge.

Let us now turn our attention for a few moments to the anchorate (woodcut, fig. 1, *a*, *b*), whose peculiarities demand special consideration, for it differs considerably from any that have hitherto come under my observation.

Thus it is equiended ("equianchorate"), as stated by Dr. Bowerbank in 1866 (*l. c.*); moreover, when viewed in front, it presents the canoe-shape of this spicule, to which I have applied the generic term of "naviculiform" (fig. 1, *a*); but when viewed laterally (fig. 1, *b*) the crumpled appearance which is represented in Dr. Bowerbank's illustrations (*l. c.* figs. 3, 4, and 5), but not the "bifurcate terminations" of the anterior arms, although rightly mentioned in both his earlier and later descriptions, which are *not* illustrated. Examining it more particularly we find that the term "siliceo-membranous," used by Dr. Bowerbank, well applies to the whole spicule, and hence its "crumpled appearance;" while others of the same kind in other sponges which are stiffer do not yield in this way, but maintain their straight navicular shape when viewed in *all* directions. In *Chalina palmata*, however, the shaft of the anchorate is much thinner towards the ends ("siliceo-membranous") than in the middle, which may account for its bending up there; it is also alate on both sides throughout, the aliform portion being narrow in the middle third, and then expanded circularly on each side, after the manner of the wing-like appendages of these spicules generally; while the anterior arm or appendage, being obovate, leaf-like, or petaloid (fig. 1, *a*), and supported in the centre by a process like a midrib extended from each end of the shaft, appears, when viewed laterally (fig. 1, *b*), to be bifurcated, which seems to arise from the extension inwards of a process from the midrib, and outwards by an eversion of the free border of this petaloid arm (as is often the case), termed by Dr. Bowerbank "exflected." This gives the anchorate of *Chalina palmata* its peculiar appearance, which I have never noticed before except in *Microciona affinis* (from the Gulf of Manaar), where the free extremity of the anterior arm presents

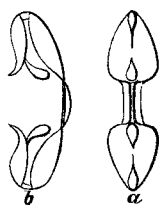


Fig. 1.—Anchorate of *Chalina palmata*, greatly magnified. *a*, front view; *b*, lateral view.

a "fish-hook"-like form, that I have endeavoured to illustrate ('Annals,' 1880, vol. vi. p. 41, pl. iv. fig. 15), but, from the minuteness of the object, could not explain.

Returning to the description of this sponge generally, it seems to me that Schmidt has wrongly identified his *Reniera palmata* with the *Spongia palmata* of Ellis and Solander (Spong. Adriatisch. Meeres, p. 74); for if we look at their representation (*op. et loc. cit.*) we shall find that it is a branched form with prominent pustular vents on the surface, which would not have been the case had they been at the ends of the branches, as stated in Schmidt's diagnosis of his *Reniera palmata*, viz. "in extremitate plerumque observatur osculum;" for both do not occur together. Besides, the type specimen of the latter in the British Museum (no. 75) is soft, fragile, and isodictyal, while that of *Chalina palmata* is tough and fibrous, to say nothing of the absence of any flesh-spicule.

Among Dr. Bowerbank's general collection of sponges now in the British Museum there are several specimens of one which, in its structure, spiculation, and colour, although not in general form, very much resembles *Chalina palmata*; but they are so worn down by having been washed about in the sandy beach from which they were probably picked up for preservation, that, although their general form and structure remain, it is difficult to say positively if they originally possessed those fringe-like growths around the vents which would conclusively identify them with other specimens of the like kind that have been known for many years past. Thus Esper represents one, under the name of *Spongia compressa* (tab. lv.), which, but for the "fringes," seems to be identical with that in question; while Ehlers, who in 1870 examined Esper's specimens in the museum at Erlangen with the view of identifying them with Schmidt's nomenclature, calls it "*Desmacidon compressa*," whereby we learn that it has the characters assigned by Schmidt to this genus in 1868, viz. a network formed of spiculo-fibre, the skeleton-spicule an acerate, and the flesh-spicule an *equianchorate* (Spong. Küste Algier, p. 11), which are just those of the sponge to which I have alluded, and which, but for the *uncrumpled* form of the naviculiform anchorate, would be those of *Chalina palmata*; hence I shall now describe it, as far as the specimens will permit, under Esper's specific and my own generic appellation, thus:—

Chalina compressa, Esper.

Battledore-shaped, compressed, for the most part broader

than long, subelliptical transversely, thick, sometimes subpyriform by proliferous growth; round on the free edge, becoming contracted and stipitate on the other. Consistence firm, resilient. Colour now light yellowish grey. Surface on both sides even for the most part, but sometimes proliferously lobed, as above stated. Vents large, confined to the margin, arranged irregularly in one or two lines, Pandean-pipe-like, or on the prominent parts of the lobes when there are any; raised round the orifice, and presenting the remains apparently of a fringe. Structure fibro-reticulate; fibre kerato-spiculiferous, with the vertical lines most pronounced, traversed by the excretory canals, which, radiating from the stem upwards, end in the large vents on the margin. Spicules of two kinds, viz. :—1, skeletal, acerate, fusiform, curved, gradually sharp-pointed at each end, smooth, 89 by $5\frac{1}{2}$ -6000ths inch in its greatest dimensions; 2, flesh-spicule, equianchorate naviculi-form, about 6-6000ths inch long; the former chiefly confined to the fibre, and the latter plentifully distributed throughout the sarcode. Size variable according to the specimen, say 6 inches broad and 4 inches high without the stem; $\frac{1}{2}$ to 1 inch in thickness; stem thick, compact, and stout.

Hab. Marine.

Loc. ?Algoa Bay.

Obs. While the other structures and spiculation are the same as in *Chalina palmata*, the equianchorate differs in not being bent upon itself and in the absence of the peculiar bifurcation at the end of the anterior or petaloid arm. Again, while the anchorate in *Chalina compressa* represents, as it were, a canoe cut entirely down to the keel in its middle third, which would thus represent the shaft only, that of *Chalina palmata* is, as it were, alate on each side of the keel (fig. 1, a). One of the specimens (for there are several) evidently presents the remains of a raised and apparently fringed border round the vents, which tends to identify it with Esper's *Spongia compressa*, if not also with the *Spongia tubulosa* of Pallas (Elench. Zoophytorum, no. 229, p. 383), although the other specimens are so rounded by attrition that, if there was any thing of this kind, it is all washed off. The raised pustular margin round the vents is also a feature of *Chalina palmata* (see Johnston, p. 93, pl. ii. figs. 1 and 4, also Ellis and Solander, p. 189, tab. lviii. fig. 6). As to colour, it might have originally been brown or amber, instead of grey (as the specimens now are); but this is the case with those of *Chalina palmata* under similar circumstances, viz. after having been exposed to the action of the surf, as the amber-colour of the "Mermaid's Glove" in the Bowerbank

collection indicates. Thus, too, there is a specimen in the British Museum, no. 39, registered 71. 6. 5. 1, from Port Elizabeth (that is, also in Algoa Bay), South Africa, which in general form, structure, and spiculation is almost identical with *Chalina compressa*, but, not having been exposed to the action of the surf, still retains the fringes round the vents, and presents an amber-brown colour. No. 205 *bis*, registered 50. 2. 5. 4, from the Falkland Islands, and no. 42, registered 71. 6. 5. 1, also from Port Elizabeth, appear to belong to the same category.

Order V. ECHINONEMATA.

Fam. 1. Ectyonida.

Group 1. PLURIFORMIA.

Echinonema vasiplicata, n. sp.

Vasiform, plicate, stipitate; wall stout, continuous, meandriform; margin round. Consistence compact, firm. Colour light grey now, ?originally purple. Surface even throughout, both outside and in. Vents not obvious. Pores probably as usual, in the dermal sarcode tympanizing the interstices of the reticulated subdermal tissue. Structure fibro-reticulated; fibre kerato-spiculiferous, echinated, finer on the surface than internally. Spicules of three forms, viz.:—1, skeletal, acerate, curved, fusiform, pointed at each end, smooth, varying much in size, the largest being 62 by 2-6000ths inch in its greatest dimensions; 2, echinating, straight, clavate, round at the ends, spined throughout, spines recurved, longer over the middle than at the ends, 21 by 2-6000ths inch in its greatest dimensions, not including the spines; 3, thin, setaceous, acute, about the same length as the skeletal spicule, scanty. Size of specimen $4\frac{1}{2}$ inches high, $3\frac{3}{4}$ inches across the brim; cavity $3\frac{1}{2}$ inches deep.

Hab. Marine.

Loc. Swan-River district; Freemantle, S.W. Australia.

Obs. There is a specimen of this kind in the British-Museum collection, viz. no. 594, registered 72. 5. 21. 46, also labelled "Swan River." That above described belongs to the Bowerbank general collection.

Trikentrion leve, Crtr.

This name was proposed for a little digitate branched specimen in the British Museum, described and illustrated, so far as the spiculation goes, in the 'Annals' for 1879

(vol. iii. p. 294, pl. xxvii. figs. 9-12), which up to this time had appeared only from the "west coast of Africa;" but the one which I am now about to notice was found without label among a set of sponges in the Bowerbank collection from the coast of S.W. Australia, whereby I am inclined to infer that it also came from this locality. Although totally different in form, it possesses the same kind of spiculation, and is infested apparently by the same kind of parasitic polyp; but, being much waterworn and correspondingly mutilated, I can only give the following description of it, viz. :—

Irregularly fan-shaped, very thin, stipitate. Consistence firm. Colour now cinnamon-brown. Infested with a parasitic polyp (*Bergia*), whose anastomosing stoloniferous growth forms a branched reticulation of a white colour that contrasts strongly with that of the sponge, over both sides of which it has spread itself. Size of specimen about $4\frac{1}{2}$ inches square and $\frac{1}{8}$ of an inch thick.

Although the stem is nearly worn off and the edge generally appears to have equally suffered in the surf, yet the general thickness cannot have been much reduced, or the branches of the parasitic polyp would not be still existing almost in their entirety over the plane surfaces. The structure and spiculation need not be described, as they would hardly be different from those of the little digitating branched specimen above mentioned.

Order VI. HOLORHAPHIDOTA.

Fam. 1. Renierida.

Group 4. CARNOSA.

Reniera crateriformis, n. sp.

Globular, thick, excavated, sessile; excavation cup-like, conical; vertically ridged externally, smooth within. Consistence friable. Colour now whitish grey outside, light brown internally. Surface covered with a fine dermal spiculo-fibrous reticulation, rendered irregular on the outside by the presence of the vertical ridges, which, becoming shorter and more multiplied upwards by subdivision and addition, finally end in the thin and even margin of the excavation. Vents chiefly on the inner surface and towards the bottom of the excavation; the rest, which are few in number and smaller, external on the ridges. Pores in the fresh state probably in the sarcode tympanizing the interstices of the fine dermal fibro-reticulation. Structure internally fibro-reti-

culate, fibre almost entirely composed of the spicules of the species, glistening, asbestos-like; traversed by the branches of the excretory canal-system, which are very large and chiefly end in the vents opening into the bottom of the excavation. Spicule of one form only, viz. acerate, large, curved, fusiform, sharp-pointed at each end, smooth, about 90 by 6-6000ths inch in its greatest dimensions; chiefly confined to the formation of the spiculo-fibre. Size of specimen about $7\frac{1}{2}$ inches in diameter; excavation $4\frac{1}{2}$ inches across the brim, and $3\frac{1}{2}$ inches deep.

Hab. Marine.

Loc. ? Australia (so said by the dealer).

Obs. This sponge belongs to the first family of my order Holorhaphidota, viz. the Renierida, originally made up of the genera "*Rayneria*" and "*Esperia*" of Nardo, not Schmidt ('Isis,' 1833, Spongiarum Classificatio, order ii. p. 519 *et seq.*), under the characters of "Spongiaria fulcimentis naturæ siliceæ aculeiformibus, &c." Influenced by this, Schmidt placed both under the genus to which he has given the name of "*Reniera*, Nardo," restricting the spiculation to that of an acerate form, viz. "simplicissima et uniformia, nunquam nodosa" (Spong. Adriatisch. Meeres, 1862, p. 72 &c.), and using the name "*Esperia*" generically for a totally different kind of sponges (*ib.* p. 53).

I have divided my family of Renierida into four groups, of which typical examples have been given in the key to my classification ("Notes" &c., 'Annals,' 1875, vol. xvi. p. 196); and it is to the last of these, viz. the "*Crassa*," that I would relegate the species above described, viz. *Reniera crateriformis*, chiefly on account of its spicule being the largest in the family and connected with the largest specimens. Thus, in the British Museum, no. 492, registered 61. 5. 11. 8, is all together 18 inches in diameter and 12 inches high, of which the excavation is 13 inches across the brim and 12 inches deep, surrounded by a number of minor crateriform cones, each of which is as large as a small sponge of this kind; so that probably it is one of the largest on record. There are two other specimens bearing ridges externally, like that above described, viz. one numbered 288, registered 41. 1. 13. 45, with "8332" in the corner of the label, and the other 492, without any register number; but these with others of the like kind, although still large specimens, are not near so large as that first mentioned.

Schmidt's "*Reniera* ? *calyx*" (Spong. Adriatisch. Meeres, 1862, p. 76, Taf. vii. fig. 12), of which there is a type specimen in the British Museum no. 81, registered 67. 7. 26. 71,

although of considerable size, being 9 inches high, including the stem, and 5 inches broad, has a spicule not more than half the size, although of the same shape as that of *Reniera crateriformis*; besides, it has a smooth homogeneous cuticle, underneath which is a fibrous layer like the bark of a tree, to which I shall more particularly allude presently; and this it was probably which induced Schmidt to place the note of interrogation after "*Reniera*" above quoted.

Proposed new group:—

PHLÆODICTYINA*.

Under the above name and with the following characters, provisionally given, I propose to group the few sponges to be hereafter mentioned, whose peculiar structure seems to me to make it desirable that they should be thus separated from all others of the kind.

Characters. Form variable, chiefly globular, accompanied by tubular expansions both above and below, or above only, which are closed at the extremities, simple, or branched; or globular in form, growing round the root of an aquatic plant?, without tubular extensions; or vasiform, with pustular eminences only inside. Structure essentially laminated and concentric; laminæ of two distinct kinds, which may alternate with each other in variable plurality, commencing dermally with an apparently homogeneous, fine, isodictyal layer, densely spiculous; followed by a coarse open spiculo-fibrous reticulated one, whose lamination is parallel to the surface, and contrasts strongly in structure (and bass-relief internally where not followed by another layer) with the isodictyal homogeneous one outside; also strongly with the tissue of sponges generally, whose reticulated structure is *continuous* with the deepest portion, and not laminar, like the bark of a tree, as in this instance. Internally hollow or more or less filled with a pulpy isodictyal tissue like the outer lamina, *i. e.* composed of sarcode densely charged with the spicule of the species. No evident oscula. Pores in the dermal layer. Spicule of one kind only, viz. acerate, sometimes accompanied by a bihamate flesh-spicule (*fibula*).

The first mention of such a sponge as this was made by Dr. Bowerbank in 1866 under the name of *Isodictya robusta* (Mon. Brit. Spong. vol. ii. p. 304), from a specimen obtained by the Rev. A. M. Norman in 1861, who found it in abundance about 30 miles east of the Outer Skerries, Shetland. The specimen was "cup-shaped," had "apparently" been

* φλοιός, bark, bass; δίκτυον, net.

furnished with a "short pedicel," and was " $1\frac{1}{2}$ inch high by $\frac{3}{4}$ inch broad;" the skeletal spicule "acerate," accompanied by a "bihamate" flesh-spicule; and that the above name was given provisionally, may be learnt from the following passage, viz. "These peculiarities of structure strongly induce me to believe that the sponge should form the type of a new genus."

A few pages on, the same species (as we shall see by and by) obtained in 1864 by Mr. J. G. Jeffreys at Shetland, is structurally described under the name of "*Desmacidon Jeffreysii*" (*ib. ib.* p. 347); but *here* no mention is made of the flesh-spicule, nor is the entire form of the sponge given, as it was "cut into numerous pieces by the dredge;" but a basal fragment is stated to have presented "numerous tubular cloacæ, varying from $\frac{1}{2}$ an inch in height and 2 lines in diameter to 4 inches in height and $\frac{3}{4}$ inch in diameter at the base, usually decreasing gradually in size to the distal extremity, and terminating in a contracted apparently permanent orifice" (p. 348); the word "apparently" of course implies doubt. It is evident from Dr. Bowerbank's description here that he was influenced by the presence of the spiculo-fibrous layer in placing this sponge under his genus *Desmacidon* (*ib. ib.* p. 10).

Thus we find it repeated by Dr. Bowerbank again, with a very good illustration, ten years afterwards, viz. in 1870, and again from a specimen supplied by Mr. Norman, who dredged it at Shetland in 1868 (Mon. B. S. vol. iii. pl. lxii.); meanwhile, however, Mr. Norman himself had described it, and had given it a new *generic* name, i. e. "*Oceanapia*," having, as he states, become "convinced" that Dr. Bowerbank had mistaken it "for something very different from what he had imagined." Hence the following synonymy:—

"*Oceanapia Jeffreysii* (Bow.) = *Desmacidon Jeffreysii*, Bow. Brit. Spongiadæ, vol. ii. p. 347, = *Isodictya robusta*, *ibid.* p. 304." (Report of Brit. Association for 1868, p. 334.)

As Mr. Norman's description of this sponge is far more satisfactory than any that had preceded it, we, of course, find it quoted by Dr. Bowerbank (B. S. vol. iii. p. 158) with other observations of his own, among which, as Mr. Norman's name for it is taken from the sponge being in form like a "Swede turnip," Dr. Bowerbank rightly observes that the choosing of "*Oceanapia*," as a generic term, is "unfortunate," because "there are numerous other sponges of a similar form, both British and exotic, which vary so greatly in their anatomical structures as to render it quite out of the

question that they should be grouped together in the same genus" (p. 161). But it is equally "unfortunate" that Dr. Bowerbank should have called it "*Desmacidon*;" for who with his diagnosis of the genus *Desmacidon* (l. c. before quoted) could find out *Oceanapia* by it? or why has Dr. Bowerbank used the term "*Rhaphiodesma*" for "British" sponges (viz. our *Esperina*) in which, if any thing, the presence of spiculose fibre is even more characteristic than in his type specimen, *Desmacidon fruticosa*? That he knew both possessed such fibre is evident; for the terms *Desmacidon* and *Rhaphiodesma* etymologically mean the same thing.

If, then, neither Dr. Bowerbank's nor Mr. Norman's names are satisfactory, and we look for another, viz. one which is but a "mere fortuitous combination of letters" indicating nothing, such as "*Biemna*," given by the late Dr. J. E. Gray to *Desmacidon Jeffreysii* in 1867 ("Notes on the Arrangement of Sponges," Proc. Zool. Soc. Lond. 1867, pp. 538, 539), it will be observed that, in point of priority, it precedes Mr. Norman's; but it includes a number of other species which have nothing to do with *Oceanapia*; and as for the description of this sponge, first given by Dr. Bowerbank under the name of "*Isodictya robusta*," this will be seen to just precede "*Biemna*" under the generic name of "*Gellius*" (!). Under such circumstances I can see no other course to follow but to accept Mr. Norman's generic appellation, viz. "*Oceanapia*." It may not be desirable to call sponges generically after their *form*, as before stated; but this has the merit of being graphically expressive externally, and almost equally applies to the fibrous often mixed up with the pulpy isodictyal structure internally, so that on the whole the term "*Oceanapia*" is not only most appropriate, but most acceptable to me generally, as I know of no other sponge with which its characteristics could be confounded.

Hitherto, with the exception of Dr. Bowerbank's conjectured (i. e. "apparently") permanent orifice" in the termination of the tubular extensions of *Oceanapia*, already mentioned, no vents have been noticed; while in a fragment of some pieces which Mr. Norman kindly sent me in 1876 there is an entire branch whose termination neither has nor ever had any; it is simply rounded like the finger of a glove; and in one subsequently found by Dr. Bowerbank, which was "well preserved" and "three and a half inches in height, the distal termination was in the form of a blunt cone, very thin, and rather coarsely reticulated" (B. S. vol. iii. p. 159). My own observations on a species that will be mentioned hereafter accord with Dr. Bowerbank's statement; so that it may fairly be inferred that

the "coarsely reticulated" structure at the ends of the tubular appendages serves the purpose of a distinct vent, especially as no others have been observed; but how Dr. Bowerbank could ally this to the open cloacal vents at the ends of the lobes in *Desmacidon fruticosa*, I am unable to conceive (B. S. vol. iii. p. 160).

It was hardly to be expected that the hitherto best of all spongologists, viz. Dr. Oscar Schmidt, should, during his great experience, have failed to meet with some of the Phlœodictyina; and thus we find them described and illustrated in his introduction to the Atlantic sponge-fauna, under the name of "*Rhizochalina*" (Spong. Atlantisch. Gebiet. p. 35, Taf. iv. figs. 1, 2). He also likens their form to that of an "onion or turnip," with a firm layer on the outside and concentric fibrous ones within, together with one form of spicule, viz. acerate; and considers the upper tubular appendages to be for the introduction of water and nourishment, while the under ones are for excretionary and root purposes. Yet it is strange, after this, that Schmidt should identify Dr. Bowerbank's *Desmacidon Jeffreysii* with his own "*Esperia*" (*op. cit.* p. 77), and, in his footnote, assume that the anchorates had escaped observation ("entgangen"); while he fails to notice Mr. Norman's *Oceanapia* in connexion with his *Rhizochalina*, which he himself, as before stated, likens to an onion or turnip ("zwiebel- oder rübenartige Körper").

With reference to the classification of these sponges, I should, now that I have had to examine most of them more particularly, be inclined to put the group in my first family of the order Holorhaphidota, viz. the Renierida, next to Crassa. Schmidt has placed his *Rhizochalina* in that of the Chalineæ (*op. cit.* p. 79); and so I at first "felt inclined" to place them in the second family of the Rhaphidonemata, viz. the Cavochalinida ('Annals,' 1880, vol. vi. p. 37); but since I have had to study them more seriously my views have changed, and now I find that, the outer layer being isodictyal and the inner one *spiculo*-fibrous, it is impossible to place them among the Chalineæ, where, if any thing, the keratine preponderates over the spiculous part of the fibre; albeit the Chalineæ and Isodictyosa run into each other, as already stated ('Annals,' 1882, vol. ix. p. 277). Again, the isodictyal character of the outer layer and the form of the spicule allying them to the first four groups of my Renierida, it seems to me desirable that the Phlœodictyina should come next to these, as above suggested, *Desmacidon fruticosa* belonging to my Hali-chondrina.

There is a resemblance between the appendiculate Poly-

mastina (ex. gr. *P. spinula*, Bk. B. S. vol. iii. pl. xi. figs. 10-13) and those Phlœodictyina, especially in the structure of their tubular appendages, whose wall is composed of a layer of fine spicules externally resting on a reticulated spiculo-fibrous one within; but the body of the *Polymastia* is solid, sessile, and filled with a tough structure consisting of bundles of stout long spicules radiating in bundles from a central point, like that of *Donatia*, while the spiculation, being acuate or pinlike, is totally different from that of the Phlœodictyina. Balsamo-Crevelli's *Suberites appendiculatus*, illustrated and described in the 'Atti della Soc. Ital. de Scienze' for 1863, vol. v. tav. vi. figs. 10-17, is no doubt an appendiculate *Polymastia*.

Having thus introduced the subject, I will now briefly enumerate the species of Phlœodictyina that have come to my notice, beginning with the British one first mentioned:—

1. *Desmacidon Jeffreysii*, Bowerbank.
(= *Oceanapia Jeffreysii*, Norman.)

Well described by the latter in 1868 (Report Brit. Association, p. 334); well illustrated by the former in 1874 (Mon. Brit. Spong. vol. iii. pl. lxii.), but the flesh-spicule (bihamate) is omitted, although mentioned in the description. Skeletal spicule acerate; flesh-spicule bihamate.

Loc. Shetland.

Type specimen in the British Museum.

2. *Rhizochalina oleracea* and *R. carotta*, Schmidt.

Described and illustrated in 1870 (Spong. Atlantisch. Gebiet. pp. 35, 36, Taf. iv. figs. 1, 2). Spicule of one kind only, viz. acerate, curved, sharp-pointed at each end, smooth,

Loc. Antilles.

3. *Desmacidon fistulosa*, Bowerbank.

Well illustrated in 1873 (Proc. Zool. Soc. Lond. p. 19, pl. iv. figs. 7, 8). Tubular appendages "above only." Dermal layer smooth, yellowish, glassy, like a varnish in its dried state ("coriaceous," Bk.),? from the abundance of dried sarcode. Spicule of one kind only, viz. acerate, curved, fusiform, sharp-pointed at both ends, smooth.

Loc. Freemantle, S.W. Australia; Gulf of Manaar.

Type specimen in the British Museum, Bowerbank general collection. There is also a specimen in the general collection of the British Museum, No. 513, but with no other label.

4. *Desmacidon fistulosa*, var. *fuliginosa*, Crtr., n. var.

In the Bowerbank general collection, now in the British

Museum. Dermal layer even, but not glassy, varnish-like. Colour throughout soot-black. Spicule of one kind only, like the foregoing.

Loc. Freemantle, S.W. Australia.

5. *Phlæodictyon isodictyi*forme, Crtr., n. sp.

Massive, sessile, incrusting, spreading, irregular in form; more or less composed of erect cylindrical appendages rising from a subbasal lamina. Consistence fragile. Colour fawn. Surface even; appendages hollow, tubular, closed at the free end, which is often expanded and bifurcate; walls composed of two layers, viz. an external and an internal one,—the former isodictyal and homogeneous in appearance, densely spiculous; and the latter spiculo-fibrous, consisting of a coarse, open reticulation, whose longitudinal lines are most pronounced, projecting in relief from the inner surface. Tubular appendage rougher over its free extremity than elsewhere, but presenting no defined osculum there, nor on any other part of the sponge that I can see. Pores probably in the soft dermal layer. Body of the sponge almost obsolete, consisting of that small portion of the lamina which exists between the erect appendages, with which it is confounded both in structure and continuation. Spicule of one kind only, viz. acerate, curved, fusiform, sharp-pointed at each end, smooth, 30 by $\frac{1}{3}$ -6000th inch in its greatest dimensions. Size of specimen about 2 inches square; tubular appendages about 9-12ths inch high and 2-12ths inch in diameter.

Hab. Marine. Growing over shell-detritus at the sea-bottom, old mussel-shells &c., amidst Polyzoa, especially *Crisia eburnea*.

Loc. Vigo Bay; west coast of Spain.

Obs. This sponge is in the Kent collection at the British Museum, No. 15, registered 72. 5. 4. 1, dredged on board the 'Norna' in 1870. At first sight it looks very much like an *Isodictya*, but, on dissection, is found to be similar in structure to *Desmacidon Jeffreysii*—which distinguishes it from an appendiculate *Polymastia*, to which it also bears some resemblance externally.

6. *Phlæodictyon hondurasensis*, Crtr., n. sp.

This name is proposed for a tubular fragment, about $2\frac{1}{2}$ inches long, which consists of the bifurcation of one 5-8ths of an inch in diameter, of which the wall is composed of two laminae, as in the foregoing species, viz. an outer or homogeneous isodictyal tissue of spicules, and an inner one of coarse reticulated spiculo-fibre. The latter, however, although

laminar, does not present any prominence of its fibre parallel with the surface, as in the foregoing species, but a uniformly reticulated structure in which the interstices of different sizes are circular, like those of a similarly constructed sieve; it is also more or less repeated inwards, accompanied finally by a tissue like that of the dermal layer, which appears to have filled the central portion, supported on a loose straggling reticulated fibre. Spicule of one kind only, viz. acerate, curved, fusiform, sharp-pointed at each end, smooth; 40 by 2-6000ths inch in its greatest demensions.

Loc. Honduras.

The specimen, which bears a label on which is written "Honduras, D.," is in the Bowerbank general collection, now in the British Museum. As Dr. Dyson supplied Dr. Bowerbank with specimens from Honduras, the "D" probably stands for his name.

7. *Phlæodictyon niduliformis*, Crtr., n. sp.

This name is proposed for a species which has grown around the root or the stem of an aquatic plant in a conical form, with the largest end upwards, looking like a bird's nest in its present state. Its vertical diameter is about 4 inches, and the same across the base of the cone or upper part; composed of concentric reticulated layers or coarse spiculo-fibre; faced externally by the same kind of isodictyal tissue noticed in the other species. Spicule of one kind only, viz. acerate, curved, cylindrical, abruptly pointed at each end, smooth; about 37 by 1-6000th inch in its greatest dimensions.

Loc. ?

The specimens, of which there are two in the British Museum, numbered 206 *bis*, and registered 43. 4. 10. 27 and 28 respectively, are much mutilated, but, bearing bits of *Polytrema miniaceum*, may have come from some tropical climate, ? West Indies.

8. *Phlæodictyon vasiformis*, Crtr., n. sp.

This name, again, is proposed for a mutilated fragment of a vase-like form, now compressed, about $5\frac{1}{2}$ inches high, 5 inches across the brim, and $1\frac{1}{2}$ inch thick in the wall. The latter is composed of two kinds of structures, viz. a dermal layer, which is homogeneous and isodictyal, continued over the inner as well as the outer surface, with a coarse spiculo-fibrous reticulated structure between, in which the vertical fibres predominate, and the interstices are oblique or elongated in the same direction. But while the isodictyal layer on the outer side is even and uniform in its structure, that on

the *inner* side is covered with little pustuliform eminences, through which the excretory contents may have been eliminated, as there is no appearance of oscula in any other part. Spicule of one kind only, viz. acerate, curved, fusiform, sharp-pointed at each end, smooth; about 60 by 3-6000ths of an inch in its greatest dimensions.

Loc. ? Australia.

The specimen is in the British Museum, general collection, numbered 557, and registered 59. 10. 7. 40.

9. *Reniera? calyx*, Schmidt.

(Spong. Adriatisch. Meeres, p. 76, Taf. vii. fig. 12.)

I have already alluded to this species, of which the British Museum possesses a type specimen, No. 81, registered 67. 7. 26. 71. It is large and goblet-shaped, 9 inches high, with a cup-shaped excavation 3 inches across the brim and 4 inches deep; covered with a smooth, thin, dark, dermal layer, under which is a coarse fibrous structure arranged, according to Schmidt's examination of Esper's specimen (see *l. c.*), in concentric layers, with a "simple vent" at the bottom of the cup. The spicule, which is comparatively small for the size of the sponge, and of one kind only, is acerate, curved, fusiform, sharp-pointed at both ends, and smooth, about 60 by 2-6000ths inch in its greatest dimensions.

Loc. Adriatic Sea.

Although Schmidt considered this sponge a Renierid, he doubted, as may be seen by the note of interrogation after the generic name, as well as in his following description, whether it should be classed with the sponges that he was then describing. Its position, as I have not the opportunity of more closely reexamining the type specimen in the British Museum, is here placed among the Phlœodictyina provisionally.

Fam. Suberitida.

Group 12. LAXA.

Suberites stelligerus, Crtr., n. sp.

Massive, conoidal, lobate, erect, sessile, somewhat compressed, contracted towards the base, expanded towards the centre, which, from the presence of vacuities below, appears to have been formed by the union of lobes or branches originally separate, finally terminating by subdivision of the mass into little conical processes over the upper third. Consistence fragile, tender. Colour now, in its apparently washed-out state, light grey. Surface villous, soft, uniformly covered with a pile formed of pinlike spicules arranged vertically, with their points

outwards. Vents numerous, irregularly scattered over the surface. Texture soft, reticular, without fibre, more or less cellular, traversed by the branches of the excretory canal-system, which terminate in the vents mentioned. Spicules of two kinds, viz. :—1, skeletal, pinlike, with terminal or ante-terminal more or less capitate inflation, curved, slightly fusiform, gradually sharp-pointed, 265 by 5-6000ths inch in its greatest dimensions (fig. 2, *a*); 2, flesh-spicule, stelliform,



Fig. 2.—Spiculation of *Suberites stelligerus*. *a*, skeletal spicule; *b*, flesh-spicules: scale 1-96th to 1-6000th inch. *c*, flesh-spicule, much more magnified, to show general form and spinous ends of rays.

more or less nucleated, in which originate 8-10 straight rays, each of which terminates abruptly in four or more short everted spines about 4-6000ths inch in diameter (fig. 2, *b*, *c*). Pinlike spicules and stellates equally plentiful. Size of specimen 6 inches high, 4½ inches broad, and 2 inches thick.

Hab. Marine.

Loc. Honduras.

Obs. This sponge, from its loose, apparently compressed, fibreless structure, pinlike form of the skeletal spicule, and presence of shell detritus imbedded in its surface, has all the characters of a Suberite belonging to my group *Laxa*; but the presence of the *stellate* flesh-spicule is new to me, although not in allied forms, ex. gr. *Axos Cliftoni*, *A. flabelliformis* ('Annals,' 1879, vol. iii. pl. xxvi. figs. 3 and 6), and the small stellate in *Donatia tyncurium*. From the old appearance and mutilated condition of the specimen, which belongs to the Bowerbank general collection, it appears to have been picked out of a sandy beach, where it might have been for years, and now bears a label on which is written "Honduras, Dyson;" hence the locality is known.

XIII.—Contributions to the Knowledge of the Alcyonaria.

Part II., including Descriptions of new Species from Mauritius. By STUART O. RIDLEY, M.A., F.L.S., &c.

[Plate V.]

LIKE the first paper of this series (this Journal, ser. 5, vol. ix. p. 184), the present communication will be found to owe its