

XXXVII.—*Supplement to the Descriptions of Mr. J. Bracebridge Wilson's Australian Sponges.* By H. J. CARTER, F.R.S. &c.

[Plate X.]

[Continued from p. 290.]

Order III. PSAMMONEMATA.

STELOSPONGOS, Sdt.

I have already gone into the history of this genus under the head of "*Stelospongius laevis*, Hyatt" ('Annals,' 1885, vol. xv. p. 303), and I should not have returned to the subject had I not found, on comparing the whole of the specimens in Mr. Wilson's several collections, that I had confused, in my description, two forms so very much alike externally that without many examples of each, and thus sufficient material for the destruction caused by sectioning, I should not have been able to contrast their characters satisfactorily for distinction. Let us now see what these are.

In *Stelospongius laevis* the keratose skeletal structure not only predominates in quantity over the sarcodic, but is peculiarly abundant, presenting in a vertical section of the dried and washed-out specimen a radio-floral arrangement of the main bundles of the fibre, by their curving upwards and outwards from the lower part of the axis to the circumference, being bound together on their way by a dense network of lateral or smaller fibre. In the other species, for which I propose the name of "*Stelospongius cribrocrusta*," it is the opposite, viz. the sarcodic greatly predominates over the keratose structure, which, on the other hand, is very scanty, presenting itself only under the form of a scattered fibro-reticulation, in which the meshes appear from their width to be almost absent in the centre, while they thicken by becoming smaller towards the circumference, and especially in the stem, where this structure is most required for general support.

In *Stelospongius laevis* the surface consists of a thin incrustation uniformly studded over with little tufts of fibres, which project beyond the dermal sarcode and are the circumferential terminations of the radiating bundles of the interior; these tufts may be separate, or, becoming compressed and extended laterally, so as to meet each other, may give rise to a poly-

gonal or honeycomb appearance on the surface. In *S. cribrocrusta* it consists of a thick incrustation of foreign material, which externally presents a polygonal lattice-like reticulation in slight relief, whose interstices in the perfect condition are diaphragmed with sieve-like pore-structure, which, in the worn state, is replaced by a single circular hole; while internally this crust is attached to the circumferential portion of the subjacent fibrous skeleton by a few straight, single, delicate filaments, which for the most part do not penetrate the crust sufficiently to appear on the surface; indeed, so slight is this attachment that on desiccation the crust cracks up, through partial collapse of the sarcodic interior, and thus separates itself from the filaments of the subjacent fibre.

In *Stelospongius lævis* the abundance of keratose skeletal fibre enables it under desiccation to retain its original form, while in *S. cribrocrusta* there is more or less corrugation and breaking-up of the crust, owing, as just stated, to the shrinking of the sarcode internally.

Thus the keratose fibro-skeletal structure of *S. cribrocrusta* is so delicate and so scanty that it could hardly sustain the wash of the sea-shore waves without going to pieces, while that of *S. lævis* is so firm and dense that the utmost washing of the waves could hardly destroy its structure; hence the latter has been found in great numbers on the South-Australian shores, as our museums and private collections testify; while I have never seen a specimen of *S. cribrocrusta* except in Mr. Wilson's collection, where the specimens were transferred from the dredge directly to a vessel containing methylated spirit and water for preservation.

The spirit-preserved specimen described and illustrated by Bowerbank under the name of "*Halispongia choanoides*," so named from its supposed identity with the fossil "*Choanites Kænigii*" (Proc. Zool. Soc. 1872, p. 123, pl. vi.), seems to have been a variety of *S. cribrocrusta*; but if this should not be the case, the illustrations of the "keratose sponge" from South Australia, which he described from spirit-preserved specimens in the British Museum in 1841 ('Annals,' vol. vii. p. 129, pl. iii.), are so undoubtedly! and to those, especially that of the dermal crust in its "perfect state" (fig. 7), I would refer the reader, for it is, as Dr. Bowerbank has stated of all the rest, "beautifully and faithfully represented."

It is strange that, in his description of *Halispongia choanoides*, Bowerbank should have made no allusion to this "keratose sponge," which is so typical of *S. cribrocrusta* that had he proposed a name for it, I should not have had to introduce the one above mentioned; for the characters of

Stelosponrus laevis and *S. cribrocrusta* are so remarkably different that the two cannot come under the same designation, while those of *Halispongia choanoides* and *Stelosponrus cribrocrusta* are remarkably alike.

At the same time Dr. Bowerbank, in 1872 (*l. c.*), evidently connects *Halispongia choanoides* with *Stelosponrus laevis*, when at p. 123 he says, "the skeletons of what are apparently various species of this genus are very common in collections from Australia," by which he probably meant those of *S. laevis*, to which I have alluded as being so durable that their skeletal structure survives the ordeal of the waves in which *S. cribrocrusta* would go to pieces.

Again, Hyatt states, with reference to the typical structure of the fibrous skeleton in "*Stelosponrus*," viz. the radiating primary bundles (*op. et loc. cit.* p. 529), that "there are none of these, properly speaking, in some other species, but only closely connected sheets of parallel primary fibres; . . . these lead into the genus *Spongelia*, between which and this genus no definite and constant differences, applicable to all the species without reservation, have been found in the skeleton." How far this may apply to *S. cribrocrusta* I cannot say, for the other species of *Stelosponrus* which I have described from "Port Phillip Heads" (*op. et loc. cit.*), viz. *S. flabelliformis*, *S. latus*, and provisionally *S. tuberculatus*, present respectively the crust of *S. cribrocrusta*, but with much more keratose fibre—especially *S. flabelliformis*, which, but for the difference in consistence, form, and structure of the fibre, might *externally*, on account of the crusts being so much alike, be viewed as a specimen of *Coscinoderma*; while, on the other hand, the density of the keratose structure and its sand-bearing fibre internally allies it to *Stelosponrus laevis*.

Under these circumstances I shall give the following description of *Stelosponrus cribrocrusta*, and leave others to form their opinion of it afterwards.

Stelosponrus cribrocrusta, n. sp.

General form pear-shaped (the same as that of *S. laevis*). Colour grey. Surface even, composed of foreign material so arranged as to present a uniform polygonal reticulation in slight relief, whose interstices are diaphragmed by the pore-areas, which consist of a much smaller reticulation formed of sarcode, also charged with foreign material. Vents for the most part very large, single or in plurality, on the summit of the sponge, more or less projected on conical eminences of the general structure, or on a level with the arenaceous crust that extends up to their margin, which is not fringed but even.

Internal structure sarcodic, much more than kerato-fibrous, the latter consisting of a loosely reticulated fabric, whose interstices are so wide and the fibres so small and scanty in the centre of the sponge that it is hardly noticeable, thickening in structure and consistence towards the circumference, and especially in the stem. Fibre stiff, of a clear amber-colour and transparency, here and there cored with grains of quartz-sand, supporting on the circumference the crust above mentioned, which is very thick, consisting of a reticulated dermo-fibrous sarcodic structure, densely charged with foreign material, presenting *externally* the kind of "surface" above described, which is penetrated on the inner side by fine straight filaments of the skeletal fabric, the latter (still further in) supporting the sarcodic parenchyma, which is largely traversed by the canals of the excretory system that empty themselves into a cylindrical, central, cloacal, tubular cavity, which terminates in the single vent mentioned, or in plurality, when the vents also are more than one in number. Size variable, the largest specimen about 5 in. long, one third of which is stem; head 2 in. in its greatest diameter; stem, which expands upwards into the head and downwards into the root, $\frac{1}{2}$ in. in diameter in its narrowest part.

Loc. Port Phillip Heads and Port Western.

Obs. When a vertical section of this species is made the great cylindrical, cloacal canal of the centre, which in *Stelospongia laevis* is in the midst of dense fibrous keratose structure, is found to be in the midst of almost entirely parenchymatous sarcode, for the skeletal fibre here is so scanty that the greater part of the body appears to be composed of sarcode, so that in this matter alone *S. cribrocrusta* and *S. laevis* are totally different; yet it sometimes seems to me possible that they may be the extreme structures of the same form and genus respectively, hence the same generic name has been used for both.

Hircinia flagelliformis, n. sp. (dry).

Erect, cauliform, cylindrical, round, solid, long stems of different lengths, growing together and branching scantily from an expanded base of the same structure; round at the free end and decreasing in size backwards so gradually that one 28 in. long may be only $\frac{1}{2}$ in. in diameter at the base and $\frac{1}{4}$ in. at the other extremity. Consistence firm and stiff, especially when dry. Colour amber-brown. Surface uniformly presenting small conuli arranged in more or less broken sinuous lines intertympanized by homogeneous fine sarcode charged with small epithelial cells supported by the subjacent keratose

structure. Pores not seen. Vents numerous, scattered over the surface irregularly throughout the branch. Skeletal support consisting of densely reticulated, stiff, short-jointed fibre of two kinds, viz. sand-cored or main, whose branches end in the conuli on the surface, and transparent or lateral, interuniting the sand-cored filaments, the latter diminishing in size with the increase of the reticulation. Largest specimen, which consists of a group of twelve stalks of different lengths, varying from $2\frac{1}{2}$ to 28 in. in length and under $\frac{1}{2}$ in. in diameter, all growing up out of the same expanded base.

Loc. Port Western.

Obs. This species in form is very like that from the West Indies, which I have described under the name of "*Aplysina longissima*" ('Annals,' 1882, vol. ix. p. 271), whose structure and characters were so ill-defined, that at the time I was doubtful whether to call it an *Aplysina* or "*Hircinia*," so it is just possible that the two are the same. The soft fibro-reticulated dermal structure which characterizes most sponges of this kind in Mr. Wilson's collection is absent in *Hircinia flagelliformis*, in which, instead of being thick and opaque when dry, it is thin, transparent, and homogeneous.

Hircinia (Spongelia) rectilinea, Hyatt.

Hircinia (Spongelia) rectilinea, Hyatt, Revision of N. American Porifera, p. 537, pl. xvii. no. 13.

Vase-shaped, cylindrical, stipitate, rather everted at the brim, externally nodose and lumpy, internally even; stem smooth, rather compressed. Colour sponge-brown. Surface minutely conulated both externally and internally; conuli projecting through a soft, fleshy, fibro-reticulated, dermal structure, the interstices of which are occupied by the pore-areas, which are chiefly on the outside of the specimen. Vents circular, plentifully scattered over the inside, increasing in size towards the bottom of the cup, where there are two very large ones. Skeletal fibres sand-cored and transparent, the former main or primary, and the latter interuniting or secondary, producing together a reticulated structure which, on the outside of the vase, grows up into large, irregularly nodose or lumpy excrescences without any distinct form or arrangement, but on the inner side presents an even surface. Size of specimen:—Body 5 in. high by 3 in. in diameter; cup-like excavation about 2 in. deep and 4 in. in diameter across the brim.

Loc. Port Western.

Obs. This is so very like the form and description of Hyatt's *Ann. & Mag. N. Hist.* Ser. 5. Vol. xviii.

specimen, which came from the same neighbourhood, viz. "Phillip's Island," close to "Port Western," that I have given it his designation.

Besides these there are other massive specimens of *Hirciniae* in Mr. Wilson's collection from Port Western, mostly small, which, but for the character of their keratose fibre, might be mistaken for colourless or grey *Aplysinæ*, since they present no particular shape, and, as I have before stated respecting the *Aplysinidæ*, much experience on the spot where an unlimited number of specimens can be obtained is necessary to reduce the whole here as well as elsewhere to their proper specific value, a task which the *great* number of species among the PSAMMONEMATA renders as important as at present it seems to be overwhelming.

Euspongia infundibuliformis, n. sp.

Vase-shaped or flabellate; infundibularly contracted towards the base where the stem has been truncated (probably by the dredge). Outer surface raised into thick, broken, sub-reticulate ridges, which radiate irregularly from the base to the circumference; inner surface even. Colour light brown. Surfaces (internal and external) uniformly covered with minutely conulated, sinuous ridges, projecting through an epithelial layer of nucleated circular cells, each about $2\frac{1}{2}$ -6000ths in. in diameter, which, in its turn, rests on a soft, fleshy, dermal fibro-reticulation. Pores in the interstices of the reticulation, chiefly on the outside. Vents thickly distributed over the *inner* side, each about 1-18th in. in diameter, and for the most part respectively provided with a sarcodic sphinctral ring, subuniform in size and distribution, absent about the lower part of the cup; structure, although fine, very compact, chiefly composed of comparatively small keratose fibres of two kinds, viz. sand-cored and transparent, the former scanty and branching in more or less straight lines towards the surface, where they end in the conuli, the latter abundant and interuniting the former, but so delicate that they can only be seen with a microscope. Size of vasiform specimen (for there are two) 5 in. high both inside and out, wall $\frac{1}{4}$ in. thick, diameter across the brim 7 in.; stem, where it has been truncated, about 2 in. in diameter.

Loc. Port Western.

Obs. The exact height of this specimen cannot be given as the stem has been cut off. In its dried state it is firm and hard on the surface, on account of the presence of the dried sarcode over its compact structure, which, if thoroughly

washed out, as some specimens are among the waves, would have presented the usual woolly or soft structure of the finest "Turkey sponge." The flabellate specimen is (as I have before stated in many instances) only preparatory to the vase-shaped one, wherein the two sides of the former approximating become united, often, too, leaving a hole at the bottom.

There is another, but dried, cup-shaped specimen whose surface throughout is covered with a thick coating of sand mixed with the filaments of *Spongiophaga communis*; hence it is very hard, and the surfaces (inner and outer) respectively very smooth. It is 4 in. across the brim and 2 in. deep.

Order IV. RHAPHIDONEMATA.

Chalina oculata, var. *repens*, n. var.

Reptant, spreading over both sides of the flat fronds of a black olive *Fucus*, at least 8 in. long and 2 to 3 in. broad, covered with large circular vents respectively, terminating conical, monticular processes in juxtaposition. Colour light brown. Consistence resilient. Surface even, minutely fibro-reticulate. Pores in the interstices of the fibro-reticulation. Vents numerous, large, and circular, each terminating the summit of a flask-shaped or monticuliform individual which, in conjunction with others of the same kind, form the reptant crust of which the specimen is composed. Structure essentially keratose, that is without spicules; fibre reticulate and short-jointed, smaller on the surface than in the interior, supporting a thin sarcode charged with ova in an advanced state of segmentation. No spicules. Size of specimen about 8 in. long (that is, the size of the branches of the *Fucus* over which it has grown), about 1 in. thick.

Loc. Port Western.

Obs. This variety of *Chalina oculata* is evidently allied to the "knotty mass or crust-like" form of *Halichondria simulans*, Johnston (Brit. Spong. 1842, p. 109), whose relations I have noticed in connexion with specimens in the British Museum, being, from the nature of its keratose structure, a *Chalina* in one place and a *Reniera* in another ('Annals,' 1882, vol. ix. p. 277), to which I must refer the reader for further observations on the subject, as it bears upon the fact to which Schmidt alluded in 1870, viz. the connexion between *Chalina* and *Reniera* (Atlantisch. Spongienf. p. 37). It is illustrative of my family no. 3, viz. the "Reptata" (see Classification, 'Annals,' 1875, vol. xvi. p. 141), and is a repent variety of *Chalina oculata*, as described in the 'Annals' of 1885 (vol. xvi. p. 285). The absence of spicules is as

remarkable as it is unusual; but I have already alluded to the extreme smallness of these in the other specimens of Mr. Wilson's *Chalinae* (*ib.* p. 284), and here they are *altogether* absent, while the fibre is only cored by a flocculent substance such as appears in the transparent fibre of the PSAMMONE-MATA.

Acervochalina claviformis, n. sp.

Erect, cylindrical, clavate or pyriform, with the largest end uppermost. Consistence remarkably loose and tender. Colour grey-brown. Surface uniformly smooth, covered with a fine fibro-reticulation. Pores in the interstices of the reticulation. Vents numerous, very large and circular, with prominent or raised margin, scattered irregularly over the surface. Structure remarkably loose, composed of fibres cored with the spicules of the species, many of which project through the sides, supporting the sarcode abundantly traversed by large excretory canals which terminate respectively in the vents mentioned. Spicule of one form only, viz. acerate, smooth, curved, fusiform, sharp-pointed, about 40 by $1\frac{1}{2}$ -6000th in., coring the fibre and more or less projecting through it. Size of specimen (of which there are two almost exactly alike, although coming from different localities), 5 in. high, $1\frac{1}{2}$ in. in diameter in the widest part of the head, and 5-8ths at the base, where it expands into a discoid root-like attachment.

Loc. Port Phillip Heads and Port Western.

Obs. This species, in the present instance, is chiefly characterized by its pyramidal erect form, large vents, and delicate structure, so that, if handled roughly, it would go to pieces.

Order V. ECHINONEMATA.

Plumohalichondria plumosa, var. *purpurea*, n. var.

Fig-shaped, the largest end upwards, growing on a fragment of the calcareous test of a Polyzoon. Consistence firm. Colour pinkish purple. Surface even, minutely reticulated. Pores in the interstices of the reticulation. Vents small, scattered over the summit. Structure compact; dermis pinkish, but internally light sponge-yellow, composed of sarcode supported on the spiculiferous fibre of the species, traversed by the canals of the excretory system. Spicules of two kinds, viz. skeletal and echinating:—1, skeletal spicules of two forms, viz. acuate, curved, scantily spined but chiefly towards the large end, about 45 by 2-6000ths in.; and acerate, smooth, curved or nearly straight (viz. the "tibiella"), more or less gradually pointed: 2, echinating spicule clavate, thickly

spined, spines large, viz. as long as the shaft is thick; total size about 20 by 3-6000ths in. Skeletal spicules of both forms mixed in the fibre, the "tibiella"* most numerous; No. 2, the echinating spicule, plentifully dispersed over the fibre.

Loc. Port Western.

Obs. This variety is chiefly characterized by the absence of a flesh-spicule, viz. the usual angulated equianchorate, together with the presence of a pinkish colour in the dermis, although in respect to the latter, when only superficial, I am always in doubt how far it may have been derived from the proximity of a similarly coloured sponge, ex. gr. *Suberites Wilsoni*.

Axinella chalinoides, var. *cribrosa* (dry).

Specimen a compressed cluster of polychotomous branches rising from a short thick stem with root-like expansion; branches finger-like, subcylindrical, subpointed, dividing more or less on the same plane, interuniting more or less midway between the stem and the free extremities. Consistence compressible, not hard. Colour fawn-colour. Surface cribrate generally. Pores not seen, probably in the holes of the cribration. Vents in great plurality, arranged linearly on each side of the subcylindrical branch, deeply sunk into the tissue and rendered stelliform by grooves radiating from them to the surface, probably in the fresh state consisting of subdermal branched venations of the excretory systems leading to the vents. Structure compact generally, that is not condensed axially; fibre strongly developed, short-jointed. Spicules acuate, of two sizes, viz. one comparatively stout and short, about 25 by 1-6000th in., and the other long and thin, about 50 by $\frac{1}{2}$ -6000th in. in diameter—the former coring the fibre and projecting through it, especially towards the surface, which is thus rendered shortly hispid, and the latter both in the fibre with the former and loose in the surrounding sarcode. Size of specimen 9 in. high and 4 in. in its broad diameter.

Loc. Port Phillip Heads.

Obs. The rough cribose surface together with the stelliform vents and acuate form of spicules of this species cause it to differ from, as much as the general form and linear arrangement of the vents cause it to resemble, the digitiform *Chalinæ*.

Axinella cladoflagellata, n. sp.

Long, round, attenuated, whip-like, branched, scantily divided, the whole rising from a short thick stem. Consistence firm. Colour grey. Surface even, granulated with

* "Tibiella," the name proposed for this spicule in the 'Annals' of 1881 (vol. vii. p. 369, pl. xviii. fig. 9, b).

little tufts of spicules that just project through the dermis where the latter is entire, but where the dermis is abraded, presenting a villous surface. Neither pores nor vents seen. (They are generally very small in these sponges, and on desiccation, from the compactness of the structure and the thickness in consistence of the sarcode, disappear altogether owing to the contraction of the latter.) Structure very compact and condensed in the axis, becoming less so towards the surface, also usual with these sponges. Spicules of one kind only, viz. long, acuate, entering thickly into the composition of the axis, and appearing at the circumference in the little "tufts" mentioned. Size of specimen 1 ft. long; stem thin, long, 5-8ths in. in diameter.

Loc. Port Western.

Obs. This is simply a *Dictyocylindrus* without echinating spicules, and therefore called an "*Axinella*."

Axinella coccinea, n. sp.

Massive, lobodigitate, digitations united, contracted towards the base, stipitate. Consistence lax. Colour rich deep purple-red throughout. Surface even, smooth, fibro-reticulate, covered by thin dermis. Pores in the interstices of the reticulation. Vents conical, at the ends of the digitations respectively. Structure lax, fibrous, consisting of spiculiferous fibre stained by the red colouring-matter exuding from the granules of the sponge; supporting sarcode plentifully charged with dark red-purple granuliferous, pigmental cells, whose cell-wall is colourless and about 10-6000ths in. in diameter, accompanied by the granules also *separately*, in the form of minute, spherical, pigmental cellulæ about 2-6000ths in., which have become extravasated into the tissue generally, but of which I could see neither on the surface in the form of *epithelial* cells; structure traversed plentifully by the canals of the excretory canal-system. Spicule of one form only, viz. acuate, smooth, curved, rather abruptly pointed at one end, round at the other, about 55 by $1\frac{1}{2}$ -6000th in.; coring the fibre, and here and there projecting through it subechinatingly. Size of specimen 6 in. high by 4 × 4 in. in its greatest horizontal diameters.

Loc. Port Western.

Obs. This differs from *Axinella atropurpurea*, viz. the similarly coloured specimen already described ('Annals,' 1885, vol. xvi. pp. 359, 360), both in general form and spiculation, as may be seen by comparing the descriptions respectively; but the colouring-matter and its persistence is the same, that is to say it is neither altered by preservation in spirit nor by desiccation. I am in doubt, from its loose structure, whether it ought not to be considered a *Chalina*.

Phakellia ventilabrum, var. *australiensis*, n. var.

Specimen flat, thin, wedge-shaped. Consistence firm. Colour grey. Surface even, consisting of a thin, white dermal crust of small spicules arranged cribrately, covering both sides of the frond and continuous over the margin, which is round. Pores in the minute holes of the cribriform crust. Vents not seen. Structure consisting of fine, dense, kerataceous, spiculiferous fibre. Spicules of one form only, viz. a simple acuate, of two sizes, coring the fibre and composing the dermal layer respectively, much larger in the former than in the latter. Size of specimen 7 in. high, 6 in. broad at the upper margin, and 2-8ths in. thick.

Loc. Port Western.

Obs. The sinuous spicule which is present in the British species, viz. *Phakellia ventilabrum*, is here absent.

Phakellia papyracea (dry).

Flabelliform, more or less slit in through the margin or lobed, very thin, papyraceous. Consistence tough, stem hard. Surface of the lobes or divisions concentrically lineated. Pores numerous, minute, general, undistinguishable in size from the vents. Fibre tough, keratose, short-jointed, and dense; cored and subechinated by the spicules of the species. Spicules of two forms, viz.:—1, comparatively stout, smooth, acuate, curved, varying in size under 50-6000ths in. long by 2-6000ths in. in its thickest part; 2, thin, sub-pinlike, 60-6000ths in. long by $\frac{2}{3}$ -6000th in. thick. The former coring and projecting through the keratose fibre subechinatingly, the latter confined to the sarcode about no. 1. Size of largest specimen, for there are two, 9 in. high, including the stem (which is round, 2 in. long and $\frac{3}{8}$ in. in diameter), 10 in. broad, and about $\frac{1}{8}$ in. thick, thinning towards the margin.

Loc. Port Western.

Phakellia villosa, n. sp.

Undulating, texture-like, or in the form of a vase, with continuous undulating, infoliated, thin wall and margin; stem truncated (probably by the dredge). Consistence firm. Colour purplish. Surface even, villous, soft. Poriferous generally on the outer surface. Vents, or rather excretory canal-systems, in the form of little stelliform branched venations scattered subuniformly over the inner surface. Spicules of one form only, viz. acuate, smooth, short, thick, curved, 53 by 3-6000ths in., coring the fibre and projecting through it echinatingly. Size of vasiform specimen 4 in. high by 3 in. across the brim, wall 2-8ths in. thick.

Loc. Port Western.

[To be continued.]



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