

XXXV.—*Remarks on the Nyctisaura.*

By G. A. BOULENGER.

AMPHICÆLIAN vertebræ, distinct parietal bones, incomplete orbital ring, and absence of a parietal bar are the principal characters upon which the suborder *Nyctisaura* is based. Cope *, however, makes a restriction as to the former character, writing "vertebræ usually amphicælian;" but in what forms the exception exists is not stated. So far as I know, proœlian vertebræ occur in three genera only, viz. *Eublepharis*, *Psilodactylus*, and *Coleonyx*. No exception to the second character has been recorded; and I was not a little surprised to find that these very genera which so strikingly differed in the structure of their vertebræ, differed also from all other Geckos in having the parietal single, as in most Cionocrania proper.

Now that undoubted *Nyctisaura* are known to present exceptions to the two former characters, and as the absence of the orbital ring and temporal bar cannot be considered to distinguish them constantly from the Cionocrania (for the *Varanidæ* have the orbit incompletely surrounded, and the parietal bar is absent in the *Helodermatidæ*), there remains no character of sufficient importance to justify the suborder *Nyctisaura*; therefore I believe that it has to be cancelled. But I propose to maintain the old definition of the group as diagnostic of the family *Geckonidæ*, and to refer the three aberrant genera mentioned above to a distinct family, which I name *Eublepharidæ*. In spite of their extraordinary geographical distribution (*Eublepharis* is Indian, *Coleonyx* Central-American, and *Psilodactylus* West-African), these three genera are very closely allied, not only in structure, but even in coloration. They all possess connivent movable eyelids.

XXXVI.—*Contributions to our Knowledge of the Spongida.*

By H. J. CARTER, F.R.S. &c.

[Plates XI., XII., XIII., & XIV.]

MY "Contributions" in this respect may appear incoherent, but this will be understood by the statement that they are compiled from notes, sketches, and specimens put aside for

* Proc. Acad. Philad. 1864, p. 226.

more convenient opportunity of publication, from which the following species have been advisedly selected.

Order III. PSAMMONEMATA.

Family 1. BIBULIDA.

Char. "Solid fibre chiefly without core of foreign objects"
(*'Annals,'* 1875, vol. xvi. p. 132).

Coscinoderma lanuginosum, n. gen. et sp.

Battledore-shaped, subsquare, compressed, stipitate, covered with a white, continuous cribriform incrustation of remarkable uniformity in its foramination. Surface for the most part even throughout, interrupted only by a small proliferous projection or outgrowth on one side and a line of vents situated pandean-pipe-like along the upper border, between which the structure is denticulated. Pores in plurality, situated in the sarcode tympanizing the interstices of the cribriform incrustation. Incrustation composed of microscopic foreign bodies, chiefly quartz-grains and fragments of sponge-spicules, imbedded in the anastomosing dermal fibre with such firmness, evenness, and regularity as to constitute a white, compact, reticulated, smooth, shagreen-like structure, whose interstices are uniformly subcircular and about the same size, viz. 1-90th inch in diameter, underneath which again the "subdermal cavities" make their appearance in much the same form, but twice the size and in the midst of fibre only. Fibre not less remarkable than the incrustation, for there appears to be almost an entire absence of the usual attenuation, the whole being almost uniformly alike in size and colour, viz. very small and fine, very long, scantily branched, curled up together in little whorls (representing so much wool under the same condition), of a deep sponge-colour, in the midst of which are excavated the channels of the pore and excretory systems, encircled respectively by the whorls of fibre, through which, in the absence of sarcode, their calibre is still maintained. When viewed under the microscope very few of the filaments are found to contain foreign bodies. Size of entire specimen 8 × 8 inches square by 1½ inch thick; stem 2 inches long, 1½ broad, and ½ thick, compressed, and terminated by a root-like expansion.

Hab. Marine.

Loc. Freemantle, S.W. Australia.

Obs. The remarkable appearance of the incrustation, internal structure, and characters of the fibre, if not the battledore-

shape of the specimen also, renders this species very easy of determination. There would be nothing extraordinary in the cribriform incrustation, as it is common among the Bibulida and Hercinida, were it not that it is so uniform in structure, smooth, and continuous, on account of the entire absence of any projection of the dermal fibre to render the surface polygonally divided, as in these families generally; but the wool-like character of the fibre, owing to its being so small and uniform in size, is peculiar. The specimen, which is very striking, is in the Bowerbank general collection at the British Museum.

Order V. ECHINONEMATA.

Family 1. ECTYONIDA.

Char. "Echinated with proper spicules on the fibre" ('Annals,' l. c. p. 133).

Ectyon mauritianus, n. sp. (Pl. XII. fig. 3, a, b.)

Entire form not seen. General and microscopic characters the same as those of *Ectyon sparsus* ('Annals,' 1871, vol. vii. p. 270), with the exception of the spicule, which is nearly twice the size and still more beautifully ornamented, as may be seen by the illustration (Pl. XII. fig. 3, a), which is drawn upon the same scale as that of *E. sparsus* for comparison (*op. et loc. cit.* pl. xvii. fig. 3, a, b). It is about 52 by 4-6000ths inch in size, not including the projections of the spines laterally, each of which amounts to 1-6000th inch on each side, which gives a total diameter of 6-6000ths, for its greatest dimensions. The spines, instead of being circular and based on the surface of the spicule, as in *E. sparsus*, are compressed laterally and raised on an angular ridge or inflation, whereby the spicule presents a moniliform appearance, that is, a series of constrictions, which renders it so much more beautiful than that of *E. sparsus*, as before stated.

Hab. Marine.

Loc. Mauritius.

Obs. This specimen, with many others, was collected at the Mauritius by Col. Pike, then U.-S. Consul there, and forwarded to me by the late Dr. Dickie, F.R.S., in the month of November 1872*. It is not more than 2 inches in dia-

* I learnt from Mr. J. S. Tyerman in October 1881 that, when he was living at Liverpool, the collection was sent to him first, and that he sent it on to Dr. Dickie, the latter to Dr. Bowerbank, who, after a

meter, but is sufficiently large for me to see that, in general character, it is, as above stated, precisely like *Ectyon sparsus*. I have used a masculine termination for the specific name, in accordance with that adopted by Dr. Gray (Proc. Zool. Soc. Lond. 1867, p. 515), otherwise the termination "on" indicated neutrality; but as "*Ectyon*" appears to have no other meaning than that which Dr. Gray has assigned to it, and, like many other names applied to his genera of sponges, also appears to be nothing more than a "fortuitous combination of letters," as he himself states (*op. et loc. cit.* p. 500), I follow his example. Moreover, as there can be no doubt that the generic name was intended for Dr. Bowerbank's "West-Indian sponge" (Mon. Brit. Spong. vol. i. p. 275, pl. xvii. fig. 289), otherwise undescribed, I have used the term "*Ectyon sparsus*" (Nos. 462-3, being in halves) for that species in the British Museum which, if not identical with, is, at all events, most closely allied to it ('Annals,' *l. c.*); hence am carrying on Dr. Gray's appellative.

Ectyon flabelliformis, n. sp. (Pl. XI. fig. 1, 1 a.)

Flabelliform, pedunculate, composed of a large thin frond divided into three lobes, one central and two lateral, presenting concentric lines or ridges of growth on the surface; round undulating margin and short peduncular stem. Consistence tough, firm. Colour brown-yellow. Vents circular, large, numerous, and alone on one side, more or less irregular in form, and accompanied by smaller ones in groups, as in *Ectyon sparsus* (see Pl. XII. fig. 2, c), on the other, where the latter appear to be for the pores, and the most regular or circular ones only of the former for the vents, all sphericallly tympanized by the dermal sarcode. Structure compact, clathrous throughout, the clathrous cavities extending to the surface, where they are also tympanized by the dermal sarcode, whose disappearance in the dried state causes some confusion as to function from their resemblance to the great irregularly circumscribed vents just mentioned (see Pl. XII. fig. 2, d).

Spicule of one form only, viz. acute, curved chiefly towards the large end, pointed at the other, bearing verticils of short spines throughout at nearly equal distances from each other; point smooth, large and spined (Pl. XI. fig. 1, a); average largest size of spicule about 30 by 3-6000ths inch in its

year, returned it, saying that he had not time to describe the specimens, and finally from Dr. Dickie to myself in July 1872. I have described several of them, but the rest are too fragmentary and rotten from the presence of sea-salt to be now worth any thing.

greatest dimensions; spicules forming the core of the fibre and echinating its surface in groups respectively, whereby the free surfaces are all hispid. Size of specimen 21×13 inches square in its greatest dimensions by about $\frac{1}{2}$ inch thick; stem well defined, peduncular, short, about $1\frac{1}{2}$ inch in diameter generally.

Hab. Marine.

Loc. West Indies.

Obs. This sponge has the appearance of a large piece of tanned cow-hide, and thus it may be easily recognized. The other characters, *mutatis mutandis*, are like those of *Ectyon sparsus*, and the spicule in its largest size, although a little thinner, is not inferior to that of *E. sparsus* in point of beauty. The specimen is in the British Museum, and bears my running number "367."

I am indebted to my kind friend Mr. Thos. H. Higgin, F.L.S., of Liverpool, for the illustration of this species (Pl. XI. fig. 1), which has been photographed from a much larger although similar specimen of the same species in the Liverpool Free Museum. It is 33 inches broad, 21 inches high, and averages (being irregular over both surfaces) about an inch in thickness; hence the real size is six times that of the illustration. It is registered "no. 4. 8. 81. 14," and was obtained from Barbadoes.

The cribriform grouping of the "small holes" on the surface over the subcavernous clathrous structure, which may be easily seen in the illustration of this and that of *Ectyon sparsus*, var. *claviformis* (Pl. XII. fig. 2, c), another specimen in the Liverpool Free Museum that will be mentioned presently, as well as in the original species, viz. *Ectyon sparsus*, which I described and illustrated in 1871 ('Annals,' l. c. pl. xvii. fig. 2), is also characteristic of the surface of the great Suberite from Belize, viz. *Spongia Dysoni* ('Annals,' 1882, vol. ix. p. 350). The photograph (Pl. XI.) represents the side on which the "small holes" exist.

General Observations on the Ectyones.

The specimen in the British Museum for which I have adopted the name "*Ectyon sparsus*" is solid, thick, flat, and expanded; but among others still larger, especially that registered 42. 12. 21. 40, there is one which consists of a group of eight thick erect hollow cylinders, mounted on a stand of "plaster of Paris," and numbered "548." Altogether the group is about 12×8 inches horizontally, of which the largest cylinder is 10 inches high, $3\frac{1}{2}$ inches thick, and $1\frac{1}{2}$ inch across at the

orifice. Here, of course, as in all *hollow* sponges, the vents open on the inner surface of the cylinder, and therefore few or none are on the outside, which thus contrasts strongly with that of the *solid* forms.

On the other hand there is a *solid* cylindrical form in the Liverpool Free Museum, of which Mr. T. Higgin has also caused a photograph to be made, and from which the illustration in Pl. XII. (fig. 2) has been lithographed. It is $16\frac{1}{2}$ inches high by $4\frac{1}{2}$ inches thick in its greatest dimensions, and therefore upwards of three times as large as the photograph, but clearly shows on the surface the scattered vents (fig. 2, *b*) and cribriform grouping of the "smaller holes" between them (fig. 2, *c*), to which I have already alluded, but which I have heretofore not had an opportunity of illustrating in an entire specimen of this species; hence am here again indebted to Mr. Thos. Higgin for his kind assistance*. Being club-shaped as well as cylindrical, I have, for distinction's sake, called this variety of *Ectyon sparsus* "*claviformis*" (Pl. XII. fig. 2). Internally the colour is brown-yellow, but, probably from exposure on the beach where the specimen may have been picked up, the surface had become so bleached and white as to simulate a *vitreous* sponge; now, however, this has changed to dirty grey after exposure to a smoky atmosphere. It is registered 28. 3. 78. 5. As I have lately seen several examples of this form, but less club-shaped and more regularly cylindrical, I am inclined to think that it is the kind of growth most commonly assumed by the specimens of this species which come from the West Indies generally; while one cannot help being impressed with the fact that the spicules of all the forms from this district are so much alike that they alone present no specific difference.

For such sponges Dr. Bowerbank in 1866 (Mon. B. S. vol. ii. p. 14) instituted his genus "*Ophlitaspongia*," having first illustrated them in 1862 (Phil. Trans. pl. xxx. fig. 7). After this Duchassaing de Fonbressin and G. Michelotti described four species from the Caribbean Sea under the generic name "*Agelas*" ('Spongiaires de la Mer Caraïbe,' p. 76, 1864), apparently illustrating the two above mentioned, viz. *Ectyon sparsus* and *E. flabelliformis* (pl. xv. figs. 1 and 2, together with their characteristic spiculation in the diagram "G," pl. i.); but, as usual, there is too much room left for doubt in their descriptions to make them available. Subse-

* Mr. Higgin got these photographs made for illustrating a description of the Ectyonida which had been commenced by himself; but not knowing when he might have time to complete it, they were handed over to me for this purpose.

quently Dr. Gray divided Dr. Bowerbank's genus into the genera "*Seriatula*" and "*Ectyon*," allotting to the former our British species *Chalina seriata*, and to the latter Dr. Bowerbank's "West-Indian sponges," viz. *Ectyon sparsus* &c. (Proc. Zool. Soc. Lond. 1867, p. 515). Schmidt, in 1864 (Spong. adriat. Meeres, 1st Suppl. p. 35, Taf. iv. fig. 2), described and illustrated the European representative of *Ectyon* under the name of *Clathria oroides*, and in 1870 changed the name to "*Chalinopsis oroides*" for his West-Indian specimens (Spongienf. atlantisch. Gebietes, p. 60, Taf. v. fig. 2).

There is yet another species that has come under my observation, of which only a fragment about $2\frac{1}{2}$ inches long exists in the Bowerbank general collection at the British Museum, but sufficient for me to compile the following description under the name of

Ectyon cylindricus, n. sp. (Pl. XIII. fig. 4, a-e.)

Cylindrical, solid, curved (Pl. XIII. fig. 4, a, b). Consistence firm, resilient. Colour brown ochre-yellow. Surface even, reticulate. Vents scattered, numerous, large, round, averaging 1-8th inch in diameter (fig. 4, d). Cribriform groups of "small holes" not present here. Pores not seen. Internal structure firm, compact, tough, elastic, traversed freely by the branches of the excretory canal-systems, which open at the vents mentioned (fig. 4, b). Spicule acute, curved, sharp-pointed, verticillately spined; average largest size 30 by $2\frac{1}{2}$ -6000ths inch in its greatest dimensions (fig. 4, c); verticils twenty-two in number, about 2-6000ths inch apart in the centre, diminishing in this respect towards the extremities, especially towards the point; spines about eight in the central verticils, becoming less in number towards the point, which is smooth for a short distance up; spicules forming the axis of the fibre and congregated into groups echinatingly on the outside, so that all the free surfaces of the cancellated cavities of the tissue and those of the excretory canals are thus rendered hispid. Size of fragment, which is cylindrical and represents a short segment only, of a large curve, about $2\frac{1}{2}$ inches long by 1 inch in diameter, slightly compressed, as may be seen by the section (fig. 4, b).

Hab. Marine.

Loc. West Indies.

Obs. This not only differs in general form from all the foregoing species, but also in structure, which is compact throughout, and not clathrous, while the only holes on the

surface are a few scattered large vents (fig. 4, *d*). The spicule, like that of *E. flabelliformis*, is a little thinner, but otherwise ranks next in beauty to that of *Ectyon sparsus*, presenting in like manner, from its hispid arrangement over the free surfaces, a beautiful object under the microscope by direct light, particularly characteristic of the echinonematous order to which it belongs. On the surface of this specimen also are scattered small isolated parasitic polyyps, about 1-24th inch in diameter (fig. 4, *e*).

Ectyonopsis ramosa, n. gen. et sp.
(Pl. XIII. fig. 5, *a*, *b*.)

Form:—a thick cluster of branches rising from a hard contracted peduncular base; branches compressed, dividing polychotomously, when, by lateral union, they may produce a clathrous lamina, or dividing dichotomously throughout, ending in bifid, thin, expanded extremities, or not dividing at all, and ending in a simple wedge-shaped or spatulous expansion, in the present instance $2\frac{1}{2}$ inches in its greatest width and 1-6th inch in thickness. Consistence firm, resilient, becoming hard, compact, and rigid towards the base. Colour now (in its dried state) sponge-brown. Surface even; fibre reticulate, with groups of echinating spicules springing from the lines of reticulation. No appearance of vents. Pores not seen, from absence of the dermal sarcode. Internal structure uniformly fibro-reticulate; solid, presenting no appearance of excretory canals; fibre echinated with the spicule of the species. Spicules of two forms, viz.:—1, acerate, cylindrical, slightly curved, obtusely ended, spined irregularly throughout, most thickly over the ends, which therefore look larger than the centre; about 48 by 4-6000ths inch in its greatest dimensions (fig. 5, *a*); 2, acuate, slightly curved, spined irregularly, chiefly over the large end, smooth and pointed at the other, about 53 by 4-6000ths inch in its greatest dimensions (fig. 5, *b*). Thus these two spicules are very much alike, and, on account of one end of the former often presenting a diminution in size, appear by gradations to run into each other; but while the former is chiefly confined to the axis, the pointed form in groups chiefly echinates the fibre. Size of specimen 7 inches high, 6 inches broad at the top, and $2\frac{1}{2}$ inches thick; stem, which is rather compressed, $1\frac{1}{2}$ inch in its greatest diameter.

Hab. Marine.

Loc. S. Australia.

Obs. This specimen, no doubt also picked off a beach, is very much worn in the outside branches, but the central ones

are tolerably perfect. Its dictyocylindrous form, generally compact solid structure, apparent want of vents and excretory canal-systems (probably from their smallness and contracted state in the dried specimen), are all indications of the order to which it belongs, while the spiculation in its character and arrangement so resembles that of *Ectyon* that, although generically different, as the name implies, there can be no hesitation in placing it among the Ectyonida, as the spines of the spicules are merely disposed irregularly instead of being confined to a verticillate arrangement. It bears the number 17. 2. 73. 6, and was presented to the Free Public Museum at Liverpool by Mr. C. P. Melly.

Family 2. AXINELLIDA.

Char. "Echinated with proper spicules projecting from the interior of the fibre" ('Annals,' *l. c.* p. 133).

Such is the simple diagnosis which I have given for this in contradistinction to that of the first family of this order, wherein the echinating spicule (generally claviform) has its base inserted in the surface instead of the interior of the fibre; but in all probability it will have to be considerably extended; for the group "Multiformia" (*op. et loc. cit.* p. 145), which, like that of "Pluriformia," in the first family of the Echinonemata, was only intended to include *provisionally* a number of distinct genera that I then had before me, but which I knew time and opportunity alone could, by description and illustration, make available for this purpose. It is this more extended sense which I now wish to initiate.

The term "Axinellida," which has been taken from that of "*Axinella*," used by Schmidt for a genus which he established in 1862 (*Spong. adriat. Meeres*, p. 60), was chiefly instituted by myself for sponges whose typical structure is perhaps best illustrated by that of *Halichondria ventilabrum*, Johnst., = *Phakellia ventilabrum*, Bk. (*Mon. B. S.* 1874, vol. iii. pl. xxii.), which is one of the "key" or typical specimens of the family "Axinellida" mentioned in my proposed classification of the Spongida (*op. et loc. cit.* p. 196); thus, if this sponge is divided with a sharp knife perpendicularly to the surface, the section will present the edge of a thin compact plane *mesially* (Pl. XIII. fig. 6, *a a*), from which on both sides, but especially externally, emanate *scopiform* portions (fig. 6, *b b b b*), which, curving upwards and outwards, become subdivided as they reach the surface, where their extremities are interunited by the dermal sarcode, which thus, tympanizing the spaces between them, keeps the whole together and affords a con-

venient structure for the situation of the pores. The spicules here are of two forms, viz. :—1, vermiculate, smooth, and cylindrical, sharp-pointed at both ends (Pl. XIV. fig. 9, *a*); and 2, acuate, smooth, curved or bent chiefly towards the blunt end (fig. 9, *b*); the former 73 to 130 by 1 to $1\frac{1}{2}$ -1800ths inch in its greatest dimensions, and the latter or acuate about 30 by 1-1800ths; thus the former are imperfectly represented in Dr. Bowerbank's illustrations (*op. et loc. cit.*), since the vermiculate spicules here, viz. "5" and "6," should have been sharp-pointed at each end, which would have been the case probably had they been boiled out of the microscopic fragment with nitric acid instead of mounted in the dried sarcode, where the draughtsman could not see that in the *perfect* form their ends were sharp-pointed*. The vermiculate spicules, which are by far the largest, form the base or axis of the "scopiform portions," and the acuates the echinating spicules, while both forms are indiscriminately mixed in the "median" plane. Such are the characters of the structure in *Phakellia ventilabrum*; but of course they may be more or less modified in other species of this family, since there may be only one form of spicule, viz. acuate, bent chiefly towards the thick end like the hilt of a pistol, which seems to be the most common situation of the curvature in the Echinonemata; or this "one form" may be acerate, or the skeletal spicule may be accompanied by flesh-spicules, as in the new species about to be described, viz. *Phakellia ramosa*; still the way in which the echinating character is produced is always the same as that mentioned in the diagnosis of the family. Sometimes there is a transitional form of the spicule in which the acerate appears to be thickened and shortened on one side, so as to produce a kind of subacuate form (Pl. XIV. fig. 14), which seems to explain how it is on the one hand that the spicule

* The quickest way to examine a sponge is to soak a microscopic fragment of it in distilled water for from twelve to twenty-four hours; then tear it to pieces on a slide, drain, dry, and mount with balsam as usual; but to be *certain* of the exact form of its spicules requires that they should be boiled out with nitric acid, which may also be easily and quickly effected by placing the microscopic fragment on the centre of a glass slide and covering it with a drop or two of nitric acid, then boiling this over a spirit-lamp with low flame till it is nearly dry, after which the same process must be repeated twice or thrice; and, finally, before the last drop of nitric acid is entirely dried up, removing the slide to the table, when, through gradually increased inclination and sufficient but careful edulcoration with distilled water, the residuum may be freed from all remaining acid, drained, dried, and mounted in balsam; or, if desired, another microscopic fragment, prepared as first mentioned, may be added to it previously, when the perfect form of the spicules respectively, together with their position *in situ*, may be seen at once in the same preparation.

when fully acute often has its blunt end smaller in diameter than the shaft, and on the other that, in consequence of this half of the spicule having become thus thickened by shortening, the curve or bend comes to be on this side of the centre of the entire length.

Phakellia ramosa, n. sp. (Pl. XIV. fig. 10, *a-d*.)

Stipitate, expanded, branched stag-horn-like; branches compressed, terminating, after two or more divisions, in bifid, pointed extremities, varying in length and form in the same bifurcation, that is, from round or cylindrical and long to compressed and short. Stem hard and solid. Colour, now, in its dried state, light grey-brown. Surface even. Pores and vents not seen. Internally presenting in the vertical section a dense median plane, out of which, on both sides, extend upwards and outwards little scopiform portions or processes, which, in juxtaposition (like those to which I have alluded in *P. ventilabrum*), end on the surface. Spicules of three forms, viz.:—1, skeletal, acute, smooth, sharp-pointed, curved towards the large end, which is smaller in diameter than the body of the shaft, about 50 by 2-1800ths inch in its greatest dimensions (fig. 10, *a*), more or less accompanied by an acerate about the same size or a little smaller (fig. 10, *b*); 2, flesh-spicule, acerate, minute, curved, smooth, sharp-pointed, in bundles or loose (?trichites), about 5-6000ths inch long, but very variable in size above this (fig. 10, *d*); 3, bihamate flesh-spicule, simple C- or S-shaped, 3-6000ths inch long (fig. 10, *c*); both in great abundance. The skeletal spicules, with their large ends fixed in the sarcod of the scopiform processes and their pointed ones projecting outside, give the echinated character (see Pl. XIII. fig. 6, *bb*), while the flesh-spicules are plentifully scattered among them. Size of specimen $4\frac{1}{2}$ inches high, $5\frac{1}{2}$ inches broad, and about 1 inch thick, being somewhat compressed; lamina of which the branches are formed about $\frac{1}{4}$ inch thick.

Hab. Marine.

Loc. Sydney, Australia.

Obs. This appears to be an intermediate form between the usually cylindrical-branched *Dictyocylindrus* of Bowerbank, and the flabellate form, viz. *Phakellia ventilabrum*, Bk. Hence the branches are, for the most part, compressed stag-horn-like, thinning out towards the extremities. The presence of the flesh-spicules also is a distinguishing character, while the scopiform processes emanating from both sides of a dense median or axial structure are remarkably characteristic

of the Axinellida. This specimen was presented to me in its dry state by my late friend, Dr. Dickie, F.R.S.

Phycopsis hirsuta, n. gen. et sp. (Pl. XIV. fig. 11.)

Stipitate, thickly and dichotomously branched, covered with a brown loose shaggy coat, looking altogether like a species of *Fucus*; branches round, exceedingly hard and rigid, diminishing in size dendritically, until they end in attenuated sharp points. Axial or condensed portion of the stem, which gives the rigidity, predominating over the hirsute appendages, especially towards the base, composed of colourless fibre charged with the spicules of the species, and so hard and tough as to resemble the dried stalk of a stipitate *Laminaria* or *Keratophyte*; hence preeminently illustrating this character in the *Echinonemata*. Shaggy or hirsute coat composed of minute sarcodic filaments about half as long as the diameter of the condensed or axial portion, emanating in a round form from the circumference of the latter and equally charged with spicules of the species, curving upwards and outwards, and becoming more or less spatular as they approach their termination, which is sometimes slightly bifid; echinated as usual throughout by the projecting ends of the internal spicules. Spicule of one form only, viz. acerate, curved, smooth, sharp-pointed at each end, 29 by $\frac{2}{3}$ -1800ths inch in its greatest dimensions (fig.11). Size of specimen about 4 inches broad by 4 inches high, and, being compressed, about 1 inch thick; stem $\frac{3}{12}$ ths inch in diameter at the base.

Hab. Marine.

Loc. South Australia.

Obs. The characters of this specimen as above given are sufficient to distinguish the species, which, at first sight, looks so much like a specimen of hirsute sea-weed that microscopic examination is necessary to prove that it is a sponge. It was sent to me by the late Dr. Dickie, F.R.S.

So far as my observation goes there is not another sponge of this order with such a dense, large, wood-like stem. Undoubtedly it is closely allied in most respects to the British species of "*Dictyocylindrus*, Bk.," but, unlike these species, it has only one form of spicule, and that an acerate; while all the British species of *Dictyocylindrus* possess an acuate skeleton-spicule and a short, clavate, spined echinating one, which places them in the first family of this order. There is a similar specimen in the British Museum which also came from "Australia," viz. No. 621, registered 72. 11. 6. 1. Probably the characteristic stiffness or rigidity of all the species of *Dictyocylindrus*, especially that of the stem, is owing to the strong, glue-like, tenacious nature of the sarcode.

In the British Museum there is yet another species of this kind, which also came from the same neighbourhood, viz. "Van Diemen's Land" (No. 397), labelled in Dr. Gray's handwriting, "517, *Radiella*;" but it is not mentioned in any of his publications, so that it appears never to have gone beyond the MS. form mentioned; whereas Schmidt, in 1870 (*Spongienf. atlantisch. Gebietes*, p. 48), published a genus by this name, under which two species are described (Taf. iv. figs. 6 & 8), viz. *Radiella sol* and *R. spinularia*, the latter identified by Schmidt himself with Dr. Bowerbank's *Tethya spinularia* (Mon. B. S. vol. iii. pl. xv. figs. 23-30); while both species appear to me to belong to Dr. Bowerbank's genus "*Polymastia*," established in 1866 (*op. cit.* vol. ii. p. 5). As the term "*Radiella*," therefore, is only in MS., Schmidt's use of it in *print* must be preferred, and a new one instituted for the specimen in the British Museum, which, being totally different from Schmidt's *Radiella*, while it is closely allied to *Phycopsis hirsuta*, I will describe under this generic name as follows:—

Phycopsis fruticulosa, n. sp. (Pl. XIV. fig. 12.)

Stipitate, bushy, thickly and dichotomously branched from a common stem; clothed with bright brown filamentous processes. Branches thick, round, dividing at short intervals so as to form a close shrubby mass; diminishing in diameter from the stem upwards, ending in thick round points. Axial portion or stem not predominating, being only one sixth of the length of the filamentous processes in diameter, composed of colourless fibre charged with the spicules of the species. Filamentous coat consisting of narrow strips of yellowish sarcode, about half an inch in length, also charged with the spicules of the species, emanating from the circumference of the axial portion in a radiating manner (hence, probably, Dr. Gray's MS. name "*Radiella*") upwards and outwards, more or less united together at first, but finally terminating by division into two or more white or colourless threads, which give the surface a filamentous aspect; echinated throughout by the projection of the spicules. Filamentous coat longest midway between the base of the stem and its branched extremities; shortest about the base, where the stem is thick and hard, as in the foregoing species. Spicule of one form only, viz. acerate, curved, smooth, and sharp-pointed at each end, like that of the last species, about 35 by $1\frac{1}{2}$ -1800ths inch in its greatest dimensions (fig. 12). Size of specimen $3\frac{1}{2}$ inches high by $2\frac{1}{2}$ in its greatest horizontal diameter.

Hab. Marine.

Loc. Van Diemen's Land.

Obs. Although this sponge, from its general appearance and spiculation, is closely allied to *Phycopsis hirsuta*, yet the form and greater length of the hirsute filaments, together with the less compact and generally much smaller axis, at least claim the separation above indicated. Like *Phycopsis hirsuta* it is closely allied to the genus *Dictyocylindrus*, Bk., but, for the same reason as that above assigned, it is placed among the Axinellida. The hirsute appendages are, of course, equivalent to the scopiform processes in *Phakellia ventilabrum* &c.

We next come to two species of much more modified forms, although still fundamentally possessing the same kind of structure, and therefore giving rise to allied development. There are the same kind of echinated scopiform processes emanating from the same kind of condensed axial stem as in the other Axinellida, but the general form consists of long narrow branches which altogether present a feather-like group; hence the genus will be termed "*Ptilocaulis*," with the following species:—

Ptilocaulis gracilis, n. gen. et sp.
(Pl. XIII. fig. 8, and Pl. XIV. fig. 13.)

Long, cylindrical, plumose branches, dichotomously and polychotomously divided, rising from a hard contracted solid base. Branches about half an inch in transverse diameter generally; obtusely ended (Pl. XIII. fig. 8). Colour now, that is in the dried state, white, transparent. Axis consisting of slightly condensed fibre charged with the spicules of the species, from which emanate processes of the same structure in a floral form like the leaves of a Corinthian capital (fig. 8); passing through a delicate reticular tissue at the base and becoming inflated, clavate, bifid, or irregularly divided at the extremities. Spicules of one form only, viz. acute, curved chiefly towards the large end, smooth, sharp-pointed, about 17 by $\frac{1}{2}$ -1800th inch in its greatest dimensions (Pl. XIV. fig. 13); more or less obscured in their echination, by being covered with an extension of the outer layer of the transparent fibre. Size of specimen, which consists of several branches in a group, 18 inches long by $9\frac{1}{2}$ inches in its greatest horizontal diameter.

Hab. Marine.

Loc. West Indies.

Obs. This graceful specimen, looking in its dried state like a cluster of long, drooping, narrow, round feathers, affords

another instance of the characteristic features of the Axinellida, in the condensed structure of the axis growing outwards into spatuliform or clavate processes (equivalent to the scopiform ones of *Phakellia ventilabrum*), and the acute spicule, curved chiefly towards the large end, the echination being somewhat concealed, as above stated, by an extension of the outer lamina of the transparent horny fibre over their points, which thus encloses them. It is in the British Museum, No. 483, registered 45. 12. 30. 1, and has very much the appearance, under a different form, of "*Spongia Marquezii*," De Foubressin et Michelotti (Spong. de la Mer Caraïbe, p. 40, pl. xx. fig. 1, Harlem, 1864), which, together with the diagram of its spiculation, given in pl. i. fig. "A," seems to confirm this view, although de F. et M.'s descriptions in other respects defy all attempts at further identification.

Ptilocaulis rigidus, n. sp.

(Pl. XIII. fig. 7, and Pl. XIV. fig. 14.)

Stipitate, composed of long, rough, cylindrical branches dichotomously divided, rising from a short hard stem; branches narrow, round, about an inch in transverse diameter, obfusely ended (Pl. XIII. fig. 7, *a, b b*). Colour now, in its dried state, brown. Axis consisting of condensed fibre charged with the spicules of the species, from which emanate in equally condensed structure thick short processes that give it its rough appearance, viz. spatuliform and expanded, bifid or irregularly divided towards the circumference, more or less irregular in form generally, lobate, sometimes interuniting clathrously and situated at variable distances from each other; pubescent generally, from the well-marked projection of echinating spicules, that is the echinonematous character (fig. 7, *b b*). Spicule of one form only, viz. acerate, smooth, curved or rather bent on one side of the centre, sharp-pointed especially at one end, which is more attenuated than the other, therefore partaking of the form of an acute or subacute form; $\frac{3}{4}$ by $1\frac{1}{2}$ -1800ths inch in its greatest dimensions (Pl. XIV. fig. 14). Size of specimen 2 feet long by 11 x 2 inches in its greatest horizontal dimensions, presenting a compressed cluster of long cylindrical branches.

Hab. Marine.

Loc. ? Australia.

Obs. This specimen is very much like the last in general appearance, but probably came from the coast of South Australia, judging from its more robust form and greater rigidity. Like the other specimens from Australia before described, viz. *Ilycopsis*, it has but one form of spicule, and that acerate;

also like these, it has all the characters, except in spiculation, of Dr. Bowerbank's British species of "*Dictyocylindrus*," modified. Sharp-pointed as the spicule is at both ends, the preponderance being on one side of the centre causes it to tend towards the acute form, which is characteristic of the last species. There are two specimens of this sponge in the British Museum, which are both numbered "402," but without register-number.

Different again as the foregoing specimens may be from those with which we commenced this family, the following are so much more so in appearance that, until minutely examined also, the fundamental composition and structure which determine their position cannot be satisfactorily observed. At first they look so much like specimens of *Halichondria panicea* that it is difficult to conceive that they do not belong to the same group or genus (which is the first in my order Holorhaphidota) on account of the massiveness of their structure, the characteristic whiteness of the dermal layer and the sponge-colour of the interior also being so similar; but the delusion disappears as the structure and spiculation of the elementary portions of a typical species like the *following* are microscopically examined, when the "scopiform" filaments emanating from the condensed axial structure recall to mind those of *Phycopsis fruticulosa*, and there is also an echinating spicule, which here (although not in all the species belonging to this group) is *acute* and not *acerate*; still, as this is chiefly seen in the circumferential growths before they pass into the axial or general mass, it is necessary especially here to look for it at the commencing rather than in the subsequent development, wherein all such distinctions become merged in the general mass.

Leucophlæus massalis, n. gen. et sp.
(Pl. XIV. fig. 15, a, b.)

Globo-conical, massive, surrounded towards the base with proliferous, erect, conical columns of variable size and length, entering as they grow into the increase of the central part. Consistence compact. Colour snow-white. Surface smooth, but irregular, being more or less rugose and furrowed vertically, pierced with minute puncta which now (in the dry state) indicate the position of the pores. Vents not seen. Internal structure concealed by a thick white crust, composed of the spicules of the species supported on a dense sponge-brown fibrous mass, partaking in compactness of the axial structure of the circumferential columns, which in their turn

consist respectively of a small solid axis, around which radiate in all directions, upwards and outwards, filamentous scopiform portions echinated by the projection of the internal spicules which, finally dividing, end in a lash of branches, and these, united together by the dermal sarcode, support the white incrustation of proper spicules on the surface. Spicule of one form only, viz. acute, smooth, curved chiefly towards the blunt end, sharp-pointed, less in diameter at the obtuse end than in the centre of the shaft, 35 by 1 - 1800 th inch in its greatest dimensions (Pl. XIV. fig. 15, *a*); abundant in the general mass and axial parts of the scopiform, filamentous processes, from which the points more or less project in an echinating manner. Size of specimen 6 by $3\frac{1}{2}$ inches at the base and 4 inches high.

Hab. Marine.

Loc. Freemantle, S.W. coast of Australia.

Obs. The thickness of the white dermal layer and the compact solid structure of the interior, together with the mode of growth in each, combined with an acute spicule chiefly curved towards the large end, distinguish this sponge from *Halichondria panicea*, which otherwise it so resembles, that to all appearance at first sight, as above stated, the two are the same. The specimen may be found in the Bowerbank general collection at the British Museum.

My attention was originally called to this species by the still greater likeness to *Halichondria panicea* of a similar specimen in the general collection of the British Museum, wherein the structure is not so evident as in the specimen above described, owing to the proliferous columnar processes of the circumference being less distinct and more involved in the general mass, which is globular and large, *i. e.* 6×6 inches in its greatest horizontal diameter and $3\frac{1}{2}$ inches high; the form of the spicule is the same, but it is much larger, viz. 50 by $1\frac{2}{3}$ - 1800 ths inch in its greatest dimensions (Pl. XIV. fig. 15, *b*). It came from New Zealand, was presented by Dr. Sinclair, and bears my running no. "473," with the registration "57. 1. 2. 29."

Leucophlæus compressus, n. sp. (Pl. XIV. fig. 16, *a*.)

Stipitate, hard, massive, compressed, lobate, proliferous; lobes flabellate, more or less denticulate at the margin, sometimes united clathrously; stem thick, short, hard, expanded at the base of attachment. Colour snow-white. Surface uniformly even, consisting of a white crust composed of the spicules of the species; granulate, continuous, or reticulate according to the amount of incrusting material; sometimes

raised in vertical ridges over the stem, which extend radiatingly more or less to the circumference. Vents scattered over the surface as simple holes, which may be marginated or stelliform. Whiteness of the incrustation, which extends sufficiently deep to include the marginal cavities, followed by a light brown colour of the fibre which, charged with the spicules of the species, increases in density of structure towards the axis or centre. Spicule of one form only, viz. acerate, curved, fusiform, smooth, sharp-pointed, varying in size from 11-30 by $1\frac{1}{3}$ -1800ths inch in its greatest dimensions (Pl. XIV. fig. 16, a), the smaller, mixed with the longer ones, echinating the surface. Size of specimen 10 inches high, 11 inches broad, and 28 inches round its greatest horizontal diameter.

Hab. Marine.

Loc. Swan River, W. Australia.

Obs. There are at least four specimens of this species in the general collection of the British Museum, viz. :—no. 592, registered 72. 5. 21. 41, which is that above described; no. 534, registered 59. 10. 7. 24, both from Australia; and nos. 197 and 506, bearing the nos. of the dealer only, viz. "42 a" and "42 b" respectively. No. 20, registered 71. 5. 12. 1, from Port Elizabeth, S. Africa, appears to be of the same kind; but this possesses an acuate spicule together with a small acerate. Nos. 534 and 20 present the radiating lines mentioned with the same kind of acerate spicule (Pl. XIV. fig. 16, b), but no conspicuous vents; while nos. 592 and 506 do present vents; still, as I have above stated, all appear to belong to the same category.

To this group I think we may relegate Dr. Bowerbank's genus "*Ciocalypta*," established in 1866 (Mon. B. S. vol. ii. p. 5), of which he has described and illustrated three species, viz. *Ciocalypta penicillus*, *C. Leei*, and *C. Tyleri*; the first two are British, and the last species, of which there is also a specimen in the British Museum (no. 24, reg. no. 71. 5. 12. 1), comes from Algoa Bay, at the Cape of Good Hope. They are all composed of what Dr. Bowerbank has called the "penicillate organ," that is our "proliferous, erect, conical column," grouped together in greater or less plurality. (See representation of *C. penicillus*, Mon. B. S. vol. iii. pl. xiii. fig. 2; and of *C. Tyleri*, Proc. Zool. Soc. Lond. 1873, pl. iv. fig. 9.) *C. Leei*, however, of which a single "penicillate organ" only is represented in Dr. Bowerbank's illustrations of this species (*op. cit.* vol. iii. pl. lxxxvi. fig. 1), exists in great plurality on one specimen in the Kent collection, from the coast of Portugal, in the British Museum (no. 7), if I am right in identifying the two, which I see no reason to doubt, although the

latter presents a granulated surface, which the former in the illustrations does not. Fig. 2 (Bk. *l. c.*) also, which is intended to represent the dermal expansion (in short, the "incrustation") of one of the bundles of spicules (that is, the "scopiform process" emanating from the axial structure) after having passed through the subdermal cavities, *hardly*, in its circumscribed umbrella-like form, realizes the interunion of such expansions to form the dermal crust, as might be anticipated, nor is it indicated by Dr. Bowerbank's description (*op. et l. c.* p. 297). In Saville Kent's specimen, the "penicillate organ" is much larger and longer, while the granulated surface, when viewed from the interior, may be observed to be formed by the apex of the "umbrella"-like expansions as they interunite at the circumference to form the white crust. The illustration of *C. penicillus* (*op. et l. c.*) closely resembles in figure that of *Leucophlæus massalis*, only the latter is more compact towards the centre, but the form of the spicule is the same, viz. *acuate*. while the two other species of *Ciocalypta* present *acerate* spicules; still, in each, there is *only one form* of spicule, faced by an intermingling of a small one of the same form, which thus thickens and increases the whiteness of the dermal layer.

Order VI. HOLORHAPHIDOTA.

Family 1. RENIERIDA.

Char. "Spicules more or less arranged in a fibrous form. Structure yielding to pressure like crumb of bread" ('Annals,' *l. c.* p. 133).

New group. Phlæodictyina.

(See char. 'Annals,' 1882, vol. x. p. 117.)

Phlæodictyon singaporense, n. sp.
(Pl. XIII. fig. 17, *a, b.*)

This specimen, now incomplete, seems when entire to have been globular, but having been cut off horizontally from the base, presents a convex or subhemispherical form, from the surface of which several blind, hollow, tubular appendages are prolonged. Consistence fragile. Colour said to be "bright yellow" when fresh, but now, in its dried state, brown. Surface uniformly even, except where interrupted by the tubular prolongations. Pores and vents not seen. Tubular appendages hollow, ten in number, of which five only remain entire, two of which are bifurcated; one appendage, of which the aperture alone remains, was much larger than the

rest, *i. e.* 1-3rd inch in diameter, while the five entire ones, about an inch long respectively, of which two, as before stated, are bifurcate, are all closed and round at the extremities. Internal structure consisting of an open reticulated, coarse, white spicule-fibre (that is, composed of spicules only held together by a minimum of sarcode, or holorrhaphidotic), which fills the cavity of the body and in the horizontal section at the base presents a subconcentric growth, covered on the surface by a thin, soft, dermal layer of small spicules. Body-structure permeated vertically by tubular channels, which respectively communicate with the tubular appendages of the surface, which on their part are formed by hollow extensions of the coarse reticulated structure of the body covered by that of the soft brown dermal layer before mentioned, which also extends more or less into the *interior* of the reticulated structure generally. Spicules of two forms, *viz.*:—1, large, skeletal, acerate, fusiform, curved, smooth, more or less abruptly sharp-pointed and often blunt, about 72 by 4-6000ths inch in its greatest dimensions (Pl. XIII. fig. 17, *a*); 2, smaller spicule, cylindrical, smooth, much curved, obtuse and rounded at each end, sausage-like, varying in size from 10 to 20 by 1-6000th inch (fig. 17, *b*). Skeleton-spicules chiefly confined to the now white body-fibre, and the smaller ones to the now brown dermal layer. Size of specimen, in its present hemispherical truncated form, about 1 inch high by 2 and $1\frac{1}{2}$ inch respectively in diameter across the truncated surface or present base, thus irregularly oval.

Hab. Marine.

Loc. Singapore.

Obs. The bright colour when fresh and the spiculation are the distinguishing characters of this species. Although the excretory canals in the body-structure can be seen to be in continuation, as above stated, with the tubular appendages, yet there is, as in other species of the group, no appearance upon the latter or the body generally of vents; but their being in continuation with the tubular appendages indicates that the whole belong to the excretory canal-system, and the open structure observed at the extremity of the appendages themselves in *Oceanapia* ('Annals,' 1882, vol. x. p. 119) seems to confirm this view, by supplying the place of a distinct vent or vents of the usual form.

There is a similar specimen in the Johnstonian collection in the British Museum, now bearing my running no. "54," but no register no. and no locality. That belonging to the Liverpool Free Museum is numbered 24. 5. 83. 21, and was, together with another specimen of about the same size, but still more incomplete, presented by Dr. Archer.

Observations on Classification.

Now although the terms of my classification ('Annals,' 1875, vol. xvi. p. 126 *et seq.*) may be very plain to myself, who have carefully examined each of the specimens in the British Museum, including those lately purchased from Dr. Bowerbank's executors, in all amounting in cubic measurement to three or four yards, or sufficient to fill a small room of this size—consisting of thousands of specimens from various parts of the world, most of which are still undescribed,—yet these terms may not be so plain to those whose observation in this respect has been confined to their own cabinets, which can hardly be expected to afford so much *general* knowledge; therefore, before any determined opposition is made to my classification I trust it may be based on a similar amount of practical experience, when such criticism ought to be very valuable; for I do not wish to insist on my views any further than as the best *under the circumstances* that I could offer, therefore still open to great improvement. When the Spongida shall have been worked upon as much as the Plants, then their classification may be expected to be as satisfactory.

EXPLANATION OF THE PLATES.

N.B.—The spiculation of the *Ectyones*, together with that of *Ectyopsis*, is all on the same scale, viz. 1-12th to 1-6000th inch, chiefly to show their sizes *relatively*. That in Pl. XIV. is all on one scale also, viz. 1-12th to 1-1800th inch, for the same purpose; with the exception, however, of the flesh-spicules *c* and *d*, fig. 10, which are on the scale of 1-12th to 1-6000th, and the spicules &c. of the Diluvium from the valley of the Altmühl river, in Bavaria, whose scales respectively are stated *in loco*.

PLATE XI.

Fig. 1. *Ectyon flabelliformis*, n. sp. One sixth of the natural size. From a photograph. Specimen in the Liverpool Free Public Museum. *a*, spicule. West Indies.

PLATE XII.

Fig. 2. *Ectyon sparsus*, var. *claviformis*, n. var. Less than one third of the natural size. From a photograph. Specimen in the Liverpool Free Public Museum. *a*, spicule; *b*, vents; *c*, small congregated foramina; *d*, clathrous openings. West Indies.

Fig. 3. *Ectyon mauritianus*, n. sp. *a*, spicule, lateral view; *b*, transverse section. Mauritius.

PLATE XIII.

Fig. 4. *Ectyon cylindricus*, n. sp. (fragment), nat. size. *a*, lateral view; *b*, transverse section; *c*, spicule; *d*, vents; *e*, parasitic polyp. West Indies.

- Fig. 5. *Ectyonopsis ramosa*, n. sp., spiculation of: *a*, axial form; *b*, echinating form. W. coast of Australia.
- Fig. 6. *Phakellia ventilabrum*, Bk., diagram of skeletal or spicular structure: *a a*, mesial plane; *b b b b*, scopiform processes. Shetland.
- Fig. 7. *Ptilocaulis rigidus*, n. sp., fragment magnified two diameters, to show scopiform processes: *a*, stem; *b b b b*, processes. ? S. Australia.
- Fig. 8. *Ptilocaulis gracilis*, n. sp., terminal end of a branch, nat. size. West Indies.
- Fig. 17. *Phloxodictyon singaporense*, n. sp., spiculation of: *a*, skeletal spiculæ of fibre; *b*, smaller spiculæ of dermal layer. Singapore.

PLATE XIV.

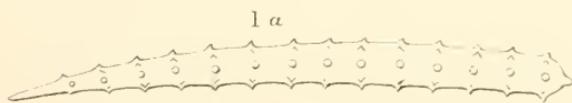
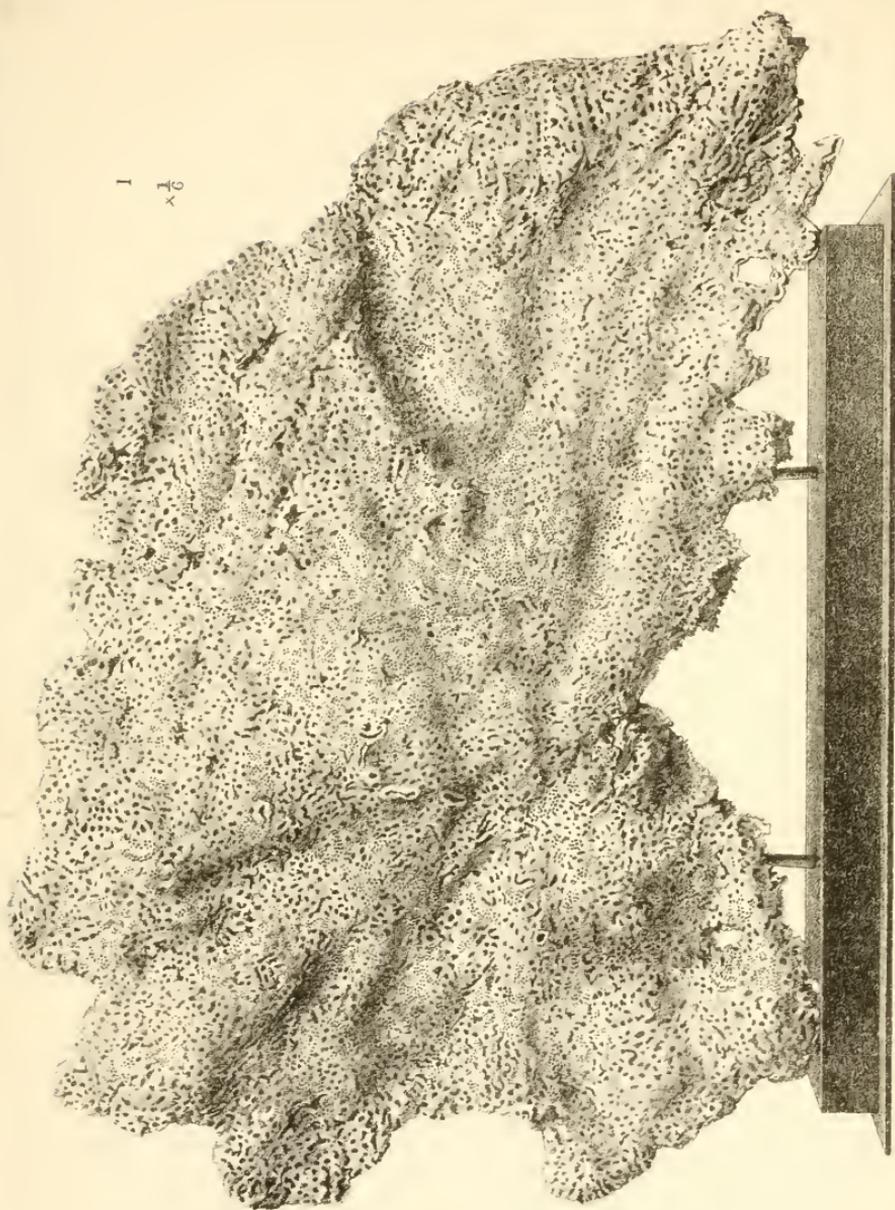
- Fig. 9. *Phakellia ventilabrum*, Bk., spiculation of: *a*, vermicular form; *b*, acuate.
- Fig. 10. *Phakellia ramosa*, n. sp., spiculation of: *a*, acuate; *b*, acerate; *c*, bihamate; *d*, trichites.
- Fig. 11. *Phycopsis hirsuta*, n. sp., spiculation of. One form only, viz. acerate.
- Fig. 12. *Phycopsis fruticulosa*, n. sp., spiculation of. One form only, viz. acerate.
- Fig. 13. *Ptilocaulis gracilis*, n. sp., spiculation of. One form only, viz. acuate.
- Fig. 14. *Ptilocaulis rigidus*, n. sp., spiculation of. One form only, viz. acerate or subacuate.
- Fig. 15. *Leucophleus massalis*, n. gen. et sp., spiculation of two specimens, viz. :—*a*, acuate of Dr. Bowerbank's specimen; *b*, acuate of specimen in the British-Museum general collection.
- Fig. 16. *Leucophleus compressus*, n. sp., spiculation of two specimens, viz. :—*a*, acerate of specimen described; *b*, acerate of no. 534.

XXXVII.—*Spicules of Spongilla in the Diluvium of the Altmühl Valley, Bavaria.* By H. J. CARTER, F.R.S. &c.

[Plate XIV.]

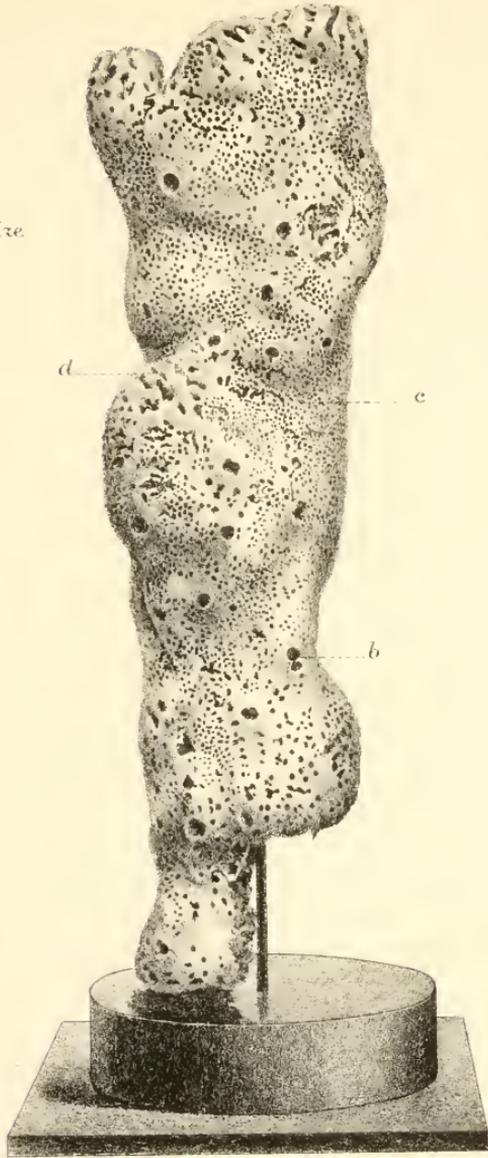
So far back as the 3rd March, 1881, Professor Zittel, of Munich, kindly sent me some pieces of dark brown argillaceous diluvium from the valley of the Altmühl, in which he had recognized spicules of a *Spongilla* (Pl. XIV. fig. 18, *a*, *b*); but, partly from want of opportunity and partly from want of the necessary knowledge, I have not been able to record publicly the results of my examination of it until the present time.

This freshwater deposit, besides the skeletal spicules mentioned (fig. 18, *a*, *b*), which, from their spiniferous character, appear to me to be most nearly allied to those of *Spongilla* (*Meyenia*, Crtr.) *erinaceus*, Ehr., contains another kind which are quite new to me (fig. 18, *c-f*), together with the detritus of

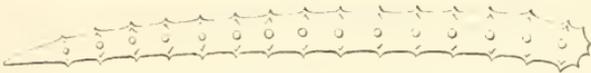


2.

$\frac{2}{11}$ nat size

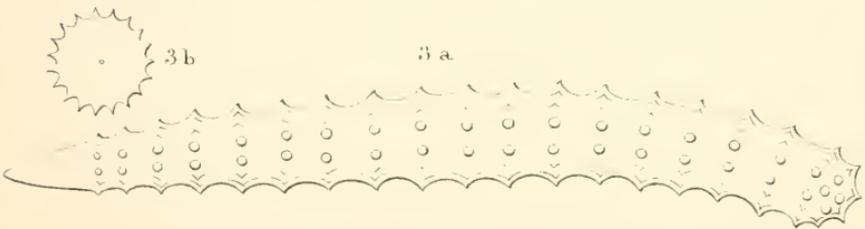


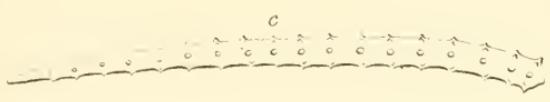
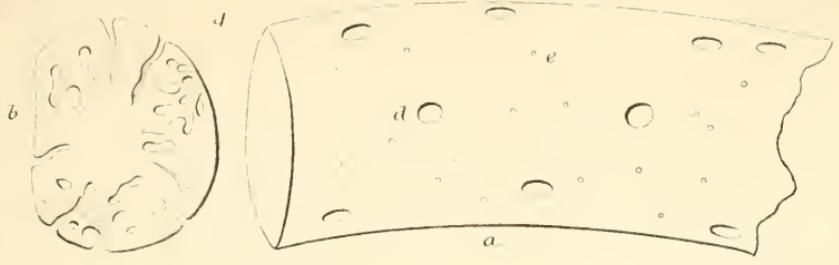
2 a



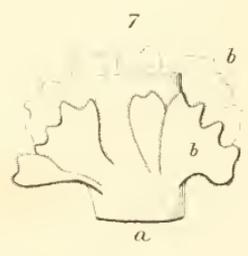
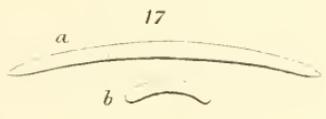
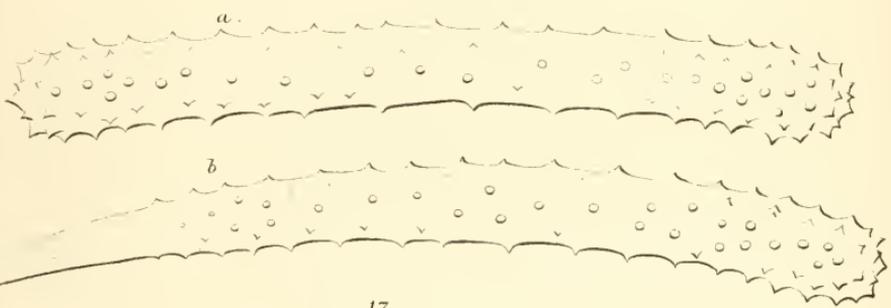
3 b

3 a

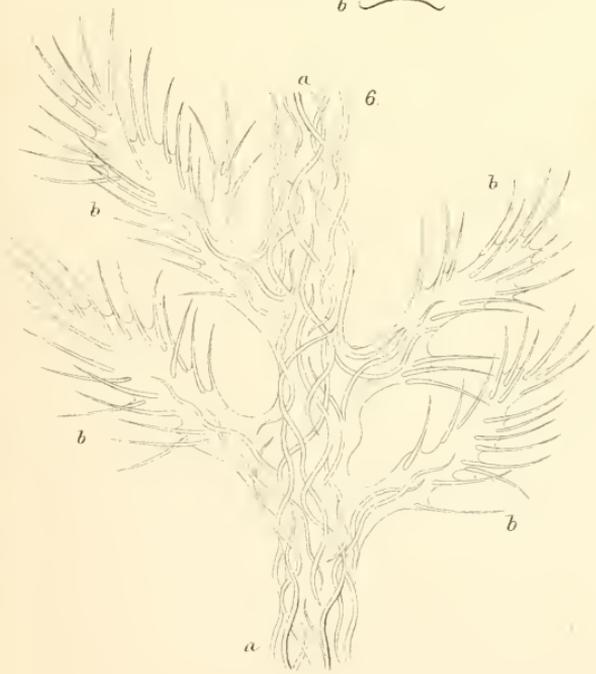




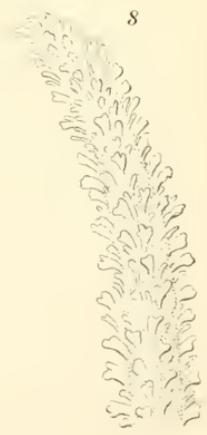
5.



7



6



8

