or less yellow in colour; the arrangement of nervures much the same; palpi thicker, antennæ much more slender. Type *C. divisa*.

CELERENA VULGARIS, n. sp.

Allied to *C. perithea*, of Cramer, from Amboina, but with the transverse golden-yellow band of primaries twice as wide, and the black-brown border of secondaries only half as wide: expanse of wings 2 inches 4 lines.

This is evidently a very common species.

The above-named genus will include the following species:—*C. lerne*, Boisd.; *C. divisa*, Walker; *C. andamana*, Felder; *C. commutata*, Walker; *C. mutata*, Walker; *C. perithea*, Cramer; *C. proxima*, *spreta*, and *conneza* of Walker; and *C. eucnemis* of Felder.

5. Contributions to a General History of the *Spongiadæ*. By J. S. BOWERBANK, LL.D., F.R.S., &c.—Part VIII.

[Received November 8, 1876.]

(Plates LXXVIII.–LXXXI.)

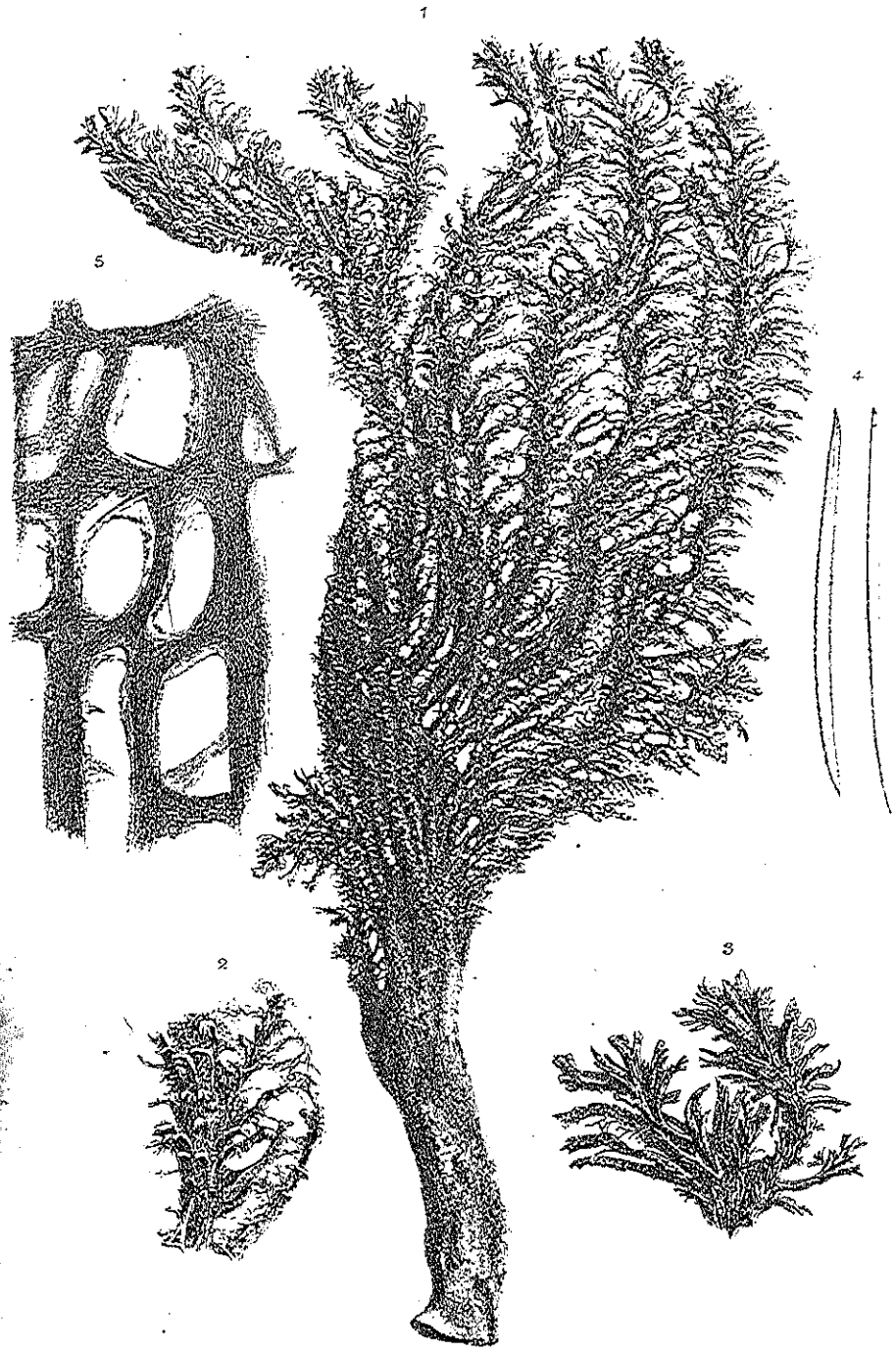
The Sponges described in the present contribution to a general history of the Spongiadæ are rare and very remarkable species. Three of them are, to the best of my knowledge, unique specimens; and the fourth, *Chalina verticillata*, elucidates in a singularly striking manner the structure and history of a diluvial fossil sponge enveloped in flint, which has for a long period been a mystery to palæontologists.

DESMACIDON PLUMOSA, sp. nov. (Plate LXXVIII.)

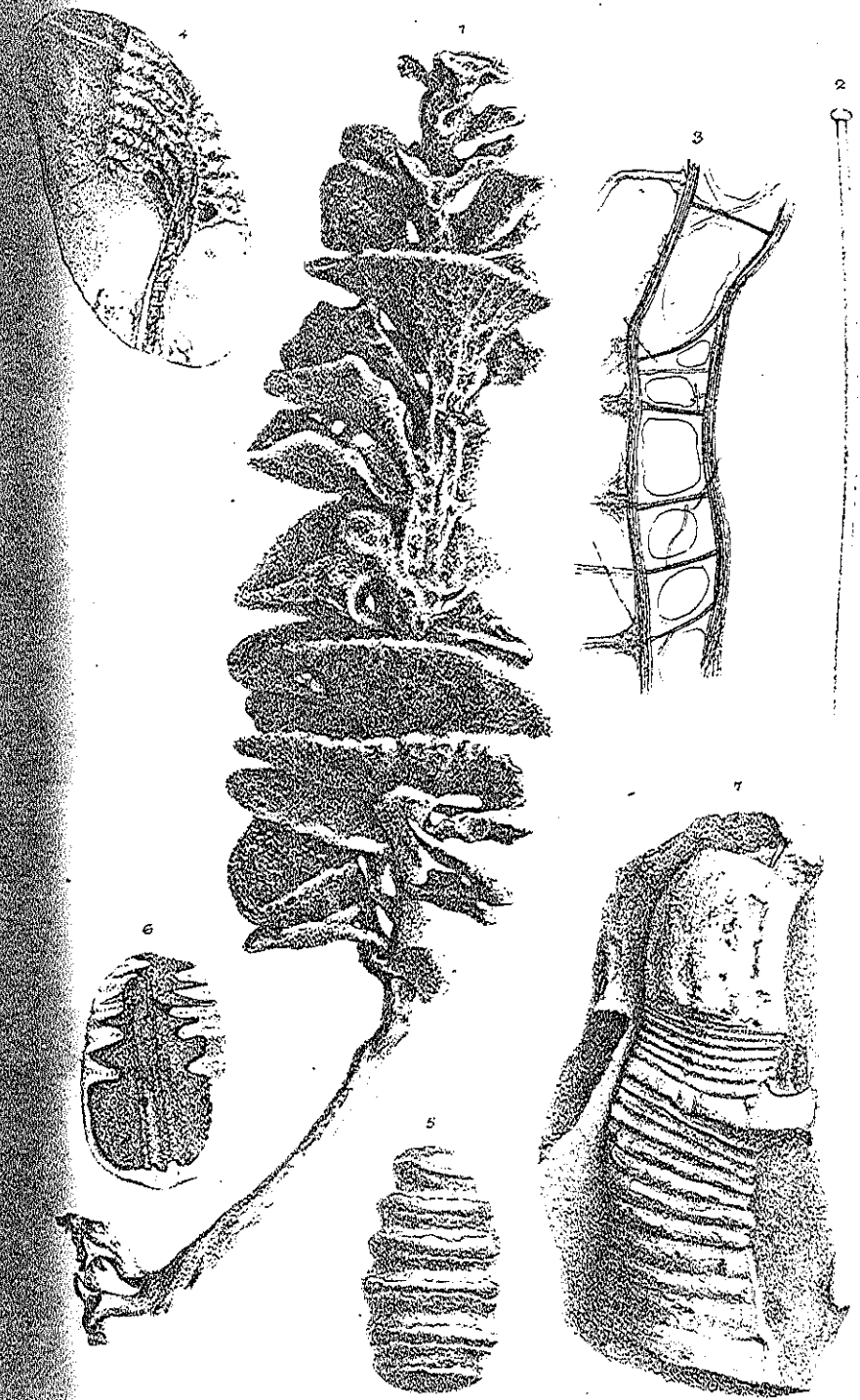
Sponge elongately fan-shaped, pedicellate; pedicle long and stout, smooth, fan-shaped, expansion prominently hispid on both planes. Oscula simple, dispersed, minute, and numerous. Pores inconspicuous. Dermal membrane aspiculous. Skeleton reticulated, rete irregular; primary fibres stout and solid, radiating irregularly from the discal end of the pedicle in the same plane; secondary fibres radiating from the primary ones at nearly right angles to the planes of the sponge, short, slender, and delicately plumous. Spicula subfusiform-acerate.

Colour, in the dried state, fawn-yellow.
Hab. Sharks' Bay, Western Australia.
Examined in the dried state.

I obtained this singular and interesting sponge among many others from a dealer in specimens of natural history, who stated that it was from Sharks' Bay, Western Australia. It is 15 inches in height, and about 5 inches broad at near the middle of the fan-shaped expansion. No portion of the basal attachment remains; and the pedicle in its present state slightly exceeds 4 inches in length. It is slightly



Desmacidon plumosa.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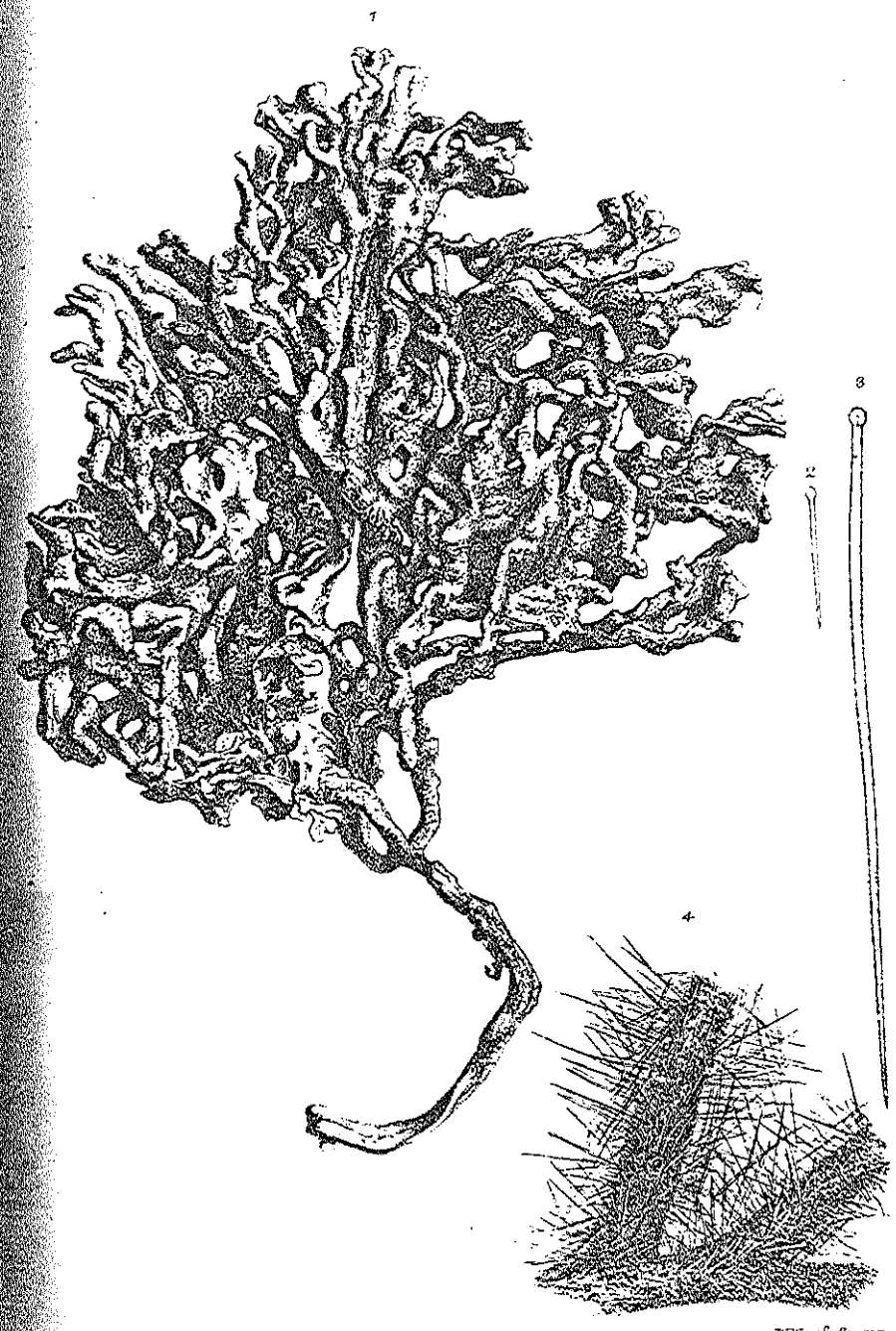

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compressed and very solid in its structure. The hispidity of the surfaces is produced by the projection of the secondary lines of the skeleton, which are uniform in length on both surfaces of the sponge; but they are more abundantly produced on the surface presented to the eye in the figure than on the opposite one; and they always terminate in plumous expansions. The primary lines of the skeleton are projected in slightly meandering lines, but always in the same plane; and none of them exceeds about a quarter of an inch in diameter. The oscula are abundantly dispersed on the primary lines of the skeleton; they are very minute, and are scarcely perceptible without the aid of a lens of about 2 inches focus. The dermal membrane is closely adherent to the spiculo-fibrous structures of the skeleton; and it can be seen distinctly only when small portions of the sponge are mounted in Canada balsam, in the form of thin expansions within the areas of the rete of skeleton-fibres. There is but one form of spiculum, the subfusiformi-acerate one; their average proportions are $\frac{1}{107}$ inch in length, and $\frac{1}{2808}$ inch in diameter. The general aspect of this sponge is very remarkable: all the secondary plumous fibres projected from either surface rise to nearly the same height, rarely exceeding that of about a quarter of an inch; and all of them assume the same plumous expansion of their apices. The skeleton-structure is purely that of a *Desmacidon*; but its peculiar mode of development differs widely from every other species of the genus with which I am acquainted.

CHALINA VERTICILLATA, sp. nov. (Plate LXXIX.)

Sponge pedicellate; pedicle long, smooth; proximal portion without sponge-plates; distal portion sustaining a succession of numerous thin perforate more or less circular cup-shaped plates of sponge, decreasing in size to the apex. Surface—upper and under surfaces of the plates rugose, margins entire. Oscula simple, dispersed, numerous on the under surfaces of the plates. Pores inconspicuous. Dermis reticular, rete irregular; dermal membrane sparingly spiculous; spicula depresso-spinulate, same size and form as those of the skeleton, dispersed. Skeleton symmetrical, radiating irregularly from the centres of the plates; primary and secondary lines slender and delicate, not very numerously spiculous; spicula depresso-spinulate, rather variable in length and diameter. Interstitial membranes sparingly spiculous; spicula same as those of the skeleton.

Colour, in the dried state, nut-brown.
Hab. Fremantle, Australia (*Geo. Clifton, Esq.*).
Examined in the dried state.

The height of this sponge is 13 inches, and its greatest breadth 3 inches. At 5 inches from the basal attachment the pedicle divides and becomes two branches; at the part from which the lowest of the plates of the sponge is projected, and thence to the apex, they are produced in a rather irregular series. The form of this sponge is remarkable and unusual; but the species in course of description is not the only one in which we find it. The whole of such sponges

appear to be Australian. I have other specimens in my possession of very much greater dimensions, and among them some rather exceeding 3 feet in length, having plates exceeding 5 inches in diameter; and one of the largest, at about the middle of the series of plates, divides, and each stem supports a separate series of plates. The plates of these sponges are not projected from the pedicles at right angles to them; they always assume a more or less ascending direction, so that they form an ascending series of rather irregularly shaped shallow cups.

The dermal rete is rather more strongly produced than the skeleton-structures beneath it, and it is quite irregular in form. Very little of the dermal membrane remains; the small fragments that were apparent were furnished with a few dispersed spicula.

The skeleton-structure is rather slender and delicate. The primary lines vary to some extent in their diameter; and in some there are a greater number of spicula than in others. The secondary lines of the skeleton are also variable in the number of their spicula and in their mode of disposition.

These singularly formed sponges are interesting, not only on their own account, but also for affording us an explanation of a remarkable series of fossils that are not unfrequently found in a more or less perfect condition in our diluvial gravel, and which have been conjectured by some geologists to have been allied to the Trilobites, while others have believed them to have been Pennatulæ.

I had longitudinal sections made and polished of several of these fossils; and on examining them by direct light with a power of 100 linear I found in some of them traces of sponge-structure, but so indistinct as to afford very unsatisfactory evidence of their real nature; but in some, as in the specimen represented by figure 4, Plate LXXIX., I found unmistakable proofs of a central axial column, and in this specimen the included sponge was of a nut-brown colour, while the enveloping one was of a milk-white; and the two were cemented together by an intervening thin stratum of semitransparent silex, without any indication of sponge-tissue in it. This peculiarity is strictly in accordance with the natural laws of the Spongiadæ, as when two living specimens of the same species touch each other, they unite and become as one sponge; but, however closely two specimens of different species of sponge may envelop each other, they never unite and become one inseparable mass, however closely they may be allied to each other in anatomical structure.

In each section of the brown verticillate fossil sponge represented by figure 4, when viewed by direct light with a power of 175 linear, there were unmistakable evidences of a very delicate spongeous reticulation; while in the white enveloping sponge traces of a very different character of reticulate spongeous structure could be distinctly seen between the leaves of the verticillate sponge. In the latter sponge there are numerous specimens of foraminated shells of various species, such as are frequently found embedded in recent sponges of a similarly complicated structure. The enveloping sponge does not appear to be always of the same species as the

sponge represented by figure 4. In the specimen represented by figure 5 (Plate LXXIX.) it is apparently the same as in that represented by figure 4; but it has not so completely involved the verticillate species, the margins of the plates of which are still uncovered.

For the most perfect specimen of these enveloped species of sponges I am indebted to my late friend Dean Buckland, who could not imagine what it could be, unless it represented an animal allied to the Trilobites, the apparent smooth head and striated body having impreseed that idea upon his mind; but on my pointing out to him a small spot on the middle of the smooth end of the mass, which I conjectured might be the basal end of the pedicle, he presented it to me that I might, if possible, clear up our doubts regarding its structure. I accordingly marked it for cutting in such a direction as to make a section of the supposed pedicle, as well as through the centre of the plates of the sponge; and the result was the production of the specimen represented by figure 4, Plate LXXIX., completely confirming the ideas regarding the nature of these fossils that had previously arisen from my examinations and comparisons of the fossils with the singular verticillate sponges from the Australian seas.

Very few of these enveloped specimens of verticillate sponges are in so perfect a state of preservation as that represented by figure 4. By far the greater number of them appear to have been in a very young state when thus enveloped by the parasitical sponge; and their size has been still further curtailed, and their true form obscured in the fossil state, by the destructive attrition that they have undergone in the diluvial gravel, in which they are by no means scarce. I have in my own collection 33 specimens of various sizes and states of preservation, among which there is one that is evidently the termination of a fossil specimen quite as large as the recent one figured, the greatest breadth of the spongeous plates being two and a quarter inches.

These fossils, from the general character of the siliceous matter in which they are embedded, probably belong to the chalk formation; but I have never yet obtained one from that deposit, and therefore the formation whence they are derived cannot be positively determined. It is a remarkable circumstance that these diluvial fossils should have their nearest analogues among the recent Australian sponges, and that the same may be said of the fossil fruits of the London-clay formation.

Oplitospongia fucoides, sp. nov. (Plate LXXX.)

Sponge pedicellate; pedicle long, slender, smooth, ramifying and expanding into numerous compressed fucoideal branches disposed in nearly the same plane, so as to be rudely fan-shaped. Surface uneven, minutely hispid. Oscula simple, minute, dispersed. Pores inconspicuous. Dermis irregularly fibro-reticulate; rete abundantly punctiunculate, sparingly spiculous. Dermal membrane abundantly spiculous; spicula spinulate, smaller, shorter, and more attenuated than those of the skeleton. Skeleton-fibres smooth,

punctiunculate, abundantly furnished with subfusiformi-spinulate spicula, radiating irregularly from the centres to the circumferences of the branches; spicula very irregular in length.

Colour, in the dried state, red.
Hab. Sharks' Bay, Western Australia.
Examined in the dried state.

I obtained this interesting species from a dealer in natural-history specimens. It is 9 inches in height and 7 inches in greatest breadth. Its mode of growth is very singular. It consists of a number of separate irregularly shaped fan-like aggregations, by anastomosis of the smaller branches, all projected in nearly the same plane, the whole forming a complicated fan-shaped mass of branches, from many of which, in numerous parts, by a careful examination, minute leaves of fuci may be seen projected; but whether these are separate and independent growths, or projections from an originally enveloped fucus, it is difficult to decide, as I could not trace any portions of the stem of a fucus in numerous sections made at right angles to the surface of the sponge, even when mounted in Canada balsam. From the very young condition of all these minute fuci, and there being two species of them, and several other parasitical bodies, such as little Barnacles, embedded in some of the branches, I am inclined to believe the small fuci to be parasites on the sponge, and not the sponge on a fucus.

The dermal surface is furnished with an irregular fibro-reticulate rete, the fibre of which does not appear to be so profusely furnished with spicula as those of the skeleton. The minute hispidation of the surface is produced by the projection of the spicula of the fibres of both the dermal rete and the skeleton immediately beneath it. This character is not visible, excepting in thin slices of the sponge made at right angles to the dermal surface when mounted in Canada balsam. The fibres of both the surface and the skeleton are very remarkable; their surfaces are profusely punctiunculated; this character is best seen in the fibres of the dermal rete, the surfaces of which are usually less abundantly spiculous than those of the skeleton. These minute dottings of the surfaces of the fibres require a power of not less than 300 linear, when sections of the sponge are mounted in Canada balsam, to render them distinctly to the eye. I have never seen this remarkable dotting of the surface of the fibres of a keratose sponge in any other species of sponge; and in the one in course of description it forms a very decisive specific character.

The structure of the skeleton is very irregular and complicated. The fibres are stout and rigid, and are profusely furnished with their defensive spicula. These organs vary to great extent in their length and diameter; one of the largest measured $\frac{1}{68}$ inch in length, while one of the numerous short ones measured only $\frac{1}{300}$ inch in length; the two forms are distributed on the fibres without the slightest approach to order. This sponge is a very remarkable species of the genus. It is unlike any of its numerous congeners.

RAPHIODESMA RADIOSA, sp. nov. (Plate LXXXI.)

Sponge irregularly rameous; branches rather slender. Surface uneven and irregular, both strongly and minutely hispid. Oscula simple, dispersed. Pores inconspicuous. Dermal membrane pellucid, abundantly spiculous, reticulated; spicula of the rete of the same form as those of the skeleton. Tension-spicula acuate, slender, few in number; retentive spicula dentato-palmated inequianchorate, congregated in rosette-shaped groups, rather numerous, and, rarely, simple and contort bihamate spicula. Skeleton-fasciculi numerous, abundantly spiculous; spicula acuate, rather stout. Interstitial membranes sparingly furnished with the same tension- and retentive spicula as those of the dermal membrane.

Colour, in the dried state, light grey.
Hab. Savanilla, South America.
Examined in the dried state.

I received this very remarkable sponge from Mr. Moore, of the Liverpool Free Library and Museum, for examination and description. He informed me that it was collected at Savanilla, a sea-port town on the South-American coast, latitude 11° S., longitude 75° W.

What has been the nature of the basal attachment of this sponge is very doubtful; as it is at present, it appears as if it had been broken off immediately above the basal attachment. The length of the specimen represented by the figure in Plate LXXXI. is 19 inches; and its diameter averages $\frac{5}{8}$ of an inch at three inches above its present base. The whole of the surface is very uneven, and it is irregularly studded with numerous conical projections about a line or a line and a half in height; and these appear to be produced by the occasional projection of the minute irregular ramifications of the young and immature branches of the sponge at *a*. Beside these conical organs, the surface is abundantly but very minutely hispid; and this affords an excellent specific character. It is produced by the gradual radiation of the distal extremities of the fasciculi of the skeleton immediately beneath the dermal membrane, as represented by fig. 2, Plate LXXXI. This singular provision of nature for the defence of the dermal structure of the sponge is very remarkable and especially characteristic; but it can only be seen to advantage in a thin section of the sponge made at right angles to the surface, mounted in Canada balsam and viewed as a transparent object with a microscopical power of about 100 linear. The amount of the projection of the distal terminations of the spicula of these fasciculi scarcely exceeds about one third or half the length of a single spiculum; but they form a most efficient protection to the dermal structure of the sponge.

The dermal membrane affords especially valuable specific characters independently of the remarkable radial groups of defensive spicula which pass through its structure. It is very pellucid; and the rete with which it is furnished is strongly but irregularly produced, and the areas are large and mostly modifications of triangular or quadrangular forms; and where any portion of it terminates

without contact with any other portions of its structures, the spicula of the termination radiate on the plane of the membrane like those which are projected through the dermis. This habit of terminal radiation of the fasciculi prevails in several other species of *Raphiodesma*. The tension-spicula are very unevenly distributed; in some parts there are very few of them, while in others they occur dispersed in very considerable numbers.

The rosette-shaped groups of dentato-palmated inequianchorate retentive spicula are rather sparingly but equably dispersed on the inner surface of the areas of the dermal network. They very closely resemble those of the type of the genus, the British species *Raphiodesma lingua*, both in the size of the groups and of the individual spicula of which they are constructed, but they are not nearly so numerous in each group as in the type specimen.

I have never found these rosette-like groups of inequianchorate spicula in any other sponges than those of the genus *Raphiodesma*, and not in every species of that genus; so that, although they cannot be considered of generic value, they are important indications of the genus whenever they are apparent. A few simple or contort bihamate retentive spicula were occasionally observed on the interstitial membranes of the skeleton; but their number was so small as to render their presence of but little value as specific characters.

The structures of the skeleton-fasciculi are longer and more continuous than in any other species of the genus with which I am familiar, so much so that the skeleton might very readily be mistaken by a hasty observation for that of a *Desmacidon*; but this illusion is dissipated by the fact that they do not form a continuous network of solid fibre as in the last-named genus, but frequently terminate in radial expansions like those of the dermal membrane and its external protected groups of defensive radiating spicula. A few rosette-shaped groups of inequianchorate spicula and a few of the bihamate ones are occasionally found on the interstitial membranes.

This sponge is the only specimen of the species that I have seen; and it is a very remarkable one. By far the greater proportion of the known species of the genus are more or less of a solid massive form; and this variation strongly illustrates the fact that there is little or no dependence to be placed on external form in regard to either generic or specific characters.

EXPLANATION OF THE PLATES.

Plate LXXVIII.

Desmacidon plumosa.

Fig. 1 represents the sponge in its dried state, rather less than half its natural size.
2, 3. Two small portions of the sponge, of the natural size, exhibiting the plumous nature of the hispidation of the surface.
4. Two of the subfusiform acerate spicula of the skeleton, × 308 linear.
5. A small portion of the skeleton-structure, × 50 linear.

Plate LXXIX.

Chalina verticillata.

Fig. 1 represents the sponge, about half its natural size.
2. One of the depresso-spinulate spicula of the skeleton, × 420 linear.
3. A small portion of the scalariform structure of the skeleton, with portions of the interstitial membrane, × 123 linear.
4 represents a longitudinal section of a diluvial flint presented to me by the late Dean Buckland, containing a fossil sponge closely allied to *Chalina verticillata*, exhibiting a section of the pedicle and the series of verticillate plates of the sponge, very closely resembling the recent sponge, natural size.
5 represents a small specimen of a fossil verticillate sponge, the margins of the plates remaining uncovered, while the intervals between them are filled by the enveloping sponge, natural size.
6. A longitudinal section of a small specimen closely resembling the one represented by figure 5, exhibiting the immature development of the verticillate plates of the sponge and a section of its central column, natural size.
7. A fine specimen of a verticillate fossil sponge, only half of which is completely enveloped longitudinally by the parasitic sponge, natural size.

Plate LXXX.

Ophlitospongia fucoidea.

Fig. 1 represents the sponge, two thirds its natural size.
2. One of the shortest of the spicula of the skeleton-fibre, × 250 linear.
3. An average-sized long spiculum of the skeleton-fibres, × 250 linear.
4. A small portion of the skeleton-fibre, exhibiting the great number of the spicula with which they are furnished, and the mode of their disposition, × 80 linear.

Plate LXXXI.

Raphiodesma radiosa.

Fig. 1 represents the sponge, rather less than half the natural size.
2. The marginal portion of a thin slice of the sponge at right angles to the surface, exhibiting the radiation of the distal terminations of the skeleton-fasciculi, projected through the dermal membrane to form the minute hispidation of the surface, × 61 linear.
3. A small portion of the dermal rete, × 61 linear.
4. One of the rosette-shaped groups of dentato-palmated inequianchorate retentive spicula, × 360 linear.
5. An acuate skeleton-spiculum, × 360 linear.

December 5, 1876.

Dr. E. Hamilton, V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of November 1876:—

The registered additions to the Society's Menagerie during the month of November were 85 in number. Of these, 36 were acquired by presentation, 14 by purchase, 4 by exchange, 3 by birth, and 28 were received on deposit. The number of departures during the same period, by death and removals, was 97.