

much like a Cormorant. None of the figures hitherto published of the various species seem to me to give its proper attitude. The best, perhaps, are those of Audubon.

6. A Black-necked Stilt (*Himantopus nigricollis*, Vieill.), likewise received from Maranh, and also new to the Society's collection.

Mr. Selater exhibited some skins of birds made up from a small collection in spirits, which had been sent to him by Dr. George Bennett of Sydney. Dr. Bennett stated that the specimens had been collected by Capt. Fergusson, of the steamer 'Captain Cook,' during a trading voyage to New Britain, New Ireland, and the neighbouring islands.

- Mr. Selater referred the specimens to the following species:—
1. *Sudoprocta melanoleuca* (Q. et G.). From New Britain. See P. Z. S. 1869, p. 119.
 2. *Graculæ melanolorus* (G. R. Gray): Hartl. Journ. f. Orn. 1864, p. 443. From New Zealand.
 3. *Merops ornatus*, Latham. From New Britain.
 4. *Haleyon albicilla* (Dumont). From New Ireland.
 5. *Haleyon chloris* (Bodd.). From New Ireland.
 6. *Haleyon sanctus* (Vig. & Horsf.). From New Ireland.
 7. *Loricardinalis* (Jacq. et Puch.). From Duke of York's Island†.

The following papers were read:—

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

[Received November 1, 1872.]

(Plates I.—IV.)

FROM FLEMING, BOWERBANK. (Plate I.)

Sponge massive, sessile. Surface even, more or less hispid. Dermal membrane unknown. Connecting spicula attenuato-expanso-laminate, simple or bifurcated, shaft occasionally cylindrical; also recurvo-laminate spicula, shafts slender and very long. Oscula congregated in dispersed, irregular groups, small and numerous. Pores inconspicuous. Interstitial membranes—retentive spicula of two sorts, large ones cylindro-sphero-stellate with numerous short radii,

the smaller ones being more or less spheroidal. But without seeing the latter I should not have been so inclined to separate it.—P. L. S.

It is interesting to me that this *Lory* differs from the specimen from the same locality described and figured by Dr. Finckh (P. Z. S. 1869, p. 126, fig. 1) in the color of the base of the lower mandible yellow. It agrees so closely with Dr. Finckh's description and figure that I have no doubt of its belonging to the same species. Duke of York's Island is between New Britain and New Ireland.—P. L. S.

Geodia Flemingii 1-8, G. depressa 9-15, G. gibberosa 16-22.

[Jan. 7,

and simple cylindro-stellate with comparatively long radii; small ones cylindro-stellate with very short radii. Skeleton-spicula fusiformi-cylindrical. Ovaria oval, variable in form.

Colour light cream-yellow.

Hab. Port Elliot, Australia (*Mr. Ray*).

Examined in the dried state.

I received this sponge with a considerable number of others of various genera from the Murray River, Australia, where they were collected by Mr. Ray. The specimen is an irregularly oval mass $1\frac{3}{4}$ inch long, $1\frac{3}{8}$ inch greatest breadth, and $1\frac{1}{2}$ inch high. On cutting off a portion of the sponge to examine its structure, I found the interior to be one large cavity, the parietes of the sponge not exceeding four lines at the thickest part, and near the basal portion about one line in thickness only, the excurrent canals running in a tortuous direction through the sponge to the oscula. The inner surface presented an irregular matting of spicula on membranous tissue, differing in no respect from other portions of the interior membranous structures.

The occurrence of this large cavity is interesting, as a similarly cavernous condition prevails in the type specimen of the genus, *Geodia gibberosa*, in the Paris Museum. I do not consider this hollow condition of such specimens the normal state of the sponge, and I should not expect to find it of common occurrence in this or any other species of the genus; it is probable that it is only in young and incompletely developed specimens, or by the accidental action of drying, that it would be found to occur.

The surface-characters of the sponge are unfortunately nearly obliterated, apparently by maceration and attrition. No portion of the dermal membrane is preserved. Sections at right angles to the surface exhibit the remains of a few large spicula that have passed through the dermal crust and have been projected about one-third of their length beyond the surface, which in its natural condition was therefore more or less hispid. The connecting spicula are few in number and very irregularly disposed, and the terminal radii are more frequently simple than they are dichotomous. The spicula of the skeleton vary considerably in their proportions; and the greater part of the ovaries have the apices of the radial spicula of which they are composed more or less acute. From the whole of these circumstances combined, it may naturally be inferred that the specimen is not in a fully matured condition.

The connecting spicula are exceedingly various in form. In their early state they are simple expando-ternate ones; as they advance in size one or more of the rays exhibit symptoms of bifurcating; and you may thus trace their progressive development until they attain the size and proportions of the fully developed spiculum represented by fig. 3, Plate I. In the completely developed condition they are not very numerous; nor, indeed, are they abundant in any state.

The recurvo-ternate spicula are very slender in their proportions, and their shafts are usually exceedingly long.

The largest description of stellate retentive spicula vary greatly in their size and degree of development, and also in the number of their radii. In some there are little or no indications of a spherical central mass, and the number of radii does not exceed six or eight, while others have well-developed central spheres and very numerous radii.

The small stellate retentive spicula are very much more numerous than the larger ones, and they all appear to have well-developed spherical centres. The extreme diameter of an average-sized one measured $\frac{1}{100}$ inch; and a smaller one did not exceed $\frac{1}{1000}$ inch. The average greatest diameter of the larger description of stellate retentive spicula was $\frac{1}{100}$ inch.

The ovaria do not exhibit any important specific characters.

I have dedicated this species in memory of the veteran naturalist the late Dr. Fleming, who has worked so much and so ably to extend our knowledge of British natural history, and to whom we are indebted for the first detailed description of a British *Geodia*, under the title of *Geodia Mulleri*, in his 'History of British Animals,' p. 515.

GEODIA DEPRESSA, Bowerbank (Plate I.)

Sponge massive, sessile; surface minutely hispid, even. Oscula congregated in depressed areas, numerous, small. Pores inconspicuous, congregated. Skeleton-fasciculi large; spicula fusiformi-acerate, large and long. Connecting spicula attenuato-patento-ternate, large and long and recurvo-ternate; radii stout, shafts long and slender. Interstitial membranes abundantly spiculous; retentive spicula attenuato-stellate, large and very numerous, and cylindro-spherostellate, small and very numerous. Ovaria spherical, slightly depressed.

Colour in the dried state cream-white.

Hab. Dardanelles (*J. T. Streatfield, Esq.*), Museum of Royal College of Surgeons, n. 181.

Examined in the dried state.

This sponge is in size and form very like an irregularly compressed Normandy pippin, its largest diameter being two and three quarters, and its greatest height an inch and three quarters. Its original attachment is at the thinnest part of its circumference, where there is a small univalve shell about a quarter of an inch in length imbedded, with a portion of a bivalve, apparently a *Mytilus*, attached to it; but other than these substances there are no appearances of attachment, and it had probably been freely floating about in the sea for a considerable period before it was taken. On that which is apparently its opposite, closely adjoining the shells above named, there is an irregularly deep depression an inch and half in length and about a quarter of an inch deep, in which the numerous small oscula are congregated, and surrounding which there is a thick crop of large and long attenuato-ternate external defensive spicula; and the remains of similar spicula may be detected on other parts of its surface. Beside these large spicula there is a secondary set of external defensive ones, which are very long and slender, projecting through the dermal surface for about one-third or one-fourth of their length, and

protecting the dermal membrane from its minute enemies. These spicula are in strong contrast with the primary series of external defensive ones, which equal those of the skeleton in length and diameter. They are frequently $\frac{1}{3}$ of an inch in length, with a diameter of $\frac{1}{54}$ inch, while those of the long and slender secondary series are from $\frac{1}{12}$ to $\frac{1}{14}$ inch in length, and do not exceed $\frac{1}{80}$ inch in diameter.

The sponge has evidently suffered from partial decomposition, and I could not find any portion of the dermal membrane remaining in a condition for satisfactory examination; but if we may judge by the profusion of the spicula in the other membranes of the sponge, it will probably prove to be abundantly spiculous.

The skeleton-fasciculi are large and strong, and especially so near the dermal surface, where strong shafts of the patent-ternate connecting spicula are incorporated with them. The latter form are very numerous and much larger and stouter than those in many other species of the genus. Their length frequently exceeds $\frac{1}{2}$ inch, their greatest diameter is $\frac{1}{16}$ inch, and the expansion of their ternate radii varies from $\frac{1}{20}$ to $\frac{1}{14}$ inch. The average dimensions of the skeleton-spicula is, length $\frac{1}{3}$ inch, and greatest diameter $\frac{1}{54}$ inch.

The recurvo-ternate spicula are also more than usually large and numerous; their slender shafts are frequently $\frac{1}{4}$ inch in length, while their greatest diameter does not exceed $\frac{1}{80}$ inch.

The interstitial membranes are in a fine state of preservation, and are coated abundantly with sarcodæ; and in many parts they are literally crowded with the two forms of stellate retentive spicula, each form being about equally abundant; on some parts of the membranes they are so numerous as to render it impossible to discriminate their forms.

There is another, a larger specimen of *G. depressa* in the Museum of the Royal College of Surgeons. In its general anatomical details it is in perfect accordance with the one described. In the larger specimen, on what was probably the upper side of the sponge, rather on one side near the thickest portion, there is an elliptical orifice five eighths of an inch long by a quarter of an inch wide, leading into an expanded cavity one and a half inch deep, in which most probably the oscula are congregated, as we find them to be in many other species of the genus. On the distal end of the sponge the little depressions on its surface indicating the intermarginal cavities beneath are in a good state of preservation; and it is probable, from their forms and modes of disposition, that the pores in this species are congregated.

GEODIA GIBBEROSA, Lamarck. (Plate I.)

Sponge massive, sessile; surface more or less tuberculated. Dermal membrane thin, pellucid? Connecting spicula attenuato-patent-ternate, slender. Oscula small, congregated in depressed areas in mature specimens; loosely congregated or dispersed in young specimens. Pores inconspicuous. Skeleton-spicula fusiformi-acerate, slender, and, rarely, acute slender. Interstitial

membranes—tension-spicula fusiformi-acerate, small and few in number; retentive spicula attenuato-stellate, radii long and slender; and cylindro-stellate, radii short and stout, minute. Ovaria globose, slightly depressed.

Colour cream-yellow in the dried state.

Hab. Martinique and Porto Rico, Antilles (Lamarck); Island of Dominica, West Indies (Dr. Fleming).

Examined in the dried state.

The type specimen of the genus is preserved in the Museum of the Jardin des Plantes at Paris. It is subglobose in form, with numerous slight and irregularly shaped elevations dispersed over its surface; and it is from 4 $\frac{1}{2}$ to 5 inches in diameter.

There is one large oscular area about an inch in diameter, somewhat sunk beneath the general surface, and contained within a well-defined marginal ring, the greatest diameter of which is about two inches. Nearly the whole of the radial fasciculi of the skeleton have apparently been scooped out to facilitate the drying of the specimen, through a large hole in the sponge about 1 $\frac{1}{2}$ inch in diameter; and so effectually has this operation been performed that the sides of the sponge do not appear to exceed about half an inch in thickness in its dried condition.

There is a second specimen of apparently the same species of *Geodia* in the French Museum, somewhat larger than the type one, varying from 5 $\frac{1}{2}$ to 6 inches in diameter. The form is nearly the same as the first, but the surface more prominently tuberculated, and more conical in form; but these slight variations are of no importance as specific characters. This specimen, like the type one, has a single nearly circular oscular area, with a well-defined marginal ring, the diameter of which is about 1 $\frac{1}{2}$ inch; it has also a large hole about 1 $\frac{1}{2}$ inch in diameter; and the interior substance of the sponge has evidently been removed to facilitate the drying of the specimen. These specimens were hitherto considered to be the only two known. Through the kind assistance of Professors Alphonse Edwards and Valenciennes, I had an opportunity of thoroughly examining their organization; and from them, and from a third one in the possession of Dr. Andrew Fleming, son of the late veteran naturalist, Professor Fleming of Edinburgh, I have constructed the above specific characters.

The oscula in Dr. Fleming's specimen are so small as to be scarcely perceptible without the aid of a lens. On one side of the sponge they are dispersed; but on other parts they are congregated in small groups, but are especially so in the depressions of the surface. They are each furnished with a contractile membrane; some of them were apparently closed, while others were more or less in an open condition. The difference in the disposition of the oscula in Dr. Fleming's specimen and those in the French Museum, may probably be accounted for by the younger and less-developed state of the smaller specimen.

Unfortunately all the three specimens have much deteriorated, apparently by imbibition in water, or by repeated washing; so that

there remains scarcely a trace of the dermal membrane or of the sarcodous stratum immediately beneath it, and the greater portion of the sarcode of the interior is also destroyed. A few minute external defensive spicula were seen projecting from one portion when sectioned for examination, and a few small fusiformi-acerate ones lying parallel to the surface, apparently belonging to the membranous tissue, being all that I could detect. In some of the depressions of the surface of Dr. Fleming's specimen there are the remains of a very thin parasitic sponge with spinulate spicula, which might readily be mistaken for a portion of the absent dermal membrane, while in truth they have no organic connexion with the *Geodia*.

The skeleton-spicula of this species, although similar in form to those of *G. zelandica*, differ exceedingly in size, the latter having the average length of one eighth of an inch, while those of the former rarely exceed one eighteenth of an inch in length. They are slender in proportion, and intermingled with the fusiformi-acerate spicula; there are a very considerable proportion of purely acerate ones exhibiting no tendency to the fusiform shape. The two forms of stellate spicula of the sarcode are indiscriminately mixed and dispersed in that substance; and the cylindro-stellate ones are very much the smaller of the two, requiring a linear power of at least 600 to render their forms visible; their extreme diameter does not exceed $\frac{1}{1000}$ inch, while the attenuato-stellate ones vary from $\frac{1}{1400}$ inch to $\frac{1}{933}$ inch in diameter.

The spicula of the membranes are few in number, small, and in many cases scarcely, if at all, fusiform.

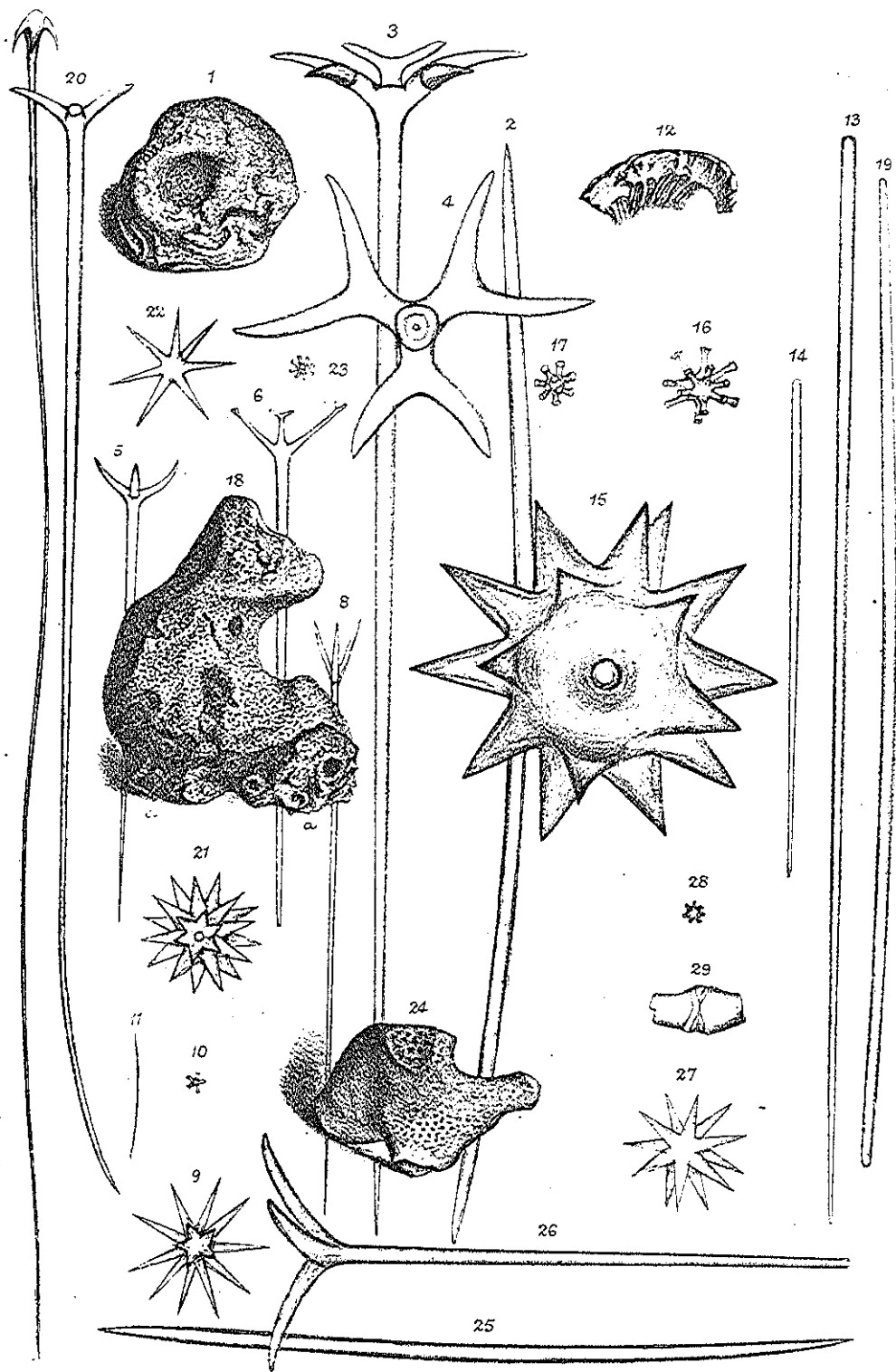
I did not observe any prolific or immature ovaria in the external crust of the sponge; but in the internal membranes they were in every stage of development. The immature ones always appeared to be completely surrounded by a thick coat of sarcode; but this sarcodous coat was not apparent in the fully developed ones.

The spicula figured are from Dr. Fleming's specimen, from the Island of Dominica. They are identical in all their structural characters with those from the specimens in the French Museum in my possession.

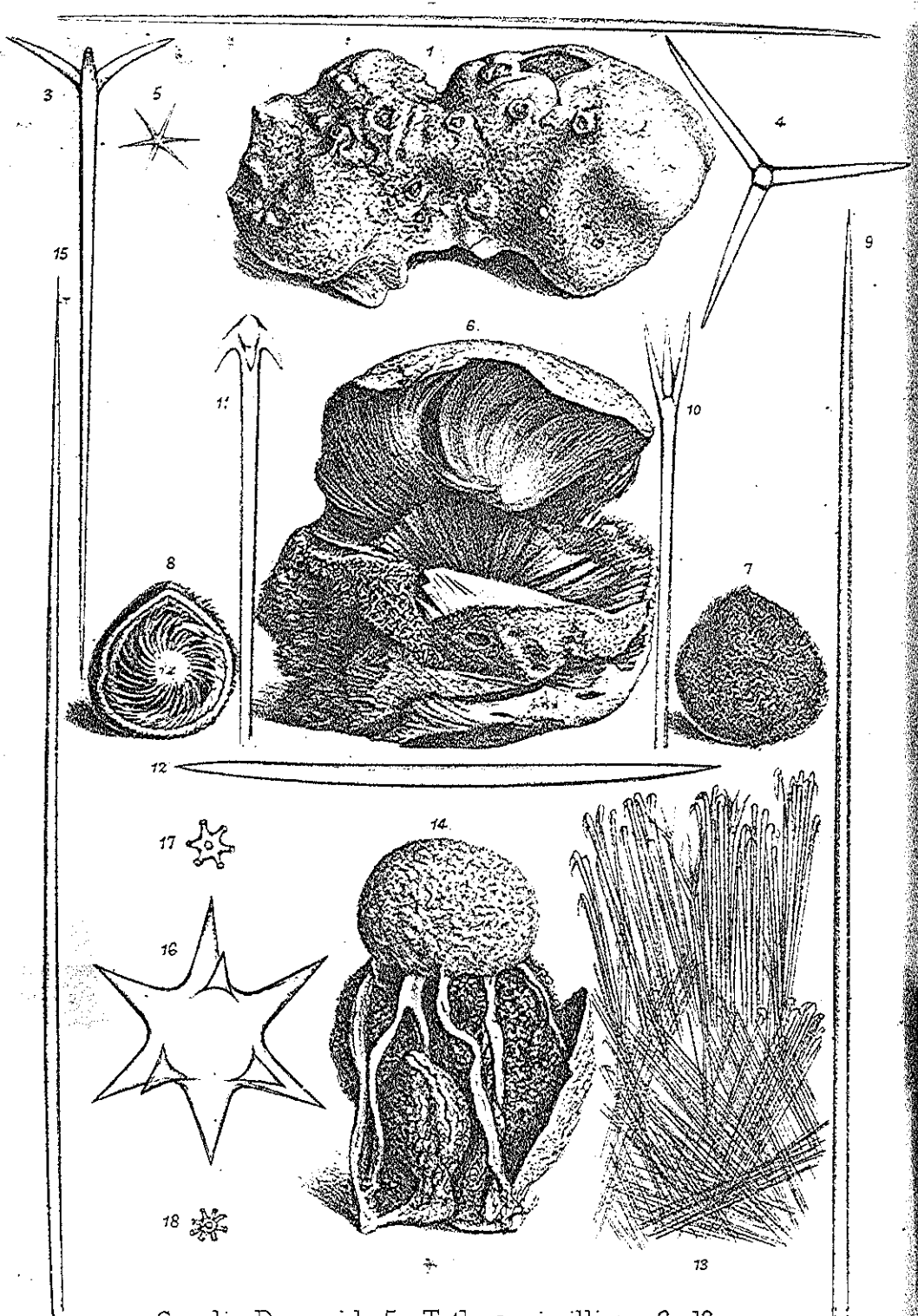
GEODIA PERARMATUS, Bowerbank. (Plate II.)

Sponge massive; sessile. Surface even. Oscula congregated in depressed areas. Pores inconspicuous, dispersed. Dermal membrane pellucid, spiculous; tension-spicula fusiformi-acerate, minute, short, rather few in number; retentive spicula subsphero-stellate, radii attenuating, rather obtusely terminated, very few in number, and simple attenuato- or cylindro-stellate, very minute, abundant. Skeleton-fasciculi compact; spicula fusiformi-acerate, large and stout. Connecting spicula attenuato-patenti-ternate with bifurcating radii, very large and stout; and recurvo-ternate, small and slender, shafts long and attenuated; also porrecto-ternate, minute and slender. Interstitial membranes—spicula the same as those of the dermal membrane. Ovaria spheroidal, slightly depressed.

Colour in the dried state cream-yellow.



Geodia perarmatus 1-11. Tethea robusta 12-17. Geodia inequalis 18-23.
G. media 24-29



Geodia Dysoni 1-5. Tethea simillima 6-13.

Tethea Cliftoni 14-18.

Hab. Unknown (*Mr. Thos. Ingall*).
Examined in the dried state.

I received this sponge from my late friend Mr. Thomas Ingall in 1861. He purchased it with other specimens, the localities of which were unknown. The specimen is evidently in a young and somewhat immature state, and it is very probable that its form would undergo considerable modification in a more fully developed condition; but even in its present state it is a very remarkable species. The surface is even but very rough to the touch, in consequence of the projection of the radii of many of the large bifurcating patentoternate connecting spicula. Although so young, there are already two well-developed oscular areas upon its surface—one in a rather deep depression, and the other nearly level with the external surface. Very little remains of the dermal membrane; but what there is of it is crowded with the minute attenuato-stellate retentive spicula, among which there are a very few of the larger subsphero-stellate ones. The acerate tension-spicula are scattered on the surface of the membrane and are rather few in number. The same spicula that occur in the dermal membrane are found dispersed over the surface of the interstitial ones, but they are much fewer in number than on the dermal membranes.

It is a remarkable circumstance in this specimen that many of the connecting patentoternate spicula, the triradiate heads of which in other species of *Geodia* are attached to the inner surface of the dermal crust of the sponge, in this one are projected forward to such an extent through the stratum of siliceous *ovaria* that their radii are seen emerging immediately at the dermal surface, while others are seen at and near the inner surface of the dermal crust. This difference in the disposition of these spicula from those in other species of the same genus may probably be accounted for by the fact that the specimen under consideration is most likely in an early stage of its growth and development, and that in future examinations of larger and more completely developed individuals the connecting spicula will be found occupying their usual positions immediately beneath the dermal crust.

The recurvo-ternate spicula occupy their usual position beneath the dermal crust; their long slender shafts are incorporated with the skeleton-fasciculi, their heads appearing in the intermarginal cavities.

The progressive development of the bifurcating patentoternate connecting spicula is exceedingly well illustrated in this sponge. They are first observed to be small and slender with simple patentoternate radii acutely terminated; and in this form they remain, gradually increasing in length and stoutness until they attain the size represented by fig. 5, Plate II. As they approach their complete state of development the bifurcations of the radii become more or less produced, but frequently in a very unequal manner, as in fig. 6, the furcations being developed on one or two of the primitive rays, while the third remains simple; but when their

development has been fully accomplished, they exhibit the forms represented by figs. 3 and 4. The adult form only is available as a specific character.

The small porrecto-ternate spicula must not be confounded with the young state of the large bifurcating expando-ternate ones. They are always much more delicate in their structure; their ternate radii are projected at a very different angle from those of the former description; and their shafts are not rapidly attenuated and comparatively short, but in their perfect state are very long and slender.

The skeleton-spicula vary to some extent in size, many of them exceeding in length and stoutness the one figured.

The large subsphero-stellate retentive spicula are exceedingly few in number; and all that I have seen have a well-defined spheroidal centre, the like of which I have never observed in the numerous minute ones.

TETHEA ROBUSTA, Bowerbank. (Plate II.)

Sponge subspherical, sessile; surface even, strongly tuberculated; tubercles depressed, large, and numerous. Oscula and pores inconspicuous. Dermis coriaceous, very thick, crowded with very large sphero-stellate spicula with short acutely conical radii; dermal membrane obsolete. Skeleton-fasciculi multispiculous, large, closely compacted, expanding at their distal apices to form the corymbose fasciculi of the tubercles of the dermal surface; spicula inequifusiformi-cylindrical, large and long. Interstitial membranes abundantly spiculous; retentive spicula of three sorts:—first, of very large sphero-stellate, the same as those of the dermal rind, comparatively few in number, dispersed; second, small cylindro-stellate, radii rarely attenuated, very numerous; third, minute cylindro-stellate, radii short, distal terminations clavate, very numerous.

Colour in the dried state light grey.

Hab. Australia (Mr. Stutchbury).

Examined in the dried state.

I examined this sponge at the British Museum many years since, very shortly after its purchase, with other sponges from Australia, from the late Mr. Stutchbury; and I figured one of the large sphero-stellate spicula in my paper "On the Anatomy and Physiology of the Spongiadæ," published in the 'Philosophical Transactions' for 1858, plate xxv. fig. 15, and also in vol. i. plate vi. fig. 165, of my 'Monograph of the British Spongiadæ.' On applying to Dr. Gray for the use of the sponge at the British Museum that it might be figured, I was informed on January 11, 1872, by his late brother Mr. G. R. Gray, that the specimen could not be found; I have therefore figured a thin slice of it which was taken from it for microscopical examinations. This affords an excellent sectional view of the most important structural characters of the sponge. I can therefore only describe its general external characters from recollection. It was not, I think, quite perfect, and did not much

exceed an inch in diameter. Originally it had been nearly spherical in form; it was in the dried state when I examined it. When alive it would probably have been about two inches in diameter; and, judging its surface characters by those of the well-known British species *T. lyncurium*, which in many points it closely resembles in its anatomical characters, it would in the living state have presented a smooth surface, and in the dried state, as shown by the section figured and the microscopical sections in Canada balsam in my possession, it would have been abundantly furnished with large depressed tubercles.

The oscula and pores are not distinguishable; nor could I detect the slightest indication of a dermal membrane. The dermal rind is more than usually thick in this species of the genus. The closely packed mass of the thick stratum of large sphero-stellate spicula, and their enveloping membranes, of which it is composed, would naturally prove a serious impediment to the inhalant operations of the sponge. To remedy this obstruction, the inhalation is effected through numerous very deep cylindrical depressions, which are found between the corymbose distal terminations of the skeleton-fasciculi; these depressions form cylindrical sacs the depth of which is three or four times their own diameter, and extending nearly or quite to the inner surface of the dermal rind. Similar, but more highly developed organs exist in several species of *Geodia*, as in *G. Barretti* and *M. Andrewi*, through which aerating and nutrient streams have access to the interior of the sponge.

The skeleton-fasciculi radiate from a central mass composed of numerous loosely compacted bundles of spicula of the same form as those of the skeleton, but very much smaller; these fasciculi do not appear to have any definite arrangement, but cross each other in every direction. The skeleton-fasciculi proceeding from the central mass are large and closely compacted, and in this state they enter the inner surface of the dermal rind, and commence separating and radiating to form the corymbose terminations at the distal surface of the dermal rind of the sponge; and they expand to such a degree that the large dermal tubercles thus formed are in very close conjunction on the surface.

The stellate spicula of this species are very remarkable. The extreme diameter of a fully developed one of the largest description is $\frac{11}{16}$ inch, and the radii are, comparatively, exceedingly large and stout. The number of these organs is very great; and in the dermal rind they are so closely packed that the rays of each pass between those of the adjoining ones, and the whole become, as it were, cemented into a solid mass.

The two smaller ones are also exceedingly abundant on the interstitial membranes. They occur in about equal quantities, thickly dispersed over the membranes. The largest of the two, the cylindro-stellate ones, have an average extreme diameter of $\frac{1}{21\frac{1}{4}}$ inch; while the smaller cylindro-stellate ones do not exceed $\frac{1}{33\frac{1}{4}}$ inch in diameter, being less than one-third of the greatest diameter of a skeleton-spiculum, which measured $\frac{1}{10\frac{1}{2}}$ inch.

GEODIA INÆQUALIS, Bowerbank. (Plate II.)

Sponge irregularly massive, sessile; surface minutely pitted. Oscula congregated in irregular groups. Pores congregated in minute pits. Dermal membrane obsolete. Skeleton-fasciculi loosely constructed; spicula rather few in number, inequicylindrical, variable in size. Connecting spicula expando-ternate; radii short; shafts long, slender, and attenuating. Interstitial membranes spiculous; tension-spicula inequicylindrical, long and very slender, few in number; retentive spicula attenuato-stellate, very variable in size, number, and degree of attenuation of their radii, comparatively few in number; also cylindro-stellate, very minute, radii numerous and short, very abundant. Ovaria spherical or somewhat oval, slightly depressed.

Colour in the dried state cream-white.

Hab. Unknown.

Examined in the dried state.

I received this sponge with other specimens from my late friend Mr. Thomas Ingall in 1861, without any account of its locality. The specimen has every appearance of having been freely floating about in the sea for some time, as no traces of a basal attachment can be detected on any part of it, and at the part indicated in fig. 18, *aa*, there is a group of sand-worms which have built their cases upon its surface. I could not detect any portion of a dermal membrane; but, from the excellent state of preservation of the interstitial structures of the sponge, there is no doubt of its being alive when taken from the sea. Several groups of oscula dispersed over the surface represented in the figure, and especially on the part immediately above the open mouths of the sand-worm-cases at *a*; but on the reverse of the figure there are no oscular groups. The oscula are rather small; and, in consequence of the absence of the dermal membrane, the depressed areas of the distal ends of the intermarginal cavities are almost as large as the oscula; but a careful observation soon enables us to discriminate the one from the other.

The skeleton-spicula are very loosely combined in the skeleton-fasciculi, and they are rather few in number; their inequicylindrical form affords an excellent specific character. It is the only *Geodia* in which I have yet seen that form of skeleton-spiculum; they vary to some extent in size, but the form is constant.

The stellate retentive spicula of the largest description vary to a considerable extent; their extremes are well represented by figures 21 and 22, Plate II. In the form represented by fig. 21 the radii are very numerous and acutely conical, while in that of fig. 22 they have very much more slender radii and comparatively few of them; but intermediate forms in every degree may be readily found among them. Their average diameter is $\frac{1}{37}$ inch. The smaller description, the minute cylindro-stellate ones, are very numerous and much more constant in their forms than the larger ones; their average diameter is $\frac{1}{37}$ inch. The interstitial membranes are rather thickly coated with dark amber-coloured sarcodine, and in many parts they are quite crowded with the two descriptions of stellate spicula.

The remarkable forms of these spicula, combined with the inequicylindrical skeleton ones, render the discrimination of this species comparatively easy.

The ovaria in the dermal crust are all fully developed; but on the interstitial membranes they may be seen in all stages of development, from a size not exceeding that of one of the largest of the stellate spicula to that of the fully developed ovarium.

GEODIA MEDIA, Bowerbank. (Plate II.)

Sponge massive, sessile; surface smooth. Oscula congregated in slightly depressed areas. Pores inconspicuous, congregated. Dermal membrane obsolete. Skeleton-fasciculi large, multispiculous, rather closely compacted; spicula fusiformi-acerate, short and stout. Connecting spicula attenuato-patenti-ternate, rather short, strongly developed. Interstitial membranes—tension-spicula acerate, small and few; retentive spicula attenuato-stellate, radii acutely conical, very variable in number, and cylindro-stellate very minute. Ovaries slightly oval, depressed.

Colour in the dried state pale buff-yellow.

Hab. Mexico (*Mr. Thomas Ingall*).

Examined in the dried state.

I received this sponge from my late friend Mr. Thomas Ingall, labelled Mexico. The reverse side to that figured is smooth and regularly curved, with faint parallel striæ at right angles to the curve, as if it had been based on a shell with raised lines upon it or on the stem of a coral. The mass of the sponge is not perfect, portions having been broken away from both ends of it; but the specimen has evidently never been much larger than it is at present. The oscula occupy two well-defined areas, which are very slightly depressed. The porous areas are visible by the aid of a lens of two inches focus; they are not so numerous as in many other species of this genus. I could not find any remains of the dermal membrane. The skeleton is rather strongly constructed; the skeleton-fasciculi are both large and numerous. The connecting spicula are also strong and numerous; and their shafts, incorporated with the distal ends of the skeleton-fasciculi, contribute greatly to the strength and firmness of the skeleton-structures immediately beneath the dermal crust. In their adult state the connecting spicula are large and strong, and their radii patienti-ternate; but in the young and immature condition they are more or less expando-ternate, and they are found in every stage of development. There were very slight indications of the presence of recurvo-spicula. I observed among the spicula separated by nitric acid the remains of one very small specimen, and a fragment of another in one of the sections mounted in Canada balsam.

The tension-spicula of the interstitial membranes are very small and few in number.

The largest description of attenuato-stellate retentive spicula vary to some extent in the number of their radii; some have but three or four, while others have as many as twelve or fourteen. In the

largest and best-developed ones the radii occasionally appear very delicately incipiently spinous. These spicula are rather numerous distributed on the membranes. The smaller spherostellate ones are not so numerous; but they are more regular in their forms than the larger ones.

The general characters of this species render it not very difficult of discrimination.

A few doliolate spicula were found among those separated by the aid of nitric acid; they vary in their forms to some extent: the one figured is the largest I observed.

GEODIA DYSONI, Bowerbank. (Plate III.)

Sponge massive, sessile? Surface uneven but smooth. Oscula simple, small, numerous, dispersed rather regularly. Pores inconspicuous. Dermal membrane obsolete. Skeleton somewhat slender and delicate; fasciculi numerous; spicula fusiformi-acerate, rather small comparatively. Connecting spicula attenuato-patenti-ternate, rather slender; radii variable in size. Interstitial membranes—retentive spicula attenuato-stellate, small, and delicate. Ovaria spherical, slightly depressed.

Colour in the dried state cream-white.

Hab. Honduras (*Mr. Dyson*).

Examined in the dried state.

I received a single specimen of this sponge from Mr. Dyson, who found it at Honduras. It has probably been a beach specimen, as nearly the whole of the dermal membrane has been destroyed, and the specimen itself is apparently a portion only of a larger sponge, the under part being quite destitute of dermal crust.

The oscula are simple orifices of nearly equal size; they are found in about equal numbers on all parts of the dermal surface, and they are dispersed at very nearly regular distances from each other.

The dermal membrane is nearly all destroyed; but the membranes investing the ovaria in the dermal crust are in a good state of preservation, and so are the interstitial ones, though the sarcoderm is not very abundant upon them. These conditions of the specimen seem to indicate that the sponge has undergone decomposition to some extent. A few very small fragments of the dermal membrane were detected on the external surfaces of the slices mounted for examination; they were aspiculous and very translucent; but it is probable that when in a more natural condition it would be found to possess the same spicula as the interstitial membranes immediately beneath the dermal crust, and very likely in greater numbers than in those organs under their present circumstances. The attenuato-stellate retentive spicula are rather abundant on some parts of the interstitial membranes; and a few exceedingly minute radiate spicula were interspersed among them.

The skeleton-spicula, compared with many other species of *Geodia*, may be designated as rather small and slender, and the skeleton-fasciculi delicate in proportion. The connecting spicula are rather

numerous. They vary to a considerable extent in the degree of development of their triradial heads, the rays in some being twice the length of those in others.

The ovaria are abundant in the dermal crust; and they are also numerous on the interstitial membranes, where they are found in every stage of progressive development, some of them having a diameter not more than one-tenth part that of the mature ovarium; in their fully developed state they are globular with a very slight amount of depression.

TETHEA SIMILLIMA, Bowerbank. (Plate III.)

Sponge globular, sessile; surface even, strongly hispid. Dermal coat abundantly furnished with stout fusiformi-acerate spicula surrounding the defensive fasciculi. Dermal membrane thin, pellucid. Oscula and pores inconspicuous. Spicula of the skeleton fusiformi-acerate large, and long. Defensive spicula external, collected in fasciculi; fusiformi-acerate large and long, few in number; fusiformi-porrecto-ternate abundant, radii short and stout; and attenuato-recurvo-ternate very abundant, shaft slender, very much attenuated. Sarcoderm furnished sparingly with minute bihamate spicula. Gemmules lenticular, surface smooth, tough, and strong; furnished with fusiformi-acerate attenuated unihamate or occasionally bihamate, and with short slender porrecto-ternate spicula mixed in fasciculi radiating from the centre of the gemmule.

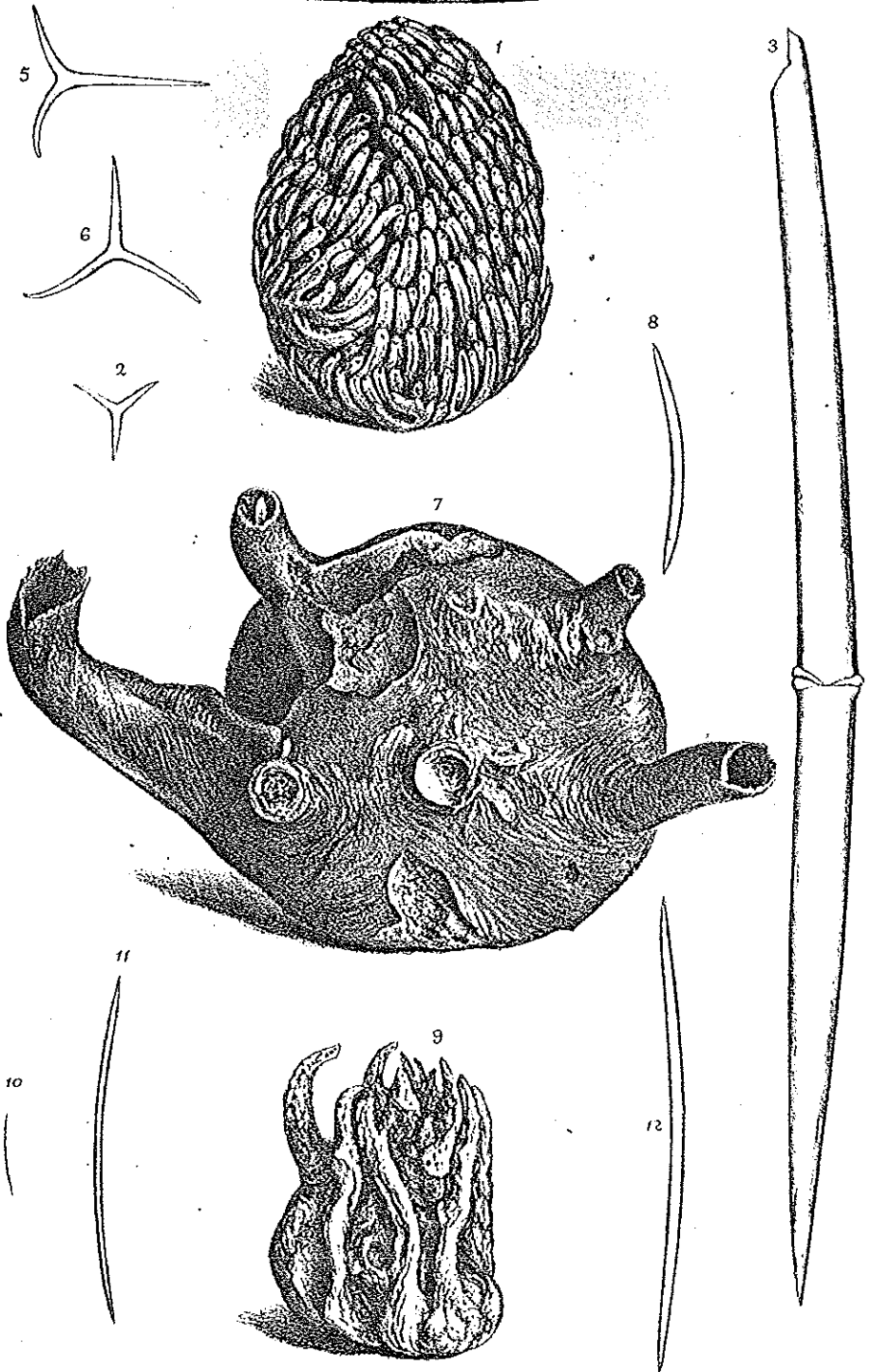
Colour, dried, light brown.

Hab. South Seas (*Sir Everard Home*).

Examined dried and in spirit.

The characters of this species are given from two specimens brought home from the South Seas by Sir Everard Home. The most perfect specimen is in the dried state, and measures eleven lines in diameter. The second one is about one third of a much larger specimen, not less than two inches in height, and is in spirit; both specimens are in the Museum of the Royal College of Surgeons.

This species is remarkable for the very close resemblance it has to *Tethea cranium* of our northern seas; and although I have designated it as a species, I have great doubt whether it should be thus distinguished. The same forms of spicula are found in both; but their comparative proportions and the degree of their prevalence in the respective parts of the sponge differ to a considerable extent. There is but a very little difference between the skeleton-spicula; those of *T. simillima* are slightly the longer and greater of the two: but in the defensive spicula there is a considerable amount of discrepancy. In the projection of the defensive fasciculi of *T. cranium* the appearance of recurvo-ternate spicula is very rare, while in *T. simillima* they are almost as abundant as the porrecto-ternate ones; and in the first-named species the radii of the porrecto-ternate spicula are very much longer and more attenuated than in the last species named. In the sarcoderm of the small specimen of *T. simillima* I could not detect the minute bihamate spicula; but I found a few in that of the



Leuconia glomerosa 1-6. *Desmacidon fistulosa* 7-8.
Ciocalypa Tyleri 9-12.

larger specimen; while in *T. cranium* they are extremely abundant, but much more minute than those of *T. simillima*. I found but one description of gemmule in *T. simillima*, which was very similar in form and structure to the larger form that exists in *T. cranium*; and in these organs we again find a considerable difference in the proportions of the spicula of the two species. In *T. cranium* the porrecto-ternate spiculum of the gemmule is more slender in its general proportions, and the radii are expanded at a greater angle and are much longer than those of *T. simillima*. The unihamate spicula also exhibit a characteristic variation in form. In *T. cranium* the hamate apex is more clavate but the hook less produced than in *T. simillima*; in the latter the hook is not only very strongly produced, but the spiculum often becomes bihamate; and a practised eye would readily distinguish the one species from the other by these characters alone. Thus, although very closely allied in their general structure, there appears to exist a sufficient permanent structural difference to warrant our considering them distinct species.

TETHEA CLIFTONI, Bowerbank. (Plate III.)

Sponge spherical, slightly depressed, sessile. Surface even, smooth, minutely pitted or areolated, areola very shallow. Oscula and pores inconspicuous. Dermal rind thick and very solid, exterior and interior surfaces furnished with a thick stratum of large closely packed spherostellate spicula; radii acutely conical; interspaces with comparatively few of the large spherostellate spicula, but abundantly supplied with minute subspherostellate spicula with clavate cylindrical radii, variable in form and size. Dermal membrane aspiculous. Skeleton—radial fasciculi polyspiculous; fasciculi compact, expanding slightly towards the dermal surface, through which their distal terminations pass, to a slight extent forming external defences; spicula fusiformi-acuate, rarely cylindrical, or fusiformi-acerate, large and long. Interstitial membranes—retentive spicula the same as those of the dermal rind, few in number. Sarcodæ dense.

Colour in the dried state light orange.

Hab. Fremantle, Australia (*Mr. G. Clifton*).

Examined in the dried state.

The form of this sponge is that of a slightly depressed sphere. Its greatest horizontal diameter is 13 lines, and its height 11 lines. Its location is especially remarkable. It is seated on the top of a mass of agglutinated sand and mussel-shells; and, apparently feeling the insecurity of its situation, it has given off from its base seven root-like basal processes, two of which divide shortly after leaving the sponge and proceed in different directions: the longest of these appendages is $1\frac{1}{2}$ inch, and its greatest diameter rather exceeding a line; it terminates in an irregularly formed adherent expansion about 3 lines in diameter. These root-like appendages form no part of the specific character of the sponge; they are projected, in accordance with the necessities of the individual, by almost every species of *Tethea* with which I am acquainted.

The pitting or areolation of the surface of the sponge is scarcely seen by the unassisted eye; with the aid of a two-inch lens it very closely resembles the pock-marks on the human face. The disposition of the large spherostellate spicula in the dermal rind is different from those in any other nearly allied species. Instead of being evenly distributed throughout its substance, they are collected into two dense strata at the outer and inner surfaces of that organ, while the intervening space has comparatively a few only distributed in its substance, and in these comparatively clear spaces the smaller description of subspherostellate retentive spicula are abundant. The large spherostellate spicula very closely resemble those of *Tethea robusta* and *T. Ingalli*; but they are less robust in form than those of the former, and more so than those of the latter species. The greatest diameter of one of the largest size was $\frac{1}{16}$ inch.

The minute subspherostellate retentive spicula with clavated cylindrical radii are exceedingly various in both size and form. In some the radii are slender with very slightly developed bulbous terminations, while others, with the radii quite as slender, have large well-developed distal terminations; and in some the radii are short and stout with a very slightly developed bulb. These minute organs are strikingly different in form from the corresponding ones in any of the nearly allied species, and are certainly the most distinctive of all the specific characters of the species. The average size of the greatest number is $\frac{1}{1500}$ inch extreme diameter; but there were a few that measured $\frac{1}{557}$ inch in diameter. They require a power of about 700 linear to distinctly demonstrate their forms; one of the smallest did not exceed $\frac{1}{3000}$ inch in extreme diameter.

The skeleton-spicula vary to a considerable extent in size and in the degree of their fusiformity, so as in some almost to simulate the acerate form. The really acerate and cylindrical ones are of very rare occurrence.

The sarcodæ in all parts of the sponge appears to be very dense.

It is most likely that succeeding specimens of this species may not exhibit any of the extraordinary basal appendages that render the specimen figured so singular in its appearance. Such organs appear to be only thrown out when a necessity for them arises from the peculiarities of the locality impeding the safe attachment of the young sponge. Similar appendages are projected from the bases of *Tethea norvegica*; and there is little doubt that such organs will be observed to be thrown out by other species of *Tethea* when a necessity for them arises.

LEUCONIA GLOMEROSA, Bowerbank. (Plate IV.)

Sponge sessile? composed of a closely compressed mass of repeatedly divaricating, slender, compressed, ascending branches. Surface smooth. Cloacæ continuous from base to apex of the branch through all its divarications; terminal orifice rarely ciliated; oscular surface coarsely reticulated; rete multispiculous. Oscula large and open. Pores inconspicuous. Dermis—dermal membrane thin, spiculous;

spicula equiangular, triradiate; radii short and stout; reposing on a closely packed stratum of very large and strong fusiformi-acerate dermal spicula disposed in lines in accordance with the long axis of the branch. Skeleton—interstitial structures sparingly spiculous; spicula inequitradiate, variable in size and form.

Colour in the dried state cream-white.

Hab. Port Elizabeth (*Capt. Charles Tyler*).

Examined in the dried state.

The basal attachment of the sponge has been destroyed; but the whole mass of closely compressed branches appear to spring from one basal mass or sessile attachment, dividing and subdividing into a complex mass of ramuli, each terminated with a fæcal orifice; the cloacæ, of which these orifices are the terminations, are continuous from the extreme proximal end of each branch to the distal end of each of its ramuli. The terminal orifices are rarely ciliated; but when they are so furnished the ciliary fringe is composed of a prolongation of the layer of large acerate spicula. When a longitudinal section of one of the ramuli is made and mounted in Canada balsam, the interior of the sponge forms a very interesting object, the whole of the inner surface of the cloaca being occupied with beautiful oscular reticulation; the rete is formed of broad flat threads of closely felted triradiate spicula; and within each area there is a well-defined osculum. In other well-known species of *Leuconia* we find a series of defensive spicula projected from the oscular surface, the points of these organs being usually inclined towards the mouth of the cloaca; but in this species no such spicula could be detected.

The dermal membrane is exceedingly delicate; it is furnished with numerous equiangular triradiate spicula; and in the present state of the sponge it is closely adherent to the dense stratum of large fusiformi-acerate spicula beneath it. The disproportion of the comparatively enormous spicula of which it is composed is very remarkable; and in their closely packed state they form a most efficient protection to the delicate interstitial structures beneath them. One of these large spicula separated with others from the sponge and mounted in Canada balsam presented a striking instance of the vitality of these organs. It had evidently been fractured near its middle while in its natural position during the life of the animal; the broken surfaces have been cemented together and a strong angular ridge thrown out to strengthen the reunited parts. This spiculum is represented in Plate IV. fig. 3. The reuniting of the soft parts of sponges is of exceedingly common occurrence; but this is the only instance among sponges analogous to the uniting of fractured bones among the higher classes of animals that I have hitherto observed. The interstitial structures between the dermal surfaces and the parietes of the cloaca are but sparingly spiculous; the spicula are inequitradiate, having two short and one long ray. The two short ones are applied to the surface of either the cloaca or the inside of the dermal stratum; and their apices are slightly curved backwards, so as to bring them into about the same plane; while the

long ray is projected among the interstitial membranes at about right angles to either the dermal or the cloacal surface. The space between the cloacal and the dermal strata seldom exceeds the length of two long radii as projected from the opposite surfaces, their apices meeting and being cemented together by keratode. There are no interlacing spicula connecting these slender compound columns, the dense case of strong acerate dermal spicula affording sufficient protection and support to the delicately constructed interstitial tissues.

DESMACIDON FISTULOSA, Bowerbank. (Plate IV.)

Sponge massive, sessile (?), furnished with long, slender, external, fistulous cloacæ. Surface smooth and even. Oscula and pores inconspicuous. Dermal membrane coriaceous, abundantly spiculous; spicula thickly but equably dispersed, same size and form as those of the skeleton. Skeleton—fibrous rete stout, elongately diffuse, most abundant near the external surface; interstitial rete regular, insipiduous, areas rarely exceeding the length of one spiculum in width; skeleton-spicula of both parts acerate, rather short and stout.

Colour in the dried state fawn-yellow.

Hab. Fremantle, Australia (*George Clifton, Esq.*).

Examined in the dried state.

I received two specimens of this remarkable species from my friend Mr. George Clifton. The one figured is rather the smallest of the two; but the form of the bulbous mass of the sponge is as nearly as possible the same in both. In the figured specimen there are four large cloacæ remaining; and two others have formerly existed, but have been rubbed off close to the dermal surface and their orifice healed over. On the second specimen nine fistulous cloacæ are projected from the distal surface; they are less in diameter than those of the figured one, and none of them exceeds an inch in height. There is a remarkable coincidence in the condition of the basal portions of the two specimens: each of them has undergone abrasion to such an extent as to have totally destroyed the dermal membranes of those parts, as if they had been freely floating about on a coarse sandy surface. On neither of them is there any indication of their having had stout root-like appendages for attachments; and the abraded surfaces consist of interstitial reticulate structure without any admixture of the stout spiculo-fibrous skeleton. The dermal membrane in its present state has a very coriaceous appearance, and on some parts of the surface it is wrinkled by drying, much like very thin leather under similar circumstances. It is rather thick and is abundantly spiculous; the spicula are short and stout, of the same size and form as those of the skeleton. They are thickly and irregularly but equably dispersed.

The fibrous portion of the skeleton prevails more especially near the dermal surface; and the fistulous cloacæ are composed almost entirely of it—long lines of primary fibres parallel to each other, connected by secondary ones at nearly right angles to the primary

fibres, forming a rather regular elongate reticulation; and the same mode of fibrous arrangement prevails on the bulbous surface of the sponge, but not with quite so much regularity in its structure. Beneath the fibrous stratum at the dermal surface, the sponge is principally composed of a mass of interstitial reticulate skeleton-structure, with a few long threads of spiculo-fibrous tissue running amidst it. The reticulate interstitial skeleton-structure is uniform and regular in its construction, the rete being unispiculous, and the areas rarely exceeding the breadth of the length of one spiculum; the spicula are of the same size and form in all parts of the sponge.

There is a considerable amount of similarity in form and structure between this Australian species and our British one, *Desmacidon Jeffreysii*. Both are bulbous in form, and they are both furnished with long fistulous cloacæ; but those of *D. fistulosa* are very much more delicate in their structure than the similar organs in *D. Jeffreysii*; and in the latter species there are large root-like basal processes which serve to elevate the sponge above the mass to which it may have been attached; but no such organs appear to have existed in *D. fistulosa*. The spicula in both sponges are exactly alike in size and form, but they do not agree in their mode of arrangement. In the dermal membrane of *D. Jeffreysii* they appear always to assume more or less of a reticulate arrangement; but in the like organ of *D. fistulosa* they are irregularly dispersed. The interstitial halichondroid part of the skeleton in both species also differs. In *D. fistulosa* it is very delicate and the rete is unispiculous, while in *D. Jeffreysii* the rete is often constructed of two or three spicula, and the areas are much larger and more irregular in their construction. In these structural characters there are therefore good and sufficient specific differences to discriminate the species. It is an interesting fact, but by no means a singular case, that we should have a fossil sponge from the hard chalk of Flamborough closely resembling the recent specimen, *D. fistulosa*, from Australia. This fossil sponge is described by Mr. John Edward Lee in Charlesworth's 'Magazine of Natural History,' vol. iii. for 1839, p. 15, as *Spongia spinosa*, and is represented in page 16, figs. 11 and 12; and I have by me a specimen of the same species of fossil from the locality mentioned by Mr. Lee, which is much more like the recent *D. fistulosa* than the specimens described and figured by that author. Not only does the fossil resemble the recent sponge in its external characters, but there is little doubt that in its living state its internal structure was also similar. Mr. Lee, in page 16 of his paper, writes, "Being anxious to see more of the internal structure, I had the specimen cut through just below the plates figured in the last diagram: an irregular fibrous structure then became visible, similar to that shown in fig. 12." The artist, in the figure of the specimen thus treated (13), has faithfully represented the fibrous structure alluded to, on each side of the lower part of the figure; and the fibrous structure is so like that in the corresponding part of the recent *D. fistulosa*, that the drawing would equally well represent the arrangement of the fibrous skeleton-tissues of either species.

From this case, and from other similar experiences, it appears that, if we wish to find the living representatives of the beautiful series of the chalk sponges, we must search for them among the multitudinous singular forms of the recent animals that abound in Australian seas.

CIOCALYPTA TYLERI. (Plate IV.)

Sponge massive, sessile, composed of numerous, closely packed, attenuating, penicillate branches rising perpendicularly from a common base; branches gradually attenuating, apices rather acutely terminated, entirely closed, deeply furrowed or corrugated. Oscula simple, dispersed over all parts of the sponge. Pores inconspicuous, dispersed. Dermal membrane smooth, abundantly spiculous; spicula acerate, small and slender, dispersed, closely felted together over the whole surface of the membrane, with a few skeleton- or larger spicula intermixed. Skeleton-spicula acerate, rather variable in size.

Colour in the dried state cream-white.

Hab. Port Elizabeth (*Capt. Charles Tyler*).

Examined in the dried state.

I received two specimens of this interesting species from my friend Capt. Charles Tyler, who obtained them from Port Elizabeth. The one figured is the smallest of the two; but it is the most characteristic in its growth and general external appearance, which, in both specimens, so closely resemble those of the British species in its early stage of growth, that it would be impossible to separate the two species if it were not for the differences that exist in their organization. The structure of the skeleton of *C. Tyleri* is in principle exactly that of *C. penicillus*. There is the same central column in each of the penicillate organs, with numerous short pedicels of closely compacted spicula radiating from it at right angles to the axis, their distal ends diverging at various angles over the inner surface of the dermis; but their mode of disposition is not nearly so regularly elegant as in the British type species. Although so closely resembling each other in external form, there is no difficulty in discriminating the two species by their anatomical characters, the forms of their respective skeleton-spicula at once affording an unerring means of separation, those of *C. penicillus* being fusiformi-acuate, while those of *C. Tyleri* are acerate. The dermal membrane also of the former species has its spicula fasciculated in the form of a regular and beautiful reticulation, while the spicula in the latter species are irregularly dispersed and closely felted together on the surface of the membrane. The inhalant and exhalant systems are the same in each species.

This species is especially interesting, not only from the singularity and beauty of its anatomical structure, but from its exceedingly close resemblance to our British species, although so widely separated from it as regards locality. The British type specimen of the genus, as figured in vol. iii. pl. xiii. fig. 2, 'Monograph of British

Spongiadæ, is very much more largely developed than the subject of our present description; but several small specimens of *C. penicillus* that I subsequently obtained are as nearly as possible of the same size and external appearance as those of *C. Tyleri*.

DESCRIPTION OF THE PLATES.

PLATE I.

Geodia Flemingii, Bowerbank.

- Fig. 1 represents the type specimen based on a mass of Nullipora and sand, natural size, exhibiting a portion of the irregular groups of oscula.
 Fig. 2. A view of the reverse of fig. 1, exhibiting a section of the sponge and its hollow interior.
 Fig. 3. A fully developed attenuato-expando-ternate bifurcated connecting spiculum, magnified 80 linear.
 Fig. 4. One of the recurvo-ternate spicula, magnified 80 linear. The greater number of these spicula have their shafts very much longer than the one represented.
 Fig. 5. A fusiformi-cylindrical skeleton-spiculum, magnified 80 linear.
 Fig. 6. One of the large cylindro-stellate retentive spicula with numerous short radii, magnified 530 linear.
 Fig. 7. A simple cylindro-stellate retentive spiculum, magnified 530 linear.
 Fig. 8. One of the small cylindro-stellate retentive spicula, magnified 530 linear.

Geodia depressa, Bowerbank.

- Fig. 9 represents the type specimen in the Museum of the Royal College of Surgeons, London: natural size.
 Fig. 10. Half of one of the large fusiformi-acerate skeleton-spicula, magnified 80 linear.
 Fig. 11. One of the large attenuato-patenti-ternate connecting spicula with large and long shafts, magnified 80 linear.
 Fig. 12. A recurvo-ternate connecting spiculum with long and slender shafts, magnified 80 linear.
 Fig. 13. An attenuato-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 14. One of the small and very numerous cylindro-sphero-stellate retentive spicula from the interstitial membranes, magnified 530 linear.
 Fig. 15. An adult ovary, magnified 230 linear.

Geodia gibberosa, Bowerbank.

- Fig. 16 represents the specimen in the possession of Dr. Andrew Fleming, son of the late eminent naturalist Professor Fleming of Edinburgh: natural size.
 Fig. 17. One of the attenuato-patenti-ternate connecting spicula, magnified 80 linear.
 Fig. 18. A fusiformi-acerate skeleton-spiculum, magnified 80 linear.
 Fig. 19. One of the slender acute skeleton-spicula, magnified 80 linear.
 Fig. 20. A small fusiformi-acerate tension-spiculum from the interstitial membranes, magnified 80 linear.
 Fig. 21. An attenuato-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 22. One of the minute cylindro-stellate retentive spicula, magnified 530 linear.

PLATE II.

Geodia perarmatus, Bowerbank.

- Fig. 1 represents the type specimen, natural size.
 Fig. 2. One of the large fusiformi-acerate skeleton-spicula, magnified 80 linear.

- Fig. 3. A large bifurcated patenti-ternate connecting spiculum, magnified 80 linear.
 Fig. 4. The apex of a large-sized bifurcated patenti-ternate connecting spiculum, magnified 80 linear.
 Fig. 5. A small simple attenuato-expando-ternate connecting spiculum, magnified 80 linear.
 Fig. 6. A young expando-ternate bifurcating connecting spiculum, exhibiting the gradual development of the bifurcations of the ternate radii, magnified 10 linear.
 Fig. 7. One of the recurvo-ternate spicula, magnified 80 linear.
 Fig. 8. A porrecto-ternate spiculum, magnified 80 linear.
 Fig. 9. A large attenuato-sphero-stellate retentive spiculum, magnified 530 linear.
 Fig. 10. One of the minute cylindro-stellate retentive spicula, magnified 530 linear.
 Fig. 11. A minute slender acerate tension-spiculum from the dermal membrane, magnified 80 linear.

Tethca robusta, Bowerbank.

- Fig. 12. A section at right angles to the surface of *T. robusta*, from the type specimen in the British Museum: natural size.
 Fig. 13. One of the skeleton-spicula from the large fasciculi, magnified 80 linear.
 Fig. 14. A smaller skeleton-spiculum from the central nucleus, magnified 80 linear.
 Fig. 15. One of the very large sphero-stellate spicula of the dermal rind, magnified 530 linear.
 Fig. 16. A small cylindro-sphero-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 17. One of the minute clavated cylindro-stellate spicula from the interstitial membranes, magnified 530 linear.

Geodia inaequalis, Bowerbank.

- Fig. 18. The type specimen, natural size.
 Fig. 19. One of the inequicylindrical skeleton-spicula, magnified 80 linear.
 Fig. 20. An expando-ternate connecting spiculum with the shaft slightly curved, magnified 80 linear.
 Fig. 21. A large attenuato-multiradiate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 22. An attenuato-sphero-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 23. One of the minute cylindro-sphero-stellate spicula from the interstitial membranes, magnified 530 linear.

Geodia media, Bowerbank.

- Fig. 24. The type specimen, natural size.
 Fig. 25. One of the short stout acerate skeleton-spicula, magnified 80 linear.
 Fig. 26. An expando-ternate connecting spiculum, magnified 80 linear.
 Fig. 27. A multiradiate attenuato-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 28. A minute cylindro-stellate retentive spiculum from the interstitial membranes, magnified 530 linear.
 Fig. 29. A doliolate spiculum from the interstitial membranes, magnified 150 linear. These spicula are very few in number, and vary to some extent in their shape and size.

PLATE III.

Geodia Dysoni, Bowerbank.

- Fig. 1 represents the type specimen, natural size.
 Fig. 2. One of the fusiformi-acerate skeleton-spicula, magnified 80 linear.

- Fig. 3. An attenuato-patenti-ternate connecting spiculum of about the average size, magnified 80 linear.
 Fig. 4. The head of one of the largest and most fully developed connecting spicula, magnified 80 linear.
 Fig. 5. One of the attenuato-stellate retentive spicula from the interstitial membranes, magnified 530 linear.

Tethea similima, Bowerbank.

- Fig. 6 represents the type specimen in spirit in the Museum of the Royal College of Surgeons, London: natural size.
 Fig. 7. The small specimen in the dried state, exhibiting a view of the external surface, natural size.
 Fig. 8. A sectional view of the same specimen that is represented by figure 7, showing the central nucleus and the mode of disposition of the skeleton-fasciculi: natural size.
 Fig. 9. Two thirds of one of the large fusiformi-acerate skeleton-spicula, magnified 80 linear. This figure also represents the same form of spiculum as an external defensive one.
 Fig. 10. One of the fusiformi-porrecto-ternate external defensive spicula, magnified 80 linear.
 Fig. 11. An attenuato-recurvo-ternate defensive spiculum, with long and very slender shaft, magnified 80 linear.
 Fig. 12. One of the stout fusiformi-acerate spicula that surround the defensive fasciculi of the external surface, magnified 80 linear.
 Fig. 13. A small portion of the skeleton of one of the gemmules of the sponge, extending from its centre to its external surface, showing its unihamate and porrecto-ternate spicula *in situ*, from a specimen mounted in Canada balsam: magnified 80 linear.

Tethea Cliftoni, Bowerbank.

- Fig. 14. The type specimen, showing the remarkable mode of its location under difficulties: natural size.
 Fig. 15. One of the fusiformi-acuate skeleton-spicula, magnified 150 linear.
 Fig. 16. One of the large sphero-stellate spicula of the dermal rind of the sponge, magnified 530 linear.
 Fig. 17. A minute subsphero-stellate retentive spiculum with clavated cylindrical radii, magnified 530 linear.
 Fig. 18. A smaller specimen of the same description as that represented by fig. 17, magnified 530 linear.

PLATE IV.

Leuconia glomerosa, Bowerbank.

- Fig. 1. The type specimen, natural size.
 Fig. 2. One of the equiangular triradiate spicula of the dermal membrane, magnified 80 linear.
 Fig. 3. One of the largest-sized fusiformi-acerate dermal spicula, which has been fractured near its middle and cemented together again: magnified 80 linear.
 Fig. 4. A small-sized fusiformi-acerate dermal spiculum, magnified 80 linear.
 Figs. 5 & 6. Two of the triradiate spicula of the interstitial skeleton, magnified 80 linear.

Desmacidon fistulosa, Bowerbank.

- Fig. 7 represents the type specimen, natural size.
 Fig. 8. One of the skeleton-spicula, magnified 150 linear.

Ciocalypta Tyleri, Bowerbank.

- Fig. 9. The type specimen, natural size.