

is known of the birds of Narborough Island, though little can be expected here from the extreme barrenness of this island. Hood Island offers a better prospect; and Tower Island ought certainly to be visited. Nor ought the smaller islets, such as Barrington Island and Duncan Island, to be omitted when the collector is in search of new ground. The islands already explored are well worthy of further investigation. Of the whole archipelago, Indefatigable Island is the only one where a really extensive series of birds has been obtained, though Dr. Habel's collections from Bindloe and Abingdon islands are by no means small.

In conclusion, I would recommend any one visiting the Galapagos to call at Cocos Island, in N. lat. $5^{\circ} 33'$, long. $86^{\circ} 58' W$. At present we only know of one land bird from this well-wooded and well-watered island; and that is a peculiar Cuckoo of an American genus, *Coccyzus ferrugineus*. A collection made here cannot fail to be of high interest.

Mr. Salvin's Memoir will be printed entire in the Society's 'Transactions.'

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The following papers were read:—

1. A Monograph of the Siliceo-fibrous Sponges.

By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.—Part III.*

[Received March 12, 1875.]

(Plates XXXIX. & XL.)

FARREA GASSIOTI, Bowerbank.

Sponge cup-shaped, expansive, parietes very thin; pedicel short. Oscula, pores, and dermal membrane unknown. Skeleton siliceo-fibrous; fibres cylindrical, furnished more or less with short acutely conical spines; rete rectangulated; areas mostly square; central canals large and very distinct, not always confluent, frequently two in each fibre. Interstitial spicula rectangulated sexradiate; radii cylindrical, smooth, few in number. Sarcode, dried, dark amber-brown.

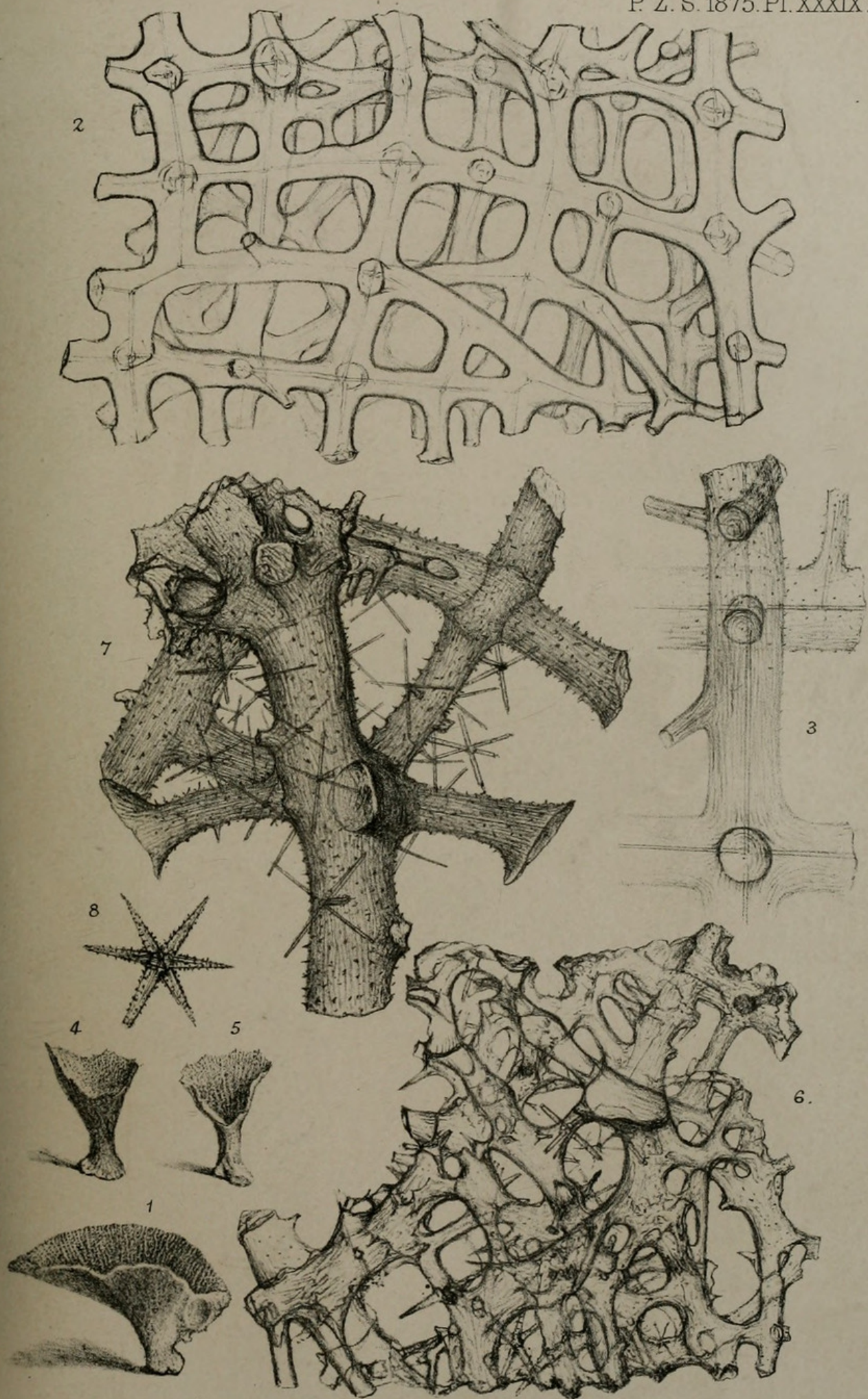
Colour, in the dried state, brown?

Hab. West Indies (*Capt. Hunter, R.N.*).

Examined in the skeleton state.

The type specimen is 9 lines in height. The pedicel does not exceed 2 lines. The cup is partially compressed; it is 1 inch in its greatest marginal diameter, and 8 lines in its smallest breadth. I could not detect the slightest indication of either dermis or oscula. The primary series of skeleton-fibres radiate from the basal portion of the cup, the secondary ones having a circumferential direction at about right angles to the primary ones; they each appear to be as nearly as possible of the same diameter, and to have the central canals and the spination of the fibres equally apportioned. There

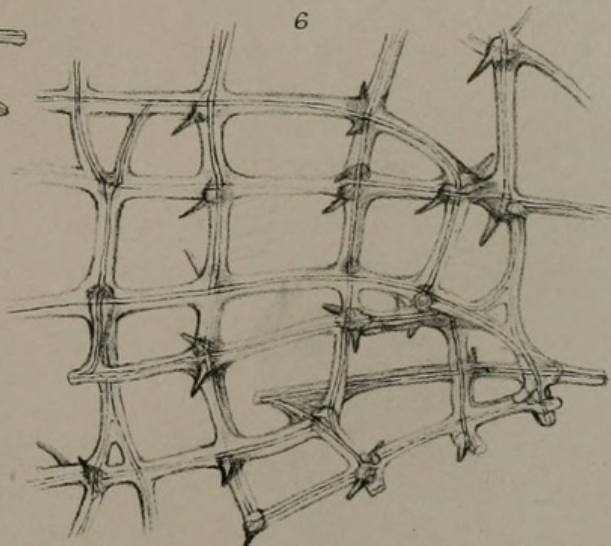
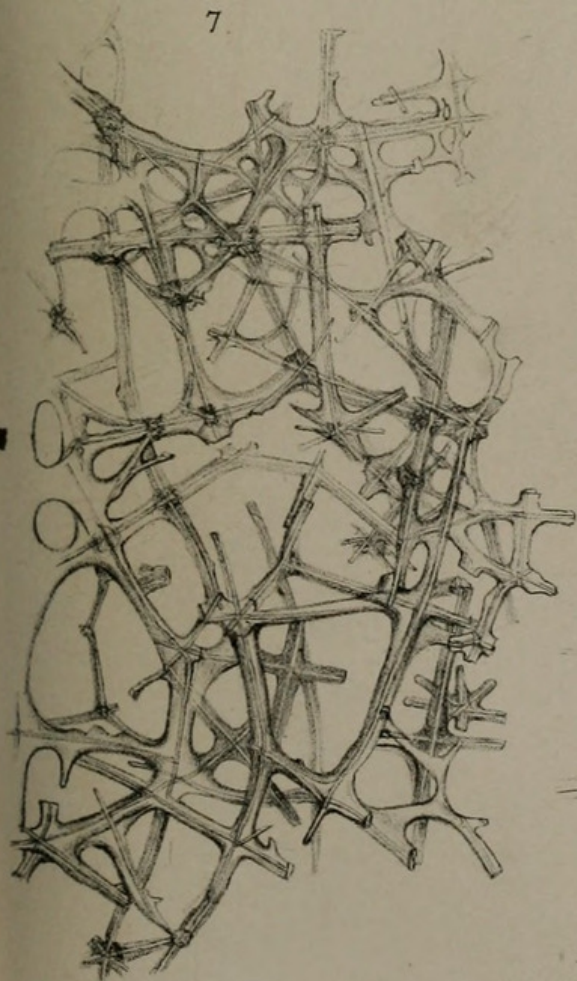
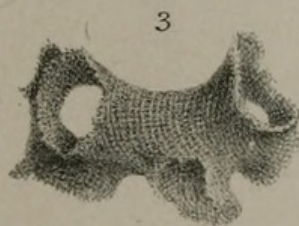
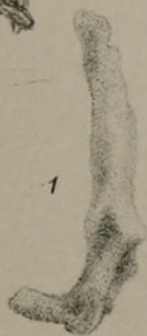
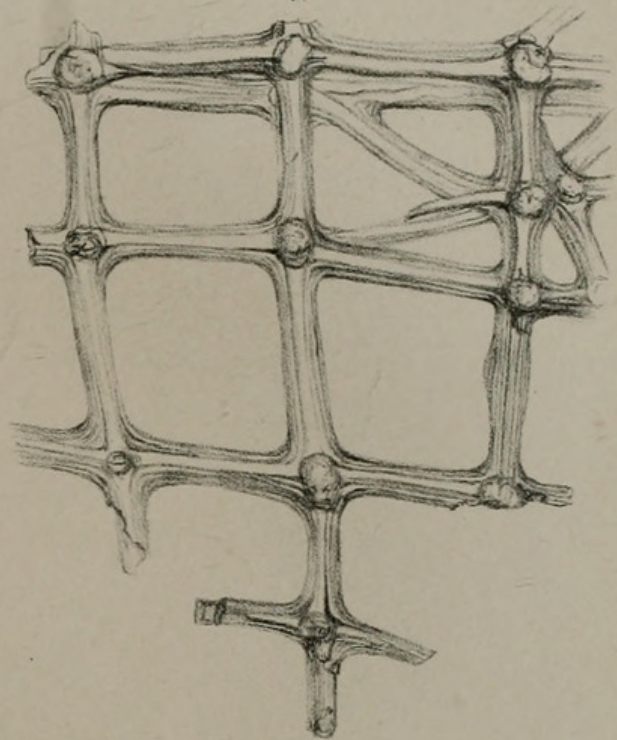
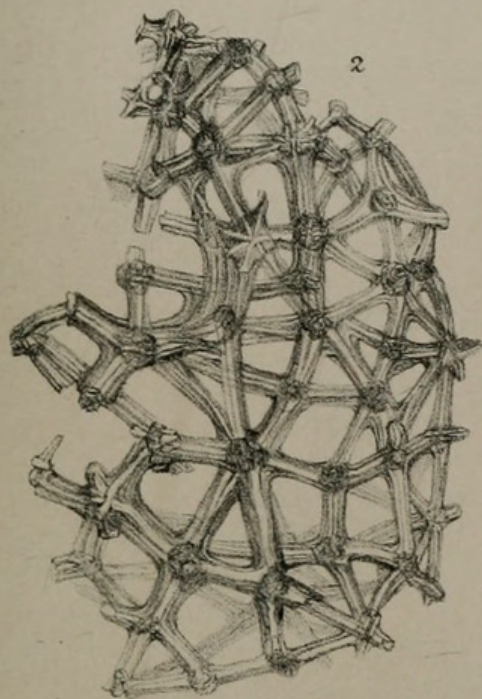
* For Part II. see Proc. Zool. Soc. 1869, p. 323.



Farrea Gassioti 1-3. *F. pocillum* 4-8.

W. Lens Aldous del. et lith.

W. West & C^o imp.



Deanea virgultosa 1-2. Farrea fistulata 3-4. F. lævis 5-6.
F. parasitica 7.

J. Dinkel del et lith.

W. West & C^o imp.

are three or more layers of the skeleton-structure. The fibres of the interior of the cup have the greatest number of spines upon them; those of the outer surface appear to be nearly spineless. The spines are acutely conical; their greatest height rarely exceeds their basal diameters. The fibres and the central canals within them both vary to a considerable extent in their diameter. One of the largest fibres measured $\frac{1}{158}$ inch and one of the smallest $\frac{1}{500}$ inch in diameter. The average of three that were measured was $\frac{1}{286}$ inch. One of the largest canals measured $\frac{1}{2308}$ inch in diameter; and a very small one in connexion with the large one was $\frac{1}{7500}$ inch, and the average $\frac{1}{4904}$ inch in diameter. There does not appear to exist any definite proportion between the fibre and its central canal, a large canal frequently occurring in a small fibre, and a very slender one in a stout fibre. In their course through the skeleton they usually coalesce at each angle of the rete; but it not unfrequently occurs that large fibres have two canals running parallel to each other, as if each had originated at opposite angles of the rete; and occasionally one or both terminate in a spherical dilatation. A few of the interstitial spicula fortunately remain entangled in the skeleton-rete. They are small, rectangulated, sexradiate forms, with smooth cylindrical radii, and are all of about the same size. Some portions of the skeleton-fibres were covered by a very thin layer of sarcode of a bark-brown amber-colour.

The sponge was apparently a skeleton when brought up from the bottom of the sea; but although so many important characters are absent, those available are sufficiently striking to render its discrimination from other nearly allied species satisfactory.

I have named the species after Dr. Gassiot, through whose kindness I have had the opportunity of examining and describing it. The specimens were dredged on the 22nd July, 1872, lat. $14^{\circ} 8' N.$, long. $77^{\circ} 38' W.$, 800 to 1000 fathoms; and Dr. Gassiot in his letter to me states, "Reliance can be placed on statement of locality, depth &c., as the specimens were put into bottles and marked by Capt. Hunter, who is a most energetic officer and careful observer."

FARREA POCILLUM, Bowerbank.

Sponge cup-shaped, contracted; pedicel short; parietes thin. Oscula, pores, and dermal membrane unknown. Skeleton siliceo-fibrous; fibres cylindrical, furnished more or less with short acutely conical spines; rete more or less rectangulated, rather irregular; central canal very slender, often terminating abruptly in a cæcoid manner. Internal defensive organs rectangulated sexradiate, rather large, based on the sides of the fibres; radii attenuated, abundantly spinous, and also furnished rather abundantly with rectangulated sexradiate spicula, small and slender; radii attenuating, incipiently spinous. Sarcode dark and opaque.

Colour, in the dried state, very faint rose-pink.

Hab. West-Indian seas (*Capt. Hunter, R.N.*).

Examined in the dried state.

I am indebted to my late friend Mr. Henry Deane for two specimens of this interesting species; neither of them exceeds 8 lines in height and 5 in greatest diameter. From their form and other external characters they might readily have been mistaken for specimens of *Farrea gassioti*; but a microscopical examination readily separates them from that species. As was the case with *F. gassioti*, the characters derivable from the dermis, oscula, and pores were not available; so that the discrimination of the species was in a great measure dependent on the structural peculiarities of the skeleton; and the resemblance of the two species in size, form, and mode of arrangement of the spicula is very close; but they differ very strikingly in the characters afforded by the central canals of the skeleton-structure. In those of *P. gassioti*, when examined beneath the microscope in Canada balsam with a power of 108 linear, they are strikingly large and distinct, while in *F. pocillum*, although the fibres of the two species are as nearly as possible of the same size, they are remarkably slender, and in some cases nearly obsolete; and this was the case in portions taken from both of the specimens in my possession. These distinctive characters are quite sufficient to separate the two species; but there are fortunately others that aid materially in their discrimination. Thus in *F. pocillum* there are numerous internal defensive organs of a rectangular sexradiate form, based on the sides of the skeleton, and projected into the areas of the rete. These organs are comparatively large and strong; and are abundantly furnished with large conical spines. Sometimes the primary central portion of these organs is destitute of the four lateral radii; and occasionally the lateral radii are doubled in number, a second set of them being projected beyond the first ones. In addition to these internal defensive organs there are numerous unattached rectangular sexradiate spicula, occasionally grouped together in considerable numbers on the areas of the skeleton-rete. These spicula are very distinct from those organs of the same form which are based upon the skeleton-fibre; they are very much smaller, and their radii are slender and usually spineless. All are alike acutely terminated, and have evidently never been based upon the skeleton-fibres, as the organs first described always are. The presence of these organs in the one species and their apparent complete absence in the other strongly confirms the propriety of their separation, notwithstanding the close resemblance they bear to each other in external form.

The specimens were dredged July 22, 1872, in lat. $14^{\circ} 8' N.$, long. $77^{\circ} 38' W.$, 800 to 1000 fathoms, by Capt. Hunter, R.N.

DEANEA, Bowerbank.

Skeleton siliceo-fibrous. Fibres canaliculated; canals continuous. Rete symmetrical; areas rotulate, confluent.

This genus is intermediate between *Iphiteon* of Valenciennes and *Farrea*. The skeleton has the confluent rotulate structure of the former, but differs from it in having the fibres distinctly canaliculated. It agrees with the latter genus in the canaliculation of the

skeleton-fibre, but it differs essentially from it in the form of its reticular arrangement.

I have named the genus after my late friend Mr. Henry Deane, to whom I am indebted for my knowledge of the sponge.

DEANEA VIRGULTOSA, Bowerbank.

Sponge sessile (?), virgultose, solid, irregularly cylindrical. Surface even. Oscula, pores, and dermis unknown. Skeleton symmetrical; fibre cylindrical; central canals large and very distinct.

Colour, in the dried state, amber-brown.

Hab. West-Indian seas?

Examined in the skeleton condition.

All that remains of this interesting sponge is unfortunately its well-washed skeleton, so that little more can be said of it than what appertains to its generic characters; but these are fortunately very distinctive. The specimen is $1\frac{1}{4}$ inch long, and of an average diameter of about 2 lines. Which has been its basal end cannot be determined, as both are broken terminations. The substance of the sponge is very compact, there being no central cavity. There are no indications on its surface of oscules, and not the slightest remains of either dermal membrane or sarcode.

When a section of the sponge is made at right angles to its long axis, mounted in Canada balsam and viewed with a power of 100 linear, its structure is beautifully displayed. Its singular confluent rotulate rete is as regular as that of *Iphiteon*, described and figured in the 'Proceedings' of this Society for May 1869, p. 323, pl. xxi. figs. 1 & 2. No other form of structure occurs in the skeleton; and whether we view a transverse section, a longitudinal one, or the surface of the sponge, the same rotulate structure is presented to the eye.

The canaliculated structure is very strongly produced. The canals radiate from the axis of each rotulum, and usually appear to be continuous through the whole of the skeleton-structure; occasionally, but not frequently, a single ray will be entirely destitute of the central canal; but this is the exception, not the rule. The skeleton-fibres vary in diameter from $\frac{1}{666}$ inch to $\frac{1}{333}$; but the general average is about $\frac{1}{350}$ inch. The central canals are large in proportion to the size of the fibres; their range in diameter is from $\frac{1}{1000}$ inch to $\frac{1}{333}$ inch, but their average diameter is about $\frac{1}{1500}$ inch. They are not always in proportion to the size of the fibre, the largest canals being frequently in the smallest fibres.

Since the above description was written I have received a small fragment of another specimen of the sponge. It is a piece of a similar small cylindrical mass, about 3 lines in length and rather less in its diameter. In this specimen there are remains of sarcode thinly coating some of the skeleton-fibres; and in many of them the canals are lined with a sarcodous membrane of a dark amber-brown colour, a strong evidence that the sponge was in a living state when taken. No spicula of any description could be detected in any part of the

specimen. The confluent rotulate form of skeleton-structure is not confined to the siliceo-fibrous sponges; it also occurs in the dermis of a rare British sponge, *Desmacidon rotalis*. In this case it does not occur in the internal skeleton of the sponge, but in the reticulated dermis only. I have figured this beautiful dermal tissue in vol. iii. pl. xc. fig. 9, 'Monograph of the British Spongiadæ.'

The specimen of *Deanea virgultosa* figured was presented to me by my late friend Mr. H. Deane, along with those of *Farrea gassioti* and *pocillum*; and I presume it is from the same locality as those species.

FARREA FISTULATA, Bowerbank.

Sponge fistulous, orifices both terminal and lateral, very large, parietes thin. Surfaces, exterior and interior, even, but rough to the touch, each abundantly armed with a single series of harrow-like teeth, based on the angles of the skeleton-tissues, and projected outwardly from their respective surfaces. Oscula and pores unknown. Dermal membrane thin, abundantly spiculous; tension-spicula acerate, variable in size, rather numerous; retentive spicula simple and contort, bihamate, numerous, dispersed. Skeleton-fibre cylindrical, smooth and even; canals large and very distinct; rete symmetrically quadrangular, areas usually square. Internal defensive spicula attenuato-acuate, basally spined, based on the skeleton-fibres, projected at about right angles into the areas of the rete. Sarcode dark amber-colour, thinly coating the skeleton-structures.

Colour, dried state, dark amber-brown.

Hab. West-Indian seas?

Examined in the dried state.

This remarkable sponge consists of a single thin stratum of skeleton-tissue in the form of a compound pipe about four lines in diameter. It has all the appearance of being only a portion of a more perfect specimen. It is but an inch in length, but in that short space it has six open terminations of what has apparently been as many ramifications of its fistulous structure; and none of these orifices have a natural or an even margin. The general surface of the specimen is even, and no indications are apparent of either oscula or pores. The dermal membrane is in an excellent state of preservation on the surface of the sponge; and from its present condition it was evidently in a living state when taken. It is a thin translucent structure, abundantly spiculous. The tension-spicula are slender and acerate, not very numerous; they are variable in size and irregularly disposed on the surface of the membrane. The bihamate retentive spicula are rather numerously dispersed on the membrane; they are slender and very equable in size. The skeleton is a remarkably beautiful structure. The fibre is perfectly smooth, very equable in its diameter, and it is arranged as nearly as possible in a regular quadrangular network. The central canals are moderately large and very distinct, and are as equable in their diameter and mode of distribution as the rete of the skeleton is. The thin stratum of

skeleton-structure appears to consist of two and sometimes three layers of this beautiful network. The outer and the inner layers are powerfully armed by a single series of stout harrow-like teeth projected from the angles of the network at right angles to the surface; and each of these teeth is furnished with numerous imbricated scales, like the similar organs in *Farrea occa*, described in the 'Proceedings of the Zoological Society of London,' for May 13, 1869, p. 339. These organs in the species under consideration differ from those in *F. occa* in being longer and more slender in their proportions. If the specimen be examined by direct light with a power of 50 linear, these structures are exhibited in a very beautiful manner, projecting outwardly from the angles of the dermal layer of the quadrangular network at right angles to its surface, and from the internal skeleton-layer in like manner into the interior cavity of the sponge, while the intermediate layer or layers of the skeleton are entirely destitute of these organs; but in place of them they are abundantly furnished with attenuato-acuate entirely spined internal defensive spicula, which are based on the sides of the skeleton-fibres, and are projected at various angles into the areas of the rete. These internal defensive spicula are very numerous where the fibre is well coated with the dark amber-coloured sarcode; but when the sarcode is absent not a single spiculum is to be seen on the fibres. The skeleton-fibres of the interior surface do not appear to be furnished with internal defensive spicula; but those of the outer and intermediate layers are abundantly furnished with them. These spicula vary to a considerable extent in size, the longer being frequently twice the length of the shorter ones. The basal half of both is abundantly spinous, while the distal half is usually entirely spineless. The spines are short and acutely conical. I could not detect any interstitial membranes; but a few large acerate spicula were observed in the interstitial spaces; but whether they belonged to the sponge or were adventitious I could not determine, as several other forms of spicula were observed on both the outer and the inner surfaces of the sponge. On examining the interior of the sponge with a lens of two inches focus through one of the large terminal orifices I observed a small patch of flocculent-looking sponge-tissue; and on removing a portion of this and mounting it in Canada balsam, it proved to be a very young *Hymedesmia johnsonia* in an excellent state of preservation, with numerous specimens of that remarkable form of spiculum, the trenchant contort bihamate, dispersed among the acerate skeleton-spicula of that sponge, and closely resembling the portion of the type specimen represented in vol. i. plate xviii. fig. 293, 'Monograph of British Spongiadæ.' The occurrence of this well characterized sponge parasitical within the *Farrea* is a remarkable circumstance, and it seems to indicate that the open tubular structure of that sponge is probably its normal condition. Beside *Hymedesmia johnsonia*, naturally parasitical on its inner surface, there were two other small groups of sponge-spicula that were evidently adventitious. One consisted of numerous short entirely spined cylindrical spicula distributed irregularly over the fibres of three or four areas of the skele-



Bowerbank, J. O. 1875. "A Monograph of the Siliceo-fibrous Sponges. Part III." *Proceedings of the Zoological Society of London* 1875, 272–281.

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