

Fig. 3 a, 6 a. Thumb of ditto.

4, 5. View of side and concave surface of suctorial disk of *Thyroptera tricolor*, Spix.

6. Foot of *T. tricolor*, with suctorial disk, also calcaneum with projections from its posterior margin.

7. Foot and part of the inferior surface of the leg of *Mystacina tuberculata*, Forst.

7 a. Thumb of *M. tuberculata*, showing denticle at base of claw.

8. Foot of *Hemidactylus coctæi* (Geckotidæ).

9. Hind foot of *Hyrax dorsalis*.

2. A Monograph of the Siliceo-fibrous Sponges. By J. S. BOWERBANK, LL.D., F.R.S., F.Z.S., &c.—Part VI.

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(Plates LVI. & LVII.)

DEANEA FAVOIDES, Bowerbank. (Plate LVI. figs. 1, 2.)

Sponge laminar or cup-shaped, thin, resembling a thin section of a honeycomb. Surface even. Dermis thin, translucent, aspiculous. Oscula and pores unknown. Skeleton symmetrical, rotulate; rotulæ confluent; fibres cylindrical; central canals large and very distinct. Sarcodæ dense, opaque, amber-coloured.

Colour, in the dried state, dark amber.

Hab. West Indies? (*Captain Hunter*?).

Examined in the dried state.

This is a remarkably constructed sponge. It consists of a very open reticulate structure, closely resembling a thin slice of the cells of the comb of the honey-bee taken at right angles to the long axis of the cells. The parietes of these large open areas are constructed of a confluent rotulate rete of the same form as that of the skeleton-structure of *Deanea virgultosa*, described in the Society's 'Proceedings,' 1875, p. 275; and, as in that species, the fibres are all canaliculated and confluent, but the canals are not quite so strongly produced. The external surface and open spaces of the sponge do not appear to be covered with a continuous dermal membrane; but it covers the interstices of the rotular areas of the skeleton rete, and is in those parts thickly coated with a dense and nearly opaque layer of sarcodæ.

The dermal membrane appears to pass inward and to line the interior of the large open spaces of the skeleton-structure; and in no instance could I find even a fragment of the membranous and sarcodous structures projected into the large open areas of the sponge, although upon their parietes it is in a perfect state of preservation. We may therefore reasonably infer that in a living state these great orifices are in an open condition.

The dermal surface is quite smooth; and a comparatively thick dense stratum of dark sarcodæ intervenes between the dermal membrane and the siliceous skeleton.

I have no certain record of the habitat of this species; nor am I cer-

tain to whom I am indebted for the specimens. It is probable that I received them among other specimens of siliceo-fibrous sponges from my late friend, Mr. Henry Deane; and if so, its locality may be the same as that of *D. virgultosa*; and I have a strong suspicion that the remains of the sponge in course of description should be referred to that species. The skeleton-structure is identical with that from the solid stem of *D. virgultosa*, which may very probably have been the stem of a perfect specimen of *D. favoides*, presuming that sponge to have been cup-shaped and elevated on a pedestal. I have three fragments of *D. favoides*, apparently from the same individual, neither of which exceeds three lines in diameter; and they exhibit very faint traces of curvature; so that if they have been portions of a cup-shaped sponge, it must have been of considerable size—and are probably portions of its distal margin, as the pieces all agree in their general character, and no indications of approximation to the base of the cup is apparent in either of them.

In the specimen of *D. virgultosa* the fibres of the rete of the stalk-like specimen are rather stouter than those in *D. favoides*; but in other respects there is a remarkably close similarity. If the former should hereafter prove to have been the stalk or pedestal of a cup of the latter species, this slight difference might naturally be expected to occur.

Another strong indication of the close alliance of the two species exists in the peculiarities of their sarcoderm, which in both is extremely dark and opaque. In *D. favoides* it is very abundant; but a very small portion remains attached to the small fragment of *D. virgultosa* in my possession.

Under all the circumstances of the case I have thought it advisable to designate them as separate species, until further information enables us to decide the question.

FARREA INERMIS, Bowerbank. (Plate LVI. figs. 3, 4.)

Sponge cup-shaped? Dermal surfaces furnished with a quadrilateral, smooth, or rarely incipiently spinous siliceo-fibrous network, rarely armed at its angles externally with short, stout, imbricated, conical, spicular defences. Areas square or slightly oblong, regular; sides of the areas very rarely armed with long and slender acutely conical spines. Fibres of the dermal rete cylindrical, nearly equable in diameter, canaliculated irregularly. Dermal membrane thin and pellucid, aspiculous. Internal skeleton—rete indistinct and very irregular; fibres slender, occasionally slightly furnished with minute conical spines; gemmules spherical, smooth, membranous, aspiculous, dense and opaque.

Colour, in the dried state, dark amber.

Hab. West Indies? (*Captain Hunter*).

Examined in the dried state.

I received the only specimen of this sponge that I have seen, from my late friend Mr. Henry Deane, among several other species of siliceo-fibrous sponges, without any special account of its locality;

but as it was accompanied by several others obtained by Captain Hunter from the West-Indian Seas, I think it is highly probable that it is from the same locality. It is a fragment, eight lines in length by six in width, of a thin plate of sponge. It is slightly curved at right angles to the primary fibres of the skeleton, which radiate slightly from one end of the sponge; and from these indications it is probable that it has formed a portion of a cup-shaped sponge, and probably a rather widely expanded one. A few patches of the dermal membranes remain adhering to the skeleton-fibres; they are thin and delicate in structure, and many of them are slightly coated with dark amber-coloured sarcode, and not the slightest remains of retentive or other spicula could be detected upon any of them.

The primary fibres of the skeleton run in nearly parallel lines in the direction of the greatest length; and the secondary ones are disposed at right angles to the primary lines, causing the areas of the skeleton-rete for the greater part to be uniformly square, comparatively a few only being slightly oblong. The secondary lines of the exterior and interior surfaces of the sponge are very slightly less in diameter than the primary ones; and there are straggling portions of an intermediate layer of fibres, which are few in number and very much more slender than any portions of the external layers. Both the primary and secondary lines of the two outer surfaces of the skeleton are very smooth; on some portions of their fibres no indication of spines can be detected, while on others the faintest possible indications of them are perceptible; but on some of the straggling intervening portions they are much more decidedly produced. On the external or inhalant surface of the sponge there are a few well-produced short stout imbricated conical spicular defences, based on some of the angles of the rete; but they are of comparatively rare occurrence, and I could not detect them on the inner or exhalant surface. There are also a few long slender conical defensive spines projected from the skeleton-fibres into the interstitial spaces of the sponge; but, on the whole, the armature of the skeleton-tissues is very meagre, and it requires a linear power of not less than about 100 to render these characters distinctly to the eye.

The canaliculation of the skeleton-fibres is very unequal and irregular; and they appear to be often projected in opposite directions; and their cæcoid terminations frequently pass each other without uniting.

Minute fragments of the interstitial membranes are seen adhering to some of the skeleton-fibres; they are thin and delicate in structure; and some of them are slightly coated with dark amber-coloured sarcode; and not the slightest remains of retentive or other spicula could be detected upon any one of them.

The gemmules appear to have been very abundant in this sponge, as there are several groups of them attached to the skeleton-fibres, each containing a considerable number closely packed together. They are membranous and smooth, and apparently aspiculous, but so opaque that their contents cannot be seen. They vary slightly in size; their average diameter measured $\frac{1}{200}$ inch.

I have compared the structures of this sponge with other nearly allied species without being able to assign it to any one of them. From the paucity of its armature I have designated it, specifically, *inermis*.

FARREA PERARMATA, Bowerbank. (Plate LVII. figs. 1, 2.)

Sponge cup-shaped? Surface even. Oscula and pores unknown. Dermal system reticulated; primary and secondary fibres cylindrical, disposed at right angles to each other. Areas of the rete mostly quadrilateral, occasionally oblong; fibres profusely furnished with minute conical spinules; canals of the fibres obsolete; areas of the rete frequently furnished at their angles, both at the external and internal surfaces of the inhalant surface, with large imbricated conical defensive organs, frequently terminated with rectangulated sexradiate organs of defence; also with numerous separate slender rectangulated sexradiate defensive organs and single long and slender spinulated spines, based on the skeleton-fibres, and occasionally with rather long and slender attenuated spines based on the fibres between their angles in cruciform arrangement. Nearly all the defensive organs more or less spinulous.

Colour unknown.

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

Examined in the dried state.

The only specimen I have seen of this sponge is a fragment of what has apparently been a portion of a very delicate siliceo-fibrous cup. It is seven lines in length and five lines broad. I am indebted to my friend, Mr. J. Deane, for my possession of it. It was received, with other siliceo-fibrous specimens of Sponges, from Captain Hunter by my late friend, Mr. Henry Deane, of Clapham. The fragment is slightly curved in one direction, inducing the belief that it has formed a portion of the sides of a rather expansive cup-shaped sponge.

There are not the slightest remains of either membranous structures or of sarcode on any part of the well-washed specimen. The skeleton of the sponge only remains; but this is fortunately remarkably characteristic.

The primary and secondary lines of the skeleton are nearly or quite equal in size, and they are generally disposed at right angles to each other, so that the areas are usually square or more or less oblong. All parts of the skeleton-rete are profusely and rather regularly furnished with minute conical spinules; and not the slightest indication of the presence of central canals could be detected in any part of the skeleton-structures.

The angles of the skeleton-rete, both externally and internally, are frequently armed with stout imbricated conical defensive spines, which are occasionally terminated by slender more or less perfect rectangulated sexradiate defensive organs, which are rarely quite smooth, but more frequently amply supplied with minute conical spinules. The rectangulated sexradiate defensive organs are also often projected from the skeleton-fibres without the intervention of the large imbricated

spines, and they are then generally based on the skeleton-fibres at some point between two of the angles of the skeleton-rete. In other cases four long slender spines are projected in opposite directions from the skeleton-fibres, so disposed as to form a symmetrical cross. In fact, there appears to be no end of variations in the form and mode of disposition of these defensive organs; and they are at the same time exceedingly numerous and very irregularly distributed. At some parts they are disposed singly at intervals, while in other parts a considerable number are congregated within a small space.

Although the discriminative characters in the specimen of this sponge are in this instance so few in number, they are fortunately so striking, and so different from those of other nearly allied species, that there will be little difficulty hereafter in recognizing the species in a more perfect condition by the peculiar specific characters afforded by the skeleton and its elaborate system of armature.

FARREA IRREGULARIS, Bowerbank. (Plate LVII. figs. 3, 4.)

Sponge laminar, cup-shaped? Surface even. Oscula and pores unknown. Dermal membrane thin, aspiculous. Skeleton siliceo-fibrous; fibres cylindrical, irregular in size; rete occasionally rectangulated, but more frequently irregular; central canals very slender, often obsolete. Interstitial defences rectangulated sexradiate, few in number, very small. Sarcoderm dark, opaque, aspiculous.

Colour, in the dried state, dark amber.

Hab. Algiers (*Mr. Henry Deane*).

Examined in the dried state.

The only specimen that I have seen of this species is a thin plate of it, eight lines in length by five in breadth, which, from its slight curvature in one direction, has apparently formed part of a cup-shaped sponge. I am indebted to my friend Mr. Charles Tyler for it; and he informed me that it was presented to him by our late friend Mr. Henry Deane, and that its habitat was Algiers.

The structures of the dermal surface are even, but much complicated; and the intervening skeleton-tissues to a great extent have the same character.

A few very minute portions of the dermal and interstitial membranes remained, upon each of which there is a thin film of dark amber-coloured sarcoderm; but I could not, with a power of 100 linear, discover the slightest remains of retentive or defensive spicula upon any of them. Small irregular dense masses of opaque sarcoderm are adherent to some portions of the interstitial skeleton; but they also appeared to be quite destitute of retentive spicula.

The configurations of the skeleton of both the inhalant and exhalant surfaces are very irregular in the mode of the disposition of their skeleton-structures; and the fibres also of which they are composed are very unequal in size. For small spaces the rete sometimes assumes a quadrangular form; but the more general mode is very irregular.

The skeleton consists of several layers of reticulate structure; but

the intermediate portions between the inhalant and exhalant surfaces are so completely intermingled that it cannot be determined with certainty how many of them there are. The fibres also of which they are composed are very variable; some of them, and especially the largest ones, are nearly quite destitute of minute spinules, while others of small diameter abound in them in an incipient state of development. The central canals of the fibres are also very irregularly developed: in some parts they are obsolete; in others they are visible, but are of extreme tenuity; they rarely appear continuous for any distance; and frequently they terminate abruptly. The same irregularity is apparent with the interstitial defensive organs. A few single slender small attenuated spines are observable on the fibres of the skeleton, disposed at considerable distances from each other; they are very variable in size and mode of disposition. A few rectangular sexradiate defensive organs are also present at considerable intervals. They are mostly very minute, requiring a power of about 200 linear to render them distinctly to the eye; and if of larger dimensions, they are often abnormal and distorted in form.

The prevailing irregularities in the structure of this species, in addition to the more positive specific characters, will readily separate it from other nearly allied species with which we are acquainted.

EXPLANATION OF THE PLATES.

PLATE LVI.

- Fig. 1 represents a portion of one of the pieces of *Deanea favoides*, exhibiting the dark sarcodous development of the skeleton on one part, and the denuded rotulate skeleton on the other portion, $\times 36$ linear.
2. A small portion of the confluent rotulate skeleton of the specimen represented by fig. 1, showing the structure of the rotulæ and the central canals of the fibre, $\times 80$ linear.
 3. *Farrea inermis*: a portion of the skeleton, exhibiting its general structure and the paucity of its armature, and a small piece of its membranous structure, with numerous gemmules embedded upon it at *a*, $\times 36$ linear.
 4. The group of gemmules represented at *a*, fig. 3, $\times 80$ linear.

PLATE LVII.

- Fig. 1 represents a portion of the skeleton of *Farrea perarmata*, with the manner of the disposition of its abundant armature, $\times 61$ linear.
2. A small portion of the specimen represented by fig. 1, exhibiting the structure of the defensive organs, $\times 123$ linear.
 - 3 represents a portion of the skeleton of *Farrea irregularis*, exhibiting the intricate and irregular structure of its rete, $\times 31$ linear.
 - 4, *a*, *b*, *c*. Examples of the varieties in size and of the distortions of form of the interstitial sexradiate defensive organs, $\times 123$ linear.



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