IX NOTES ON FRESHWATER SPONGES

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No. XVI.—THE GENUS *Pectispongilla* AND ITS ALLIES.

The genus *Pectispongilla* was described in 1909 (*Rec. Ind. Mus.* III, p. 103) for the reception of a single species (*P. aurea*) from Travancore in the south-west of the Indian Peninsular Area; the subsequent account in the "Fauna" (*Freshwater Sponges*, etc., p. 106: 1911) added nothing to the generic diagnosis, but included the description of another form (*subspinosa*) from Cochin in the same part of India. This form was then regarded as a variety of *P. aurea*. The receipt of fresh material from Cochin has resulted in a re-examination of the original specimens and in the detection of an error in the generic diagnosis, *viz.* the statement that free microscleres were absent. It has also been found necessary to recognize at least three distinct species.

The genus may now be redefined as follows :—

> Small Spongillinae of massive or encrusting habit, of soft and friable consistency, with delicate skeletons in which the vertical fibres, though well-defined and not devoid of horny substance, are always very slender. Dermal membrane aspiculous. Skeleton-spicules rough or smooth amphioxi; free microscleres present in the flesh of the sponge, often of more than one type; gemmule-spicules with the extremities flattened and expanded in the main axis, the terminal expansions bearing, on one face only, large spines arranged longitudinally in parallel comb-like rows.

Type-species.—*Pectispongilla aurea*, Annandale.

Geographical Distribution.—The plains of Travancore and Cochin in the southern part of the Malabar Zone of Peninsular India.

Affinities.—In the original description of the genus I suggested that the peculiar gemmule-spicule had been derived from that of *Ephydatia* by a rotation of the terminal rotules. Dr. W Weltner wrote to me shortly afterwards expressing the opinion that this type of spicule had more probably been produced from one like that of *Spongilla* by a specialization of the extremities. A consideration of the form of the gemmule-spicules in the species of *Spongilla* most nearly related in general structure to *Pectispongilla* has induced me to accept Dr. Weltner's views. These species of *Spongilla* constitute a little group in the sub-

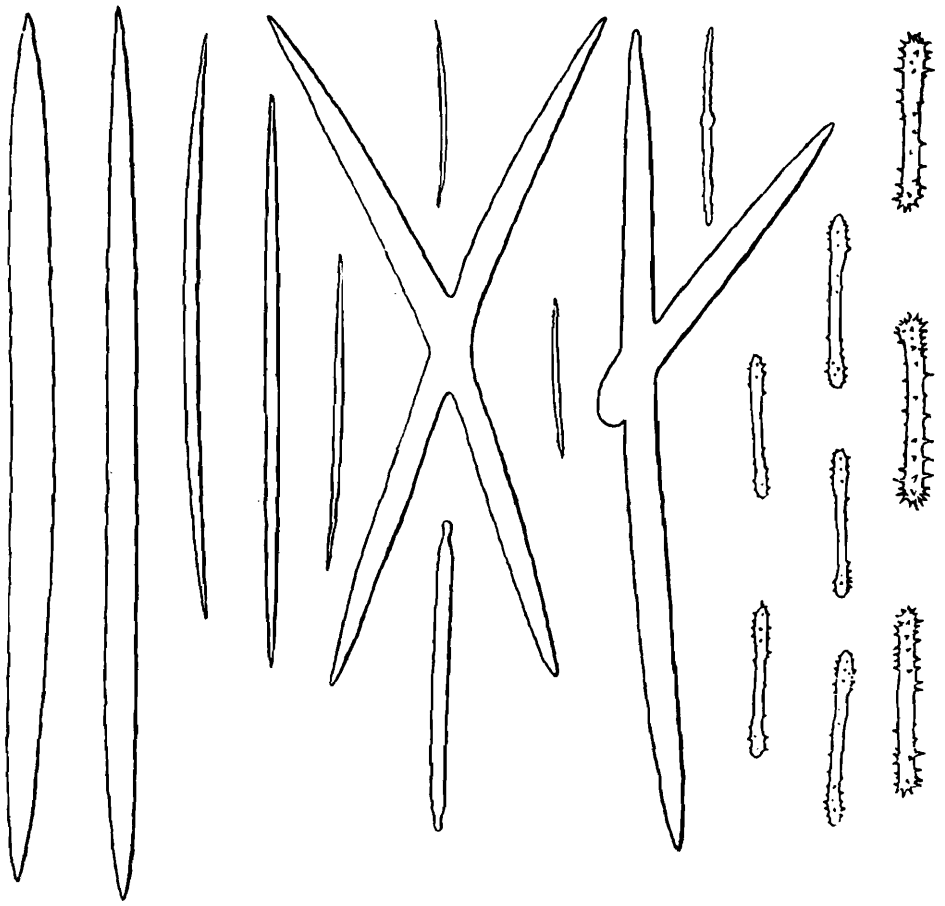

FIG. 1.—Spicules of *Spongilla hemephydatia*, Annandale.

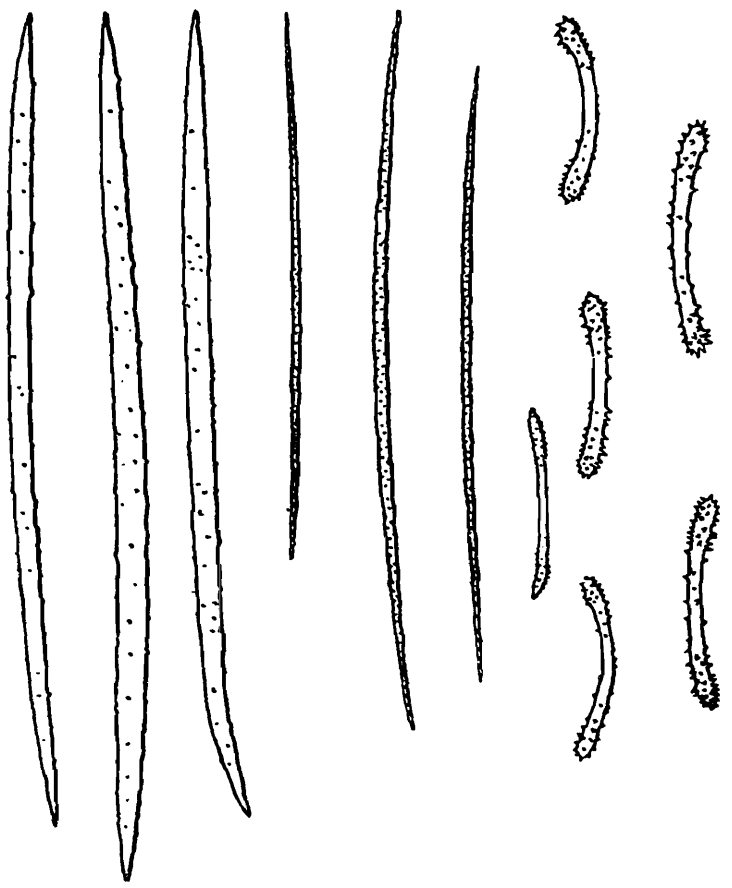

FIG. 2.—Spicules of *Spongilla sansibarica*, Weltner.

genus *Euspongilla* typified by *S. crateriformis* (Potts), and distinguished from other members of the subgenus by the erect or semi-erect posture of all or most of their gemmule-spicules and by the fact that the terminations of these spicules are clearly specialized. The specialization may, however, take one or other of two directions, for the ends of the spicule may (as in *S. crateriformis* and the closely allied *S. biseriata*, Weltner[1]) bear an imperfect horizontal rotule of large recurved spines, or they may (as in my own *S. hemephydatia*, in *S. sansibarica*, Weltner[1] and apparently in Haswell's imperfectly known *S. botryoides*) be inflated, so that the spicule is technically tornote. The group is, therefore, of particular interest as representing the ancestral form, at any rate so far as the gemmule-spicule is concerned, of both *Ephydatia* and *Pectispongilla*.

I give figures here, in both cases from the type-specimens, of *S. hemephydatia* (fig. 1) and *S. sansibarica* (fig. 2). The tetraxon spicules that occur not uncommonly among the macrosceres of the type-specimen of the former are of course abnormal, but they have some interest as possible examples of reversion of the type by no means uncommon in the Spongillidae.

The general structure of the skeleton in *Pectispongilla* is identical in the different species and does not differ in any important feature from that found as a rule in *Euspongilla*. In particular it agrees closely with that which can be readily demonstrated by the use of pyrogallic acid in *S. hemephydatia*, *S. crateriformis* and *S. sansibarica*. Weltner (*op. cit.*, p. 127), indeed, states that the skeleton of the last species corresponds precisely with that of the Chalininae, in that the fibres are enclosed in a sheath of horny substance. That this substance is present in amount much greater than can be seen in unstained preparations or might be argued from the thinness of the fibres, is certainly a fact; but its arrangement seems to me to be quite different from that I recently demonstrated in *Lubomirskia*[2], for although it permeates the fibre, cementing together the component spicules and occupying the spaces between them, I can detect no external fibre-sheath. Where, as is often the case, it forms veil-like films at the nodes of the skeleton, it has the appearance of a perfectly homogeneous film.

The geographical distribution of *Pectispongilla* is peculiar. It is apparently the only genus of the Spongillinae that has so limited a range, for even *Asteromeyenia*,[3] which is confined, so far as we know, to the southern part of the United States of America, considerably surpasses it in this respect.

The two species of *Spongilla* most closely allied to *Pectispongilla* (*S. hemephydatia* and *S. sansibarica*) occur in the main area

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[1] *Mitt. Naturh. Museum Hamburg* XV, pp. 121, 127, pl.—, figs. 1-5, 13-17 (1897).

[2] *Rec. Ind. Mus.*, X, p. 144, pl. ix, fig. 1*a* (1914).

[3] Annandale, *Proc. U.S. Nat. Mus.*, XL, p. 593 (1911).

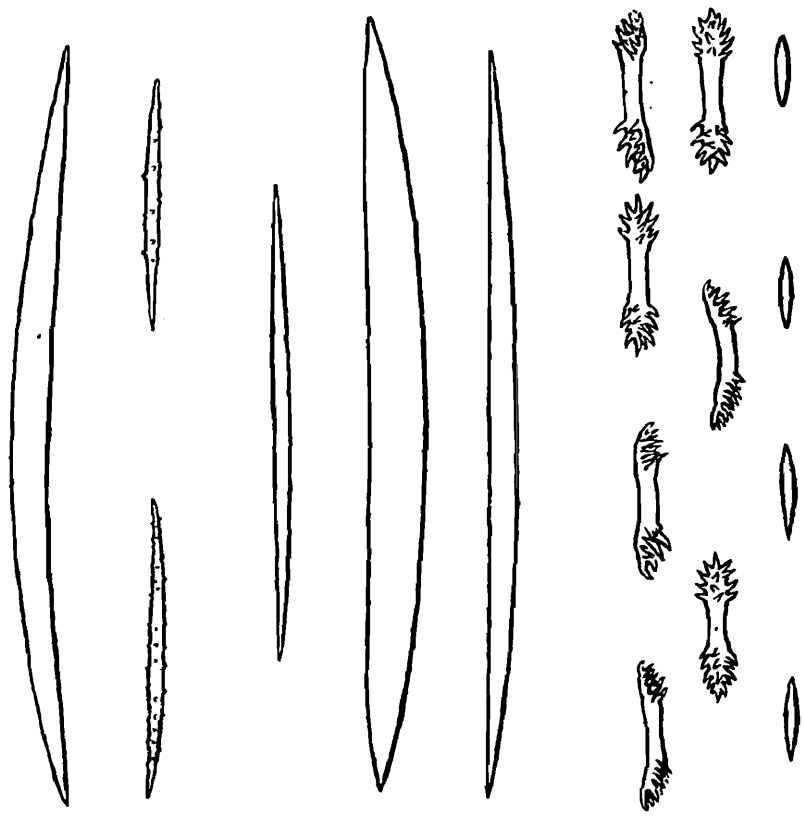

Fig. 3.—Spicules of *Pectispongilla aurea*, Annandale.

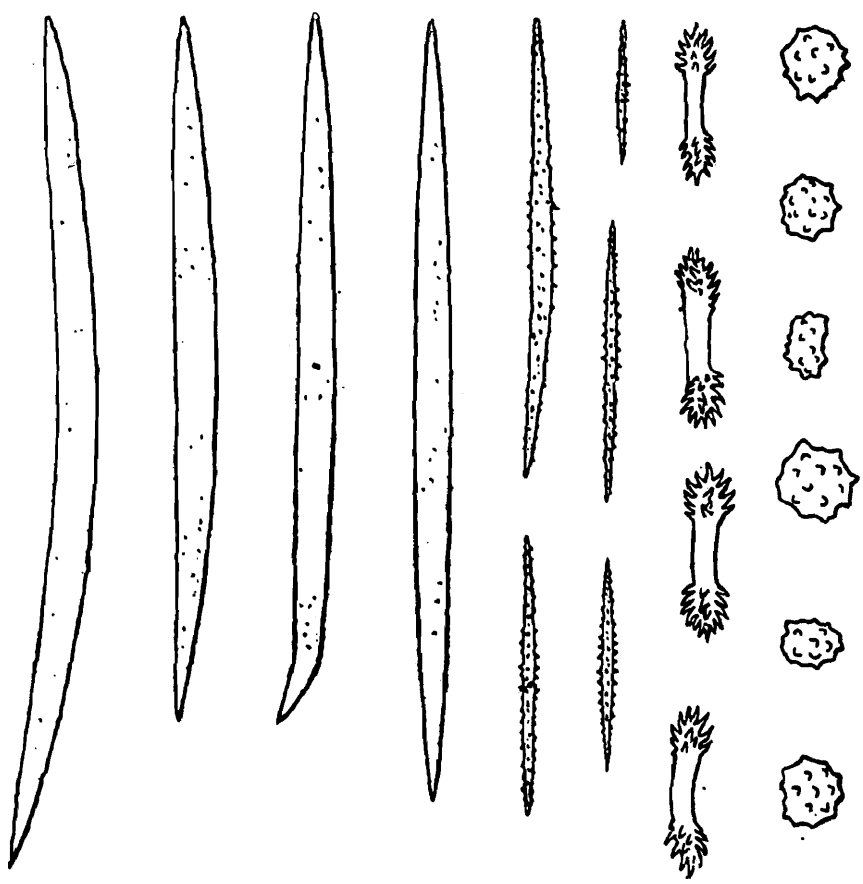

Fig. 4.—Spicules of *Pectispongilla stellifera*, sp. nov.

of the Indian Peninsula and at Zanzibar off the East Coast of Africa respectively, while *S. botryoides*, which may also be related, has been found only in New South Wales.

Key to the known species of PECTISPONGILLA.

1. Skeleton-spicules quite smooth.
   Free microscleres of two types: (*a*) minute, smooth, rhomboidal, and (*b*) moderately large, slender, spindle-shaped, bearing scattered spines — *P. aurea.*
2. Skeleton-spicules rough or spiny.
   A. Free microscleres of two types: (*a*) amphioxous, spindle-shaped, somewhat closely spined, and (*b*) subspherical with scattered tubercles. — *P. stellifera.*
   B. Free microscleres less distinctly of two kinds, spindle-shaped or cylindrical, amphioxous or truncated, all definitely spiny — *P. subspinosa.*

Pectispongilla aurea, Annandale.

(Fig. 3).

1909. *Rec. Ind. Mus.*, III, p. 103, pl. xii, fig. 2.
1911. *Faun. Brit Ind., Freshw. Sponges*, etc., p. 106, fig. 20.

In describing this species I neglected to observe the free microscleres, or rather confused them with immature macroscleres and with the skeletons of diatoms. The free spicules are actually of two kinds: (1) small, slender, straight or nearly straight, spindle-shaped, sparsely spiny amphioxi on an average about 0·084 mm. long, and (2) minute, smooth, relatively thick amphioxi rhomboidal in outline and on an average about 0·024 mm. long. The former (1) are extremely scarce, the latter (2) abundant. Both types of spicules are confined to the flesh of the sponge. *P. aurea* is only known from Tenmalai on the western side of the Western Ghats in Travancore.

Pectispongilla stellifera, sp. nov.

(Fig. 4).

The sponge apparently forms thin films encrusting bodies such as the fibres of cocoanut-husks that have fallen or been thrown into the water, but my specimens are dry and not in very good condition. They have a brownish colour. The skeleton resembles that of *P. aurea*, but is rather stouter.

The macroscleres are slender and sharply pointed; they have minute rounded spines or tubercles scattered almost uni-

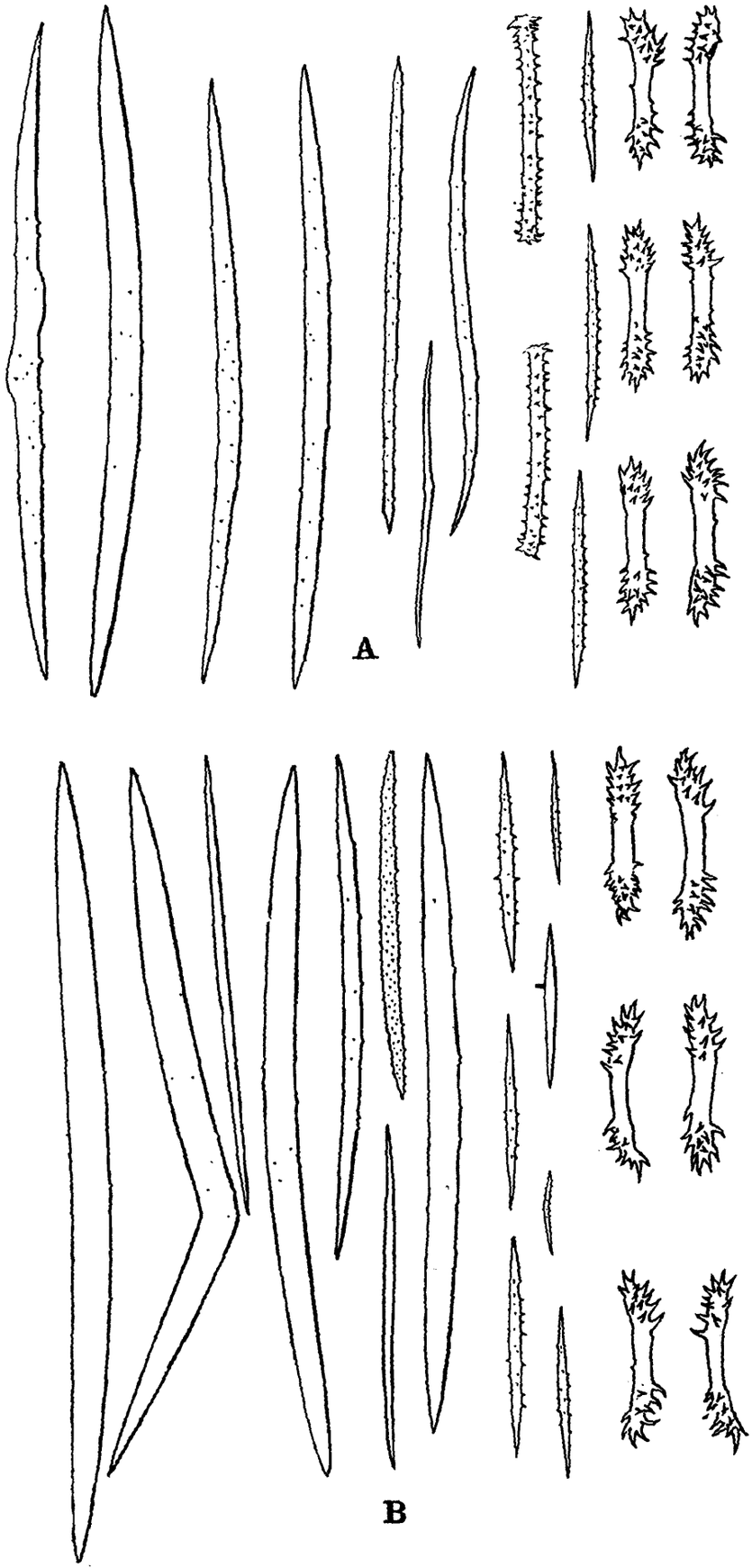

FIG. 5.—Spicules of *Pectispongilla subspinosa*, Annandale.

formly, though sparsely, over their surface, but their extremities are as a rule smooth.

The gemmule spicules resemble those of *P. aurea* but are a little stouter.

The free microscleres are of two quite distinct kinds: (1) slender, spiny, spindle-shaped, straight or nearly straight amphioxi, and (2) short, stout, cylindrical or subspherical tuberculate bodies of very characteristic form. The former vary greatly in size and proportions; their spines, which are scattered less sparsely than those of the macroscleres, are short and not very sharp. The free microscleres of the second type are, so far as I am aware, unique in the Spongillidae; their form is shown in the figure.

Diameter of gemmule	0·201 mm.
Length of macrosclere (average)	0·273 ,,
Diameter of macrosclere (greatest average)	0·0084 ,,
Length of gemmule-spicule (average)	0·0336 ,,
Length of free microsclere of type 1	0·0546—0·1554 ,,
Diameter of free microsclere of type 1	0·0021—0·0063 ,,
Length of free microsclere of type 2 (average)	0·0126 ,,
Diameter of free microsclere of type 2	0·0084 ,,

Locality.—Trichur, Cochin State, Malabar Zone.
Type-specimen.—Z E.V 3790/7. *Ind. Mus.*

Pectispongilla subspinosa, Annandale.

(Fig. 5, *A-B*).

1911. *Pectispongilla aurea* var. *subspinosa*, Annandale, *Faun. Brit. Ind., Freshw Sponges.* etc., p 107.

This species is closely related to *P. stellifera*, with which it was at first confused, but lacks the aster-like microscleres characteristic of the latter.

The free microscleres are not so definitely separated in o two kinds as in the other two species of the genus but, in the type-specimen from Ernakulam at any rate (fig 5 *A*), there are a few spicules that closely resemble the gemmule-spicules of *Spongilla craterif·rmis* in shape, bei ıg truncate at the extremities, and having rudim ntary rotules thereat These spicules are, however lacking in sponges recently obtained by Mr F. H Gravely at Trichur (fig 5 *B*) in which the amphioxous free microscleres are also more va iable. The truncate spicules may possibly be adventitiou and until further specimens are obtained it seems inadvisable to separate the form discovered by Mr. Gravely as a species or variety His specimens, which were growing on rocks in a small pool connected with a sluggish stream, are (in spirit) of a dull brown colour and form an irregular crust some 2 to 5 mm. thick. The external apertures are small and inconspicuous,

the subdermal cavity is relatively small and the external surface smooth. The skeleton resembles that of *P. stellifera.*

P. subspinosa is known only from Trichur and Ernakulam in the plains of Cochin.