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II.—DESCRIPTION OF A NEW DICTYONINE SPONGE FROM THE INDIAN OCEAN.

By R. KIRKPATRICK

(Plate i.)

On the occasion of a visit to the Indian Museum, Calcutta, I was kindly permitted by Dr. Annandale, the Superintendent of the Museum, to inspect the collection of Sponges. Among the treasures obtained from the Indian Ocean by the "Investigator," were several dictyonine sponges of very elegant and remarkable form, all belonging to a species which had not been described before. For reasons stated below I consider the species to come under *Eurete*, despite the fact that there is no "beautiful network" of anastomosing tubes, but simply a vertical hollow stem with hollow separate lamellæ. Dr. Annandale entrusted the material to me for description, and I propose to name the new species *Eurete annandalei*.

Family EURETIDÆ, F. E. Schulze.

Genus EURETE, Semper.

1868. *Eurete*, Semper. *Verhandl. Würzburg phys. med. Gesellsch.*, Neue Folge, band i. *Sitzb.*, July 18, 1868, p. xxix.
1887. *Eurete*, Schulze. "Challenger" Report, Hexactinellida, p. 289.
1899. *Eurete*, Schulze. *Amerikanische Hexactinelliden*, p. 106.
1904. *Eurete*, Wilson. *Mem. Mus. Comp. Zool. Harvard*, vol. xxx. No. 1, "Albatross" Exp., 1891, Sponges, p. 62.

Eurete annandalei, sp. nov.

Sponge in form of an erect, hollow, sub-cylindrical column with four vertical longitudinal series of lamellate branches at right angles to the central column and arranged in opposite pairs, each pair forming angles of 50° and 130° with the pair immediately above and below. Lamellate branches tubular at place of origin, then explanate and obcordate, and with thin margin; with a well-defined round orifice on the upper and under surface of each lamella. With two kinds of scopulæ, with small hexactins, and micro-discohexasters.

Localities.—One specimen, $\frac{\text{Z.E.V. 1422}}{7}$ (fig. 2), from Lat. 7°55′ N., Long. 81° 47′ E., 506 fathoms; six specimens, $\frac{\text{Z.E.V. 2145}}{7}$

(fig. 1), from Station 321, Lat. 5° 4′ 8½″ N., Long. 80° 22′ E., 660 fathoms.

Of the seven specimens the best preserved is the broken one (B) depicted in fig. 2, in which many of the flesh spicules still remain, but neither in this nor the others are there any traces of the spicules of the dermal or gastral layers.

The other specimens consist only of the dictyonal network; and the central tube is mostly filled with mud.

In the longest specimen (A, fig. 1) the central sub-cylindrical column is 17 cm. in length, 1·4 cm. in diameter near the base, and 1 cm. in diameter at the upper end. The specimen rises from a solid disk-like base 3 cm. in diameter. In three of the smaller specimens the basal disk is perforated by an opening leading into the axial gastral cavity. The thickness of the wall of the central column varies from 1·1 to 1·2 mm. In the inner wall are four vertical rows of orifices leading to the lamellate branches.

In several of the specimens the lumen of the central tube is filled with mud; in one instance there are several minute Ophiurids. In five of the specimens the inner wall is smooth and the lumen bare of structure. The upper end of the central cylinder opens by an oval orifice with the long axis forming angles of 50° and 130° with the axis of the lamellar pair immediately below, and with the margins slightly flared out. In specimen A is an incomplete (?) vertical partition of slender dictyonal network, so that there is an appearance of a double tube. The presence of mud makes it difficult to discover whether the partition is complete or not; possibly at first there is a complete partition which becomes ruptured as the sponge grows. In specimen B there are, on the inner wall, alternating pairs of longitudinal vertical ridges situated on a level with the orifices leading to the branches and in a plane at right angles to them.

The lamellate branches or lamellæ—

The lamellæ are arranged at right angles to the central tubular axis, and in opposite pairs, each pair forming angles of 50° and 130° with the pair above or below it, the open or obtuse angle of the ✕ thus formed (fig. 8) being 130° and the acute angle 50°. A botanical colleague informs me that the four rows are orthostichous, and that the arrangement in opposite pairs alternately crossing, but not at right angles might be described as spuriously decussate. Looking down on the specimen from above, the wall of the central tube is visible along the course of the opposite obtuse angles, but is concealed by the overlapping lamellæ along the line of the acute angles. Again, viewed in front there is an appearance of bilateral symmetry, *i.e.*, of two series of alternating lamellæ on each side of the spaces bounded by the opposite obtuse angles; but the branches or lamellæ develop in opposite pairs, accordingly the bilateral symmetry is a secondary development.

Specimen A has twenty pairs of lamellæ, *i.e.*, four vertical series of ten.

The lamellæ, in the well-preserved specimen B, have a short, sub-cylindrical, laterally compressed stem ; but this is less obvious in the other specimens, in which the branches come off at once as flat leaflets. The lamellæ are saddleshaped with the lateral edges curving downwards ; accordingly, in the fragmentary specimen B, it was possible to see at a glance which were the upper and lower ends of the specimen.

The lowest and oldest branches are reduced almost to mere ridges. A fully formed lamella is 19 mm. long, and 18 mm. wide.

The single circular orifices on the upper and lower surfaces are 4 mm. in diameter, and with well-defined slightly raised rim.

The upper orifice, obliquely directed and pointing upwards and outwards, is further away from the central column than the lower, which points downwards and outwards. In two instances there is a third orifice near the upper edge, suggesting an atavistic return to the form of colony with anastomosing tubes such as is found in the less specialised species of *Eurete*.

The orifices on the lower surface of the lamella persist to a greater degree than those on the upper. Along one vertical series, for instance, all the ten lower surface ones are open, but only the four highest of the upper surface ones. In the orifices more recently closed up it is still possible to see the outline below the thin layer of dictyonal skeleton.

Several of the lamellæ in B have a denticulate process or tongue on the inner margin of the upper orifice and a larger one on the outer margin of, or quite external to, the lower orifice.

The lamellæ are hollow at their origin, but beyond the orifices the upper and lower laminæ meet to form a thin edge.

The Skeleton.—The dictyonal network does not present any striking peculiarities. The network has square or oblong meshes, sometimes of considerable length, below the surface ; but at the surface the meshes form polygonal areas, each polygon being divided by spokes radiating from a centre, into triangular spaces.

From the nodes arise spines varying in length, shape, thickness and character of surface, but for the most part cylindrical, knobbed and slightly tuberculated, and sufficiently numerous to give the surface of the sponge a hirsute appearance to the naked eye. The spines round the lamellar orifices are very short and terminate in spherical knobs. Among these spines are numerous specimens of a Lituoline Foraminifer, which often so closely resembles the spines, that it is not easy to distinguish them from the latter. This organism is cylindrical, with a bulbous base, and with a surface layer of overlapping, fine, diamond-shaped, vitreous plates. The resemblance between the skeletal spines and the Foraminifer is so close as almost to suggest protective mimicry ; though at the same time it is difficult to imagine how such a minute organism could profit in this manner.

The dictyonal network does not fine off at the growing edges into a single layer as commonly happens in *Farrea*, and rarely in *Eurete*.

Spicules.—Scopulæ of two kinds. 1. With four or five knobbed prongs (fig. 10), 436 μ in total length, the prongs being 62 μ long; the shaft, which is slightly swollen at the point of origin of the prongs, is roughened at the upper and lower end; the lower end is blunt-pointed; the prongs are coarsely granular; and the pyriform knobs provided with retrocedent spines; the shaft, which is swollen at the cladal origin, is roughened at the upper and lower ends; the lower end rather blunt-pointed usually; the prongs, 62 μ long, are coarsely granular, and the pyriform knobs provided with retrocedent spines. 2. Scopulæ with lanceolate prongs (fig. 11), total length 694 μ; the whole surface smooth; shaft 6·5 μ thick at centre, swollen at cladal end to 11 μ. Prongs, usually five in number, smooth, lanceolate, 82 μ in length.

I found both kinds of scopulæ on the dermal side, and was unable to make out any distinction between dermal and gastral scopulæ.

Small hexactins, varying a good deal in size, but with rays on an average 400 to 450 μ in length, with finely spined surface.

Discohexasters 44·5 μ in total diameter, with smooth primary rays 6·25 μ long, each primary with four roughened curved, secondary rays 16 μ long, each ending in minute disk with finely denticulate edge.

Affinities.—The new species in its general form comes nearer to *Eurete erectum*, F. E. Schulze (*l.c.*, *supra*, p. 106), and its varieties (Wilson, *l.c.*, *supra*, p. 62, *et seq.*), than to other species of the genus, but at the same time there are great differences.

In *E. erectum* there is a tendency to form a long axial growth rather than a clump of anastomosing tubes. In *E. erectum* var. *tubuliferum*, Wilson, there is only a single axis with lateral branches, as in the new species; in this variety the lateral branches are at first cup-like, with flaring edges, which latter in more developed branches curve over and meet in such a way as to leave an orifice at each end of the line of junction.

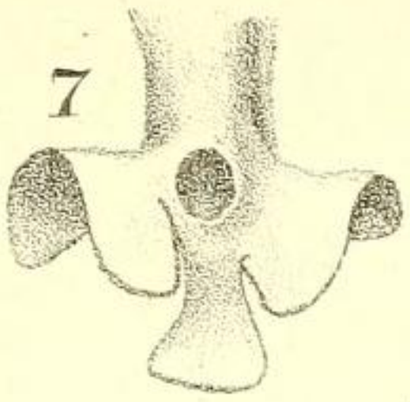
In *E. annandalei* a great degree of specialisation has arisen, the simple tube or cup expands into a hollow lamella in which the coalescent edges form the margin of a leaf-like lamina.

The upper and lower laminar orifices represent the openings left by the partial fusion of the edges of the simple tubular branch.

In spite of the high degree of specialisation attained in this species by the branches and their openings, it did not seem necessary to place the form under a new genus. In other Euretid sponges we find great divergence from the anastomosing tubular growth even within the limits of the same species, as in *Farrea occa* (Bowerbank) var. *laminaris*, Topsent (*Résult. Camp. Sci. Monaco*, fasc. xxv, p. 44, pl. vi, figs. 1, 2), and *F. occa* var. *foliascens*, Topsent (*Bull. Mus. Oceanograph. Monaco*, November 1906, p. 1).

EXPLANATION OF PLATE I.

FIG. 1.—*Eurete annandalei*, sp. nov. Specimen A, nat. size.
,, 2.—Specimen B, nat. size.
,, 3.—Section of a third specimen showing interior of axial column, nat. size.
,, 4.—Upper surface of a lamella, nat. size.
,, 5.—Under surface of same, nat. size.
,, 6.—Side view of same, nat. size.
,, 7.—Front view of same, nat. size.
,, 8.—Diagrammatic transverse section to show angle at which branches cross.
,, 9.—Uncinate, × 160.
,, 10.—Knobbed scopula, × 160; 10 *a*, cladal end of another spicule, × 425.
,, 11.—Lanceolate scopula, × 160; 11 *a*, cladal end of another spicule, × 425.
,, 12.—Hexactin, × 160.
,, 13.—Discohexaster, × 425.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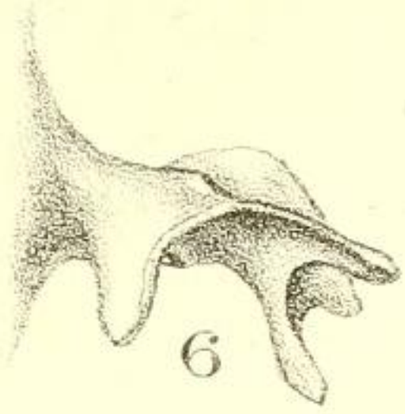
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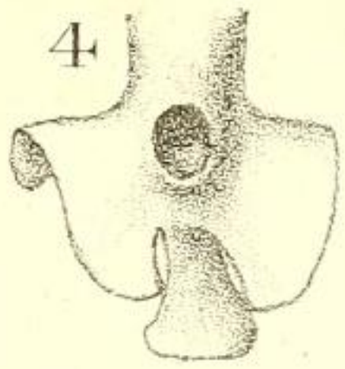
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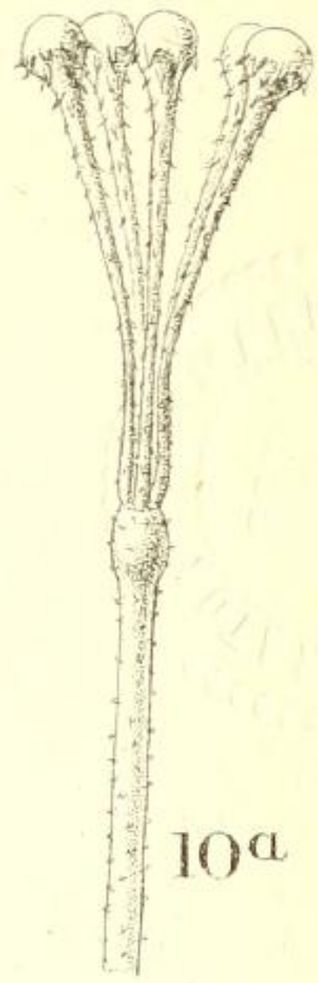
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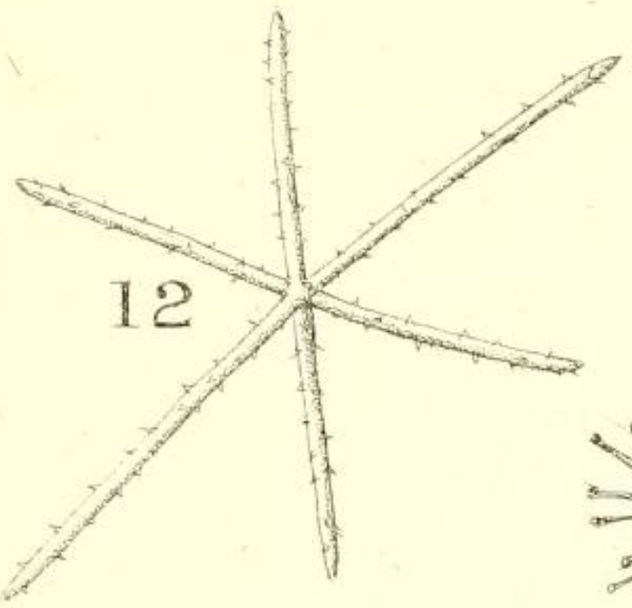
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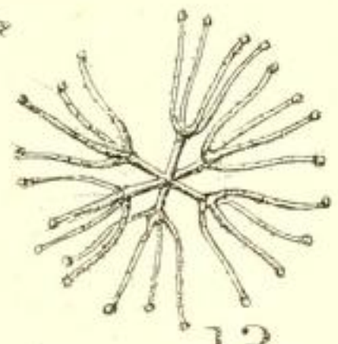
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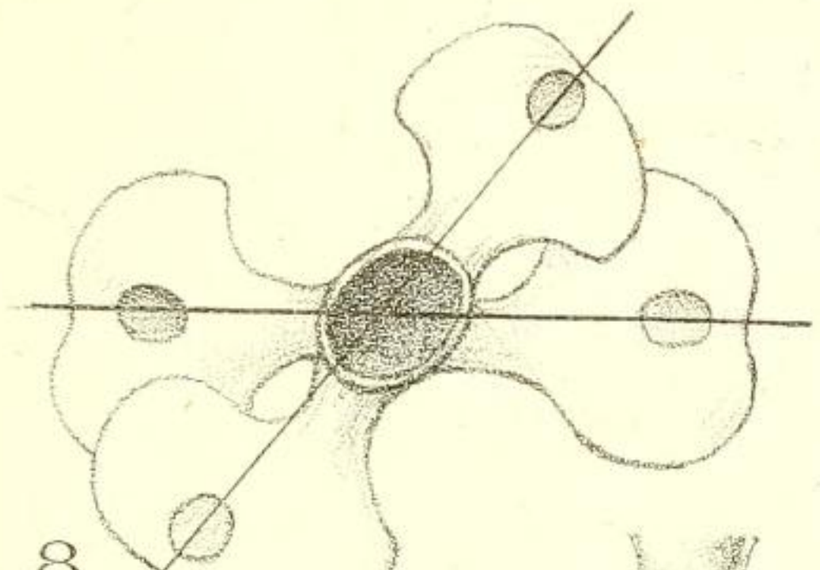
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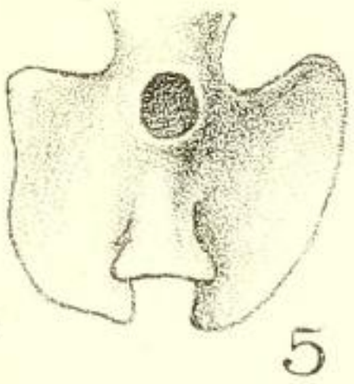
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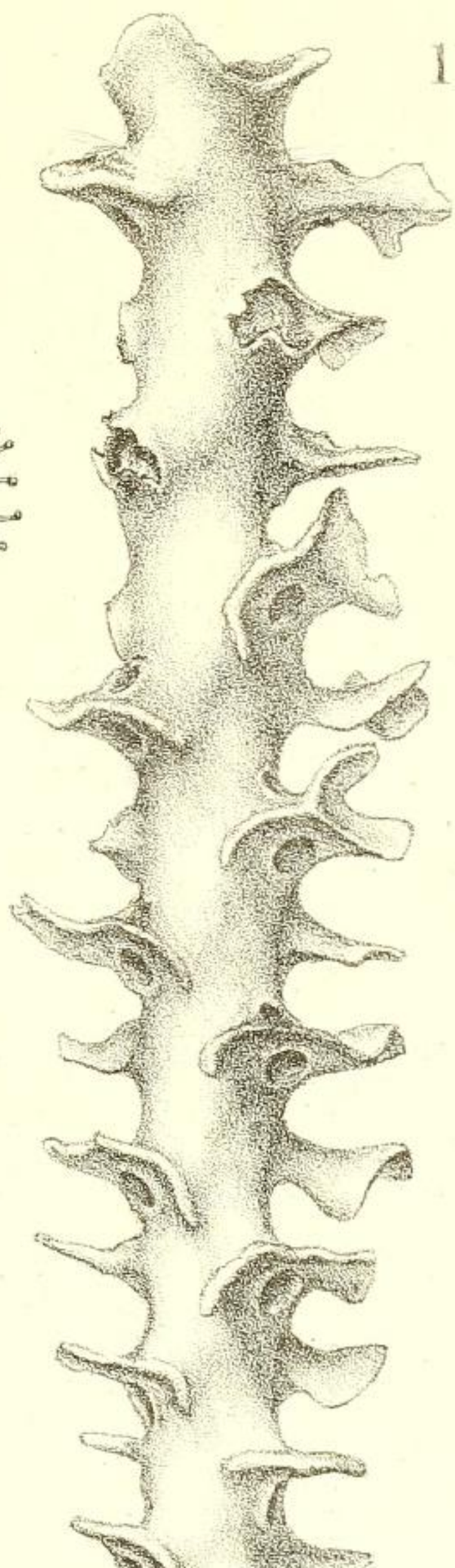

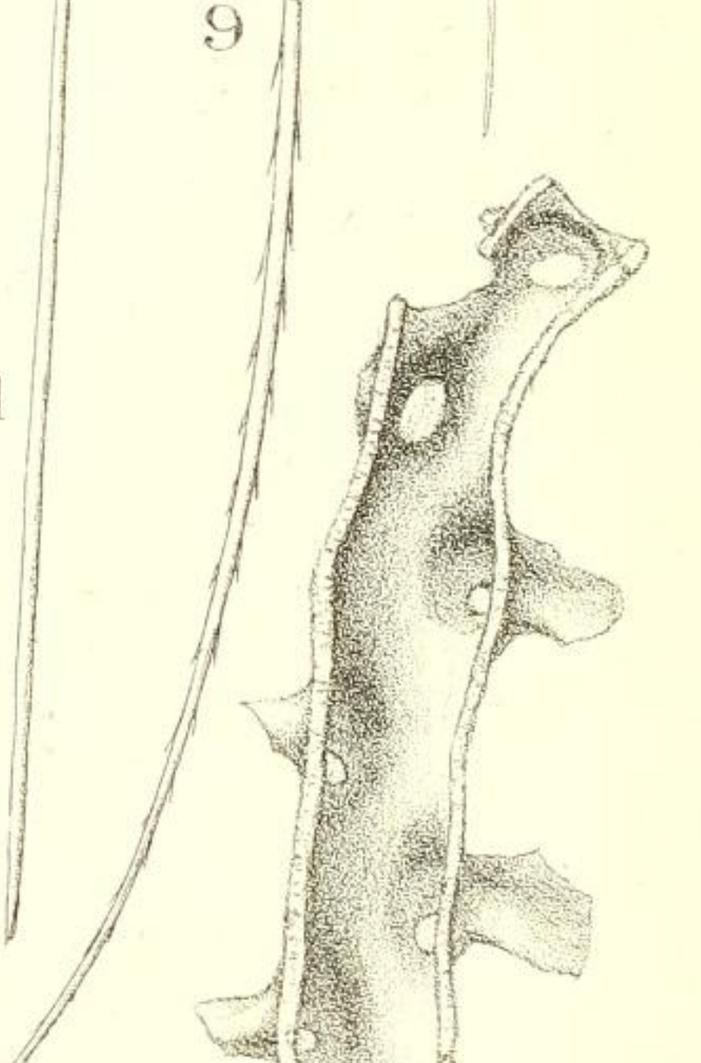
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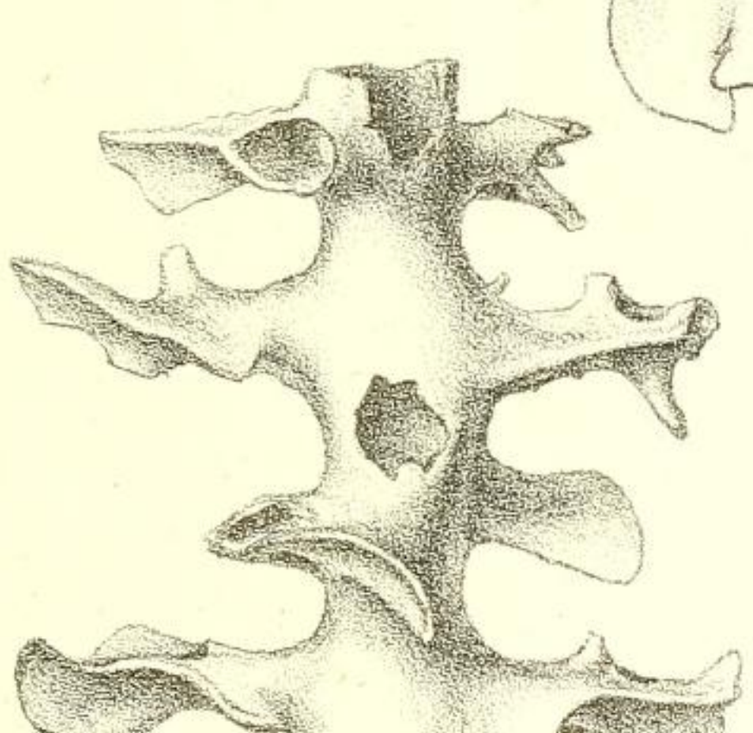
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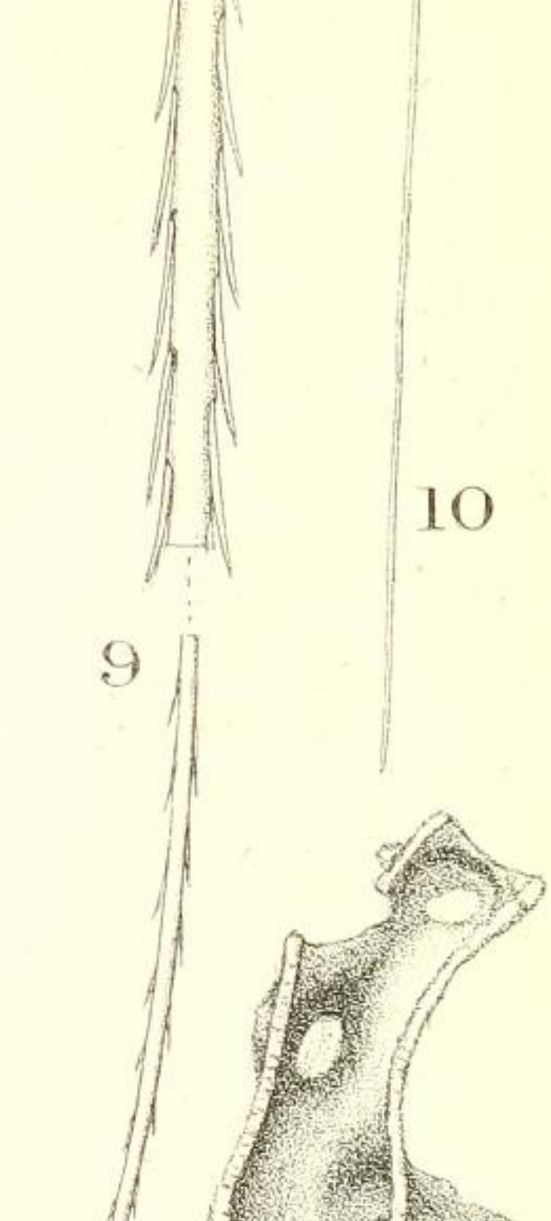
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Highley, del et lith.

EURETE ANNANDALEI. n. sp.