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Addition to the Sponge Fauna of Madras^{1, 2}

BY

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ABSTRACT

Ten species of Monaxonid sponges are described from the Madras Harbour and Royapuram area. Of these, *Prostylissa arcotti* and *Reniera delicatula* are new to science and *Lissodenderyx similis* Thiele is recorded for the first time from Indian waters.

Introduction

The sponges from the Gulf of Manaar on the southern Madras coast have received considerable attention from several authors (Carter, 1880, 1881; Dendy, 1887, 1889, 1905; Burton & Rao, 1932; Burton, 1937; and Rao, 1941).

The sponge fauna of the Coramandal coast, on the other hand, has received little attention from workers in this field with the exception of Annandale (1914-1915), who described 3 new species from the Madras Harbour and 3 from the Chilka Lake. Due to the sandy nature of this coast, the sponge fauna is poor except in places like the Madras Harbour and the adjoining Royapuram area where the stonework of the former and the rocky nature of the latter provide good support for the sponges to attach and grow. In view of the abundance of sponges in this area and the paucity of literature regarding them it was felt that a taxonomic survey would be worthwhile.

The sponges collected were fixed in 5% formalin and preserved in 70% alcohol or methylated spirit. The larger specimens were dried. Hydrofluoric acid was used for desilicification. Paraffin and

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celloidin were used in preparation of histological sections which were stained with Delafield's and Heidenhein's haematoxylin. To examine the spicules, pieces of sponge were teased and boiled with nitric and sulphuric acids, centrifuged and washed with distilled water a number of times. The spicule dimensions given are average measurements. In a few instances the sizes of extreme forms are given.

The scheme of classification suggested by Dendy (1905) and Burton (1937) is followed in this paper

Account of the sponges

Order Tetraxonida

Group Monaxonida

Family Haploscleridae

Genus Pachychalina

Pachychalina multiformis var. *manarensis* Dendy

Pachychalina multiformis var. *manarensis* Dendy (1889).

Two specimens were taken from a fisherman's net, north of Madras.

Size: 120 mm. in length, diameter of the branches 7 mm. to 15 mm.

Colour: Brownish in living condition as well as after preservation.

Spicules: Curved oxea, 0.082 mm. by 0.0038 mm.

Reniera delicatula sp. nov. (Figs. 1 & 4).

Diagnosis: Sponge fragile and compressible; consisting of irregularly branching tubes, widely open at the end. Skeleton formed of a triangular meshed reticulation of oxea, which are joined at the tips by spongin. Oxea are slender, slightly curved and sharp-pointed, ending abruptly and measuring about 0.124 mm. by 0.008 mm.

Occurrence: Found abundantly on the side walls of the boat basin of the Madras Harbour and also on the bottom of the boats tied there for long periods. Sometimes they are found attached to the shells of dead molluscs. They do not occur in Royapuram.

Description: The body consists of a clump of about twenty tubes (Fig. 1), all rising from a common basal position. There is a great variation in the size of this sponge, ranging from 50 mm.-long tubes to 120 mm.-long ones. The diameter of the tubes also varies from 2 mm. to 10 mm. Oscula are found at the tip of the tubes and are usually very wide, their diameter being 3 mm. to 5 mm. The *Reniera* tubes exhibit a great deal of lateral fusion; in some cases it is so extensive that the individuality of the tubes is marked only by the oscula. Tube walls are quite thick. Sponge is very soft and fragile, and is easily torn. Colour in the living condition as well as in spirit is light yellowish brown. The smaller sponges, however, are cream coloured when alive.

Sub-dermal cavities of medium size underlie the thin dermal membrane. From these, narrow afferent canals extend radially into the wall of the sponge. Corresponding radial afferent canals open directly into the oscular apertures of these canals close together. Outer surface of a well-preserved sponge, when examined, is found to be minutely conulose, conuli being not very prominent. Though these sponges were collected and examined throughout the year, larvae were never found.

Skeleton: Skeleton is typically renieroid reticulum; meshes are square; the sides are unispicular and of the same length, transparent spongin is found at the nodes. Spicules (Fig. 4) are oxea and are slightly curved and do not have tapering tips. They measure 0.124 mm. by 0.008 mm. In the present case the tube wall was not found to contain any polyspicular tracts.

This harbour sponge undoubtedly belongs to the genus *Reniera* as may be seen from the nature of the skeleton; appearance and texture of the sponge.

Ridley and Dendy (1887) and Topsent (1904) observed that the specimens belonging to this genus collected by them from the North Atlantic and Mediterranean regions had elongated, slender tubes which were about 7 to 10 mm. in diameter. They also observed that these sponges were stipitate and that in addition to the renieroid reticulum, longitudinal polyspicular tracts were present.

In the present case it is seen that the spicule shapes and measurements are different from those of the closely related species *Reniera implexa* described by previous authors (Schmidt, 1868; Ridley and Dendy, 1887; Row, 1911; Wilson, 1925). In the Mediterranean sponge described by Ridley and Dendy (1887), the oxeas

measured 0.138 mm. by 0.007 mm. and in the North Atlantic specimens the recorded range is from 0.160 mm. by 0.006 mm. (Ridley and Dendy, 1887) to 0.2 mm. by 0.007 mm. (Topsent, 1904). In Dendy's (1905) specimens from Ceylon the multispicular fibres are loose, feeble and sparsely present. Roy's (1911) Red Sea sponge resembled the Mediterranean form.

In view of the above-mentioned features of this sponge and the differences between this and other known members of the genus *Reniera*, the present form is considered a new species and named *Reniera delicatula*.

Genus *Oceanapia*
Oceanapia arenosa RAO

Oceanapia arenosa: Rao, H. S. (1941)

Found attached to submerged rocks in the Royapuram area, 1 or 2 feet below the low-tide watermark. A few specimens were also collected from the stonework of the Madras Harbour below the low-tide watermark.

Size: 70 mm. by 50 mm.

Colour: Pale yellowish when alive, turns whitish on preservation.

Spicules: Oxeas: slightly curved and tapering, 0.15 mm. by 0.0054 mm.

Genus *Callyspongia*
Callyspongia diffusa RIDLEY

Cladochalina diffusa: Ridley, S.O. (1884)

Callyspongia diffusa: Rao, H. S. (1941)

Size: 100 mm. in height, diameter 10 mm.

Colour: Violet or yellowish brown in the living condition; fades slightly on preservation.

Spicules: Oxeas; slightly curved, without tapering but pointed extremities. 0.09 mm. by 0.0054 mm.

Family *Desmacidonidae*
Section *Myxilleae*
Genus *Tedania*
Tedania nigrescens SCHMIDT

Reniera nigrescens: Schmidt, E.O. (1862)

Tedania digitata: Gray, G. E. (1867)

Tedania nigrescens: Burton, M. and Rao, H. S. (1932)

Tedania nigrescens: Burton, M. (1937)

Twenty-five specimens belonging to this species were collected from the Royapuram area. Great variation in colour, size and spicule measurements is seen.

Size: 30 mm. to 120 mm. by 40 mm. to 80 mm. Average-sized specimen being 50 mm. to 80 mm. by 50 mm. to 65 mm.

Colour: Deep red or greenish to light greenish-yellow in life, changes to dull greyish; yellow on preservation.

Spicule measurements (average sizes)

Styles: 0.22 mm. by 0.008 mm.

Tylotes: 0.14 mm. by 0.054 mm.; diameter of head 0.0081 mm.

Onychata: 0.15 mm. by 0.0027 mm.

Genus *Lissodendoryx*
Lissodendoryx similis THIELE

Lissodendoryx isodictyalis: Thiele, Z. (1899).

Lissodendoryx leptoderma: Topsent, E. (1897)

Lissodendoryx isodictyalis: Topsent, E. (1897)

Lissodendoryx similis: Burton, M. and Rao, H. S. (1932)

This sponge occurs in small numbers, both in the Madras Harbour as well as Royapuram area. It is found encrusting on the side walls of the harbour and the rocks in the Royapuram area.

Specimens were fixed in Bouin's, embedded and sectioned in order to study the anatomy fully and it was found that the dermal membrane, mesenchyme, canal system, skeleton as well as general histology were found similar to those of *Esperella* (Wilson, 1894) and *Halichondria* (Dendy, 1891).

This species was recorded by Topsent (1897) from Ambon Carter (1882) from the West Indies and Burton and Rao (1941) from Mergui Archipelago. This is the first record of this species from India.

Size: 65 mm. by 47 mm. Surface is very uneven (Fig. 2) and texture is very soft and friable. Oscula are small and inconspicuous, scattered all over the surface of the sponge. Oscula measure about 0.9 mm. in diameter.

Colour: In the living condition it is orange in colour, which fades to greyish white in spirit.

Skeleton: Reticulate fibres made up of spicules (styles) which are in bundles. There is very little spongin in the skeleton which is chiefly spicular.

Spicules (Fig. 5): Styles are stout, bent slightly near the blunt end; 0.176 mm. by 0.0081 mm. Tyloles are slightly slender, with prominent heads; 0.17 mm. by 0.005 mm. Head's diameter is 0.0081 mm.

Microscleres: Isochela are arcuate with tridentate heads and curved shafts. Measure 0.03 mm. in length.

Sigmas are few in number. Measure 0.02 mm. in length.

Section Mycaleae
Genus Mycale

Mycale mytilorium ANNANDALE

Mycale mytilorium: Annandale, N. (1914)

Mycale mytilorium: Burton, M. (1937)

This sponge is found abundantly in the Madras Harbour, attached to the stonework from 4 to 6 feet below the low-tide mark. Thirty-two specimens were collected of which only five were found covering large living mussels as Annandale (1914) observed; the rest were in an irregular and shapeless mass attached to the stonework of the harbour. A large number of polychaetes, echinoids, copepods and isopods are associated with this sponge.

Size: Very thin film about 3 mm. in thickness.

Colour: Bright red in the living condition, becoming pinkish in spirit.

Spicules: Tylostyles: Smooth and sharply pointed; straight with oval heads. Axial tube is well developed. Measure 0.245 mm. to 0.0054 mm. Head is 0.0081 mm. in diameter. Young and extreme forms are also met with, whose sizes vary from 0.15 mm. to 0.032 mm. respectively.

Microscleres: Sigmas: Found abundantly; some are C-shaped and some others S-shaped. Measure about 0.041 mm. by 0.0027 mm.

Anisochelae: Very small and scattered all over the body. Measure 0.0189 mm. from bend to bend.

Mycale madraspatana ANNANDALE

Mycale madraspatana: Annandale, N. (1914)

Mycale madraspatana: Burton, M. (1937)

Three specimens were collected from the stonework of the boat-basin of the Madras Harbour. They were found 2 to 3 feet below the low-tide mark, attached to the shells of living as well as dead *Mytilus*.

Size: Thin films of about 2 mm. thickness.

Colour: Red when alive, becomes whitish on preservation.

Spicules: Tylostyles: Tapering with narrow, oval heads. Measure 0.276 mm. by 0.005 mm. The heads have a diameter of 0.007 mm.

Styles: Slender and of the same size as the tylostyles.

Microscleres: Anisochelae: Arranged in rosettes of different sizes. Measure 0.00473 mm.

Sigmas: Fewer than the anisochelae and measure 0.095 mm. Toxa are present in large numbers and are of two sizes, measuring 0.140 mm. to 0.356 mm. Larger toxa, although they are microscleres, are larger than the megascleres.

Mycale aegagsopila var. *militaris* ANNANDALE

Mycale aegagsopila var. *militaris*: Annandale, N. (1914)

Five specimens found encrusted on the dead as well as living molluscan shells were collected from the stonework of the Madras Harbour 3 to 4 feet below the low-tide mark.

Size: Very thin and fragile. Thickness is about 1 or 2 mm.

Colour: Bright scarlet while alive, which fades off into dull green when preserved in spirit. The scarlet colour is due to the presence of symbiotic algae.

Spicules: Tylostyles have well developed axial tubes, which extend to their prominent heads. Measure 0.257 mm. by 0.0054 mm.

Microscleres: Anisochelae are very small and measure 0.044 mm. by 0.0027 mm.

Sigmas measure 0.12 mm. by 0.0030 mm

Toxa measure 0.149 mm. by 0.0034 mm.

Section Raspeliae

Genus Prostylissa

Prostylissa arcotti sp. nov.*

Diagnosis: Massive, irregular and encrusting forms; colour in life, greenish; surface uneven, with conical projections and depressions; spongin is scarce; three types of oxea are present, viz., large, bent ones, long straight ones and slender ones, measuring about 0.612 mm. by 0.0135 mm., 0.5 mm. by 0.0135 mm., and 0.136 mm. by 0.0054 mm., respectively. Stout styli which are shorter than the oxea and measuring about 0.244 mm. by 0.011 mm., are also present.

Occurrence: This form occurs in large numbers along the Royapuram coast attached to rocks and other substrata, and is not found in the Madras Harbour.

Description: Twenty-five specimens were examined. These are encrusting and irregular forms (Fig. 3) attached to the substratum by their broad bases. They are light greenish in colour in the living condition, and dirty greyish in spirit. They measure 250 mm. in length, 180 mm. in breadth and 80 to 100 mm. in thickness.

On the upper surface of the sponge, apart from the prominent projections, there are a few conical projections measuring about 10 to 20 mm. in height and 20 mm. in diameter at the broadest region. A few prominent oscula measuring about 1 mm. in diameter are strewn about on the upper surface of the sponge. More oscula are found on the projections than on the other parts of the sponge body. A large number of vents are scattered about, mostly on the upper surface of the sponge. A few, however, are also

*The author has great pleasure in naming this species after Sir Arcot Lakshmanaswami Mudaliar, the eminent gynaecologist and Vice-Chancellor, University of Madras.

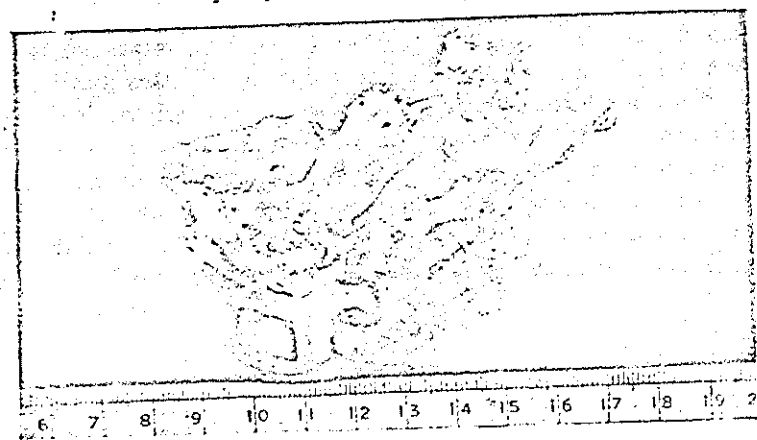


FIG. 1 Photograph of *Reniera delicatula* sp. nov.

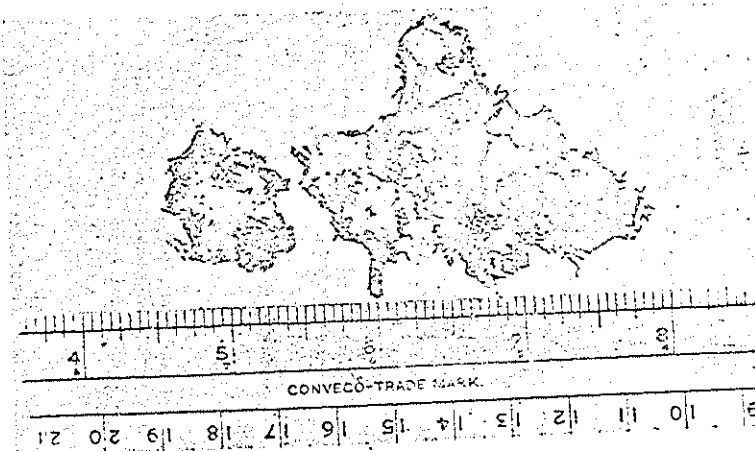


FIG. 2 Photograph of *Lissodendoryx similis* Thiele.



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Spicules: Tylostyles have well developed axial tubes, which extend to their prominent heads. Measure 0.257 mm. by 0.0054 mm.

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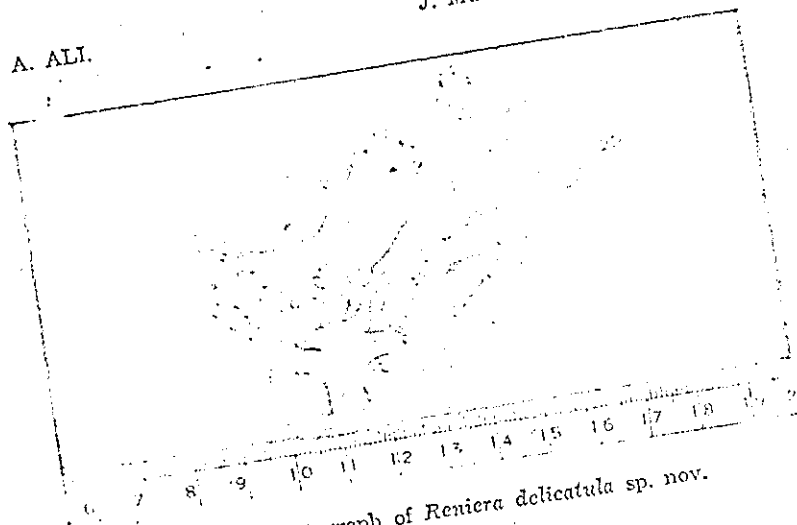


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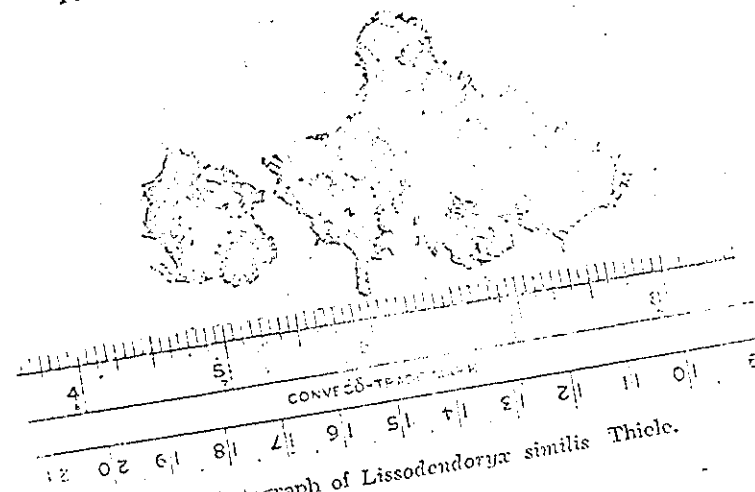


FIG. 2 Photograph of *Lissodendoryx similis* Thiele.



present on the lower surface. In addition to these, the upper surface is covered with the margins of numerous vents. The lower surface, which is the base by which the sponge attaches itself to the substratum, is rough with long and prominent ridges and the surface is uneven, in which molluscan as well as cirripede shells are embedded. In two or three sponges, algae, polyzoan and hydrozoan colonies as well as sea anemones, are found attached to the outer surface of the sponge. In all the rest the sponges were free from such associations.

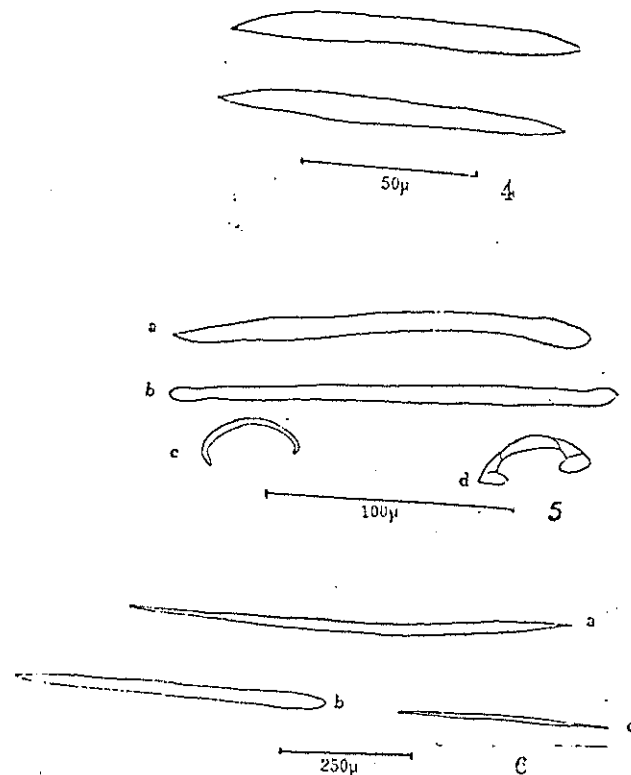


FIG. 4

Camera lucida drawings of spicules (oxea) of *Reniera delicatula* sp. nov.

FIG. 5

Camera lucida drawings of spicules of *Lissodendoryx similis* Thiele.
a:—Style; b:—Tylote; c:—Signa; d:—Isochela.

FIG. 6

Camera lucida drawings of spicules of *Prostylissa arcotti* sp. nov.
a:—Oxea; b:—Style; c:—Smaller oxea.

Skeleton: Spongin is very scarce in this form and the multi-spicular fibres are found in an irregularly reticulate fashion. The oxea and the styli are seen to form a dermal skeleton.

Spicules: Two kinds of spicules (Fig. 6) are met with in this sponge, namely, oxea and styli. Microscleres are absent.

Oxea are of three types, viz., thick, bent ones which are bent in an angle of 135° at the middle, with tapering pointed ends; stout, long, straight oxea with tapering ends and small, straight, slender oxea. They measure 0.612 mm. to 0.285 mm. by 0.0135 mm. to 0.011 mm.; 0.501 mm. to 0.283 mm. by 0.0135 mm.; and 0.136 mm. by 0.0054 mm. The smaller oxea are possibly the young forms and are too large to be called Microxea or Onychata.

Styli are stout and are shorter than the oxea. They are present in large numbers, mainly forming the dermal tangential skeleton. These measure 0.244 mm. to 0.15 mm. by 0.01 mm. to 0.008 mm.

The reticulation of oxeas and the presence of a dermal-tangential skeleton composed of oxea and styli, undoubtedly place this form in the genus *Prostylissa*.

A number of specimens belonging to this genus have been described (Topsent, 1925, 1933; Burton, 1937; Rao, 1941; de Laubenfels, 1936). The species described from the Gulf of Manaar are *Prostylissa foetida* (Burton, 1937; Rao, 1941), and *Prostylissa oculata* and *Prostylissa heterostyla* (Burton, 1937). *Prostylissa foetida* differs from the other two by its massive, lobose nature and the presence of oxea which are slightly bent. *Prostylissa oculata*, on the other hand, has digitate processes with oscula on the summits, pseudexia and styli of two sizes. *Prostylissa heterostyla* differs from the above mentioned two species by the presence of inconspicuous oscula and the total absence of oxea.

The Royapuram sponge, whose description is given above, differs from the Gulf of Manaar specimens in the presence of an uneven surface, hardness in texture, greenish colour in the living condition and the presence of three types of oxea which are not found in the Gulf species. It resembles to a certain extent *Prostylissa foetida* in its massive nature and encrusting habit but the difference in spiculation, namely, the presence of large, slightly bent oxea, straight oxea and slender oxea distinctly separate this from *Prostylissa foetida*, which has only large bent oxea measuring 0.8 mm. In view of these distinctive features this is considered a new species and named *Prostylissa arcotti*.

Summary

(1) A general taxonomic survey of the sponge fauna in the Madras Harbour and Royapuram area has been carried out.

(2) Ten species of Monaxonid sponges, viz., *Pachychalina multiformis* Schmidt var. *manaarensis* Dendy; *Reniera delicatula* sp. nov.; *Oceanapia arenosa* Rao; *Callyspongia diffusa* Ridley; *Tedania nigrescens* Schmidt; *Lissodendoryx similis* Thiele; *Mycale mytilorium* Annandale; *M. madraspatana* Annandale; *M. aegagsopila* var. *militaris* Annandale and *Prostylissa arcotti* sp. nov., are described.

(3) *Reniera delicatula* and *Prostylissa arcotti* are species new to science. *Lissodendoryx similis* is recorded for the first time from Indian waters.

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