

## Sponges of Papua and New Guinea IV. Orders Hadromerida Topsent and Epipolasida Sollas

P. A. Thomas

Central Marine Fisheries Research Institute, Cochin, India.

### Abstract

Nine species and one subspecies belonging to the orders Hadromerida Topsent and Epipolasida Sollas collected from Papua and New Guinea are described with suitable illustrations. The distribution of *Aciculites orientalis* Dendy, known only from Gulf of Mannar, is here extended to Papua and New Guinea and the presence of internal asexual bud in the case of *Asteropus sarasinorum* (Thiele) is also pointed out.

### Introduction

The present account, which is the fourth in the series on Sponges of Papua and New Guinea, deals with 9 species and a subspecies falling under the orders Hadromerida Topsent (4 species) and Epipolasida Sollas (5 species and a subspecies). Normally species belonging to the orders Poecilosclerida and Hadromerida rank first and second respectively when numerical abundance is taken into consideration in any collection of extant porifera. The reason for the scarcity of poeciloscleridean species in the present collection has been well discussed in the third part of this series and in the case of hadromerid species dealt with here the scarcity of species may be attributed to the same reason, *ie.* selective sampling. All the 4 hadromerid species represented here are massive in their body form and could be collected in good quantity for biochemical studies.

Details pertaining to collection site, classification followed etc. have been provided

in the first part of the series (Thomas, 1987). Here also only restricted synonymy is provided for each species.

### Systematics

#### Order Hadromerida Topsent

#### Family Spirastrellidae Schmidt

#### 1. *Spirastrella vagabunda* Ridley

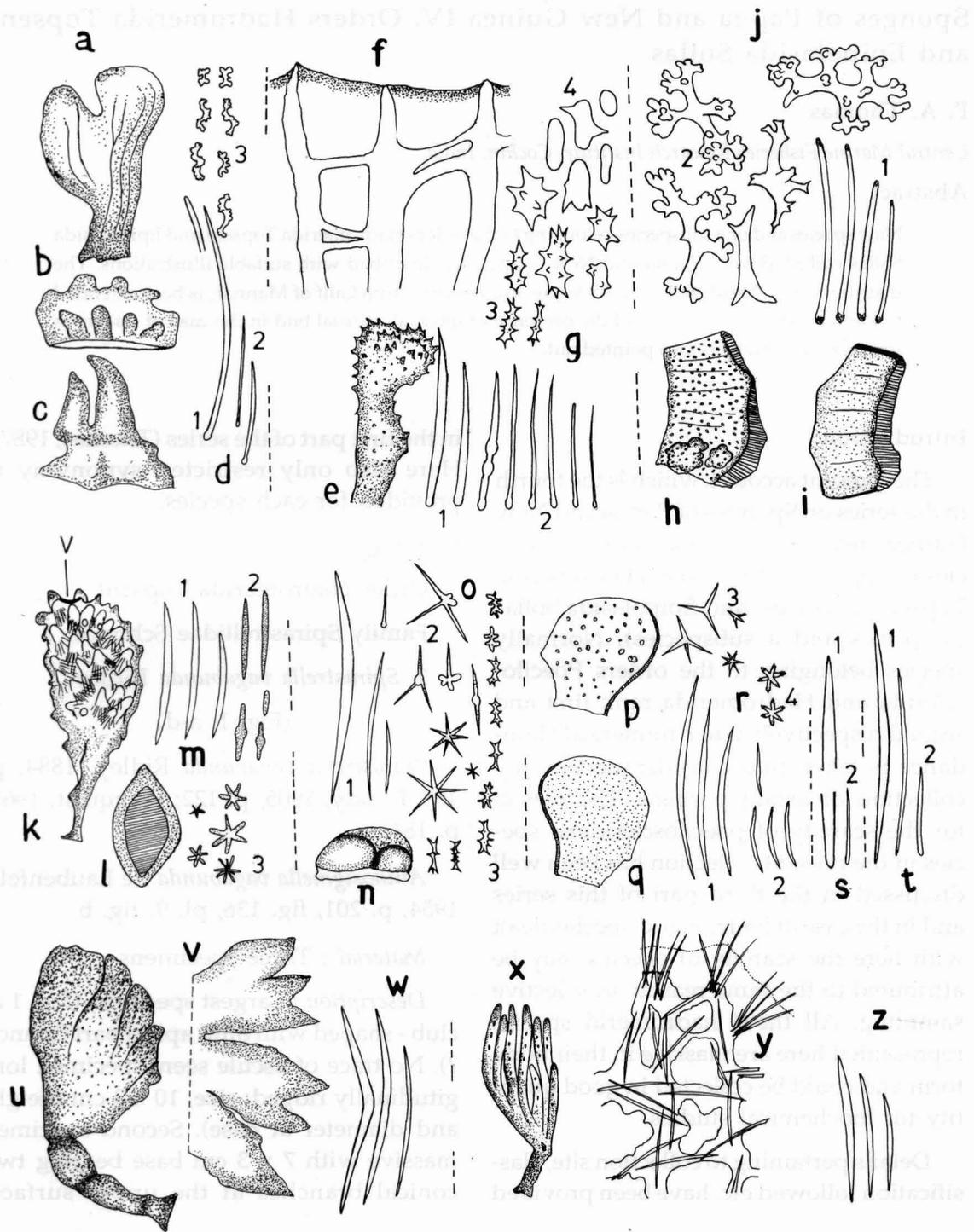
(Fig. 1, a-d)

*Spirastrella vagabunda* Ridley, 1884, p. 468; Dendy, 1905, p. 122; Bergquist, 1965, p. 184

*Anthosigmella vagabunda* de Laubenfels, 1954, p. 201, fig. 136, pl. 9, fig. b

*Material* : Three specimens

*Description* : Largest specimen (Fig. 1 a) club - shaped with bifid apical part (branch ?). No trace of oscule seen; specimen longitudinally ridged; size, 10 x 3 cm (height and diameter at base). Second specimen massive with 7 x 3 cm base bearing two conical branches at the upper surface,



## Explanation to Fig. 1

Fig. 1 a-d, *Spirastrella vagabunda* : (a) Largest specimen, (b) Specimen with 8 conical branches, (c) Specimen with two conical branches, (d) Spicules: (1) Tylostyles, larger type; one with blunt tip also shown, (2) Smaller tylostyles of dermal part, (3) Spirasters of different types. e-g. *Sigmosceptrella laevis* : (e) L. S. showing the nature of skeleton, only outline given, (f) General shape, (g) Spicules: (1) Tylostyles, (2) Tylostyles, smaller type, (3) Sigmodiscorhabds, (4) Sigmodiscorhabds with suppressed spines. h-j. *Aciculites orientalis* : (h) Outer part of specimen showing oscular openings, (i) Inner view of specimen showing pores, (j) Spicules: (1) Tylostrongyles, (2) Monocrepid desmas, different developmental stages, k-m. *Asteropus sarasinorum*: (k) General shape (*v*-position of vent) (1) Asexual body, cross section, (m) Spicules : (1) Oxeas, (2) Oxyasters with normal and suppressed rays, (3) Sandiasters, different types. p-r. *Zaplethea digonoxea* ssp. *diastra*: (p) Oscular side, (q) Poral side. *Zaplethea digonoxea* ssp. *diastra*: (2) Microxeas, (3) Oxyasters with smooth rays, (4) Oxyasters with terminally spined rays. s. *Aptos aptos* : Spicules, (1) Strongyloxea, (2) Style. t. *Prostylyssa foetida* : Spicules, (1) Oxeas, (2) Style. u-w. *Axinyssa flabelliformis* : (u) General shape, (v) Structure of conules, (w) Oxeas. x-z. *Axinyssa papuensis* : (x) General shape, (y) L. S showing the arrangement of skeleton, (z) Oxeas.

height of branches 4 and 5 cm (Fig. 1 c). Third specimen (Fig. 1, b) massively encrusting with 2 x 7 cm base with 8 short papillar projections averaging 1.5 (height) x 1 cm diameter.

*Consistency* : Hard, somewhat friable

*Colour* : Yellowish green when dry

The skeletal arrangement and other details tally well with those of the type.

*Spicules* : 1) Tylostyles : Of two sizes; smaller 0.226 x 0.008 mm average, dermal; and larger 0.546 x 0.012 mm average (Fig. 1 d 1, 2). 2) Spirasters : C or S shaped with blunt spines on the convex part or straight with blunt to pointed spines on either end (Fig. 1, d3), size up to 0.021 x 0.002 mm.

*Remarks*: Asexual buds reported by Bergquist (1965) in this case are common in *S. inconstans* (Dendy) also.

*Distribution* : Indo - Pacific

## 2. *Sigmosceptrella laevis* (Lindgren)

(Fig. 1, e-g)

*Latrunculia laevis* Lindgren, 1897, p. 484; Lindgren, 1898, p. 43, pl. 17, fig. 12; pl. 19, fig. 24.

*Sigmosceptrella laevis* Thomas, 1973, p. 51, pl.3, fig. 1, pl.5, fig. 3.

*Material* : One specimen

*Description* : Specimen almost flattened with two bulbous expansions, one near the base and other at growing tip; diameter of lower expansion 2.5 cm and of other, 4 cm. Basal part of specimen rounded with 1.5 cm diameter and without any trace of attachment. Part between two expansion 1.75 cm in diameter and specimen flatens further towards the growing tip (Fig. 1e). Total height 10cm.

*Colour* : Pale gray externally, interior brownish and fibers dark brown.

*Consistency* : Hard and incompressible when dry.

Oscules and pores not traceable, surface conulose, longer conules towards growing tip where they measure 2-4 mm high and 3-5 mm apart.

Dermal skeleton well developed with small tylostyles horizontally at different directions; sigmodiscorhabds are vertically placed at surface.

Main skeleton reticulate; fibers with irregular outline and terminate at the summit of conules but seldom jut out. Fibers compact with dense spongin; separable into primaries and connectives; former measure 0.084-0.252 mm and latter 0.042-0.126 mm in diameter, connectives are scalariform in disposition; both primaries and secondaries are compactly packed with spicules (Fig. 1f).

*Spicules*: 1) Tylostyles/Tylostrongyles. Head distinct in most and with swellings, symmetrical or asymmetrical, on the shaft; shaft straight and tip sharply pointed or rarely blunt; size, 0.336 X 0.015 mm average (Fig. 1, g 1). 2) Tylostyles. Head oblong, shaft straight, but curved or crooked forms are also noted; tip abruptly pointed, blunt or even stair-stepped; size 0.30 - 0.36 (0.32) x 0.004 - 0.008 mm (Fig. 1, g 2). A few spicules with stumpy shaft could be seen in both the above types of spicules. 3) Sigmodiscorhabds. With 4 whorls of spines and each whorl with spines in 4 lobes as in *S. quadrilobata* Dendy (1921); size 0.084 x 0.042 mm (Fig. 1, g 3); in some suppression of spines may give the appearance of silicious spherule (Fig. 1, g 4).

*Remarks* : Specimen of *S. laevis* from Seychelles (Thomas, 1973) had a central crater and the morphology noted for the present specimen is quite different and compares well with that of *S. quadrilobata* Dendy, reported from Zanzibar (Thomas,

1976, fig. 3a).

*Distribution* : Indian Ocean, Australian region

Family Suberitidae Schmidt

3. *Aaptos aaptos* (Schmidt)

(Fig. 1, s)

*Aaptos aaptos* Thomas, 1973, p.57, pl. 3, fig. 7, pl. 8, fig. 5; Thomas, 1986, p. 313, pl. 6, fig. 5

*Material* : Two slices

*Description* : Both specimens are slices from bun-shaped specimen; thickness 6 mm and maximum width, 7.5 cm.

*Colour* : Black

*Consistency* : Hard and incompressible when dry.

Details of oscules and pores could not be studied; skeletal arrangement is typical of the species.

*Spicules* : 1) Strongyloxeas. Straight or slightly curved, size up to 1.5 x 0.04 mm (Fig. 1, s 1). 2) Styles. Head prominent in about 5% spicules examined; size 0.29 x 0.008 mm (Fig. 1, s 2).

*Remarks* : For spicular measurements in the various specimens studied by earlier workers see Thomas (1973, p. 57).

*Distribution* : Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean, Australian region, Pacific Ocean

Family Gastrophanellidae de Laubenfels

4. *Aciculites orientalis* Dendy

(Fig. 1, h-j)

*Aciculites orientalis* Dendy, 1905, p. 101,

pl. 4, fig. 3: Thomas, 1986, p. 323, pl. 6, fig. 26.

*Material* : One bit

*Description* : Bit represented is only rim portion of a funnel - shaped specimen, size of bit 7 x 3 cm (height x width); thickness 1 cm at rim margin and 1.5 cm at its base; rim margin uniformly curved. A few tubercles seen on one side of the specimen and may represent the outer surface. Concentric annulations parallel to the rim margin are present on both surfaces at irregular intervals.

*Colour* : Pale white when dry

*Consistency* : Hard, stone - like

Surface uniform but minutely granular due to the presence of papillar projections arising from surface desmas. Outer surface with closely set openings of 0.5-1.5 mm diameter, rim elevated slightly or not and protected by radially paced tylostrongyles and may represent oscules (Fig. 1, h). Pores situated on the inner surface rarely in sieve areas (Fig. 1, h). Pores situated on the inner surface rarely in sieve areas (Fig. 1, i) individual pore with an average of 0.25 mm. Canals radiate from pore areas, but those leading to oscules run vertically down and then divide after reaching the middle of lamella.

Desmas unite to form a compact skeleton with tylostrongyles confined to dermal part, especially to oscular rim.

*Spicules* : 1) Monocrepid desmas. Axis strongly curved, shaft and branches with conical papillar projections (Fig. 1, J 2); size up to 0.32 mm. 2) Tylostrongyles. Slightly

curved, one end broader than the other and tylote, the other end strongylote; both ends microspined, size up to 0.6 x 0.009 mm (Fig. 1, j 1).

*Distribution* : Known previously from the Gulf of Mannar, here recorded from Papua and New Guinea.

Order Epipolasida Sollas

Family Jaspidae de Laubenfels

Subfamily Rhabdistiinae de Laubenfels

5. *Prostylyssa foetida* (Dendy)

(Fig. 1, t)

*Prostylyssa foetida* Thomas, 1986, p. 324, pl. 6, fig. 27 (synonymy)

*Material* : Three specimens

*Description* : Specimens irregularly tuberosous and attached to the substratum by broad base; size of largest specimen, 8 x 4 cm.

*Colour* : Brown when dry

*Consistency* : Hard but brittle when dry

Oscules scattered, with or without elevated rim; diameter up to 3 mm.

Dermal skeleton of oxeas tangentially placed in polygonal to irregular bands ornamented with small styles laterally. Main skeleton of oxeas in loose irregular bands running to surface.

*Spicules* : 1) Oxeas. Slightly curved and sharply pointed, size up to 1.2 x 0.032 mm (Fig. 1, t 1). 2) Styles. Size up to 0.23 x 0.008 mm (Fig. 1, t 2).

*Distribution* : Indo-Australian

6. *Asteropus simplex* (Carter)

(Fig. 1, n-o)

*Asteropus simplex* Bergquist, 1968, p. 32, pl. 4b, 11d (synonymy)

*Material* : Two specimens (an entire one and a bit)

*Description* : Bit represented is slice from a massive specimen, thickness 1 cm, width 10 cm and height 5 cm. The interior of this slice traversed by canals of 2-5 mm diameter and hence cavernous. The other specimen globular with two blunt projections arising from its upper surface (Fig. 1, n).

*Colour* : Sandy gray

*Consistency* : Hard when dry

Surface rough due to the presence of oxeas projecting from the interior. Skeleton typical of the species.

*Spicules* : 1) Oxeas. Slightly curved and sharply pointed; size 0.4 - 2.2 x 0.084 mm maximum (Fig. 1, o1). 2) Oxyasters. Centrum small to somewhat prominent and with 2-12 smooth or slightly roughened rays, rays suppressed in varying degrees (Fig. 1, o2), diameter up to 0.046 mm. 3) Sandiasters. Axis straight with pointed, blunt or even bifid rays in 2-4 whorls; size up to 0.020 mm (Fig. 1, o3).

*Remarks* : For a detailed discussion on this as well as on allied species of the genus *Asteropus* and on other related genera, see Bergquist (1968).

*Distribution* : Atlantic Ocean, Indo-Pacific

7. *Asteropus sarasinorum* (Thiele)

(Fig. 1, k-m)

*Asteropus sarasinorum* Bergquist, 1965, p. 187, figs. 30 a-c (synonymy)

*Material* : One entire specimen

*Description* : Specimen leaf-like and attached to the substratum by a slender stalk of about 5 mm diameter, stalk distally expands to a hold-fast of about 10 mm diameter. The foliaceous part is somewhat thick along the median line where the thickness, on an average, is 2 cm. Total height 13 cm and width (maximum) 5 cm. Specimen, except at the stalk proper, is ornamented with conical projections and their height increases towards the growing tip where one may measure up to 6 mm (height) on an average. Adjacent projections may fuse partly at places to form irregular ridges on the surface. The basal part of these projections often form radiating ridgelets and such ridgelets originating from adjacent projections intersect giving a tessellated appearance to the surface (Fig. 1, k).

*Colour* : Pale yellow when dry

*Consistency* : Rather hard and incompressible

Cloaca apical (Fig. 1, k-v), diameter, 10 mm and lined by ectosome. Minute pores may be present in between surface tessellations; apart from these a few rounded openings, 1-2 mm diameter, could also be seen scattered on the surface. Stalk smooth and even, but larger oxeas may be vertically arranged at places.

Ectosome 1-3 mm thick and pale white in colour, more thicker inside cloacal cham-

ber than elsewhere. Megacleres are arranged in irregular manner in ectosomal part; some may even be vertical to the surface; microscleres are also richly distributed. Endosome flesh coloured and oxeas may be irregularly arranged; stray bands of oxeas are also common.

*Spicules* : 1) Oxeas. Slightly curved and sharply pointed; some younger forms biangulate (5%), size 0.41-1.13 (0.89) x 0.008-0.047 (0.030mm) (Fig. 1, m1). 2) Microxeas. Centrotlyote or not, tips blunt in some, may or may not microspined. Size 0.008-0.060 x 0.002-0.006 mm (Fig. 1, m2) 3) Asters. Centrum inconspicuous and with 6-12 rays; rays microspined, sharply pointed to strongylote; diameter up to 0.025 mm (Fig. 1, m3).

*Asexual reproduction* : While examining the interior of the present specimen one oblong body (10 mm long axis and 5 mm diameter) was located adjacent to a main canal in the vicinity of the cloaca. This has a peduncle-like structure (made of oxeas of the sponge), on one end, but these oxeas never pierce the asexual body. Both ends of this body are somewhat bluntly pointed and the surface is uniformly smooth and glabrous and no opening of any sort could be detected on the surface. Microscopic examination revealed that this is only a miniature specimen with more compact ectosome and endosome (Fig. 1, 1). Ectosome is about 1 mm thick (average) with compactly arranged oxeas as in the adult with plenty of microxeas strewn in between. Endosome compact with larger oxeas and a few asters, the colour also is quite different from that of the ectosome.

It is quite possible that this body may represent an internally produced bud awaiting dispersal through the cloacal opening.

*Remarks* : For more details on the morphology, ecology and spicular measurements see de Laubenfels (1954, under *S. isis*) and for spicular measurements of species falling under synonymy with this species, see Bergquist 1965, (under *A. sarasinorum*).

*Distribution* : West Central Pacific, (it is here recorded from Papua and New Guinea).

Subfamily Jaspinae de Laubenfels

8. *Zaplethea digonoxea* ssp. *diastra* Vacelet & Vasseur

(Fig. 1, p-r)

*Zaplethea digonoxea* ssp. *diastra* Thomas, 1973, p. 67, pl. 3, fig. 17; Thomas, 1986, p. 328, pl. 6, fig. 35

*Material* : One bit

*Description* : Bit represented is part of a lamellar specimen probably growing erect; size, 6.5 x 6 cm and thickness, 2-4 mm.

*Colour* : Pale white when dry

*Consistency* : Soft and friable when dry

There is no differentiation into ectosome and endosome. One side of the specimen (Fig. 1, q) with small closely set pores of 0.5 - 1 mm diameter (poral side?) and the other (Fig. 1 p) with large openings of 1-1.5 mm diameter (oscular side?); some in groups of 2-5.

Surface corrugated on both sides and

oxeas may project out giving much hispidity to the surface.

Spicules, especially larger oxeas, are irregularly arranged in bundles in the interior together with smaller oxeas and micro-scleres. Oxeas may be seen at surface in bands running at different angles bordering pores and oscules.

*Spicules* : 1) Oxeas. Uniformly or centrally curved and sharply to bluntly pointed; stylote forms are rare (8%). Size 0.38-0.83 (0.67) x 0.006-0.012 (0.009 mm) (Fig. 1, r 1). 2) Microxeas. Biangulate or not (6%); sharply pointed (Fig. 1, r 2), size 0.07 - 0.136 x 0.002-0.004 (0.003 mm). 3) Oxyasters. Centrum small with 4-8 conical smooth rays (Fig. 1, r 3); diameter 0.018-0.044 (0.032 mm) 4) Oxyasters. Centrum small, with 4-8 acutely pointed rays; spines prominent only at tip of ray (Fig. 1, r 4); diameter 0.008- 0.016 mm.

*Remarks* : For spicular measurements of this subspecies recorded by previous workers see Thomas (1973). Specimens collected from the Indian seas were invariably encrusting, but lamellar body pattern is observed here.

*Distribution* : Widely distributed in the Indian Ocean and is here recorded from Papua and New Guinea.

Family Sollasellidae de Laubenfels

9. *Axinyssa flabelliformis* (Keller)

(Fig. 1, u-w)

*Axinyssa flabelliformis* Thomas, 1986, p.329

*Material* : Two specimens

*Description* : One specimen entire while the other devoid of stalk. Entire specimen 18 x 7 cm (height X width), stalk with 1.1 cm diameter at the narrowest part and expands at the point of attachment to 2 cm and with two bulbous expansions on the stalk. Lamella semicircular and cut up into 5 lobelets by deep notches, thickness 5-8 mm (Fig. 1, u). Other specimen is conical in shape, lamella 15 x 5 cm with a thickness of 4-7 mm.

*Colour* : Grayish brown when dry

*Consistency* : Tough and leathery

Oscules and pores not traceable; surface with closely set conical conules (Fig. 1, v), sometimes bifid at tips, height 1.5 mm and width 0.7 mm average and at places form ridges radiating to the periphery of the lamella.

Skeletal arrangement tallies well with that described by earlier workers.

*Spicules* : 1) Oxeas. Uniformly curved to slightly centrangulate; developmental stages well represented (Fig. 1, w); size 0.33 x 0.008 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region

10. *Axinyssa papuensis* n. sp.

(Fig. 1, x -z)

*Material* : One specimen (Type)

*Description* : Sponge bushy attached to the substratum by a stalk of about 2.5 cm length and 8 mm diameter. The stalk expands to 10 mm diameter at the point of attachment. Finger-shaped branches arise from the stalk at different levels and grow

upward in a bushy manner; branches circular in outline with diameter varying from 4-6 mm, never rebranch and end bluntly at the tip. Total height 10 cm and width, around the cluster of branches, 4 cm (Fig. 1, x).

**Colour** : Pale white except for the black distal part of branches

**Consistency** : Spongy, friable on preservation

Oscules small, 1-3 mm in diameter and arranged serially along branches at a distance of 3-8 mm, often flush with the surface, but absent in some areas.

Surface minutely conulose due to the presence of spicules projecting from the tip of fibers in a plumose fashion, and a thin dermal membrane covers these dermal brushes.

Skeleton consists of spicular fibers running through the central part of stalk and branches. These fibers branch and curve out to the periphery where they get interconnected by connectives in a scalariform pattern. Spongin content is never uniform in these fibers and hence provides a lumpy appearance at places and this character is more pronounced in the section taken from stalk portion of the sponge. Fibers are cored by oxeas in deeper parts but towards the periphery oxeas may be arranged in a plumose fashion (Fig. 1, y).

**Spicules** : 1) Oxeas. Uniformly curved and sharply pointed, size 0.187 - 0.231 (0.214) X 0.004-0.008 (0.005 mm) (Fig. 1, z).

**Remarks** : Considering the location of

the collection the specific name '*papuensis*' is suggested here.

## References

- Bergquist, P. R. 1965. The sponges of Micronesia, Part I. The Palau Archipelago. *Pacif. Sci.* 19 (2) : 123-204.
- 1968. The marine fauna of New Zealand : Porifera, Demospongiae, Part 1. Tetractinomorpha and Lithistida. *Bull. N. Z. Dep. Scient. Ind. Res.* 188 : 1-105.
- De Laubenfels, M. W. 1954. The sponges of the West-Central Pacific. *Ore.St.Monogr. Stud.Zool.* No.7 : 1-306.
- Dendy, A. 1905. Report on sponges collected by Prof. Herdman, at Ceylon, in 1902. *Rep. Govt Ceylon Pearl Oyster Fish. Gulf Mannar*, Suppl. 18 : 57-264.
- 1921. Report on the Sigma to tetraxonida collected by H. M. S "Sealark" in the Indian Ocean. *Trans. Linn. Soc. (Zool.)* (2) 18 : 1-164.
- Lindgren, N. G. 1897. Beitrag zur Kenntniss der Spongienfauna des Malaiischen Archipels und der Chinesischen Meere. *Zool. Anz.*, 20 : 480-487.
- 1898. Beitrag zur Kenntniss der Spongienfauna des Malaiischen Archipels und der Chinesischen Meere. *Inaug. Diss.* , 1-96.
- Ridley, S. O. 1884. Spongiida. Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H. M. S "Alert" 1881-1882 : 366-482, 582-630.
- Thomas, P. A. 1973. Marine Demospongiae of Mahe Island in the Seychelles Bank (Indian Ocean). *Mus. Roy. L'Afr. Cent., Belgium*, 203 : 1-98.
- 1976. Marine Demospongiae of Zanzibar Island. *J. mar. biol. Ass. India.* 18(3) : 448-460.
- 1986. Demospongiae of the Gulf of Mannar and Palk Bay. In : P. S. B. R. James (Ed.) *Recent Advances in Marine Biology*. Today and Tomorrow's Printers and Publishers, New Delhi. 205-365.
- 1987. Sponges of Papua and New Guinea I. Order Keratosida Grant. *J. mar. biol. Ass. India.* 24(1&2) : 15-22.