

Sponges Collected during the Third Indian Antarctic Research Expedition with Description of *Isodictya Echinata* Sp. Novo

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ABSTRACT

Six species of sponges collected from the Antarctic Sea off Queen Maud Land (69°54'S and 12°49' E) during the Third Indian Antarctic Research Expedition (December, 1983 to March, 1984) are described with suitable illustrations. Of the six species, three are referable to the Class Demospongiae Sollas and the others to the Class Hexactinellida Schmidt. One species of the Class Demospongiae, *Isodictya echinata* is described here as new to science.

INTRODUCTION

A small collection of sponges made from the Antarctic Sea off Queen Maud Land (69°54' and 12°49' E) by the second author during the Third Indian Antarctic Research Expedition (December, 1983 to March, 1984) is dealt with in the present account. These specimens have been accidentally collected in plankton net (Indian Ocean Standard Net) on 1st January, 1984. Details regarding the accidental inclusion of benthic animals in plankton net have been given in our paper on gorgonids* elsewhere in the present volume.

MATERIAL AND METHODS

An analysis of the sample revealed the presence of six species of sponges of which three are referable to the Class Demospongiae and the others to the Class Hexactinellida. The Demospongian species represented here are referable to three distinct orders; Haplosclerida Topsent, Poecilosclerida Topsent and Choristida Sollas. The Haplosclerid sponge, *Isodictya echinata* is reported here as new to science. Out of the three Hexactinellid species, one is represented only by the rooting tuft from which the body had been severed while collecting. The other two species of this Class are referable to the Subclass, Hexasterophora. These Hexactinellid species could not be identified to specific level for want of sufficient material. However, detailed descriptions and figures are provided in all these cases to facilitate future identification.

LIST OF SPECIES

- Class Demospongiae Sollas
- Order Haplosclerida Topsent
- Family Desmacionidae Gray
- 1. *Isodictya echinata* sp. novo

* P.A. Thomas and K.J. Mathew. *Primnopsis spicata* (Hickson) (Order Gorgonacea Lmx. Family Isididae Lmx.) from the Antarctic Sea.

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- Order Poecilesclerida Topsent
 Family Myxillidae Hentschel
 2. *Myxilla asigmata* Topsent

- Order Choristida Sollas
 Family Ancorinidae Gray
 Subfamily Stellettiniae Sollas
 3. *Monosyringa longispinna* (Lendenfeld)

- Class Hexactinellida Schmidt
 Subclass Hexasterophora Schulze
 4. *Hexactinellid* No. 1
 5. *Hexactinellid* No. 2
 6. *Hexactinellid* No. 3

SYSTEMATICS

1. *Isodictya echinata* sp. novo
 (Fig. 1: a,b)

Material: One specimen.

Type locality: 69°54' S and 12°49' E, off Queen Maud Land, Antarctica.

Description: Sponge erect, composed of loosely interwoven fibres bearing long, filiform conules from the outermost arms of the axial net-work. Conules are formed in all directions. The attachment of sponge to the substratum is effected by a short peduncle which has the same net-like appearance as in the main axis. Conules found on the peduncle are shorter as compared to those elsewhere. Length attained may be 30 mm on an average. These conules seldom divide, but if they do so, the division is dichotomous and subequal. They are set at right angle to the axial part, but near the actively growing areas they may be a bit tilted upwards.

Total height of the specimen 140 mm; axial part 3–6 mm wide, total width of the specimen including conules 30–50 mm.

Colour: White when dry (when dried after preservation in strong formalin).

Consistency: Fibrous; axis and conules easily breakable when dry. Surface of axial part uneven, coarsely reticulate; mesh size may vary considerably and conules originate directly from the outer-most arm of the axial net-work. Conules have the same diameter as that of axial fibres, say 0.37–0.75 mm. No trace seen of dermal skeleton, soft parts, oscules and pores.

Skeleton composed of stout fibres ranging in diameter from 0.37–0.75 mm. Spicules are closely packed in these fibres and the quantity of spongin is quite negligible. In some places spicules may be seen partly projecting out from the fibre in a slanting manner. The arrangement of spicules on conules is quite similar to that in the axial fibres; tip of these fibres often with plumosely arranged spicules. Chelas may be partly embedded in the axial fibres, but they are seldom noted on conules.

Spicules: (1) Oxeas. Slightly curved and sharply pointed; size, 0.45–0.75 x 0.008–0.033 mm, may assume stylote or strongy lote form. (2) Chelas. Chord 0.042–0.063 mm; rather abundant.

Remarks: Loosely reticulate fibres of the axial part, fibres originating directly from the axis in the form of conules which are directed in all planes as in the bristles of a bottle-brush and the total

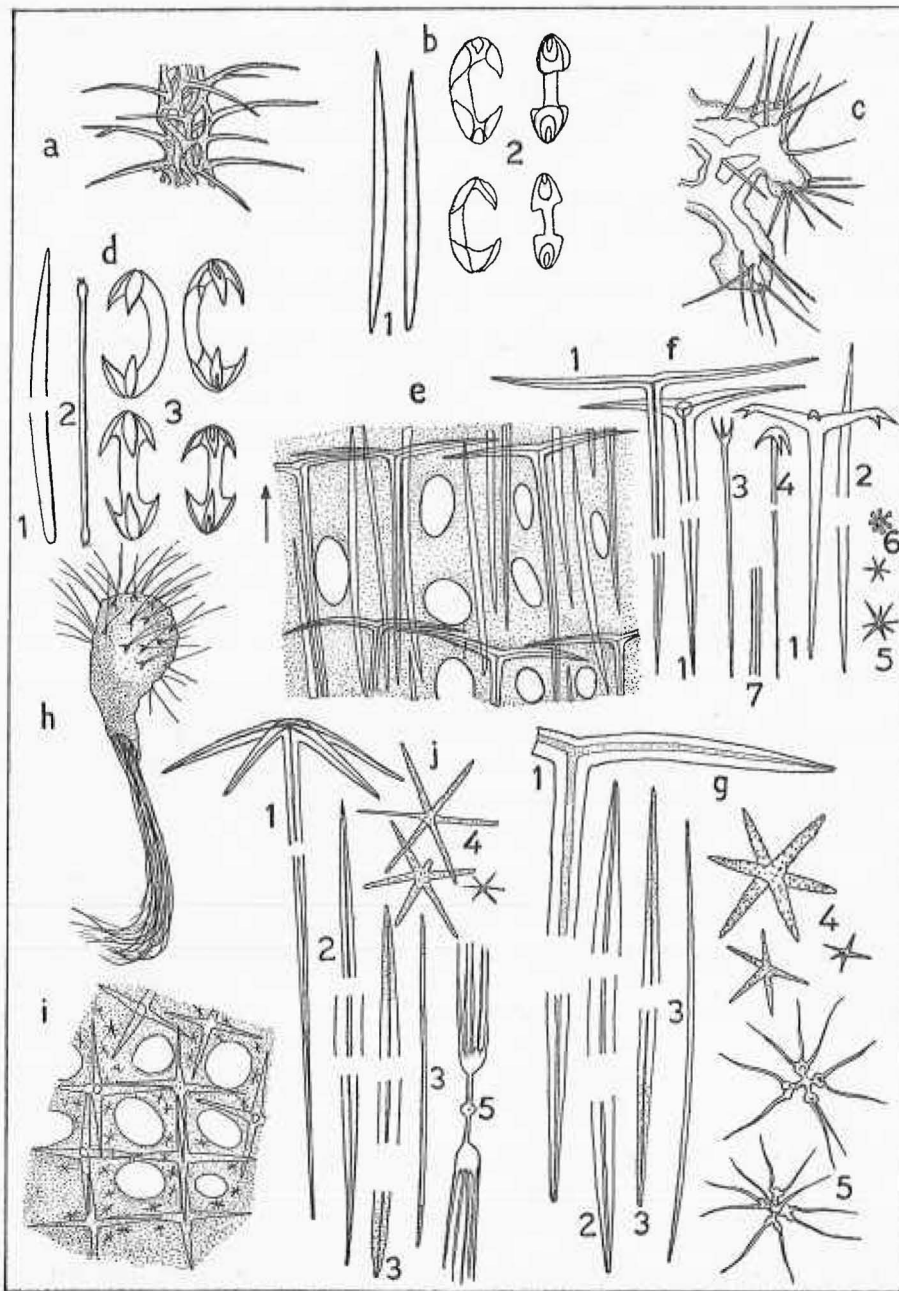


Fig. 1. (a) *Isodictya echinata*: Branch enlarged to show the general morphology; (b) *I. echinata*: Spicules, 1. Oxea (one with stylote modification is also shown), 2. Chelas, different views; (c) *Myxilla asigmata*: Section of sponge showing the arrangement of conules; (d) *M. asigmata*: Spicules, Style, 2. Tylote, 3. Chelas, different views; (e) *Monosyringa longispinna*: Portion of tube enlarged to show the arrangement of spicules and pores (arrow indicates the terminal part of the tube); (f) *M. longispinna*: Spicules, 1. Diaene, Triaene and Dichotriaene, 2. Oxea, 3. Protraiaene, 4. Anatriaene, 5. Oxyasters, different types, 6. Tylaster, 7. Raphides; (g) *Hexactinellid* No. 1: Spicules, 1. Diaene, 2. Large oxea, 3. Spiny oxea, 4. Hexasters, different types, 5. Oxyhexasters; (h) *Hexactinellid* No. 2: General appearance; (i) *Hexactinellid* No. 2: Dermal reticulation showing the arrangement of hexasters on the dermal part and pores; (j) *Hexactinellid* No. 2: Spicules, 1. Pentact, 2. Long oxea, 3. Spiny oxea (two types), 4. Hexasters (different types), 5. Calycome.

absence of any soft part are some noteworthy characters of the present new species. Considering the characteristic spiny appearance of the specimen the specific name *echinata* is suggested here.

2. *Mysilla asigmata* Topsent
(Fig. 1: c,d)

Lissodendoryx spongiosa var. *asigmata* Topsent, 1908, p. 26, pl. 3, fig. 1.
Myxilla asigmata Koltun, 1964, p. 50, pl. 9, figs. 8–11 (synonymy).

Material: One macerated specimen; size 15 x 11 mm, height 6–8 mm.

Description: Sponge irregularly massive, surface with hillock-like projections all over bearing conical conules.

Colour: Light brown, when dried after preservation in strong formalin.

Consistency: Fragile.

Oscules and pores not traceable. Surface with Hillock-like projections bearing conical conules. Styles which project partly out of the conules give much hispidity to the surface.

Ectosome is inseparable from endosome, densely charged with brown pigment granules of about 0.024 mm which are irregularly shaped. Endosome is cavernous.

Skeleton consists of tangentially arranged tylotes in the dermal part and ill-defined fibres with plumosely arranged styles. Spongin, pale yellow in colour and the quantity may vary from place to place. Main fibres, though form a reticulation, their exact structure is often obscured by the over-crowding of spicules, especially at the peripheral parts.

Spicules: (1) Styles. Slightly curved and sharply pointed, size up to 0.94 x 0.037 mm. (2) Tylotes. Neck portion less wider than the central part; size, 0.29–0.39 mm, diameter at the central part, up to 0.008 mm. (3) Chelas. Teeth sharp, chord upto 0.075.

Distribution: Antarctic and Sub-Antarctic.

3. *Monosyringa longispinna* (Lendenfeld)
(Fig. 1: e,f; Fig. 2: A)

Monosyringa longispinna Koltun, 1964, p. 15, pl. 1, figs. 1–9 (synonymy).

Material: One complete specimen and two smaller bits.

Description: Body bun-shaped with several (about 25) erect tubular structures (exhalant tubes?) arising from the upper surface. These tubes have a length of 100 mm on an average and a diameter of 9 mm at the base. The diameter of these tubes decrease gradually and at the extremities they open out by wide openings of about 6 mm diameter. Wall of the tube is thin and papery. Some smaller tubes with a diameter of 2–5 mm may also be seen along the periphery of the body. The bun shaped body has a height of 40 mm and a maximum diameter of 120 mm. The surface of the body, in between the tubes, lodges a thick layer of broken shells and other arenaceous objects and this indicates that the body was lying buried on the substratum. At places, where the surface was devoid of any foreign inclusions, erect spicules (mainly oxeas and triaenes) may be found projecting up to a height of about 4 mm.

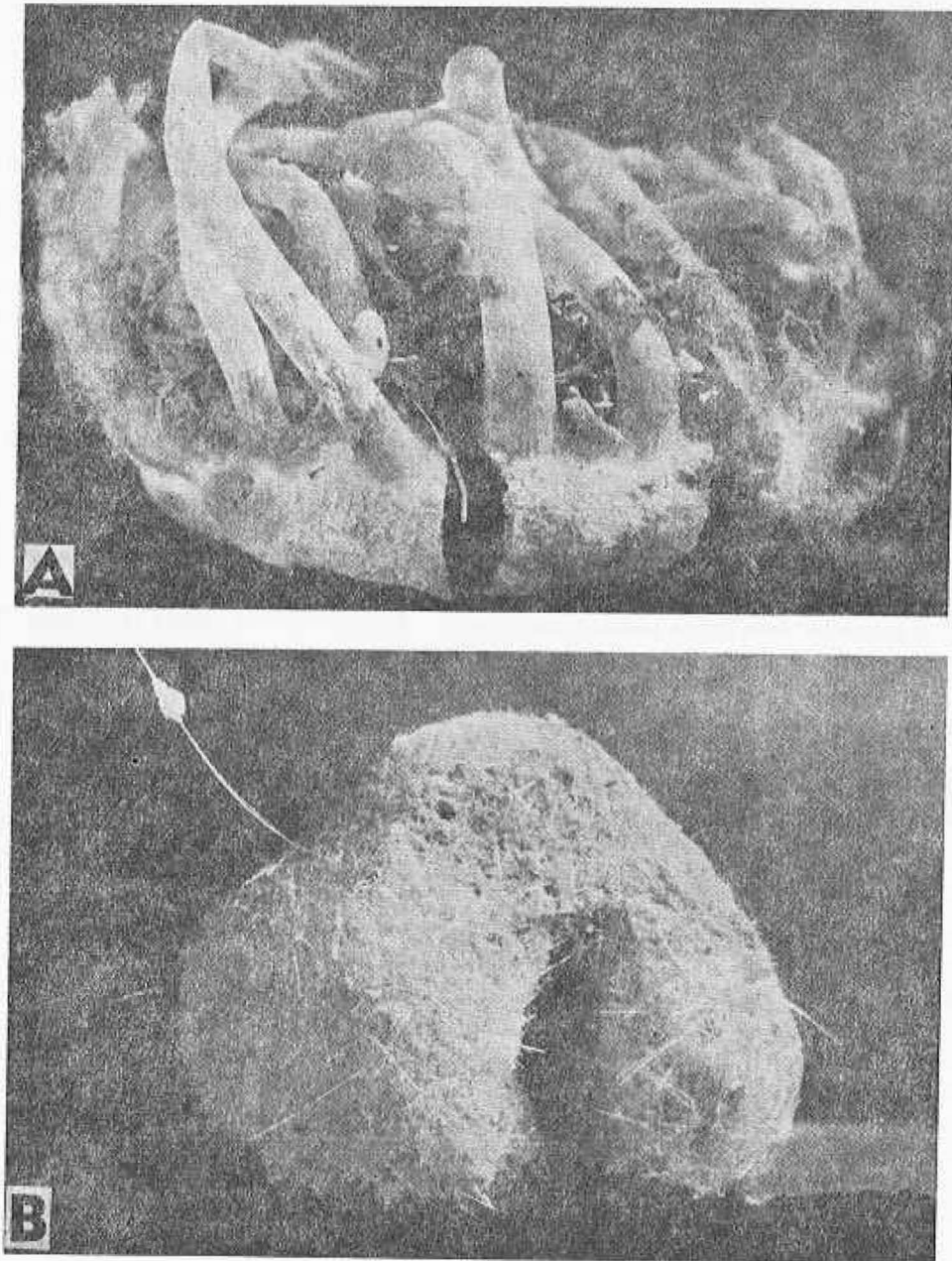


Fig. 2. A. *Monosyringa longispinna*: General morphology.
B. *Hexactinellid* No.1: General morphology (note the presence of a small bud attached to a spicule.)

Colour: Body pale white and tubes light brown in dry condition.

Consistency: Hard and stiff.

Surface of the main body highly hispid due to the presence of spicules projecting from the interior. Tubes have a smooth and uniform surface.

Openings situated at the tip of tubes may represent oscules (?). Apart from these, the wall of tubes may be pierced rather regularly by openings ranging in size from 0.1 to 0.3 mm and these may represent incurrent openings. Larger canals may be found inside the main body as a continuation of the canals inside the tube. These canals make the interior rather cavernous.

Skeletal arrangement of the tube is quite characteristic, composed of diaenes with their clads arranged at the same level along the wall in transverse ring-like fashion. Such rings may be located at intervals of 0.8 to 1 mm. Oxeas are also arranged longitudinally parallel to the shaft of diaenes, reinforcing the wall of the tube. The wall, at places where it is devoid of any spicules, is thin and semi-transparent and may, at the most, be reinforced with tylasters. Such areas may be pierced with small oblong or oval pores mentioned earlier (incurrent pores?).

The skeleton of the main body is typically radical consisting of triaenes and oxeas mainly, but occasionally pro or anatriaenes may also be noted partly jutting out of the surface. These spicules, in the interior, get arranged into irregular bands radiating towards the centre. Cortex is rather well developed with a thickness of about 0.5 mm. Clads of triaenes, as also of dichotriaenes which are rather sparse, are located either in the cortex or just beneath it. These spicules may project out of the surface giving a characteristic hispidity at places.

Spicules : (1) Triaenes, Diaenes and Dichotriaenes. Diaenes are present only on the wall of tubes while triaenes form the major constituent of the main radial skeleton, intermingling with dichotriaenes which are rather rare in the present specimens. Average size of diaene is: shaft, 5.6 x 0.07 mm and clad 1.1 x 0.09 mm. Clads may be slightly curved or twisted and are arranged at right angle to the shaft. These triaenes may measure on an average : shaft, 5.5 x 0.11 mm and clad, 0.8 x 0.08 mm. Dichotriaenes have the same dimensions as in triaenes. (2) Oxeas. Uniformly curved, size upto 7.5 x 0.08 mm. (3) Anatriaenes. Very rare, size; shaft, 3.7 x 0.02 mm, clad, 0.18 mm and chord, 0.226 mm. (4) Protriaenes. Very rare; shaft, 2.8 x 0.02 mm and clad, 0.15 mm. (5) Oxyasters. Rays conical and spiny throughout, diameter may vary from 0.021 to 0.05 mm. (6) Tylaster. Rays 6-10, diameter upto 0.012 mm. (7) Raphides. In bundles, individual size upto 0.37 mm and hair-like; some may be thicker at the middle portion (oxeote form).

Discussion : The present specimen is distinct from all those recorded previously under the genus in that the tubes originating from the upper part of the main body are numerous and this character is exceptional for the genus *Monosyringa* Brondsted. Upper part of the body with several tubes as noted in the present case may hence denote an adaptation to suit its growth on vertical surface. Characteristic diaenes reinforcing the wall of the tube lengthwise with their clads forming a continuous ring encircling the tube at regular intervals as noted in the present case is unique for this sponge. Diaenes found on the wall may be regarded as modified triaenes formed by the suppression of one ray and arranging the other two at 180° to suit the plane of orientation. Since these tubes are thin and papery, two clads arranged at 180° may serve the purpose of reinforcing the wall properly and hence there is no need for a third ray. This shows that function can alter the morphology to nature's advantage.

Distribution: Antarctic and Sub-Antarctic.

4. *Hexactinellid* No. 1
(Fig. 1: g; Fig. 2: B)

Material: Three specimens.

Description: Largest specimen is conical in shape with a base of 70 mm and a height of 50 mm. A cavity is present on one side of this specimen. The other two specimens were growing partly attached to the largest and may represent specimens formed by asexual means. These are onion-

shaped and the apices taper into a point. A small bud exactly resembling the above mentioned onion-shaped specimens is found attached to a spicule projecting from the upper part of the largest specimen (see photograph).

Colour: Pale-white when dry.

Consistency: Hard and stiff.

Surface hispid due to the presence of spicules projecting from the interior. Small circular openings of about 2 mm in diameter could be located in some parts of the largest specimen.

Spicules: Diaenes. A few spicules of this type could be noticed in one of the two onion-shaped specimens. However, this type of spicule was very rare and measured upto 20 mm in length. (2) Large oxeas. These spicules project out at the surface and are arranged radially inside. Asexually formed buds are found attached to these oxeas. Size, when well formed, upto 70 x 0.5 mm; one end blunt in about 6 o/c of the spicules examined. (3) Spiny oxeas. Both ends with spines; size upto 1.1 x 0.021 mm. This type constitutes the bulk and may project considerably out of the surface adding to the hispidity. Axial canal well developed in most. (4) Hexasters. Rays straight and spiny, those associated with canals with one ray suppressed; rays sharply pointed to blunt, size of ray upto 0.126 x 0.016 mm. Smaller forms are rather abundant. (5) Oxyhexasters. Rays suppressed in varying degrees, each arm with two rays generally; total diameter upto 0.063 mm.

5. *Hexactinellid* No. 2 (Fig. 1: h,i,j)

Material: One specimen.

Description: Sponge bulb-shaped with long rooting tufts originating from its base. Total height 70 mm, height of the bulbous portion being 30 mm with a maximum diameter of 25 mm.

Colour: Pale white when dried after preservation in strong formalin.

Consistency: Moderately tough, but brittle.

Surface, at places, with conical projections; height of these projections upto 1.5 mm with a diameter of 1.0–1.5 mm at the basal part. Each such projection supports 1–3 long oxeas at the summit. Radiating grooves may be seen just at the emerging part of these oxeas on the dermal portion. In between these conical projections mentioned above, the general surface is finely reticulate with each side of the 'mesh' formed by arms of adjacent hexasters lying side by side. The area in between these rectangularly arranged mesh is covered with a thin membrane which is pierced by pores having a diameter varying between 0.2 and 0.3 mm. These pores may be circular or oblong in outline and their number per mesh is generally one; but areas devoid of such pores could also be seen. The rim of the pore is sometimes reinforced by smaller hexasters, but generally smaller hexasters lie concentrated near the rays of larger hexasters that form the side of dermal mesh. Oscule is not traceable.

Dermal skeleton consists of hexasters, both large and small, arranged in the form of fine reticulation. The main skeleton is composed of oxeas, which are spiny at their tips, in radial to irregular bundles associated with long oxeas which project out at the surface. Occasionally anchoring pentacts may be found intermingled with long oxeas emerging from the summit of conical projections. Hexasters are abundant in the interior also.

Spicules forming the rooting tuft are long pentacts measuring upto 100 mm in length.

Spicules: (1) Pentacts. Axial canal well developed in most; size of shaft 100 x 0.126 mm and clad, 1.1 x 0.056 mm, sometimes two rays may be suppressed. (2) Long oxeas. Project considerably beyond the surface, length upto 50 mm and diameter, on an average, 0.5 mm. (3) Spiny oxeas. Slightly curved, uniformly pointed and with spines at both ends. Axial canal well developed; size upto 5.6 x 0.126 mm. Smaller forms are plenty and it is not known whether these constitute a different category at all. (4) Hexasters. Rays conical and spiny throughout, larger ones with abruptly pointed tips. One ray suppressed in those associated with canals. Size of ray upto 0.151 x 0.006 mm. Smaller forms are generally met within the surface and in this case a ray may measure upto 0.046 mm in length with a diameter of 0.004 mm. It is not sure whether these are younger forms of the above types. (5) Calycomes. Rare, length of ray upto 0.126 mm.

6. *Hexactinellid* No. 3

The third hexactinellid in the present collection is represented by a rooting tuft measuring upto 500 mm in length. This resembles a pony-tail in shape and is composed of a bundle (diameter may come upto 30 mm when closely packed) of long pentacts, each measuring 430 mm in length with a maximum diameter of 0.13 mm. Clads are four in number, each measuring 0.94 x 0.094 mm. on an average. The shaft is slightly constricted at the neck portion and the axial canal is very conspicuous in almost all spicules examined.

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