

**STUDIES ON INDIAN SPONGES**  
**VIII. FOUR NEW RECORDS OF SILICIOUS SPONGES**  
***ECHINOCHALINA GLABRA* (RIDLEY AND DENDY),**  
***HIGGINSLIA MIXTA* (HENTSCHEL), *GEODIA LINDGRENII***  
**(LENDENFELD) AND *PACHAMPHILLA DENDYI* HENTSCHEL**  
**FROM THE INDIAN OCEAN**

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ABSTRACT

Four species of silicious sponges *Echinochalina glabra* (Ridley and Dendy) *Higginsia mixta* (Hentschel), *Geodia lindgrenii* (Lendenfeld) and *Pachamphilla dendyi* Hentschel are recorded here from the Indian region. All these four species are known previously from Australia and adjacent regions.

IN THIS communication, four species belonging to the families Ophlitaspongiidae de Laubenfels, Axinellidae Schmidt, Geodiidae Gray and Halinidae de Laubenfels are dealt with. All these species are known previously from Australia and adjacent regions. The discovery of these species from the Gulf of Mannar, Palk Bay and Andaman Sea extends the distribution of these species to the Indian Ocean.

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ORDER : POECILOSCLERIDA Topsent

Family : *Ophlitaspongiidae* de Laubenfels

Genus : *Echinochalina* Thiele

Sponge consisting of a honey-comb like reticulation of thin lamellae. Skeletal reticulation of horny fibres, cored by smooth cylindrical spicules - either monactinal or quasideactinal and echinated by smooth conoidal styles. Microscleres absent.

The generic name was proposed by Thiele (1903) with type *Ophlitaspongia australiensis* Ridley (1884) from Queensland.

***Echinochalina glabra* (Ridley and Dendy) (Fig. 1 F, G)**

*Echinoclathria glabra* Ridley and Dendy, 1886, p. 475; 1887, p. 163, pl. 29, fig. 11, pl. 31, fig. 2. Dendy, 1896, p. 40. Whitelegge, 1907, p. 507. Hallmann, 1912, p. 290. Text fig. 67. Burton, 1934, p. 600.

*Echinochalina reticulata* var. Whitelegge, 1907, p. 536, p. 35, fig. 25. Hallmann, 1912, p. 290, pl. 30, fig. 2. Text fig. 66; Hallmann, 1912, p. 290, pl. 31, fig. 1.

*Thalassodendron viminalis* Whitelegge, 1901, p. 87.

*Echinoclathria intermedia* Whitelegge, 1902, p. 214.

*Echinochalina anomala* Hallmann, 1912, p. 294, Text fig. 69.

**Material :** One dry specimen from the Andaman Sea. CMFR1-S. 72.

**Description :** Sponge consisting of honey-comb like reticulation of flattened lamellae with their edges pointing outwards (this character is well seen only in the outermost lamellae). The width of each lamella varies from 1 to 3 mm and is flat in outline. The mesh size of these honey-combs average about 6 mm; mainly reticular. Total height of the specimen 160 mm and greatest width, 130 mm. In living condition, attached to the bottom by a small stalk (?). A number of balanoid shells found partly buried in the body.

**Colour :** Grey when dry.

**Consistency :** Fibrous, compressible and resilient. Oscules and pores not visible due to extremely worn out condition.

**Skeletal arrangement :** Well developed reticulation of main and connecting fibres. Main fibres cored by auxillary spicules and abundantly echinated by main styles. Coring spicules present inside the connecting fibres also, but not so abundantly as in the main fibres. Spongin somewhat pale and transparent. Meshes usually oval in outline due to the accumulation of spongin at the corners. Main fibres about 0.094 mm and connectives a little lesser in diameter. Auxillary spicules distributed in between the fibres abundantly. Certain compound fibres also present in the basal part of the specimen.

#### **Spicules**

**Styles :** Mainly echinating, head distinct with a narrow constriction; smooth with an uneven surface; Maximum width of the specule is at the middle portion. Length varies from 0.088 to 0.150 mm (average 0.1 mm) and width from 0.006 to 0.009 (average 0.008 mm).

**Tylostrongyles and Tylostylotes :** Straight with slightly expanded head; tip evenly rounded or sharply pointed; all the stages in between these two forms also met with Length varies from 0.151 to 0.222 mm (average 0.168 mm) and width from 0.002 to 0.004 (average 0.003 mm). Normally straight or slightly curved.

**Distribution :** Australian region, Andaman Sea.

**ORDER :** HALICHONDRIDA Vosmaer

**Family :** Axinellidae Schmidt

**Genus :** *Higginsia* Higgin

Characterised by the presence of styles and oxeas as megascleres and spiny microxeas for microscleres.

Type of the genus is *H. coralloides* Higgin (1877) collected during the cruise of the Steam Yacht 'Argo' from West Indies.

***Higginsia mixta* (Hentschel) (Fig. 1 H)**

*Dendropsis mixta* Hentschel, 1912, p. 415, pl. 21, fig. 54.

*Higginsia mixta* ♂ Hallmann, 1917, p. 656. Bergquist, 1965, p. 176, fig. 26.

**Material:** Two specimens. CMFRI - S. 90 (Rameswaram Island, Gulf of Mannar), CMFRI - S. 90 A (Waltair, Bay of Bengal).

**Description:** Body massively lamellar and highly ridged. Ridges, at the growing part, may project vertically up freely. In living condition one (R. No. 90) was attached to the carapace of a crab (*Dromia* sp.) and the cavity made by the crab being prominent on the side of the specimen. Height 65 mm and greatest width 45 mm. The other specimen (R. No. 90A) was collected from the seashore in a macerated condition; bushy and lamellar in shape. Height 170 mm and width 50 mm.

**Colour:** Brickred externally and pale yellow internally when alive.

**Consistency:** Rather compact. Oscules and pores visible. Surface quite rough due to the presence of spicules emerging from the interior in plumose manner.

**Skeletal arrangement:** Irregular ascending tracts present along the central part. Tracts may fuse with adjacent ones and in some parts, especially in the older, they may fuse and form a dense network. From the central parts by actual division of the axial fibres the extra-axial fibres arise and travel in an oblique direction towards the periphery. In these axials, styles predominate. The styles present usually in the centre of each tract surrounded by oxeas. Spongin not seen enveloping the tracts completely. Extra-axial fibres end in surface conules. Small acanthoxeas abundantly met with just below the dermal part, arranged in a tangential manner.

**Spicules**

**Stout oxeas:** Main component of the spicular tracts; centrally angulated and sharply pointed; stylote modifications, rarely represented. Maximum length 0.943 mm (0.566 to 0.943 mm) and width from 0.008 to 0.036 mm (0.022 mm).

**Slender oxeas:** Chiefly represented in the dermal brushes; slightly angulated at the centre. Length varies from 0.610 to 1.02 (average 0.733 mm) and width from 0.004 to 0.008 (average 0.005 mm).

**Long styles:** Length varies from 1.801 to 3.112 mm (average 2.17 mm) and width from 0.002 to 0.016 mm (0.012 mm).

**Acanthoxeas:** With a central flexure in most cases; a central belt of long spines prominent in some; intermediate forms between entirely smooth and entirely spined, usually met with. Length varies from 0.044 to 0.181 mm (average 0.121 mm) and width from 0.002 to 0.009 mm (average 0.004 mm) (excluding spines).

Burton (1959) classified the present species under the group "main megascleres seldom exceeding 0.9 mm in length". But Bergquist (1965)

recorded specimens with oxeas exceeding 1 mm very often. In the present specimen also this exceeds 0.9 mm.

*Distribution* : Australian region, Western Pacific, Indian Ocean.

ORDER : CHORISTIDA Sollas

Family : *Geodiidae* Gray

Genus : *Geodia* Lamarck

Sterrasters arranged to form a distinct armour. Skeleton radial, composed of long shafted triaenes and oxeas as main.

Type : *Geodia gibberosa* Lamarck.

*Geodia lindgreni* (Lendenfeld) (Fig. 1 A -- C)

*Sidonops picteti* Lindgren, 1897, p. 436; 1898, p. 67, pl. 18, fig. 17a, b, pl. 20, figs. 6 a-b, c', c'', d'.

*Sidonops lindgreni* Lendenfeld, 1903, p. 102; 1910, p. 223. (Not *S. picteti* Topsent 1897)

*Material* : Nine specimens from Palk Bay and Gulf of Mannar. CMFRI - S. 137. Depth 1-2 metres.

*Description* : In the younger specimens the shape is almost spherical. As growth proceeds the body assumes an irregular shape and sometimes digitiform projections appear from the upper parts. Surface areolated. Oscules in groups at the base of slightly depressed areas. All specimens are alike in general shape and surface pattern.

*Colour* : Pale white when alive.

*Consistency* : Hard and incompressible.

Oscules in localised areas, often protected by a sphincter reinforced by radially arranged styles; oval in outline. Pores distributed throughout the general surface; diameter 0.1 mm.

*Spicules*:

The general arrangement of spicules agrees well with the description by Lindgren (1898). Thickness of the cortex varies from 1 to 2 mm.

*Orthotriaenes* : Clads at right angles to the shaft; long and convex. Shaft conical and sharply pointed. Maximum length of clad 0.7 mm. Length of shaft in well developed forms upto 2.5 mm and width about 0.042 mm. Clads of the triaenes are just beneath the sterraster crust and parallel to it; rays subequal.

*Anatriaenes* : Radially arranged corresponding to the direction of orthotriaenes. Rhabds slender and with hair-like terminations. Total length upto 2.8 mm and width 0.016 mm. Clads when well developed, 0.063 mm and chord length, 0.071 mm. Rarely represented in some specimens.

*Protriaenes* : Suppression of clads normal; monaenes or diaenes. Total length upto 4.5 mm, greatest width at the middle portion 0.025 mm. Length of clad 0.096 mm maximum.

*Oxeas* : Slightly curved and sharply pointed. Well developed forms attain a length of 3.3 mm and width 0.037 mm. Younger forms rarely crooked.

*Styles* : Dermal; slightly curved, maximum width at the central part. Size 0.296 x 0.006 mm.

*Sterrasters* : Oval in outline; size, when well developed 0.147 x 0.126 mm.

*Oxyasters* : Choanosomal; rays long and slightly roughened; centrum small, diameter upto 0.054 mm; abundantly represented.

*Strongylasters* : Mainly dermal; centrum small and rays blunt. Diameter upto 0.005 mm.

*Distribution* : Australian region, Indian Ocean.

ORDER : CARNOSIDA Carter

Family : *Halimidae* de Laubenfels

Genus : *Pachamphilla* Lendenfeld

The spiculation consists of oxeas of two types, styles and dichotriaenes. Spherules may or may not be present. Type *P. alata* Lendenfeld (1907).

The genus *Pachamphilla* Lendenfeld (1907) was originally included in the family Pachastrellidae. de Laubenfels (1936) synonymised this genus with *Dercitopsis* Dendy (1905), but this procedure is not justifiable on account of the peculiar spiculation of this genus and hence the genus *Pachamphilla* Lendenfeld is retained here.

#### ***Pachamphilla dendyi* Hentschel (Fig. 1 D, E)**

*Pachamphilla dendyi* Hentschel, 1912, p. 308, pl. 13, fig. 5, pl. 17, fig. 3.

*Material* : Three specimens from Palk Bay from a depth of 1-2 metres. CMFRI-S. 146. Examined in dry condition.

*Description* : Sponge encrusting on the lower surface of coral rocks; spreading irregularly. Maximum thickness 1 mm.

*Colour* : Chocolate when dry.

*Consistency* : Smooth and compressible, without much resiliency.

Surface smooth and microscopically reticulate, brought about by the bands of oxeas crossing each other at regular or irregular intervals. Such arrangements quite clearly noted in all specimens examined.

Oscules small and scattered; with raised margins. Pores, minute and in most cases oval in outline; diameter varies from 0.033 to 0.085 mm.

*Estosome* : A well developed and detachable ectosome present.

*Endosome* : Fibrous.

*Skeletal arrangement* : In the dermal part, large and smaller oxeas arranged in thickly packed bands, large oxeas present at the centre and smaller ones at sides, ornamenting the bands. But this arrangement gets confused at places, resulting in oxeas lying scattered in the dermal membrane

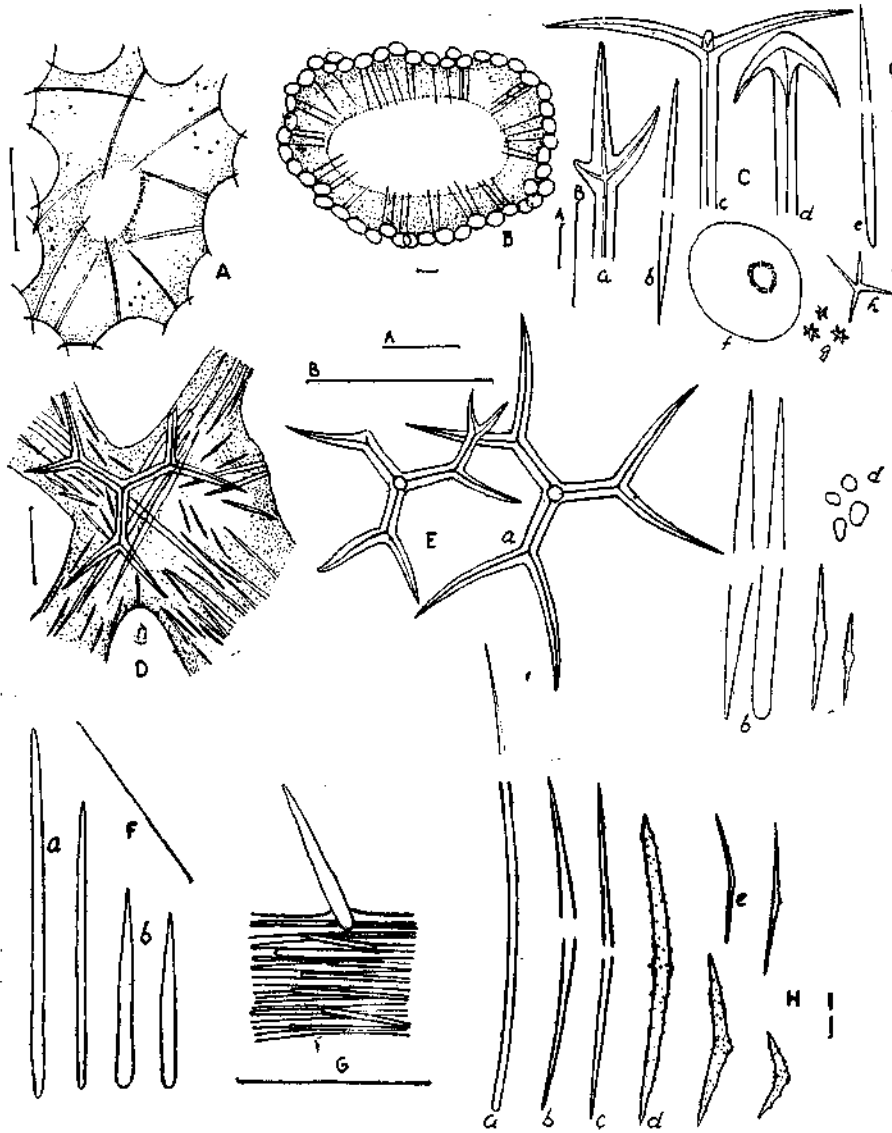


Fig. 1 A - C. *Geodia lindgreni* (Lendenfeld): A. pore, B. oscule, and C. spicules - a. protriaene, b. oxea, c. orthotriaene, d. anatriaene, e. dermal style, f. sterraster, g. strongylaster, h. oxyaster (b, c - scale A; f - scale B; others - scale C, D), E. *Pachamphilla dendyi* Hentschel: D. dermal skeleton; E. spicules - a. dichotriaene, b. oxea and style, c. microxeas; d. spherules (a-scale A, others-scale B); F, G. *Echinochalina glabra* (Ridley and Dendy): F. spicules - a. tylostrongyle and tylostyle, b. echinating style; G. part of the fibre-showing the echination; H. *Higginsia mixta* (Hentschel): Spicule - a. style, b. oxea, c. slender oxea, d. acanthoxeas; and e. acanthoxeas initial stage. (Inset scale shows 0.1 mm throughout)

irregularly. At the junction of these bands the dichotriaenes present with their clads extending horizontally; their shafts penetrate deep into the endosome vertically.

In the endosome the oxeas lie scattered irregularly and form bands supporting the dermal skeleton vertically in some places.

#### *Spicules*

*Oxeas* : Slightly curved and sharply pointed; rarely stylote, strongylote or stair stepped. Often show considerable variations in size. Length varies from 0.21 to 0.544 mm (average 0.384 mm) and width from 0.004 to 0.018 mm (average 0.013 mm.)

*Dichotriaenes* : Shaft conical, average length 0.188 mm and width about 0.020 mm at the junction between the shaft and clads. In well developed spicules the protoclad has a length of 0.084 mm and a width of 0.014 mm average. The deuteroclad has a length of 0.168 mm and a width of 0.012 mm average at its origin. Chord length when well developed, 0.51 mm. Suppression of clads quite common.

*Microxeas*. Fusiform with a ring-like swelling at the centre. Length varies from 0.048 to 0.088 mm and width 0.005 mm average.

*Spherules* : Rounded or irregular. Diameter varies from 0.004 to 0.012 mm; well represented.

*Remarks* : The chief difference between *P. dendyi* and *P. ochracea* (Carter, 1886) is in the size of oxeas. They measure upto 1 mm in *P. ochracea*.

*Distribution* : Australian region, Indian Ocean.

#### REFERENCES

- BERGQUIST, P. R. 1965. The sponges of Micronesia, Pt.1. The Palau Archipelago. *Pacif. Sci.*, 19 (2) : 123-204.
- BURTON, M. 1934. Sponges. Great Barrier Reef Expedition (1928-29). *Scientific Reports Brit. Mus. Nat. Hist.*, 4 (14) : 513-614.
- \_\_\_\_\_. 1959. Sponges. John Murray Expedition 1933-34. *Ibid.*, 10(5) : 151-281.
- CARTER, H. J. 1886. Supplement to the description of M. J. Bracebridge Wilson's Australian sponges. *Ann. Mag. nat. Hist.*, 18 (5) : 271-290; 369-379; 445-466.
- DENDY, A. 1896. Catalogue of non calcareous sponges collected by J. Bracebridge Wilson Esq., M.A., in the neighbourhood of Port Philip Heads Pt. II. *Proc. R. Soc. Vict.* 8 (2) : 14-51.
- \_\_\_\_\_. 1905. Report on the sponges collected by Prof. Herdman at Ceylon in 1902. *Rep. Govt. Ceylon Pearl Oyster Fish. Gulf of Mannar Suppl.*, 18 : 57-246,
- DE LAUBENFELS, M. W. 1936. A discussion of the sponge fauna of Dry Tortugas in particular and the West Indies in General with materials for a revision of the families and orders of the Porifera. *Pap. Tortugas Lab.*, 30 : 1-225.
- HALLMAN, E. F. 1912. Report on the sponges obtained by F.I.S. 'Endeavour' on the coast of New South waks, Victoria, South Australia, Queensland and Tasmania Pt.1. *Zool. Results Fish. Exp. 'Endeavour'*, Pt. II : 117-300.

- \_\_\_\_\_. 1917. A revision of the genera with microscleres included, or provisionally included in the family Axinellidae; with description of some Australian species Pt. III. *Proc. Linn. Soc. N. S. W.*, 41 : 634-676.
- HENTSCHEL, B. 1912. Kiesel- und Hornschwamme der Aru und Kei-Inseln. *Abh. senckenb. naturforsch. Ges.*, 34 : 295-448.
- HIGGIN, T. 1877. Description of some sponges obtained during a cruise of the Steam Yacht "Argo" in the Caribbean and neighbouring seas. *Ann. Mag. nat. Hist.* 19 (4) : 291-299.
- LENDENFELD, R. VON 1903. Tetraxonida. *Das-Tierreich.*, 19 : 1-168.
- \_\_\_\_\_. 1907. Tetraxonida. *Wiss. Ergebn. dt. Tiefsee Exped. 'Valdivia'*, 11 : 59-374.
- \_\_\_\_\_. 1910. Report on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz by the U. S. Fish Commission Steamer 'Albatross' I. The Geodidae. *Mem. Mus. comp. Zool. Harv.*, 41 (1) : 1-255.
- LINDGREN, N. G. 1897. Beitrag zur kenntnis der spongienfauna des Malayischen Archipell un der Chinesischen Meere. *Zool. Anz.*, 20 : 480-487.
- \_\_\_\_\_. 1898. Beitrag zur kenntnis der spongien fauna des Malaiischen Archipels und der Chinesischen Meer. *Inaug. Diss.*, 1-96.
- RIDLEY, S. O. 1884. Spongiida. Report on the zoological collection made in the Indo-Pacific Ocean during the voyage of H.M.S. 'Alert' 1881-1882, 366-482; 586-630.
- \_\_\_\_\_. AND A. DENDY 1886. Preliminary report on the monaxonida collected by H. M. S. 'Challenger'. *Ann. Mag. nat. Hist.*, 18 (5) : 325-351, 470-493.
- \_\_\_\_\_. AND 1887. Report on the monaxonida collected by H.M.S. 'Challenger' during the years 1873-1876. *Rep. Sci. Res. Challenger, Zool.*, 20 : 1-275.
- THIRLE, J. 1903. Kieselschwamme von Ternate II. *Abh. senckenb. naturforsch. Ges.*, 25: 933-968.
- THOMAS, P. A. 1968. Studies on Sponges. *Ph. D. Thesis, University of Kerala.*
- TOPSENT, E. 1897. Spongiaires de la Baie d'Amboine. *Revue suisse Zool.*, 4 : 421-487.
- WHITELEGGE, TH. 1901. Report on sponges from the Coastal beaches of New South Wales. *Rec. Aust. Mus.*, 4 : 55-118 (1-63).
- \_\_\_\_\_. 1902. Supplementary notes to the reports on sponges from the coastal beaches of New South Wales. *Ibid.*, 4 : 211-216.
- \_\_\_\_\_. 1907. Scientific results of the Trawling Expedition of H.M.C.S. 'Thetis' of the coast of New South Wales in February and March 1898, Pt. IX. Sponges. *Mem. Aust. Mus.* 4 : 487-515.