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Family Merliidae Kirkpatrick, 1908

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Merliidae Kirkpatrick (Demospongiae, Mycalina) is a monogeneric family of poecilosclerids with a 'sclerosponge' body plan. The calcareous basal skeleton of the single genus *Merlia* Kirkpatrick, 1908d has a distinct 'chaetetid' architecture and the mineral composition is high magnesium calcite. The poecilosclerid affinity is evident from the siliceous spicules, particularly the unique microscleres called clavidiscs, which bear structural resemblance to hamacanthid diancistras. Other spicular features, such as the possession of tylostyles and commata-like raphides indicate relationships with desmacellid sponges. Thus, the family is assigned to the poecilosclerid suborder Mycalina. Five species of *Merlia* have been named, including one fossil. Some species lack either the calcareous basal skeleton or the clavidiscs.
Keywords: Porifera; Demospongiae; Poecilosclerida; Mycalina; Merliidae; *Merlia*.

DEFINITION, DIAGNOSIS, SCOPE

Definition

Mycalina with calcareous basal skeleton and clavidisc microscleres.

Diagnosis

Thin crusts consisting of a chaetetid calcareous basal skeleton (i.e., formed of a layered system of calcareous chambers), the outer layer of which is filled with sponge tissue and siliceous spicules. The basal skeleton is made up of high magnesium calcite and the microstructure is of the 'water-jet' type. The spiculation consists of thin tylostyles arranged in wispy plumose bundles, unique keyhole type microscleres called clavidiscs, rugose raphides, and small commata-like spicules appearing monactinal.

Scope

A single genus, *Merlia*, with about five species.

Taxonomic history

Kirkpatrick (1908d) discovered this remarkable organism and immediately recognized its sponge nature, but misinterpreted it as a 'pharetronid' sponge because he attributed some foreign tuning-fork spicules to it. In a follow-up study (Kirkpatrick, 1909) he assumed that the siliceous spicules were from an independent organism, naming the latter *Noronha scalariformis*. However, after extensive fieldwork and the study of many specimens he reached the conclusion (Kirkpatrick, 1911) that the limestone base is secreted by the siliceous sponge, and that the complex should be classed as a sister-group to Desmacellinae. Subsequently, the systematic position of *Merlia* varied among authors (see Hoshino, 1990 for a table of assignments). Hartman & Goreau (1970) assigned *Merlia* to their class Sclerospongiae, erected for sponges with calcareous basal skeletons. This was subsequently contested by Van Soest (1984a) and Vacelet (1985), who pointed out that the calcareous basal skeleton is facultative and certainly not of phylogenetic significance at the ordinal or class levels. Vacelet (1980a, 1985) proposed assignment of an order Merliida to the subclass Tetractinomorpha, but Van Soest (1984a), Hoshino (1990), Reitner (1992) and Hajdu (1995) emphasized similarities of clavidiscs and diancistras, and the commata-like raphides, and returned *Merlia* to Poecilosclerida, either as a member of Hamacanthidae or Biemnidae/Desmacellidae. In view of the fact that *Merlia* shows affinities to both Hamacanthidae and Desmacellidae, and because the calcareous basal skeleton is unique in Mycalina, it is proposed here to follow Kirkpatrick in assigning *Merlia* to a family of its own.

MERLIA KIRKPATRICK, 1908

Synonymy

Merlia Kirkpatrick, 1908d: 510. *Noronha* Kirkpatrick, 1909: 48.

Type species

Merlia normani Kirkpatrick, 1908d (by monotypy).

Definition

As for definition of family.

Diagnosis

Thin crusts with smooth surface, covering usually a calcareous basal skeleton consisting of a system of layered chambers. The chambers of the outer layer are filled with choanosomal tissue and spicules, the inner chambers are filled with undifferentiated cell masses. The calcareous basal mass may be absent. Spicules consist usually of thin tylostyles, clavidiscs, raphides, and finely spined monactines (commata). Clavidiscs may be absent.

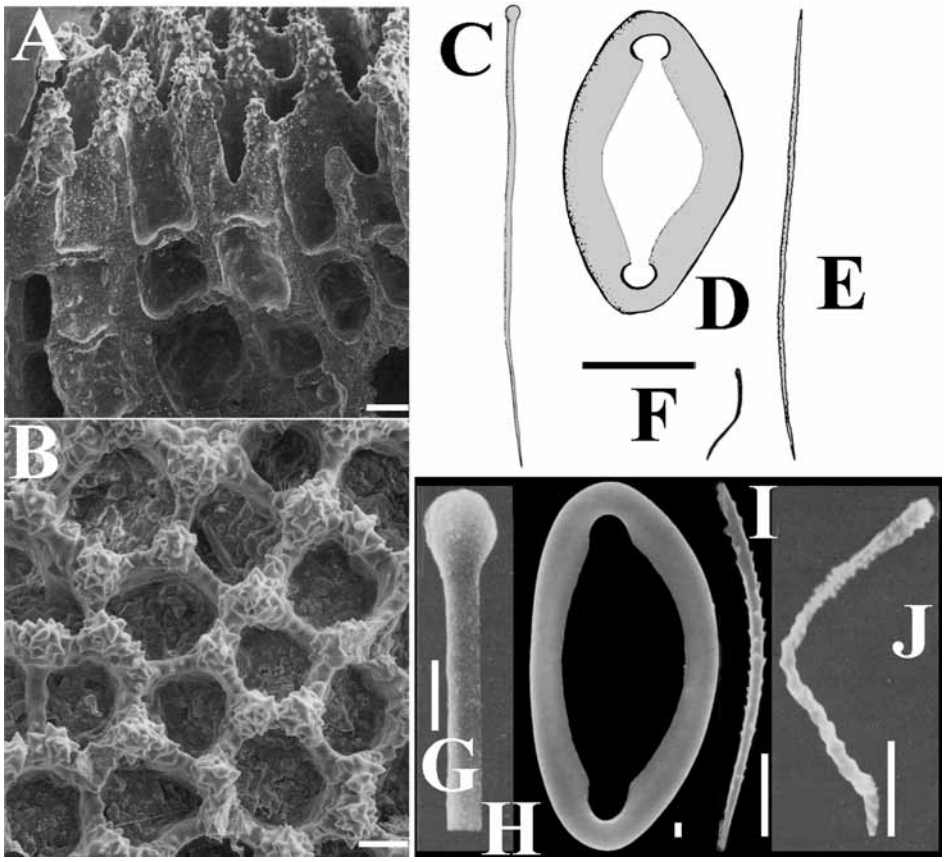

Fig. 1. *Merlia normani* Kirkpatrick, 1908d. A, SEM image of cross section of calcareous basal skeleton (scale 100 μm) (from Vacelet & Uriz, 1991). B, SEM image of upper chamber layer (scale 100 μm) (from Vacelet & Uriz, 1991). C–F, drawing of spicules (scale 15 μm) (from Van Soest, 1984a). G–H, SEM images of spicules. G, tylostyle (scale 10 μm). H, clavidisc (scale 1 μm) (from Gautret *et al*., 1991). I–J, rugose commata (scale 5 μm) (I, from Gautret *et al*., 1991; J, from Van Soest, 1984a).

Recent reviews

Vacelet, 1980a: 227; Van Soest, 1984a: 212; Hoshino, 1990; Vacelet & Uriz, 1991: 171; Reitner, 1992: 236.

Description of type species

Merlia normani Kirkpatrick, 1908d (Fig. 1A–J).

Synonymy. *Merlia normani* Kirkpatrick, 1908d: 510, pl. XV, figs 10–18; *Noronha scalariformis* Kirkpatrick, 1909: 48.

Material examined. Holotype: BMNH 1911.4.7.10 – Canon Norman's original type specimen, on rock, Porto Santo. Other material. BMNH 1911.4.7.2–9 (including the 1911 figured specimen 1911.4.7.7), BMNH 1954.2.21.115–116, 1954.6.3.2 – specimens and slides, all from Porto Santo.

Description (adapted from Kirkpatrick, 1911: 661). 'The great majority of the specimens, of which there are about 1000, were obtained from sixty fathoms off Porto Santo Island.' Small incrustations, ca. 1 cm^2, 1 mm thick, growing on shells, octocorals ('branches of corallines'), foraminiferans and worm-tubes; bright-vermillion in colour, smooth surface. Calcareous basal skeleton (Fig. 1A–B) more-or-less regularly honeycombed, 'with blocks of reddish orange-coloured jelly filling in the spaces', with three or four, rarely five layers from edge to centre of the sponge. Blocks (crypts, chambers) in fairly regular horizontal and vertical rows; occasionally some blocks of double breadth are found; regularity of horizontal rows frequently broken due to shorter or longer than average size of the blocks. Meshes are 180–220 μm in diameter, the cavities being 120–150 μm across, and the walls 40–60 μm thick. Youngest specimens with no crypts at all, the calcareous skeleton made of slender bars of a wide-meshed polygonal reticulation. The number of layers diminishes from centre to the edges of the sponge, where there may be a region devoid of the basal calcareous skeleton. Meshes surrounded by 4–8 tubercles. Tubercles are 75 μm high and 75 μm broad, and bear sharp-pointed conules, about 10 μm high and 16 μm broad at the base. The basal skeleton and its outer layer of chambers is filled with choanosomal tissue (choanocyte chambers, canal system) and covered by organic ectosome. The inner chambers are filled with masses of archaeocytes which are assumed to have a function similar to that of gemmules. Siliceous skeleton. Upright bundles of tylostyles with points outwards, along with a few raphides, forming more or less vertical pillars of support. Megasclere bundles may be seen lying transversely on the floor of an upper open crypt. Only very rarely spicules are seen in the lower crypts. Clavidiscs occur everywhere, but are more abundant on the surface. Commata occur in the choanosome, especially close to the choanocyte chambers. Spicules (Fig. 1C–J). Tylostyles (Fig. 1C, G), slender, commonly curved at the distal end, sometimes nearly straight, ca. 140 × 1.8 μm thick, with tyles 5 × 2.2 μm. Clavidiscs (Fig. 1D, H), ca. 45 × 30 μm, with a rim beveled inwards to a thin edge, ca. 3 μm thick. A key-hole shaped sinus or notch is present on the inner margin at each end of the long axis. Rugose raphides (Fig. 1E), in trichodragmata ca. 80 μm long. Monactine curved commata-like spicules (Fig. 1I–J), rugose or spined, occuring singly or in bundles, ca. 15 μm.

Remarks. *Merlia* is well distinguished from other mycaline genera based on either the basal skeleton or the clavidiscs or both. *Noronha* is a clear objective synonym as it was based on the mistaken assumption that the soft parts pertained to a different sponge than the hard basal calcareous skeleton. Five species of *Merlia* have been named, including one fossil, *M. morlandi* (Hinde & Holmes, 1892). Some species lack the generic synapomorphies: the calcareous basal skeleton is lacking in *M. deficiens* Vacelet, 1980a and *M. tenuis* Hoshino, 1990, and the clavidiscs are lacking in *M. lipoclavidisca* Vacelet & Uriz, 1991. The latter authors expressed concern for the possible inclusion of deficient/lipoclavidisc species of *Merlia* in genera such as *Terpios*, but this could apply to many other cases in the Poecilosclerida where reduced forms may occur. The often markedly lobate head of the tylostyles in *Terpios* (e.g., Rützler & Smith, 1993) should prevent such erroneous identifications.

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