

Family Hamacanthidae Gray, 1872

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Hamacanthidae Gray (Demospongiae, Poecilosclerida, Mycalina), including Vomerulinae Ridley & Dendy, includes eight nominal genera of which only two genera and two subgenera are considered valid. The family is defined by its possession of mycalostyles and diancistra derivatives (diancistras and cyrtancistras), c-shaped, flat or contorted, and placed near Mycalidae by their lack of tridentate chelae and restricted architectural specialization (e.g., lack of acanthostyles).

Keywords: Porifera; Demospongiae; Poecilosclerida; Mycalina; Hamacanthidae; *Hamacantha*; *Hamacantha* (*Hamacantha*); *Hamacantha* (*Vomerula*); *Pozziella*.

DEFINITION, DIAGNOSIS, SCOPE

Synonymy

Hamacanthidae Gray, 1872a: 449. Vomerulinae Ridley & Dendy, 1886: 337.

Definition

Mycalina with diancistra-derivatives (diancistras or cyrtancistras) which are always c-shaped, flat or contorted.

Remarks

The hamacanthids are a well-characterized group of about 25 species distributed worldwide. The classification of Hamacanthidae within the Mycalina is considered well corroborated by its possession of mycalostyles and likely sigmancistra derivatives (diancistras and cyrtancistras), their lack of tridentate chelae, and on the restricted architectural specialization produced by their megascleres (e.g., absence of echinating acanthostyles; Hajdu, 1994). On the other hand, their closer affinity to the Mycalidae still warrants further investigation, perhaps through the assessment of complimentary data sets (e.g., cytology, DNA, etc.). A rivalling arrangement,

which cannot be entirely ruled out on the basis of available morphological evidence, would classify *Hamacantha* Gray, 1867a and *Merlia* Kirkpatrick, 1908c (Merliidae) closer together, because of the striking similarity between diancistras and clavidiscs (e.g., Topsent, 1928c; Wiedenmayer, 1994; Lehnert & Van Soest, 1998). Despite our fragmentary knowledge of poriferan biodiversity during geological time, the diagnostic spicules that bear on the issues raised here are known from the paleontological literature. Diancistras and clavidiscs are known since the lower Jurassic (Mostler, 1990), while anisochelae are only confidently known from the lower Cretaceous (Gruber & Reitner, 1991; Wiedenmayer, 1994), which supports the second hypothesis outlined above. It has been considered here though, that affinities among every sigmancistra derivative (sigmancistras, diancistras, cyrtancistras and clavidiscs) are probably plesiomorphic. Accordingly, the classification proposed reflects instead, the undeniable similarities between *Hamacantha* and *Mycala* Gray, 1867a (Mycalidae; easily detachable reticulated ectosomal skeletons, plumo-reticulated choanosomal construction, microscleres in rosettes, sigmas disposed alongside megasclere bundles with hooks pointing outward), and those of *Merlia* (Merliidae) and *Bienna* Gray, 1867a/*Desmacella* Schmidt, 1870 (Desmacellidae; tylostyles, commas). Taxonomic decisions made here follow the rationale proposed by Hajdu (1999, and present work, see Mycalina).

KEY TO GENERA AND SUBGENERA

- | | |
|----------------------------|---|
| (1) With diancistras | 2 |
| With cyrtancistras | <i>Pozziella</i> |
| (2) With oxeads | <i>Hamacantha</i> (<i>Hamacantha</i>) |
| With styles | <i>Hamacantha</i> (<i>Vomerula</i>) |

HAMACANTHA GRAY, 1867

Synonymy

Refer to subgenera.

Type species

Hymedesmia johnsoni Bowerbank, 1864 (mistakenly emended to *Halichondria johnsoni* by Gray, 1867a; ICZN 67d) (by monotypy).

Definition

Hamacanthidae with diancistras.

Description of type species

See nominotypical subgenus.

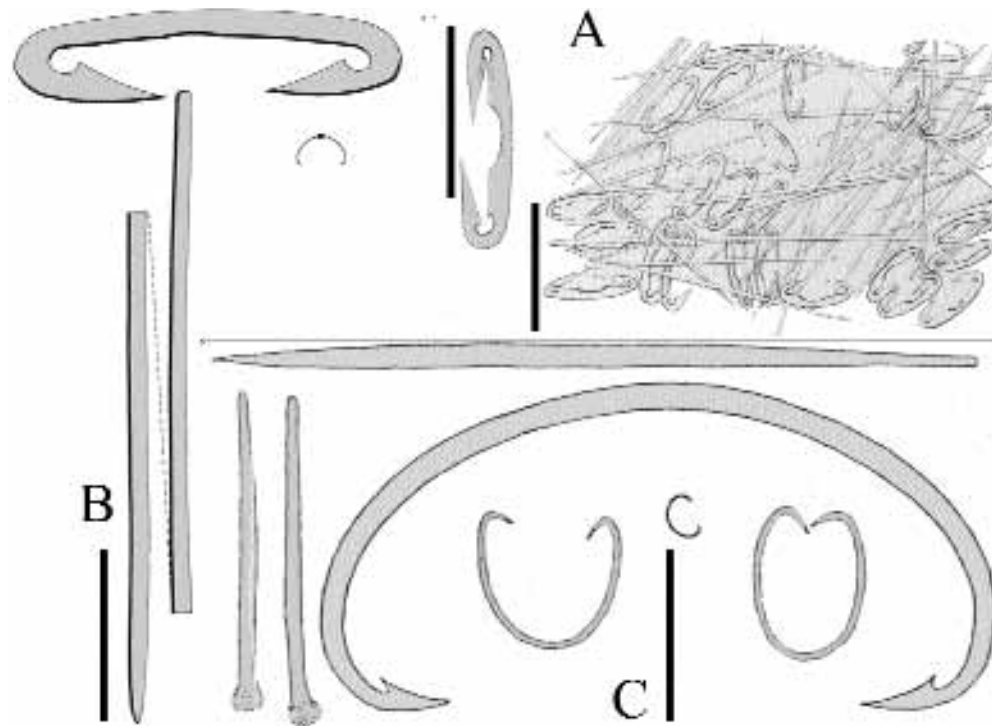


Fig. 1. A, *Hamacantha (Hamacantha) johnsoni* (Bowerbank, 1864), drawing of ectosomal architecture (scale 500 μm) and larger category of diacistras (scale 100 μm) (reproduced from Bowerbank, 1864, figs 112, 293). B, drawing of the spicule complement of *Hamacantha (Vomerula) popana* (de Laubenfels, 1935a) (reproduced from Hajdu, 1994, fig. 1) (scale 100 μm). C, drawing of the spicule complement of *Pozziella clavisaepta* Topsent, 1896b (reproduced from Topsent, 1896b, fig. 1) (scale 100 μm).

Remarks

Part of the abundant synonymy of *Hamacantha* may be attributed to the conflicting interpretations historically put forward for the diagnostic characters of its type species. The situation has been made clear by Stephens (1921), who, after re-examining a type slide, established that the spiculation of *H. johnsoni* consisted of oxeas, two categories of diacistras and sigmas.

SUBGENUS HAMACANTHA GRAY, 1867

Synonymy

Hamacantha Gray, 1867a: 538. *Athnacama* de Laubenfels, 1936a: 52.

Type species

Hymedesmia johnsoni Bowerbank, 1864 (by monotypy).

Definition

Hamacantha with diactinal megascleres.

Description of type species

Hamacantha (Hamacantha) johnsoni (Bowerbank, 1864) (Fig. 1A).

Synonymy. *Hymedesmia johnsoni* Bowerbank, 1864: 35, 127, figs 112, 293. *Halichondria johnsoni* Gray, 1867a (objective replacement name for Bowerbank's (1864), *Hymedesmia johnsoni*). *Hamacantha complanata* Topsent, 1892: 86, pl. II, fig. 9, pl. VII, fig. 5f (as *H. johnsoni* var. *complanata*). *Hamacantha schmidtii* (Carter, 1882a) (= *Desmacella johnsoni* Schmidt, 1870 from Portugal). Not *D. johnsoni* Schmidt, 1870, from Florida (= *H. schmidtii*).

Material examined. Holotype: Not seen. Comparative material examined: *Hamacantha schmidtii* (Carter, 1882a): BMNH 1870.5.3.28 (holotype) – Florida (277 m depth). *Hamacantha simplex* Burton, 1959a: BMNH 1936.3.4.339a and 1936.3.4.412a (holotype) – 'Murray' Exp. (stn. 157, Maldives area; det. M. Burton).

Description (adapted from Ridley & Dendy, 1887; Topsent, 1904b; Stephens, 1921). Deep-water sponge, encrusting or variably-thick cushion-like, with easily detachable, neatly reticulated surface peel (Fig. 1A). Megascleres are oxeas (frequently st(rong)yloid), ca. 450–600 μm long by 5–10 μm thick. Microscleres are diacistras in two size classes, 100–160 μm and ca. 30–35 μm long; and sigmas 20–25 μm long.

Remarks. *Hamacantha (Hamacantha)* is established here for those species with diactinal megascleres, which are customarily segregated from others with monactines in sponge classification. *Athnacama* de Laubenfels (type species *Hamacantha lundbecki* Topsent, 1904b), was erected on the basis of its possession of oxeas as sole megascleres, thus being a clear junior synonym of *Hamacantha (Hamacantha)*. De Laubenfels (1936a) considered *Hamacantha* to be a likely synonym of *Vomerula* or perhaps even unrecognizable, which explains his establishment of *Athnacama*.

SUBGENUS VOMERULA SCHMIDT, 1880**Synonymy**

Vomerula Schmidt, 1880b: 82. *Zygherpe* de Laubenfels, 1932: 65. *Hypsispongia* de Laubenfels, 1935a: 5 (in part). *Crellancistra* de Laubenfels, 1936a: 112. *Evomerula* de Laubenfels, 1936a: 125.

Type species

Vomerula tenda Schmidt, 1880b (by subsequent designation, present work, following recommendations by Ridley & Dendy, 1887 that it was a 'typical species of the genus').

Definition

Hamacantha with monactinal megascleres.

Description of type species

Hamacantha (Vomerula) tenda (Schmidt, 1880b) (Fig. 1B).

Synonymy. *Vomerula tenda* Schmidt, 1880b: 82.

Material examined. Holotype: Not seen. Comparative material examined. *Hamacantha esperioides* (Ridley & Dendy, 1886): BMNH 1887.5.2.157ii (syntype) – 'Challenger' Exp. (stn. 142, Agulhas Bank, SW Atlantic). MNRJ 1194 (fragment from CEAB 6B-92) – 'Benguela VII' Exp. (P-56, Namibia; det. M.J. Uriz). *Hamacantha falcula* (Bowerbank, 1874): MNRJ 870 (fragment from ZMA 4944) – Vaagegrund (Bergen, Norway; det. R.W.M. Van Soest). *Hamacantha hyaloderma* (de Laubenfels, 1932): USNM 22060 (holotype) – California (U.S.A.). *Hamacantha mindanaensis* Wilson, 1925: BMNH 1936.3.4.186 – 'Murray' Exp. (stn. 152, Indian Ocean; det. M. Burton). *Hamacantha popana* (de Laubenfels, 1935a): AMNH 262 (holotype) – Lower California (Mexico).

Description (adapted from Topsent, 1920a). Choanosome reduced (cavernous) to some skeletal tracts on which the dermal membrane rests. There are two layers of spicules in this membrane. The superficial one is made of tangential styles, densely distributed, criss-crossed in some parts, arranged in bundles in others, but mostly directed toward a central papilla, and keeping this arrangement until the apex of the papilla. The inner layer is less dense and more irregular. The criss-crossing of styles establishes some nodes, which coincide with the termination of the ascending choanosomal tracts. The papilla of two of the specimens possesses an areolated pore field just below its apex. There are rosettes of up to 30 diancistras around the choanosomal bundles of megascleres. Spicules. Megascleres: Styles, straight or slightly bent, slightly fusiform, with a slightly prominent head (mycalostyles?), apex short and obtuse, 450–760 μm long and 11–18 μm thick. Microscleres: Diancistras, 250–265 μm long. Toxas, acanthose, with large, thin spines, implanted variably perpendicularly, sparsely spread over the length of the spicule; absent from the terminations; 56–103 μm long.

Remarks. Figure 1B shows the spicule complement of *Hamacantha (Vomerula) popana* de Laubenfels, 1935a. *Hamacantha (Vomerula)* is established here for those species with monactinal megascleres, which are customarily segregated from others with diactines in the sponge classification. *Zygherpe* was erected on the basis of its possession of (sub)tylostyles. This character alone is seen as a weak diagnostic feature. The fact that no

other hamacanthid has yet been found with similar megascleres, suggests a more likely interpretation of the character as a likely apomorphy instead, and *Zygherpe* is maintained in the synonymy of *Hamacantha* in agreement with an earlier proposal (Hajdu, 1994). *Hypsispongia* was based on the study of a contaminated specimen. Hajdu (1994) has shown that its type species was a typical (valid) species of *Hamacantha*, contaminated by abundant anisochelae of *Mycale bellabellensis* (Lambe, 1905). *Crellancistra* (type species *Hamacantha integra* Topsent, 1904b), was established for its simple exotyles (although described as acanthostyles by de Laubenfels, 1936a) and diancistras with open-hooks (forming a more obtuse angle with the shaft). These features are understood as apomorphies here, and the genus is transferred into synonymy with *Hamacantha*. *Evomerula* (type species *Hamacantha agassizi* Topsent, 1920a), was established on the basis of its association of styles to diancistras and sigmas. This genus is clearly synonymous with *Hamacantha (Vomerula)*.

POZZIELLA TOPSENT, 1896**Synonymy**

Pozziella Topsent, 1896b: 147.

Type species

Pozziella clavisaepta Topsent, 1896b (by monotypy).

Diagnosis

Hamacanthidae with cyrtancistras.

Description of type species

Pozziella clavisaepta Topsent, 1896b (Fig. 1C).

Synonymy. *Pozziella clavisaepta* Topsent, 1896b: 147, fig. 1.

Material examined. None.

Description (adapted from Topsent, 1896b). Encrusting sponge with easily detachable dermal membrane and cavernous choanosome (strongly reminiscent of *Hamacantha johnsoni*). Spicules (Fig. 1C): Megascleres are styles, 470–500 μm long (strongly resembling *Hamacantha falcula* – Topsent (1928c: 198) remarked that his 1904 record of *H. johnsoni* was to be considered *H. falcula* instead), and exotyles, ca. 210 μm long, with a styloid termination on one side, and an acanthotylole on the other (15–20 μm thick). The exotyles stand on the ectosome with their acanthotylole terminations projecting away from the sponge, forming thus a characteristic crust. Microscleres are cyrtancistras (very large diancistras without most of their inner fringe/edge), ca. 450 μm long, occurring in loose dragmas alongside choanosomal bundles of megascleres, and variably shaped (from regular to flagelliform) and sized sigmas, 25–120 μm long.

Remarks. Topsent (1920a) described *Hamacantha clavisaepta* var. *aperta* from the West Indies. This is clearly a *Pozziella*, and is considered here a valid species, *Pozziella aperta*, on account of diagnostic morphological features and likely biogeographical isolation. It differs from the type species by the possession of a second category of much smaller cyrtancistras (larger ones up to 473 μm , smaller ones up to 167 μm). *Pozziella* is retained as a valid genus on the basis of its rather peculiar set of spicules, thus

opposing Topsent's own change of mind (Topsent, 1904b). Cyrtancistras are undisputably related to diancistras, and diancistras such as the smaller ones in *Hamacantha acerata* Lévi, 1993 could be seen as an evolutionary stepping-stone (=character transformation series) from typical forms, as in *H. johnsoni*, to the cyrtancistras, where most of the inner edge is reduced. Hajdu (1994) postulated a character transformation series to explain the relation among the sigmancistra derivatives. Cyrtancistras are also conspicuous by their very large length (over 400 μm), the largest diancistras known to date being those of *H. megancistra* Pulitzer-Finali, 1978, which are under 300 μm in length. Known fossil diancistras also are smaller than 300 μm (e.g., Wiedenmayer, 1994). The exotyles of *Pozziella* also set it apart as they do not appear closer to those of *H. integra* (= *Crellancistra*, *sensu* de Laubenfels, 1936a), than they appear to those of clear mycalids such as *Mycale (Rhaphidoteca) marshallhalli* Kent, 1870a (originally as *Rhaphidoteca*). It is quite possible that *Pozziella* would sit at a basal position within the hamacanthid clade, although no formal phylogenetic analysis has yet been attempted, an outcome which would not imply the acceptance of either genus as non-monophyletic.

Wiedenmayer (1994) identified a lower Cretaceous fossil spicule drawn by Rüst (1885) as a possible cyrtancistra. He was already hesitating in this respect, a suspicion shared here, so that no assertion can still be made confidently on the paleontological record of *Pozziella*.

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