Suborder Myxillina Hajdu, Van Soest & Hooper, 1994

Rob W.M. Van Soest

Zoological Museum, University of Amsterdam, P.O. Box 94766, 1090 GT Amsterdam, The Netherlands. (soest@science.uva.nl)

Suborder Myxillina Hajdu et al. (Demospongiae, Poecilosclerida) are characterized by possession of tridentate chelae and absence of toxas. Most Myxillina have differentiated choanosomal and ectosomal megascleres, but this may be lost secondarily. Eleven families are distinguished based on microsclere morphology, megasclere types, and skeletal architecture. A key to the families is provided.

Keywords: Porifera; Demospongiae; Poecilosclerida; Myxillina; Chondropsidae; Coelosphaeridae; Crambeidae; Crellidae; Dendoricellidae; Desmacididae; Hymedesmiidae; Iotrochotidae; Myxillidae; Phellodermidae fam. nov.; Tedaniidae.

DEFINITION, DIAGNOSIS, SCOPE

Definition

Poecilosclerida with tridentate or polydentate chelae microscleres; palmate chelae absent; toxas absent; sigmas usually present. Differentiated ectosomal and choanosomal megascleres, although either or all may be lost secondarily. Ectosomal megascleres typically diactinal, commonly with aniso-terminations. Choanosomal megascleres usually styles, rarely oxeas or strongyles.

Diagnosis

Myxillina basically have encrusting shape and soft consistency; some are very thinly encrusting; occasionally branching or of firm consistency, or bladder-like and fistular. They share a distinction with Microcionina in having separate ectosomal and choanosomal megascleres.

Description of characters

Ectosomal megascleres. Ectosomal megascleres, called 'tomotes' in this suborder, are most frequently arranged as palisades or bouquets; their shape is basically diactinal (oxea-, strongyle-, or tylote-like), but very frequently shape and ornamentation of both ends are slightly different (then called 'anisotomitates'). In one family their shape is so nearly a subtylostyle that these are likely to be truly monactinal and their homology with other tomotes is doubtful; in this case the name 'tomote' is avoided. The tomote shafts are smooth almost without exception; their endings may be variously sharply pointed, mucronate, blunt, swollen, microspined or bearing one or several larger spines. The extent to which the tomotes penetrate into the choanosomal skeleton varies considerably and in some families they replace partly or wholly the choanosomal megascleres. In some families the tomotes are grouped palisade-like around slightly raised rounded pore-fields called areolated porefields or 'areolae' (in French: 'cribles').

Choanosomal megascleres. Choanosomal megascleres are basically styles (occasionally oxeas or strongyles), which may be smooth, lightly or more heavily spined on and around the head, or entirely spined. Like in many Microcionina these are often of two categories: main and auxiliary, usually differentiated in size, ornamentation and location within the skeleton. Main megascleres tend to be smooth or lightly spined, usually longer and thicker forming the basic skeletal plan or – in thinly encrusting forms – perpendicular to and penetrating the surface, and macroscopically hispid. The auxiliary megascleres tend to be smaller, usually entirely spined, echinating the skeletal tracts, the nodes of the skeletal reticulum or – in thinly encrusting forms – arranged in groups ('bouquets') around a single main megasclere. In one family they simulate ectosomal spicules to form a surface crust. Auxiliary megascleres are frequently lost or in some cases undifferentiated in shape from the main megascleres. Several groups have their choanosomal skeleton partly or wholly replaced by a reticulation of sand grains and other foreign material.

Chelae. Chelae deviate from the typical poecilosclerid palmate chelae in having at least three clearly developed alae: a median fluke and two flanking alae. These 'tridentate' chelae may be further differentiated into 'arcuate' chelae (which have their flanking alae still partly attached to the shaft without visible development of further alae on the shaft) and 'anchorate' chelae (which have incipient extra alae, called 'fimbriae', which also may extend a long way along the shaft). The alae of both arcuate and anchorate chelae are normally rounded blades (called 'spatulate') but may be occasionally pointed, looking like predator's teeth (called 'unguiferate'). Both spatulate and unguiferate chelae often develop extra alae (called 'polydentate'). In one family species possess probable derivations of polydentate anchorate chelae in the shape of 'double-umbrella' microscleres (called 'birotulas'). Arcuate chelae may become deformed to shapes dissimilar to the original type (e.g., 'byssochelae'). Chelae also often occur in two size categories, which frequently differ slightly in shape. Occasionally, they may be asymmetrical, twisted, or otherwise deformed. In a few genera chelae occur with spines or hooks on their shaft. Chelae may occasionally be lost in species which otherwise share convincing similarities with various Myxillina. One family lacks chelae entirely and its membership of Myxillina is tentative based on similarities of its tomotes with those of other Myxillina.

Other microscleres. Sigmas (shared with Mycalina, but lacking in Microcionina) are frequent, often in two size categories, but lacking entirely in one family. Toxas are absent. Trichodragmas and single raphides are occasionally found. One family has special raphide-like microspined microscleres (called 'onychaetes').

Scope

Eleven families are presently assigned to Myxillina: Chondropsidae Carter, 1886: 122; Coelosphaeridae Dendy, 1922: 95; Crambeidae Lévi, 1963: 16; Crellidae Dendy, 1922: 92;

TAXONOMIC HISTORY

The suborder was only recently erected from a re-evaluation of all poecilosclerid characters (Hajdu et al., 1994a). The possession of 'tridentate' chelae (Tedaniidae excepted) and lack of toxas are pivotal independent characters that distinguish the taxonomy, forming a strong set of synapomorphies that complement the possession of other shared non-exclusive characters (such as diactinal tomotes, frequent occurrence of sigmas in more than one size category, and spined auxiliary styles). Previous attempts to classify the large numbers of Poecilosclerid genera (Topsent, 1928c; de Laubenfels, 1936a; Van Soest, 1984b; Bergquist & Fromont, 1988), although arriving at widely diverging schemes, emphasized skeletal architectural features, but disregarded, to a large extent, microsclere morphology. Only de Laubenfels (1936a) formalized his ideas at the suprafamilial level and erected several suborders, including the Myxilliformes. This name has not been adopted here because of extensive differences in content between that group and the Myxillina (allowed by the ICZN Article 1; Anon., 1999).

REMARKS

Spicule morphology versus skeletal architecture

Hajdu et al. (1994a) discussed the distribution of the various characters amongst poecilosclerid sponges over the established taxa, concluding that there was no concordance between broad sets of characters such as habit, skeletal architecture, surface characters and spicule complement. This lack of consistency has led to a proliferation of proposed families and genera: currently 189 nominal genera belong to the suborder Myxillina as recognized here. Debate continues over the validity of such characters as the precise nature of chelae morphology, ornamentation of the megascleres, absence or presence of categories of megascleres and microscleres, plumose versus reticulate architecture, etc. It is stressed here that there is no single classification that has gained wide acceptance. The classification presented here introduces changes and novelties to the established classifications (including the most recent summaries) based on re-examination of type and other specimens, and from a thorough survey of literature. However, this proposed scheme is not static, and serves as a sound objective basis for future proposals investigating non-skeletal characters such as histology, reproduction, nucleic acid sequences and secondary metabolite content.

Basic skeleton

An idealized view of basic Myxillina skeletal types and their likely development from an ancestral skeleton is presented in Figure 1A. This ancestral skeleton ‘bauplan’ is based on a combination of skeletal structures within the order and derived from the generalized skeleton of typical Microcionina (which is likely the most closely related sister group on account of shared possession of spined auxiliary styles and differentiation of megascleres into ectosomal and choanosomal spicules). The Myxillina skeletal ‘bauplan’ is assumed to have had at the surface bouquets or palisades of smooth diactinal tomotes (zone I in Fig. 1A), grouped around the peripheral ends of one or a few long smooth styles (possibly with spined heads) (zone II in Fig. 1A). These are erect