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Monanchora stocki n. sp. (Porifera, Poecilosclerida) from the Mid-Atlantic islands

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Abstract

A new species of the tropical-subtropical genus *Monanchora* Carter, 1883, is reported from São Tiago (Cape Verde Islands) and Ascension Island. The new species, *M. stocki* n. sp., is compared with related Atlantic and Indo-Pacific species, viz. Caribbean *M. arbuscula* (Duchassaing & Michelotti, 1864) (senior synonym of *Echinostylinos unguiferus* De Laubenfels, 1953, and *Monanchora barbadensis* Hechtel, 1969), and Indo-Pacific *M. unguiculata* (Dendy, 1922). The new species stands out among *Monanchora* species by the longer and more pointed teeth of its spatulate-unguiferate chelae, which in extreme cases almost meet. The structure of the chelae of *Monanchora* species of various parts of its range are compared with that found in some other (? related) genera, leading to critical remarks on current familial classifications of the Poecilosclerida.

Résumé

Une nouvelle espèce du genre tropical-subtropical *Monanchora* Carter, 1883, est signalée de São Tiago (îles du Cap-Vert) et de l'île d'Ascension. La nouvelle espèce (*M. stocki* n. sp.) est comparée à d'espèces apparentées, à savoir celle des Caraïbes *M. arbuscula* (Duchassaing & Michelotti, 1864) (senior synonyme d'*Echiniostylinos unguiferus* De Laubenfels, 1953, et de *Monanchora barbadensis* Hechtel, 1969) et celle de l'Indo-Pacifique *M. unguiculata* (Dendy, 1922). La nouvelle espèce se distingue des autres espèces de *Monanchora* par les dents plus longues et plus pointues de ses chelae spatulées -- unguiférées qui, dans des cas extrêmes, se rencontrent presque. La structure des chelae des espèces de *Monanchora* de différentes parties de l'aréal de ce genre, est comparée avec celle d'autres genres (apparentés ?), ceci permettant des remarques critiques sur les classifications actuelles des Poecilosclerida au niveau familial.

Introduction

The genus *Monanchora* was erected by Carter (1883) for a South West Australian species *M. clathrata* Carter, 1883 possessing a spicule complement of thicker and thinner subtylostyles and unguiferate chelae. This species was subsequently reported from the Indian Ocean (Lévi, 1958) and it also occurs in Indonesia (Kieschnick, 1900 as *Esperiopsis viridis*; unpublished records of the Siboga Expedition). Dendy (1922) described two species, viz. *Hymedesmia laevissima* and *Amphilectus unguiculatus*, which were subsequently associated with *Monanchora* by later authors by inclusion in the genera *Folitispa* De Laubenfels (1935) and *Neofolitispa* Bergquist (1965), which are now regarded as junior synonyms of *Monanchora* (see discussions in Bergquist, 1965, Vacelet et al., 1976 and Hechtel, 1969). Hechtel (1969) used the genus for a Caribbean species, *M. barbadensis*, of which the spicule complement includes small sigmatose reduced "chelae". Topsent (1927, 1928) erected a genus *Echinostylinos* for *E. reticulatus* Topsent, 1927 from deep water off the Azores, which showed a spiculation similar to that of *Monanchora*, but had spatulate isochelae in stead of unguiferate ones and also sigmatose microscleres. The species has also been reported from New Zealand (Bergquist & Fromont, 1988). De Laubenfels (1953) used the genus for a massive-clathrate Caribbean species *E. unguiferus*, which was eventually shown (Zea, 1987) to be the same species as *Monanchora bar-*

badensis. Kobluk & Van Soest (1989) noted that both names are preceded by *Pandaros arbusculum* Duchassaing & Michelotti, 1864, thus making the correct name of that species *Monanchora arbuscula*.

The use of *Echinostylinos* for a species of *Monanchora* by De Laubenfels (1953) already indicated that both genera are close in spiculation: *E. reticulatus* would have spatulate chelae and the thicker category of megascleres is larger and thicker than in the two known species of *Monanchora*; also, the larger category of megascleres in *Monanchora* tends to be tylostylote, rather than stylote. Since chelae of *Monanchora* species pass from unguiferate condition to spatulate during the development from immature to adult spicule, it is possible that both are the same genus. A formal unison of both genera is beyond the scope of this paper; however, it is here suggested that type species of both need critical comparison.

A third genus which needs consideration in this respect is *Crambe* Vosmaer, 1880, erected for *Suberites crambe* Schmidt (1862). This species and its congeners *Crambe acuata* (Lévi, 1958) and *Crambe talliezi* Vacelet & Boury-Esnault, 1982) possess peculiar astrose desmata but in other aspects show important features in common with *Monanchora* species: often there are two categories of (subtylo-)styles, unguiferate anchorate chelae, which are sometimes reduced to sigmatose condition. Two of the three *Crambe* species possess acanthose microrhabds in a low proportion, and such spicules were also discovered in a low proportion in the holotype of *Echinostylinos unguiferus* (USNM 23404). These similarities are considered homologous and close association of *Crambe* and *Monanchora* is here suggested.

Collections made recently at the Cape Verde Islands (CANCAP 7 Expedition, August–September 1986) and at Ascension (Operation Origin, 1987) yielded thinly incrusting specimens of *Monanchora* similar to Caribbean *Monanchora "barbadensis"*, but which differed in some aspects of spicule morphology and dimensions. Although the three specimens are not exactly identical in all respects, they share their differences with the Caribbean species, and they are here considered conspecific members of a new species.

Systematic description

Order POECILOSCLERIDA
Family uncertain (? Crambidae Lévi, 1963)
Genus *Monanchora* Carter, 1883

Synonymy: *Folitispa* De Laubenfels, 1936; *Okadaia* sensu De Laubenfels, 1936; *Neofolitispa* Bergquist, 1965

Definition. – Poecilosclerida with a spongin-enforced plumose or plumo-reticulate skeleton of irregular bundles of subtylostyles which form brushes at the surface; with a microsclere complement of one or more categories of unguiferate-spatulate anchorate chelae which show a tendency to have a grooved shaft in adult condition.

Monanchora stocki n. sp. (Text-fig. 1, Pl. I figs. 1–7)

Material. – Holotype, ZMA POR. 6937, São Tiago, SW coast near Pta Cidade, Ciudad Velha, 14°54′N 23°38′W, Cape Verde Islands, CANCAP 7 stat. D01A/13, 5–15 m, coll. R.W.M. van Soest, 20 August 1986.

Paratype: ZMA POR. 7608, Ascension Island, SE, no. 206, site no. 29, incrusting bladder-like alga on vertical wall, 33 m, coll. & don. R. Irving, Operation Origin, 16-IX-1985. Paratype, ZMA POR. 7609, Ascension Island, SE, no. 76, site no. 11, 16 m, coll. & don. R. Irving, Operation Origin, 2-XI-1985.

Description. – Thinly (1–2 mm) incrusting with smooth surface which is punctate, i.e. shows regularly spaced microscopical depressions. No apparent oscules in preserved condition. Consistency soft, easily damaged. Lateral expansion not over 1 cm^2.

Colour: red alive, pale-yellow to white in alcohol.

Ectosome: skeleton not clearly differentiated; subtylostyles in confused bundles are arranged partly in brushes, partly tangential.

Choanosome: skeleton consisting of plumose-dendritic, ill-developed bundles of spicules, up to 6 spicules in thickness, which rise from a basal plate of spongin on the substrate. Larger megasclere category concentrated singly in the basal parts.

Spicules: Thinner subtylostyles (Text-fig. 1c) with shallow constriction below the rounded end:

Table 1. List of species associated with *Monanchora* Carter, 1883, including synonyms and distributions.

Monanchora clathrata Carter, 1883: SW Australia, Indonesia, Vietnam.
  Monanchora clathrata Carter, 1883: 369, pl. XV figs. 10a–e.
  Esperiopsis viridis Kieschnick, 1900: 56, pl. 44 fig. 12, 45 figs. 51–52.
  Monanchora clathrata Lévi, 1961b: 135.
  Monanchora clathrata Vacelet et al., 1976: 56, redescription.

Monanchora unguiculata (Dendy, 1922): Western Indian Ocean, Indonesia, West Central Pacific
  Amphilectus unguiculatus Dendy, 1922: 58, pl. 12 figs. 17a–b
  Monanchora dianchora De Laubenfels, 1935: 331, pl. I fig. 4.
  Okadaia unguiculata De Laubenfels, 1936: 120.
  Folitispa pingens De Laubenfels, 1954: 159, fig. 104.
  Neofolitispa dianchora Bergquist, 1965: 172, figs. 24a–b; Vacelet & Vasseur, 1971: 90, fig. 41; Bergquist et al., 1971: 101.
  Neofolitispa unguiculata Vacelet et al., 1976: 53.
  (not: *Hymedesmia unguiculata* Lévi, 1961a: 20, fig. 26).

Monanchora laevissima (Dendy, 1922): Western Indian Ocean.
  Hymedesmia laevissima Dendy, 1922: 81, pl. 15 figs. 1a–c.
  Folitispa laevissima De Laubenfels, 1936: 119

Monanchora arbuscula (Duchassaing & Michelotti, 1864): Caribbean.
  Pandaros arbusculum Duchassaing & Michelotti, 1864: 88, pl. 18 fig. 6 (pars, only ZMA POR.1728, see Van Soest et al., 1983: 199)
  Echinostylinos unguiferus De Laubenfels, 1953: 528, fig. 6.
  Monanchora barbadensis Hechtel, 1969: 21, fig. 3; Van Soest, 1984: 40, text-fig. 12, pl. 4 figs. 3–5.
  Monanchora unguifera Zea, 1987: 152, figs. 50–51, pl. p. 257.
  Monanchora arbuscula Kobluk & Van Soest, 1989: 1217.

Monanchora stocki n. sp.: Cape Verde Islands, Ascension Island.

Echinostylinos reticulatus Topsent, 1927: Azores, New Zealand.
  Esperiopsis polymorpha var. Topsent, 1892: 91, pl. 6 fig. 1.
  Echinostylinos reticulatus Topsent, 1927: 8; Topsent, 1928: 207, pl. 2 fig. 21, pl. 7 figs. 15–16; Bergquist & Fromont, 1988: 45, pl. 17 figs. A–D.

Crambe crambe (Schmidt, 1862): Mediterranean.
  Suberites crambe Schmidt, 1862: 66, pl. 6 fig. 9.
  Suberites fruticosus Schmidt, 1862: 66, pl. 6 fig. 10.
  Crambe harpago Vosmaer, 1880: 135.
  many additional records, e.g. Rützler, 1965, with additional synonyms.

Crambe acuata (Lévi, 1958): Red Sea, Western Indian Ocean, South Africa.
  Folitispa acuata Lévi, 1958: 31, fig. 26.
  Crambe chelastra Lévi, 1960: 1; Lévi, 1961a: 20, fig. 27; Lévi, 1963: 16, fig. 13.
  Crambe acuata Vacelet et al., 1976: 72, figs. 33–34.

Crambe tailliezi Vacelet & Boury-Esnault, 1982: Mediterranean.
  Crambe tailliezi Vacelet & Boury-Esnault, 1982: 107, figs. 1–3.

175-*231.1*-263/2-*2.6*-3.5 µm. Thicker tylostyles (Text-fig. 1b, Pl. I fig. 7) with pronounced heads: 161-*243.5*-362/4-*5.6*-7 µm. Isochelae: starting out as unguiferate chelae (Pl. I figs. 1–2) with rounded shaft and 3–5 initially short-spiky, later long-thin teeth; adult chelae (Pl. I figs. 3–6) with the shaft flanked by sharp ridges, with 5-9 long slim spatulate teeth: 16-*19.7*-24 µm.

Ecology.– incrusting carbonate substrates and algae at shallow depths.
Distribution.– Cape Verde Islands, Ascension.

Etymology. – named after Prof. Dr. J.H. Stock who taught me the principles of marine biology and raised my interest in biogeography.

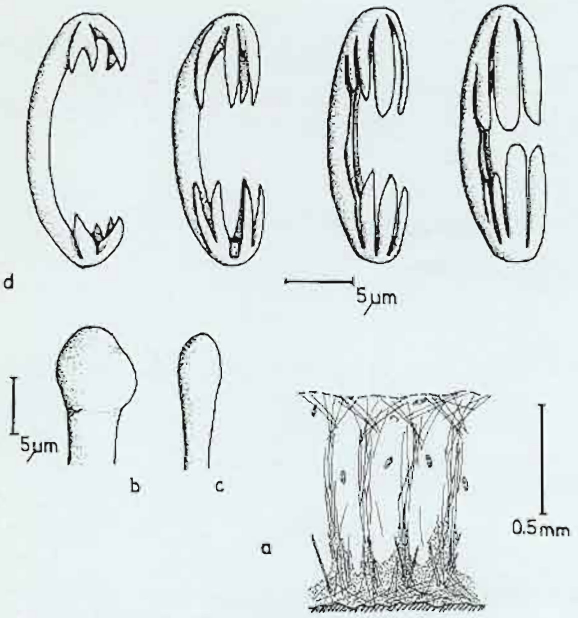

Fig. 1. Monanchora stocki n. sp.: a, cross section of holotype (dotted area is spongin); b, head of thicker tylostyle; c, head of thinner subtylostyle; d, various growth stages of unguiferate spatulate chelae.

Remarks. – The longer teeth of the chelae, which in extreme cases almost meet, are the main distinguishing feature of the new species; such chelae remind of undeveloped *Melonanchora* chelae. One of the Ascension specimens differs from the others in possessing numerous sigmata, 11-*12*-14 µm, which at low magnification are not unlike the reduced sigmatose chelae found in most specimens of *Monanchora arbuscula* (see Pl. I figs. 9–10). However, since these are found in only one specimen, and under SEM appear to be genuine sigmata, they are probably foreign. Some variation in spicule sizes is found among the three specimens. In the Cape Verde specimen the chelae tend to be somewhat larger (21–24 µm) than in both Ascension specimens (18–20 µm). In one of the Ascension specimens the length of the thicker tylostyles is considerably greater (around 300 µm on average) than in both the other Ascension specimen and the Cape Verde specimen (around 210 µm on the average). These differences are explained as infraspecific variation. In other details such as the long thin teeth in immature and adult chelae all specimens match, so conspecificity of all three specimens appears certain.

Comparison with other *Monanchora* species. – The new species shares a number of characters with Caribbean *Monanchora arbuscula* (D. & M., 1864). Colour, choanosomal architecture, and megasclere shape are generally the same in both species; however, these characters are shared with specimens of Indo-Pacific *Monanchora* too, and may not point to close relationship. In the shape of the adult chelae, the new species differs rather strikingly from *M. arbuscula* and indeed from other *Monanchora* species in the long, slim teeth. *M. arbuscula* and *M. unguiculata* (Pl. I figs. 8 and 12), *M. laevissima* and *M. clathrata* have chelae with distinctly shorter teeth, which are also much more spatulate and blunt-ending. Some of them also have predominantly only three teeth in stead of the usual five; in *M. stocki* n. sp. and *M. unguiculata* adult chelae normally have more than five teeth.

The shaft flanked by two sharp ridges, which are in fact extensions of the outermost alae, is shared between *M. stocki* and *M. arbuscula* (Pl. I fig. 8), although it is also found in *M. unguiculata* (Pl. I fig. 12), but distinctly less developed. Again the well-developed ridges, which give the shaft a grooved aspect, cannot readily be explained as a shared derived character of both Atlantic species, because this feature also occurs in other (? related) genera of Poecilosclerida: e.g. *Echinostylinos reticulatus* sensu Bergquist & Fromont (1988), *Pronax anchorata* Bergquist & Fromont (1988), *Desmacidon mammillatum* Bergquist & Fromont (1988), *Ectyonancora walvisensis* Uriz (1989), *Burtonanchora sigmatifera* Uriz (1989) and *Desmapsamma anchorata* (Carter, 1882) (See Van Soest, 1984: pl. III fig. 5). This feature can be really only reliably observed using SEM, and many more genera might be found with such spicules. For instance, the spatulate chelae of *Myxilla incrustans* (Johnston, 1842) (see Pl. I fig. 14) also show ridge-like extensions of the outermost alae. It may be hypothesized that unguiferate-spatulate anchorate chelae normally tend to have their outermost alae extended along the shaft, and in different species and genera this extension might be alternately full or incomplete.

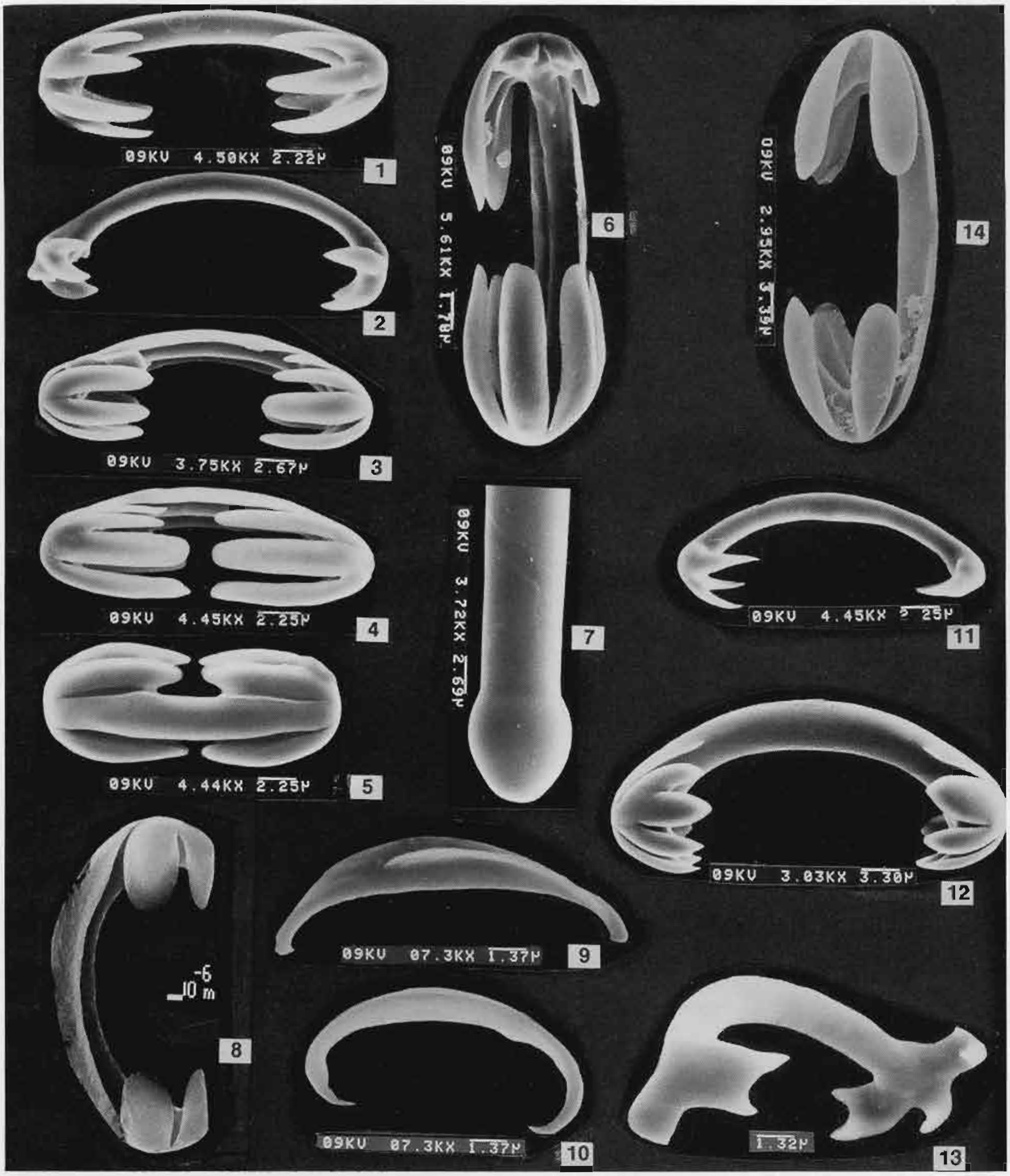

Plate I. Figs. 1–7: Monanchora stocki n. sp.; 1–2: unguiferate immature growth stages of the chelae; 3–6: spatulate adult growth stages, viewed from all sides to show shaft flanked by extensions of the innermost alae; 7: head of tylostyle. *Figs. 8–10: Monanchora arbuscula* (Duch. & Mich.) from the Caribbean; 8: spatulate three-toothed chela (copied from Van Soest, 1984); 9–10: sigmatose "reduced" chelae showing ridged shaft and tooth-like apices. *Figs. 11–13: Monanchora unguiculata* (Dendy) from Indonesia; 11: unguiferate 3-toothed immature chela of the robust category; 12: unguiferate-spatulate adult 7-toothed chela of the robust category showing incipient ridged shaft; 13: unguiferate "reduced" chela of the thinner category. *Fig. 14: Myxilla incrustans* (Johnston) from Helgoland, North Sea, adult chela of the larger category showing ridged shaft.

The tylostyles of *M. stocki* n. sp. are on the average slightly thinner than usually found in *M. arbuscula* (4–6 vs. 5–10 μm, measured in 25 spicules of each). The tyles of *M. stocki* tylostyles are generally more pronounced than in *M. arbuscula*.

Apart from the absence of sigmatose spicules, *M. stocki* n. sp. differs clearly in spicule categories and sizes from *Echinostylinos reticulatus* from deep water off the Azores. Topsent (1928) quotes for the larger megascleres 500–650 by 26–30 μm (the smaller are similar in size), chelae 27–43 μm.

A list of the currently recognized species and genera associated with *Monanchora* is presented in Table 1.

Discussion

The familial allocation of *Monanchora* and related genera *Echinostylinos* and *Crambe* remains problematic. Van Soest (1984) assigned it to the dustbin family Esperiopsidae (Desmacidonidae [sic] of other authors) with misgivings. Since then *Esperiopsis* has been associated with the Mycalidae by Bergquist & Fromont (1984) on good grounds. These authors assigned *Echinostylinos* (and thus implicitly also *Monanchora*) to the family Desmacid(on)idae. However, the type species of *Desmacidon*, viz. *D. fruticosum* (Montagu, 1818), of which I recently collected many specimens (off Mauritania), shows many similarities with *Myxilla*; if these similarities are homologous, then *Desmacidon* would fall to Myxillidae. The genus *Plumocolumella* Burton (1929) differs from *Desmacidon* only in being plumose rather than reticulate and may also be Myxillid (a "Coelosphaerid" genus *Manawa* has recently been erected by Bergquist & Fromont (1988) with very similar spiculation but fistulose habit).

Other genera assigned to the Desmacid(on)idae are strongly bearing *Strongylacidon*, *Batzella* and *Iotrochota*; these differ rather fundamentally from *Monanchora*, as do such difficult-to-place genera as *Guitarra* and *Tetrapocillon* of which recently (Van Soest, 1989) a coelosphaerid-myxillid affinity has been shown. Finally, *Isodictya* Bowerbank (1864) shows a high similarity to Haplosclerida.

In a previous paper (Van Soest, 1984) I used a broad concept of Myxillidae with the emphasis on tylote-strongylote ectosomal megascleres as the main distinguishing character, which led to inclusion of Tedaniidae, which have little in common with *Myxilla*, and such genera as *Lissodendoryx*, which seems very close to *Myxilla*. Bergquist & Fromont (1988) argued for a more restricted use of Myxillidae, emphasizing the isodictyal reticulation of the choanosomal skeleton and assigning low weight to the shape of the ectosomal megascleres. They distinguish a family Tedaniidae virtually restricted to *Tedania* and its immediate close relatives; they maintain the use of Coelosphaeridae and Cornulidae as further subdivisions of the broad assemblage of Myxillidae s. l. At first glance such a more precise subdivision seems more useful; however, there are, as yet, too many larger and smaller problems preventing the successful assignment of Poecilosclerid genera to such restricted families.

I cannot understand the firm conviction Bergquist & Fromont (1988) show in placing genera, which show series of overlapping characters, in "distinct" families Desmacid(on)idae, Myxillidae, Tedaniidae, Cornulidae and Coelosphaeridae. Many of the characters on which these families are founded (e.g. isodictyal vs. plumose arrangement of the skeleton, separate special ectosomal megascleres vs. a single type throughout the sponge, the presence or absence of echinating acanthostyles, the monactinal vs. diactinal nature of the megascleres, the combination of fistular architecture and spicule types) show signs of being transformed, reduced or developed independently several times in different species and genera. Any casual, nonformal analysis of the family classification in the Poecilosclerida will suffer from being inadequate to accommodate existing species and genera. Unfortunately, neither Lévi's (1973), nor my own (Van Soest, 1984), nor Bergquist & Fromont's (1988) classifications can claim to be based on a formal character analysis. In such circumstances it is safer to employ broad assemblages like microcionids, hymedesmids, myxillids, mycalids, and desmacellids. If we have to assign the present genus to one of these assemblages, it will have to be myxillids.

Although *Monanchora* lacks myxillid characteristics such as ectosomal tylotes, acanthostyles and reticulate architecture, it shares chela morphology with some genuine myxillids. Perhaps, a separate (sub-)family Crambidae Lévi, 1963 may serve to receive *Monanchora* until the phylogenetic relationships of the poecilosclerid families have been established.

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