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STUDIES ON THE FAUNA OF CURAÇAO AND OTHER CARIBBEAN ISLANDS: No. 199

MARINE SPONGES FROM CURAÇAO AND OTHER CARIBBEAN LOCALITIES

PART III. POECILOSCLERIDA

by

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ABSTRACT

A total of 56 species of West Indian Poecilosclerida incorporated in the collections of the Zoological Museum of Amsterdam is described and fully illustrated. Poecilosclerid type specimens of the Duchassaing & Michelotti (1864) collection housed in Amsterdam are redescribed. Next to these 29 new species are erected: *Mycale arndti*, *M. diversisigmata*, *M. americana*, *M. magnirhaphidifera*, *Strongylacidon poriticola*, *S. viridis*, *S. rubra*, *Batzella rosea*, *Hemitedania baki*, *Lissodendoryx strongylata*, *Forcepia grandisigmata*, *Coelosphaera hechteli*, *Crella chelifera*, *Hymedesmia jamaicensis*, *H. palmatichelifera*, *H. agariciicola*, *H. curacaoensis*, *Acanthancora coralliophila*, *Clathria simpsoni*, *C. bulbotoxa*, *C. hymedesmioides*, *Rhaphidophlus minutus*, *R. raraechelae*, *R. isodictyoides*, *R. oxeotus*, *Artemisina melana*, *Plocamilla barbadensis*, *Desmacella polysigmata*, and *Didiscus flavus*. The following new combinations and synonymy designations are introduced: *Mycale angulosa* (Duch. & Mich., 1864) for *Zygomycale parishi* of authors, *Acarnus souriei* (Lévi, 1952) for *Acanthacarnus souriei*, *Forcepia trilabis* Boury-Esnault (1973) for *Ectoforcepia trilabis*, *Phorbas amaranthus* Duch. & Mich., 1864, for *Merriamium tortuganensis* De Laubenfels, 1936, *Clathria affinis* (Topsent, 1889) for *Hymeraphia affinis*, and *Clathria ferrea* (De Laubenfels, 1936) for *Fisherispongia ferrea*. Several new combinations are suggested for species not represented in the present collection, but studied for comparative reasons. The genera and families of West Indian Poecilosclerida are discussed, and remarks are made on their distribution and ecology. Data on reproductive activity noted in the studied specimens are given in separate table.

INTRODUCTION

This third part follows along the same general lines as the first and second parts on Keratosa and Haplosclerida (VAN SOEST, 1978, 1980).

The Poecilosclerida comprise the largest order of the Demosponges, with a proportionately large diversity of shape and anatomy. No uniformly accepted classification of the order exists, but it will not be attempted here to revise the classification, because West Indian Poecilosclerids are not representative for the diversity of the order as a whole.

In order to be able to cope with the dazzling diversity of megascleres and microscleres in the order Poecilosclerida, authors have tended to erect genera for every different combination of spicules found in a sponge (cf. Table 1). Unfortunately it becomes more and more clear, that such characters as the form and the ornamentation of megascleres have little phylogenetic significance, and thus cannot be used to define natural groups (genera and families), at least not without using also other less easy characters. It is beyond the scope of this work to try to redefine all Poecilosclerid genera, although critical remarks will be made. DE LAUBENFELS' (1936a) review of the Porifera contains over 250 generic names referable to the Poecilosclerida in LÉVI's (1973) sense. Many of these names are authored by HALLMANN (1916–1920), TOPSENT and, of course, DE LAUBENFELS himself, who did not hesitate to erect numerous genera on the basis of mere descriptions of previous authors. One of the taxonomic challenges of the near future will be to review this order, based on the reexamination of type species of the genera.

The classification used here mostly follows LÉVI (1973), because he assigned the largest number of genera to families. This also means, that not only non-cheliferous families and genera are here included, but also controversial genera with hadromerid affinities, such as *Didiscus* and *Latrunculia*. However, a distinct separation between cheliferous Poecilosclerids and non-cheliferous presumed Poecilosclerids is here employed.

A significant contribution toward extending the knowledge of West Indian Poecilosclerids was made by studying the thin, often brightly coloured incrustations found at the underside of overhanging coral blocks or on dead corals. One of the reasons for making my trip to the Curaçao reefs, December 1980–Januari 1981, was especially to collect this type of sponges. 16 Of the 29 new species which are described below were collected in a matter of weeks in a well-investigated reef area near the Caribbean Marine Biological Institute (Carmabi). It is to be expected, that many more Poecilosclerid species will turn up from these sciaphilous localities. The 90-odd Poecilosclerid species (belonging to 38 genera), which are with the completion of this study known from the West Indian waters, are very probably only part of what is extant in this region.

ACKNOWLEDGEMENTS

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Dr. P. WAGENAAR HUMMELINCK (PWH), Prof. Dr. J. H. STOCK (JHS), Dr. S. WEINBERG, Mr. H. RINK, Drs. E. WESTINGA, Mr. P. HOETJES and Dr. H. TEN HOVE contributed by collecting material. Mr. L. A. VAN DER LAAN made most photographs of the habits, excepting those made by VAN MOORSEL. Mr. J. ZAAGMAN assisted in mounting the Plates. Mr. C. BAKKER instructed me in the use of the SEM.

For the loan of type material and other specimens I thank Dr. K. RÜTZLER (USNM, Washington) and Miss S. M. STONE (BMNH). Dr. K. RÜTZLER made valuable comments to the manuscript.

TABLE 1

EXAMPLES OF POECILOSCLERID GENERA ERECTED ON MINOR DIFFERENCES (SUCH AS CHELA-TYPE, ABSENCE OF SPICULE CATEGORIES, PRESENCE OR ABSENCE OF ACANTHOSE CONDITION OF MEGASCLERES, GROWTH FORM), NOW SUSPECTED TO BE SYNONYMS.

a. Chela-type

palmate isochela	palmate anisochela	arcuate isochela	arcuate anisochela	anchorate isochela	unguiferate isochela
Isodictya	—	*Desmacidon*	—	—	—
—	*Mycale*	—	*Anomomycale*	—	—
Xytopsen	—	*Xytopsaga*	—	—	—
Holorodesmia	*Hymedesanisochela*	*Hymedesmia*	—	*Hymenancora*	—
Marcusoldia	—	*Leptolabis*	—	—	—
Antho	—	*Anthoarcuata*	—	—	—
Clathria	—	*Anaata*	—	*Cionanchora*	—
Esperiopsis	*Corybas*	*Echinostylinos*	—	—	*Monanchora*
—	—	*Lissodendoryx*	—	*Burtonanchora*	—
—	—	*Burtonispongia*	—	—	*Anomodoryx*

b. Chelae	—	No chelae
Plocamia		*Lissoplocamia*
Crella		*Pytheas*

c. Spined megascleres	vs.	Smooth megascleres
Axoplocamia		*Plocamione*
Dictyociona		*Clathria*

d. Presence of acanthostyles	vs.	Absence of acanthostyles
Microciona		*Axociella*
Acanthacarnus		*Acarnus*

e. Massive habit	vs.	Incrusting habit
Clathria		*Microciona*
Trachyforcepia		*Leptolabis*
Myxichela		*Leptoclathria*
Axociella		*Axocielita*
Litaspongia		*Ophlitaspongia*

MATERIAL AND METHODS

Collecting localities are enumerated in part I (VAN SOEST, 1978) and Part II (VAN SOEST, 1980) of this series; localities visited during my recent visit to Curaçao and Bonaire (indicated by RWMVS) are listed in VAN SOEST (1981). In addition to these, the following localities yielded also material:
CURAÇAO: Vaarsenbaai.
BONAIRE: Lac, inlet S of Boca Fogon – Lac, C, 1 km NW of Cai – Lac, Boca di Pos – Kralendijk, jetty.
ARUBA: Playa Master.
ST. MARTIN: Great Bay – Oyster Pond.
MARGARITA: Punta Mangle.
Near JAMAICA: 18°20′N 77°20′W.
VENEZUELA: Los Roques, Dos Mosquises.
NORTH CAROLINA: New Port River, Beaufort.
For extra data on many localities, cf. WAGENAAR HUMMELINCK (1978).

The present material also includes the VAN DER HORST collection, already studied by ARNDT (1927), and some DUCHASSAING & MICHELOTTI (1864) type specimens (cf. also VAN SOEST et. al., 1983).

Methods employed are the same as in previous parts. For SEM photographs spicule preparations were made according to the method described in VAN SOEST (1977).

Order **POECILOSCLERIDA** Topsent, 1928

Definition: Ceractinomorpha with monactinal or exceptionally diactinal choanosomal megascleres arranged in plumose or hymedesmoid, exceptionally also in reticulate fashion, and if present, ectosomal diactinal or monactinal megascleres arranged in tangential halichondroid or sometimes reticulate fashion; microscleres, if present, frequently chelae, sigmata, toxa, rhaphides, commata in every thinkable combination.

Remark: This definition is of necessity so wide, that sharp delimitation towards other ceractinomorph orders (e.g. Haplosclerida) and Axinellida is not achieved. For a discussion cf. below. Cheliferous and non-cheliferous families are kept separate in the following.

CHELIFEROUS POECILOSCLERIDA

Family **MYCALIDAE** Lundbeck, 1905

Definition: Poecilosclerida with plumose or plumoreticulate choanosomal skeleton of subtylostylote or oxeote megascleres and ectosomal megascleres, if present, of the same form as the choanosomal ones. Microscleres are often diverse, but always include anisochelae.

Genus **Mycale** Gray, 1867

Definition: Mycalidae with subtylostylote megascleres and palmate anisochelae; other microscleres may include toxa, rhaphides, micracanthoxea and palmate isochelae.

REMARKS ON THE GENUS *Mycale*

This genus undoubtedly is one of the largest known in the Porifera. An uncritical tabulation of names (including those described under *Esperia* Nardo, 1833, *Esperella* Vosmaer, 1885, *Raphiodesma* Bowerbank, 1868, and *Zygomycale* Topsent, 1930) yields over 125 described species belonging in this genus. In this century only two attempts have been made to divide the genus into (sub)genera, viz. by TOPSENT (1924), and DE

LAUBENFELS (1936a). TOPSENT distinguished four subgenera based on European species only: *Mycale* Gray, 1867, *Aegogropila* Gray, 1867, *Carmia* Gray, 1867 and *Anomomycale* Topsent, 1924. This subdivision found only few followers, one of the reasons being that the alleged differences between the subgenera were rather vaguely described.

DE LAUBENFELS put all toxa-bearing *Mycale* into a separate genus *Carmia*, all sigma-bearing (but not toxa-bearing) species in *Mycale* s.s., and those lacking sigmata and toxa in *Mycalecarmia* De Laubenfels, 1936. For this pragmatic enough, but highly disputable action he gave insufficient grounds. His choice of the genus name *Carmia* for the group of toxa-bearing species was unfortunate to say the least, because TOPSENT's and his concept of *Carmia* did not concur at all. DE LAUBENFELS' use of *Carmia* has been widely adopted by later authors for obvious reasons.

I have attempted to evaluate TOPSENT's subdivision on the basis of more (though still limited) material; a total of 27 species is present in the collections of the Zoological Museum of Amsterdam, including species from Europe, West Indies and the Indo-Malayan Archipelago. Characters examined were: habit, ectosomal skeleton, choanosomal skeleton, microsclere types present, microsclere categories present and size of megascleres.

A first comparison immediately revealed the fallacy of DE LAUBENFELS' pragmatic subdivision. Toxa-bearing species can be totally different in other respects, while very similar, obviously related species, may differ in the presence or absence of toxa only.

To a large extent TOPSENT's subdivision appears to apply to the material I examined, although in one case the emphasis must be put in slightly different quarters. The material at my disposal was found to fall into the following five groups (cf. Fig. 1, Pl. II 3):

1. – Species with a largely dendritic choanosomal skeleton with confusedly arranged single spicules in between the ascending spicule tracts. The ectosomal skeleton consists of a multilayered halichondroid tangential skeleton carried by the brushed endings of the ascending tracts (cf. Fig. 1a–b). Mostly, there is littled spongin and a high spicular density, often with robust megascleres. The spiculation consists of (subtylo-)styles, anisochelae, sigmata and trichodragmata. Species examined: *Mycale*

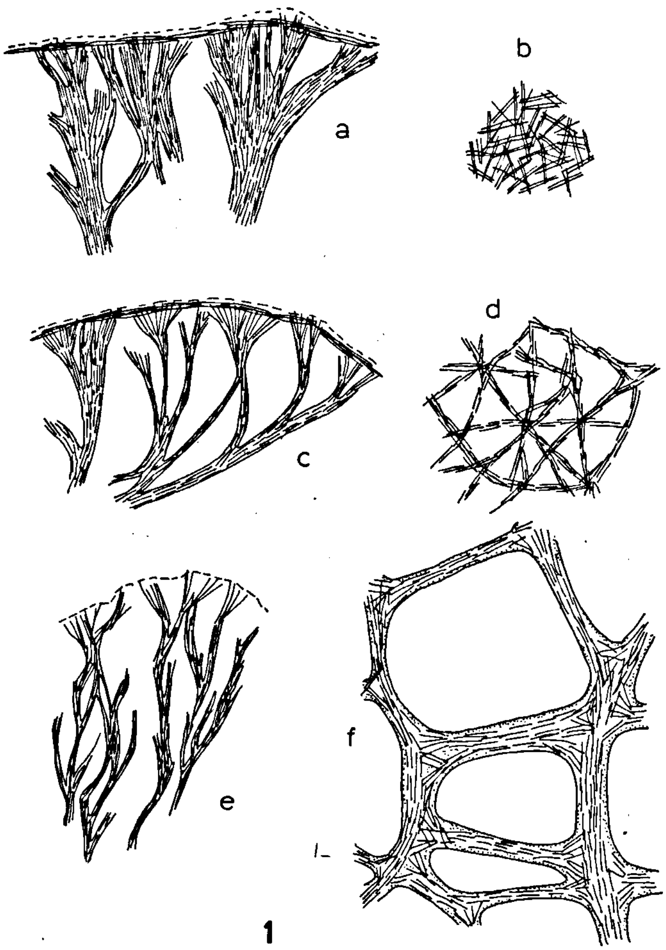

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FIGURE 1. Schematic drawings of skeletal and architectural characteristics of the subgenera of the genus *Mycale*: a–b. subgenus *Mycale* (a: transverse section, b: tangential view of ectosome); c–d. subgenus *Aegogropila*; e. subgenus *Carmia*; f. subgenus *Acamasina*.

massa (Schmidt, 1862), *M. lingua* (Bowerbank, 1866), *M. laevis* (Carter, 1881), *M. crassissima* (Dendy, 1905), *M. obscura* (Carter, 1882), and two species collected by the Siboga Expedition bearing unpublished collection names.

It is likely that these species conform to TOPSENT's subgenus *Mycale* (as

TOPSENT included *M. lingua* (type species) and *M. massa* in it), although his emphasis was laid on peripheral spicule brushes, while here the confused tangential ectosome is emphasized.

2. – Species with a neat ectosomal reticulation of spicule tracts enclosing pore areas. Choanosomal skeleton consisting of primary ascending fibres or tracts and interconnecting tracts bound mostly by a moderate amount of spongin (cf. Fig. 1c–d). In between the tracts a loose reticulation of single spicules may be found. Spiculation includes (subtylo-)styles of intermediate size, anisochelae, sigmata, toxa, trichodragmata-rhaphides, and occasionally palmate isochelae, Species examined: *Mycale contareni* (Von Martens, 1824), *M. parishi* (Bowerbank, 1875), *M. angulosa* (Duch. & Mich., 1864), *M. syrinx* (Schmidt, 1862), *M. rotalis* (Bowerbank, 1874), *M. arndti* n. sp., *M. diversisigmata* n. sp., *M. americana* n. sp. and one unnamed species from the Siboga Collection.

This group of species clearly conforms to the subgenus *Aegogropila* Gray, 1867 (type: *Halichondria aegogropila* Johnston (1845) = *M. contareni*), as redefined by TOPSENT.

3. – Species without a definite ectosomal skeleton, although loose single spicules or short tracts may be found. Choanosomal skeleton dendritic-plumose (cf. Fig. 1e). Most species of this group are rather thin incrusting, the skeleton consisting of short columns of spicule tracts, which end in loose brushes carrying the organic ectosome. Spicular density is mostly low and the megascleres are of intermediate to feeble size. Microscleres include anisochelae, sigmata, toxa, trichodragmata-rhaphides and in one case tiny "micracanthoxea". Species examined: *Mycale macilenta* (Bowerbank, 1866), *M. similaris* (Bowerbank, 1874), *M. micracanthoxea* Buizer & Van Soest, 1977, *M. magnirhaphidifera* n. sp., *M. microsigmatosa* Arndt, 1927, *M. tenuispiculata* (Dendy, 1905), *M. phyllophila* Hentschel, 1911, *M. orientalis* (Topsent, 1897).

This groups conforms to TOPSENT's definition of *Carmia* (type *M. macilenta*) (not DE LAUBENFELS' definition).

4. – Species without an ectosomal skeleton. Choanosomal skeleton a coarse reticulation of thick spicule tracts enveloped in spongin (cf. Fig. 1f). Interior cavernous. Fleshy parts flimsy, adhering closely to the skeletal

fibres; in preserved specimens the fleshy parts are often hard to find. Spiculation includes, subtylostyles of intermediate size, anisochelae and sigmata. Species examined: *Mycale laxissima* (Duch. & Mich., 1864), *M. spongiosa* (Dendy, 1884), *M. setosa* (Keller, 1889).

This group may conveniently receive the subgeneric name *Acamasina* De Laubenfels (1936a) (type: *A. laxissima*). *Mycale fistulosa* Hentschel, 1911 seems to conform to this group, too.

5. – One species, currently considered to belong to *Mycale* could not be fitted in any of the four groups, and it is proposed here to remove it from *Mycale* and even from the Mycalidae. The species concerned is the North Atlantic *Mycale lobata* (Montagu, 1818) (= *M. ovulum* (Schmidt, 1870)), type of the preoccupied genus *Corybas* Gray (1867). SCHMIDT (1870) overlooked the anisochelae, but otherwise understandably associated this species with the genus *Chalinula* Schmidt (1870) (family Haliclonidae of the order Haplosclerida). The skeleton of this species is strikingly *Haliclona*-like with paucispicular primary tracts and single interconnecting spicules. The spiculation, however, consists of short, relatively stout styles (not at all like those found in *Mycale*) and palmate anisochelae many of which verge towards isochelae. The genus *Esperiopsis* of the Poecilosclerid family Esperiopsidae contains a species, *E. fucorum*, which is very similar to "*Mycale*" *ovulum*, but has isochelae instead of anisochelae. It is quite likely, that *M. ovulum* is an aberrant *Esperiopsis*, possibly the same species *E. fucorum*.

I did not include in the survey specimens attributable to the genus *Paresperella* Dendy, 1905, because the possession of huge serrated sigmata seems a sufficiently distinct character to assume, that species possessing them are a monophyletic group. The genus is probably valid, though closely related to *Mycale*; possibly, it will be found to be a subgenus of *Mycale*, too.

From a general point of view, it might perhaps be regretted, that spicule characteristics (types, size categories) cannot be used for subgeneric assignment (although they are quite useful for characterization of the species). It must be assumed, that ancestral *Mycale* contained most of the spicule types found in the total of all recent species, otherwise the occurrence of them in the different subgenera cannot be explained. Only in the smaller groups (*Mycale* and *Acamasina*) the spiculation is limited to anisochelae and sigmata.

Subgenus Mycale Gray, 1867

Definition: *Mycale* with a largely dendritic choanosomal skeleton with confused single spicules among the ascending spicule tracts. Ectosomal skeleton a multilayered halichondroid tangential skeleton carried by the brushed endings of the ascending tracts. Spongin scarce, high spicular density. Spiculation consists of subtylostyles, anisochelae, sigmata and trichodragmata.

Mycale (Mycale) **laevis** (Carter, 1881)

Synonymy cf. HECHTEL, 1965

CURAÇAO: ZMA POR.4608 (Awa Blancu, 10–20 m, underneath *Agelas*, 29.XII.1980, coll. RWMVS); 4609 (300 m SE Hilton Hotel, 10–12 m, between *Madracis*, 17.XII.1980, coll. RWMVS); no reg. no. (Kaap Malmeeuw, 12–16 m, on *Madracis*, 23.XII.1980, coll. RWMVS).
PUERTO RICO: ZMA POR.3331 (Punta Guaniquilla, Cabo Rojo, 6 m, 16.XII.1963, coll. JHS, P.R.77).

Diagnosis (Pl. I 1–4, Fig. 2):

Shape, size and consistency: Massively incrusting, often underneath coral blocks (cf. GOREAU & HARTMAN, 1966 and Pl. I 1.). Size up to 8 × 5 × 3 cm. Surface smooth to rough (ectosomal skeleton absent in places). Oscules few in number, fairly large (4 mm). Consistency rather tough, but compressible.

Colour: orange, yellow or yellow-green; dirty white in spirit.

Ectosome: the ectosomal skeleton is a halichondroid reticulation of single megascleres, as is usual for the subgenus; in between are scattered microscleres.

Choanosome: dominated by thick, strong spicule tracts with up to 15 spicules per cross-section. The dendritic nature of the tracts is somewhat obscured by frequent anastomoses.

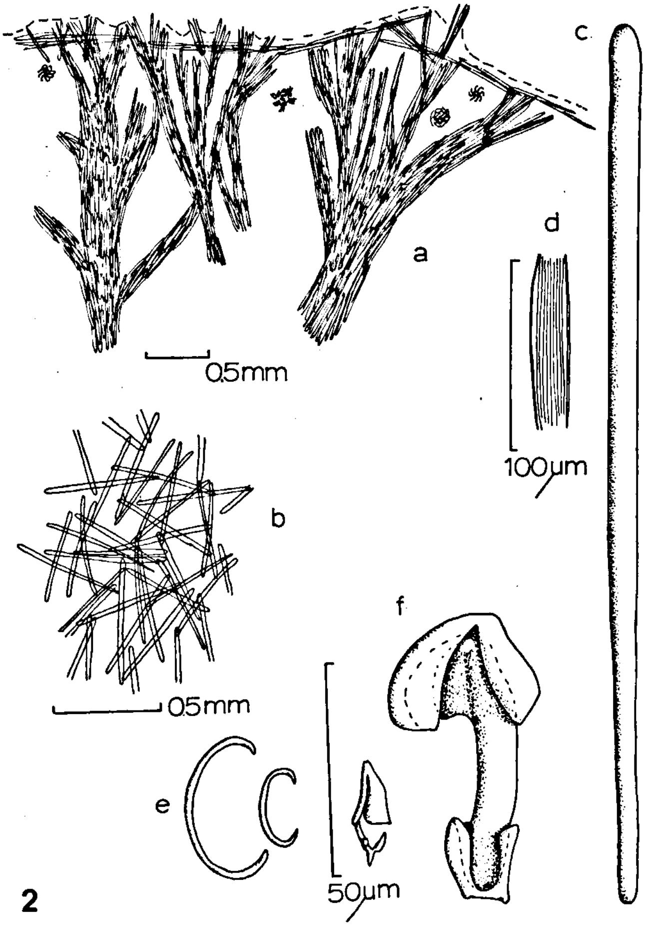

Figure 2. *Mycale* (*Mycale*) *laevis*; a. transverse section of peripheral region; b. tangential view of ectosomal skeleton; c. megasclere; d. trichodragma; e. two categories of sigmata; f. two categories of chelae.

Spiculation: Megascleres, styles and strongylostyles: 475–570 by 7–17 µm. Microscleres, anisochelae of large size, often in rosettes: 68–*75.7*–84 µm, small anisochelae: 18–*21.6*–24 µm, sigmata 12–*23.4*–34 µm, trichodragmata: 52–*61.8*–72 (by 5–*7*–9 µm), often arranged in characteristic clusters.

Ecology: incrusting undersides of corals, calcareous worm tubes in reefs and lagoons.

Distribution: Curaçao, Puerto Rico; Jamaica (HECHTEL, 1965), Venezuela (CARTER, 1881 as *Esperia*), Cuba (ALCOLADO, 1980).

Subgenus Aegogropila Gray, 1867

Zygomycale Topsent, 1930

Definition: *Mycale* with a choanosomal skeleton consisting of primary ascending fibres or tracts and interconnecting tracts bound with a moderate amount of spongin. In between the tracts a loose reticulation of single spicules. Ectosomal skeleton a neat tangential reticulation of tracts forming triangular meshes with pores. Spiculation includes megascleres of moderate size, anisochelae, sigmata, toxa, trichodragmata and occasionally isochelae.

Mycale (Aegogropila) angulosa (Duch. & Mich., 1864)

Pandaros angulosa DUCH. & MICH., 1864: 89, pl. IX 4.
Mycale macilenta; ARNDT, 1927: 143, in part, only figured specimen.
Zygomycale parishi; DE LAUBENFELS, 1956: 3; HECHTEL, 1965: 48, pl. 5 fig. 3; ALCOLADO, 1980: 4.
(? Non: *Rhaphiodesma parishi* Bowerbank, 1875).
Non: *Mycale angulosa*; DE LAUBENFELS, 1936a: 116, pl. 14 fig. 2, pl. 15 fig. 1.
(= *Mycale laxissima* (Duch. & Mich., 1864)).
Nec: *Mycale angulosa*; DICKSON, 1948: 23, pl. 37–38 (= *Mycale* spec.).
Nec: *Mycale angulosa*; LÉVI, 1959: 129, text-fig. 19, pl. 6 fig. 5 (= *M. laxissima* (Duch. & Mich., 1864)).

Holotype: *Pandaros angulosa* Duch. & Mich., 1864, Mus. Torino POR.54 (only extant type specimen).

Description of the type specimen (kindly sent on loan by Dr. O. ELTER).

Bush-like, upright with irregular surface (ectosome almost completely lost). Stiff, stringy. Choanosomal skeleton a tightly woven mass of frequently anastomosing spicule tracts, bound by spongin. Tracts 50–90 µm in diameter, up to 15 spicules in cross section. Subtylostyles: 256–287 by 3–4.5 µm, large sigmata (rare): 70 µm, small thin sigmata (rare): 22–27 µm, large anisochelae (rare): 41–46 µm, small anisochelae: 17–19 µm, toxa: 30–72 µm, rhaphides: 20–48 µm, isochelae: 9–13 µm.

CURAÇAO: ZMA POR.1596 (Spaans Water, V.1920, coll. C. J. van der Horst, labeled *Mycale macilenta*, cf. Arndt, 1927: 143, pl. III fig. 3); 3490 (Piscadera Baai, 58 m, dredged, 17.XII.1958, coll. JHS, 141); 3548 (Schottegat, Baai van de Hoop, mangroves, XI.1905, coll. Boeke).

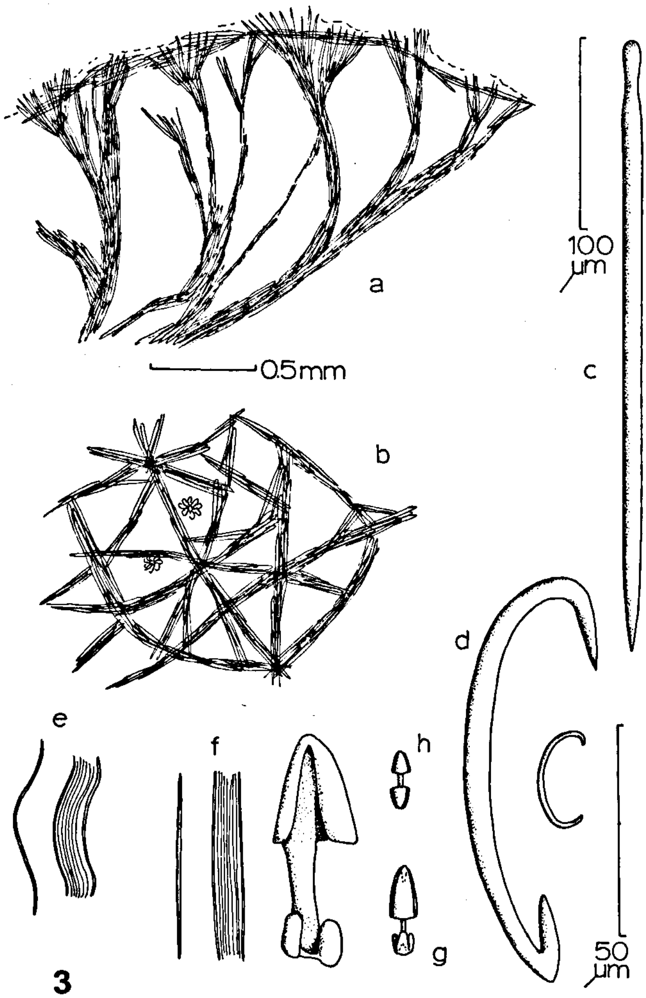

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FIGURE 3. *Mycale* (*Aegogropila*) *angulosa*: a. transverse section of peripheral region; b. tangential view of ectosome; c. megasclere; d. two categories of sigmata; e. tox and toxodragma; f. rhaphide and trichodragma; g. two categories of anisochelae; h. isochela.

MARGARITA: ZMA POR.3694 (Puente de la Restinga, on rocks near mangroves, 11.I.1964, coll. PWH *1449*).

Diagnosis (Pl. I 5–6, Fig. 3):

Shape, size and consistency: Upright, irregular branches or bushes, up to 15 cm high, branches 0.5–2 cm across, with irregular outline. Surface smooth, oscules small. Consistency tough, spongy, stringy.
Colour: brownish.
Ectosome: a tangential reticulation of spicule tracts enclosing triangular pore areas.
Choanosome: thick spicule tracts, 50–250 µm in diameter, form a tight irregular reticulation. The tracts end in brushes carrying the ectosome.
Spiculation: subtylostyles, often slightly flexuous, 256–*294.5*–341 by 3–*5.7*–8 µm; large anisochelae: 41–*47.5*–56 µm, small anisochelae: 16–*18.8*–23 µm, large sigmata: 54–*69.8*–86 µm, small sigmata: 16–*24.2*–29 µm, toxa (often in toxodragmata): 26–*52.5*–86 µm, rhaphides (mostly in trichodragmata): 20–*31.0*–48 µm, isochelae: 8–*10.6*–13 µm.

Ecology: on mangroves and rocks in bays and lagoons.

Distribution: Curaçao, Margarita; St. Thomas, Jamaica (HECHTEL, 1965), Cuba (ALCOLADO, 1980), Brasil (DE LAUBENFELS, 1956).

The type specimen of *Pandaros angulosa* conforms to material identified as *Zygomycale parishi* sensu Hechtel (1965), although microscleres are uncommon. DE LAUBENFELS' (1936a) interpretation of *Pandaros angulosa* is remarkable; his description and photograph make it amply clear, that he dealt with *Mycale* (*Acamasina*) *laxissima* (known from type specimens in Torino and London). DE LAUBENFELS' (1936a) redescription of *Acamasina laxissima* (p. 117) is unrecognizable; it is almost certainly a confusion with other specimens. Several authors (e.g. LÉVI, 1959; BERGQUIST, 1965) based their opinion of *Mycale angulosa* on DE LAUBENFELS' (1936a) description, and consequently drew the wrong conclusion.

Whether or not the present species is conspecific with *Rhaphiodesma parishi* Bowerbank, 1875 (*Zygomycale p.* of authors) from Indo-Pacific waters, remains a matter of consideration. It is obvious, that the spiculation is similar to that of *M. angulosa*, although the presumed variation in spiculation of *M. parishi* as contented by BURTON & RAO (1932) is not found in *M. angulosa*.

DICKINSON (1948) reported *M. angulosa* from the Gulf of California. His material is certainly not conspecific with *M. angulosa* nor with *M. laxissima* (Duch. & Mich.). In all probability it is a new species close to *M. microsigmatosa* Arndt, 1927. BURTON (1956) reported *Mycale contareni* from the west coast of Africa; this proved to be a specimen with isochelae, but in spicule sizes somewhat different from *M. angulosa* (specimen examined in Copenhagen Museum).

Mycale (Aegogropila) arndti n. sp.

Esperia macilenta; CARTER, 1871: 276, pl. 17 fig. 8
Mycale macilenta; ARNDT, 1927: 143, in part, not the figured specimen.
(Non: *Hymeniacidon macilenta* Bowerbank, 1866)

Holotype: ZMA POR.3675, CURAÇAO, Piscadera Baai, innerbay, on mangrove roots, 14.XI.1975, coll. students Prof. Stock.
Paratypes: ZMA POR.1595, CURAÇAO, Spaanse Water, 3.XI.1920, coll. C. J. van der Horst (one of ARNDT's "*Mycale macilenta*"); ZMA POR.4884, Piscadera Baai, centre E, on *Rhizophora*, 25.VII.1973, coll. PWH *1476B*.
ZMA POR.3842, FLORIDA, Virginia Key, NE coast, 1.5–2 m, eel grass field, rocks, 4.IX.1963, coll. PWH *1408A*.

Description (Pl. II 1, Fig. 4):

Shape, size and consistency: Thickly to massively incrusting, up to 2 cm in thickness. Consistency spongy. Oscules small and rare. Surface smooth.

Colour: greyish blue.

Ectosome: a tangential reticulum of spicule tracts forming triangular meshes, as usual for the subgenus.

Choanosome: fairly stout spicule tracts form an irregular reticulum by frequent anastomosing. The ectosome is carried by the brushed ending of the tracts. Spongin fairly abundant.

Spiculation: subtylostyles: 260–*303.7*–342 by 7–*8.2*–9 µm; large anisochelae: 45–*50.6*–55 µm, middle sized anisochelae: 19–*22.4*–26 µm, small anisochelae: 10–*11.4*–13 µm, large sigmata: 88–*94.7*–103 µm, middle sized sigmata: 25–*30.2*–38 µm, small sigmata: 13–*16.1*–21 µm, toxa (mostly in toxodragmata): 30–*60.1*–79 µm (possibly two size categories).

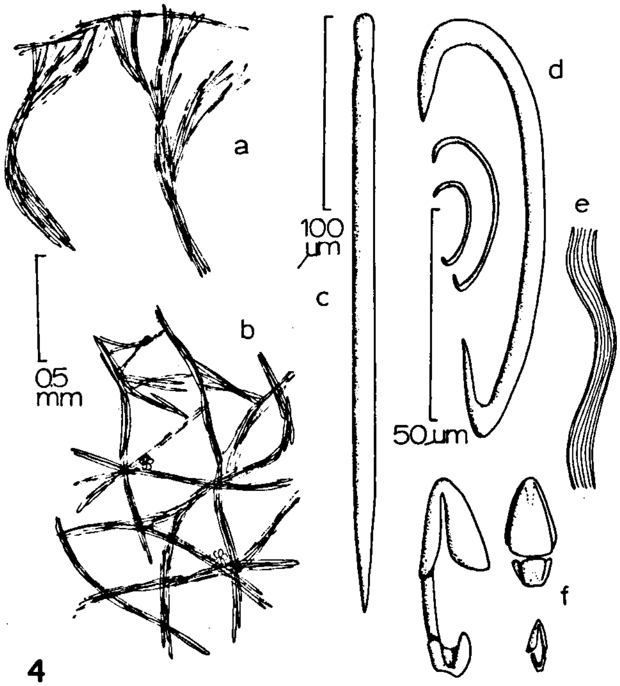

FIGURE 4. *Mycale* (*Aegogropila*) *arndti* n. sp.: a. transverse section of peripheral region; b. tangential view of ectosome; c. megasclere; d. three categories of sigmata; e. toxodragma; f. three categories of chelae.

Ecology: In mangrove forests and eel grass fields in bays and lagoons.

Distribution: Curaçao, Florida; ? St. Vincent (CARTER, 1871 as *Esperia macilenta*).

Etymology: named after Prof. Dr. WALTER ARNDT.

This species has been associated with European *Mycale macilenta* (Bowerbank, 1866) by CARTER (1871) and ARNDT (1927). This is incorrect, as *M. macilenta* by the structure of its skeleton belongs to the subgenus *Carmia*; furthermore its spiculation differs from *M. arndti* n. sp. by the more slender megascleres (290/4 µm) and by the absence of middle sized and small sigmata. The spicule complement combined with the *Aegogropila*-type of skeleton are distinctive for the present new species; it is close to *M. angulosa*.

Mycale (Aegogropila) diversisigmata n. sp.

Holotype: ZMA POR.4783, CURAÇAO, St. Martha Baai, near entrance, 1 m, under stone, 1.I.1981, coll. RWMVS.

Description (Pl. II 3–5, Fig. 5)

Shape, size and consistency: thinly incrusting, surface undulating or folded, but otherwise smooth; a few small oscules; consistency soft.

Colour: reddish orange (drab in spirit).

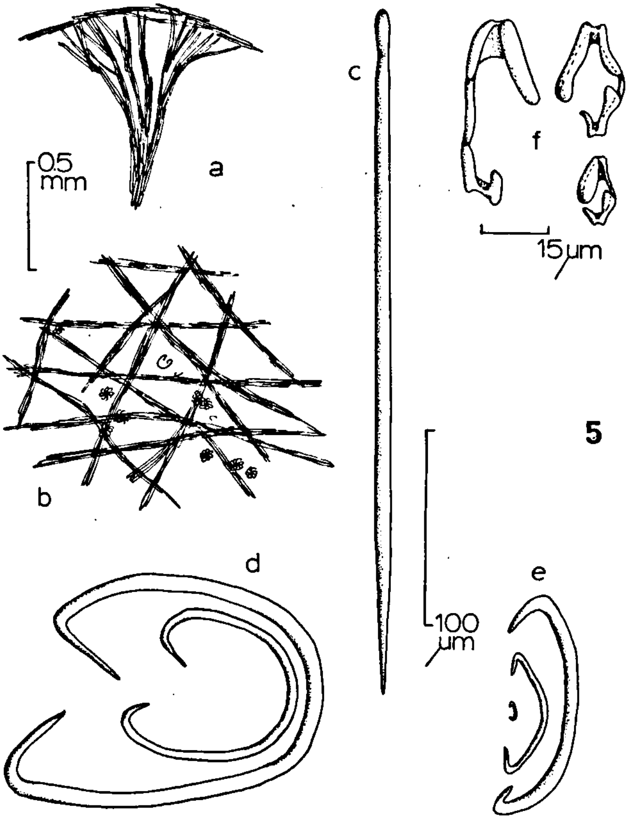

FIGURE 5. *Mycale* (*Aegogropila*) *diversisigmata* n. sp.: a. transverse section; b. tangential view of ectosome; c. megasclere; d. two categories of flagelliform sigmata; e. three categories of normal sigmata; f. three categories of chelae.

Ectosome: easily detachable; the skeleton is the usual neatly triangular reticulation of tracts. Rosettes of anisochelae are found at the crossing of the tracts.
Choanosome: fairly stout tracts of megascleres end in widely flaring "brushes" of thinner tracts which carry the ectosome.
Spiculation: subtylostyles: 335–*373.6*–393 by 5.5–*6.7*–7.5 µm, large anisochelae, mostly in rosettes: 32–*38.0*–42, small single anisochelae with one of the alae peculiarly long and often curved (Pl. II 4–5), in two size categories: 19–*22.9*–26 µm and 12–*15.1*–17 µm; rare toxa (only in the choanosome): 70–180 µm. The sigmata are quite diverse in shape and size, and constitute a very distinctive feature: large robust normal shaped ones, in two size categories: 143–178 µm and 53–69 µm, paralleled by large robust, strongly arched sigmoid spicules with incurved apices, in two size categories (height/width): 102–145/152–198 µm and 45–72/45–80 µm; finally thin, small sigmata of normal shape, fairly rare: 9–*11.8*–15 µm.

Ecology: incrusting undersides of stones in shallow bays.

Distribution: so far known only from the type locality, on Curaçao.

Etymology: the specific name refers to the great diversity of sigmoid microscleres.

By the diversity of the sigmata and the peculiar shape of the smaller anisochelae the species stands out among the West Indian *Mycale*. It approaches *M. cleistochela* ssp. *flagellifer* Vacelet & Vasseur (1971), but differs from it in spicule size.

Mycale (Aegogropila) americana n. sp.

Mycale caecilia; WELLS, et al., 1960: 212, fig. 27; COOLEY, 1978: table 6
(Non: *M. caecilia* De Laubenfels, 1936b).

Holotype: ZMA POR.4074, MARGARITA, Punta Mangle, on *Rhizophora*, 11.I.1964, coll. PWH *1446*.
Paratypes: ZMA POR.3678, CURAÇAO, Piscadera Baai, innerbay, mangrove forest, 14.XI.1975, coll. students Prof. Stock; 3889, Piscadera Baai, entrance E, 1 m, on *Halimeda*, 11.XII.1963, coll. PWH *1464A*; 3902, Piscadera Baai, near Enoch, on *Rhizophora*, tidal zone, 2.II.1949, coll. PWH *1028A*; 4267, Schottegat, Baai van de Hoop, mangrove forest, 1.XI.1905, coll. Boeke; 4784, Piscadera Baai, innerbay, on mangroves, 0.5 m, 18.XII.1980, coll. RWMVS.

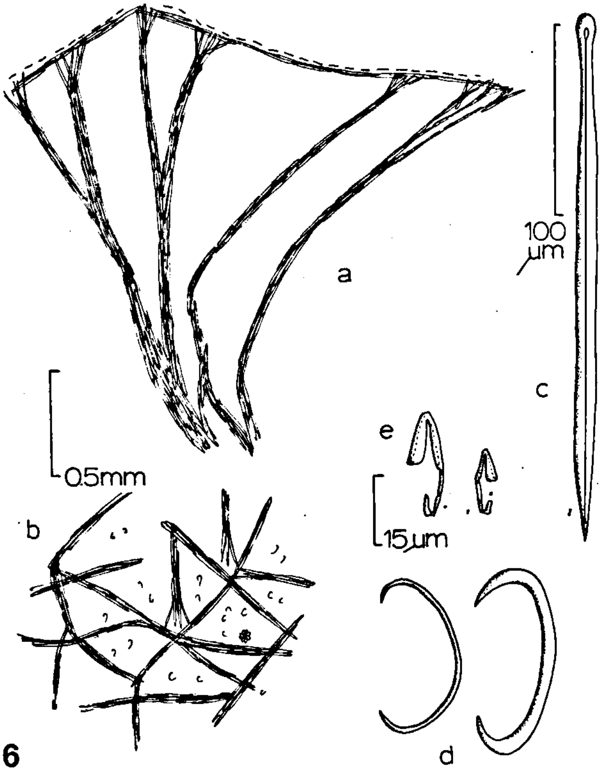

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FIGURE 6. *Mycale* (*Aegogropila*) *americana* n. sp.: a. transverse section of peripheral region; b. tangential view of ectosome; c. megasclere; d. sigmata; e. two categories of chelae.

Description (Pl. II 2, Fig. 6):

Shape, size and consistency: thickly incrusting. Oscules small and rare; surface smooth. Up to 2 cm in thickness, lateral expansion indefinite. Consistency soft, easily torn.

Colour: red.

Ectosome: the usual tangential reticulation of spicule tracts.

Choanosome: the spicule tracts verge towards a dendritic system showing very little anastomosing or reticulation. The tracts are robust; spongin is fairly rare.

Spiculation: tylostyles with clearly visible axial lumen: 190–*265.6*–338 by 5–*7.2*–10 µm; large anisochelae in rosettes: 30–*36.9*–45 µm, small anisochelae: 10–*13.9*–22 µm, sigmata: 23–*47.6*–63 µm (possibly there is a thicker and a thinner category among them).

Ecology: incrusting barnacles, stones, calcareous algae and mangrove roots in bays and lagoons.

Distribution: Margarita, Curaçao; Florida (Gulf Coast; Cooley, 1978), North Carolina (Wells, et al., 1960).

In spiculation the nearest relative seems to be *Mycale laevis*, but this orange species is much more massive and tough; it has no ectosomal triangular reticulation of spicule tracts, and also spicule sizes do not match. Moreover, *M. laevis* has trichodragmata. Wells, et al. (1960) reported this species from North Carolina under the name *M. cecilia* De Laubenfels, 1936. The structure of their specimens and the spicule size are so similar to the present material that conspecificity is quite certain. *M. cecilia* from the Pacific coast of Panamá probably is a twin species. The large category of anisochelae is smaller in *M. cecilia*, as are the sigmata; furthermore it is described as green. It is likely, that Cooley's (1978) record of *M. cecilia* is also referable to the present species.

Subgenus **Carmia** Gray, 1867 sensu Topsent, 1924

Definition: A proper ectosomal skeleton is absent, although the organic dermis may be charged with single spicules or short tracts. Choanosomal skeleton dendritic-plumose. Spicular density rather low; megascleres of intermediate to feeble size. Microscleres include anisochelae, sigmata, toxa, rhaphides and micracanthoxea.

Mycale (Carmia) microsigmatosa Arndt, 1927

Mycale fistulata Hentschel, 1911 var. *microsigmatosa* Arndt, 1927: 144, pl. I 9, text-fig. 7a–d.
? *Mycale senegalense* Lévi, 1952: 46, fig. 1.
Mycale microsigmatosa; Hechtel, 1965: 47 (with additional synonyms).
? *Mycale sanguinea* Tsurnamal, 1969: 349, figs. 17–19.
? *Desmacella meliorata* Wiedenmayer, 1977: 161, fig. 160.
Mycale lissochela; Alcolado, 1976: 5 (Non: *M. lissochela* Bergquist, 1965).

Holotype: ZMA POR.1593: CURAÇAO, Spaanse Water, 21.V.1920, coll. C. J. van der Horst, on mangrove roots.

CURAÇAO: ZMA POR.3309 (Barbara beach, 3 m, 17.I.1974, coll. JHS 74–110); 3532 (Schottegat, 22.IX.1905, coll. J. Boeke); 3725, 3982 (Piscadera Baai, N of islet, 2 m, bottom muddy, 30.X.1963, coll. PWH *1490*); 3790 (Piscadera Baai, N part SW, small bay, 2 m, bottom muddy sand, 30.X.1963, coll. PWH *1480A*); 3864 (Piscadera Baai, middle part SW, sandy mud bottom, 2 m, 29.XI.1963, coll. PWH *1474*); 3870 (Piscadera Baai, entrance E, 1 m, on *Halimeda*, 11.XII.1963, coll. PWH *1464A*); 3890 (Piscadera Baai, NE, small bay, 3.5 m, sandy mud bottom, 30.X.1963, coll. PWH *1486*); 3930 (Piscadera Baai, NE, rocky, *Rhizophora*, 11.XII.1963, coll. PWH *1485*); 3934 (Piscadera Baai, middle part, 3^d buoy, 31.X.1963, coll. PWH *1477*); 3937 (Piscadera Baai, SE part NW, *Rhiz.*, 18.XI.1963, coll. PWH *1469*); 4044 (Piscadera Baai, N, mouth of sewer, 31.X.1953, coll. PWH *1503A*); 4049 (Piscadera Baai, near entrance, SE, Rhizophora, 17.XII.1963, coll. PWH *1466*); 4319 (Piscadera Baai, NW, N entrance of small bay, *Rhiz.* and *Ulva*, 29.X.1963, coll. PWH *1495*); 4443 (Barbara beach, reeflet, on sandbottom, 21.V.1970, coll. PWH *2073Aa*); 4605 (Piscadera Baai, on *Halimeda*, 0.5 m, 30.XII.1980, coll. RWMVS); 4612, 4619 (Piscadera Baai, on *Halimeda*, 1 m, 30.XII.1980, coll. RWMVS); 4785 (Lagoen, on *Madracis*, 3 m, 27.XII.1980, coll. RWMVS).
BONAIRE: ZMA POR.3981 (Lac, inlet S of Boca Fogon, 0–0.5 m, *Rhiz.*, 14.VIII.1967, coll. PWH *1589*); 4002 (Lac, Poejito, on *Rhiz.*, 17.IV.1955, coll. PWH *1064C*).
MARGARITA: ZMA POR.4064 (Estación Punta de Piedras, on poles, 12.I.1964, coll. PWH *1447*).
FLORIDA: ZMA POR.3897 (Virginia Key, NE coast, 0.5–1.5 m, eel grass, 4.IX.1963, coll. PWH *1408*).

Diagnosis (Pl. II 6, Fig. 7):

Shape, size and consistency: Thick incrustations, with small flush oscules (1–2 mm). Surface smooth to irregular. Up to 0.5 cm in thickness. Consistency soft, easily torn, crumb-of-bread-like.
Colour: dark yellow, green-yellow, red.
Ectosome: no special ectosomal skeleton. The organic dermis is lifted into small conules by the choanosomal tracts. A dermal peel will yield abundant sigmata and some short tracts of megascleres.
Choanosome: the skeleton consists of short, whispy columns of fair thickness (5–10 spicules per cross-section), irregularly anastomosing in a dendritic manner. Spicular density is fairly high, spongin absent.
Spiculation: slender subtylostyles: 232–*261.3*–288 by 2.5–*3.5*–4.5 µm; anisochelae (not in rosettes): 12–*16.3*–21 µm; abundant sigmata: 33–*35.8*–42 µm.

Ecology: on mangrove roots, calcareous algae, molluscs, harbour poles, and calcareous sediment in bays and lagoons.

Distribution: Curaçao, Bonaire, Margarita, Florida; Jamaica (HECHTEL, 1965), ?

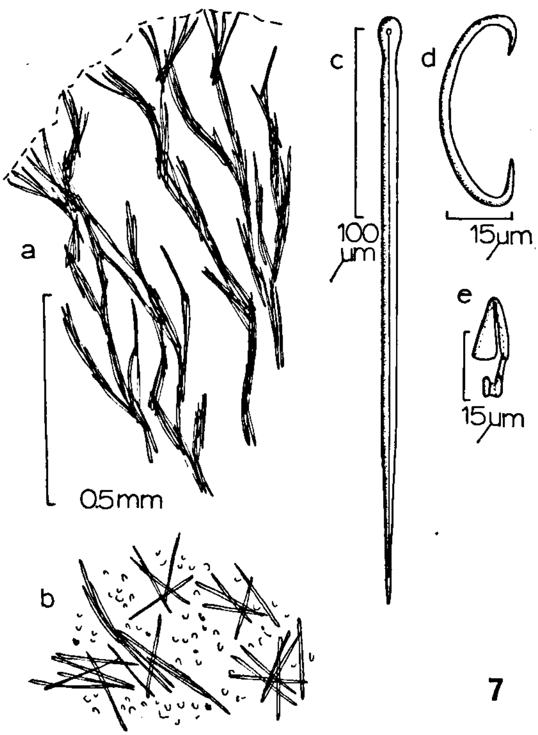

FIGURE 7. *Mycale* (*Carmia*) *microsigmatosa*: a. transverse section; b. tangential view of ectosome; c. megasclere; d. sigma; e. chela.

Bahamas (WIEDENMAYER, 1977 as *Desmacella meliorata*), Cuba (ALCOLADO, 1976 as *M. lissochela*), ? West Africa (LÉVI, 1952 as *M. senegalensis*), ? Eastern Mediterranean (TSURNAMAL, 1969 as *M. sanguinea*).

This is a clearly defined species. The yellow and red specimens are apparently conspecific. The reported occurrence elswhere outside the West Indies remains uncertain. It is likely, though, that LÉVI's (1964) material of *Mycale senegalense* and TSURNAMAL's (1969) material of *Mycale sanguinea* are conspecific. Reasons for doubt are only the disjunct distributions.

North Carolina material of *Mycale cecilia* sensu Wells et al. (1960), considered conspecific with *M. microsigmatosa* by HECHTEL (1965), is here referred to *M. americana* n. sp. (cf. above). HECHTEL (l.c.) also gives a synonymy quotation of *Mycale microsigmatosa* Burton, 1956, but I could not find this in BURTON's report. *Mycale angulosa* sensu Dickinson, 1948, from California is close to the present species.

The suggestion, that WIEDENMAYER's (1977) *Desmacella meliorata* is conspecific with the present species, stems from the observation, that in some specimens of the present material (e.g. ZMA POR.4002) the anisochelae are quite rare and very difficult to find. Further details of *D. meliorata* match the present species (shape, consistency, colour, skeletal plan, size and shape of the megascleres, size of the sigmata) (cf. also discussion on the genus *Desmacella* below).

Mycale angulosa sensu Burton (1956) from West Africa is probably conspecific with the present species; examination of the specimen in the Copenhagen Museum revealed only slight discrepancies (sigmata slightly larger and thicker).

Mycale (Carmia) magnirhaphidifera n. sp.

Holotype: ZMA POR.4885, CURAÇAO, Piscadera Baai, on poles of Hilton Hotel landing, VIII.1976, coll. H. Rink 18.

Description (Pl. II 7, Fig. 8):

Shape, size and consistency: Thinly (2 mm) incrusting. Size several sqcm. Surface optically smooth; no apparent oscules. Consistency soft, easily torn.

Colour: blue-green (keeps in spirit).

Ectosome: microtuberculate, heavily pigmented.

Choanosome: the skeleton consists of thin whispy bundles of thin megascleres. Spicular density low. No spongin.

Spiculation: thin flexuous tylostyles: 236–*254.2*–270 by 1.5–*2.2*–3 µm; large anisochelae (in rosettes): 19–*27.6*–33 µm, small anisochelae: 10–*12.4*–17 µm; large flexuous trichodragmata: 260–*291.3*–310 µm (12–18 rhaphides per dragma).

Ecology: incrusting worm tubes in bays.

Distribution: known only from the type locality, Curaçao.

Etymology: the specific name refers to the long rhaphides.

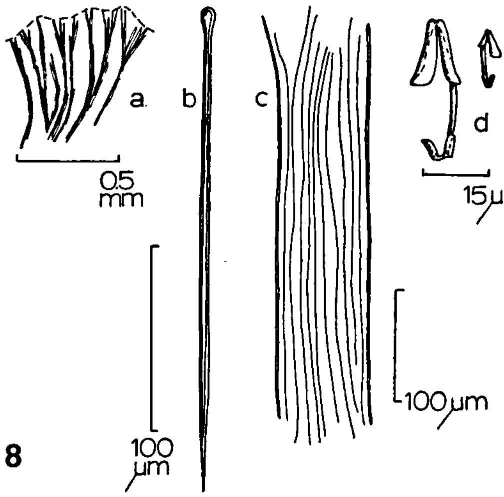

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FIGURE 8. *Mycale* (*Carmia*) *magnirhaphidifera* n. sp.: a. transverse section; b. megasclere; c. trichodragma of large rhaphides; d. two categories of chelae.

The large trichodragmata are the distinctive feature of this species. There are no matching descriptions in the literature with the possible exception of *Esperella arenicola* Ridley & Dendy, 1887, from Bass Straits, which has trichodragmata of 350 µm. Other characters separate both forms; it is even possible that RIDLEY & DENDY's species belongs in the subgenus *Mycale.*

If sigmata had been present the new species would have been extremely close to *M. rhaphidotoxa* Hentschel, 1912 from the Moluccas.

Subgenus **Acamasina** De Laubenfels, 1936

Acamas Duch. & Mich., 1864 (in part: only *A. laxissima*)

Definition: *Mycale* without ectosomal skeleton. The choanosomal skeleton consists of a coarse rectangular reticulation of thick spicule tracts, completely enveloped in a spongin coat. Interior cavernous with scanty fleshy parts. Spiculation: subtylostyles, anisochelae and sigmata.

Mycale (Acamasina) laxissima (Duch. & Mich., 1864)

Acamas laxissima Duch. & Mich., 1864: 95, pl. XXII 3.
Mycale angulosa; De Laubenfels, 1936a: 116, pl. 14 fig. 2, pl. 15 fig. 1; Lévi, 1959: pl. 6 fig. 5, text-fig. 19.
(Non: *Pandaros angulosa* Duch. & Mich., 1864: 89, pl. XIX 4).

Holotype: Mus. Torino POR. 34, St. Thomas.

Curaçao: ZMA POR.3592 (near Carmabi, 18 m, 14.XI.1972, coll. students Prof. Stock); 3950, 4758 (Piscadera Baai, piles of Hilton Hotel landing, VIII.1976, coll. H. Rink 4, 16); 4616 (Piscadera Baai, piles of Hilton Hotel landing, 1.5 m, 16.XII.1980, coll. RWMVS). Bonaire: ZMA POR.4245 (Lac, Poejito, 18.XI.1930, coll. PWH *1064A*).

Diagnosis (Pl. III 1, Fig. 9):

Shape, size and consistency: massively incrusting, up to 5 by 10 by 15 cm, possibly forming cups or small vasiform specimens. Strongly conulose due to flimsy fleshy parts. Oscules indistinct. Consistency spongy; soft. The species is notable for its copious slime production.
Colour: reddish purple with bluish tinges; slime is whitish.
Ectosome: no ectosomal skeleton; dermal peels contain only microscleres and some loose megascleres.
Choanosome: the skeleton is a coarse rectangular reticulation of stout spongin fibres, 50–300 µm in thickness, cored by 15–30 spicules per crosssection. Fleshy parts vestigial, adhering to skeletal fibres.
Spiculation: thin subtylostyles: 209–*223.2*–240 by 2–*2.5*–3.5 µm; anisochelae: 16–*20.0*–23 µm; sigmata: 70–*75.0*–81 µm.

Ecology: known from harbour poles and reefs.

Distribution: St. Thomas, Curaçao, Bonaire; Florida (De Laubenfels, 1936), West Africa (Lévi, 1959).

Confusion exists over the identity of this species (cf. also description of *Mycale angulosa* above), due to De Laubenfels' (1936a, 1950b) erroneous naming of the present species as *M. angulosa.* Thus, Lévi's (1959) record of *M. angulosa* must be taken as records of *M. laxissima.* The type specimen of *Acamas laxissima* (Museum Torino POR.34), was kindly sent on loan by Dr O. Elter; this and the British Museum (Nat. Hist.) fragments (BMNH reg.no. 1928:11:12:112) leave no doubt about the identity of this remarkable species. *Pandaros angulosa* Duch. & Mich., 1864 is represen-

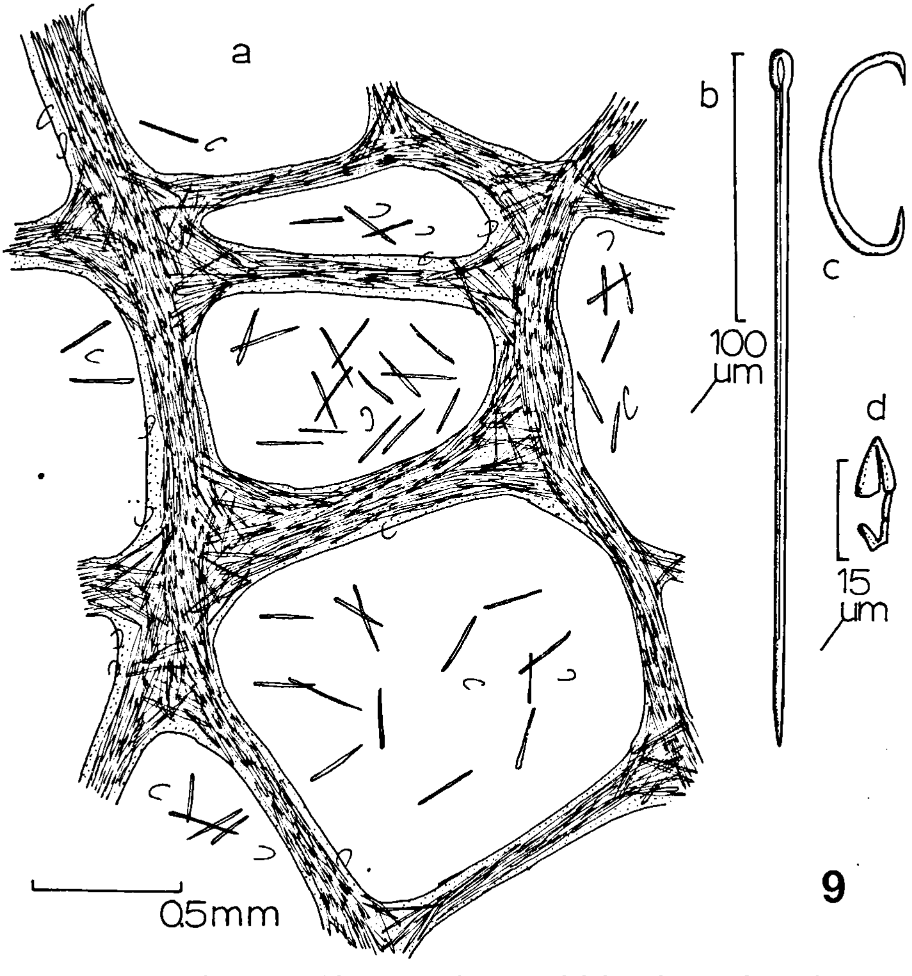

FIGURE 9. *Mycale (Acamasina) laxissima*: a. choanosomal skeleton; b. megasclere; c. sigma; d. chela.

ted by a type specimen (Mus. Torino POR.54), which conforms to what was hitherto known as *Zygomycale parishi*.

Mycale laxissima has a twin species in the Indo-Pacific area: material collected by the Siboga Expedition and identified as *M. setosa* (Keller,

1889) by BURTON, is highly resemblant of the West Indian specimens. Structure of the skeleton, the scanty fleshy parts, the size of the fibres and of the spicules are identical. A noteworthy difference, however, is the abundance of sigmata in *M. setosa*, which by far exceeds that of *M. laxissima*. Specimens of *Mycale spongiosa* Dendy (1884) reported by THOMAS (1973) from the Seychelles also seem close to *M. laxissima*.

RIDLEY & DENDY's (1886–1887) *Esperella nuda* from Brazil seems another member of the subgenus *Acamasina*; noteworthy differences with *M. laxissima* are the thickness of the megascleres (16 µm) and the size of the sigmata (100 µm).

DISCUSSION OF THE GENUS *Mycale*

All well-established *Mycale* species from the West Indies proper have been treated above. There exists a red, vasiform *Mycale*, which is possibly undescribed, although it might prove to be *Mycale laxissima*. It concerns the species described as *Mycale* spec. by REISWIG (1973), and COLIN (1978: 73, 94) and as *Mycale angulosa* by ALCOLADO (1976).

LITTLE's (1963) record of *Carmia macilenta* from the Gulf of Mexico is not attributable to the European species. Little based his identification apparently on his erroneous observation of large sigmata in his specimen. Through the kindness of Dr. K. RÜTZLER I was able to study LITTLE's material (USNM no. 23559), and I could not find a single sigma in it. Sigma-like thin growth stages of the largest category of anisochelae were frequent and might easily have been mistaken for sigmas. The specimen apparently represents an undescribed species of the subgenus *Aegogropila* with the following spicule characteristics: subtylostyles 230/7.5 µm, large anisochelae in rosettes: 45 µm, middle sized anisochelae 23 µm, small anisochelae 14 µm, large toxa 90 µm, small toxa 45 µm.

SCHMIDT (1870) described some *Esperia* species from Florida deepwaters, viz. *E. diaphana*, *E. renieroides*, *E. immitis* and *E. massa* Schmidt, 1868. Of these, only the latter two are certainly of the genus Mycale. *E. diaphana* has very large (650 µm) seemingly aberrant anisochelae, and *E. renieroides* has to be referred to the genus *Oxymycale* on account of its oxeote megascleres. *E. immitis* (synonym: *E. socialis* Carter, 1871, cf. CARTER, 1882: 293) has two sizes of anisochelae (24 and 89 µm) and sigmata of 44 µm and thus could be close to *M. americana* n. sp. It is known from deep water only. *E. massa* is unrecognizable.

All West Indian *Mycale* species are summarized in Table 2.

KEY TO THE WEST INDIAN SHALLOW-WATER SPECIES OF *Mycale*

1. – Red tubes of 15 cm high, sometimes in groups . . . . *M.* spec. Reiswig, 1973
– Incrusting or irregular upright sponges, no tubes 2

2. – Ectosomal tangential reticulation of megascleres present . . 3
– Ectosomal tangential reticulation absent (although the ectosome might contain some single megascleres or short bundles) . . 8

3. – Ectosomal skeleton confused-halichondroid; megascleres robust styles or strongylostyles (400–700 by 5–20 µm); colour yellow . . . . *M. laevis*
– Ectosomal skeleton a reticulation of tracts of megascleres forming more or less distinct triangular meshes . . . . (*Aegogropila*) 4

4. – Palmate isochelae present . . . . *M. angulosa*
– Palmate isochelae absent 5

5. – Sigmata include large (up to 180 µm) strongly arched ones with incurved apices . . . . *M. diversisigmata*
– Sigmata of normal shape and size 6

6. – Toxa absent, only two categories of anisochelae and one of sigmata . . . . *M. americana*
– Toxa present 7

7. – Sigmata absent (although thin growth stages of the larger category of anisochelae might be mistaken for them) . . . . *M.* spec. (= *M. macilenta* sensu Little, 1963)
– Sigmata present . . . . *M. arndti*

8. – Massive sponges with a coarse isodictyal skeleton of spongin fibres cored by bundles of megascleres . . . . *M. laxissima*
   – Incrusting sponges with little or no spongin and ill-developed skeletal tracts 9

9. – Abundant sigmata, no rhaphides. . . . . . *M. microsigmatosa*
   – Abundant large rhaphides (in dragmata), no sigmata . . . . . .
   . . . . *M. magnirhaphidifera*

DISCUSSION OF THE FAMILY MYCALIDAE

The genus *Anomomycale* Topsent, 1924, which has arcuate anisochelae, is represented in the West Indies by *Desmacidon titubans* Schmidt, 1870 from Florida. The genus *Oxymycale* Hentschel, 1929, with oxea for megascleres is represented in the West Indies by the ill-described *Esperia renieroides* Schmidt, 1870 from Florida.

The genus *Ulosa* De Laubenfels, 1936a has been associated with Mycalids by WIEDENMAYER (1977); it is preferred here to transfer *Ulosa* to the Esperiopsidae. West Indian species assigned to *Ulosa* (*U. hispida* Hechtel, 1965, *U. ruetzleri* Wiedenmayer, 1977, *U. funicularis* Ruetzler, 1981, and *U. arenosa* Ruetzler, 1981) do not appear to be congeneric with *Spongia angulosa* Lamarck, 1814, the type species of *Ulosa* (redescribed by TOPSENT (1930)). *U. angulosa* has a pronouncedly reticulate ("chalinid") skeleton of thick spicule tracts branching and anastomosing regularly at right angles. Spicules are fairly thick, short styles and occasionally strongyles. It is vaguely resembling the subgenus *Acamasina* of the genus *Mycale*. The West Indian "*Ulosa*" species are fleshy and have a low spicular density with thinner, often much longer styles arranged in non-branching ill-defined tracts. They probably belong to the Hymeniacidonidae of the order Halichondrida.

Desmacidon infestum Schmidt, 1879 from Florida is unrecognizable. The genus *Paresperella* Dendy (1905) possibly occurs in the West Indies, because I found a characteristic acanthose sigma in a slide of *Dictyociona adioristica* De Laubenfels (1953), USNM 23403; it is possible, of course, that it concerns a contamination from Indo-West Pacific material.

Table 2

The species of Mycale known from the West Indian region.

(*Esperia massa* sensu Schmidt (1870) is excluded, because it was unrecognizably described)

Species	Subgenus	subtylostyles	anisochelae large	anisochelae middle	anisochelae small	isochelae	sigmata large	sigmata middle	sigmata small	toxa	rhaphides
M. laevis	*Mycale*	475–570/7–17	68–*75.7*–84 (ros.)	18–*21.6*–24	—	—	12–*23.4*–34	—	—	—	52–*61.8*–72 (tr.)
M. angulosa	*Aegogropila*	256–*294.5*–341/ 3–*5.7*–8	41–*47.5*–56	16–*18.8*–23	—	8–*10.6*–13	54–*69.8*–86	16–*24.2*–29	—	26–*52.5*–86 (toxodr.)	20–*31.0*–48 (tr.)
M. arndti	*Aegogropila*	260–*303.7*–342/ 7–*8.2*–9	45–*50.6*–55	19–*22.4*–26	10–*11.4*–13	—	88–*94.7*–103	25–*30.2*–38	13–*16.1*–21	30–*60.1*–79 (dr.)	—
M. diversisigmata	*Aegogropila*	335–*373.6*–393	32–*38.0*–42 (ros.)	19–*22.9*–26 (cleist.)	—	—	1) 143–178 (normal) 2) 102–145/ 152–198	1) 53–69 2) 45–72/ 45–80	9–*11.8*–15	70–108	—
M. americana	*Aegogropila*	190–*265.6*–338/ 5–*7.2*–10	30–*36.9*–45 (ros.)	10–*13.9*–22	—	—	24–*47.6*–63	—	—	—	—
M. "*macilenta*" sensu Little	*Aegogropila*	230/7.5	45 (ros.)	23	14	—	—	—	—	90	45
M. immitis Schmidt	?	?	89	24	?	?	?	?	?	?	?
M. microsigmatosa	*Carmia*	232–*261.3*–288/ 2.5–*3.5*–4.5	12–*16.3*–21	—	—	—	33–*35.8*–42	?	?	?	?
M. magnirhaphidifera	*Carmia*	236–*254.2*–270/ 1.5–*2.2*–3	19–*27.6*–33 (ros.)	10–*12.4*–17	—	—	—	—	—	—	260–*291.3*–310 (tr.)
M. laxissima	*Acamasina*	209–*223.2*–240/ 2–*2.5*–3.5	16–*20.0*–23	—	—	—	70–*75.0*–81	—	—	—	—
M. spec. (red tubes of Reiswig, 1971)	? *Acamasina*					no data available					

Family **ESPERIOPSIDAE** Hentschel, 1923
(= Desmacidonidae sensu Bergquist, 1978)

Definition: Poecilosclerida with a reticulate or plumo-reticulate choanosomal skeleton of monactinal or diactinal megascleres. Ectosomal skeleton absent (but organic dermis often strongly developed or charged with foreign material). Microscleres include palmate, anchorate or unguiferate isochelae and sometimes sigmata.

Genus **Desmapsamma** Burton, 1934

Definition: Esperiopsidae with monactinal megascleres and ectosomal reticulation of sandgrains.

Desmapsamma anchorata (Carter, 1882)

Synonymy: cf. HECHTEL, 1965: 21.
In addition: *Desmapsamma anchorata*; HARTMAN, 1967: 20, pl. 7 fig. 1, text-fig. 6; ALCOLADO, 1976: 5.

CURAÇAO: ZMA POR.837 (Spaanse Water, 29.IV.1920, coll. C. J. van der Horst, holotype of *Desmacidon carterianum* Arndt, 1927: 147); 3303 (Barbara beach, 3 m, 17.I.1974, coll. JHS 74–111); 3311 (Barbara beach, 3 m, 17.I.1974, coll. JHS 74–106); 3312 (Hilton Hotel landing, 1 m, 22.XI.1973, coll. JHS 73–18); 3605, 3631 (near Carmabi, 11–14 m, 16.XI.1975, coll. students Prof. Stock); 3635 (Piscadera Baai, 2 m, 2.XI.1975, coll. students Prof. Stock); 3645 (Piscadera Baai, 1st buoy, 40 m, 22.III.1974, coll. JHS); 3713 (Piscadera Baai, W entrance, 1 m, 14.XII.1965, coll. PWH *1463A*); 3848 (Piscadera Baai, Boca W, S of waterpipe, *Rhizophora*, 14.XII.1963, coll. PWH *1461*); 3866, 3909 (Piscadera Baai, outerbay, on poles of landing, 0–1 m, 14.X.1967, coll. PWH *1620*); 3882 (500 m W of Piscadera, 35 m, 13.XI.1975, coll. students Prof. Stock); 3887 (Piscadera Baai, middle SE, *Rhiz.*, 13.XII.1975, coll. PWH *1475*); 3898, 4038, 4055 (Piscadera Baai, entrance, on iron poles of water basin, 0–1 m, 2.I.1964, coll. PWH *1462*); 3906 (Piscadera Baai, swimming pool, 1–1.5 m, 29.I.1949, coll. PWH *1029A*); 3935 (Spaanse Water, NW, Brakke Put Ariba, 5 m, sandy, 1.XI.1968, coll. PWH *1628*); 3948 (Hilton Hotel landing, VIII.1976, coll. H. Rink 1).
BONAIRE: ZMA POR.3803 (Lac, Sorobon, *Rhiz.*, 17.IV.1955, coll. PWH *1062A*); 3996 (Lac, Poejito, S, 0–0.5 m, *Rhiz.*, 10.VIII.1967, coll. PWH *1577*).
LOS ROQUES: ZMA POR.4810 (Dos Mosquises, 28.II.1982, coll. JHS 82–33).
MARGARITA: ZMA POR.3693 (Puente de la Restinga, on stones, 11.I.1964, coll. PWH *1449*).
COLOMBIA: ZMA POR.4886 (Cartagena, XII.1921, coll. J. Metzelaar).

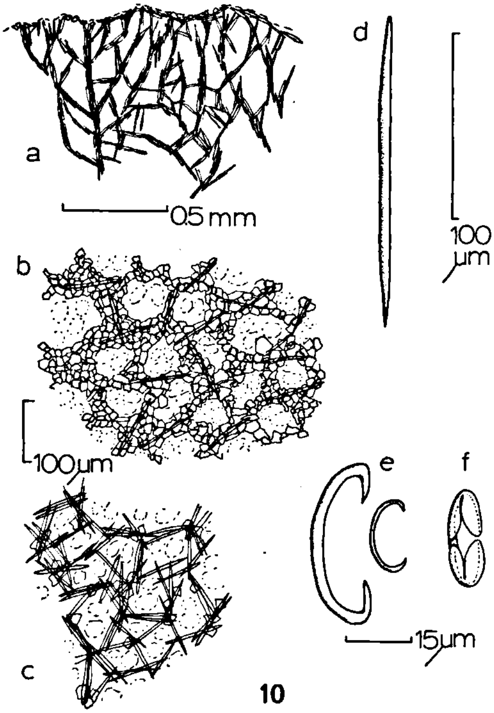

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FIGURE 10. *Demapsamma anchorata*: a. transverse section; b. tangential view of ectosome of a specimen with a heavy sand coat; c. do. of a specimen with a light sand coat; d. megasclere; e. Two categories of sigmata; f. chela.

Diagnosis (Pl. III 2–5, Fig. 10):

Shape, size and consistency: upright, somewhat ramose masses with oscules on elevations, or sprawling clumps of volcanoe-shaped oscular tubes. Up to 15 cm long or more, up to 5 cm in diameter. Oscules 1–5 mm in diameter. Consistency compressible, rather soft; slimy.

Colour: pale purplish-pink or dirty-pink alive (beige to whitish in spirit).

Ectosome: tough, charged with sand grains and oxeote megascleres in a narrow-meshed reticulation (Fig. 10b–c).

Choanosome: crumbly, cavernous; the skeleton consists of a renieroid reticulation of short spicule tracts (without any trace of spongin) and many loose megascleres.

Spiculation: oxea of slender shape: 144–*167.6*–190 by 3–*4.97*–9 µm (no distinction between ectosomal and choanosomal oxea); arcuate isochelae: 8–*14.1*–20 µm; sigmata in two distinct size categories 19–*25.7*–39 µm and 11–*12.9*–16 µm.

Ecology: common in bays and lagoons on mangrove roots and stones, occasionally also found on the reefs; a typical member of the fouling community (cf. also VAN SOEST, 1981).

Distribution: Curaçao, Bonaire, Los Roques, Margarita, Colombia; Antigua (CARTER, 1882 as *Fibularia*), Jamaica (HECHTEL, 1965), Cuba (ALCOLADO, 1976), Brasil (RIDLEY & DENDY, 1887 as *Desmacidon reptans*), West Africa (BURTON, 1956; LÉVI, 1959), Zanzibar (BURTON, 1959), China Sea (LINDGREN, 1898, as *Desmacidon reptans*), Great Barrier Reef (BURTON, 1934).

This is a clearly defined species. The conspecificity of the specimens reported from outside the West Indies must perhaps be determined again, as cosmopolitan shallow water species do not fit in with current ideas on biogeography and speciation. BURTON's (1956) West African material in the Copenhagen Museum is probably conspecific (spicules are about the same in size), although the habit is subtly different. A specimen from Indonesia studied for comparison, did not seem to have the larger category of sigmata and its megascleres were more robust than those of West Indian specimens.

The genus *Desmapsamma* was erected to distinguish sand-fortified species from sand-less *Desmacidon* Bowerbank, 1866. This may not seem a very important difference; however, considerable differences exist in the skeletal architecture between both type species, *D. anchorata* and *Desmacidon fruticosa* (Johnston, 1845). The latter has a multispicular, spongin-enforced system of primary and interconnecting fibres, not unlike e.g. *Iotrochota birotulata.*

Holopsammia helwigi De Laubenfels, 1936a, from Florida, shows considerable affinity with *Desmapsamma* (the type specimen, USNM no. 22412 was kindly sent on loan by Dr. K. RÜTZLER); however, it lacks the chelae and incorporates much more foreign material in the choanosome.

Genus **Iotrochota** Ridley, 1884

Definition: Esperiopsidae with birotulate microscleres.

Iotrochota birotulata (Higgin, 1977)

Hyrtios musciformis Duch. & Mich., 1864: 75, pl. XIV 3 (nomen oblitum).
Further synonymy: Wiedenmayer, 1977: 138.

Redescription of the holotype of *Hyrtios musciformis* Duch. & Mich., 1864 from St. Thomas, ZMA POR.1427.

A thin incrustation on a dead piece of *Porites*, with single conical elevation of about 1 cm in width and 0.5 cm in height. Surface conulose with ectosome only adhering in places. Colour black. Skeleton consisting of a neat rectangular reticulation of thick spicule tracts, 30–250 µm in diameter, encased in spongin, enclosing meshes of 200–500 µm in diameter. Spicules: styles and strongyles of about the same size: 140–230 by 3–4.5 µm; birotulates: 10–12 µm.

Curaçao: ZMA POR.3613 (near Carmabi, 18–20 m, 14.XI.1975, coll. students Prof. Stock); 3946 (Hilton Hotel landing, VIII.1976, coll. H. Rink 14); 4611 (near Carmabi, 0.5–1.5 m, underneath stone, 25.XII.1980, coll. RWMVS); 4614 (Hilton Hotel landing, 1 m, 16.XII.1980, coll. RWMVS); 4778 (300 m SE of Hilton Hotel, 33 m, on *Meandrina*, 17.XII.1980, coll. RWMVS); 4887 (Fuikbaai, E corner, 2 m, muddy rock debris, 5.X.1968, coll. PWH *1644*).
Bonaire: ZMA POR.4624 (Carl's Hill, N.W. Klein Bonaire, 20 m, 5.I.1981, coll. RWMVS).
St. Martin: ZMA POR.3492 (Little Bay, 2–3 m, 7.II.1959, coll. JHS 196).
Puerto Rico: ZMA POR.3886 (18°15′ N 67°13.5′ W, 40–50 fathoms, bottom muddy sand, 21.II.1963, coll. JHS PR.86).

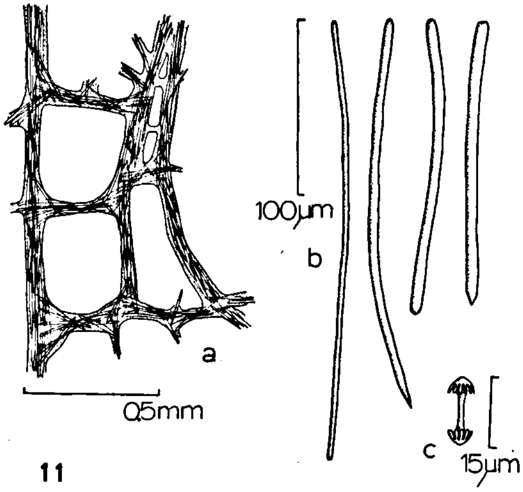

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Figure 11. *Iotrochota birotulata*: a. choanosomal skeleton; b. various megascleres; c. birotulata.

Diagnosis (Pl. IV 1–2, Fig. 11):

Shape, size and consistency: Sprawling or upright, thick, ramose branches with conulose surface; small, incrusting specimens often wholly or partly smooth. Length of branches up to 50 cm (cf. COLIN, 1978: 111, 89 (top)), diameter 1–5 cm. Incrusting specimens may be only a few mm in thickness. Consistency tough, incompressible.

Colour: black, mottled with longitudinal green patches; occasionally entirely green; gives off a dark purplish exudate when squeezed.

Ectosome: thick, organic, heavily pigmented; difficult to detach without taking some choanosomal parts. There are some single megascleres or ill-defined short tracts, and frequent microscleres.

Choanosome: tight-meshed, very regular reticulation of thick spicule tracts cemented with variable amounts of spongin. Diameter of tracts 35–100 µm, mesh size 100–700 µm. I have not been able to find any localization in strongyles and styles, as was reported by Bergquist (1965) in specimens from Jamaica.

Spiculation: strongyles (including occasional oxeote forms): 146–*183.6*–230 by 3–*3.96*–5 µm; styles: 142–*184.7*–242 by 3–*3.84*–6 µm; birotulates: 10–*12.8*–15 µm.

Ecology: apparently quite euryoecious as it is known from reefs, undersides of stones in shallow bays and from deeper water beyond the reefs.

Distribution: St. Thomas, Curaçao, Bonaire, St. Martin, Puerto Rico; Venezuela (HIGGIN, 1977 as *Halichondria*), Jamaica (HIGGIN, 1877; HECHTEL, 1965), Cuba (ALCOLADO, 1976), Florida (DE LAUBENFELS, 1932, 1936a, 1953), ? Indo-Pacific (CARTER, 1887 as *Halichondria*).

The conspecificity of Indo-Pacific specimens remains to be determined in a comparative study of *I. birotulata*, *I. purpurea* (Bowerbank, 1875) and *I. baculifera* Ridley, 1884. The variability of characters such as the amount of spongin, the ratio of styles to strongyles, and the abundance of microscleres appears to be quite substantial, if we compare descriptions of HECHTEL (1965) and WIEDENMAYER (1977) with the present material.

No clear localization of strongyles at the periphery could be found in the studied specimens, nor was this apparent in the Indonesian specimens of *I. purpurea* and *I. baculifera* collected by the Siboga Expedition (identified by M. BURTON). BERGQUIST (1965) claims to have observed this in *Iotrochota* species (also in Jamaican *I. birotulata*), and for this reason transferred the genus to the Tedaniidae (= Myxillidae in the present sense). I do not think *Iotrochota* has a special category of diactinal (amphitylote or strongylote) ectosomal spicules, and is not a typical Myxillid in other characters, either, so for the time being it should return to the Esperiopsids (of which it is also untypical). The tough organic ectosome is perhaps comparable to that of *Desmapsamma*.

Possibly, a study of the distribution of the birotulate microscleres within the order Poecilosclerida could throw new light over the affinities of the genus *Iotrochota*.

Genus **Monanchora** Carter, 1883

Definition: Esperiopsidae with a plumose choanosomal skeleton of (subtylo-)styles and unguiferate or spatulate anchorate isochelae.

Monanchora barbadensis Hechtel, 1969

Monanchora barbadensis Hechtel, 1969: 21, fig. 3.

Curaçao: ZMA POR.3664, 3668 (off Jan Thiel Baai, 23–32 m, 16.XI.1975, coll. students Prof. Stock); 3679 (Blauwbaai, 15 m, XI.1975, coll. S. Weinberg & E. Westinga); 3680 (near Carmabi, 10 m, XI.1975, coll. E. Westinga); 3859 (Vaarsenbaai, 21.XI.1975, coll. N. Broodbakker); 4610 (Boei 0, 6–12 m, 19.XII.1980, coll. RWMVS); 4617 (Playa Kalki, 10–20 m, 30.XII.1980, coll. RWMVS); 4622 (Boei 0, 25–35 m, 23.XII.1980, coll. RWMVS); 4772 (Boei O, 6–12 m, 19.XII.1980, coll. RWMVS); 4788 (Boei 4, 20–25 m, 24.XII.1980, coll. RWMVS).

Diagnosis (Pl. IV 3–5, Fig. 12):

Shape, size and consistency: mostly thinly incrusting; in some specimens the crust is elevated into small fibrous lamellations (Pl. IV 4). Surface smooth. No apparent oscules in spirit specimens (small in living specimens cf. Pl. IV 3 and Colin, 1978: 113). Size often considerable. Consistency fairly tough, compact, not soft.

Colour: bright or dark red alive (dull red to cream in spirit).

Ectosome: organic, with scattered single megascleres, but no proper ectosomal skeleton.

Choanosome: the skeleton consists of loose tracts of megascleres running parallel with the substrate, giving off frequent branches at oblique angles.

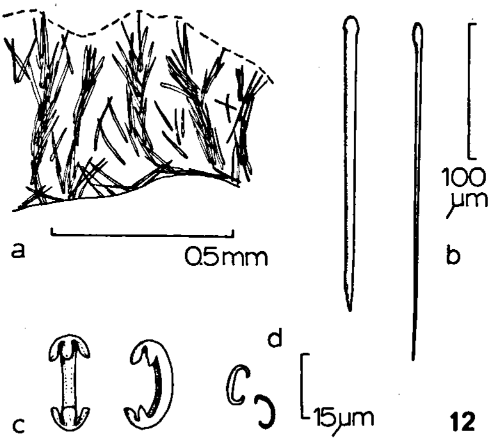


FIGURE 12. *Monanchora barbadensis*: a. transverse section; b. two categories of megascleres; c. chelae; d. reduced sigmatose chelae.

A variable amount of spongin binds the tracts, but they are often ill-defined. The branches support the ectosome with brushed endings. Spiculation: thick (subtylo)styles without, or only with a slight, tylote swelling, occasionally true tylostyles, localized mostly outside the tracts, less numerous than the next category: 189–*236.5*–272 by 4–*5.4*–7.5 µm; dominant thin subtylostyles with elongate tylote swelling, straight to curved: 190–*222.7*–322 by 1.5–*2.75*–4 µm; robust unguiferate anchorate isochelae with three-five teeth (occasionally verging towards a spatulate condition), relatively rare: 16–*17.8*–20 µm, small reduced anchorate chelae (virtually sigmatose), abundant: 7–*8.2*–10.5 µm (in one specimen, ZMA POR.4617, the "sigmata" were 17–20 µm long).

Ecology: common incrustations on (dead) corals, molluscs and gorgonian stems in reef environment.

Distribution: Curaçao; Barbados (HECHTEL, 1965), Puerto Rico, Jamaica (COLIN, 1978: 113 and 115 (top)).

The present material closely agrees with HECHTEL's descriptions, the only significant point of difference being the structure of the choanosomal skeleton. HECHTEL states, that his specimens have single spicules erect on the substrate, while in the present material there is some organization into tracts, especially in specimens with elevated lamellations. The difference may be explained by the extremely thinly incrusting nature of HECHTEL's specimens.

A second West Indian species of *Monanchora* was described by DE LAUBENFELS (1953) from Florida, as *Echinostylinos unguiferus*. The type specimen was kindly sent on loan by Dr. K. RÜTZLER (USNM no. 23404). It is an obvious *Monanchora* with unguiferous chelae (*Echinostylinos* Topsent, 1927, has spatulate isochelae). Moreover, there is a close resemblance with *Monanchora barbadensis*. Points of difference are the habit (upright, "branching") (cf. Pl. IV 6), and the size of the megascleres (100–145 by 12–13 µm, and 90 by 5 µm). These differences are considered to be wide enough to uphold both as different species.

Monanchora shows, by its size-differentiated megascleres and spongin-enforced tracts, some affinity with Microcionidae; however, the absence of echinating spicules, toxa, acanthostyles and palmate isochelae negate any close relationship. The unguiferate isochelae show some similarity with Cladorhizidae, but in other characters these are quite different from *Monanchora*. By elimination it is proposed to leave this genus in the Esperiopsidae, although it is not a typical member.

Genus **Strongylacidon** Lendenfeld, 1897, emended.

Definition: Esperiopsidae with plumosely arranged bundles of strongyles for megascleres and unguiferate or anchorate isochelae and sigmata for microscleres.

Strongylacidon poriticola n. sp.

Holotype: ZMA POR.4764, Curaçao, Lagoen, on *Porites porites*, 3 m, 27.XII.1980, coll. RWMVS.

Description (Fig. 13):

Shape, size and consistency: thinly incrusting the base of a coral colony; oscules small; surface smooth. Size several sqcm. Consistency soft.

Colour: bright red (reddish brown in spirit).

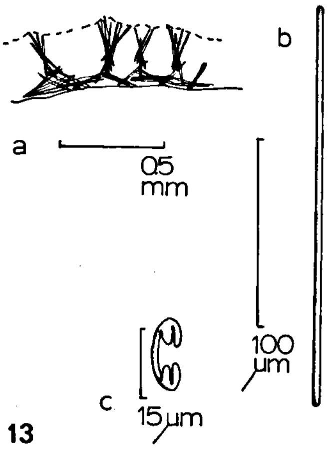
Ectosome: largely organic, fibrous-elastic.
Choanosome: largely organic, only sparse, whispy columns of megascleres strengthened by some spongin carry the ectosome; anastomosing or branching of tracts rare.
Spiculation: thin, curved strongyles, sometimes somewhat tylote: 155–*175.6*–190 by 2 µm; rare anchorate isochelae (verging towards the arcuate condition): 9–*12.0*–15 µm.

Ecology: incrusting corals on the reef flat.

Distribution: known only from the type locality.

Etymology: the name refers to its occurrence on *Porites*.

The isochelae are fairly rare, but probably proper, as this particular type of chela has not been found in any other Curaçao species. According to BURTON's (1934) redefinition of *Strongylacidon* the chelae should be unguiferate; in my opinion the distinction between anchorate and unguiferate chelae may be quite vague and not that important.



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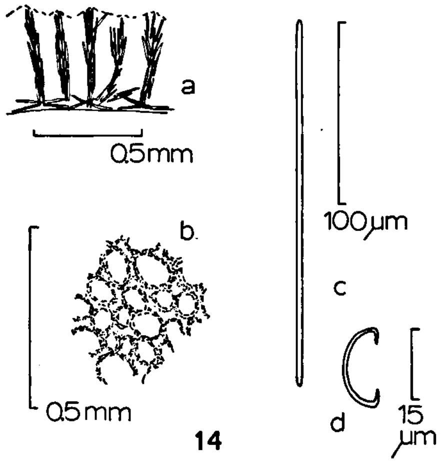

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FIGURE 13. *Strongylacidon poriticola* n. sp.: a. transverse section; b. megasclere; c. chela.

FIGURE 14. *Strongylacidon viridis* n. sp.: a. transverse section; b. tangential view of ectosome showing pigment granules surrounding the inhalant pores; c. megasclere; d. sigma.

Strongylacidon viridis n. sp.

Holotype: ZMA POR.4757, Curaçao, Hilton Hotel landing, on poles, 1–2 m, 16.XII.1980, coll. RWMVS.
Paratype: ZMA POR.4758, same locality as the holotype, VII.1976, coll. H. Rink 16 (partly incrusting on *Mycale laxissima*).

Description (Fig. 14):

Shape, size and consistency: thinly incrusting with smooth surface. Oscules not apparent. Size several sqcm. Consistency soft, easily torn.
Colour: a distinctive dark green (retained in spirit).
Ectosome: Pigment-bearing granules form a dermal reticulation around pore-fields; no ectosomal skeleton.
Choanosome: ill-defined loose tracts of megascleres traverse the choanosome at right angles to the surface. Tracts consist of about 10–15 spicules per cross-section, and do not form a distinct reticulation by anastomosing or branching. In general, spicular densities are low; microscleres are found mostly in peripheral parts.
Spiculation: perfect strongyles, uniformly thin over their entire length: 177–*189.4*–204 by 2.5–*3.3*–4 µm; thin sigmata: 13–*15.4*–18 µm.

Ecology: possibly a member of the fouling community.

Distribution: so far known only from the Hilton Hotel landing, Curaçao.

The genus *Strongylacidon* was extended by Burton (1934) to include species without chelae; his definition is here emended to include species without chelae but with sigmata. Such action may be rightly criticized, but it is felt, that the erection of a new genus for the present and the next species is not justified until a proper revision of *Strongylacidon* and related, so-called "reduced Myxillids", has been undertaken.

Strongylacidon rubra n. sp.

Holotype: ZMA POR.4759, Curaçao, Boei 0, 25–35 m, on oyster, 23.XII.1980, coll. RWMVS.
Paratype: ZMA POR.4760, Curaçao, Cape Malmeeuw, 12–16 m, on oyster, 23.XII.1980, coll. RWMVS.

Additional material: Puerto Rico: ZMA POR.3320 (shelf edge off Parguera, 10–35 m, 3.III.1963, coll. JHS).

Description (Fig. 15):

Shape, size and consistency: thinly encrusting; surface smooth; no apparent oscules but a fine ectosomal meshwork is visible to the naked eye. Size several sqcm. Consistency soft and easily torn.

Colour: bright red (white in spirit).

Ectosome: largely organic but easily detachable. Pore fields are surrounded by rows of large pigment-bearing granules.

Choanosome: largely organic with isolated columns of spicules (up to 15 spicules per cross-section), rising towards the surface where they end in brushes. Anastomosing rare.

Spiculation: thin, somewhat sinuous strongyles: 167–*177.3*–200 by 1.5–*2.1*–2.5 µm; abundant thin sigmata, in two size categories: 20–*25.4*–30 µm and 9–*12.4*–15 µm.

Ecology: incrusting oyster shells in reef environments.

Distribution: Curaçao, Puerto Rico.

The present species differs from *S. viridis* n. sp. in the life colour and spicule sizes (thinner strongyles, larger sigmata). The reticulated ectosome of both is perhaps homologous with that of *Anomomyxilla* Burton (1934) and *Desmapsamma* Burton (1934).

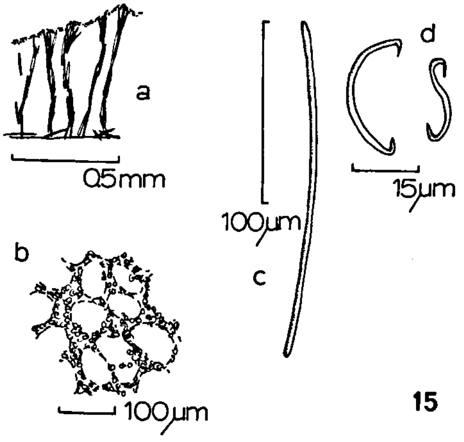

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FIGURE 15. *Strongylacidon rubra* n. sp.: a. transverse section; b. tangential view of ectosome showing pigment granules surrounding the inhalent pores; c. megasclere; d. sigmata.

DISCUSSION OF THE GENUS *Strongylacidon*

Fibulia bermudae De Laubenfels (1950) probably is a fourth West Indian species of *Strongylacidon*, a suggestion which I received from Dr. K. RÜTZLER (*in litteris*); the holotype is incorporated in the British Museum (Nat. Hist.), reg.no. 1948:18:6:21. The skeleton consists of a reticulation of tracts of strongyles 180–200 by 2 µm; the colour is dark purple. *Fibulia* sp.aff. *bermudae* sensu Johnson (1971) from Brazil is probably not conspecific as habit and colour are different. The type of *Cacochalina rubiginosa* Schmidt, 1870 from Florida is kept in the Copenhagen Museum; it resembles *Fibulia bermudae* in skeletal and spicule characters.

BURTON (1934) considered this genus to be a reduced Myxillid, along with a number of other genera (*Batzella* Topsent, 1891, *Plumocolumella* Burton, 1929, *Anomomyxilla* Burton, 1934, *Anomodoryx* Burton, 1934, *Psammodoryx* Burton, 1934, *Hemimycale* Burton, 1934 and *Rhaphoxiella* Burton, 1934). However, the evidence for this is thin, so its is proposed here to follow DE LAUBENFELS (1936a) and LÉVI (1973) in keeping it in the family Esperiopsidae.

The genera *Xytopsaga* De Laubenfels (1936a) and *Xytopsiphum* De Laubenfels (1950b) are close to *Strongylacidon*; the species *Xytopsiphum kaneohe* De Laubenfels (1950) from Hawaii has sigma-like reduced isochelae and thus may be comparable to *S. viridis* and *S. rubra*.

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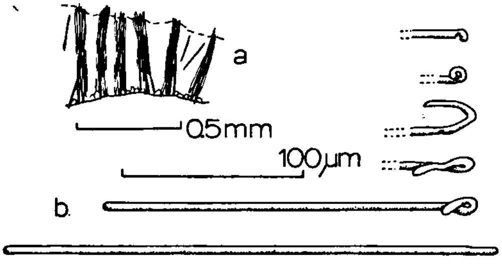


FIGURE 16. *Batzella rosea* n. sp.: a. transverse section; b. megascleres, including some of the more common malformations.

Genus **Batzella** Topsent, 1891

Definition: Esperiopsidae with a reduced, loosely plumose skeleton of strongyles (tornotes); no ectosomal skeleton; no microscleres.

Batzella rosea n. sp.

Holotype: ZMA POR.4756, CURAÇAO, Cape Malmeeuw, 12–16 m, on *Madracis*, 23.XII.1980, coll. RWMVS.

Description (Fig. 16):

Shape, size and consistency: Thinly incrusting on stems of *Madracis*; several sqmm in size; no distinct oscules. Consistency soft, easily torn.
Colour: rosy red.
Ectosome: rather easily detachable, but without a proper tangential skeleton.
Choanosome: loose, vaguely plumose tracts ending in short spicule brushes make out the skeleton. Overall spicular density low.
Spiculation: slender straight strongyles: 209–*254.9*–288 by 3–3.7–4 µm, with a fairly high percentage of malformations, in which one end of the strongyle is looped.

Ecology: incrusting corals.

Distribution: known only from its type locality, Curaçao.

It is with considerable hesitation, that this new form is assigned to the genus *Batzella* (considered monotypical by BURTON, 1934), a genus with uncertain affinities. BURTON (l.c.) thought, that *Batzella* is a reduced Myxillid (together with a number of other genera such as *Strongylacidon*); TOPSENT thought the genus belongs to the Hymeniacidonidae, while PULITZER-FINALI (1977, 1982) put it in the Halichondriidae. Because of its affinity with *Strongylacidon*, which in its turn seems to be best placed in the Esperiopsids, I propose to leave this genus in this family; species assigned to it are: *B. inops* Topsent (1891), *B. inaequalis* Hentschel (1911), *B. friabilis* Pulitzer-Finali (1977), *B. frutex* Pulitzer-Finali (1982), and *B. rosea* n. sp.

DISCUSSION OF THE FAMILY ESPERIOPSIDAE

The genus *Guitarra* Carter (1874) is represented in the West Indies by *G. fimbriata* Carter (1874) recorded by SCHMIDT (1879) from 23°52′ N 88°05′ W.

DE LAUBENFELS (1936a) described *Euchelipluma congeri* from Dry Tortugas. This species (*teste* a slide from the holotype, USNM 22517, kindly sent on loan by Dr. K. RÜTZLER), is a doubtful Esperiopsid, because it has a halichondroid-plumose skeleton of large tylostyles in dense concentrations; were it not for the presence of moderately numerous palmate isochelae the species could have easily been mistaken for a *Desmacella*, because the choanosome is crowded with sigmata. DE LAUBENFELS stated, that the isochelae verged toward placochelae, but I have seen no such chelae in the slide. The genus *Euchelipluma* Topsent, 1909, cannot hold this species, as it is defined to contain species with placochelae and reduced sigmancistra-like chelae.

The family Esperiopsidae remains somewhat a dust-bin family; compared to LÉVI's (1973) list of genera referable to this family, I propose to remove *Neofibularia* Hechtel (1965) to the Biemnidae, and return *Anomomycale* Topsent (1924) to the Mycalidae. Two distinct groups seem to exist within the family, on the one hand the genera with isodictyal reticulate skeletons (e.g. *Isodictya, Desmacidon, Desmapsamma, Esperiopsis*) on the other hand those with plumose or plumo-reticulate skeletal tracts of mostly thin megascleres (e.g. *Iotrochota, Strongylacidon, Monanchora*).

Family CLADORHIZIDAE De Laubenfels, 1936

Definition: "Abyssal Poecilosclerida with axial and radiating skeleton of monactinal megascleres; species of small size, often stipitate". (LÉVI, 1973).

No specimens of this group were present in my material. West Indian representatives are *Cladorhiza concrescens* Schmidt (1879), recorded from three localities (Virgin Islands, Grenada, and 33°44′ N 83°13′ W), and *Crinorhiza amphactis* Schmidt (1879) from Barbados. The first species probably belongs to *Chondrocladia* Thomson (1873), rather than to *Cladorhiza* Sars, 1872, because SCHMIDT described isochelae (in two size categories).

The family distinctness of the Cladorhizidae from families as Mycalidae and Esperiopsidae has to be reestablished, because above given diagnosis is not clear, if one realizes that the axially condensed skeleton is merely caused by the stipitate habit, which in its turn seems to be related to ecology.

Family MYXILLIDAE Topsent, 1928

Definition: Poecilosclerida with a (plumo-)reticulate choanosomal skeleton of smooth or acanthose monactines (rarely oxeote or strongylote), and an ectosomal tangential skeleton of diactinal smooth megascleres (sometimes with microspined apices). Microscleres isochelae (both anchorate and arcuate), sigmata, forcipes, onychaetes. Spongin ill-developed, little more than cementing at the nodes.

Genus **Tedania** Gray, 1867

Definition: Myxillidae with onychaetes as microscleres (but without chelae or sigmata); ectosomal tylotes are terminally microspined and choanosomal styles are smooth.

Tedania ignis (Duch. & Mich., 1864)

Thalysias ignis DUCH. & MICH., 1864: 83, pl. XVIII 1, 7.
Further synonymy cf. WIEDENMAYER, 1977: 133.

Redescription of the paralectotype of *Thalysias ignis* Duch. & Mich., 1864, from ST. THOMAS, ZMA POR.2373.

A small piece of about 5 by 5 by 3 cm; surface uneven, tuberculate to corrugate, though in places it is smooth on account of the presence of an ectosomal crust stretched over subdermal spaces. Ectosome charged with mostly loose tylotes and onychaetes. Choanosomal skeleton renieroid.

Spicules: tylotes 210–225 by 3 µm, styles 220–240 by 4–8 µm, onychaetes in two size categories: 180 and 50 µm.

CURAÇAO: ZMA POR.464 (Spaanse Water, V.1920, coll. C. J. van der Horst, Arndt's (1927) specimen of *T. ignis*); 3496 (Piscadera Baai, innerbay on mangroves, 6.X.1958, coll. JHS 12); 3638 (Piscadera Baai, innerbay on mangrove roots, 14.XI.1975, coll. students Prof. Stock); 3709, 3754 (Spaanse Water, N of Jan Sofat Islet, mangroves, 17.XI.1968, coll. PWH *1629*); 3719, 3720 (Spaanse Water, NE of Santa Barbara, on buoy, 1.XI.1968, coll. PWH *1634*); 3746 (Piscadera Baai, Boca W, sandy, *Rhizophora*, 14.XII.1963, coll. PWH *1460A*); 3761

(Piscadera Baai, N islet, *Rhiz.*, 26.IX.1962, coll. L. J. van der Steen don. PWH *1491A*); 3768 (Piscadera Baai, near entrance SE, *Rhiz.*, 17.XII.1963, coll. PWH *1466*); 3769 (Piscadera Baai, NE, *Rhiz.*, rocky, 11.XII.1963, coll. PWH *1485*); 3786 (Piscadera Baai, N part SW, small bay, on molluscs, 2 m, muddy sand, 30.X.1963, coll. PWH *1480A*); 3845 (Piscadera Baai, SE part, *Rhiz.*, 18.XII.1963, coll. PWH *1468*); 3867 (Piscadera Baai, S part, 4th buoy, 31.X.1963, coll. PWH *1470*); 3868 (Piscadera Baai, entrance E, 1 m, *Halimeda*, 11.XII.1963, coll. PWH *1464A*); 3892 (Piscadera Baai, middle part SE, *Rhiz.*, 13.XII.1963, coll. PWH *1475*); 3905 (Piscadera Baai, innerbay, near Carmabi, 0–0.5 m, *Rhiz.*, 30.III.1970, coll. PWH *1671*); 3915 (Piscadera Baai, SE part NE, rocky, *Rhiz.*, 18.XII.1963, coll. PWH *1468*); 3922 (Piscadera Baai, S part W, 2 m, muddy sand, 29.XI.1963, coll. PWH *1471B*); 3940, 3976 (Piscadera Baai, SE part NW, *Rhiz.*, 18.XII.1963, coll. PWH *1469*); 3947, 3952 (Piscadera Baai, on poles of Hilton Hotel landing, VIII.1976, coll. H. Rink 3); 4052 (Piscadera Baai, innerbay, NW of islet, *Rhiz.*, 26.IX.1963, coll. PWH *1623*); 4625 (Hilton Hotel landing, 1 m, 16.XII.1980, coll. RWMVS); 4776 (Piscadera Baai, on mangrove roots, 18.XII.1980, coll. RWMVS).

Bonaire: ZMA POR.3702 (Lac, W, 300 m E of Palu Calbas, sandy, 11.VIII.1967, coll. PWH *1569*); 3706 (Lac, Cai, E side, 0–0.5 m, mangrove roots, 16.IX.1967, coll. PWH *1576*); 3778 (Lac, C, 1 km NW of Cai, 1.5 m, muddy sand, 25.VIII.1967, coll. PWH *1573*); 3911 (Lac, Puitu, entrance 300 m E of Cai, 0–0.25 m, *Rhiz.*, 11.VIII.1967, coll. PWH *1575*); 3985 (Lac, near E point Cai, eel grass, sand, 0.5–2 m, 17.IX.1948, coll. PWH *1067*); 3987 (Lac, Poejito, S, 0–0.5 m, *Rhiz.*, 10.VIII.1967, coll. PWH *1577*); 4018 (Lac, Poejito, tidal zone, *Rhiz.*, 17.IX.1949, coll. PWH *1064B*); 4253 (Lac, Sorobon, *Rhiz.*, 26.X.1930, coll. PWH *1062*).

St. Martin: ZMA POR.3807 (Oyster Pond, on *Rhiz.*, 13.X.1963, coll. PWH *1429*); 4041 (Great Bay, NE coast, on wooden wreck on sandy beach, tidal zone, 26.V.1949, coll. PWH *1128A*).

Puerto Rico: ZMA POR.3328 (Isla Magueyes, La Parguera, 0–1 m, on gate of basin, 29.I.1963, coll. JHS PR 8); 3340 (Magueyes, on mangrove, 5.II.1963, coll. JHS PR 41).

Florida: ZMA POR.3891, 4059 (Virginia Key, on poles of Marine Laboratory landing, 1.IX.1963, coll. PWH *1409*); 4069 (Key Biscayne, North point, with *Thalassia*, 1.IX.1963, coll. PWH *1410*).

"West Indies": ZMA POR.3542, 3543 (coll. J. Boeke, no further data).

Diagnosis (Pl. IV 7, Fig. 17):

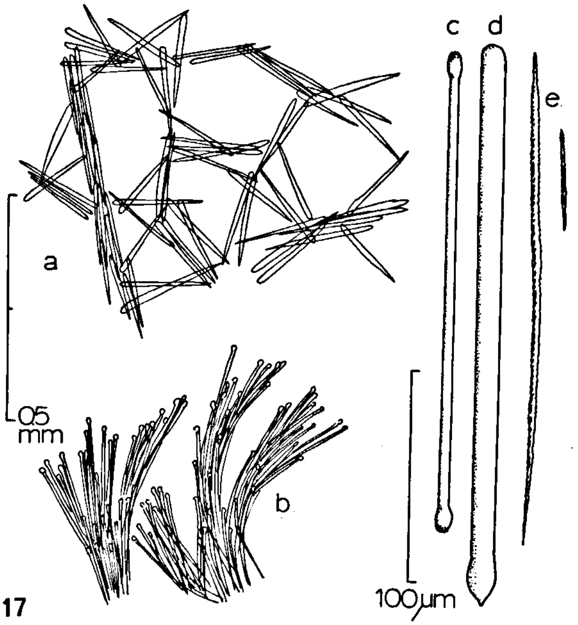
Shape, size and consistency: Massively incrusting to lobate, with smooth, tuberculate or villous surface. Oscules 0.5 cm or more when alive. Size up to 20 cm in horizontal expansion, up to 15 cm thick. Consistency soft, compressible, easily torn. The species causes a mild skin irritation and is known as "fire sponge".

Colour: a bright, warm red; occasionally rosy or even orange (light drab in spirit).

Ectosome: difficult to peel off. The dermis is charged with tangentially strewn tylotes and onychaetes. Often the tylotes are arranged in thick, whispy bundles.

Choanosome: crumb-of-bread-like, without distinct fibres. The skeleton consists for the most part of an irregular renieroid reticulation of pauci-

spicular tracts or single spicules. Large parts of the skeleton appear confused. Some spongin is found at the nodes.
Spiculation: ectosomal tylotes, straight, with distinct, though moderately swollen heads, which are microspined: 180–*217.1*–248 by 2.5–*3.38*–4.5 µm; choanosomal styles, smooth, mostly straight, sometimes slightly subtylostylote (cf. *Tedania tora* De Laubenfels, 1950): 202–*248.8*–281 by 4–*6.31*–9 µm; onychaetes (acanthose-rugose rhaphidoxea) in two distinct size categories of which the smaller is found abundantly in the ectosomal region: 154–*211.1*–247 by 0.5–*1.61*–2.5 µm, and 30–*64.0*–95 by 0.5 µm or less.



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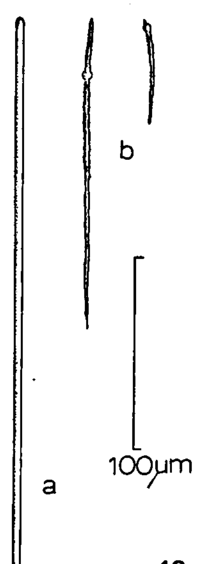

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FIGURE 17. *Tedania ignis*: a. choanosomal skeleton; b. typical arrangement of ectosomal megascleres; c. ectosomal tylote; d. choanosomal style; e. onychaete microscleres.

FIGURE 18. *Hemitedania baki* n. sp.: a. megasclere; b. onychaete microscleres showing characteristic swelling.

Ecology: mostly known from sheltered bays and lagoons, on mangroves and among eel grass or algae; it is a typical member of the fouling community.

Distribution: St Thomas, Curaçao, Bonaire, St Martin, Puerto Rico, Florida; Antigua (CARTER, 1882 as *Reniera digitata*), Jamaica (HECHTEL, 1965), Bahamas (DE LAUBENFELS, 1949; WIEDENMAYER, 1977), Bermuda (RIDLEY & DENDY, 1887 as *T. digitata*; VERRILL, 1907; DE LAUBENFELS, 1950 as *T. tora*), Gulf Coast (LITTLE, 1963), Belize (BURTON, 1954 as *T. anhelans*), Panamá (DE LAUBENFELS, 1936b), Brasil (DE LAUBENFELS, 1956).

In the present material the two sizes of onychaetes are unmistakable although overlapping sizes occur. It is perhaps a matter of appreciation whether these should be recognized as separate, rather than as a continuous series (cf. HECHTEL (1965) and WIEDENMAYER (1977)). I will not venture any opinion on the possible cosmopolitan distribution of this species, as BURTON & RAO (1932) contented. Rather than comparing literature data on spicule sizes one should have a close look at every aspect of a large series of specimens from different parts of the world before reaching conclusions.

A fragment of the type of *Tedania tora* De Laubenfels, 1950, from Bermuda is present in the collections of the British Museum (Nat. Hist.), reg.no. 1948:8:6:30. It has unusually thin megascleres, but in view of the rather large variation of this character in *Tedania ignis* from various West Indian localities, it is difficult to regard this as conclusive evidence of specific differences. I prefer to consider *T. tora* as a somewhat atypical *T. ignis.*

A ZMA specimen labeled "*Amphimedon nolitangere*" Duch. & Mich., 1864 (POR. 612), turned out to be a piece of *T. ignis*; it is probably a case of mislaid labels.

Genus **Hemitedania** Hallman, 1914

Definition: Myxillidae with strongylote megascleres and tylote onychaetes.

Hemitedania baki n. sp.

Holotype: ZMA POR.4766, CURAÇAO, Boei 0, W. of Piscadera Baai, 25–35 m, incrusting on *Agaricia agaricites*, 23.XII.1980, coll. RWMVS.
Paratypes: ZMA POR.4767, Curaçao, same locality and date as the holotype, incrusting on *Meandrina meandrina*; 4768, Boei 4, 20–25 m, incrusting on coral rubble, 24.XII.1980, coll. RWMVS.

Description (Pl. V 1, Fig. 18):
Shape, size and consistency: Thinly encrusting sheets on (dead) corals; surface smooth, slimy, no apparent oscules; size probably indefinite (in largest paratype 5 × 2 cm). Consistency soft, easily damaged.
Colour: bright red (cream in spirit).
Ectosome: easily detachable, with tangential megascleres strewn at random.
Choanosome: confused to loosely plumose tracts of megascleres carry the ectosome. Spongin rare. Microscleres extremely abundant.
Spiculation: megascleres of one type only: strongyles (tornotes), occasionally with one pointed end (stylote) or both ends pointed (oxeote), although these are obviously the same type of spicule: 171–*244.1*–297 by 2.5–*3.7*–5 µm; centrotylote onychaetes (tylote swelling mostly near one end of the spicule, Pl. V 1), in two size categories: 118–*156.0*–171 µm and 44–*82.5*–91 µm.

Ecology: incrusting corals in deep reef habitats.

Distribution: known only from Curaçao.

Etymology: named after my good friend Dr. ROLF BAK in recognition of his help.

This is the first record of the genus *Hemitedania* from the tropical Atlantic. The genus is with certainty only known from South Australia by its type species *Amorphina anonyma* Carter, 1886, a digitate rather elaborate sponge, in spiculation differing from the present species in its megascleres, which are hastately pointed oxea (cf. redescription in HALLMANN, 1914). Other potential members of *Hemitedania* are: *Tedaniopsamma arenosa* Vacelet & Vasseur (1971) (close to *H. baki*), and *Tedania bispinata* Hentschel, 1911.

A genus possibly synonymous with *Hemitedania* is *Tedaniopsis* Dendy, 1924 (type species *Tedania charcoti* Topsent, 1908), differing from it in the possession of a special category of ectosomal tornotes with microspined heads, next to choanosomal styles and tylote onychaetes. It is indeed likely, that such a distinctive feature as the tylote onychaetes was not developed twice independently. If both genera would prove synonymous, then other species might be added as members of *Hemitedania*, e.g. *Oceanapia tarantula* Kirkpatrick (1908), *O. kirkpatricki* Hentschel (1914), *Tedaniopsis turbinata* Dendy (1924), *Tedania pectinicola* Thiele (1905) and *T. fuegiensis* Thiele (1905), all from the Southern Ocean.

Genus **Lissodendoryx** Topsent, 1894

Definition: Myxillidae with monactinal or diactinal, smooth or acanthose choanosome megascleres arranged in a renieroid reticulation of single spicules; microscleres always include arcuate isochelae and sigmata.

Lissodendoryx isodictyalis (Carter, 1882)

Synonymy: cf. Wiedenmayer, 1977: 135.
In addition: *Esperiopsis fragilis* Verrill, 1907: 333, pl. XXXV C figs. 1–3.

Curaçao: ZMA POR.3894 (Piscadera Baai, N, near sewer, 31.X.1963, coll. PWH *1503A*); 3908 (Piscadera Baai, near Enoch, tidal zone, sand and mud, 2.II.1949, coll. PWH *1028*); 3939 (Piscadera Baai, NE, small bay, *Rhizophora*, 25.XI.1963, coll. PWH *1487*); 3941, 4039 (Piscadera Baai, middle E, *Rhiz.*, 25.VII.1962, coll. L. J. van der Steen, don. PWH *1476*); 4023 (Piscadera Baai, entrance E, 0.5 m, *Rhiz.*, 11.XII.1963, coll. PWH *1465*).
Bonaire: ZMA POR.3705 (Lac, Cai, E-side, 0–0.5 m, mangroves, 16.IX.1967, coll. PWH *1576*); 3722, 3989, 3995 (Lac, Poejito, SE, 0–0.5 m, *Rhiz.*, 11.III.1970, coll. PWH *1577*); 3749 (Lac, inlet S of Boca Fogon, 0–0.5 m, mangrove roots, 14.VIII.1967, coll. PWH *1589*); 3799 (Lac, entrance S of Boca Fogon, creek, 0–0.5 m, *Rhiz.*, 14.VIII.1967, coll. PWH *1590*); 3992, 4048 (Lac, Poejito, NE, 0–0.5 m, *Rhiz.*, 10.VIII.1967, coll. PWH *1577*); 4030 (Lagoen, SW, on *Avicennia*, muddy, 19.IX.1967, coll. PWH *1555*); 4246 (Lac, Poejito, *Rhiz.*, 18.XI.1930, coll. PWH *1064A*); 4252 (Sorobon, near Boca Jewfish, 0–0.5 m, *Rhiz.*, 10.III.1970, coll. PWH *1653*); 4254 (Lac, Cai, E side, 0.25–1 m, among *Thalassia* and *Halimeda*, 16.IX.1967, coll. PWH *1576A*).
Aruba: ZMA POR.4258 (Playa Master, mangroves, 29.IV.1955, coll. PWH *1009A*).
Margarita: ZMA POR.3977 (Punta Mosquito, near Porlamar, tidal zone, rock, 4.VI.1936, coll. PWH *1216*); 4063 (Estación Punta de Piedras, on poles, 12.I.1964, coll. PWH *1447*).
Florida: ZMA POR.4004, 4037 (Key Biscayne, N point, among *Thalassia*, 1.IX.1963, coll. PWH *1410*); 4060, 4061 (Virginia Key, on poles of Marine Laboratory landing, 1.IX.1963, coll. PWH *1409*).

Diagnosis (Pl. V 2–3, Fig. 19):

Shape, size and consistency: Lobate to amorphous masses, with a smooth to papillate surface. Oscules prominent on the apices of volcanoe-shaped lobes, up to 10 mm in diameter. Size up to about 10 by 10 by 5 cm. Consistency soft, easily torn, spongy. When squeezed alive, it gives off a green exudate.

Colour: green-grey to yellowish drab alive (cf. WIEDENMAYER, 1977) (drab in spirit).

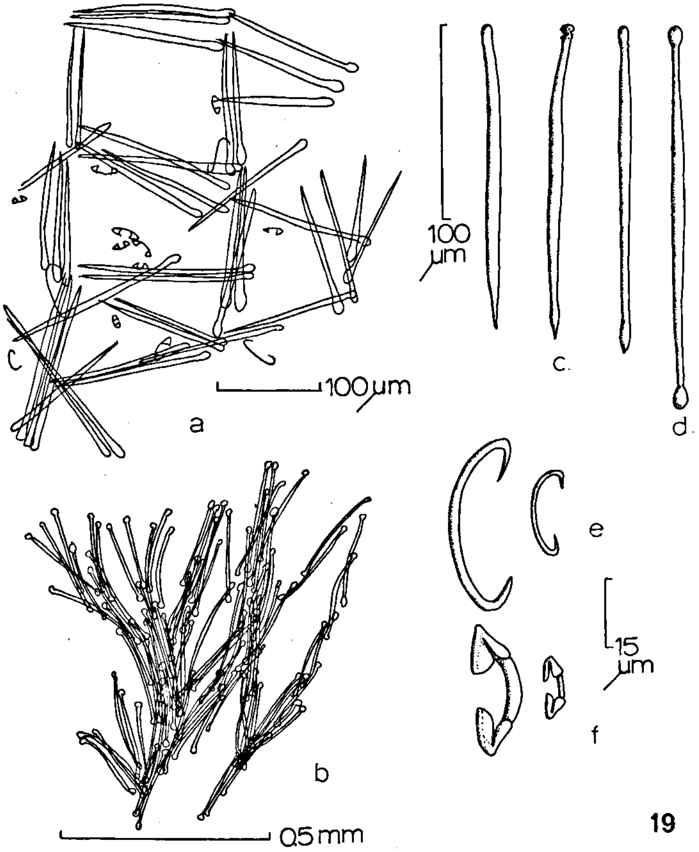

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FIGURE 19. *Lissodendoryx isodictyalis*: a. choanosomal skeleton; b. ectosomal bundles of tylotes; c. various choanosomal megascleres; d. ectosomal tylote; e. two categories of sigmata; f. two categories of chelae.

Ectosome: charged with numerous loosely strewn tylotes and microscleres; tylotes often in whispy bundles.
Choanosome: coarsely crumbly on account of the irregular single-spicule reticulation. In places, there are vague ascending and interconnecting tracts of 2–3 styles in diameter, but mostly the spicules occur singly, forming a renieroid reticulation.
Spiculation: the spicules appeared to vary enormously in shape, and also considerably in size, from one specimen to another. The most frequent spicule complement encountered was: normal ectosomal tylotes, slightly acanthose (tylo-)styles, two categories of isochelae, and two categories of sigmata. However, tylotes were sometimes polytylote, sometimes terminally acanthose, or pointed at one end; styles were often completely smooth, or heavily acanthose on one or both ends, often the sharp end was mucronate; the sigmata were sometimes found in only one category (mostly then around 25 µm). Sizes: tylotes: 156–*183.0*–212 by 2–*3.10*–4 µm, styles: 146–*165.3*–198 by 3.5–*4.70*–6 µm, large arcuate isochelae: 19–*24.6*–34 µm, small arcuate isochelae: 8–*10.3*–16 µm, large sigmata: 23–*34.7*–45 µm, small sigmata: 11–*16.5*–20 µm.

Ecology: predominantly found on mangrove roots or among turtle grass and *Halimeda*; it is a typical member of the fouling community.

Distribution: Curaçao, Bonaire, Aruba, Margarita, Florida (cf. also De Laubenfels, 1936a, and Storr, 1964); Jamaica (Hechtel, 1965), Bahamas (Wiedenmayer, 1977), Bermuda (Verrill, 1907), North Carolina (Wells, et. al., 1960; George & Wilson, 1919 as *L. carolinensis*), New England, U.S.A. (Hartman, 1958), Gulf of Mexico (Little, 1963), Yucatán (Topsent, 1889 as *Tedania leptoderma*), Venezuela (Carter, 1882 as *Halichondria*), Brasil (De Laubenfels, 1956), Pacific coast of México (Carter, 1882), Mediterranean (Topsent, 1925), Indian Ocean (Thomas, 1973).

The variability of the spicules found in the present material is amazing, when it is compared with descriptions of this sponge from other West Indian localities, where distinct categories of microscleres apparently have not been found. Also, specimens outside this area (e.g. New England coast, cf. Hartman, 1958), are quite uniform. However, the present material corroborates with Topsent's (1925) and Hartman's (l.c.) ideas, that the *Lissodendoryx isodictyalis* specimens from all corners of the world cannot be divided into (sub-)species with the present data on spicule sizes and forms. A close comparison of large numbers of specimens from all over the world is necessary to solve the question whether this species is indeed cosmopolitan in warmer waters.

Lissodendoryx sigmata (De Laubenfels, 1949) sensu Wiedenmayer (1977) is very closely related, but is distinguished by the larger tylotes and absence of true styles.

Lissodendoryx sigmata (De Laubenfels, 1949)

Xytopsene sigmatum De Laubenfels, 1949: 15; Little, 1963: 40.
Lissodendoryx sigmata; Wiedenmayer, 1977: 136, pl. 21 fig. 7, pl. 22 figs. 1–2, text-fig. 143.

Curaçao: ZMA POR.4623 (Boei 4, 20–25 m, 24.XII.1980, coll. RWMVS); 4786 (Boei 0, 25–35 m, on *Meandrina*, 23.XII.1980, coll. RWMVS).
Puerto Rico: ZMA POR.4888 (Caya Caracoles, La Parguera, 0.5 m, 1.III.1963, coll. JHS).

Diagnosis (Fig. 20):

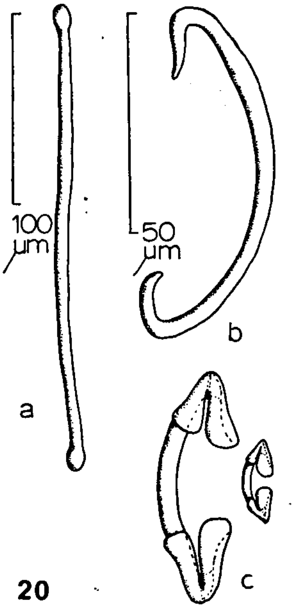
Shape, size and consistency: Thinly incrusting corals. Surface slightly rugose, no oscules apparent. Size several sqcm. Consistency soft, easily torn.
Colour: orange-yellow or pale yellow.
Ectosome: charged with tylotes and microscleres, strewn tangentially.
Choanosome: plumose, vague bundles of tylotes support the ectosome; no clear reticulation, but many tylotes strewn in confusion.
Spiculation: tylotes: 198–*224.0*–243 by 3–*3.63*–5 µm; large arcuate isochelae 27–*37.1*–42 µm, small arcuate isochelae 11–*16.8*–22 µm; large sigmata only: 45–*50.0*–53 µm.

Ecology: on corals or rocky substrates.

Distribution: Curaçao, Puerto Rico; Western Bahamas (De Laubenfels, 1949, as *Xytopsene*; Wiedenmayer, 1977).

De Laubenfels' *Xytopsene sigmatum* remains an imperfectly known species as Wiedenmayer's material and the present show small discrepancies with the original description (De Laubenfels has only one category of isochelae, but two categories of sigmata).

The species differs little from *L. isodictyalis*; life colour and ecology, however, make it obvious that both are different species.



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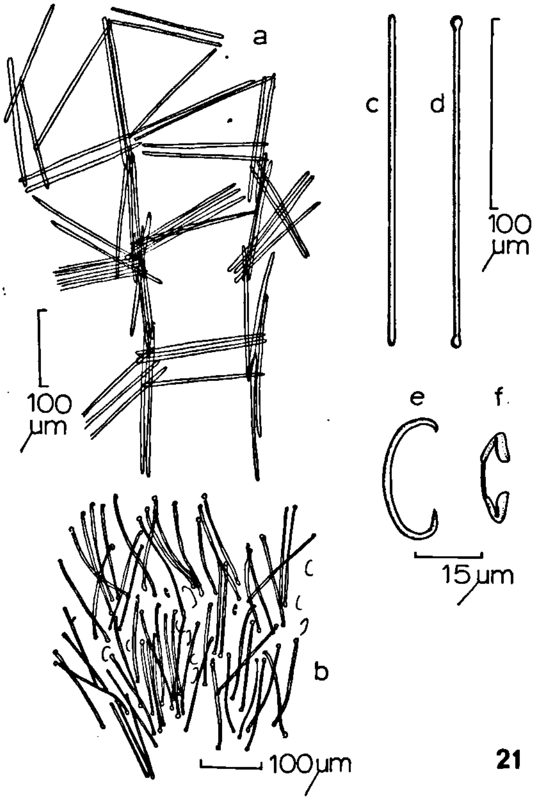

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FIGURE 20. *Lissodendoryx sigmata*: a. megasclere; b. sigma; c. two categories of chelae.

FIGURE 21. *Lissodendoryx strongylata* n. sp.: a. choanosomal skeleton; b. arrangement of tylotes in the ectosome; c. choanosomal strongyle; d. ectosomal tylote; e. sigma; f. chela.

Lissodendoryx strongylata n. sp.

Holotype: ZMA POR.3508, CURAÇAO, Piscadera Baai, 2–3 m, 21.XII.1973, coll. JHS 73–63.

Paratype: ZMA POR.3509, Curaçao, Piscadera Baai, 5 m, 15.I.1974, coll. JHS 74–99.

Description (Pl. V 4–5, Fig. 21):

Shape, size and consistency: Thick masses of amorphous shape. The surface is corrugated to villous (not unlike e.g. *Hymeniacidon* spp.), with many small depressions and holes some of which presumably represent oscules. In places the surface is smooth and a fine punctiform ectosomal network is apparent. Size about 8 by 10 by 10 cm (holotype); the paratype now consists of a mass of villous fragments. Consistency very soft, very fragile.

Colour: brick-red (light drab in spirit).

Ectosome: charged with single, thin tylotes, with small heads, and microscleres; the punctiform network is organic, not made by spicules.

Choanosome: softly crumb-of-bread-like. The skeleton consists of a renieroid reticulation of strongylote megascleres, with occasional vague tracts.

Spiculation: thin, straight ectosomal tylotes, which penetrate into the peripheral parts of the choanosome: 153–*167.4*–182 by 2–*2.58*–3.5 µm. Thin, straight choanosomal strongyles, which resemble the tylotes quite closely except for the terminal swellings: 135–*145.5*–160 by 2–*3.06*–3.5 µm; thin arcuate isochelae 16–*19.1*–23 µm; thin sigmata 18–*25.2*–34 µm.

Ecology: on lagoon bottoms and among *Halimeda*.

Distribution: Curaçao.

This third *Lissodendoryx* species is distinct from the other two in colour (brick-red), shape (no distinct oscular lobes) and spiculation (all spicules much thinner, less robust, strongyles in stead of styles).

Burtonanchora gracilis Lévi (1965) from Israel, seems close to the present species, but has choanosomal thin styles in stead of strongyles.

DISCUSSION OF THE GENUS *Lissodendoryx*

The genus has been redefined to accomodate *L. sigmata* and the new species, which are both obvious close relatives of *L. isodictyalis*. The stylote nature of the choanosomal megascleres has apparently little significance; emphasis is now being placed on the combination of a renieroid choanosomal reticulation, tylote ectosomal spicules and sigmata and arcuate isochelae for microscleres. This course of action has been taken, rather than erecting a separate genus for the species *strongylata*, because I think skeletal plan is much more important for determination of kinship in this order than hitherto recognized.

The genus *Damiriella* Burton (1935) (type *Damiria cavernosa* Topsent, 1892) also has strongyles for megascleres next to tylotes and isochelae; it is close to *Lissodendoryx*, but lacks the sigmata.

Zetekispongia De Laubenfels (1936b) (type *Z. zonea* De Laubenfels, 1936b from the Pacific coast of Panamá, USNM 22205, which I was able to examine through the courtesy of Dr. K. RÜTZLER), is here synonymized with *Lissodendoryx* as the only difference is the oxeote nature of the choanosomal megascleres. All other features (tylote ectosomal megascleres, microscleres, skeletal reticulation) are so similar to those of *L. isodictyalis*, that it is unrealistic to put them in separate genera. As another *Lissodendoryx*-like species exists, viz. *Damiriana schmidti* (Ridley, 1884) sensu Lévi (1965), it is perhaps sensible to recognize subgenera for convenience, until the phylogenetic relationships within *Lissodendoryx* s.l. have been studied. Quite probably the type of *Damiriana* De Laubenfels (1950), *D. hawaiiana*, is also a *Lissodendoryx*, thus making *Damiriana* a synonym.

An undescribed species from the West Indies, possibly also referable to the genus *Lissodendoryx* is represented by a specimen in the collection of the British Museum (Nat. Hist.), reg.no. 1934.11.26.22 (S.E. Bight Turneffe Island, British Honduras, labeled as *Hamigera*). It is an orange-red knoll (yellow-white in spirit) of 12.5 × 12.5 × 14 cm, with a single large osculum, a corrugated surface, and on its upper side several long, tapering projections pointing towards the central oscule. The skeleton consists of vague bundles of tylote megascleres supporting an ectosomal tangential skeleton of tylotes of the same size and form; microscleres include isochelae, two sizes of sigmata, and rhaphides. The specimen originated from sea-grass fields in shallow water. It is close to *L. sigmata* sensu De Laubenfels, 1949 but for the rhaphides.

Genus **Acarnus** Gray, 1867

Definition: Myxillidae with cladotylotes among the choanosomal megascleres, palmate isochelae and a diverse complement of toxiform microscleres.

Two subgenera are recognized: *Acarnus* with robust stylote megascleres and robust smooth or spined cladotylotes, and *Acanthacarnus* Levi (1952) with thin stylote megascleres, small acanthose cladotylotes and small acanthostyles.

Acarnus (Acarnus) innominatus Gray, 1867

Acarnus innominatus Gray, 1867: 544; Carter, 1871: 269; Arndt, 1927: 145, pl. 3 fig. 5; De Laubenfels, 1936a: 93, pl. 12 fig. 2; Lévi, 1963: 48, pl. VII G, fig. 55; Alcolado, 1967: 5.
Acarnus carteri Ridley, 1884: 453–454 (foot note).

Curaçao: ZMA POR.309 (Spaanse Water, on *Porites*, 5.V.1920, coll. C. J. van der Horst, Arndt's specimen); 3606 (near Carmabi, 11–14 m, 16.XI.1975, coll. students Prof. Stock).

Diagnosis (Pl. V 6–9, Fig. 22):

Shape, size and consistency: Thinly to massively incrusting on dead corals. Surface smooth, with distinct pattern of subdermal lacunae. No apparent oscules. Up to at least 1 cm in thickness; lateral expansion indefinite. Consistency soft, compressible, easily torn.

Colour: red (brown in spirit).

Ectosome: thin, slimy, charged with tangential tylotes.

Choanosome: riddled with narrow holes and corridors which end at the surface in between skeletal tracts. The skeleton consists of short, somewhat plumose tracts interconnected by a renieroid reticulation of tracts or single spicules. A fair amount of spongin binds the skeleton.

Spiculation: ectosomal tylotes with microspined heads: 217–*245.7*–262 by 2.5–*3.07*–4 µm; robust choanosomal styles: 340–*399.0*–459 by 11–*16.8*–22 µm; robust cladotylotes 217–*263.9*–294 by 7–*9.1*–12 µm; rare spiny cladotylotes 110–115 by 3 µm; isochelae palmatae: 9–*14.3*–18 µm; toxa, quite variable in shape, at least three categories can be discerned: thin, small, "normal" ones: 38–*47.2*–68 µm (possibly a growth stage of the next category); thick, widely curved ones: 57–*74.1*–158 by 2–*3.50*–4 µm; long, straight ones with a small-angled curve: 200–*272.6*–402 µm.

Ecology: apparently restricted to dead corals.

Distribution: Curaçao; Cuba (Alcolado, 1976), Florida (De Laubenfels, 1936a), South Africa (Lévi, 1963).

Mention should be made of a third sample in the present collection (ZMA POR.3830, near Jamaica) possibly belonging to *A. innominatus*; the uncertain identification stems from the fact, that no cladotylotes have been found in the specimen, but according to De Laubenfels (1936a) this is not abnormal.

The rarity of acanthose cladotylotes is remarkable (they are absent in ZMA POR.309); this category of spicules links this species with the Californian *A. erithacus* De Laubenfels (1930), which is characterized by predominantly acanthose cladotylotes. LÉVI's (1963) material differs slightly in spicule size.

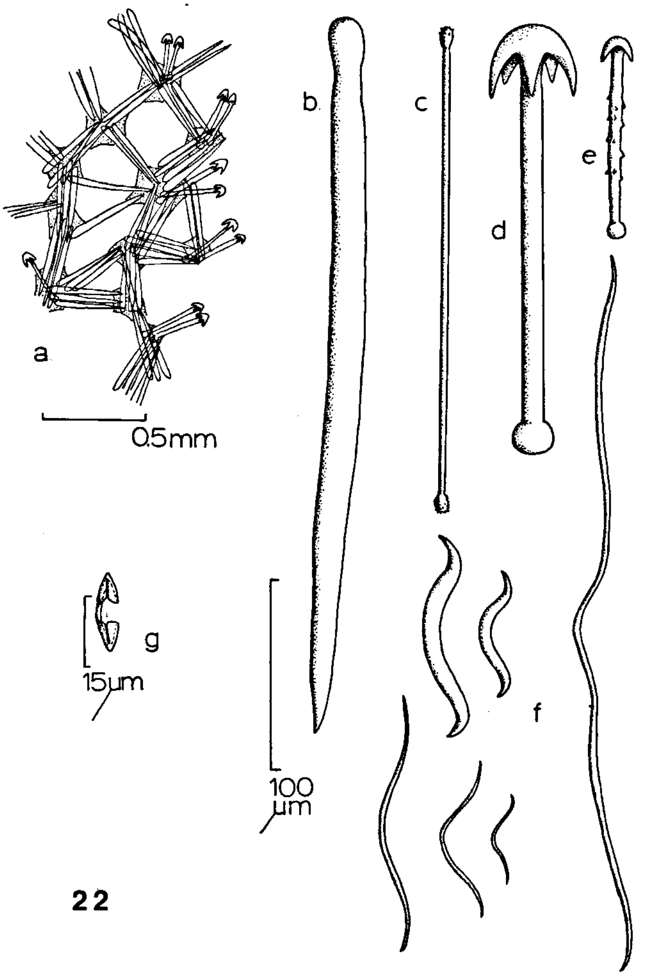

FIGURE 22. *Acarnus* (*Acarnus*) *innominatus*: a. choanosomal skeleton; b. choanosomal style; c. ectosomal tylote; d. smooth cladotylote; e. acanthocladotylote; f. three categories of toxa; g. chela.

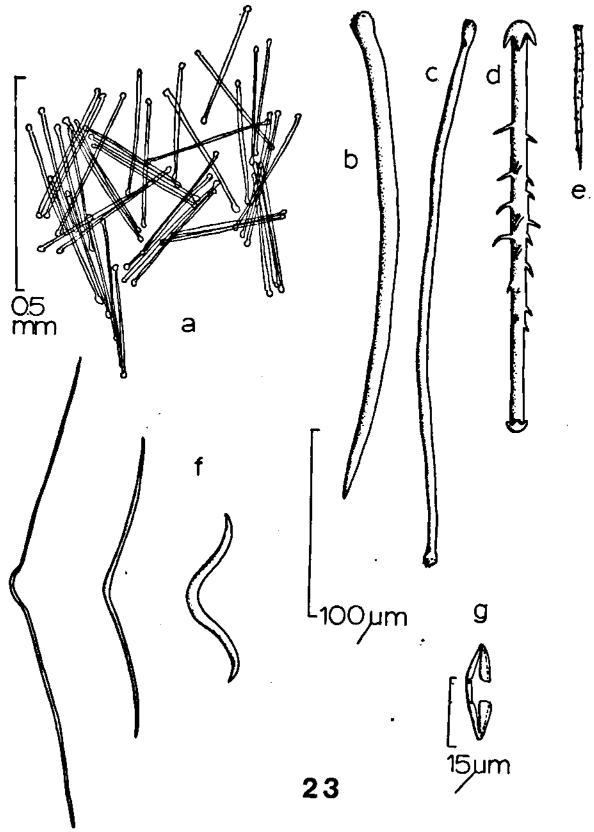

FIGURE 23. *Acarnus* (*Acanthacarnus*) *souriei*: a. arrangement of tylotes in the ectosome; b. choanosomal style; c. ectosomal tylote; d. acanthocladotylote; e. acanthostyle; f. three categories of toxa; g. chelae.

A. toxeata Boury-Esnault (1973) from Brazil is distinct from *A. nominatus* by the extreme length of the long toxa (500–1000 µm).

Acarnus (Acanthacarnus) souriei (Lévi, 1952)

Acanthacarnus souriei LÉVI, 1952: 54, figs. 18–19; 1959: 132; VACELET, 1961: 42; HECHTEL, 1965: 40; THOMAS, 1973: 30, pl. II fig. 2.
Acanthacarnus levii VACELET, 1960: 267.
? *Acanthacarnus radovani* BOURY-ESNAULT, 1973: 284, fig. 43.

Curaçao: ZMA POR.3677 (Blauwbaai, 10–15 m, XI.1975, coll. S. Weinberg & E. Westinga), 4788 (Boei 4, 20–25 m, 24.XII.1980, coll. RWMVS).
Barbados: ZMA POR.3833 (0.5 mile off Holetown, 100 m, bottom muddy sand, 19.II.1964, coll. PWH *1442*).
Puerto Rico: ZMA POR.3327 (San Cristóbal Reef, W of Parguera, 4 m, 15.II.1963, coll. JHS PR 75).

Diagnosis (Fig. 23):

Shape, size and consistency: Thinly incrusting dead corals. Surface smooth; no apparent oscules. Size indefinite. Consistency soft.

Colour: red.

Ectosome: charged with tangential spicules, mostly tylotes, although other megascleres and microscleres are frequent, too; spicules strewn at random, no tracts.

Choanosome: due to the scarceness of spongin the skeletal structure is difficult to assess; most slides reveal a halichondroid mass of megascleres, with occasional erect, short lines of single or double styles, "echinated" by acanthocladotylotes and rare acanthostyles.

Spiculation: ectosomal tylotes with microspined heads 228–*292.4*–342 by 2.5–*3.37*–4 µm; styles (not very common) with microspined heads 266–*316.1*–380 by 4.5–*5.0*–5.5 µm; short acanthostyles (uncommon, absent in one specimen): 66–*71.2*–81 by 2–*2.24*–3 µm; acanthocladotylotes (very common): 160–*200.7*–236 by 3–*3.77*–5 µm; palmate isochelae: 12–*17.1*–21 µm; toxa in at least three categories: small, thin ones: 45–*114.5*–180 µm, thick ones: 46–*69.0*–93 by 2.5–*3.5*–4 µm, long thin ones with a small arch: 160–228 µm.

Ecology: apparently restricted to dead corals.

Distribution: Curaçao, Barbados, Puerto Rico; Jamaica (Hechtel, 1965), West Africa (Lévi, 1952; 1959), Mediterranean (Vacelet, 1960), Indian Ocean (Thomas, 1973).

The conspecificity of Mediterranean-West African and West Indian populations seems to be well-established, if measured on spicule size, although the Mediterranean specimens seem to have more robust styles and tylotes, and smaller isochelae than tropical specimens. Thomas' (1973) material from the Seychelles differs slightly in that the cladotylotes are smaller. It seems best to emphasize the agreement and await further records, before specific separations are made. Boury-Esnault's (1973) Brazilian *A. radovani* is so close to *A. souriei* in spicule sizes, that conspecificity seems likely; the colour is given as "violet-foncé", but this was taken from a spirit specimen.

Acarnus bicladotylota Hoshino (1981) has acanthostyles, but also two sizes of cladotylotes like *A. innominatus.*

DISCUSSION OF THE GENUS *Acarnus*

By assigning *A. souriei* Lévi (1952) to *Acarnus* I synonymized *Acanthacarnus* with *Acarnus.* The reasons are twofold: first of all the occurrence of acanthostyles in *A. souriei* is here explained as the retention of an ancestral character. Acanthostyles occur in *Myxilla* and *Ectyomyxilla,* and in the family Clathriidae, and thus constitute an ancestral element which cannot be used to erect genera on it. Secondly, there should be enough morphological distance between two genera, and this seems barely the case; if we only compare the microsclere complement closely, it is clear that *A. souriei* and *A. innominatus* are very closely related, indeed. The absence of large, smooth cladotylotes in *Acanthacarnus* species (e.g. *A. souriei, A. tortilis* Topsent, 1892) is interpreted as a reduction. For convenience sake, I propose to retain *Acanthacarnus* as a subgenus.

The genus *Acarnus* s.l. was put into the Clathriidae by LÉVI (1973), on account of the acanthostyles in *Acanthacarnus.* Other features supporting this view are the small palmate isochelae and the diverse toxa, which are shared with such genera as *Clathria* Schmidt, 1862 and *Rhaphidophlus* Ehlers, 1870.

However, all three characters are not confined to the Clathriidae, but occur here and there in species distributed over different families on good grounds. Moreover, the acanthostyles are probably an unstable element in *Acanthacarnus* (they are for instance absent in ZMA POR.4788). The reticulate skeleton of *Acarnus,* but especially the tangential ectosomal skeleton of amphitylotes strongly point to affinity with Myxillids, and they fall quite naturally in a group of genera related to certain Coelosphaerids (which will be shown to be close to Myxillids).

Genus **Forcepia** Carter, 1874

Definition: Myxillidae with choanosomal monactinal or diactinal (tylote) megascleres and smooth and/or acanthose forcipes, isochelae and sigmata as microscleres.

Two subgenera are recognized: *Forcepia* which has styles for choanosomal megascleres, and *Ectoforcepia* Cabioch, 1968, which lacks the styles and has (ectosomal) tylotes for choanosomal megascleres.

Forcepia (Ectoforcepia) trilabis (Boury-Esnault, 1973)

Ectoforcepia trilabis BOURY-ESNAULT, 1973: 280, fig. 32.

BARBADOS: ZMA POR.4564 (0.5 mile off Holetown, 100 m, bottom muddy sand, coll. PWH *1442*).

Diagnosis (Pl. VI 1–2, Fig. 24):

Shape, size and consistency: A thin crust on a conglomerate of coral rubble and worm tubes. Size several sqcm. Surface smooth; no apparent oscules. Consistency soft, easily torn.
Colour: drab in spirit.
Ectosome: a tangential skeleton of tylote megascleres strewn in confusion.
Choanosome: a vague reticulation of single tylote megascleres.
Spiculation: tylotes: 336–*347.7*–359 by 4–*5.81*–7 µm; large arcuate isochelae with reduced teeth: 22–*30.2*–38 µm; normal anchorate isochelae: 15–*17.2*–19 µm; numerous large, acanthose forcipes: 209–*227.6*–258 by 3.5–*4.17*–4.5 µm; rare, small, acanthose forcipes: 40 by 1 µm.

Ecology: deep water.

Distribution: Barbados, Brasil (BOURY-ESNAULT, 1973).

The specimen does not fit the description of *E. trilabis* entirely; for instance the smooth forceps could not be found, and spicule sizes tend to be different, too. However, the larger category of isochelae is so strikingly similar, that close relationship is obvious and conspecificity likely in view of the variation of spicule sizes and categories found in the Myxillidae. CARTER (1874: 248, pl. XV 47) described an isolated large acanthose

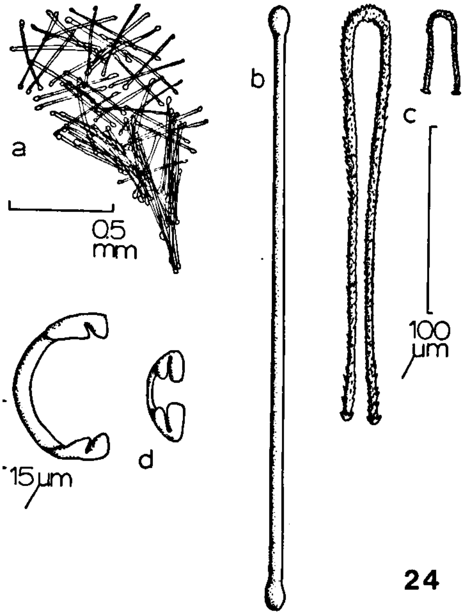

FIGURE 24. *Forcepia* (*Ectoforcepia*) *trilabis*: a. arrangement of tylotes in the ectosome; b. megasclere; c. two categories of forcipes; d. two categories of chelae.

forceps (about 260 µm long) from Colón (Panamá), which may or may not be from the present species; he gave the name *Forcepia colonensis.*

Forcepia (Ectoforcepia) grandisigmata n. sp.

Holotype: ZMA POR.4563, near JAMAICA, Calamar stat. 476, 18°20′ N 77°20′ W, 13.IX.1969, coll. L. J. K. Klein.
Schizotypes consist of two microscopic slides made of the coral rubble incrustation; in view of the scantiness of the material these are important type fragments.

Description (Pl. VI 3–5, Fig. 25):

Shape, size and consistency: A smooth, thin incrustation in holes in a mass of calcareous wormtubes and coral rubble (this mass contained approximately 8 sponge species, all thinly incrusting). No oscules are apparent. Consistency fragile.

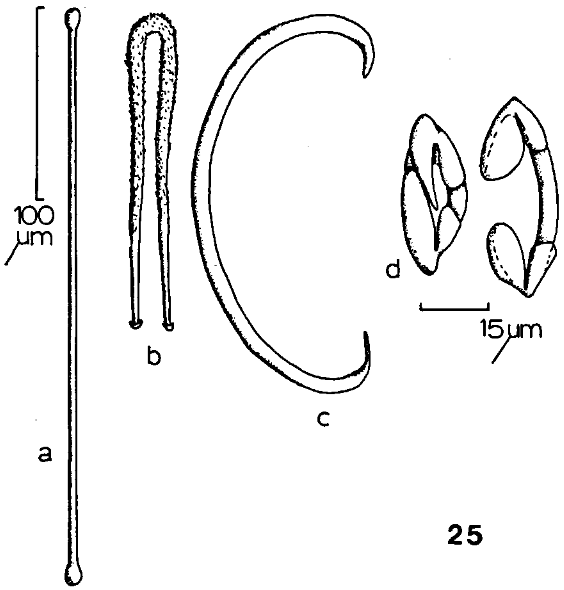

FIGURE 25. *Forcepia (Ectoforcepia) grandisigmata* n. sp.: a. megasclere; b. forceps; c. sigma; d. chelae.

Colour: drab in spirit.

Ectosome: the ectosomal skeleton consists of an open feltwork of tylote megascleres and numerous microscleres.

Choanosome: short columns of tylotes carry the ectosome.

Spiculation: tylotes, with distinct terminal swellings: 228–*265.1*–287 by 2.5–*3.44*–4 µm; robust arcuate isochelae, of which many have peculiar-looking ingrown teeth (very much like those of *Esperiopsis glomeris* TOPSENT (1904: pl. XVII 3 b), or of *Isodictya flabelliformis* sensu LUNDBECK (1905: pl. XIII 5 d), or of *Anchinoe dayi* Lévi, 1963 and *Esperiopsis pulchella* sensu Boury-Esnault & Van Beveren (1982)): 27–*30.2*–41 µm; large robust sigmata: 76–*153.8*–202 µm; acanthose forcipes: 78–*109.0*–156 by 3–*3.75*–4.5 µm.

Ecology: deep water.

Distribution: Jamaica.

Etymology: the name refers to the large robust sigmata.

The presence of sigmata is shared with *Ectoforcepia psammophila* Cabioch, 1968 (type of *Ectoforcepia*), with *Forcepia solustylota* Hoshino (1981) and with a number of true *Forcepia* species. The size of the sigmata is not really exceptional when compared to the latter species. The peculiar form of isochelae with incurved teeth can be traced back to the normal form by a series of intergrading forms found in the slides.

If the absence of choanosomal styles is disregarded, the present species is not unlike *Forcepia fabricans* (Schmidt, 1879) sensu LUNDBECK (1905: 200, pl. XIX 3 a–g); spicule sizes, however, differ somewhat.

DISCUSSION OF THE GENUS *Forcepia*

In view of the variability of choanosomal styles and ectosomal tylotes in e.g. *Lissodendoryx*, it is thought unlikely that *Ectoforcepia*, erected and discussed by CABIOCH (1968), is a good genus.

The Myxillid nature of *Forcepia* is somewhat discredited by the fistular habit of Boury-Esnault's specimen. Together with the absence of styles the specimen might easily fit the family Coelosphaeridae (cf. also THIELE, 1903). This is an example of the intermingling of characters of Myxillidae and Coelosphaeridae.

Although the forceps is a distinctive and unusual microsclere type, it cannot at present be used as a derived synapomorphic character, uniting groups of genera into monophyletic groups. Forceps-bearing species are found at least in three quite diverging families: Myxillidae (*Forcepia* Carter (1874) and *Trachyforcepia* Topsent (1904)), Esperiopsidae (*Asbestopluma* Lundbeck, 1910) and Hymedesmiidae (*Leptolabis* Topsent (1904), *Clinolabis* Topsent (1904), *Labisophlita* De Laubenfels (1936a), *Marcusoldia* De Laubenfels (1936a)).

Another genus with forceps is *Myxillabis* DE LAUBENFELS (1936a: 87), but since no type species is mentioned nor a diagnosis given, this is a *nomen nudum*.

DISCUSSION OF THE FAMILY MYXILLIDAE

The genus *Myxilla* Schmidt, 1862 is represented in the West Indies by *Myxilla distorta* Burton (1954) (from deep water near Grenada). It is not a very typical *Myxilla* because its choanosomal megascleres are smooth and of larger size than is usual. It is probably nearest to North Atlantic *M. pluridentata* Lundbeck, 1910.

One of the difficult questions in relation to the family Myxillidae is the inclusion in it of genera formerly regarded to belong in the family Psammascidae, i.e. those genera with Myxillid affinities but with a choanosomal skeleton largely composed of foreign material (sand grains, coralline algae). Such a type of sponge is represented in the West Indies by specimens known under the names of *Phoriospongia osburnensis* George & Wilson, 1919 (North Carolina) and *Xytopsues griseus* (Schmidt, 1870) sensu DE LAUBENFELS, 1950 (Bermuda), 1953 (Florida), and WELLS et al. (1960). DE LAUBENFELS made a good case for the assumption, that these records all concern a single species, but the conspecificity of it with SCHMIDT's *Desmacidon griseum* is less likely, as SCHMIDT makes no mention of any foreign material; moreover, the spicule dimensions are different from those of DE LAUBENFELS' (1950) specimen. DE LAUBENFELS (1950) also decided, that *Desmacidon dianae* Schmidt (1870) was probably conspecific with all others, but this is quite unlikely in view of the fact that SCHMIDT described also toxa in *D. dianae*. It seems best to consider *Desmacidon griseum* and *D. dianae* unrecognizable until SCHMIDT's slides, still present in the British Museum (Nat. Hist.) collections (reg.no. 1870.5.3.36–37) have been reevaluated. Thus, for the time being the sponge referred to above should be named *Xytopsues osburnensis* (George & Wilson, 1919); it is the type of the genus *Xytopsues* DE LAUBENFELS (1936a: 55) and is characterized by the possession of a single category of slender strongylote megascleres, unguiferate isochelae and small sigmata.

Psammascus psellus De Laubenfels (1936a), from Florida, is here referred to the Keratose genus *Hyrtios*; it is possibly a good species. The type specimen (USNM 22438, kindly sent on loan by Dr. K. RÜTZLER) does not possess proper megascleres. *Anomolissa amaza* De Laubenfels (1934), described in the family Myxillidae, is here referred to the Axinellida (after examination of the type, USNM 22348, which was also sent on loan by Dr. RÜTZLER). The genus *Melonanchora* Carter, 1874, is represented in the West Indies by *M. elliptica* Carter (1874), recorded by Schmidt (1879) from deep water.

The family Myxillidae can be subdivided into two groups (subfamilies) on the basis of tylote vs. oxeote or strongylote ectosomal megascleres. *Myxilla*, *Ectyomyxilla* Lundbeck (1909), and *Ectyodoryx* Gray (1867) are typical members of the latter group (which, incidentally shows great similarity with genera such as *Pronax*, assigned to the family Phorbasidae (= Anchinoidae sensu Lévi, 1973) (probably incorrectly, so)), while *Tedania*, *Lissodendoryx*, *Iophon* Gray (1867), *Acarnus* and *Forcepia* are typical members of the former group. For these groups the subfamily names Myxillinae and Tedaniinae are available, but it remains to be demonstrated, whether the differences are sufficiently distinct for such a formal separation.

Family COELOSPHAERIDAE Hentschel, 1923

Definition: Poecilosclerida with hollow, fistulose habit and ectosomal tangential crust of diactinal megascleres; choanosomal skeleton, if present, consisting of the same diactinal megascleres; microscleres may include arcuate and palmate isochelae, palmate anisochelae, sigmata, toxa and rhaphides.

Genus **Coelosphaera** Thomson, 1834

Definition: Coelosphaeridae with smooth tylote megascleres and arcuate isochelae, sigmata, and often, rhaphides for miscroscleres.

Coelosphaera hechteli n. sp.

Holotype: ZMA POR.3729, Puerto Rico, Mayagüez, 4 km off Punta Cadena, 90 m, bottom muddy sand, 14.IX.1963, coll. PWH *1415*.

Description (Fig. 26):

Shape, size and consistency: A series of hollow, sinuous irregularly interconnected fistules incrusting a *Spirastrella* specimen (which in its

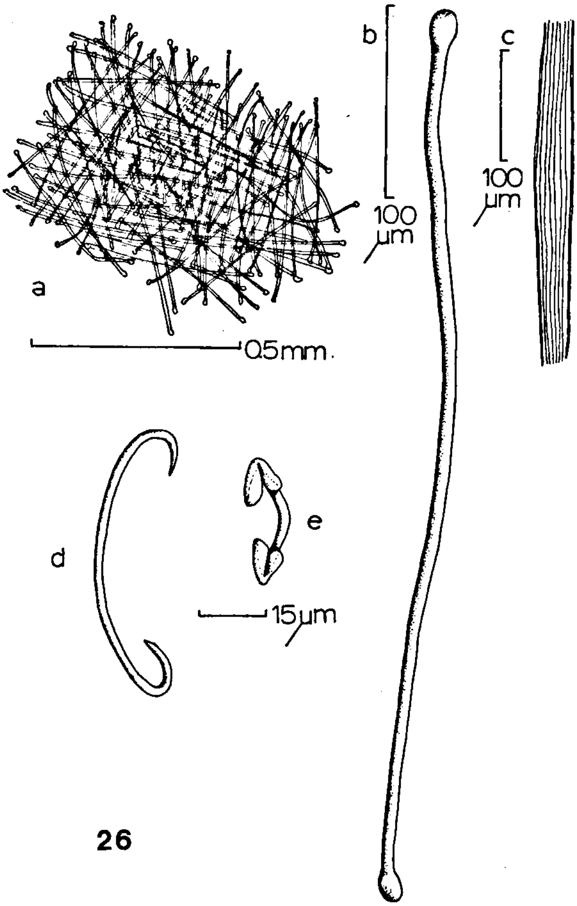

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Figure 26. ***Coelosphaera hechteli*** **n. sp.: a. tangential view of ectosome; b. megasclere; c. trichodragma of large rhaphides; d. sigma; e. chela.**

turn incrusts a *Hyrtios* specimen). Fistules are up to 3 cm long, about 3 mm in diameter. Consistency leathery – fragile.

Colour: light grey in spirit.

Ectosome: a tough feltwork of confused tangential megascleres.

Choanosome: skeleton almost non-existent, predominantly single megascleres form ill-defined, rare tracts.

Spiculation: long, curved to flexuous tylotes with barely swollen heads: 268–*386.7*–533 by 2–*4.0*–6 µm; arcuate isochelae: 22–*26.7*–30 µm; large elongated thin sigmata: 38–*48.4*–60 µm; large rhaphides in thick dragmata: 285–*306.5*–330 µm by 20–*38.8*–55 µm (diameter of dragmata).

Ecology: muddy bottom in deep water beyond reefs.

Distribution: known only from the type locality, Puerto Rico.

Etymology: named after Dr. GEORGE HECHTEL in recognition of his contribution to the taxonomy of West Indian sponges.

Coelosphaera rhaphidifera Hechtel (1969) from Barbados is quite close to the present new species. Differences are the colour (white in *rhaphidifera*), the presence of a smaller category of sigmata in *rhaphidifera*, the shape of the larger sigmata (more robust and not so elongated in *rhaphidifera*) and the smaller rhaphides. HECHTEL's specimens originated from shallow water reefs; it is also reported by ALCOLADO (1980) from Cuba.

A third rhaphidiferous West Indian species is *C. biclavata* (Priest, 1881) from Belize; this has two categories of isochelae of smaller size than those of both other species. West Indian *Coelosphaera* species without rhaphides are *C. tunicata* (Schmidt, 1870) and *C. fistula* Little (1963). An undescribed West Indian fistulose species probably referable to *Coelosphaera* is present in the collections of the British Museum (Nat. Hist.) (reg.no. 1937:11:26:23, as *Histoderma*); it originated from Turneffe Island, Belize, and has stout strongyles for megascleres (not tylote) next to sigmata and isochelae.

Genus **Damiria** Keller, 1891

Definition (emended): Coelosphaeridae with acanthotylote megascleres and no microscleres.

Damiria testis Topsent, 1928

Damiria testis Topsent, 1928: 325, pl. X 28.

Curaçao: ZMA POR.4754 (Boei 0, 6–12 m, on dead *Madracis*, 19.XII.1980, coll. RWMVS).

Diagnosis (Pl. VI 6, Fig. 27):

Shape, size and consistency: Thin, sinuously creeping incrustation of about 2 cm in length, 4 mm in width and 2 mm high. No oscules apparent. Consistency fragile.

Colour: yellow.

Ectosome: easily detachable; a tangential skeleton of loosely strewn megascleres overlies large subdermal cavities.

Choanosome: skeleton virtually absent; only a few choanosomal, ill-defined tracts carry the ectosomal crust.

Spiculation: tylotes with finely acanthose or rugose knobs: 162–*211.5*–247 by 3–*4.25*–5.5 µm.

Ecology: on reefs and in deeper water.

Distribution: Curaçao; Azores area (Topsent, 1928).

If any other spicule type would have been incorporated the species (and the genus) would probably be assigned to *Cornulum* Carter, 1876 or *Paracornulum* Hallmann, 1920 on account of the acanthose tylotes. However, these genera only harbour species with microscleres (isochelae and toxa) and acanthostyles. Likewise, any relationship with *Plocamia* and related genera is precluded by the absence of special ectosomal megascleres of different shape.

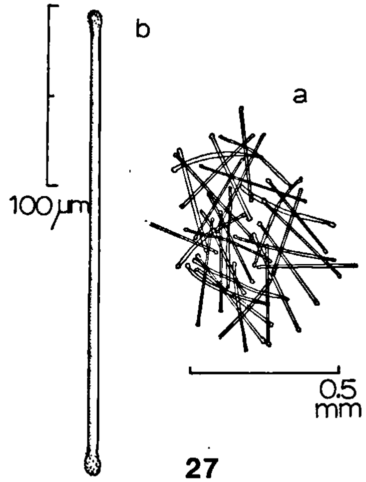
The tylotes of the present species are also similar in shape to those of *Artemisina tylota* Boury-Esnault (1973) from Brazil, though much shorter; it also has styles, isochelae and toxa. *A. tylota* seems to fit better in *Cornulum.*

The genus *Anisotylacanthea* Vacelet (1969) is close to *Damiria,* but differs in the possession of inequiended tylotes.

DISCUSSION OF THE FAMILY COELOSPHAERIDAE

The genus *Inflatella* Schmidt (1875) is represented in the West Indies by its type species *I. viridis* Schmidt (1875), reported by BURTON (1954) from deep water (720–800 m) near Grenada. I was able to check the specimen (BMNH reg.no. 1938.6.30.10) during a recent visit, and it seems to be correctly assigned. Due to the absence of any microscleres and the large size of the megascleres *Inflatella* is not a typical Coelosphaerid. *Inflatella bartschi* De Laubenfels (1934) is transferred to *Oceanapia* of the family Oceanapiidae (Haplosclerida) (cf. VAN SOEST, 1980).

The genus *Coelosphaerella* De Laubenfels (1934) is represented in the West Indies by its type species *C. johnsoni* De Laubenfels (1934). This species (*teste* a slide of the holotype, USNM 22364, kindly sent on loan by



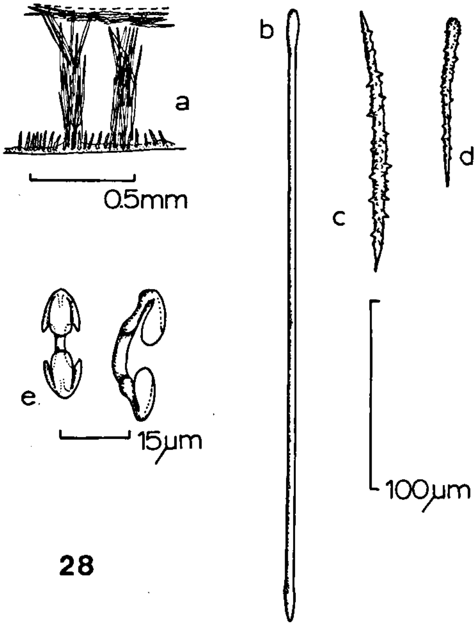


FIGURE 27. *Damiria testis*: a. tangential view of ectosome; b. megasclere.

FIGURE 28. *Crella chelifera* n. sp.: a. transverse section; b. tornote; c. ectosomal acanthox; d. basal acanthostyle; e. chelae.

Dr. K. RÜTZLER) has strongylote megascleres with microspined apices, two sizes of toxa and peculiarly twisted palmate isochelae (comparable to those of e.g. *Clathria ferrea* (De Laubenfels, 1936b), *Esperiopsis* (= *Clathria*) *obliqua* George & Wilson (1919) or *Paratenaciella microxea* Vacelet & Vasseur (1971)). The ectosome is an open feltwork of megascleres supported by irregular tracts of choanosomal megascleres. This description matches the genus *Cornulum* Carter (1876), and it is quite clear that *Coelosphaerella* is a synonym of it. The species *C. johnstoni* is close to *Cornulum textile* Carter (1876) from the Shetland Isles but differs in habit.

A substantial number of genera assigned to the Coelosphaeridae has been found to consist of synonyms of each other: *Ichnodonax* De Laubenfels (1954) and *Coelocarteria* Burton (1934); *Coelosphaericon* Bakus, 1963 and *Coelosphaera* Thomson, 1834; *Joyeuxia* Topsent (1892) and *Inflatella* Schmidt (1875); *Pyloderma* Kirkpatrick (1908) and *Siderodermella* Dendy, 1922 (originally *Sideroderma* Ridley & Dendy (1887), but this was preoccupied); *Histoderma* Carter (1874) and *Coelosphaera* Thomson (1834); *Cornulella* Dendy (1922) and *Cornulum* Carter (1876) (also as noted above *Coelosphaerella* = *Cornulum*); *Histodermopsis* De Laubenfels (1936a) and *Histodermella* (Lundbeck, 1910); *Hiltonus* De Laubenfels (1936a) and *Paracornulum* Hallmann (1920). *Pyloderma* is probably synonymous with *Coelosphaera* (and thus *Siderodermella* = *Coelosphaera*).

Of the genera associated with the Coelosphaeridae by TOPSENT (1928) the following seem to be definitely not coelosphaerid in nature: *Cornulotrocha* Topsent (1927), *Astylinifer* (Topsent, 1927), *Dragmatella* Hallmann (1916), *Fusifer* Dendy (1896), *Heteroxya* Topsent (1904) and *Acheliderma* Topsent (1927).

The remaining genera of the family are: *Coelosphaera* Thomson (1834), *Coelocarteria* Burton (1934), *Amphiastrella* Dendy (1924), *Cornulum* Carter (1876), *Inflatella* Schmidt (1875), *Phlyctaenopora* Topsent (1904), *Damiria* Keller (1891), *Coelodischela* Vacelet, et al., 1976, *Lepidosphaera* Lévi & Lévi (1978). Included, but with suspected Myxillid affinities, are also a few genera possessing acanthostyles or acanthoxea: *Histodermion* Topsent (1927), *Paracornulum* Hallmann (1920) and *Histodermella* Lundbeck (1910).

Some superficial resemblance exists between above given (heterogeneous) assemblage of fistulate forms and the Haplosclerid family Oceanapiidae. Major points of difference are the reticulate ectosome, the choanosomal spicule tracts of the latter, and the rarity of spongin in the former. The hollow fistulose habit is found in the Haplosclerid families Oceanapiidae (*Oceanapia*, *Pellina*) and Niphatidae (*Siphonodictyon*), in the Poecilosclerid families Coelosphaeridae and Biemnidae (*Dragmatella*), in the Axinellid genus *Heteroxya*, and even in some Lithistid forms. From this it may be safely concluded, that it is an adaptive character (in sponges burrowing in the substrate) and cannot be used to define higher taxa as families. The family Coelosphaeridae, thus, seems suspect and may eventually be fitted in the Myxillidae (subfamily Tedaniinae).

Family **CRELLIDAE** Hentschel, 1923

Definition: Poecilosclerida with an ectosomal skeleton of densely packed acanthoxea or acanthostyles, a choanosomal skeleton of smooth diactinal megascleres grouped into vague bundles, with sometimes basal acanthostyles erect on the substrate. Microscleres, if present, arcuate isochelae or anisochelae, sigmata.

Genus **Crella** Gray, 1867

Pytheas Topsent (1890)

Definition: Crellidae with basal acanthostyles erect on the substrate and ectosomal acanthoxea.

Crella chelifera n. sp.

Holotype: ZMA POR.4565, BARBADOS, 0.5 mile off Holetown, bottom muddy sand, 90–100 m deep, incrusting on *Agelas schmidti*, 19.II.1964, coll. PWH *1442*.

Description (Fig. 28):

Shape, size and consistency: Incrustation of about 2 mm. No apparent oscules. Consistency soft, easily damaged.

Colour: beige in spirit.
Ectosome: easily detachable cortex made up of a densely packed mass of acanthoxea.
Choanosome: basal acanthostyles erect on the substrate, heads buried into a basal plate of spongin; next to this plumose columns of smooth tornotes carry the ectosome; microscleres rare.
Spiculation: ectosomal acanthoxea: 117–*131.7*–141 by 2.5–*3.0*–3.5 µm; smooth tornotes with pointed apices and shafts slightly swollen near the apices: 289–*302.8*–320 by 2.5–*3.2*–4 µm; acanthostyles (possibly in two size categories): 72–*196.3*–300 by 3.5–*5.16*–7 µm, arcuate isochelae: 19–*21.4*–24 µm.

Ecology: deep water.

Distribution: known only from the type-locality, near Barbados.

Etymology: most *Crella*-species are without chelae.

This is the first record of the genus *Crella* from the West Indian region. The family Crellidae seems to be further represented in the West Indies by *Yvesia papillosa* (Schmidt, 1870) from deep water near Florida. It has been described as small, yellow-white knolls provided with flat papillae. These papillae apparently possess an apical pore sieve. De Laubenfels (1936a: 64) found a specimen in the Strassbourg museum labeled "*Cribrella papillosa*" which appeared to be *Spheciospongia vesparia* (Lamarck, 1814). It is obvious, that labels must have been confused, because Schmidt (1870) distinctly mentions "... in der Oberhaut schlanke, allmählich zugespitzte Dornenspindeln ..." next to smooth strongylote choanosomal megascleres and isochelae; this points strongly to the genus *Yvesia* Topsent (synonym *Pytheilla* De Laubenfels, 1936a). It could turn out that *papillosa* will prove synonymous with the new species described above. Schmidt made no mention of acanthostyles erect on the surface, but these could have been overlooked.

The retention of a separate genus for *Crella* species with chelae, i.c. *Pytheas* Topsent, 1890 seems superfluous.

Family HYMEDESMIIDAE Topsent, 1928

Definition: Poecilosclerida with ectosomal smooth tornotes or anisotornotes, and choanosomal acanthostyles erect on the substrate; microscleres arcuate or palmate isochelae, and sometimes anisochelae and sigmata.

Genus **Hymedesmia** Bowerbank, 1864

Definition: Hymedesmiidae with two sizes of acanthostyles, arcuate or palmate isochelae and in one case anisochelae.

Hymedesmia jamaicensis n. sp.

Holotype: ZMA POR.4559, near JAMAICA, 18°20′ N 77°20′ W, deep water, Calamar stat. 476, 13.IX.1969, coll. L. J. K. Kleijn.

Description (Fig. 29):

Shape, size and consistency: Thin microhispid incrustation on coral rubble and worm tubes; oscules not apparent; size several sqmm. Consistency soft, fragile.

Colour: transparent-drab in spirit.

Ectosome: hispid because of projecting spicules; thin tornotes are arranged tangentially.

Choanosome: acanthostyles erect on the substrate, heads buried in a basal plate of spongin.

Spiculation: tornotes, thin, whispy, often in groups of three or four: 160–*190.0*–228 by 0.5–1 µm; acanthostyles in two size categories: 133–*214.3*–276 by 4.5–*6.5*–9.5 µm and 53–*73.2*–106 by 3–*4.7*–7.5 µm; palmate isochelae 12–*15.2*–18 µm.

Ecology: deep water.

Distribution: known only from the type locality.

Etymology: named after the type locality, near Jamaica.

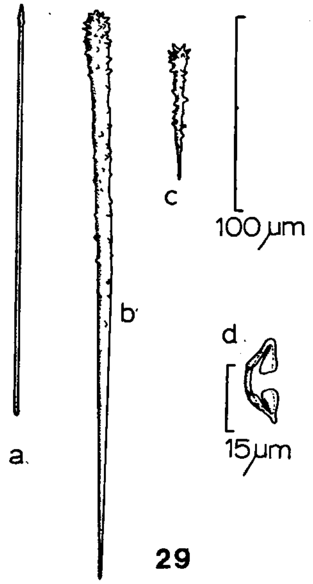


Figure 29. *Hymedesmia jamaicensis* n. sp.: a. tornote; b. large acanthostyle; c. small acanthostyle; d. chela.

The rhaphide-like tornotes together with the palmate isochelae constitute the distinctive characters of this species. For *Hymedesmia*-species with palmate isochelae a separate (sub-)genus was erected by Topsent (1928), viz. *Holorodesmia*, but this seems superfluous.

Hymedesmia palmatichelifera n. sp.

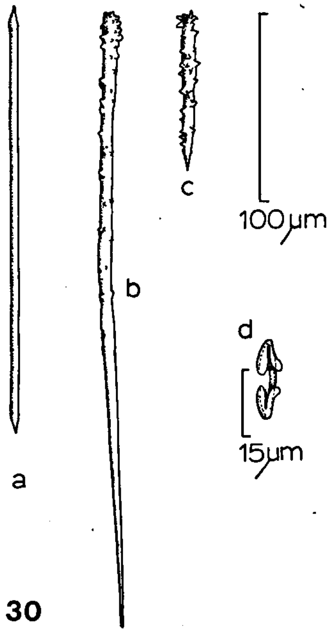
Holotype: ZMA POR.4777, Curaçao, 300 m SE of Hilton Hotel, 33 m, on *Meandrina*, 17.XII.1980, coll. RWMVS.

Description (Pl. VI 8, Fig. 30):

Shape, size and consistency: Thinly incrusting, surface smooth, no apparent oscules. Size several sqcm. Consistency fleshy, easily torn.

Colour: yellowish to orange reddish (keeps in spirit).

Ectosome: the dermis is charged with vague tangential bundles of tornotes.



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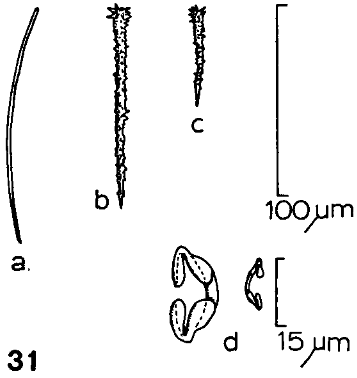

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FIGURE 30. *Hymedesmia palmatichelifera* n. sp.: a. tornote; b. large acanthostyle; c. small acanthostyle; d. chela.

FIGURE 31. *Hymedesmia agariciicola* n. sp.: a. tornote; b. large acanthostyle; c. small acanthostyle; d. two categories of chelae.

Choanosome: single megascleres stand erect on the substrate. The larger category dominates over the smaller.
Spiculation: thin tornotes with barely swollen equal endings: 167–*200.2*–232 by 1.5–*2.1*–2.5 µm; large acanthostyles: 293–*320.0*–361 by 6–*7.1*–8 µm; short acanthostyles: 66–*76.6*–91 by 4–*5.7*–7.5 µm; palmate isochelae with protruding alae: 15–*16.7*–19 µm.

Ecology: incrusting coral in the reef environment.

Distribution: known only from the type locality.

Etymology: palmate isochelae are not the usual microscleres found in the genus *Hymedesmia*.

The present species differs from the previous one in the size of the large acanthostyles and the morphology of the isochelae, but is otherwise close to it through the shared palmate condition of the chelae and the thin tornotes.

Hymedesmia agariciicola n. sp.

Holotype: ZMA POR.4769, CURAÇAO, Boei 4, 10 m, under *Agaricia agaricites*, 2.I.1981, coll. L. Delvoye.

Description (Fig. 31):

Shape, size and consistency: Thinly incrusting; smooth to microhispid surface, no apparent oscules. Consistency soft.

Colour: orange.

Ectosome: tangential tornotes.

Choanosome: megascleres erect on the substrate.

Spiculation: thin equiended tornotes, whispy: 111–*123.0*–142 by about 1 µm; large acanthostyles: 91–*141.0*–194 by 4–*4.8*–5.5 µm; small acanthostyles: 48–*51.2*–57 by 2.5–*2.7*–3.5 µm; arcuate isochelae in two size categories: robust ones: 18–*19.2*–21 µm and thin ones: 8–*10.2*–12 µm.

Ecology: incrusting corals.

Distribution: known only from Curaçao.

Etymology: named after its occurrence on the coral *Agaricia*.

The presence of two categories of chelae, and the small size and overall delicateness of the spicules is distinctive. Unfortunately, only very little material of this new species is available. *Hymedesmia peachi* Bowerbank, 1866, sensu LÉVI (1956) from West Africa, also has two categories of isochelae.

Hymedesmia curacaoensis n. sp.

Holotype: ZMA POR.4770, CURAÇAO, Awa Blancu, 10–20 m, on dead coral, 29.XII.1980, coll. RWMVS.

Paratype: ZMA POR.4771, Curaçao, 300 m SE of Hilton Hotel, 33 m, on *Meandrina*, 17.XII.1980, coll. RWMVS.

Description (Fig. 32):

Shape, size and consistency: Thinly incrusting with optically smooth surface; no apparent oscules. Consistency fragile.

Colour: bright red (dull red in spirit).

Ectosome: detachable dermis with numerous microscleres and whispy bundles of tornotes.

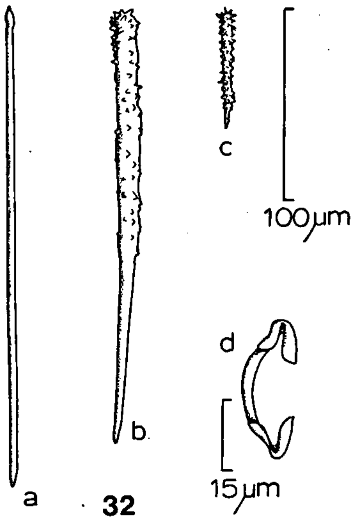
Choanosome: acanthostyles erect on the substrate.

Spiculation: anisotornotes with some distal swelling: 182–*205.2*–230 by 1.5–*2.05*–2.5 µm; large acanthostyles: 205–*216.2*–229 by 8–*8.7*–10 µm; small acanthostyles: *57–78.8*–114 by 3.5–*4.6*–6 µm; robust arcuate isochelae: 28–*30.0*–33 µm.

Ecology: on dead corals in reef environment.

Distribution: known only from Curaçao.

The size of the anisotornotes and the red colour distinguish this species from other West Indian *Hymedesmia*.



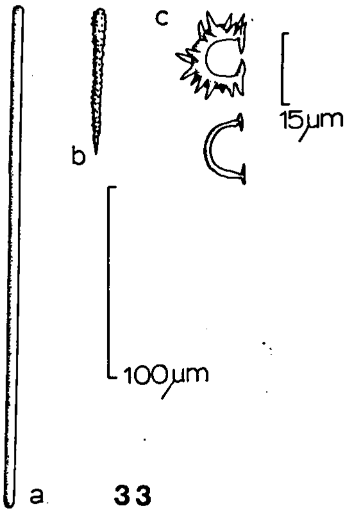


FIGURE 32. *Hymedesmia curacaoensis* n.sp.: a. tornote; b. large acanthostyle; c. small acanthostyle; d. chela.

FIGURE 33. *Acanthancora coralliophila* n.sp.: a. megasclere; b. acanthostyle; c. different growth stages of acanthancora.

DISCUSSION OF THE GENUS *Hymedesmia*

Hymedesmia nummota De Laubenfels (1936a) was described from deep water off Florida. It differs considerably from the above described *Hymedesmia* species in the larger and more robust megascleres (1000 by 20 µm and 180 by 5 µm) (a slide of the holotype USNM 22519 was kindly sent on loan by Dr. K. RÜTZLER). *Hymedesmia stellata* Bowerbank, 1866 sensu Topsent, 1889, is unrecognizable. *Hymedesmia schmidti* Carter, 1882, is referred to *Hamacantha*.

Palmate isochelae are not the normal type of chela found in *Hymedesmia*, although RIDLEY (1881) and TOPSENT (1928) already described them. TOPSENT erected a subgenus, *Holorodesmia*, raised to full generic status by DE LAUBENFELS (1936a), for *Hymedesmia* species with palmate isochelae. Likewise, BAKUS (1966) erected a genus *Hymedesanisochela* for a species (*H. rayae* Bakus, 1966) containing anisochelae next to the normal spicule complement. Palmate isochelae and anisochelae are widely distributed in quite different Poecilosclerid families, and thus are likely to represent ancestral characters, the retention of which cannot be considered derived and thus they do not constitute generic characters. For convenience sake subgeneric names might be used, until a phylogenetic view of species groups within the genus *Hymedesmia* is developed. The West Indian *Hymedesmia* species are summarized in Table 3.

TABLE 3

WEST INDIAN *Hymedesmia* SPECIES

(spicule sizes in µm)

Species	Ectosomal tornotes	Large acanthostyles	Small acanthostyles	Isochelae
H. jamaicensis	160–*190.0*–228/ 0.5–1	133–*214.3*–276/ 4.5–*6.5*–9.5	53–*73.2*–106/ 3–*4.7*–7.5	12–*15.2*–18 (palmate)
H. palmatichelifera	167–*200.2*–232/ 1.5–*2.1*–2.5	293–*320.0*–361/ 6–*7.1*–8	66–*76.6*–91/ 4–*5.7*–7.5	15–*16.7*–19 (palmate)
H. agariciicola	111–*123.0*–142/1	91–*141.0*–194/ 4–*4.8*–5.5	48–*51.2*–57/ 2.5–*2.7*–3.5	1) 18–*19.2*–21 2) 8–*10.2*–12
H. curacaoensis	182–*205.2*–230/ 1.5–*2.05*–2.5	205–*216.2*–229/ 8–*8.7*–10	57–*78.8*–114/ 3.5–*4.6*–6	28–*30.0*–33
H. nummota	478–565/6–8	970–1240/18–21	620/10	44–63

Genus **Acanthancora** Topsent, 1927

Definition: Hymedesmiidae with isochelae ornamented with thick spines.

Acanthancora coralliophila n. sp.

Holotype: ZMA POR.4755, CURAÇAO, Boei 0, W. of Piscadera Baai, 25–35 m, 23.XII.1980, coll. RWMVS.

Description (Pl. VI 9–11, Fig. 33):

Shape, size and consistency: Thinly incrusting sheet of several sqcm on dead coral; surface smooth, no apparent oscules. Consistency soft, easily torn.

Colour: bright red (drab in spirit).

Ectosome: thick organic dermis charged with numerous microscleres.

Choanosome: the skeleton consists of short columns of smooth megascleres carrying the ectosome, next to single acanthostyles erect on the substrate.

Spiculation: smooth strongylote isotornotes: 234–*253.6*–276 by 3–*3.6*–4.5 μm; acanthostyles: 68–*82.1*–99 by 3–*3.9*–5 μm; profusely acanthose stout isochelae (isancres): 15–*17.7*–23 μm (juvenile stages are smooth).

Ecology: on dead coral in reef environment.

Distribution: known only from the type locality.

Etymology: the name reflects its occurrence on dead corals.

The genus *Acanthancora* was erected to accomodate *Leptosia schmidti* Topsent (1895) (type species) and *A. clavatancora* Topsent (1927); both species originate from abyssal depth in the Mediterranean (although a real abyssal Mediterranean fauna does not exist). *Pseudohalichondria clavilobata* Carter (1886) also seems to belong to this genus. This is a massive species from Australia. *Acanthancora stylifera* Burton (1959) from Arabian waters is a fourth species referable to this genus. From all these the new species differs in having strongylote tornotes (isotornotes) in stead of stylotes (anisotornotes).

The relationship of *Acanthancora* and *Hymedesmia* is probably close, especially with those with acanthose chelae like *H. serulata* Vacelet (1969) and *H. uchinourensis* Hoshino (1981).

Family **PHORBASIDAE** De Laubenfels, 1936, emended

Anchinoidae TOPSENT (1928).

Definition: Poecilosclerida with choanosomal tracts of acanthostyles echinated by single acanthostyles; ectosomal brushes of oxeote tornotes; microscleres arcuate isochelae, sigmata.

DE LAUBENFELS' name for this family has preference over TOPSENT's (used also by LÉVI (1973) and BERGQUIST (1978)) in spite of the latter being older, because the genus *Phorbas* Duch. & Mich. (1864) is synonymous with *Anchinoe* Gray (1867).

Genus **Phorbas** Duchassaing & Michelotti, 1864

Definition: Phorbasidae in which the choanosomal skeleton consists of columns of acanthostyles mixed with ectosomal oxeotes, echinated by a special category of acanthostyles; microscleres arcuate isochelae.

Phorbas amaranthus Duch. & Mich., 1864

Phorbas amaranthus DUCH. & MICH., 1864: 92, pl. XXI 1; DE LAUBENFELS, 1936a: 63.
Merriamium tortugasensis DE LAUBENFELS, 1936a: 83, pl. 11 fig. 1; DE LAUBENFELS, 1939: 4; LITTLE, 1963: 48, figs. 19, 21; ALCOLADO, 1976: 5.

CURAÇAO: ZMA POR.4606 (Boei 4, 20–25 m, on dead coral, 24.XII.1980, coll. RWMVS); 4607, 4618 (Playa Kalki, 10–20 m, 30.XII.1980, coll. RWMVS); 4620, 4775, 4778 (300 m SE of Hilton Hotel, 33 m, on dead coral, 17.XII.1980, coll. RWMVS); 4774 (Boei 0, 6–12 m, on dead coral, 19.XII.1980, coll. RWMVS).

Diagnosis (Pl. VI 7, Fig. 34):

Shape, size and consistency: Incrusting, several mm to about 0.5 cm, smooth, with a distinctive areolate surface pattern. Consistency soft, easily damaged. It gives off a dark red exudate.
Colour: bright red (dark red in spirit).

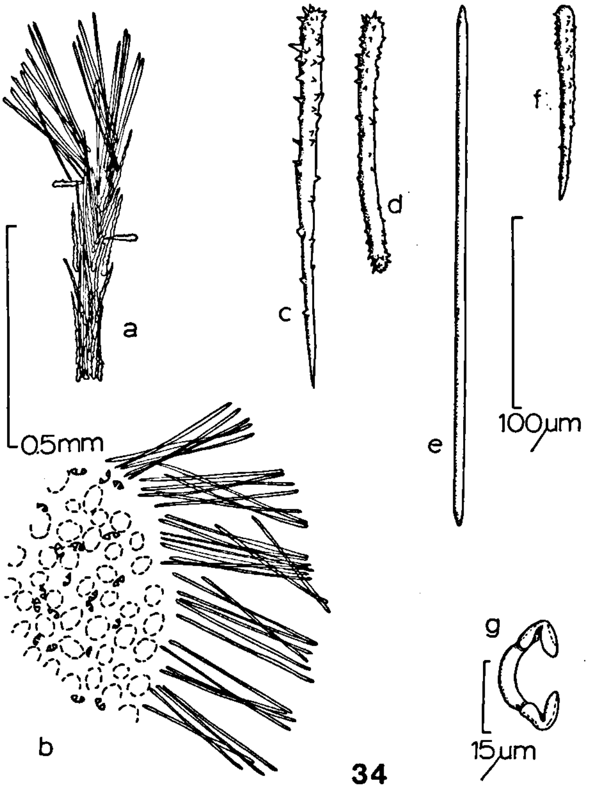


FIGURE 34. *Phorbas amaranthus*: a. skeletal column; b. tangential view of part of a surface areole; c. large acanthostyle; d. acanthostrongyle; e. tornote; f. small acanthostyle; g. chela.

Ectosome: charged with abundant microscleres and tangential ectosomal tornotes. Surface areolae represent round fields of pores, each 50–100 µm in diameter surrounded by isochelae and radiating packages of tornotes (cf. Fig. 34b).

Choanosome: Thick skeletal columns of acanthostyles, near the surface replaced by tornotes, echinated by single acanthostyles, ending in brushes of tornotes. Columns are about 100 µm in diameter, 400 µm apart.

Spiculation: robust, smooth oxeote tornotes, straight with hastately pointed apices: 235–*254.5*–266 by 3.5–*4.4*–5.5; large acanthostyles, with occasional strongylote modifications: 129–*159.4*–182 by 5–*6.6*–8 µm; short echinating acanthostyles: 91–*104.3*–112 by 4.5–*6.0*–7.5 µm; robust arcuate isochelae with short teeth: 20–*22.1*–24 µm.

Ecology: incrusting undersides of corals in reef environment.

Distribution: St. Thomas, Curaçao; Florida (DE LAUBENFELS, 1936a), Gulf coast (LITTLE, 1963).

DE LAUBENFELS (1936a) apparently misinterpreted the type of *Phorbas amaranthus* as he did not realize that acanthostyles constitute the bulk of the coring spicules of the skeletal columns (not oxeas as he stated: p. 63). Also, he attributed rare sigmata to this species. I failed to find these in a slide made from the holotype (Mus. Torino POR.59, kindly sent on loan by Dr. O. ELTER). In the same paper DE LAUBENFELS described *Merriamium tortugasensis*. Comparison of the type of this species (USNM 22418, kindly sent on loan by Dr. K. RÜTZLER) with that of *Phorbas amaranthus* yielded the following spicule data: tornotes 260–285/2–4 µm against 270–300/2–4 µm; acanthostyles: 120–215/3.5–4.5 µm against 100–190/3.5–5 µm (short and large category taken together); isochelae: 20–24 µm against 20–27 µm. DE LAUBENFELS' (1939) revision of *Merriamium* should be reexamined; many assigned species will probably fall to *Phorbas* or related genera in the Phorbasidae.

Judged on the spiculation the genus *Phorbas* closely adheres to the genus *Hymedesmia* of the family Hymedesmiidae; differences are the skeletal columns echinated by the smaller acanthostyles, against all stylote megascleres erect on the substrate. Other more subtle differences are the neat ectosomal spicule brushes and the areolate porefields.

Phorbas is synonymous with *Anchinoe* Gray (1867), because its type species *Hymeniacidon perarmatus* Bowerbank, 1866, cannot be separated from *Phorbas*. Other species assigned to *Anchinoe* might not be conforming to it, so a revision of *Anchinoe* species is needed.

DISCUSSION OF THE FAMILIES HYMEDESMIIDAE AND PHORBASIDAE

Two characters apparently separate the two families, viz. the ectosomal tornote shape and the architecture; other characters are quite similar, such as the shape and size of the remaining megascleres and the isochelae. The ectosomal tornotes of the Hymedesmiids are generally slimmer, often polytylote or anisotornote, while those of the Phorbasidae are more oxeote; however, a distinct difference does not exist. The architecture of the Hymedesmiids is comparable to the leptoclathriid condition of many Clathriids, so it might not be of taxonomic significance at the family level. Since both families are also small in number of genera, it might be considered to unite them.

Certain genera of the Phorbasidae (e.g. *Pronax* Gray, 1867) show a distinct affinity in spiculation with typical Myxillids (of the Myxillinae). The distinction between *Pronax* and *Myxilla*, for instance, is entirely based upon the skeletal columns in the former, against the reticulated skeleton in the latter.

Family CLATHRIIDAE Hentschel, 1923

Microcionidae CARTER, 1875

Definition: Poecilosclerida with smooth ectosomal (sub-)tylostyles (may be terminally microspined), smooth or acanthose choanosomal styles, and mostly short, echinating acanthostyles (may be lost); microscleres include palmate isochelae, toxa, and toxiform rhaphides.

As will be elaborated below *Clathria* Schmidt, 1862, and *Microciona* Bowerbank (1862), are probably synonymous, and a choice has to be made, which of both names has to be used. Here, preference is given to *Clathria*, and consequently to the family name Clathriidae, because it could be argued, that *Microciona* was not published officially until 1863 (cf. WIEDENMAYER, 1977).

Genus **Clathria** Schmidt, 1862

Microciona Bowerbank, 1862 (1863)
Leptoclathria Topsent, 1928
Hymantho Burton, 1930

Definition: Clathriidae with a single category of ectosomal tylostyles arranged paratangentially, and a choanosomal skeleton consisting of (acantho-)styles erect on the surface, and/or coring dendritic or anastomosing spongin fibres; echinating (acantho-)styles erect on the substrate and/or echinating spongin fibres.

Remarks: From the numerous often partly erroneous discussions over the content of such genera as *Clathria* Schmidt (1862), *Microciona* Bowerbank (1862), *Rhaphidophlus* Ehlers, (1870), *Axociella* Hallman (1919) and *Thalysias* Duch. & Mich. (1864) (e.g. De Laubenfels (1936a), Lévi (1960), Hechtel (1965), Simpson (1968), and Wiedenmayer (1977)), no clear agreement has emerged. There are incrusting (*Microciona*) or bushy forms (*Clathria*), forms with (*Microciona*) or without (*Axociella*) echinating acanthostyles, forms with ectosomal spicule brushes (*Rhaphidophlus / Thalysias*) and without (*Clathria*); however, no consistencies occur.

Simpson (1968) showed that West Indian representatives could be assigned to two genera on skeletal as well as cytological characters (i.c. *Microciona* and *Thalysias*), but found some cytological differences with these in the respective type species of *Clathria* and *Rhaphidophlus*, suggesting to restrict the use of these generic names to those species. If we accept the phylogenetic significance of Simpson's results in full, we know the generic placement of the West Indian species studied by him, but are in doubt over those not treated cytologically. Thus, the species *spinosa* (Wilson, 1902) and *prolifera* (Ellis & Solander, 1786) are assigned to *Microciona*, and *juniperina* (Lamarck, 1814) and *schoenus* (De Laubenfels, 1936a) to *Thalysias*, but *ferrea* (De Laubenfels, 1936b), *calla* (De Laubenfels, 1934), and several new species described below cannot be assigned because cytological data cannot be provided (preserved material). This is impractical; it is here proposed to emphasize the ectosomal specialization and use it for classing species of the *Clathria-Microciona-Thalysias-Rhaphidophlus* group. Since *Clathria* and

Microciona are similar in this respect, it is proposed here to synonymize them, and restrict the use of *Microciona* as a convenient subgeneric name for incrusting forms. *Thalysias* and *Rhaphidophlus* are likewise similar.

Thalysias as a generic name for Clathriids has to be abandoned, because CARTER (1876: 311) clearly indicates *Thalysias subtriangularis* (Duch., 1850) as representative for the genus *Thalysias*. Although he did not use the words "type species", there can be no doubt, that CARTER's remarks are valid as subsequent type species designation. This has been overlooked or ignored by DE LAUBENFELS (1936a), who designated *Thalysias virgultosa* (Lamarck, 1814) Duch. & Mich., 1864 as the type species of *Thalysias*. At the same time he stated, that this was a junior synonym of *Spongia juniperina* (Lamarck, 1814), a species originally described from the Indian Ocean, thus making that species (redescribed by TOPSENT, 1932) the objective type. All DE LAUBENFELS' actions are invalid in view of CARTER's earlier designation. *Spongia juniperina* and related forms conform to genera described at later dates, the eldest of which are *Rhaphidophlus* Ehlers, 1870, and *Tenacia* Schmidt, 1870. Since the former is still in current use by most French authors, it is here used for the species formerly described under *Thalysias*.

Clathria (Clathria) prolifera (Ellis & Solander, 1786)

Synonymy: cf. HARTMAN, 1958.

NORTH CAROLINA: ZMA POR.38 (Newport River, Beaufort, 5 m, trawled, 1.IX.1963, coll. JHS).

Diagnosis (Fig. 35):

Shape, size and consistency: Irregularly ramose (incrusting specimens are known); branches short, numerous, irregular in outline, originating from a massive, flattened clump. Surface finely conulose, Size up to 15 cm high. Consistency tough, spongy.
Colour: red (brown in spirit).
Ectosome: conules are formed by brushed endings of choanosomal fibres, in between tangential or protruding subtylostyles and microscleres support the dermal membrane.
Choanosome: a reticulation of strongly developed spongin fibres, pro-

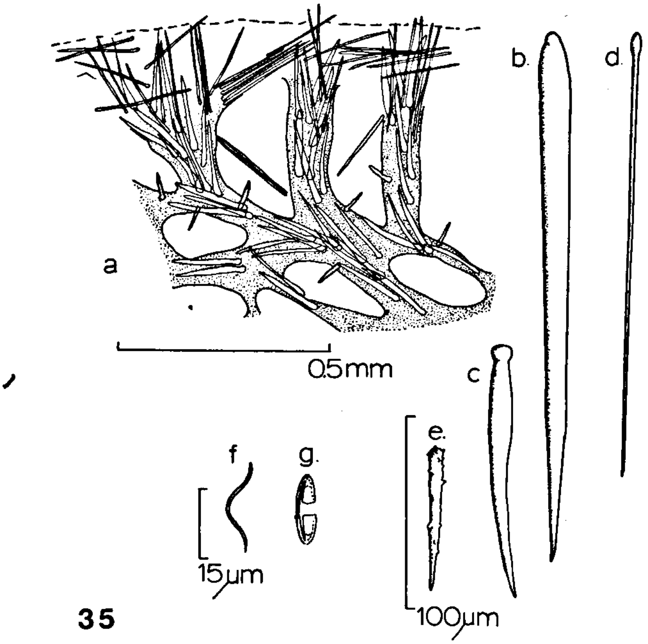


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FIGURE 35. *Clathria* (*Clathria*) *prolifera*: a. transverse section of subectosomal skeleton; b. large choanosomal coring style; c. short choanosomal coring or echinating style; d. ectosomalsubtylostyle; e. echinating acanthostyle; f. tox; g. chela.

fusely cored by long choanosomal styles, and echinated by shorter choanosomal styles and special, short acanthostyles.
Spiculation: ectosomal subtylostyles, sometimes with microspined heads: 160–*252.8*–342 by 1.5–*2.6*–3.5 µm, choanosomal smooth styles with mucronate or microspined heads: 141–*242.6*–387 by 6.5–*7.25*–10 µm; acanthostyles: 56–*74.1*–86 by 3.5–*4.8*–7 µm, palmate isochelae: 12–*14.9*–17 µm, and small, thin toxa: 15–*20.6*–27 µm.

Ecology: known from estuarine waters.

Distribution: N. Carolina (also: WELLS, et. al., 1960); New England (HARTMAN, 1958), Florida (DE LAUBENFELS, 1936a; LITTLE, 1963), Mexico (GREEN, 1977).

This is a well-defined species, which differs from other elaborate ramose American Clathriids by its habit and spicule complement. It is probably a temperate-subtropical rather than a West Indian species, although it penetrates this area as far south as México; it is also reported by JOHNSON (1971) from Brazil. The latter record is doubtful, as the toxa-size of her specimens is greater than that of the northern material, and also her description of fibres filled with foreign material sounds unlike *C. prolifera* proper. Were *Clathriopsamma* Hallmann, 1920, a good genus, then JOHNSON's material would fit it.

Clathria (Microciona) affinis (Topsent, 1889)

Hymeraphia affinis TOPSENT, 1889: 43, fig. 8 A

CURAÇAO: ZMA POR.4791 (Awa Blancu, 10–20 m, on dead coral, 29.XII.1980, coll. RWMVS).

Description (Fig. 36):

Shape, size and consistency: A small thin incrustation on a piece of dead coral, microhispid, soft.

Colour: orange.

Ectosome: due to the thinly incrusting habit difficult to study; choanosomal megascleres pierce the organic dermis, which seems to be charged with microscleres and ectosomal subtylostyles.

Choanosome: leptoclathriid (cf. Lévi, 1960), with only a basal plate of spongin with megascleres erect on the sbustrate. Each smooth thick style is surrounded by several acanthostyles.

Spiculation: ectosomal smooth tylostyles with microspined heads: 342–*407.2*–538 by 3.5–*4.4*–5 µm; choanosomal smooth styles with acanthose head, of widely different sizes: 178–*415.4*–602 by 7.5–*10.9*–13 µm; choanosomal acanthostyles spined all-over: 85–*91.7*–107 by 4.5–*5.3*–7 µm; palmate isochelae: 18–*19.4*–20 µm; toxa with a wide curve: 114–*139.6*–190 µm.

Ecology: reef dweller.

Distribution: Curaçao; México (TOPSENT, 1889).

I was able to examine a slide of TOPSENT's specimen from the Paris Museum through the kindness of Dr. NICOLE BOURY-ESNAULT; the spicu-

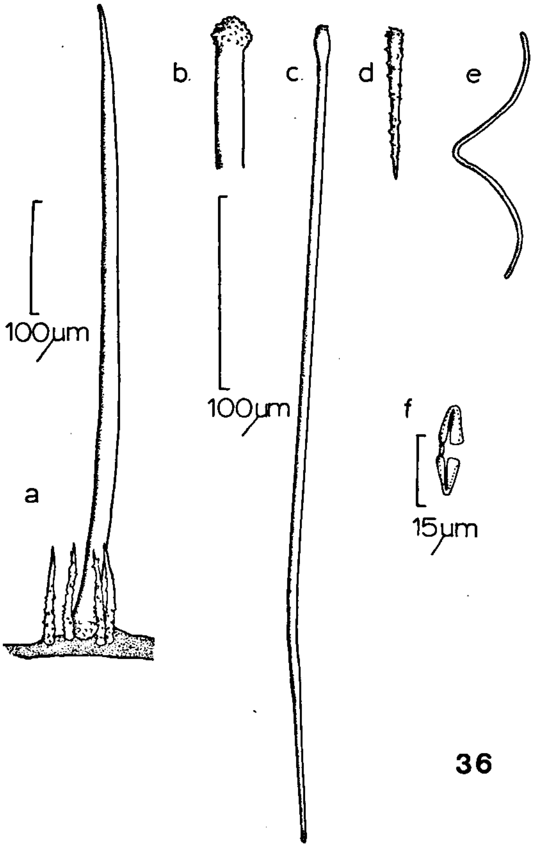

FIGURE 36. *Clathria* (*Microciona*) *affinis*: a. arrangement of basal skeleton; b. detail of choanosomal style; c. ectosomal subtylostyle; d. acanthostyle; e. tox; f. chelae.

lation is similar to that of the Curaçao material (subtylostyles up to 450/4 µm, styles up to 600/10 µm, acanthostyles up to 105/5 µm, isochelae 20 µm, toxa 150 and 70 µm), but for the second category of smaller toxa.

Through the possession of the acanthostyles this species stands out among the West Indian *Microciona*-species. If this will be shown to be of phylogenetic signifinance, it would bring this species close to Western European *Microciona* (cf. LÉVI, 1960) and most Indo-West-Pacific representatives.

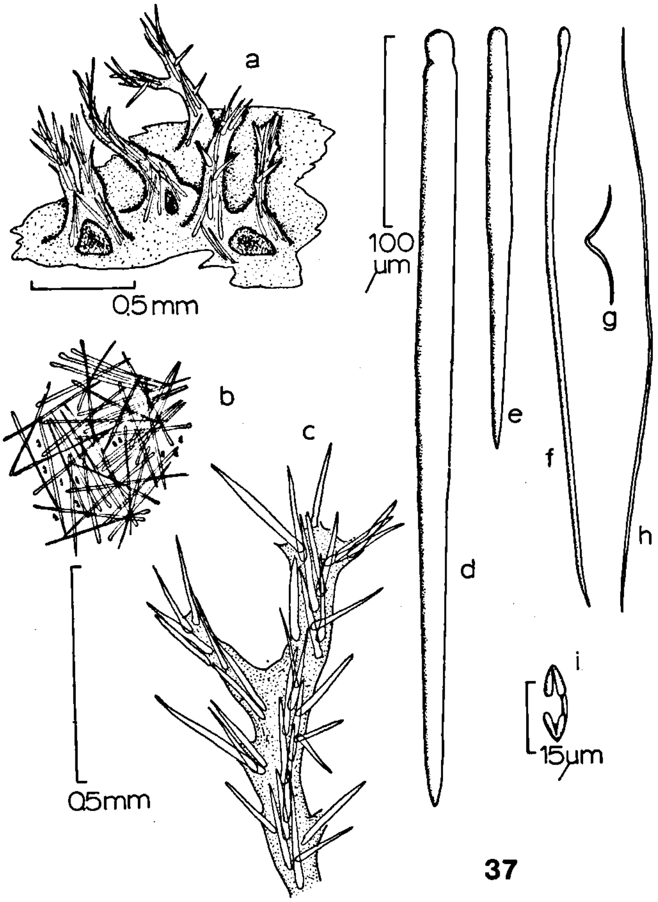

FIGURE 37. *Clathria* (*Microciona*) *spinosa*: a. choanosomal skeleton; b. tangential view of ectosomal skeleton; c. skeletal fibre; d. large coring style; e. small coring or echinating style; f. ectosomal subtylostyle; g. tox; h. oxeote tox; i. chela.

Clathria (Microciona) spinosa Wilson (1902)

Synonymy: cf. WIEDENMAYER (1977).

CURAÇAO: ZMA POR.3665 (Playa Forti, Westpunt, 4 m, 2.XI.1975, coll. students Prof. Stock); 3860 (off Lagoon Jan Thiel, in shallow caves, 2 m, 16.XI.1955, coll. students Prof. Stock).

Diagnosis (Fig. 37):

Shape, size and consistency: Thinly to massively incrusting dead corals, up to about 1 cm high, with a tendency to form quite shaggy, globular mounds. Surface pronouncedly conulose; the conules are formed by the brushed endings of the skeletal fibres. Oscules indistinct, hidden between the shaggy conules. Consistency spongy, compressible.

Colour: bright red.

Ectosome: draped in the meandering valleys between the conules, easily detachable, charged with a halichondroid mass of thin tylostyles and isochelae.

Choanosome: skeleton clathriid (cf. Lévi, 1960). From a basal plate of spongin rise columns of irregularly anastomosing, but chiefly dendritic spongin fibres. These are up to 0.5 mm in diameter and are cored mostly by thick truncate styles, but occasionally the ectosomal tylostyles are also coring. The fibres are regularly echinated by smooth thick styles of the same general morphology as the coring styles.

Spiculation: ectosomal thin tylostyles: 215–*247.8*–293 by 2.5–*3.2*–4 µm; choanosomal thick styles with blunt narrow heads, of widely varying lengths: 169–*277.3*–410 by 6.5–*10.3*–13 µm; palmate isochelae: 13–*15.6*–18 µm; toxa in two (or possibly three) categories: small, thin ones of variously strongly arched to rather shallow-curved form: 22–*39.9*–71 µm, and long, flexuous toxiform oxeotes: 200–273 by 0.5–1.5 µm.

Ecology: shallow reef environment.

Distribution: Curaçao; Puerto Rico (Wilson, 1902), Western Bahamas (Wiedenmayer, 1977).

The microsclere complement of the present material seems to differ somewhat from previous descriptions of Wilson (1902), Simpson (1973) and Wiedenmayer (1977), in the number of toxiform microsclere categories and their form. Possibly this complement is subject to infraspecific variation; perhaps, too, the distinction of size categories has been based too much on artificially recognized discontinuities in a continuous series from small to large.

Clathria (Microciona) simpsoni n. sp.

Holotype: ZMA POR.3332, Puerto Rico, Mata Gagada near Parguera, 0.3 m, 28.II.1963, coll. JHS PR.110.
Paratypes: ZMA POR.3639, Curaçao, near Carmabi, 18–20 m, 14.XI.1975, coll. students Prof. Stock; 4773, Boei 2, on *Meandrina*, 30.XII.1980, coll. R. Bak.

Additional material: ZMA POR.4788, Curaçao, Boei 4, 20–25 m, 24.XII.1980, coll. RWMVS.

Description (Pl. VII 2–4, Fig. 38):

Shape, size and consistency: Thinly to massively (up to 5 cm high) incrusting with a tendency to develop tubular elevations; surface shaggy-conulose with protruding fibre endings. Massive specimens clathrate with oscules and other openings irregularly united into a system of deep furrows, up to 8 mm in diameter. Consistency spongy, compressible.

Colour: bright red.

Ectosome: fleshy, draped between protruding fibres, charged predominantly with microscleres and some loose ectosomal megascleres.

Choanosome: clathriid skeleton; irregularly anastomosing dendritic fibres, heavily cored and echinated by stylote megascleres. Diameter of the fibres up to 180 µm.

Spiculation: ectosomal thin tylostyles: 300–*347.0*–495 by 2–*3.3*–4 µm; thick, smooth styles, with blunt, narrow heads of widely varying size: 230–*449.8*–595 by 6.5–*9.1*–17 µm; normal palmate isochelae: 19–*20.4*–23 µm; cleistochelae ("closed" palmate isochelae): 15–*21.9*–27 µm; toxiform spicules in two categories: small, thin shallow-curved real toxa: 11–*37.6*–76 µm, long, stout oxeotes with a gradual shallow curve: 500–*637.5*–760 by 2.5–*3.4*–4 µm.

Ecology: reef environment.

Distribution: Puerto Rico, Curaçao.

Etymology: named after Prof. T. L. Simpson in recognition of his important contribution to Clathriid taxonomy.

The present species resembles the previous one in such detail, that identification problems might arise. Habit, architecture and general spicule complement are essentially similar; however, the peculiar morp-

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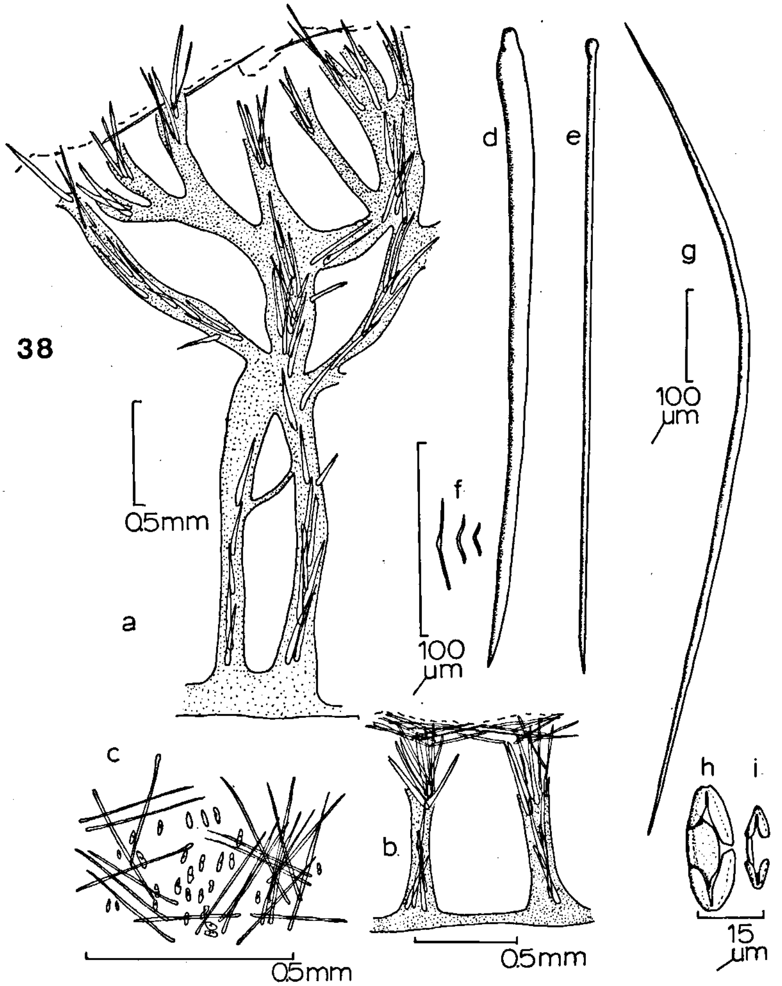


FIGURE 38. *Clathria* (*Microciona*) *simpsoni* n. sp.: a. choanosomal skeleton of a massive specimen; b. choanosomal skeleton of an incrusting specimen; c. tangential view of ectosome; d. choanosomal style; e. ectosomal subtylostyle; f. toxa; g. oxeote; h. cleistochela; i. normal chela.

hology of the cleistochelae, the greater size of the megascleres and especially the toxiform oxeotes are distinct from *C. spinosa.* The species are apparently closely related. By its cleistochelae this species also shows affinities with Mediterranean *M. cleistochela* Topsent (1925) and *M. chelifera* Lévi (1960), *M. heterospiculata* Brondsted (1924), and with *Colloclathria ramosa* Dendy (1922); quite possibly, however, the cleistochelate condition might have been developed independently in the different species, since *Colloclathria ramosa* has to be assigned to *Rhaphidophlus* on the basis of ectosomal characters.

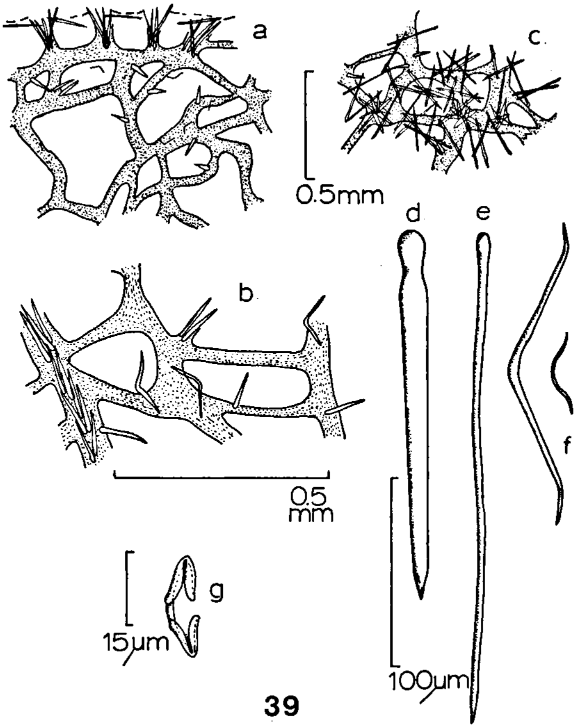


FIGURE 39. *Clathria* (*Microciona*) *calla*: a. transverse section; b. detail of choanosomal skeleton; c. tangential view of ectosome; d. choanosomal style; e. ectosomal subtylostyle; f. two categories of toxa; g. chela.

Clathria (Microciona) calla (De Laubenfels, 1934)

Axociella calla De Laubenfels, 1934: 16.
? *Microciona rarispinosa* Hechtel, 1965: 42, text-fig. 8.
? *Clathria calla*; Boury-Esnault, 1973: 286, fig. 46.
Tenaciella obliqua; Alcolado, 1976: 5.

Curaçao: ZMA POR.3817, 3859 (Vaarsenbaai, on *Antipathes* spec. and molluscs, 20 m, 21.XI.1975, coll. N. Broodbakker).
Florida: ZMA POR.3782 (E of Elliott Key, 2–6 m, 5.IX.1963, coll. PWH *1414*).

Diagnosis (Pl. VII 1, Fig. 39):

Shape, size and consistency: massively incrusting, up to 1 cm in thickness; surface microtuberculate, no apparent oscules. Texture tightly woven; consistency toughly spongy.
Colour: bright red (drab in spirit; the specimen growing on *Antipathes* is purple in spirit, no doubt due to pigments given off by the black coral).
Ectosome: virtually absent in preserved specimens; close-set fibre-endings protrude slightly, giving a microtuberculate appearance.
Choanosome: clathriid-dictyoclathriid skeleton; it consists of a close-meshed, almost isodictyal reticulum of spongin fibres sparingly cored by almost completely smooth styles; the extent of coring is characteristically low, with whole stretches of fibre devoid of coring spicules. The same type of spicule is coring the fibres at regular intervals.
Spiculation: ectosomal thin (sub-)tylostyles: 186–*235.6*–266 by 2–*2.4*–3 µm; smooth coring and echinating styles, sometimes with minutely spined heads: 114–*184.3*–228 by 5–*7.4*–12 µm; palmate isochelae 16–*21.3*–25 µm; toxa in two size categories: robust, straight, shallow-curved: 95–*121.2*–169 µm, and thin, more deeply curved: 27–*36.2*–42 µm.

Ecology: incrusting dead corals at some depth (De Laubenfels' holotype is from 20–30 fathoms).

Distribution: Curaçao, Puerto Rico, Florida; ? Jamaica (Hechtel, 1965), Cuba (Alcolado, 1976), ? Brasil (Boury-Esnault, 1973).

The present material exactly matches De Laubenfels' type from Puerto Rico (USNM 22333, kindly sent on loan by Dr. K. Rützler). The species stands out among *Microciona* species of the West Indies by the scantiness of coring spicules and for that reason is associated with

HECHTEL's *M. rarispinosa*, in spite of considerable differences with his description. HECHTEL's material was not so pronouncedly reticulate, had smaller styles and apparently lacked the larger category of toxa. BOURY-ESNAULT's material was ramose and lacked the smaller category of toxa.

I noted a great resemblance in spiculation between *Clathria coralloides* (Schmidt, 1862) from the Mediterranean and the present species, the main difference being the larger size category of toxa in the latter. Also, the spongin reticulation of both "twin" species is very similar.

Clathria (Microciona) ferrea (De Laubenfels, 1936)

Fisherispongia ferrea DE LAUBENFELS, 1936b: 460, fig. 44.

CURAÇAO: ZMA POR.4613 (near Carmabi, 1 m, under a piece of dead coral, 21.XII.1980, coll. RWMVS).

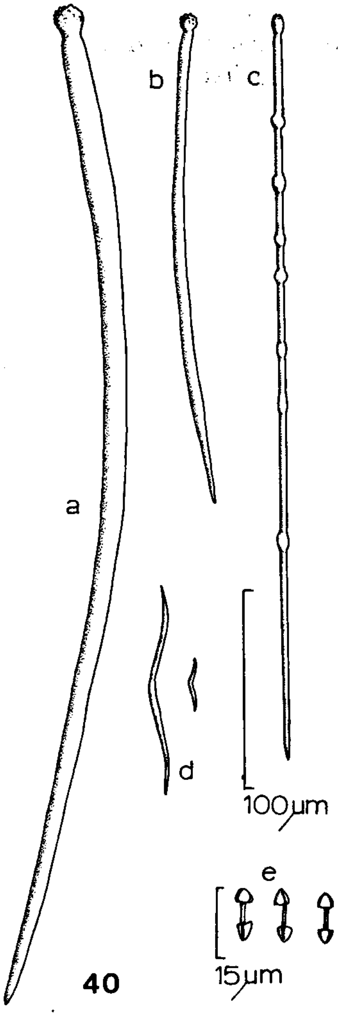
Diagnosis (Fig. 40):

Shape, size and consistency: Thin (2 mm) incrustation on dead coral, superficially smooth, no apparent oscules. Consistency soft and fragile.
Colour: bright red.
Ectosome: microhispid by protruding spicules.
Choanosome: leptocionid skeleton, with spicules standing in tufts on the substrate, points upwards; interior filled to a large extent with coral debris agglutinated by spongin.
Spiculation: ectosomal polytylote subtylostyles, often with minutely spined heads and 2–11 tylote swellings: 277–*373.3*–480 by 2–*2.92*–3.5 µm; smooth choanostomal styles with roughened or microspined heads, of widely different sizes: 72–*312.0*–596 by 3.5–*8.7*–12 µm; palmate isochelae of which a large proportion is twisted: 11–*12.1*–15 µm; robust, shallow-curved toxa of distinctive recurved shape: 29–*76.8*–114 µm.

Ecology: incrusting in shallow locations.

Distribution: Curaçao; Atlantic coast of Panamá (DE LAUBENFELS, 1936b).

Except for a more heavy microspination of the heads of the styles the present specimen agrees completely with DE LAUBENFELS' type (USNM 22239, a slide of which was kindly sent on loan by Dr. K. RÜTZLER), from



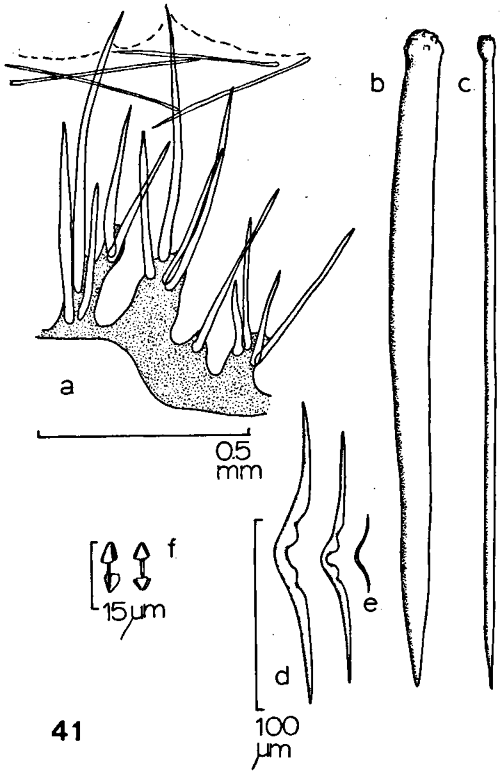


Figure 40. *Clathria* (*Microciona*) *ferrea*: a. large choanosomal style; b. small choanosomal style; c. polytylote ectosomal subtylostyle; d. two categories of toxa; e. twisted and normal chelae.

Figure 41. *Clathria* (*Microciona*) *bulbotoxa* n. sp.: a. transverse section; b. choanosomal style; c. ectosomal sybtylostyle; d. bulbous toxa; e. normal toxa; f. twisted and normal chelae.

which we may infer that the polytylote condition of the subtylostyles is not a freak incidence but a stable specific character.

Clathria (Microciona) bulbotoxa n. sp.

Holotype: ZMA POR.4789, CURAÇAO, Boei 4, 20–25 m, 24.XII.1980, coll. RWMVS.

Description (Pl. VII 5–8, Fig. 41):

Shape, size and consistency: Thin (1 mm) incrustation on the underside of a dead coral; surface optically smooth, somewhat slimy; no evident oscules. Consistency soft.

Colour: bright red.

Ectosome: microscopically hispid due to protruding choanosomal spicules; organic dermis charged with ectosomal tylostyles and microscleres.

Choanosome: microcionid skeleton, with occasional elevated masses of spongin cored with thick styles from which styles and subtylostyles stick out as from a pin cushion; microscleres abundant.

Spiculation: ectosomal (sub-)tylostyles with microspined heads: 272–*330.5*–418 by 3–*4.0*–5 µm; choanosomal thick styles with smooth or slightly roughened prominent heads, coring and echinating the spongin: 284–*437.1*–608 by 9–*14.4*–17.5 µm; isochelae palmatae of which a fair percentage is twisted: 11.5–*12.4*–14 µm; toxa in two size categories: robust, with peculiar bulbous outgrowth on the inside of the arch, of wide length variation 49–213 µm, and seemingly normal, small ones (although the possibility is not excluded that they are incipient bulbous toxa): 15–50 µm.

Ecology: incrusting corals in the deeper reef parts.

Distribution: known only from the type locality on Curaçao; it probably also occurs at Cape Malmeeuw since the characteristic toxa were found in slides made from that locality.

Etymology: the name refers to the peculiar shape of the large toxa.

The new species stands out among the remaining West Indian *Microciona* by the peculiar toxa and the overall combination of spicular characters. Disregarding the bulbous thickening the shape of the toxa reminds of those found in *M. ferrea* and in *Plocamilla penneyi* (DE LAUBENFELS, 1936a, cf below). The twisted isochelae are also shared with these species, but these also occur in e.g. *Microciona adioristica* (DE LAUBENFELS, 1953, cf. below), *Cornulum johnsoni* (DE LAUBENFELS, 1934, cf. above), and *Clathria obliqua* (GEORGE & WILSON, 1919).

Clathria (Microciona) hymedesmioides n. sp.

Holotype: ZMA POR.4790, CURAÇAO, Awa Blancu, on dead coral, 10–20 m, 29.XII.1980, coll. RWMVS.

Description (Pl. VII 9–10, Fig. 42):

Shape, size and consistency: Thinly (1 mm) incrusting, optically smooth, no apparent oscules. Size about 5 × 8 cm. Consistency soft.
Colour: dull red.
Ectosome: microhispid because of protruding spicules, dermis charged with tangential subtylostyles and microscleres.
Choanosome: leptoclathriid skeleton: megascleres erect on the substrate.
Spiculation: ectosomal subtylostyles, heads often minutely roughened: 340–*413.8*–473 by 3–*3.95*–4.5 µm; choanosomal styles with prominent spinous or roughened heads, not infrequently with also a few spines on the shaft, of widely different size: 223–*437.7*–688 by 7.5–*9.8*–13 µm, normal palmate isochelae: 12–*15.5*–19; normal, delicate toxa: 23–*36.4*–52 µm.

Ecology: on dead corals in reef environment.

Distribution: known only from the type locality.

Etymology: the name refers to the *Hymedesmia*-like structure of the species.

Not a single outstanding feature characterizes this species, but the dull red colour and the leptoclathriid architecture, next to the individual form and size of the spicules make it a distinct species. The incrusting habit presumably is its true habit since it occupied a considerable surface area.

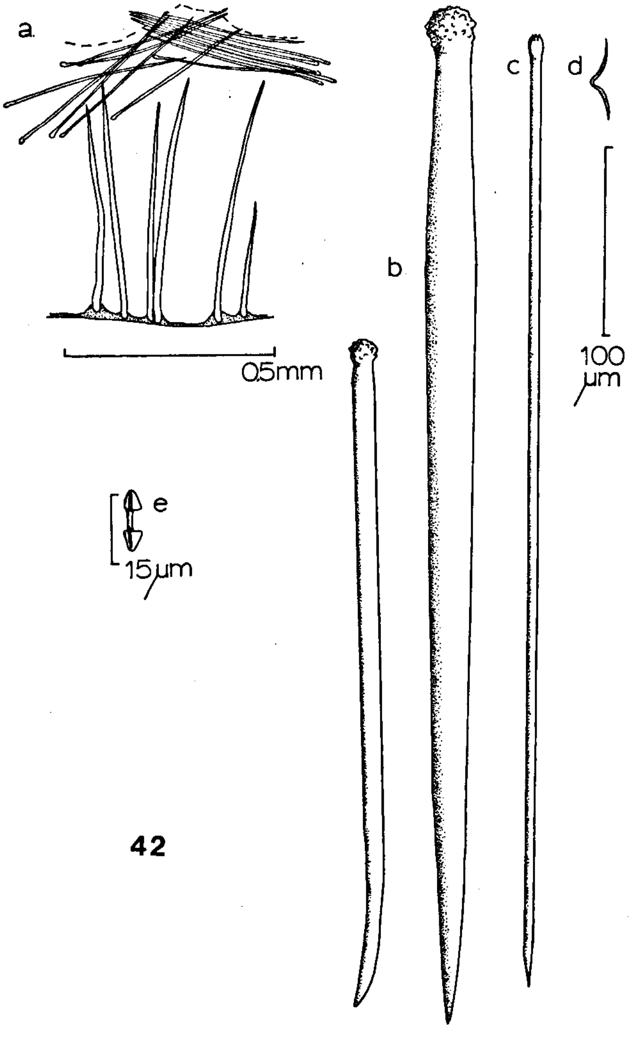


FIGURE 42. *Clathria* (*Microciona*) *hymedesmioides* n. sp.: a. transverse section; b. choanosomal styles of different sizes; c. ectosomal subtylostyle; d. tox; e. chela.

TABLE 4

Clathria AND *Rhaphidophlus* SPP. OCCURRING IN THE WEST INDIAN REGION

(data on *Clathria vasiformis* and *C. adioristica* from De Laubenfels, 1953, on *C. foliacea* from De Laubenfels, 1936a, on *C. obliqua* from George & Wilson, 1919, and Wells, et al., 1960, on *R. fascicularis* from Topsent, 1889).

Species	ectosomal tylostyles (ms = microspined)	choanosomal styles (ms = microspined)	acanthostyles	isochelae	toxa	toxiform oxeotes
Clathria affinis	342–*407.2*–538/ 3.5–*4.4*–5 (ms)	178–*415.4*–602/ 7.5–*10.9*–13 (ms)	85–*91.7*–107/ 4.5–*5.3*–7	18–*19.4*–20	114–*139.6*–190	—
Clathria spinosa	215–*247.8*–293/ 25–*3.2*–4	169–*277.3*–410/ 6.5–*10.3*–13	—	13–*15.6*–18	22–*39.9*–71	200–273/0.5–1.5
Clathria simpsoni	300–*347.0*–495/ 2–*3.3*–4	230–*449.8*–595/ 6.5–*9.1*–17	—	15–27 (including cleistochelae)	11–*37.6*–76	500–*637.5*–760/ 2.5–*3.4*–4
Clathria calla	186–*235.6*–266/ 2–*2.4*–3	114–*184.3*–228/ 5–*7.4*–12 (ms)	—	16–*21.3*–25	1) 95–*121.2*–169 2) 27– *36.2*– 42	—
Clathria ferrea	277–*373.3*–480/ 2–*2.92*–3.5 (ms)	72–*312.0*–596/ 3.5–*8.7*–12 (ms)	—	11–*12.1*–15 (twisted)	29–*76.8*–114	—
Clathria bulbotoxa	272–*330.5*–418/ 3–*4.0*–5 (ms)	284–*437.1*–608/ 9–*14.4*–17,5 (ms)	—	11.5–*12.4*–14 (twisted)	1) 49–213 2) 15– 50	—
Clathria hymedesmioides	340–*413.8*–473/ 3–*3.95*–4.5 (ms)	223–*437.7*–688/ 7.5–*9.8*–13 (ms)	—	12–*15.5*–19	23–*36.4*–52	—
Clathria prolifera	160–*252.8*–342/ 1.5–*2.6*–3.5 (ms)	141–*242.6*–387/ 6.5–*7.25*–10 (mucr. or ms)	56–*74.1*–86/ 3.5–*4.8*–7	12–*14.9*–17	15–*20.6*–27	—

Clathria vasiformis	present	700–900/11–13	105/5	—	—	—
Clathria obliqua	120–140/2–4	110–150/6–10	a few	9–11 (twisted)	20 + 60	—
Clathria adioristica	210–250/2–4	150–350/8–15	70–200/3–8	16–20	45	—
Clathria foliacea	235/2.5	190–365/10–20	75/4	—	—	—
Rhaphidophlus fascicularis	present (ms)	present (ms)	present	—	present	—
Rhaphidophlus juniperinus	1) 95–*116.8*–137/ 1.5–*2.0*–2.5 2) 257–*283.6*–319/ 3.5–*4.2*–5	228–*260.5*–308/ 7.5–*8.3*–9.5	42–*48.3*–57/ 4.5–*5.9*–7.5	11–12	8–*42.5*–76	144–*172.0*–209
Rhaphidophlus schoenus	1) 89–*107.6*–156/ 1–*1.6*–2 2) 198–*272.6*–361/ 2.5–*3.6*–5 (ms)	240–*352.1*–445/ 4–*8.0*–13 (ms)	41–*55.1*–76/ 4.5–*5.2*–6	1) 12–*13.0*–15 2) 3–*4.6*–5.5	35–*54.4*–71	118–*166.7*–252
Rhaphidophlus minutus	1) 147–*191.5*–258/ 1.5–*2.1*–2.5 2) 294–*322.6*–361/ 3–*3.6*–4 (ms)	266–*348.0*–403/ 7.5–*7.9*–8.5 (ms)	97–*123.1*–152/ 5–*6.4*–7	15–*15.8*–17	47–*75.5*–115	—
Rhaphidophlus raraechelae	1) 98–*156.2*–212/ 1–*1.82*–2.5 2) 271–*316.3*–415/ 2.5–*3.77*–5	268–*354.6*–408/ 5.5–*6.45*–8	42–*52.9*–65/ 3–*4.0*–5	7.5–*11.2*–14	—	48–*115.0*–152
Rhaphidophlus isodictyoides	1) 160–*214.7*–274/ 1–*1.9*–3 2) 276–*401.6*–500/ 3–*3.8*–4.5	314–*488.9*–608/ 7–*8.4*–10 (mucronate)	84–*92.6*–99/ 5–*7.6*–8	15–*16.9*–19	—	145–*195.8*–268
Rhaphidophlus oxeotus	1) 125–*204.7*–262/ 1–*1.9*–3.5 2) 312–*404.5*–488/ 3–*4.1*–5	228–*328.7*–456/ 5.5–*8.1*–9.5 (ms)	43–*49.6*–57/ 4–*4.25*–5	11–*11.9*–14	—	1) 125–*305.6*–390 2) 530–*711.0*–995/ 1.5–*2.8*–4

DISCUSSION OF THE GENUS *Clathria*

TOPSENT (1889) described five West Indian species in the genus *Clathria*, viz. *C. fascicularis*, *C. dentata*, *C. carteri*, *C. foliacea* and *C. copiosa*. Dr. BOURY-ESNAULT (pers. commun.) was unable to find the type specimens in the Paris Museum, when I requested them on loan, so it would appear they are lost. To a certain extent, however, it is possible to draw conclusions about the identity of these specimens. *C. copiosa* is undoubtedly a specimen of *Rhaphidophlus juniperina*. *C. fascicularis* and *C. dentata* are probably synonymous and also belong to *Rhaphidophlus* on account of their ectosomal spicule brushes. *C. carteri* and *C. foliacea* also seem to be synonymous and conform to the genus *Clathria* with not much else to characterize them, than the habit and the absence of microscleres. DE LAUBENFELS (1936a) transferred *Clathria* specimens without microscleres to a new genus *Thalyseurypon*, with type *Spongia raphanus* Lamarck, 1814 (redescribed as *Clathria raphana* by TOPSENT, 1932: 100, pl. IV fig. 9). I do not think the loss of microscleres (or acanthostyles, for that matter) is a synapomorphy for a group of related *Clathria*-species, since these losses also occur in *Rhaphidophlus*-species. I propose to abandon the use of *Thalyseurypon*. *C. foliacea* Topsent (1889) was also described from Tortugas by DE LAUBENFELS (1936a: 107); its spiculation is characterized by choanosomal thick styles (190–365 by 10–20 µm) with mucronate heads, acanthostyles (75 by 4 µm) and ectosomal tylostyles (235 by 2.5 µm). DE LAUBENFELS' specimen is kept in the USNM (no. 22516).

Incrusting *Clathria*-species were recorded by TOPSENT (1889) as *Microciona plana* Carter (1876), which is unrecognizable and *Hymeraphia affinis*, which is a good species (cf. above: *Clathria affinis*). *Microciona pusilla* Carter (1876) sensu Topsent (1889) is a *Rhabderemia* (order Axinellida).

Esperiopsis obliqua George & Wilson (1919) is a *Clathria* similar to *C. prolifera*, but differing from it in spicule sizes and its chelae are twisted. WELLS, et al. (1960) recorded the species under *Tenaciella*. There is a good chance that *Dictyociona adioristica* De Laubenfels (1953, also recorded by WELLS, et al., 1960) is synonymous with *C. obliqua*, because *adioristica* also has twisted chelae. A slide of the holotype of *Dictyociona adioristica* (USNM 23403, kindly sent on loan by Dr. K. RÜTZLER) contained toxa of about 45 µm, despite the fact that both De Laubenfels and Wells, et al. failed to find them. Differences remaining between *obliqua* and *adioristica* are the apparent rareness of true echinating acanthostyles and the more slender megascleres in the former.

Thalyseurypon vasiformis De Laubenfels (1953) is a good species belonging to the genus *Clathria*, characterized by the vase-like habit and the absence of microscleres.

The great resemblance in skeletal plan and spiculation between incrusting *Clathria calla* (De Laubenfels, 1934) and ramose *Clathria coralloides* Schmidt (1862) is illustrative for the artificiality of distinguishing incrusting and ramose forms on the generic level.

Genus **Rhaphidophlus** Ehlers, 1870

Thalysias of authors (not of Duch. & Mich., 1864)
Tenacia Schmidt, 1870
Echinonema Carter, 1875
Tenaciella Hallman, 1920
Axociella Hallman, 1920
Colloclathria Dendy, 1922

Definition: Clathriidae with ectosomal brushes of short, thin (sub-) tylostyles over subectosomal larger tylostyles and choanosomal styles arranged in fibres or tracts, often echinated by acanthostyles.

Remarks: The genus *Rhaphidophlus* is characterized by the ectosomal specialization, but is otherwise similar to *Clathria*. The habits also vary from thin leptoclathriid incrustations to bushy clathriid forms. The category of thin, short subtylostyles perhaps constitutes only the juveniles of the larger subectosomal subtylostyles, in which case there is distinct localization of juvenile and adult spicules.

Rhaphidophlus juniperinus (Lamarck, 1814)

Synonymy: cf. Wiedenmayer, 1977 (as *Thalysias*)
In addition: *Clathria clathrata*; Alcolado, 1976: 5.

St. Thomas: ZMA POR.1730 (Duch. & Mich. specimen labeled "*Pandaros juniperina*").
Florida: ZMA POR.4792 (E of Elliott Key, 2–6 m, 5.IX.1963, coll. PWH *1414*).

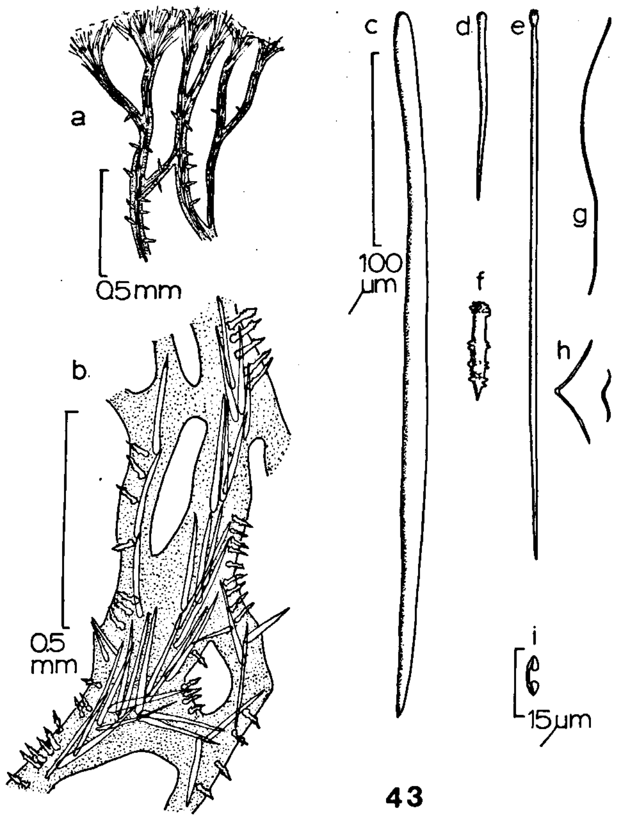


Figure 43. ***Rhaphidophlus juniperinus*: a. transverse section of peripheral region; b. detail of choanosomal fibres; c. choanosomal style; d. small ectosomal subtylostyle; e. large sub ectosomal subtylostyle; f. echinating acanthostyle; g. rhaphidiform tox; h. normal toxa; i. chela.**

Diagnosis (Pl. VII 11, Fig. 43):

Shape, size and consistency: The two available samples are different in habit: the Duch. & Mich. specimen is a flabellate mass of tightly interwoven compressed branches and ridges, 9 cm in widest expansion, 5 cm high and on average 1.5 cm across. The dry specimen lost most of its ectosome, but individual branches and ridges are smooth. The Florida sample consists of several basically incrusting pieces which have the ten-

dency to form a small fan. The surface is fairly smooth. Consistency spongy, compressible.
Colour: red.
Ectosome: the ectosomal skeleton is a crust of partly erect, partly paratangential, ill-defined spicule brushes; spicular density is high. Ectosomal tylostyles smaller than the subectosomal tylostyles.
Choanosome: from a basal plate of spongin rise strongly developed spongin fibres, which bifurcate and anastomose frequently. Fibre diameter up to 100 µm. Characteristically the fibres are cored by one to seven styles and heavily echinated by short acanthostyles, which are often completely enveloped within the fibres. Not infrequently, however, parts of the fibres are uncored or not echinated. Next to coring the fibres styles are erect on the substrate, buried with their heads in the basal plate of spongin, surrounded by several acanthostyles.
Spiculation: ectosomal small tylostyles, smooth: 95–*116.8*–137 by 1.5–*2.0*–2.5 µm; loose or coring tylostyles, smooth: 257–*283.6*–319 by 3.5–*4.2*–5 µm; large, smooth styles: 228–*260.5*–308 by 7.5–*8.3*–9.5 µm; acanthostyles, characteristically with the most heavy spination on the distal part: 42–*48.3*–57 by 4.5–*5.9*–7.5 µm; palmate isochelae: 11–12 µm; small proper toxa (possibly in two size categories): 8–*42.5*–76 µm, long, often flexuous or rhaphidiform toxa: 144–*172.0*–209 µm.

Ecology: reef environment.

Distribution: St. Thomas, Florida; Guadeloupe (Duch. & Mich., 1864 as *Pandaros*), Puerto Rico (Wilson, 1902 as *Clathria clathrata* and *C. jugosa*), Cuba (Alcolado, 1976), Yucatán (Topsent, 1889 as *Clathria copiosa*; Hartman, 1955 as *Microciona*).

Although such characters as amount of spongin and amount of echination are variable, it is quite clear that this species together with *R. fascicularis* (Topsent, 1889) approaches the clathriid habit closest of all West Indian *Rhaphidophlus* species. The material from North Carolina reported upon by Wells, et al. (1960) (as *Microciona*) may be different: it is reported to have acanthostyles twice as long, much more robust toxa and rare sigmata (?). Alcolado lists the species under *Clathria clathrata* (Alcolado, 1976); his material of *Microciona juniperina* he now considers (pers. comm.) to belong to *Clathria carteri* (Topsent, 1889) (= *C. folicea*).

Rhaphidophlus schoenus (De Laubenfels, 1936)

Clathria copiosa var. *curacaoensis* ARNDT, 1927: 148, pl. I fig. 3, text-fig. 9.
Aulospongus schoenus DE LAUBENFELS, 1936a: 100, pl. 13 fig. 3.
Microciona microchela HECHTEL, 1965: 41, fig. 7.
Thalysias schoenus; SIMPSON, 1968: 56, pls. 13–14, text-fig. 5; ALCOLADO, 1980: 4.

CURAÇAO: ZMA POR.726 (Spaanse Water, V.1920, coll. C. J. van der Horst, type specimen of *Clathria copiosa* var. *curacaoensis* Arndt, 1927); 3595 (Piscadera Baai, inner bay, on mangrove, 14.XI.1975, coll. students Prof. Stock); 3598 (Blauwbaai, 15–20 m, XI.1975, coll. S. Weinberg & E. Westinga); 3715, 3854, 3917 (Piscadera Baai, Boca W, 1–1.5 m, sandy bottom, 5.I.1964, coll. PWH *1458*); 3861, 3862 (off Lagoon Jan Thiel, in shallow caves, 2 m, 16.XI.1975, coll. students Prof. Stock); 3937 (Piscadera Baai, SE part NE, rocky bottom, on mangroves, 18.XII.1963, coll. PWH *1468*); 4782 (Boei 0, 25–35 m, on dead coral, 23.XII.1980, coll. RWMVS); 4794 (Caracas Baai, 10.V.1920, coll. C. J. van der Horst); 4795 (Boei 4, 10 m, 2.I.1981, coll. L. Delvoye).
BONAIRE: ZMA POR.4793 (Kralendijk, jetty, 1 m, 20.XII.1958, coll. JHS 157).
PUERTO RICO: ZMA POR.3505 (Mata Gagada, Parguera, 0.3 m, 8.II.1963, coll. JHS PR.111).

Diagnosis (Pl. VIII 1–4, Fig. 44):

Shape, size and consistency: Thinly to massively incrusting, or lobate to ramose-palmate-flabellate. Size up to 10–15 cm high in ramose specimens. Surface comparatively smooth and fleshy, microscopically hispid. Consistency spongy, tough, especially in ramose specimens.

Colour: variously described as orange, orange-brown, dull red, bright red. In spirit, specimens are always light yellow-brown to cream.

Ectosome: distinct brushes of small tylostyles are closely packed to make a cortex-like ectosomal skeleton. Isochelae of the smallest size category are abundant in the ectosome.

Choanosome: from a basal plate of spongin rise irregularly anastomosing spicule tracts enveloped in variable quantities of spongin; no distinct spongin fibre skeleton as is found in *R. juniperinus*. Especially near the surface the spicule tracts form a more or less isodictyal reticulation. The tracts ending at the surface are crowned with a brush of tylostyles. Choanosomal spicule tracts are made up of a mixture of thick styles and the larger category of (originally) subectosomal tylostyles. Echination of tracts and fibres by short acanthostyles is relatively rare. The basal plate of spongin carries a large number of thick styles surrounded by short acanthostyles, points upward, erect on the substrate.

Spiculation: short smooth ectosomal tylostyles: 89–*107.6*–156 by 1–*1.6*–

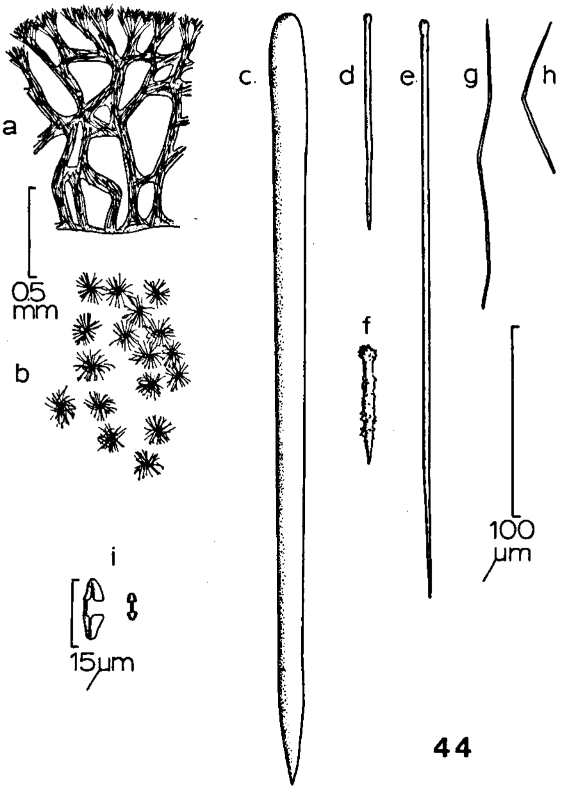


Figure 44. ***Rhaphidophlus schoenus*****: a. transverse section; b. tangential view of ectosome; c. choanosomal style; d. small ectosomal subtylostyle; e. large subectosomal subtylostyle; f. echinating acanthostyle; g. rhaphidiform tox; h. normal toxa; i. two categories of chelae.**

2 µm; large subectosomal tylostyles, often with microspined heads: 198–*272.6*–361 by 2.5–*3.6*–5 µm; thick styles, sometimes with rugose heads: 240–*352.1*–445 by 4–*8.0*–13 µm; short acanthostyles spined all over: 41–*55.1*–76 by 4.5–*5.2*–6 µm; palmate isochelae in two size categories: 12–*13.0*–15 and 3–*4.6*–5.5 µm; toxa in two categories, shorter normal ones: 35–*54.4*–71 µm, and long, sinuous, rhaphidiform ones: 118–*166.7*–252 µm. Reproduction: embryos (up to 300 µm in diameter) were observed in specimens collected in January.

Ecology: in mangrove forests and fouling localities in bays and lagoons; occasionally also reported from reef localities.

Distribution: Curaçao, Bonaire, Puerto Rico; Jamaica (HECHTEL, 1965), Cuba (ALCOLADO, 1976), Florida (DE LAUBENFELS, 1936a).

In spiculation this species is quite close to the previous one. Points of difference are the longer choanosomal styles and especially the two

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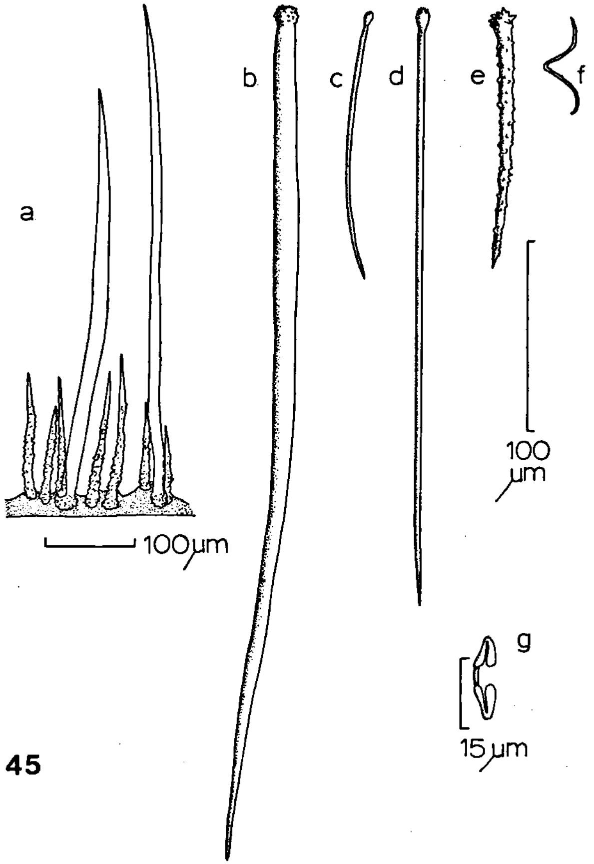

FIGURE 45. *Rhaphidophlus minutus* n. sp.: a. basal choanosomal skeleton; b. choanosomal style; c. small ectosomal subtylostyle; d. large subectosomal subtylostyle; e. basal acanthostyle; f. tox; g. chela.

categories of isochelae. HECHTEL's (1965) *Microciona microchela* was described unaware of the fact, that *Aulospongus schoenus* contained isochelae (DE LAUBENFELS omitted to mention them in his description). SIMPSON (1968) studied both *R. juniperinus* and *R. schoenus* and found them to be different in cytological as well as spicular characters. HECHTEL listed differences between his *M. microchela* and ARNDT's *Clathria copiosa* var. *curacaoensis*, but these fall within the variation of the species. It has been decided not to use ARNDT's older name (not necessary because it concerns a mere varietal name), in favour of the more established name *R. schoenus*.

Other *Rhaphidophlus* species with a smaller category of palmate isochelae of 4–6 µm next to the normal ones of 10–15 µm are: *Esperiopsis canaliculata* Whitelegge, 1901 (type of *Tenaciella* Hallman, 1920), *Tenacia ridleyi* Lindgren (1899), *Clathria frondifera* var. *dichela* Hentschel (1913), *Clathria mixta* Hentschel (1913), *Colloclathria ramosa* Dendy (1922), *Rhaphidophlus* sp. 1–7 Vacelet & Vasseur (1971), *Clathria oxitoxa* Lévi (1963), *Axociella nervosa* Lévi (1963), *Dictyociona eurypa* De Laubenfels (1954), *Clathria toxipraedita* Topsent, 1913.

Rhaphidophlus minutus n. sp.

Holotype: ZMA POR.4796, CURAÇAO, 300 m SE of Hilton Hotel, 33 m, on dead *Meandrina*, 17.XII.1980, coll. RWMVS.

Description (Fig. 45):

Shape, size and consistency: Thinly encrusting, surface smooth, oscules not apparent. Size several sqcm. Consistency soft.

Colour: red (pale red in spirit).

Ectosome: the skeleton consists of the usual brushes of small tylostyles.

Choanosome: leptoclathriid skeleton: choanosomal large styles embedded with their heads in a basal plate of spongin.

Spiculation: ectosomal small tylostyles, smooth: 147–*191.5*–258 by 1.5–*2.1*–2.5 µm; ectosomal large tylostyles, smooth or with microspined heads: 294–*322.6*–361 by 3–*3.6*–4 µm; choanosomal large styles with rugose or knobbly heads: 266–*348.0*–403 by 7.5–*7.9*–8.5 µm; fully spined acanthostyles: 97–*123.1*–152 by 5–*6.4*–7 µm; palmate isochelae: 15–*15.8*–17 µm; toxa: 47–*75.5*–115 µm.

Reproduction: the specimen contained numerous embryos, up to 250 μm in diameter.

Ecology: incrusting corals in the deeper reef parts.

Distribution: known only from the type locality on Curaçao.

Etymology: the name refers to the inconspicuous habit.

The species differs in habit and spicular characteristics (large acanthostyles) from the previous species.

Rhaphidophlus raraechelae n. sp.

Holotype: ZMA POR.4874, CURAÇAO, Boei 0, 25–35 m, on dead coral, 23.XII.1980, coll. RWMVS.
Paratypes: ZMA POR.4872, Curaçao, Boei 0, 25–35 m, on dead gorgonian, 23.XII.1980, coll. RWMVS; 4873, Cape Malmeeuw, 12–16 m, on dead coral, 23.XII.1980, coll. RWMVS; 4875, Hilton Hotel Landing, VIII.1976, coll. H. Rink; 4876, Hilton Hotel Landing, 2 m, 16.XII.1980, coll. RWMVS.

Additional specimens: Curaçao, ZMA POR. 3604 (near Carmabi, 11–14 m, 16.XI.1975, coll. students Prof. Stock); 3640 (near Carmabi, 18–20 m, 14.XI.1975, coll. students Prof. Stock); 3641 (off Jan Thiel Baai, 23–32 m, 16.XI.1975, coll. students Prof. Stock); 3958 (Blauwbaai, 20–30 m, XI.1975, coll. S. Weinberg & E. Westinga).

Description (Pl. VIII 5, Fig. 46):

Shape, size and consistency: Thinly incrusting, with conspicuous characteristic vein-pattern of the canal system and oscules. Lateral expansion indefinite, often quite extensive. Consistency soft, slimy to the touch. All these characters disappear in preservation.
Colour: mostly yellow, but greyish specimens are also found; in both cases the choanosome colour underneath the skin is bright red.
Ectosome: the usual spicule brushes carry the organic dermis.
Choanosome: in the somewhat fleshy more elaborate specimens an irregular spongin reticulation rises from a basal plate of spongin, cored by smooth styles and echinated by acanthostyles. More often, however, the spongin reticulation is absent or ill-developed, in stead of which spicule tracts rise from the basal plate to the surface, to end in the characteristic brushes of smaller subtylostyles.

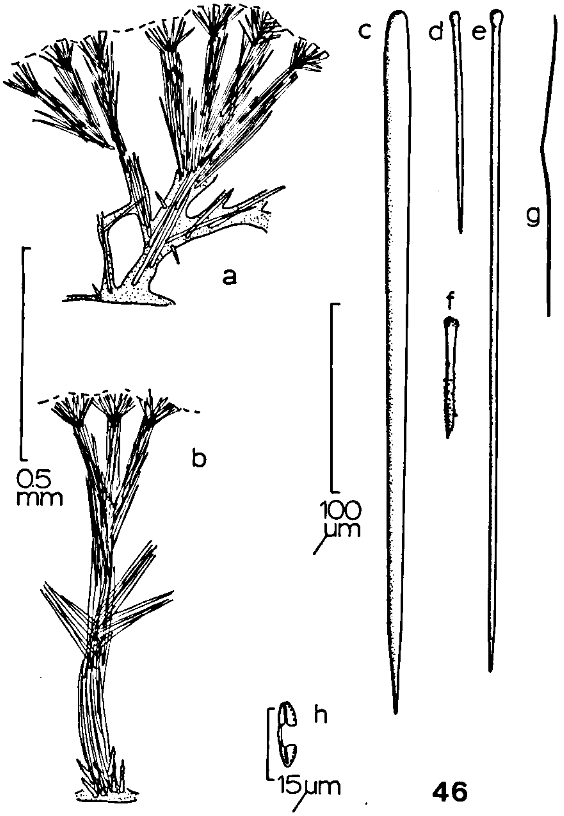

Figure 46. ***Rhaphidophlus raraechelae*** **n. sp.: a. transverse section of a more elaborate specimen; b. skeletal column of an incrusting specimen; c. choanosomal style; d. small ectosomal subtylostyle; e. large subectosomal subtylostyle; f. basal or echinating acanthostyle; g. rhaphidiform tox; h. chela (rarely observed).**

Spiculation: short, thin subtylostyles (from ectosomal spicule brushes): 98–*156.2*–212 by 1–*1.82*–2.5 µm, larger subdermal subtylostyles: 271–*316.3*–415 by 2.5–*3.77*–5 µm, both categories without apical hispidation, smooth choanosomal styles: 268–*354.6*–408 by 5.5–*6.45*–8 µm, wholly acanthose acanthostyles with prominent head and heavily acanthose distal part: 42–*52.9*–65 by 4–*4.0*–5 µm, thin toxa or toxiform rhaphides (often rare or extremely thin): 48–*115.0*–152 µm, and sometimes rare palmate isochelae (often absent): 7.5–*11.2*–14 µm.

Ecology: predominantly incrusting reef corals, but also found in the fouling community.

Distribution: so far known only from Curaçao and Bonaire.

Etymology: the name refers to the rare isochelae.

The combination of life colour, slimy consistency and rare or absent isochelae make this new species easy to distinguish from other incrusting *Rhaphidophlus*. The instability of the isochelae, and also of the toxiform microscleres makes it likely that their presence or absence is not of generic significance. The species described here is quite common on the Curaçao reefs and also on those of Bonaire (cf. VAN SOEST, 1981) (although the present collection holds no specimens from Bonaire).

Rhaphidophlus isodictyoides n. sp.

Holotype: ZMA POR.4781, CURAÇAO, Cape Malmeeuw, 12–16 m, on *Madracis* (together with *Pellina carbonaria* and *Aplysilla* cf. *sulfurea*), 23.XII.1980, coll. RWMVS.

Description (Pl. VIII 6, Fig. 47):

Shape, size and consistency: Thinly incrusting. Size several sqcm. Consistency soft, easily damaged.

Colour: bright red (cream coloured in spirit).

Ectosome: the usual brushes of subtylostyles carry the organic dermis.

Choanosome: choanosomal styles and acanthostyles are embedded with their heads in a basal plate of spongin. They are sheathed in bundles of the larger category of subtylostyles.

Spiculation: short, thin subtylostyles, completely smooth: 160–*214.7*–274 by 1–*1.9*–3 µm; long, robust subtylostyles, completely smooth: 276–*401.6*–500 by 3–*3.8*–4.5 µm; long, thick, choanosomal styles with mucronate heads: 314–*488.9*–608 by 7–*8.4*–10 µm; robust, short acanthostyles (wholly acanthose): 84–*92.6*–99 by 5–*7.6*–8 µm; peculiar palmate isochelae with ridged stem, overall shape not unlike chelae found in the genus *Isodictya* of the family Esperiopsidae: 15–*16.9*–19 µm; long, thin, rhaphidiform toxa: 145–*195.8*–268 µm.

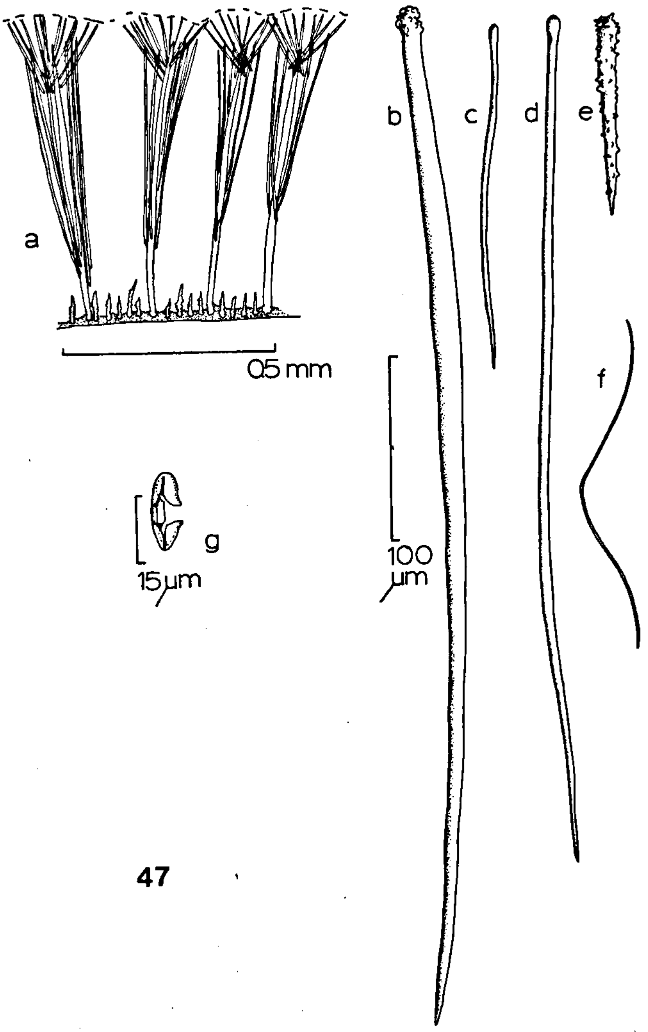

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FIGURE 47. *Rhaphidophlus isodictyoides* n. sp.: a. transverse section; b. choanosomal style; c. small ectosomal subtylostyle; d. large subectosomal subtylostyle; e. basal acanthostyle; f. tox; g. chela.

Ecology: incrusting corals on the reefs.

Distribution: known only from the type locality.

Etymology: named after its peculiar isochelae which resemble those of the genus *Isodictya*.

By its peculiar isochelae this species is well characterized among the West Indian Clathriids. *Clathria alata* Dendy (1896) also has *Isodictya*-like chelae and probably is the nearest relative.

Rhaphidophlus oxeotus n. sp.

Holotype: ZMA POR.4880, CURAÇAO, 300 m SE of Hilton Hotel, 33 m, on dead *Meandrina*, 17.XII.1980, coll. RWMVS.

Additional material: ZMA POR.4778, same data as holotype.

Description (Fig. 48):

Shape, size and consistency: Thinly incrusting, though somewhat fleshy-conulose in places. Size several sqcm. Consistency soft, easily torn.
Colour: red (grey in spirit).
Ectosome: the usual brushes of small subtylostyles carry the organic dermis.
Choanosome: in places the basal plate of spongin rises from the substrate to form irregular spongin fibres or masses, which are cored predominantly by the larger category of subtylostyles, and echinated by the acanthostyles; in other parts the styles stand erect on the substrate, points upward, their heads surrounded by acanthostyles, the shaft surrounded by bundles of the larger category of subtylostyles which in their turn are crowned by a dense brush of smaller subtylostyles.
Spiculation: short, thin ectosomal subtylostyles: 125–*204.7*–262 by 1–*1.9*–3.5 µm; robust (subectosomal) subtylostyles with smooth heads: 312–*404.5*–488 by 3–*4.1*–5 µm; choanosomal thick styles with microspined heads: 228–*328.7*–456 by 5.5–*8.1*–9.5 µm; acanthostyles, with heavy spination on the distal part: 43–*49.6*–57 by 4–*4.25*–5 µm; abundant palmate isochelae: 11–*11.9*–14 µm; thin rhaphidiform toxa: 125–*305.6*–390 (possibly representing juvenile stages of the next category); extremely long oxeote toxa: 530–*711.0*–995 by 1.5–*2.8*–4 µm.

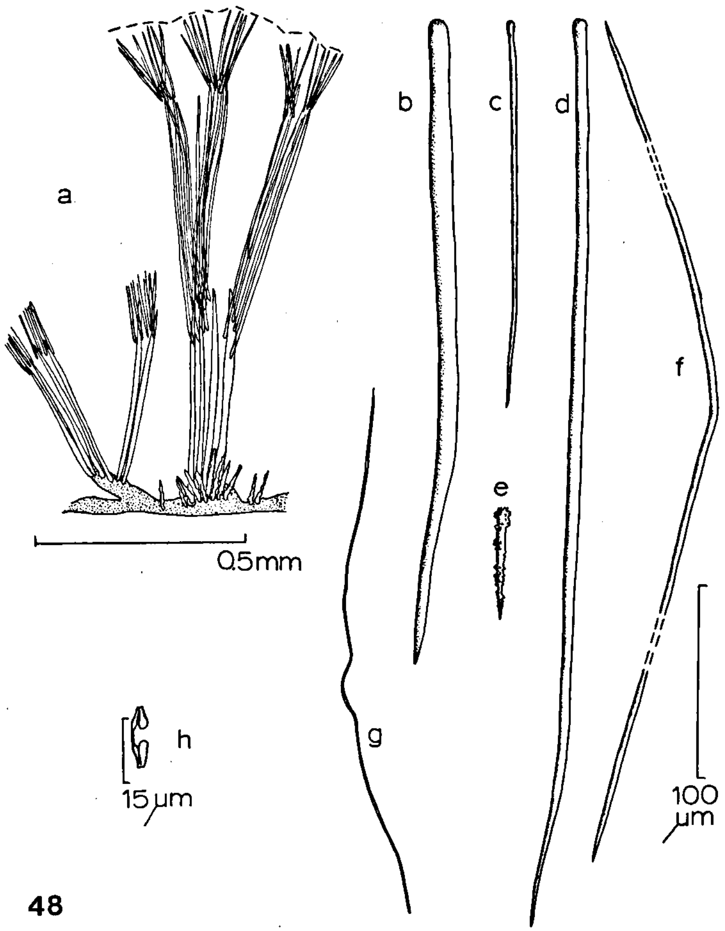

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FIGURE 48. *Rhaphidophlus oxeotus* n. sp.: a. transverse section; b. choanosomal style; c. small ectosomal subtylostyle; d. large subectosomal subtylostyle; e. basal acanthostyle; f. oxeote; g. rhaphidiform tox; h. chela.

Ecology: incrusting dead corals on the deeper parts of the reef.

Distribution: known only from the type locality on Curaçao.

Etymology: the name refers to the long oxeote toxa (or toxiform oxeotes).

The long oxeote toxa remind of those of *Clathria simpsoni* described above; however, the oxeotes of the latter are smaller, the smaller category of toxa are genuine toxa, and the chelae include cleistochelate forms; next to this, there is of course, the generic ectosomal difference. The new species is close to *Clathria oxitoxa* Lévi, 1963, from South Africa. Points of difference are the very large choanosomal styles (up to 40 µm in diameter), large acanthostyles (up to 90/10 µm) and two categories of isochelae. *C. oxitoxa* seems to be a clear *Rhaphidophlus*.

DISCUSSION OF THE GENUS *Rhaphidophlus*

TOPSENT's (1889) *C. fascicularis* and *C. dentata* are probably synonymous and conform to *Rhaphidophlus*; they differ, somewhat in habit, but are similar in spiculation according to Topsent himself. It is proposed to name this species *Rhaphidophlus fascicularis*; it is different from *R. juniperinus* in the absence of chelae, but remains ill-known. The type material is probably lost. DE LAUBENFELS (1936a) referred this species to *Pseudanchinoe* Burton, 1929.

Genus **Artemisina** Vosmaer, 1885

Definition: Clathriidae without echinating and ectosomal spicules, and normally with little or no spongin, thus causing a confused, virtually halichondroid skeleton. Microscleres include palmate isochelae and toxa.

Artemisina melana n. sp.

Holotype: ZMA POR.4881, CURAÇAO, Playa Kalki, 10–20 m, on dead *Madracis*, 30.XII.1980, coll. RWMVS.
Paratypes: ZMA POR.4882, CURAÇAO, Cape Malmeeuw, 12–16 m, on dead gorgonian, 23.XII.1980, coll. RWMVS; 4883, Hilton Hotel landing, VIII.1976, coll. H. Rink, 2.

Description (Pl. VIII 7–8, Fig. 49):

Shape, size and consistency: Thinly incrusting with optically smooth (in life velvety smooth) surface, but microscopically hispid. Few small oscules (1 mm) on small elevations of about 2 mm high, scattered. Consistency velvety, easily damaged.

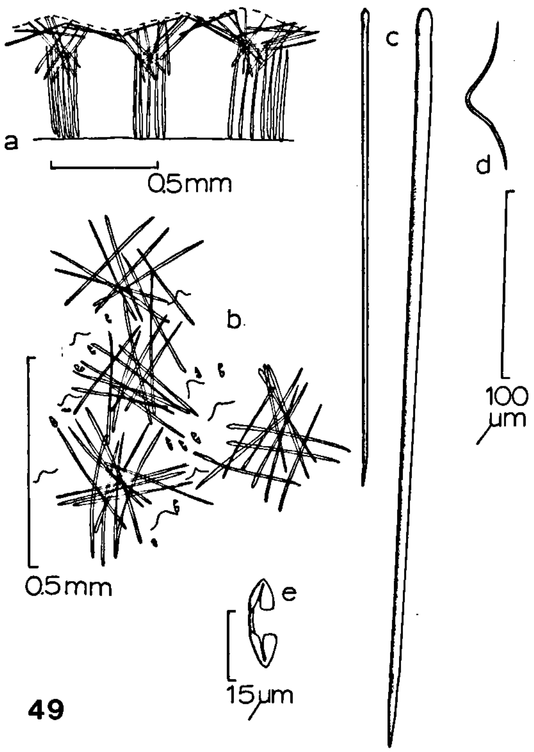

FIGURE 49. *Artemisina melana* n. sp.: a. transverse section; b. tangential view of ectosome; c. megascleres; d. tox; e. chela.

Colour: black (keeps in spirit), red (grey) underneath the skin.
Ectosome: microhispid through projecting spicules; heavily pigmented.
Choanosome: predominantly confused, but towards the surface the spicules tend to be arranged in brush-like bundles.
Spiculation: subtylostyles with barely swollen, elongate heads, which are most often smooth, but may bear a single spine centrally: 228–*293.6*–338 by 2.5–*3.16*–3.5 µm; choanosomal smooth styles, barely distinct from the subtylostyles: 230–*334.0*–385 by 4–*4.93*–5.5 µm; palmate isochelae: 16–*18.5*–20 µm; smooth toxa: 49–*68.5*–78 µm.

Ecology: incrusting dead corals on the reef, or landing poles.

Distribution: known only from Curaçao.

Etymology: the Greek "melanos" means black.

Although most *Artemisina* species are more elaborate, there can be little doubt, that the present species is a member of that genus, which is predominantly reported from colder water. This is the first record of the genus from the West Indies.

BOURY-ESNAULT (1973) recorded *Artemisina* from Brazilian waters (*A. tylota*), but I think her species belongs to *Cornulum* Carter, 1876, on account of the tangential tylotes with acanthose heads, found in this species.

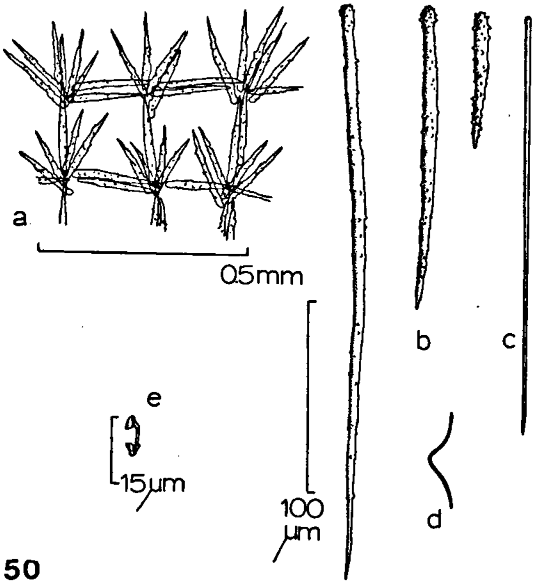

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FIGURE 50. *Plocamilla barbadensis* n. sp.: a. choanosomal reticulation; b. choanosomal megascleres; c. ectosomal subtylostyle; d. tox; e. chela.

Genus **Plocamilla** Topsent, 1928

Definition: Clathriidae with mostly acanthose stylote or strongylote megascleres arranged in a renieroid reticulation, at the nodes of which radiate brushes of styles and acanthostyles of mostly larger size than those of the reticulum. Ectosome carried by tufts of such megascleres (from the peripheral nodes). Echinating small acanthostyles (rare), palmate isochelae and toxa usually present.

Plocamilla barbadensis n. sp.

Holotype: ZMA POR.3832, BARBADOS, 0.5 mile off Holetown, 100 m, bottom muddy sand, on coral rubble attached to *Agelas schmidti*, 19.II.1964, coll. PWH *1442*.

Description (Fig. 50):

Shape, size and consistency: A thin crust cementing some coral rubble, surface microtuberculate, oscules not apparent. Consistency soft, easily damaged.

Colour: drab in spirit.

Ectosome: damaged, but the usual ectosomal tufts of megascleres are still recognizable.

Choanosome: skeleton consisting of the usual renieroid reticulation of acanthostyles, with sides made up of one to three spicules.

Spiculation: thin ectosomal (tylo-)styles, smooth: 220–*262.3*–304 by 1.5–*2.0*–2.5 µm; large (acantho-)styles in two sizes: 450–500 and 200–300 by 8 µm; large acanthostyles, wholly acanthose: 159–*207.2*–301 by 5–*6.7*–8 µm; small echinating acanthostyles, wholly acanthose: 57–*67.0*–73 by 3–*3.8*–4.5 µm; palmate isochelae: 6–*7.5*–9 µm; toxa: 40–*66.0*–108 µm.

Ecology: deep water.

Distribution: known only from the type locality.

The present species differs from most other *Plocamilla* species in the absence of a clear morphological difference between the acanthostyles of the reticulate skeleton and the smaller category of styles of the nodal tufts; there is a slight difference in size, but nothing else. Also a special category of echinating acanthostyles is unusual.

Other West Indian *Plocamilla* species are *Holoplocamia penneyi* De Laubenfels (1936a) from Florida, and *Holoplocamia delaubenfelsi* Little (1963) from the Gulf Coast. Microscopic slides of both (kindly sent on loan by Dr. K. RÜTZLER) revealed small differences, but significant details such as the twisted palmate isochelae were identical. Both are considered conspecific. The species differs from the Barbados one in the acanthostrongylote nature of the main choanosomal spicules, the smooth shaft of the nodal tuft spicules, and the smaller size of isochelae and toxa.

West African *P. burtoni* Lévi (1952) is clearly different in spicule sizes. The genus *Plocamilla* is barely different from *Antho* Gray, 1867.

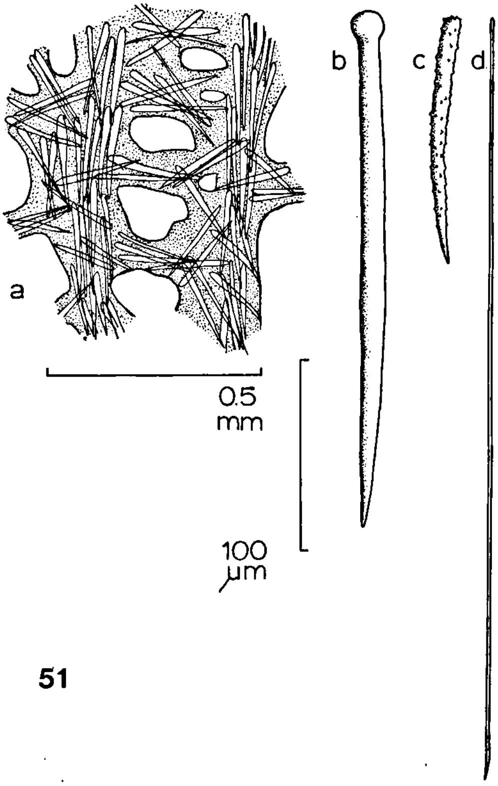

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FIGURE 51. *Pandaros acanthifolium*: a. choanosomal skeleton; b. megasclere; c. echinating acanthostyle; d. accessory rhaphide-like spicule.

Genus **Pandaros** Duch. & Mich., 1864

Definition: Clathriidae (?) in which the spongin fibres are woven into flattened-anastomosing trabeculae or into continuous sheets. Fibres are cored and echinated by styles, subtylostyles or tylostyles, which are predominantly smooth, but may be wholly or more often apically acanthose. No ectosomal skeleton.

Pandaros acanthifolium Duchassaing & Michelotti, 1864

Synonymy cf. WIEDENMAYER (1977).
In addition: *Thalyseurypon conulosa*; ALCOLADO, 1976: 5.

CURAÇAO: ZMA POR.3587 (Blauwbaai, 15–20 m, XI.1975, coll. S. Weinberg & E. Westinga); 3588 (off Lagoon Jan Thiel, 23–32 m, 16.XI.1975, coll. students Prof. Stock); 3589 (Vaarsenbaai, 10 m, 21.XI.1975, coll. students Prof. Stock); 3590, 3591 (Awa di Oostpunt, 21 m, 17.III.1964, coll. JHS); 4621 (Boei 0, 25–35 m, 23.XII.1980, coll. RWMVS).

Diagnosis (Fig. 51):

Shape, size and consistency: Erect, dark bushes with flattened branches. Surface pronouncedly conulose, with blunt truncate conules 0.5–1.5 mm high. No oscules apparent. Branches up to 25 cm long, 4 cm wide. Consistency soft, almost limp, spongy-compressible.
Colour: purplish black; it gives off a purple exudate when squeezed, or put into spirit.
Ectosome: fleshy, heavily pigmented, with only a few tangential spicules of the same type as those of the ectosome.
Choanosome: heavily pigmented; a system of anastomosing trabecular spongin fibres without any regular architecture fills the interior. The fibres and trabeculae are cored by spicules lying in all directions; some of them might be considered coring, some of them echinating, but quite a large proportion cannot be classed in this respect. True, acanthose echinators are rare.
Spiculation: (sub-)tylostyles, smooth, often bent near the apex, occasionally perfect styles, occasionally with acanthose heads: 209–*329.4*–427 by 8–*9.8*–10 µm; rare echinating acanthostyles, finely spined all-over: 162–*180.7*–192 by 5–*6.5*–8 µm; (?) microscleres rhaphidiform, verging towards thin anisotornotes: 370–*397.7*–437 by 1.5–*2.3*–3 µm.

Ecology: reef dweller.

Distribution: Curaçao; St. Thomas (DUCH. & MICH. 1864), Jamaica (HECHTEL, 1965 as *Thalyseurypon conulosa*), Cuba (ALCOLADO, 1976), Bahamas (WIEDENMAYER, 1977), Florida (DE LAUBENFELS, 1936a).

Three other species described in the genus *Thalyseurypon* De Laubenfels (1936a), viz. *Clathria foliaceum* Topsent (1889), *C. carteri* Topsent (1889) and *T. vasiforme* De Laubenfels (1953) have been associated with *Pandaros* by WIEDENMAYER (1977). These three are, however, typical members of the genus *Clathria*.

The rare echinating acanthostyles constitute the only character linking *Pandaros* with the Clathriidae. It might turn out necessary to erect a separate family for it, or even remove it from the Poecilosclerida altogether, because it shows affinities with Axinellid genera like *Ptilocaulis*.

Of the DUCH. & MICH. species of *Pandaros* all are still represented by specimens (cf. VAN SOEST, et al., 1983). *P. arbusculum* is referred to the Axinellid genus *Ptilocaulis*, *P. pennata* to the Axinellid genus *Echinodictyum*, *P. lugubris* also to *Echinodictyum*, *P. angulosa* to *Mycale* (cf. above), *P. acanthifolium* (cf. above), *P. juniperina* to *Rhaphidophlus* (cf. above), and *P. walpersi* to *Ptilocaulis*.

DISCUSSION OF THE FAMILY CLATHRIIDAE

The present concept of the family Clathriidae covers more or less that of LÉVI (1960, 1973), with the exception of the genus *Acarnus*, which is here considered a Myxillid on account of the ectosomal tylotes.

HALLMANN (1920) erected a number of genera related to *Clathria* based on minor spicular differences: *Dendrocia* (in which the choanosomal coring spicules cannot be distinguished from the ectosomal spicules), *Allocia* (in which the ectosomal spicules are strongyles), *Isociona* (which has a choanosomal subrenieroid reticulation of acanthostyles), *Tenacia* Schmidt, 1870 (in which there are two sizes of ectosomal styles forming surface brushes), *Clathriopsamma* (which incorporates foreign material), *Paracornulum* (which has strongyles for megascleres), *Megaciella* (which has tylotes for ectosomal megascleres), *Tenaciella* (like *Tenacia*, but without acanthostyles), *Axociella* (like *Tenaciella*, but with a distinct category of small ectosomal megascleres), *Isociella* (like *Isociona* but with smooth choanosomal styles), *Isopenectya* (like *Isociona* or *Isociella* but without microscleres).

Some of these genera do not belong in the Clathriidae (*Allocia, Paracornulum* and *Megaciella*), others are clear synonyms of well-established genera like *Antho* Gray (1867) (*Isociona*), *Clathria* (*Dendrocia, Clathriopsamma*), or *Rhaphidophlus* (*Tenacia, Tenaciella, Axociella*). A few of them might be good genera, e.g. *Isociella* and *Isopenectya.*

Topsent (1928) enumerates the following genera of Clathriidae: *Echinoclathria* Carter, 1884 (like *Clathria* but without microscleres and some diactinal megascleres), *Leptoclathria* (Clathriids with hymedesmioid skeleton), *Rhaphidophlus* Ehlers, 1870 (two sizes of ectosomal tylostyles), *Stylotellopsis* Thiele, 1902 (like *Rhaphidophlus* but without microscleres), *Echinonema* Carter, 1875 (like *Rhaphidophlus*), *Echinochalina* Thiele, 1902 (oxeas for megascleres), *Microciona* Bowerbank, 1862 (incrusting *Clathria*), *Dictyociona* Topsent, 1927 (like *Microciona* but with acanthose choanosomal styles), *Ophlitaspongia* Bowerbank, 1866 (like *Clathria* but with isodictyal reticulation of spongin fibres and only toxa for megascleres), *Clathria* Schmidt, 1862, *Wilsonella* Carter, 1885 (no special category of choanosomal megascleres), *Allantophora* Whitelegge, 1907 (a clear Biemnid), *Dictyoclathria* Topsent, 1920 (renieroid reticulation of acanthostyles).

Again, some of these genera are no Clathriidae (*Echinochalina, Allantophora*), some are clear synonyms of well-established genera as *Antho* (*Dictyoclathria*), *Clathria* (*Leptoclathria* pars, *Microciona, Wilsonella*), and *Rhaphidophlus* (*Stylotellopsis, Echinonema, Leptoclathria* pars). *Echinoclathria* and *Ophlitaspongia* seem good genera.

De Laubenfels (1936a) distributed Clathriid genera over three suborders (Plocamiformes, Myxilliformes and Microcioniformes) and five families (Plocamiidae, Raspailiidae, Microcionidae, Ophlitaspongiidae and Amphilectidae). The following genera listed by De Laubenfels are Clathriid: *Holoplocamia* (= synonym of *Plocamilla* Topsent, 1928), *Antho, Aulospongus* (= *Rhaphidoplus*), *Anomoclathria* Topsent, 1929 (with algal strands in stead of fibres), *Coloclathria* Dendy, 1922 (= synonym of *Rhaphidophlus*), *Dendrocia* (cf. above), *Pseudanchinoe* Burton, 1929 (like *Clathria,* but without chelae), *Marleyia* Burton, 1931 (like *Clathria* but with special ectosomal spongin reticulation), *Dictyociona* (cf. above), *Hymantho* Burton, 1930 (choanosomal styles erect on the substrate), *Isociona* (cf. above), *Microciona*, *Quizciona* (like *Microciona*, but with cleistochelae), *Wetmoreus* (like *Microciona*, but with arcuate-like chelae), *Thalysias*, *Thalyseurypon* (cf. above), *Axociella* (cf. above), *Artemisina* (cf. above), *Axosuberites* Topsent, 1898 (like *Axociella* but without microscleres), *Axocielita* (like *Axociella* but incrusting), *Echinoclathria* (cf. above), *Ophlitaspongia* (cf. above), *Pandaros* (cf. above), *Labacea* (like *Pandaros*, but with toxa added), *Ligrota* (which seems a clear synonym of *Artemisina*), *Parosperia* Burton, 1930 (like *Ligrota*, but without toxa), *Tenaciella* (cf. above).

Of this whole list only *Antho*, *Marleyia*, *Rhaphidophlus*, *Clathria* (as *Microciona*), *Artemisina*, *Echinoclathria*, *Ophlitaspongia* and *Pandaros* are well-established genera. Added to this should be *Plocamilla*, *Isociella* and *Isopenectya* to complete the generic contents of the family Clathriidae.

This discussion is of course only an outline of the field to cover when a proper revision of the Clathriidae is made. In the literature there are quite a few descriptions of species and genera, with arcuate chelae for microscleres and ectosomal subtylostyles, which might possibly belong to the Clathriidae, but for the time being are here regarded as Phorbasidae – Hymedesmiidae.

Key to the West Indian species of the genera *Clathria* and *Rhaphidophlus*

1. – Habit ramose, bushy, vasiform or upright-lamellate 2
– Habit thinly or massively incrusting. 9

2. – Habit vasiform. . . . . *Clathria vasiformis*
– Habit ramose or lamellate 3

3. – No microscleres . . . . *Clathria foliacea*
– Microscleres of some form present 4

4. – Toxa but no chelae. . . . . *Rhaphidophlus fascicularis*
– Chelae present 5

5. – Chelae twisted 6
   – Chelae normal palmate 7

6. – Echinating acanthostyles abundant . . . . *C. adioristica*
   – Echinating acanthostyles rare or absent . . . . . . *C. obliqua*

7. – Toxiform oxeotes absent, only a single category of ectosomal subtylostyles . . . . *Clathria prolifera*
   – Toxiform oxeotes (> 120 µm) present, two categories of ectosomal subtylostyles 8

8. – Only a single category of isochelae; surface tuberculate . . . . *R. juniperinus*
   – Two categories of isochelae; surface smooth . . . *R. schoenus*

9. – Echinating acanthostyles present 10
   – Echinating acanthostyles absent 16

10. – Only a single category of ectosomal subtylostyles . . *C. affinis*
    – Two categories of ectosomal subtylostyles arranged to form typical surface brushes 11

11. – Long, thin toxiform oxeotes present. 12
    – Long, thin toxiform oxeotes absent (although normal toxa are present) . . . . *R. minutus*

12. – A smaller (ca 300 µm) and a larger (ca 700 µm) category of oxeote microscleres . . . . *R. oxeotus*
    – Only a single category of oxeotes (although a separate category of toxa may be present) 13

13. – Normal toxa absent. 14
    – Normal toxa present (8–120 µm) 15

14. – Chelae abundant, of peculiar shape (*Isodictya*-like) . . . . *R. isodictyoides*
    – Chelae rare, of normal shape. . . . . *R. raraechelae*

15. – Two categories of chelae. . . . . *R. schoenus*
    – Only a single category of chelae . . . . *R. juniperinus*

16. – Long toxiform oxeotes present 17
    – Long toxiform oxeotes absent (although normal toxa are always present) 18

17. – Chelae include many cleistochelate forms . . . . *C. simpsoni*
    – Chelae of normal shape (although they may be twisted) . . . . *C. spinosa*

18. – Chelae include many twisted forms 20
    – Normal shaped chelae. 19

19. – Two categories of toxa (ca 120 and 35 µm). . . . . . . *C. calla*
    – Only a single category of toxa (35 µm). . . *C. hymedesmioides*

20. – Two categories of toxa (one of which has curious bulbous swellings), ectosomal subtylostyles of normal shape . . *C. bulbotoxa*
    – A single category of toxa without swellings, ectosomal subtylostyles polytylote. . . . . *C. ferrea*

NON-CHELIFEROUS POECILOSCLERIDA

Three families of non-cheliferous sponges are assigned to the Poecilosclerida by Lévi (1973) on presumed affinities with Mycalidae and Esperiopsidae, viz. Biemnidae Hentschel (1923), Hamacanthidae Gray, 1872, and Latrunculiidae Topsent, 1922. The latter family is associated with Hadromerida by Bergquist (1978), which might possibly be correct; in any case Latrunculiids are quite divergent from the remaining Poecilosclerids. They will be treated here, but are considered incertae sedis.

The upholding of two distinct families Hamacanthidae and Biemnidae is based entirely on the presence of sigmancistras in the former. It is proposed here to merge these two groups into one family, Biemnidae. This group of genera show Axinellid affinities, but through their architecture and microscleres seem to be also close to the Mycalidae.

Family **BIEMNIDAE** Hentschel, 1923

Definition: Poecilosclerida with a plumose, plumo-reticulate or reticulate skeleton of smooth monactinal or diactinal megascleres; without special ectosomal megascleres; microscleres may include sigmata, rhaphidiform spicules and sigmancistras and their derivatives.

Genus **Biemna** Gray, 1867

Definition: Biemnidae with stylote or tylostylote megascleres arranged in plumoreticulate fashion; ectosome a paratangential arrangement of megascleres carried by brushed endings of the skeletal tracts; microscleres sigmata and rhaphides (often toxiform).

Biemna tubulata (Dendy, 1905)

Desmacella tubulata Dendy, 1905: 155, pl. IX 4; Dendy, 1916: 116.
Toxemna tubulata; Hallmann, 1917: 673; Little, 1963: 51; Thomas, 1973: 40, pl. 2 fig. 12.
Biemna tubulata; Dendy, 1922: 57; Burton & Rao, 1932: 327, pl. 18 fig. 4; Rao, 1941: 441.
Toxemma (sic) *tubulata*; De Laubenfels, 1936a: 124.

Bonaire: ZMA POR.3707 (Lac, Cai, E-side, 0–0.5 m, mangrove roots, 16.IX.1967, coll. PWH *1576*); 3737, 4243 (Lac, Poejito, on *Rhizophora*, 18.XI.1930, coll. PWH *1064A*); 3799 (Lac, entrance of Boca Fogon, creek, 0–0.5 m, *Rhizophora*, 14.VIII.1967, coll. PWH *1590*); 3991 (Lac, Poejito, NE, 0–0.5 m, *Rhizophora*, 10.VIII.1967, coll. PWH *1579*); 3999 (Lac, Poejito, *Rhizophora*, 17.IV.1955, coll. PWH *1064C*); 4016 (Lac, Boca di Pos, creek, *Rhizophora*, 0–0.5 m, 14.VIII.1967, coll. PWH *1583*); 4256 (Lac, Poejito, S, 0.5 m, muddy, *Thalassia* and *Halimeda*, 10.VIII.1967, coll. PWH *1577A*).

Puerto Rico: ZMA POR.3520 (Isla Magueyes, on mangrove roots, 5.II.1963, coll. JHS); 3967, 4257 (Parguera, Magueyes, NE, *Rhizophora*, 17.IX.1963, coll. PWH *1417*).

Diagnosis (Pl. IX 1, Fig. 52):

Shape, size and consistency: Massively incrusting, with irregular partly hollow oscular elevations, up to 5 cm in height. Horizontal dimensions unknown, probably extensive. Surface corrugated conulose, consistency soft, compressible, easily torn.

Colour: a distinctive yellow (beige in spirit).

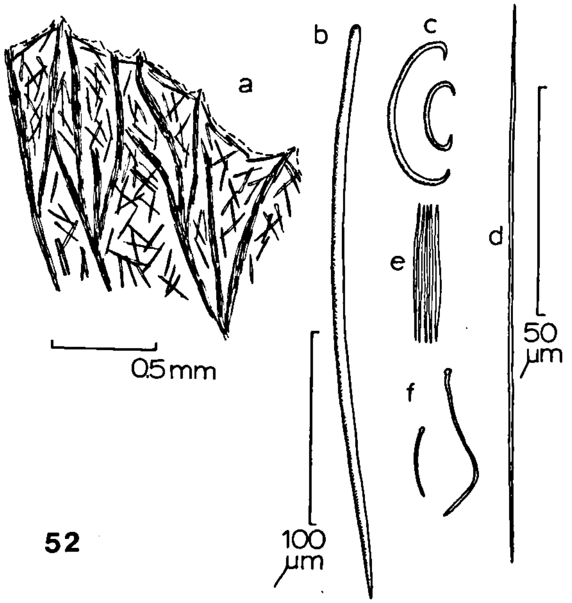


Figure 52. *Biemna tubulata*: a. transverse section of peripheral region; b. megasclere; c. two categories of sigmata; d. large rhaphide; e. trichodragma of small rhaphides; f. two categories of commata.

Ectosome: Difficult to detach, charged with a partly tangential mass of confused megascleres and microscleres.
Choanosome: rather fine-grained, with large tubular cavities. The skeleton consists of long whispy or meandering spicule tracts, giving off smaller ones in dendritic fashion; little or no anstomosing of tracts. Spongin virtually absent. Many megascleres strewn in confusion. Microscleres very abundant.
Spiculation: slender styles: 266–*293.6*–323 by 3–*4.03*–5.5 µm; two size categories of sigmata: 27–*29.4*–33 µm, and 12–*13.3*–15 µm; two size categories of rhaphides mostly in trichodragmata (although the large size category often is single): 94–*108.4*–126 µm and 30–*45.7*–78 µm; two size categories of toxiform rhaphides or commata (sometimes in dragmata): 27–*38.7*–53 µm and 10–13 µm.

Ecology: a typical member of the mangrove community.

Distribution: Bonaire, Puerto Rico; Florida (DE LAUBENFELS, 1936a), Gulf Coast (LITTLE, 1963), West Africa (LÉVI, 1956), Indian Ocean (DENDY, 1905, 1916, 1922; BURTON & RAO, 1941; THOMAS, 1973).

A comparative study should be made in order to determine whether the West Indian populations are conspecific with those of the Indian Ocean and West Africa; the distinct categories of sigmata, rhaphides and commata have not been noted in previous descriptions, but the size range of Indian Ocean spicules seems to be similar to West Indian ones.

It is remarkable, that a species which is apparently so common in the Lac of Bonaire, is so rare elsewhere in comparable ecological circumstances.

HALLMANN (1917: 673) erected the genus *Toxemna* for the present species on the basis of a remark made by DENDY (1916) on the presence of toxodragmata among numerous trichodragmata in his 1916 specimens. It is clear from the above given description, that the "toxa" are merely commata, a type of spicule found also in the type species of *Biemna* (i.e. *Isodictya peachii* Bowerbank (1866) = *Biemna variantia* (Bowerbank, 1860)). I do not know, whether the other species included in *Toxemna* by Hallmann, i.c. *Desmacella fragilis*, is also a *Biemna*.

Other West Indian records of the genus *Biemna* are: *Biemna microstyla* De Laubenfels (1950), which could very well be a specimen of *Mycale* *microsigmatosa* Arndt (1927) with rare chelae. In the same publication De Laubenfels recorded *Desmacella jania* Verrill, a lavender coloured, soft cushion-like sponge; in its spiculation it shows great similarity with *Biemna tubulata.* Possibly the same species is represented in the collections of the British Museum (Nat. Hist.) by the specimen with reg.no. 1939:2:14:26/24, from the Cayman Islands; it bears an unpublished collection name.

Genus **Desmacella** Schmidt, 1870

Definition: Biemnidae with stylote or tylostylote megascleres arranged in a plumose or halichondroid fashion; ectosome halichondroid-confused tufts of tangential megascleres; microscleres sigmata and rhaphides.

Desmacella pumilio Schmidt, 1870

Desmacella pumilio Schmidt, 1870: 53, pl. 5 fig. 14; De Laubenfels, 1936a: 114, pl. 22 fig. 1.
Desmacodes pumilio; Vosmaer, 1880: 108.
Tylodesma pumilio; Burton, 1930: 525.

Near Jamaica: ZMA POR.4761 (Calamar stat. 476, 18°20′N 77°20′W deep water, 13.IX.1969, coll. L. J. K. Kleijn).

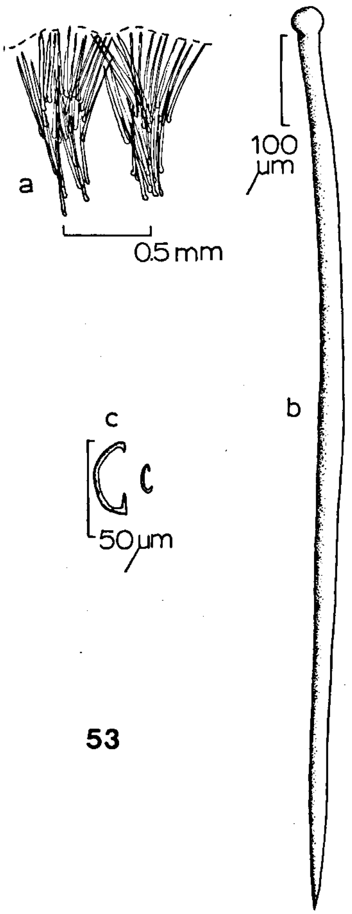
Diagnosis (Pl. IX 2, Fig. 53):

Shape, size and consistency: Thinly to massively incrusting coral rubble; oscules not apparent; surface smooth. Size several sqcm. Consistency: compressible, fragile.

Colour: greyish brown in spirit.

Ectosome: due to large subdermal cavities the outer part of the sponge easily comes off. Such a dermal peel contains tufts of megascleres over which the organic dermis is stretched.

Choanosome: ill-defined plumose tracts of megascleres and a halichondroid confused mass of single spicules make out the choanosomal skeleton. Towards the periphery the megascleres are arranged in dense tufts, occasionally so close together that they form a dermal palissade with points of the spicules outwards. Between choanosomal tracts are moderate quantities of microscleres.



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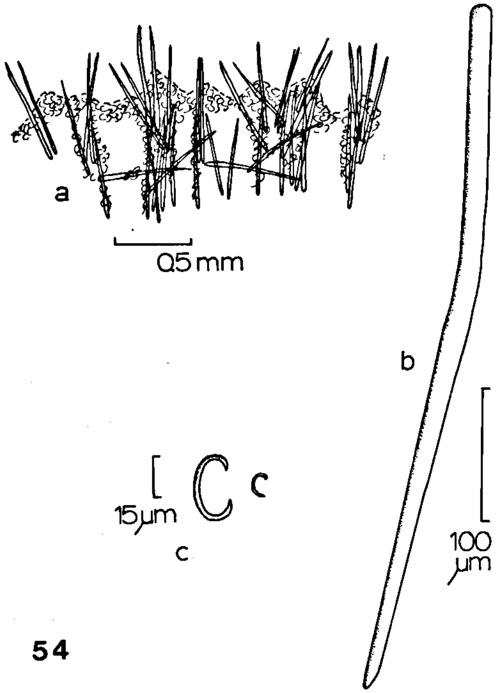

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FIGURE 53. *Desmacella pumilio*: a. transverse section of peripheral skeleton; b. megasclere; c. two categories of sigmata.

FIGURE 54. *Desmacella polysigmata* n. sp.: a. transverse section of peripheral skeleton; b. megasclere; c. sigmata.

Spiculation: tylostyles with robust heads of widely ranging size: 235–*459.4*–960 by 6–*11.3*–20 µm; sigmata in two size classes: 31–*38.6*–46 µm and 12–*17.9*–27 µm.

Ecology: deeper shelf waters.

Distribution: Jamaica; Florida (SCHMIDT, 1870; DE LAUBENFELS, 1936a), California (DE LAUBENFELS, 1932).

Although the habit of the present material deviates rather strongly from that of the type (club-shaped), the skeleton is quite similar (cf. redescription by BURTON, 1930). DE LAUBENFELS' 1932 and 1936a material (kindly sent on loan by Dr. K. RÜTZLER) is indeed similar to the present, although the maximum size of the megascleres may be up to 1800 µm in these specimens.

Desmacella polysigmata n. sp.

Holotype: ZMA POR.4762, BARBADOS, 0.5 mile off Holetown, 100 m, bottom muddy sand, 14.XII.1964, coll. PWH *1442*.

Description (Pl. IX 3 Fig. 54):

Shape, size and consistency: Eight rounded fragments of 0.5–2 cm in diameter, which probably were parts of a bigger sprawling body. Surface rough, with a fair amount of sand and coral debris adhering. Oscules indistinct, possibly they are represented by several small depressions of about 1 mm in diameter. Consistency crumbly, incompressible.

Colour: beige-sandy coloured in spirit.

Ectosome: no distinct spicule brushes, although individual spicules may protrude beyond the dermal membrane which is heavily charged with sigmata.

Choanosome: cavernous, with many subdermal spaces. The megascleres are relatively few in number and arranged in a halichondroid reticulation. The sigmatose microscleres dominate the choanosome to a large extent, massively supporting the megasclere reticulation and lining the canals and open spaces.

Spiculation: styles with often strongylote modifications ("strongylostyles"): 513–*575.4*–635 by 10–*15.2*–19 µm; sigmata in a larger abundant size category: 30–*37.3*–42 µm, and a small, very thin, rare size category: 10–*11.6*–15 µm.

Ecology: muddy sand in deep water.

Distribution: known only from the type locality off Barbados.

Etymology: the name refers to the abundant sigmata.

On the basis of the microsclere complement, this species falls to *Desmacella*, but stylote megascleres are not usual in this genus; possibly, this is evidence of a close relationship, maybe even congenericness, of *Desmacella* and *Biemna*.

DISCUSSION OF THE GENUS *Desmacella*

Hymedesmia campechiana Topsent, 1889, from Mexico, is perhaps close to the new *D. polysigmata*, judging from a slide of the holotype, kindly sent on loan by Dr. N. BOURY-ESNAULT (Paris). The spiculation consists of large tylostyles (up to 1000/8 µm), short tylostyles (up to 200/8 µm), and abundant sigmata in three (not two as TOPSENT stated) size categories: 55, 25 and 7.5 µm. Remarkably enough, it seems to have had a basal plate of spongin with the large tylostyles embedded with their heads in it. TOPSENT (1897) made it the type of the genus *Tylosigma*, which seems a clear synonym of *Desmacella*.

Other West Indian records of this genus are: *Desmacella vagabunda* Schmidt (1870), which is considered a *Sigmadocia* by HOSHINO (1981), but is better considered unrecognizable (cf. also BURTON, 1930), *Desmacella janiae* Verrill (1873), which seems to be also unrecognizably described, but may be conspecific with *Mycale microsigmatosa* Arndt (1927) or *Biemna tubulata* Dendy (1905), *Desmacella meliorata* Wiedenmayer (1977), which also may be the same *Mycale microsigmatosa*, and finally *Desmacella annexa* Schmidt (1870), which is a valid species, made the type of a genus *Sigmatoxella* De Laubenfels (1936) on account of its possession of thick toxiform rhaphides. These toxiform rhaphides are not at all abnormal microscleres in the genera *Biemna* and *Desmacella*; on the basis of the megascleres and the architecture *D. annexa* fits the genus *Desmacella*.

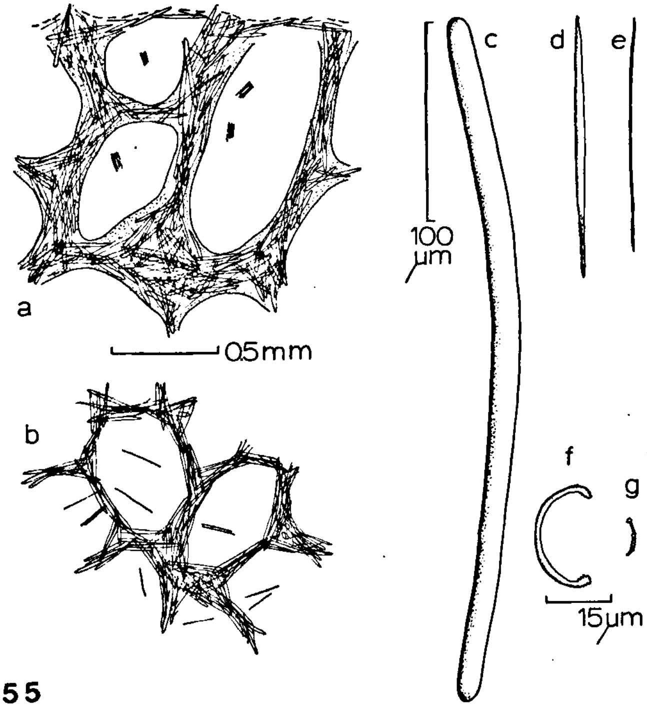

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FIGURE 55. *Neofibularia nolitangere*: a. transverse section of peripheral skeleton; b. tangential view of ectosome; c. megasclere; d. microx; e. rhaphide; f. sigma; g. comma.

BURTON's (1954) record of this species from the Rosaura Expedition (BMNH 1938:6:30:19/18, Grenada) seems to be correct. In the same report BURTON mentions the occurrence of *Desmacella inornata* from Grenada; the specimen (BMNH 1938:6:30:20) is close to *D. pumilio* but has unusual thick tylostyles and a rather large size of sigmata. *Desmacella dendyi* De Laubenfels (1936a) is a replacement name for a specimen, allegedly from the West Indies, reported by DENDY (1924) as *Tylodesma vestibularis* Wilson, 1904.

From the extensive (often erroneous) discussions of the genera *Desmacella* and *Biemna*, and related names as *Tylodesma* Thiele (1903), *Toxemna* Hallmann (1916) and *Sigmatoxella* De Laubenfels (1936), made by THIELE (1903), HALLMANN (1916), TOPSENT (1892, 1925), BURTON (1930) and WIEDENMAYER (1977), it has become apparent that *Biemna* and *Toxemna* are synonyms, and *Desmacella*, *Tylodesma*, *Sigmatoxella* and *Tylosigma* are, too. From BURTON's review of species to be regarded as *Biemna* and as *Tylodesma* (= *Desmacella*), two major points of difference emerge: *Biemna* species have always styles for megascleres, and sigmata and rhaphides for microscleres, whereas *Desmacella* would always have tylostyles for megascleres and sigmata for microscleres (*D. annexa* in addition has rhaphidiform toxa). In view of the fact, that *Desmacella polysigmata* has perfect styles next to only sigmata, this distinction of *Biemna* and *Desmacella* is not very useful. BURTON's (1930) revision did not take into account ectosomal and choanosomal architecture, although there seem to be some definite trends cutting right through the traditional distinction of *Biemna* and *Desmacella*.

Genus **Neofibularia** Hechtel, 1965

Definition: Biemnidae with a choanosomal isodictyal reticulation of spicule tracts bound by spongin; megascleres diactinal; microscleres sigmata, commata, microxea (rhaphides).

Neofibularia nolitangere (Duch. & Mich., 1864)

Synonymy: cf. HARTMAN (1967).

CURAÇAO: ZMA POR.1103 (no further data, 1920, coll. C. J. van der Horst, ARNDT's (1927) specimen of *Gellius massa*); 3316 (Piscadera Baai, near Carmabi, 2 m, 14.XII.1973, coll. JHS 73–47); 3879 (Blauwbaai, 20–30 m, XI.1975, coll. S. Weinberg & E. Westinga); 4445 (Piscadera Baai, outer bay near Carmabi, sandy reef, 45 ft, 9.VI.1970, coll. H. ten Hove *2054*), no reg.nr. (Spaanse Water, 1920, coll. C. J. van der Horst, cf. ARNDT (1927) as *Gellius massa*, pl. II 5).
BONAIRE: ZMA POR.4444 (near jetty of Kralendijk, reef flat, 3–6 m, 1.VII.1970, coll. H. ten Hove *2107C*).

Diagnosis (Pl. IX 4–5 Fig. 55):

Shape, size and consistency: Cake-shaped (or massively incrusting), with apical depression, which may lead to cup-shape. Oscules apical or inside the apical depression up to 2 cm. Surface smooth or shaggy,

areolate. Size up to about 30 cm high and 30 cm wide. Consistency: corky to compressible, fragile, crumbly.
Colour: dark red.
Ectosome: a wide irregular tangential reticulation of spicule tracts, sometimes enveloped in spongin, with many brushed endings of choanosomal fibres.
Choanosome: an irregular, probably basically isotropic, reticulation of tracts of megascleres, bound by varying quantities of spongin (often strongly developed). Interstitially many of the thick microxea are in parallel arrangement, mostly in dragmata-like bundles. Thin microxea and sigmata are strewn at random. Microsclere density mostly high. Megasclere tracts are 50–100 µm enclosing meshes of 300–700 µm.
Spiculation: megascleres for the majority are perfect strongyles, often slightly curved, occasionally stylote or hastately oxeote: 255–*329.5*–384 by 4.5–*9.3*–15.5 µm (the variation in width between different specimens as well as within one specimen is striking); sigmata with distally roughened ends: 11–*16.5*–21 µm; commata, roughened, not very deeply curved (clearly comprising sigmatose derivates): 6–*7.3*–8.5 µm; microxea, sharply pointed at one end, more gradually pointed at the other (the sharply pointed end is minutely roughened): 111–*126.0*–141 by 1.5–*2.4*–4 µm; rhaphides, distally roughened, 99–*111.6*–118 by 1 µm.

Ecology: occurring in the reef environment, but often in areas with some disturbance; occasionally also a member of the fouling community.

Distribution: Curaçao, Bonaire (VAN SOEST, 1981); St. Thomas (DUCH. & MICH., 1864, as *Amphimedon*), Jamaica (HECHTEL, 1965, as *Neofibularia massa*; HARTMAN, 1967), Cuba (ALCOLADO, 1980), Bahamas (CARTER, 1882a, as *Fibularia massa*; WIEDENMAYER, 1977), Florida (DE LAUBENFELS, 1936a, as *Fibulia*; DE LAUBENFELS, 1953, as *Fibulia massa*).

Reproduction: the species has been observed to "smoke" by Drs. GODFRIED VAN MOORSEL on October 10, 1979 and September 30, 1980, both times near Boei 3, Curaçao; REISWIG (1976: table 1) lists a smoking *Neofibularia* from Jamaica on October 23, 1969. Such massive sperm release suggests an oviparous reproduction.

The present material agrees closely with HARTMAN's (1967) extensive redescription of the holotype of *Amphimedon nolitangere* (Mus. Torino Por. 42), and with the types of *Fibularia massa* Carter, 1882. HARTMAN divided this species into two subspecies (*N. n. nolitangere* and *N. n. oxeata*); no specimens have been found with exclusive or dominant oxea, so no opinion can be given on the status of these subspecies. The distribution of both forms seems odd, though.

The existence of a second species of *Neofibularia* in the West Indies is mentioned by WIEDENMAYER (1977), viz. *N. proxima* (Duch. & Mich., 1864). This species is represented by type specimens in Torino (Mus. Torino Por. 74) and London (BMNH 1928:11:12:45). It is here referred to the genus *Xestospongia*, of which it is probably a separate though ill-known species (cf. also VAN SOEST, et al., 1983).

The ZMA DUCH. & MICH. specimen of *Amphimedon nolitangere* is not conspecific with the Torino type; it is a small piece of *Tedania ignis* incrusting a gorgonian stem.

HARTMAN (1967) assigned *Neofibularia* to the Mycalidae, but considered *Biemna* also close to it. LÉVI (1973) placed the genus in the Esperiopsidae, no doubt because of its diactinal megascleres. *Neofibularia*, however, fits neatly in the Biemnidae on account of microscleres and general consistency.

Genus **Hamacantha** Gray, 1867

Definition: Biemnidae with a plumo-reticulate skeleton of monactinal or diactinal megascleres; microscleres are peculiar safety-pin-like sigmoid microscleres (diancistras).

Hamacantha agassizi Topsent, 1920

Hamacantha agassizi TOPSENT, 1920: 11, fig. 2a.

Near JAMAICA: ZMA POR.4560 (Calamar stat. 476, 18°20′ N 77°20′ W, 13.IX.1969, coll. L. J. K. Kleijn).

Diagnosis (Fig. 56):

Shape, size and consistency: Thinly incrusting coral rubble (only a very small patch was found); surface smooth; no oscules apparent. Texture stringy, but soft.

Colour: drab in spirit.

Ectosome: the skeleton consists of tangentially arranged single megascleres.

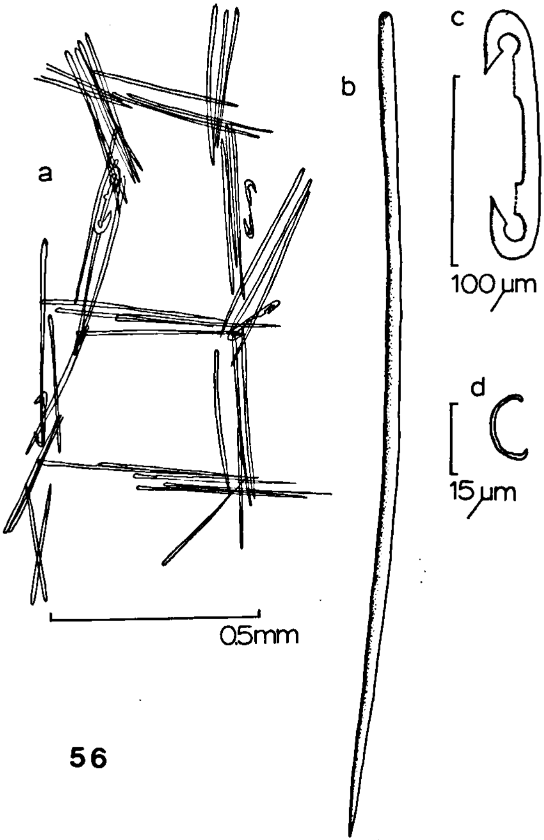

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FIGURE 56. *Hamacantha agassizi*: a. choanosomal skeleton; b. megasclere; c. diancistra; d. sigma.

Choanosome: reticulate skeleton; primary tracts consist of several megascleres per cross-section supported by an alignment of diancistras; architecture comparable to *Mycale*.

Spiculation: robust styles: 338–*378.3*–399 by 3–*4.30*–5 µm; diancistras (fairly common): 110–*120.9*–133 µm; small sigmata, abundant: 11–*15.0*–21 µm.

Ecology: deep water.

Distribution: Jamaica, Azores.

The present specimen fits TOPSENT's (1920) description quite closely. LÉVI (1973) put *Hamacantha* along with *Poziella* Topsent (1896) into a separate family, but I do not think this is justified, because the diancistras are clearly sigmatose derivates. SCHMIDT (1870, 1889) described several species referable to *Hamacantha* from the West Indies: *Desmacella johnsoni* (Bowerbank, 1866) (which specimen was described as the type of a new species, *H. schmidti* by CARTER (1882), which in its turn was put into a genus *Athnacama* by DE LAUBENFELS, 1936a), *Vomerula tenda* Schmidt (1879) and *Vomerula tibicen* Schmidt (1879); without further data on them, it is not possible to recognize these species. *Hymedesmia schmidti* is probably a good species, because it has oxea as megascleres.

The sigmancistras of *Euchelipluma* Topsent, 1909 and *Cladorhiza* Sars, 1872 are no sigmatose microscleres, but clearly chelate reductions, and as such not comparable to those of *Hamacantha*.

DE LAUBENFELS (1936a) made the present species the type of his genus *Evomerula*, but this is a clear synonym of *Hamacantha*.

DISCUSSION OF THE FAMILY BIEMNIDAE

As already recorded above *Vomerula* Schmidt, 1880 is a synonym of *Hamacantha*. *Poziella* Topsent, 1896 is represented in the West Indies by *P. clavisaepta* var. *aperta* Topsent (1920). A genus to be associated with Biemnids is *Merlia* Kirkpatrick (1911). It is a sclerosponge, but in spiculation this genus is probably intimately related to *Hamacantha* and *Poziella* on account of its clavidiscs, which are compound diancistras. VACELET (1979, 1980) already intimated, that the (sub-)class Sclerospongiae Hartman & Goreau, 1970, is probably of polyphyletic origin. BERGQUIST (1978: 229) finds this hard to believe, since it would mean that parallel development of the calcareous skeleton must have taken place. There is, however, another possibility: the calcareous skeleton could be a primitive, ancestral character lost in most modern sponges, but retained here and there in various orders. This idea, developed by VACELET (l.c.) will have to be studied further. *Merlia* is a promising project since it is known to occur without the calcareous skeleton (VACELET, 1980), thus indicating the instability of this character. Such a *Merlia* without calcereous base is also found on the Curaçao reefs (Boei 4, 10 m, coll. L.

Delvoye); I will describe this material elsewhere. HARTMAN & GOREAU (1970) and VACELET (1980) described *Merlia* from the Jamaican reefs. *Merlia* contains next to clavidiscs as microscleres also commata, which it shares with *Biemna* and this is a strong argument for uniting *Biemna*, *Hamacantha* and *Merlia* into one family.

ORDO INCERTA

The family Latrunculiidae is associated with the Poecilosclerida by LÉVI (1973, following TOPSENT, 1928), and with the Hadromerids by REID (1968), BERGQUIST (1978), and BOURY-ESNAULT & VAN BEVEREN (1982) following DENDY, 1922, and BURTON (1930). Arguments for either choice are weak and it is here left undecided. As LÉVI's (1973) review of the genera of the Porifera is more extensive, it has been decided (cf. Introduction of this paper) to follow his guide line; thus the family Latrunculiidae will be treated in the present paper.

Family **LATRUNCULIIDAE** Topsent, 1922

Definition: Poecilosclerida (?) with an ectosomal crust of discorhabs (sensu DENDY, 1924, including verticillate sanidasters) over a halichondroid skeleton of monactinal or diactinal megascleres.

Genus **Didiscus** Dendy, 1922

Definition: Latrunculiidae with simple discorhabds consisting of microxea provided with two discs with smooth or frayed edges.

Didiscus flavus n. sp.

Didiscus spec., BERGQUIST & HARTMAN, 1969: table 2; COLIN, 1978: 70, 91.
Didiscus n. sp., VAN SOEST, 1981, p. 13.

Holotype: ZMA POR.4889, CURAÇAO, 300 m SE of Hilton Hotel, 33 m, 17.XII.1980, coll. RWMVS.

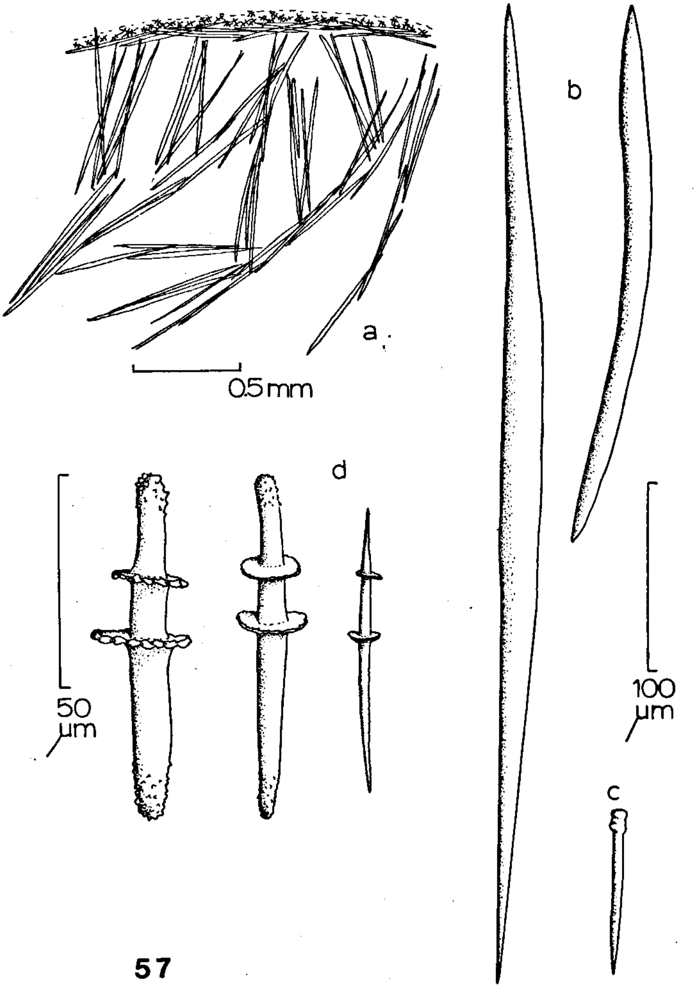

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FIGURE 57. *Didiscus flavus* n. sp.: a. transverse section of peripheral region; b. megasclere; c. accessory tylostyle; d. different growth stages of discorhabds.

Paratypes: ZMA POR.4890, Curaçao, 500 m E of Carmabi, 10–15 m, 1.IV.1976, coll. E. Westinga & P. Hoetjes; 4891, near Carmabi, 10–15, 10.XII.1975, coll. E. Westinga & P. Hoetjes; 4892, Cape Malmeeuw, 12–16 m, 23.XII.1980, coll. RWMVS.

Description (Pl. XI 1–4, Fig. 57):

Shape, size and consistency: Irregularly rounded, compact knolls or clumps. Surface smooth, provided with characteristically meandering grooves of 1–5 mm in width. Oscules large (5 mm), in groups of two or three, but these contract in spirit specimens. Size up to 15 mm in diameter. Consistency brittle but compressible; interior pulpy-crumbly.

Colour: ochrous yellow; after some time in spirit the sponge produces a red discolouration of the fluid and turns grey.

Ectosome: a distinct and easily detachable cortex consisting of a feltwork of tangential megascleres on top of which are arranged numerous discorhabds.

Choanosome: the ectosome is carried by an indistinct reticulation of loose spicule tracts with no apparent distinction between primary and interconnecting tracts. In large parts the skeleton is almost halichondroid, with single spicules strewn at random. There are numerous subdermal spaces of small size, which make the ectosome rather independent of the choanosome. The interior is decidedly pulpy, with a high spicular density.

Spiculation: megascleres predominantly oxea of extremely variable size, occasionally with stylote modifications: 210–1570 by 3.5–20 µm (typical sizes are: 1370/20, 1140/9, 570/8, 255/4.5 µm; thin growth stages are often somwhat flexuous); rare tylostyles with polytylote modifications: 114–361 by 3–9 µm; discorhabds acanthose with blunt apices: 60–80 by 4–6 µm, with the larger disc (up to 20 µm in diamter) in the middle, and the smaller disc (up to 15 µm) about halfway to one apex. Thinner growth stages of the discorhabds are smooth with sharply pointed apices; they develop from smooth microxea. The first appearance of discs occurs at about 60/2 µm. Full grown discorhabds have somewhat incurved and indented disc-rims.

Ecology: reef dweller.

Distribution: Curaçao; Bonaire (VAN SOEST, 1981), Jamaica (BERGQUIST & HARTMAN, 1969), Puerto Rico, Honduras, (COLIN, 1978).

This is the first taxonomic description of a species of the genus *Didiscus* from the tropical Atlantic. Three other species are known to exist. The type species *D. placospongioides* differs from the present species in habit (ramose), abundance of tylostyles, and the sharply pointed apices of the discorhabds. *D. acerata* Ridley & Dendy (1886) (from Tristan da Cunha?) has discorhabds only half the size of *D. flavus*, and it has strongylote megascleres next to the oxea. *D. styliferus* Tsurnamal, 1969 (probable synonym: *D. placospongioides* sensu Burton, 1936) from the E. Mediterranean has styles for megascleres next to the oxea, abundant tylostyles and smaller discs (10–13 µm) on the discorhabds. These differences are small and the variation of characters is not well known. Illustrative of this is VACELET & VASSEUR's (1971) Madagascar description of *D. placospongioides*; their discorhabds were only 37–42 µm long, against 90 µm in the type of the species.

The genus *Latrunculia* Bocage (1870) is known from the West Indies by a record of SCHMIDT (1870) as *Sceptrella regalis*. *Alcyospongia india* De Laubenfels (1934) was described in the family Latrunculiidae, but later (1936a) transferred to the Choanitidae (= Spirastrellidae), probably correctly so.

DISCUSSION OF THE ORDER POECILOSCLERIDA

In accordance with BERGQUIST (1978) the Agelasidae are considered a separate group which will be treated in a forthcoming paper. Also the Sclerosponge family Ceratoporellidae (with genera *Ceratoporella*, *Goreauiella*, *Hispidopetra* and *Stromatospongia*) are left out, although VACELET (1979, 1980) emphasized their probable Poecilosclerid affinities (based on spicule morphology and reproduction).

The possession of acanthose megascleres is a common feature of Poecilosclerid, Agelasid, Ceratoporellid, Raspailiid and Euryponid sponges. In many Tetraxonid and Hadromerid sponges microscleres are often acanthose, but never the megascleres. This might point to microsclere ancestry of the acanthose megascleres. In any case, the distribution of acanthose megascleres is here interpreted as an indication of phylogenetic close relationship between Poecilosclerids and certain Axinellid groups. Unfortunately, such a view conflicts with the current ideas on the major subclass division of the Demosponges into Ceractinomorpha and Tetractinomorpha (LÉVI, 1956). This division is based on reproductive strategies, the Ceractinomorphs being viviparous, the Tetractinomorphs oviparous. This simple scheme cannot be upholded any longer, since many exceptions have been found, e.g. the Keratose order Verongida Bergquist, 1978, is oviparous (REISWIG, 1976; BERGQUIST, 1978, 1980), the Haplosclerid genus *Xestospongia* is oviparous (for that and other reasons BERGQUIST (1980) erected a separate order Nepheliospongida for Petrosiids and Oceanapiids); the genus *Neofibularia* might prove to be oviparous; the sclerosponge *Stromatospongia* is viviparous (HARTMAN, 1969); Agelasidae are oviparous. I do not think it is sensible to remove all oviparous Ceractinomorphs from that subclass, because it is quite conceivable that such an adaptive character as vivipary was developed several times independently in different orders. A major subdivision in two subclasses is not corroborated by skeletal structure, microsclere and megasclere distribution. Poecilosclerids show not only affinity with Raspailiids and Euryponids, but also with Hadromerids (Latrunculiidae, and Biemnidae such as *Desmacella*); another Ceractinomorph group, the Halichondrida, also shows Hadromerid affinities; some of these affinities may be interpreted as parallel phenomena.

A considerable number of Poecilosclerids show genuine or independently acquired similarities with Haplosclerids, e.g. *Esperiopsis*, Myxillidae, certain Clathriids, in their reticulate, often spongin enforced skeletal architecture. The incrusting hymedesmioid-clathrioid architecture with the basal plate of spongin could be interpreted as having been ancestral to Dendroceratids.

When we compare Poecilosclerid characters with those of above mentioned "sister"-groups, it is likely that such characters as the possession of acanthostyles, or acanthoxea, the presence of spongin (including a basal plate), a reticulate or plumo-reticulate architecture and an ectosomal skeleton of tangential megascleres of the same category as those of the choanosome, the type of choanosomal megascleres itself (styles, tylostyles, diactinal), and microscleres as sigmata, toxa and rhaphides, are all primitive, ancestral, shared with one or more of the outgroups. Synapomorphic characters for all Poecilosclerids s.l. I do not know; for the Poecilosclerids s.s. there is, of course, the chela as synapomorphy. The most primitive chela probably is the small palmate isochela, as it is found in most families. The different types of chelae cannot be easily used as apomorphic characters for a further subdivision of the Poecilosclerids s.s., as the distributions of them cut right through recognized families; it is likely, that similar chela-types developed independently several times, but a detailed analysis is not possible on the basis of West Indian Poecilosclerids.

Three Poecilosclerid families are characterized by the absence of a special category of ectosomal megascleres, different from those of the choanosome, viz. Mycalidae, Esperiopsidae and Cladorhizidae. Although this absence is here interpreted as primitive, these families show rather close affinities, e.g. *Mycale* (*Mycale*) with *Esperiopsis*, *Mycale* (*Carmia*) with *Strongylacidon*, *Mycale* (*Acamasina*) with *Ulosa*; *Cladorhiza*, like *Mycale*, has anisochelae. I do not know, however, any synapomorphic characters for the three families combined, unless it is the secondary loss of acanthostyles.

The remaining Poecilosclerida s.s. have special ectosomal megascleres, mostly diactinal, with the exception of the Clathriidae which have small tylostyles, often in ectosomal brushes. Another character, namely echinating (acantho-)styles sets the Clathriids apart. Crellidae have fully acanthose ectosomal tangential spicules, and as such are quite set apart, too. Myxillids-Coelosphaerids, Hymedesmiids and Phorbasids seem close as far as the smooth diactinal ectosomal megasclere is concerned, but the reticulate skeleton of Myxillids s.l. is quite different from the hymedesmoid-plumose skeleton of the others; it may even be possible, that Myxillid tylotes have been independently derived and are not homologus with Phorbasid-Hymedesmid tornotes. The latter two families cannot be separated by apomorphic characters and should be merged.

The above given considerations lead to the phylogenetic tree given in Fig. 58; it is clear that it should be substantiated by detailed character analysis, before it can gain any predictive value.

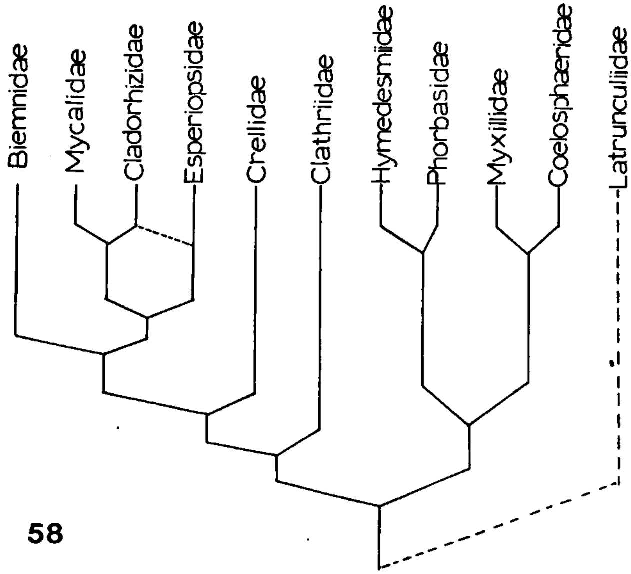

FIGURE 58. Presumed phylogenetic relationships of Poecilosclerid families.

ZOOGEOGRAPHY

With the aid of literature data (RIDLEY, 1881, 1884; RIDLEY & DENDY, 1887; TOPSENT, 1928; DE LAUBENFELS, 1954, 1956; BURTON, 1934, 1956; HECHTEL, 1976; JOHNSON, 1971; BOURY-ESNAULT, 1973; THOMAS, 1973) the world distribution of all West Indian Poecilosclerida has been determined (cf. Table 5). The subdivision used in this table is the same as that of VAN SOEST (1980). From Table 5 it appears that 82% of all recognized species is endemic to the West Indian region (compared to 60% in the case of Keratosa, and 72% in Haplosclerida), 90% is endemic to the tropical Western Atlantic. This high percentage of endemism as compared to the Keratosa and Haplosclerida is perhaps a reflection of the fact, that through their diversity of spicules Poecilosclerid species can be better delimited, than Keratose and Haplosclerid species. It is quite conceivable, that the real endemism of those two groups is as high as in Poecilosclerids, but that lack of sufficient discriminating characters prevents the recognition of this.

HECHTEL (1976) lists 17 Brazilian endemics, viz. *Acanthacarus radovani*, *Acarnus toxeata*, *Anchinoe* spec., *Clathria calypso*, *Clathria rhaphida*? (HECHTEL states that it was recorded by BOURY-ESNAULT (1973), but in that paper there is no such record; it must be a misprint for *Cliona rhaphida* Boury-Esnault, 1973, which makes *Clathria rhaphida* a nomen nudum), undescribed species of Crellidae, *Didiscus* spec., *Ectoforcepia trilabis*, *Mycale fusca*, *Mycale quadripartita*, *Mycale nuda*, *Paresperella spinosigma*, *Psammochela recife*, *Psammochela tylota*, *Psammotoxa nigra*, *Rhaphidophlus basiarenacea*, *Trachytedania birhaphidora*; next to these BOURY-ESNAULT (1973) listed also *Iotrochota bistylata*, and JOHNSON (1971) described *Fibulia* aff. *bermudae* and *Kieplitela* aff. *antrodes*.

Of these 20 allegedly endemic species only *Ectoforcepia trilabis* and *Acanthacarnus radovani* are probably also distributed elsewhere (cf. above), the remaining ones are either true endemics or probable ones.

Endemism on the generic level is again quite low, if present at all. Relationships on the generic level with the Indo West Pacific region seem high, which is of course to be expected. The Poecilosclerid fauna is also similar to the Western European-Mediterranean fauna, in contrast to marked contrasts found between these areas in their Haplosclerid and Keratose faunas. Similarities are found in the high number of species of

TABLE 5

WORLD DISTRIBUTION OF SPECIES OF POECILOSCLERIDA OCCURRING IN THE WEST INDIES.

	Bermuda	N.Carolina	Florida	Gulf of Mexico	Belize, Yucatán	Panamá	Venezuela, Colombia	Leeward Group	Windward Group	Virgin Islands	Greater Antilles	Bahama Islands	Brasil	Pacific Coast America	Mediterranean-Atlantic	W.Africa	Tropical Pacific	Tropical Indian Ocean
A. Cosmopolitan species																		
Desmapsamma anchorata	—	—	—	—	—	—	x	x	x	—	x	—	x	—	—	x	x	—
Lissodendoryx isodictyalis	—	x	x	x	—	—	x	x	—	—	x	x	—	x	x	—	x	—
Acarnus innominatus	—	—	x	—	—	—	—	x	—	—	—	—	—	—	—	—	—	x
Acarnus souriei	—	—	—	—	—	—	—	x	x	—	x	—	—	—	x	x	—	x
Biemna tubulata	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	x	—	x
B. Tropical Atlantic species																		
Mycale microsigmatosa	—	—	x	—	—	—	—	x	—	—	x	x	—	—	x	x	—	—
Mycale laxissima	—	—	x	—	—	—	—	x	—	x	—	—	—	—	—	x	—	—
Anomomycale titubans	—	—	x	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—
Damiria testis	—	—	—	—	—	—	—	x	—	—	—	—	—	—	x	—	—	—
Hamacantha agassizi	—	—	—	—	—	—	x	—	—	—	—	—	—	—	x	—	—	—
C. Amphi-American species																		
Desmacella pumilio	—	—	x	—	—	—	x	—	—	—	—	—	—	x	—	—	—	—
D. Tropical Western Atlantic species																		
Mycale angulosa	—	—	—	—	—	—	—	x	—	x	x	—	x	—	—	—	—	—
Monanchora barbadensis	—	—	—	—	—	—	—	x	x	—	x	—	x	—	—	—	—	—
Iotrochota birotulata	—	—	x	—	—	—	x	x	—	x	x	—	x	—	—	—	—	—
Tedania ignis	x	—	x	x	x	x	—	x	x	x	x	x	x	—	—	—	—	—
Forcepia trilabis	—	—	—	—	—	—	—	—	x	—	—	—	x	—	—	—	—	—
Clathria calla	—	—	x	—	—	—	—	x	—	—	x	—	x	—	—	—	—	—
E. West Indian Endemics																		
Mycale laevis	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—
Mycale arndti	—	—	x	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Mycale americana	—	x	x	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Strongylacidon rubra	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—
Chondrocladia concrescens	x	—	—	—	—	—	—	—	x	x	—	—	—	—	—	—	—	—

	Bermuda	N.Carolina	Florida	Gulf of Mexico	Belize, Yucatán	Panamá	Venezuela, Colombia	Leeward Group	Windward Group	Virgin Islands	Greater Antilles	Bahama Islands	Brasil	Pacific Coast America	Mediterranean-Atlantic	W.Africa	Tropical Pacific	Tropical Indian Ocean
Lissodendoryx sigmata	—	—	—	—	—	—	—	x	—	—	x	x	—	—	—	—	—	—
Xytopsues osburnensis	x	x	x	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—
Coelosphaera rhaphidifera	—	—	—	—	—	—	—	—	x	—	x	—	—	—	—	—	—	—
Phorbas amaranthus	—	—	x	x	—	—	—	x	—	x	—	—	—	—	—	—	—	—
Clathria prolifera	—	x	x	—	x	—	—	—	—	—	x	—	—	—	—	—	—	—
Clathria spinosa	—	—	—	—	—	—	—	x	—	—	x	x	—	—	—	—	—	—
Clathria foliacea	—	—	x	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Clathria affinis	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—	—	—	—
Clathria simpsoni	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—
Clathria ferrea	—	—	—	—	—	x	—	x	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus juniperinus	—	—	x	—	x	—	—	x	—	x	x	—	—	—	—	—	—	—
Rhaphidophlus schoenus	—	—	x	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—
Pandaros acanthifolium	—	—	x	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—
Didiscus flavus	—	—	—	—	x	—	—	x	—	—	x	—	—	—	—	—	—	—

E.1. Known from a single locality only

	Bermuda	N.Carolina	Florida	Gulf of Mexico	Belize, Yucatán	Panamá	Venezuela, Colombia	Leeward Group	Windward Group	Virgin Islands	Greater Antilles	Bahama Islands	Brasil	Pacific Coast America	Mediterranean-Atlantic	W.Africa	Tropical Pacific	Tropical Indian Ocean
Mycale diversisigmata	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Mycale magnirhaphidifera	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Mycale immitis	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mycale "massa"	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mycale "macilenta" sensu Little	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oxymycale renieroides	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
"Euchelipluma" congeri	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Batzella rosea	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Strongylacidon viridis	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Strongylacidon poriticola	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Monanchora unguiferus	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guitarra fimbriata	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crinorhiza amphactis	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Hemitedania baki	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Lissodendoryx strongylata	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Lissodendoryx spec.	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Forcepia grandisigmata	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Myxilla distorta	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Coelosphaera hechteli	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—
Coelosphaera biclavata	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Coelosphaera tunicata	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Coelosphaera fistula	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Bermuda	N.Carolina	Florida	Gulf of Mexico	Belize, Yucatán	Panamá	Venezuela, Colombia	Leeward Group	Windward Group	Virgin Islands	Greater Antilles	Bahama Islands	Brasil	Pacific Coast America	Mediterranean-Atlantic	W.Africa	Tropical Pacific	Tropical Indian Ocean
Coelosphaera spec.	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Inflatella viridis	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Cornulum johnsoni	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—
Crella chelifera	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Yvesia papillosa	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hymedesmia jamaicensis	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—
Hymedesmia nummota	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hymedesmia agariciicola	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Hymedesmia curacaoensis	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Hymedesmia palmatichelifera	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Acanthancora coralliophila	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Clathria bulbotoxa	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Clathria hymedesmioides	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Clathria vasiformis	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clathria adioristica	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Clathria obliqua	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus raraechelae	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus isodictyoides	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus minutus	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus oxeotus	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Rhaphidophlus fascicularis	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Plocamilla barbadensis	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Artemisina melana	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Desmacella polysigmata	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Desmacella campechiana	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—
Desmacella vagabunda	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Desmacella annexa	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Desmacella "inornata"	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Biemna microstyla	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hamacantha schmidti	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Poziella clavisepta	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Latrunculia regalis	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Mycale, *Hymedesmia* and *Clathria* (*Microciona*). Differences are for instance the absence of any shallow water *Myxilla* and *Pronax* from the West Indian fauna. In Haplosclerids (van Soest, 1980) differences are more fundamental: genera with large numbers of species in Western Europe such as *Haliclona*, *Reniera* and *Gellius* are barely represented in the West Indies, while large West Indian genera as *Callyspongia* are lacking in Western Europe.

The Mediterranean shows a closer relationship with the West Indies and is intermediate in many respects. This is especially clear in the Keratosa, which are reasonably represented in the Mediterranean with many close relatives of West Indian species, but which are virtually absent in Western Europe (about six species are known).

ECOLOGICAL REMARKS

Data provided by the various collectors and by my own observation allow an assessment of the ecological preferences of the species treated in this study; five habitat types are distinguished:

Intertidal rocks, harbour piles and reef flat: *Mycale diversisigmata, M. microsigmatosa, M. magnirhaphidifera, M. laxissima, Strongylacidon viridis, S. poriticola, Desmapsamma anchorata, Iotrochota birotulata, Neofibularia nolitangere, Tedania ignis, Lissodendoryx isodictyalis, L. sigmata, Clathria ferrea, Rhaphidophlus raraechelae, Artemisina melana.*

Mangroves: *Mycale angulosa, M. arndti, M. americana, M. microsigmatosa, Biemna tubulata, Desmapsamma anchorata, Tedania ignis, Lissodendoryx isodictyalis, L. strongylata.*

Reefs: *Mycale laevis, M. laxissima, Batzella rosea, Strongylacidon rubra, Monanchora barbadensis, Desmapsamma anchorata, Iotrochota birotulata, Hemitedania baki, Lissodendoryx sigmata, Acarnus innominatus, A. souriei, Damiria testis, Hymedesmia agariciicola, H. palmatichelifera, H. curacaoensis, Acanthancora coralliophila, Phorbas amaranthus, Clathria affinis, C. spinosa, C. simpsoni, C. bulbotoxa, C. calla, C. hymedesmioides, Rhaphidophlus raraechelae, R. minutus, R. juniperinus, R. schoenus, R. isodictyoides, R. oxeotus, Pandaros acanthifolium, Didiscus flavus, Neofibularia nolitangere.*

Deep water (beyond the reefs): *Iotrochota birotulata, Acarnus souriei, Forcepia trilabis, F. grandisigmata, Coelosphaera hechteli, Crella chelifera, Hymedesmia jamaicensis, Plocamilla barbadensis, Biemna pumilio, Desmacella polysigmata, Hamacantha agassizi.*

No data: *Clathria prolifera.*

Definite euryoecious species seem to be: *Desmapsamma anchorata* and *Iotrochota birotulata.*

REPRODUCTIVE ACTIVITY

In Table 6 data are assembled on reproductive elements (embryos, larvae and sperm release) noted in the studied specimens. These data may be useful for future experimental studies on West Indian Poecilosclerids.

TABLE 6

REPRODUCTIVE ACTIVITY NOTED IN WEST INDIAN POECILOSCLERIDS

Species	Date	Remarks
Mycale angulosa	XI.1905	embryos
Mycale americana n.sp.	11.I.1964	embryos
Mycale microsigmatosa	12.I.1964	larvae 300–450 µm, spicules of 150 by 1 µm concentrated at one end of larva.
	31.X.1964	embryos and larvae
Strongylacidon rubra n.sp.	23.XII.1980	embryos
Tedania ignis	11.XII.1963	embryos
	30.III.1970	embryos
Lissodendoryx isodictyalis	1.III.1970	larvae up to 700 µm, including incipient tylote spicules.
	1.IX.1963	larvae up to 680 µm.
Desmapsamma anchorata	13.XI.1975	embryos
	VIII.1976	embryos
	2.I.1964	embryos
Rhaphidophlus schoenus	5.I.1964	larvae up to 300 µm
	20.XII.1958	embryos
Rhaphidophlus minutus n.sp.	17.XII.1980	embryos up to 100 µm.
Rhaphidophlus raraechelae n.sp.	16.XI.1975	embryos 100–300 µm.
Rhaphidophlus oxeotus n.sp.	17.XII.1980	larvae up to 600 µm.
Neofibularia nolitangere	10.X.1979	sperm release ('smoking')
	30.IX.1980	sperm release ('smoking')

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PLATE I

1. *Mycale laevis*, photographed alive in situ under *Agaricia* on Curaçao; photo G. van Moorsel (× 1.0).
2. *Mycale laevis*, preserved specimen ZMA 3331 from Puerto Rico (× 1.0).
3. *Mycale laevis*, SEM photo of large chela.
4. *Mycale laevis*, SEM photo of trichodragma.
5. *Mycale angulosa*, preserved specimen ZMA 3490 (× 0.6).
6. *Mycale angulosa*, SEM photo of large chela.

PLATE I

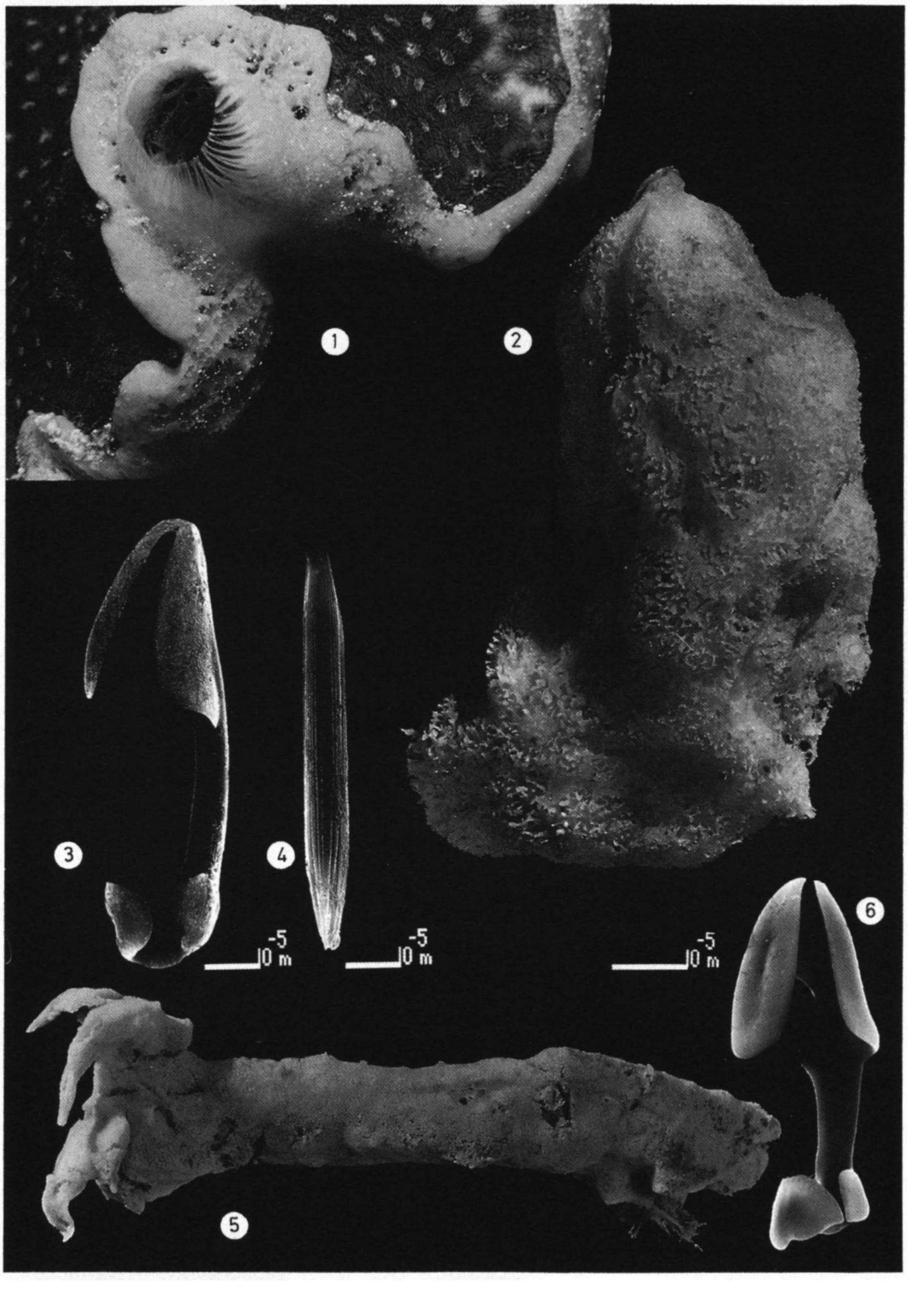
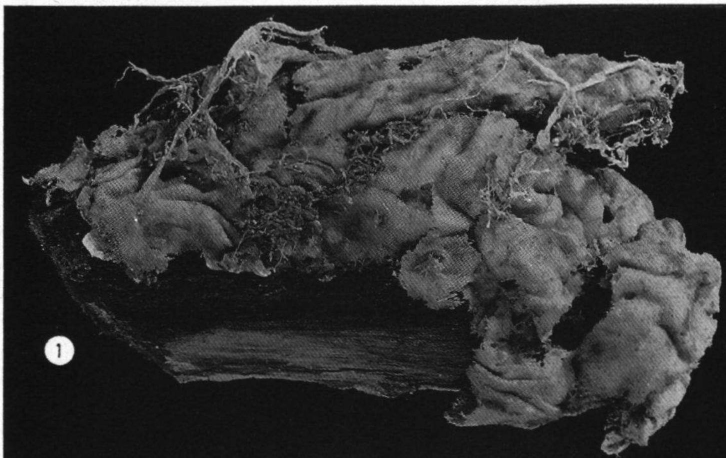


PLATE II

1. *Mycale arndti* n.sp., holotype ZMA 3675 (× 1.0).
2. *Mycale americana* n.sp., SEM photo of large chela.
3. *Mycale diversisigmata* n.sp., tangential view of ectosomal skeleton to show typical *Aegogropila*-arrangement (× 40).

4.–5. *Mycale diversisigmata* n.sp., SEM photos of middle category of bizar-shaped chelae.

6. *Mycale microsigmatosa*, preserved specimen ZMA 3309 (× 1.0).
7. *Mycale magnirhaphidifera* n.sp., SEM photo of large chela.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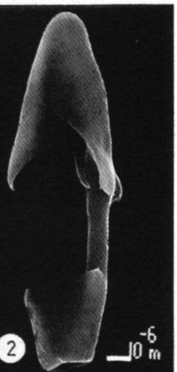
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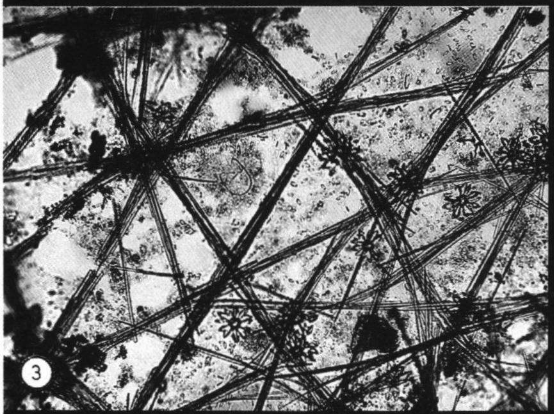
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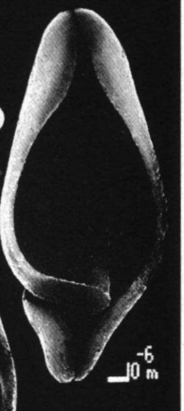
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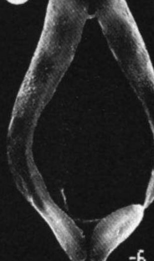
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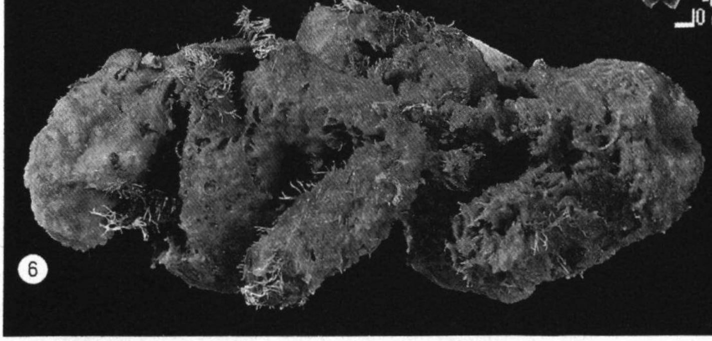
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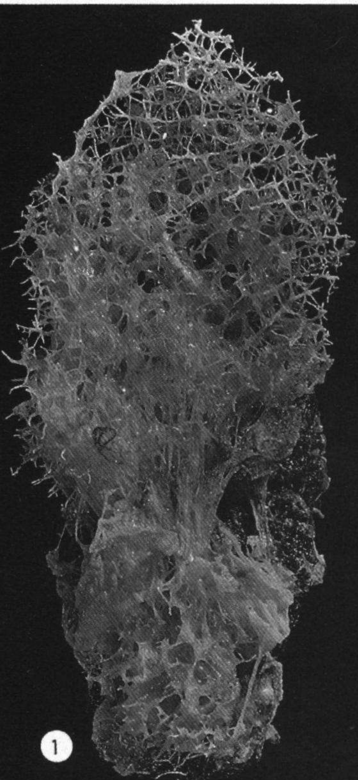
PLATE III

1. *Mycale laxissima*, preserved specimen ZMA 3592 (× 1.0).
2.–3. *Desmapsamma anchorata*, photographed alive in situ (photos G. van Moorsel) (× 0.3).
4. *Desmapsamma anchorata*, preserved specimen ZMA 3303 (× 1.0).
5. *Desmapsamma anchorata*, SEM photo of chela.

PLATE III



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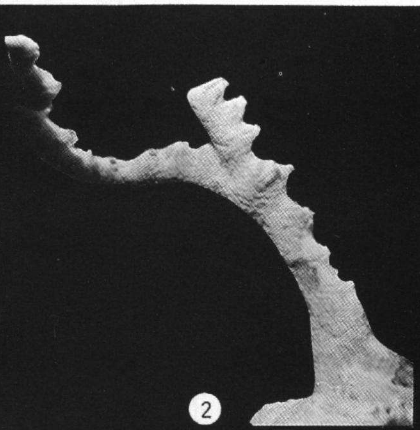

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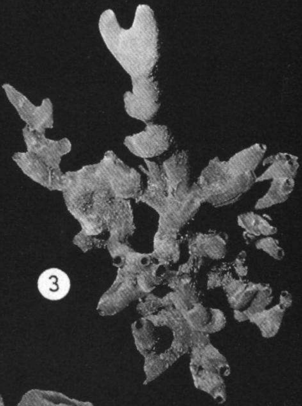

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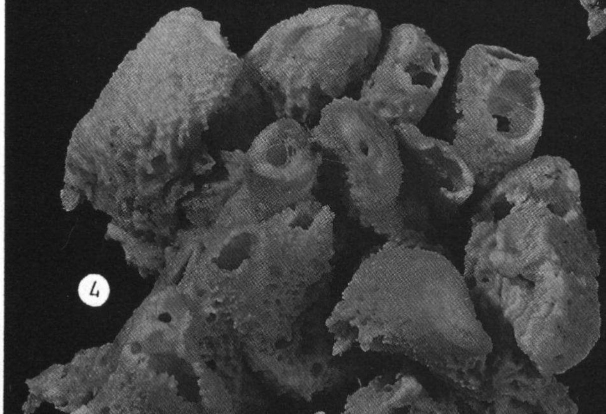

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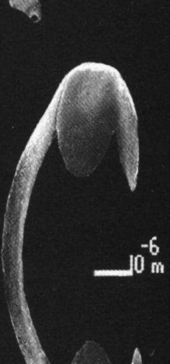

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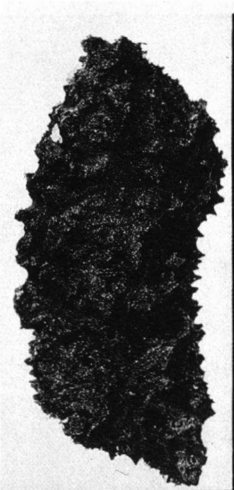
PLATE IV

1. *Iotrochota birotulata*, preserved specimen ZMA 3613 (× 0.5).
2. *Iotrochota birotulata*, SEM photo of birotulate.
3. *Monachora barbadensis*, photographed alive in situ under *Colpophyllia natans* (photo G. van Moorsel) (× 0.25).
4. *Monachora barbadensis*, preserved specimen ZMA 3664, showing small elevations (× 1.0).
5. *Monachora barbadensis*, SEM photo of chela showing a grooved shaft.
6. *Monanchora unguifera*, De Laubenfels' type specimen, USNM no. 23404 (× 1.0).
7. *Tedania ignis*, preserved specimen ZMA 3652 (× 1.0).

PLATE IV



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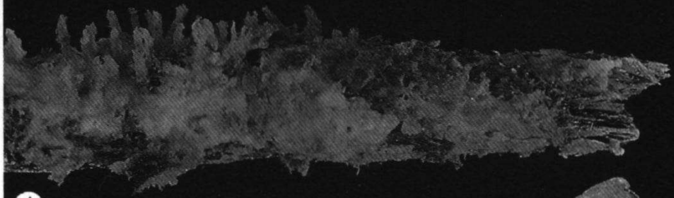

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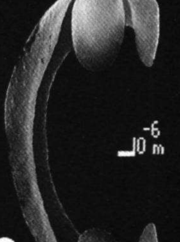

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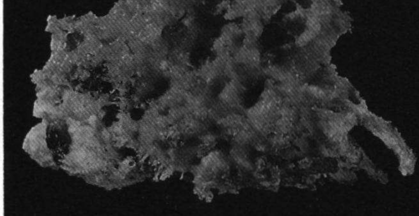

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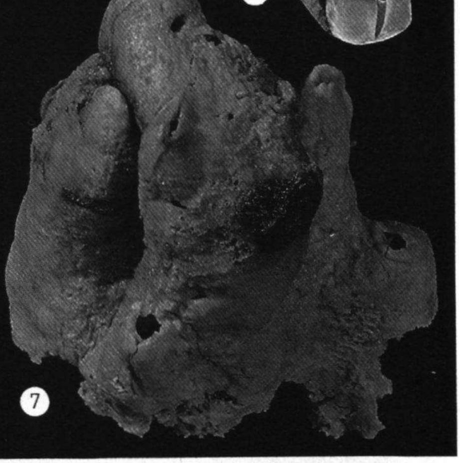

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PLATE V

1. *Hemitedania baki* n.sp., SEM photo of distal part of onychaete to show the tylote swelling.
2. *Lissodendoryx isodictyalis*, preserved specimen ZMA 3748 (× 0.6).
3. *Lissodendoryx isodictyalis*, SEM photo of chela.
4. *Lissodendoryx strongylata* n.sp., holotype ZMA 3508 (× 1.0).
5. *Lissodendoryx strongylata* n.sp., SEM photo of chela.
6. *Acarnus innominatus*, SEM photo of some of the skeleton spicules.
7. *Acarnus innominatus*, SEM photo of thick tox.
8. *Acarnus innominatus*, SEM photo of tylote apex.
9. *Acarnus innominatus*, SEM photo of chela.

PLATE V

PLATE VI

1. *Forcepia trilabis*, SEM photo of (reduced) chela.
2. *Forcepia trilabis*, SEM photo of middle part of large forceps.
3. *Forcepia grandisigmata* n.sp., SEM photo of terminal part of forceps.
4.–5. *Forcepia grandisigmata* n.sp., SEM photos of grotesque chelae with ingrown teeth.
6. *Damiria testis*, SEM photo of megasclere apex.
7. *Phorbas amaranthus*, SEM photo of chela.
8. *Hymedesmia palmatichelifera* n.sp., SEM photo of chela.
9.–10. *Acanthancora coralliophila* n.sp., SEM photos of chelae in front- and side view.
11. *Acanthancora coralliophila* n.sp., SEM photo of juvenile chela.

PLATE VI

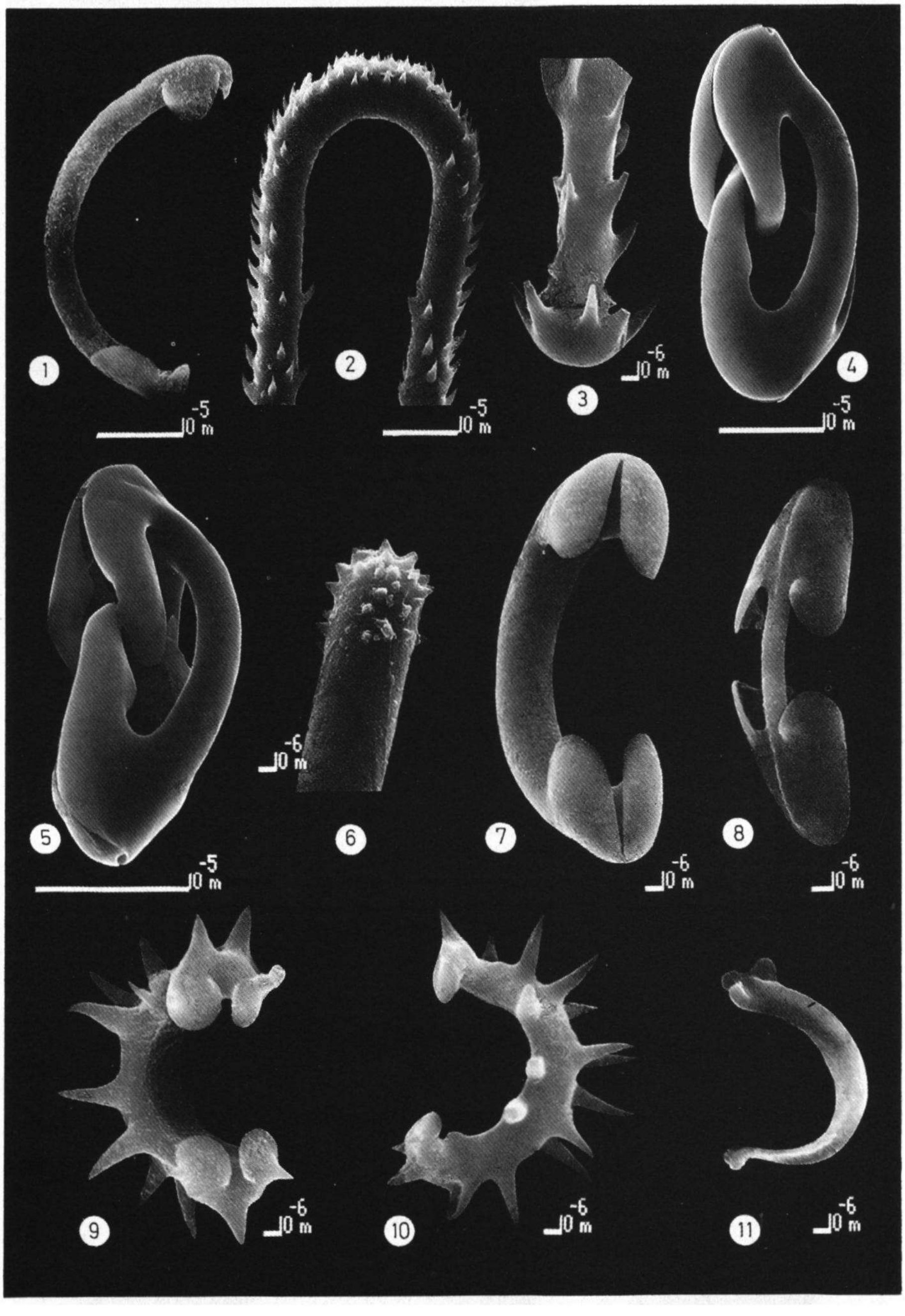
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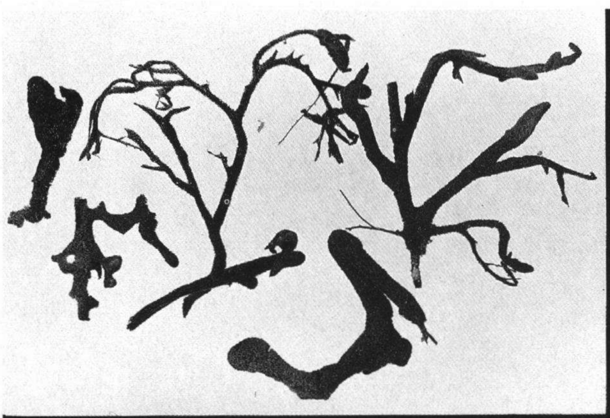
PLATE VII

1. *Clathria calla*, preserved specimens ZMA 3817 incrusting on *Antipathes* (× 0.3).
2.–3. *Clathria simpsoni* n.sp., SEM photos of cleistochelae.
4. *Clathria simpsoni* n.sp., SEM photo of smaller, normal chela.
5. *Clathria bulbotoxa* n.sp., SEM photo of apex of choanosomal thick style.
6. *Clathria bulbotoxa* n.sp., SEM photo of bulbotox.
7. *Clathira bulbotoxa* n.sp., SEM photo of detail of bulbotox.
8. *Clathria bulbotoxa* n.sp., SEM photo of twisted chela.
9. *Clathria hymedesmioides* n.sp., SEM photo of apex of choanosomal thick style.
10. *Clathria hymedesmioides* n.sp., SEM photo of apex of ectosomal sybtylostyle.
11. Duch. & Mich. specimen of *Pandaros juniperina*, ZMA 1730 (= *Rhaphidophlus juniperinus*) (× 0.8).

PLATE VII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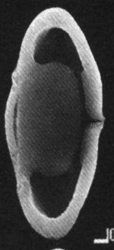

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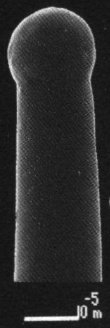

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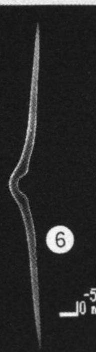

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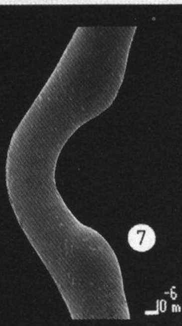

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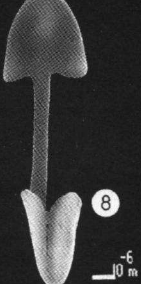

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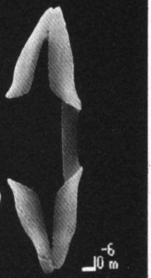

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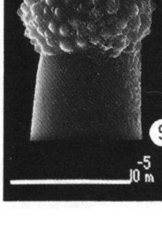

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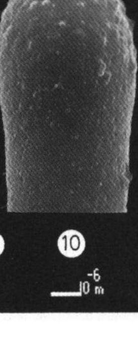

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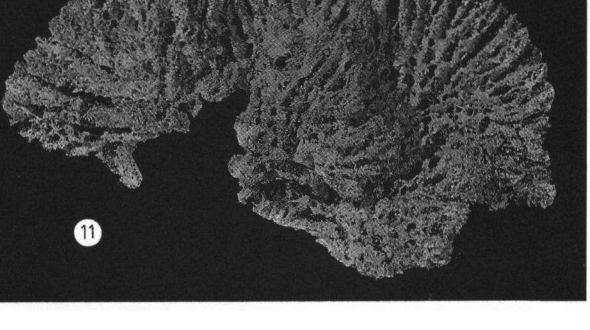
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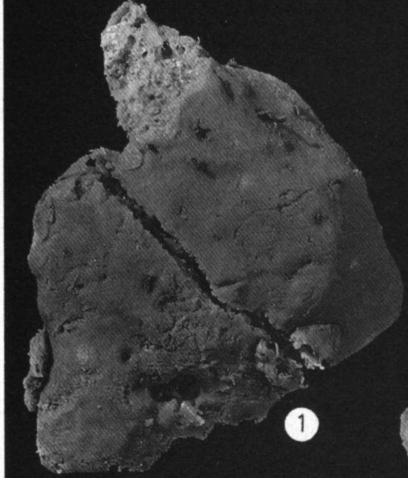
PLATE VIII

1. *Rhaphidophlus schoenus*, preserved incrusting specimen ZMA 3715 (x 0.5).
2. *Rhaphidophlus schoenus*, preserved incipient ramose specimen ZMA 4793 (x 1.0).
3. *Rhaphidophlus schoenus*, SEM photo of echinating acanthostyle.
4. *Rhaphidophlus schoenus*, SEM photo of large chela.
5. *Rhaphidophlus raraechelae* n.sp., photographed alive in situ (photo G. van Moorsel) (x 2.5).
6. *Rhaphidophlus isodictyoides* n.sp., SEM photo of chela.
7. *Artemisina melana* n.sp., SEM photo of apex of choanosomal style to show sparse minute spines.
8. *Artemisina melana* n.sp., SEM photo of chela.

PLATE VIII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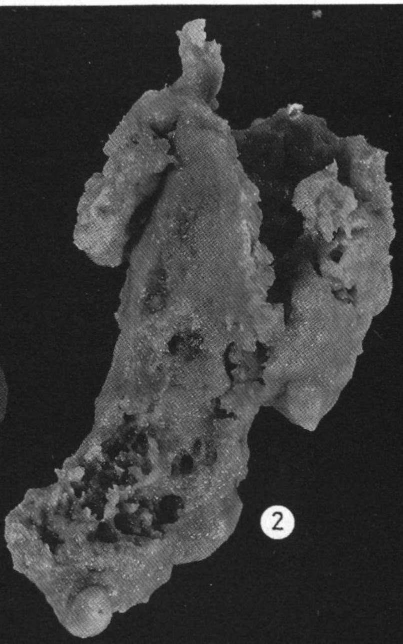
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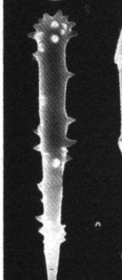

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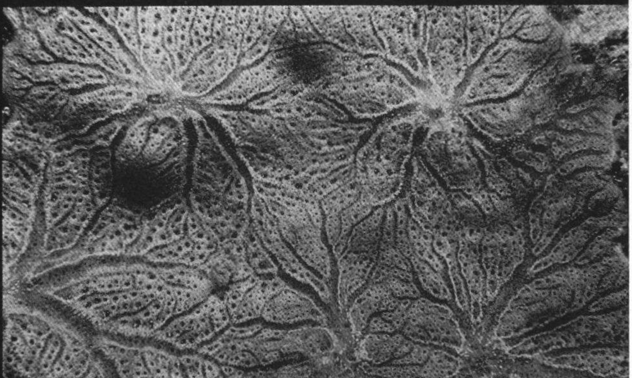

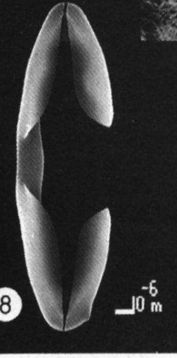

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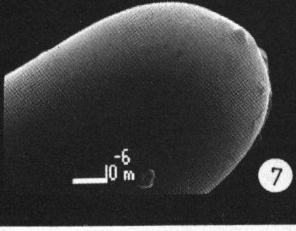

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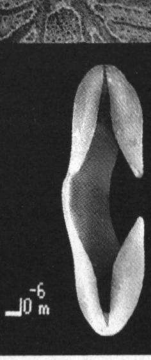

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PLATE IX

1. *Biemna tubulata*, preserved specimen ZMA 3999 (× 2.0).
2. *Desmacella pumilio*, preserved specimen ZMA 4761 (arrow), incrusting a dead coral (× 1.0).
3. *Desmacella polysigmata* n.sp., holotype ZMA 4762 (× 1.0).
4. *Neofibularia nolitangere*, preserved small specimen ZMA 3316 showing volcanoe-shaped oscules (× 0.5).
5. *Neofibularia nolitangere*, detail of vent of a large specimen with symbiotic *Gobiosoma* (fish) and *Syllis* (tube worms), photograhed alive in situ (photo G. van Moorsel) (× 0.25).

PLATE IX


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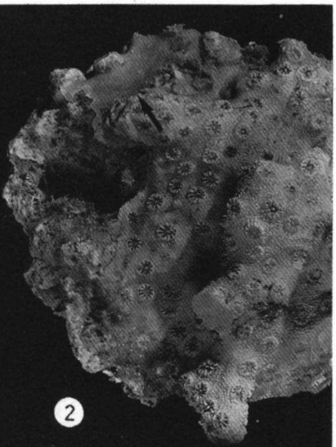
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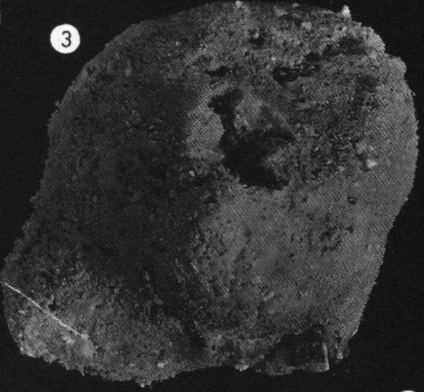
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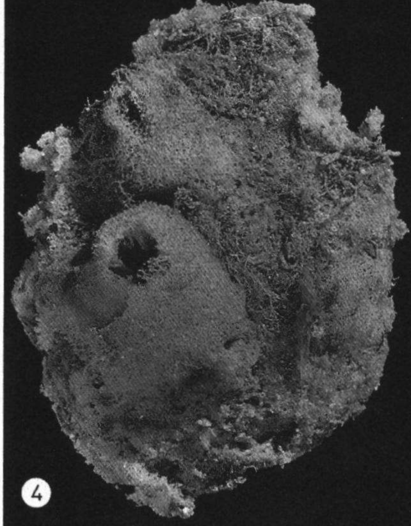
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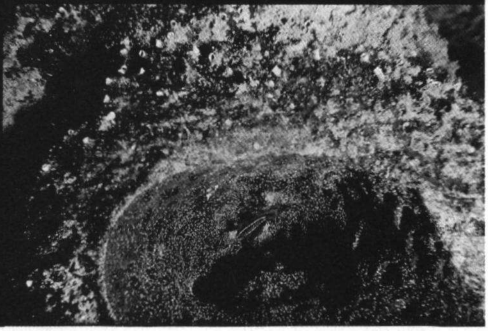
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PLATE X

1. *Didiscus flavus* n.sp., holotype ZMA 4889 (× 0.5).
2. *Didiscus flavus* n.sp., detail of surface of specimen photographed alive in situ (photo G. van Moorsel).
3. *Didiscus flavus* n.sp., SEM photo of discorhabd.
4. *Didiscus flavus* n.sp., SEM photo of detail of discorhabd.

PLATE X