MARINE SHALLOW-WATER HAPLOSCLERIDA (PORIFERA) FROM THE SOUTH-EASTERN PART OF THE NORTH ATLANTIC OCEAN

by

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Key words: Porifera: Haplosclerida; North Atlantic; biogeography; new species.

Sixteen species of marine Haplosclerida were collected by the CANCAP-expeditions, among which two are new to science, viz. *Petrosia canariensis* and *Oceanapia cancap*. The Haplosclerida fauna of the south-eastern part of the North Atlantic, comprising 46 species, is reviewed, discussed and compared with those of neighbouring areas of the North Atlantic (NE Atlantic, W Atlantic, West Indies, Mediterranean). Three distribution patterns are recognized: Mediterranean-Atlantic, endemic and amphi-Atlantic.

RÉSUMÉ

Haplosclerida des eaux peu-profondes des régions sud-est de l'Atlantique du Nord:

Seize espèces d'éponges Haplosclerida marines sont collectionnées durant les expéditions CANCAP; deux entre elles sont des espèces nouvelles: *Petrosia canariensis* et *Oceanapia cancap*. La faune à Haplosclerida de la région sud-est de l'océan Atlantique du Nord (comprenant 46 espèces) est revue, discutée, et comparée à celles des régions voisinantes (Atlantique nord-est et nord-ouest, les Indes Occidentales, et la Méditerranée). Trois répartitions générales sont reconnues: Méditerranéennes-Atlantiques, endémiques, et Amphi-Atlantiques.

RESUMEN

Haplosclerida marinas (Poriferos) de las aguas superficiales del sudeste del Atlantico norte:

Diez y seis especies de las Haplosclerida marinas fueron recogido por las expediciones CANCAP, de cual dos son nuevas por la ciencia, a saber *Petrosia canariensis* y *Oceanapia cancap*. La fauna de las Haplosclerida en el sudeste del Atlantico norte, contando 46 especies, es remirado, rediscutido, y comparado con los sitios cercos del Atlantico septentrional (nordest Atlantico, oest Atlantico, las Indias occidentales, el Mediterraneo). Tres patronas de dispersion son reconocido: Mediterraneo-Atlantico, endemico, y anfi-Atlantico.

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1. INTRODUCTION

Marine shallow-water Haplosclerida feature among the sponges that are most difficult to characterize and thus to recognize at the species level. In recent times, heightened efforts have been made to deal with the group, mostly on a regional basis. Monographic reports are now known from the Mediterranean (Griessinger, 1971), the West Indies (Van Soest, 1980), New Zealand (Bergquist & Warne, 1980), and New Caledonia (Desqueyroux, 1984, and in preparation). Haplosclerids from Western Europe are currently being studied by De Weerdt (papers in press and in preparation). The present study fits in this series, as it is an attempt to deal with the shallow-water species of the south-eastern and central parts of the North Atlantic, including the volcanic archipelagoes of the Azores, Madeira, Canaries and Cape Verde.

Most of the area is known to harbour a predominantly Mediterranean-type fauna, with the exception of the Cape Verde Islands and nearby coasts of West Africa, which are considered tropical (cf. Briggs, 1974). The marine benthic fauna of these Atlantic archipelagoes is not well-known and this applies *a fortiori* to the sponge fauna. Descriptions of shallow-water sponges are rare, the major ones being those of Topsent (1892a, 1904, 1928), Burton (1956) and Lévi (1952, 1959, 1960). Recently some sponges were described by Cruz & Bacallado (1983a, b), and more studies by these authors may be expected.

The main purpose of the present paper is to make a contribution towards an analysis of the geographic distribution of the North Atlantic Haplosclerids. For this purpose, a complete survey was made of the literature on Haplosclerida reported from the area presently under consideration south to the equator, and type material and other described specimens were examined or slides of them were studied. Dr. Boury-Esnault kindly lent us her manuscript (coauthored by T. Lopez) on Azorean sponges; Dr. T. Cruz (Tenerife) sent a list and some fragments of his Haplosclerid collection. All these so far unpublished data are included in the survey.

Extensive studies on the taxonomy of the family Haliclonidae have led to the conclusion that the genera *Haliclona, Reniera, Adocia* and *Gellius* (s.l.) must be considered synonymous. The justification for this major decision will be presented in a future paper (De Weerdt, in preparation).

2. MATERIAL AND METHODS

The material was collected during several expeditions organized by the Rijksmuseum van Natuurlijke Historie (RMNH) at Leiden, based on research vessels of the Royal Netherlands Navy (HNlMS "Onversaagd" and HNlMS "Tydeman"). The expeditions are collectively known as CANCAP-expeditions. Approximate localities where Haplosclerids were collected are presented in fig. 1. Detailed lists of the collecting activities (including dredging, diving, snorkling, and shore collecting) may be obtained from the leader of the expeditions, Dr. J. van der Land. The Haplosclerid sponges were put at our disposal by Mr. J. C. den Hartog (RMNH). Type material and most other specimens will be incorporated in the collections of RMNH.

Type specimens and slides of type specimens from the Muséum National d'Histoire Naturelle (Paris), the British Museum (Natural History) (London), and the Zoologisk Museum (København) were borrowed or examined in these musea. The respective curators in charge, Prof. Dr. C. Lévi/Dr. N. Boury-Esnault, Miss S. M. K. Stone, and Dr. E. Rasmussen/Dr. O. S. Tendal, are thanked for their cooperation.

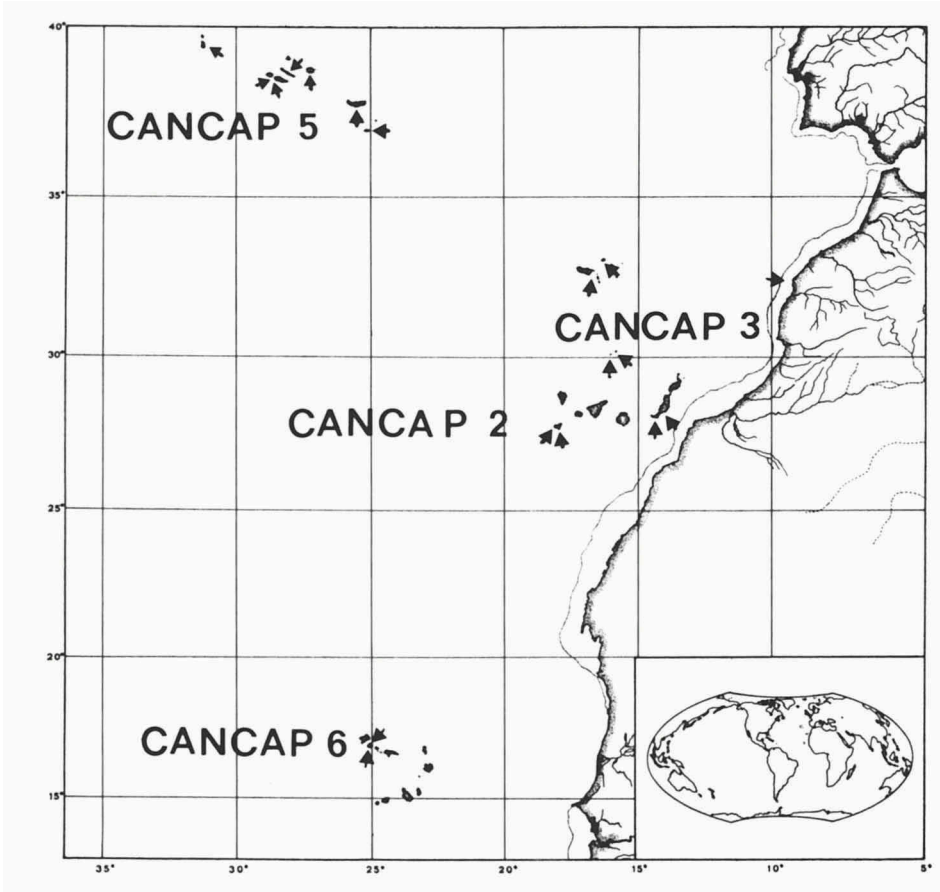


Fig. 1. Map showing the SE part of the North Atlantic Ocean, including the volcanic Archipelagoes of the Azores (visited during the CANCAP 5 cruise), Madeira and Selvagens (CANCAP 3), Canaries (CANCAP 2) and Cape Verdes (CANCAP 6); arrows indicate approximate collecting localities.

3. SYSTEMATIC DESCRIPTIONS

Family Haliclonidae

Genus **Haliclona** Grant, 1835

Haliclona cinerea (Grant, 1826)
(figs. 2, 3)

Remark. – Synonymy quotations for this much abused species name will be presented in a forthcoming paper (De Weerdt, in preparation).

Material. – CANCAP 5 stat. K10, N coast São Jorge, Faja da Caldeira, 38°38'N 27°56'W, cobble beach and lagoon, shallow-water, 13-VI-1981.

Description. – Shape, size and consistency: sprawling masses of conical tubes with fairly thin rims; tubes 1.5-2 cm high; apical oscules 4-5 mm in diameter; very soft, easily damaged. Colour (spirit): light beige, in part semi-transparent. Ectosome: a regular tangential, six-angled reticulation of single spicules, bound at the nodes by a small amount of spongin.Choanosome: basically, the skeleton consists of a regular, isotropic, unispicular reticulum, with only few subdermal spaces. Spicules: characteristic, short, rather thick, abruptly pointed oxea, often with strongylote or stylote modifications, 100 by 8 μm in average size.

Ecology. – Shallow-water, on rocks.

Distribution. – At least it occurs in the Mediterranean-Atlantic region, penetrating apparently south to West Africa (Lévi, 1956) and north to the British Isles (e.g. our own observations), possibly much further north but these records need verification.

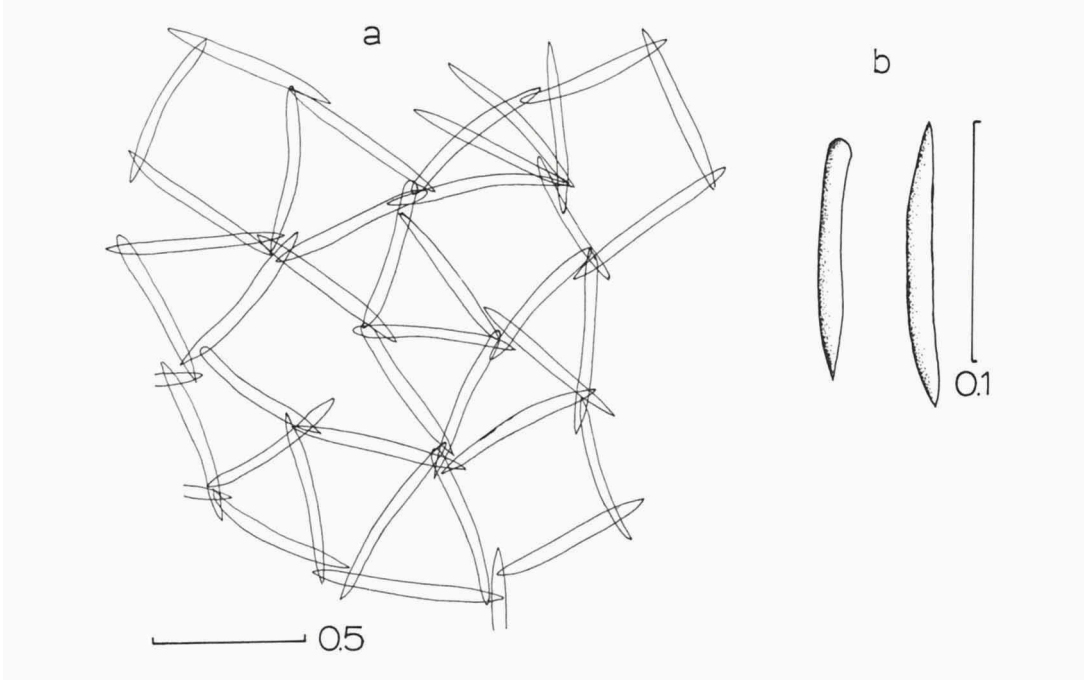


Fig. 2. *Haliclona cinerea*, a. tangential view of ectosomal skeleton, b. representative spicules (scale in mm).

Fig. 3. *Haliclona cinerea*, habit (natural size).

Discussion. – This species name has been misused many times, and it is beyond the present study to deal with every record. A cosmopolitan distribution may be possible, although it is not very likely; for instance the species has not been reported from the West Indies, nor from the Atlantic coast of North America, south of Cape Cod. The distribution in the Mediterranean-Atlantic region is based on close comparison of fresh specimens from widely different parts of the area.

Haliclona cf. **neens** (Topsent, 1918)
(figs. 4, 5)

Reniera neens Topsent, 1918: 536.

Material. – Azores stat. 26, S coast Terceira near Porto Negrito, 38°39'N 27°16'W, rocky shore with tide pools, 3-X-1979, coll. J. C. den Hartog & M. S. S. Lavaleije. Azores stat. 33, S coast Pico, Lages Harbour, 38°24'N28°15'W, 13/15-X-1979, shore collecting, J. C. den Hartog & M. S. S. Lavaleije.

Description. – Shape, size and consistency: massively incrusting pieces with oscule-bearing lobes or with flush oscules; several sqcm in lateral expansion, up to 2 cm high; oscules 2-5 mm in diameter; surface finely pilose, somewhat shaggy; consistency soft, compressible, easily torn. Colour (spirit): tan. Ecto-

some: the thin organic dermis is charged with tangential single spicules and short lines of spicules, no coherent reticulation. Choanosome: a rather close-meshed skeleton of single spicules with barely recognizable primary and secondary lines; some spongin is present at the nodes. Spicules: predominantly strongyles and styles, although the thinner growth stages are mostly oxea, making it apparent that the mature spicules are modified oxea; average size 110 by 7-8 μm.

Ecology. – Shallow-water, on stones and rocks.

Distribution. – West Africa, Azores.

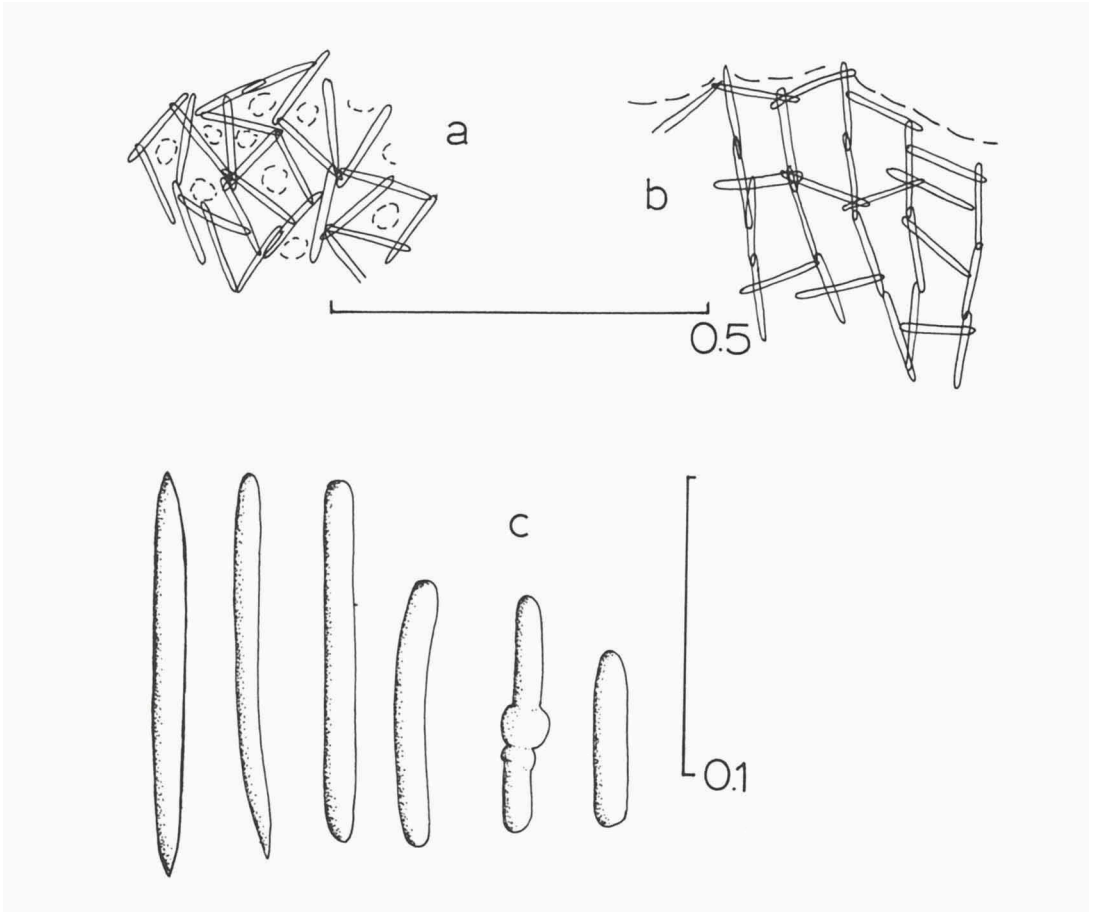


Fig. 4. *Haliclona* cf. *neens*, a. tangential view of ectosomal region, b. cross section, c. representative spicules.

Fig. 5. *Haliclona* cf. *neens*, habit (natural size).

Discussion. – The specimens are hesitatingly assigned to *Haliclona neens* because of the predominance of strongylote spicules. From the description of Topsent (1918) it is apparent that the present material differs in habit (no oscules in Topsent's material). Examination of a microsocpical slide of it (MNHN D.T. 2058) revealed that its spicules were only about 4 μm in

diameter. The only other strongyle-bearing *Haliclonal/Reniera* species in the area is *Haliclona cratera*; this well-known species has much longer spicules (it is also represented in the present material, cf. below).

The spicules and the skeletal architecture are extremely similar to those of *Haliclona (Toxadocia) abbreviata* (Topsent, 1918), also described from West Africa. We were able to study a microscopic slide from its type specimen (MNHN D.T. 2057). In addition to short, thick strongylote spicules, however, this species has abundant toxa in several size categories. But for the presence of these toxa, the present material of *H.* cf. *neens* fits better in *H. abbreviata*. It is clear that they are closely related; the possession of toxa is here regarded as an ancestral character retained in this species. De Laubenfels (1936a) erected the genus *Toxadocia* for the species *abbreviatus*; this genus is here considered a junior synonym of *Haliclona*.

De Laubenfels' (1936a) record of this species from the West Indies (as *Adocia*) is incorrect (cf. Van Soest, 1980).

Haliclona implexa (Schmidt, 1868)
(figs. 6, 7)

Reniera implexa Schmidt, 1868: 27; Ridley & Dendy, 1887: 15, pl. 14; Topsent, 1904:244; Griessinger, 1971: 133, figs 5c, 6d, 6k; Pulitzer-Finali, 1978: 72.
Haliclona coriacea Burton, 1956: 123 (Not: *Siphonochalina coriacea* Schmidt, 1868).

Material. – CANCAP 2 stat. 99, off Punta Restinga, S of Hierro, Canary Islands, 27°37'N 18°00'W, 160 m, Van Veen grab, 3-IX-1977. CANCAP 3 stat. 30, S of Porto Santo, Madeira Archipelago, 33°02'N 16°21'W, 65-135 m, dredge 6-X-1978. CANCAP 5 stat. 085, E of Faial, Azores, 38°31' N28°35'W, 150-170 m, Agassiz-trawl, sandy bottom, 1-VI-1981. CANCAP 5 stat. 142, W of Pico, Azores, 38°35'N 28°33'W, 108-118 m, dredge, bottom *Chama* – bed, 7-VI-1981.

Description. – Shape, size and consistency: ramose bushes consisting of dichotomously branching and frequently anastomosing osculiferous tubes; total size up to 10 cm, individual branches up to 1 cm in diameter; consistency limp, fragile. Colour(spirit): pale or dirty yellow. Ectosome: tangential spicules in short lines make up an irregular unispicular reticulation. Choanosome: the skeleton is a dense reticulation of paucispicular (2-5 spicules in cross section) primary lines and single interconnecting spicules; spongin scarce. Spicules: gradually tapering, but sharply pointed oxea of 110 by 2-6 μm.

Ecology. – On sandy bottom, below 40 m.

Distribution. – Mediterranean-Atlantic.

Discussion. – Griessinger (1971) reported a difference in skeletal architecture between Mediterranean and Atlantic specimens of this species. The

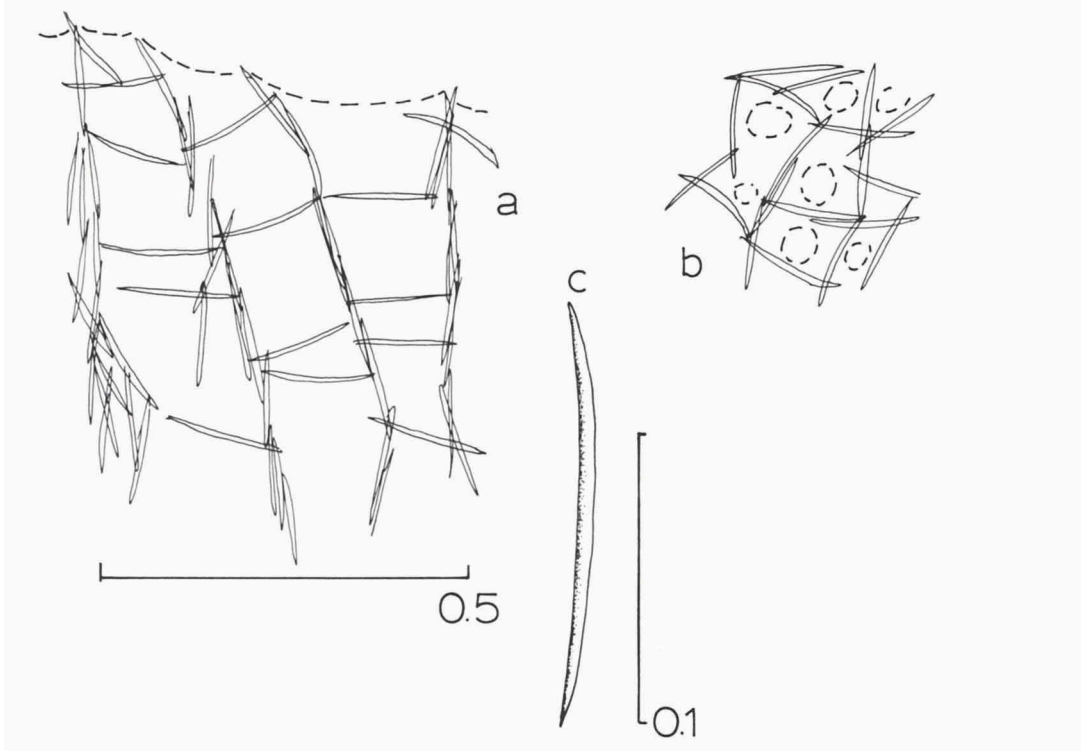


Fig. 6. *Haliclona implexa*, a. cross section, b. tangential view of ectosome, c. spicule.

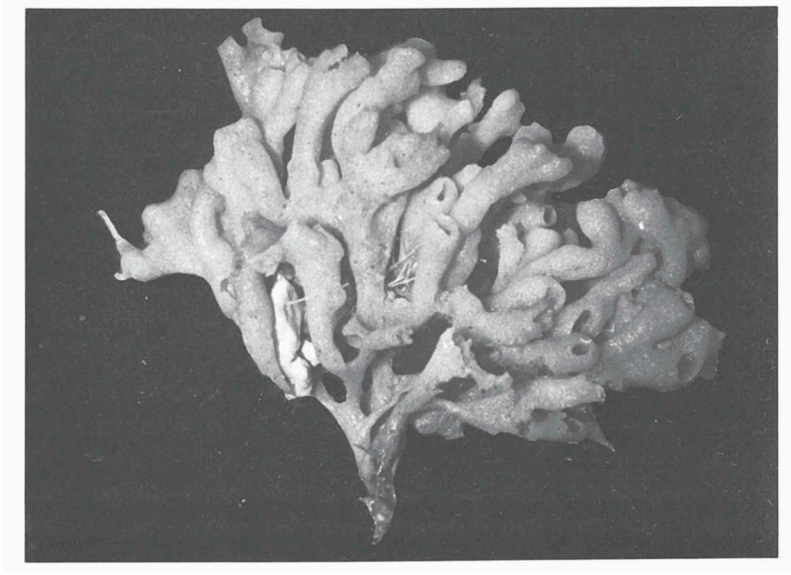


Fig. 7. *Haliclona implexa*, habit (×0.25).

Mediterranean specimens apparently have unispicular skeletons, while the specimens known from the Azorean region have paucispicular lines. This observation is corroborated by the present material.

Specimens from Scandinavian waters reported under this name (Burton, 1930; Alander, 1942), are probably not conspecific on account of their deviating habit and/or different skeletal architecture; they conform to *Haliclona urceolus* (Rathke & Vahl, 1806), which is corroborated by specimens in the Copenhagen Museum.

West Indian material reported under the name *Haliclona spiculosa* (Dendy, 1887) by Burton (1954), and subsequently (incorrectly) assigned to *Siphonochalina coriacea* (Schmidt, 1868) by Van Soest (1980), is quite close to *Haliclona implexa*.

H. implexa was compared with similar stalked tubiform species found in the North Atlantic, viz. *H. urceolus* and *H. clava* (Bowerbank, 1886) (cf. De Weerdt, in press).

Haliclona cratera (Schmidt, 1868)
(fig. 8)

Material. – CANCAP 6 stat. 136, S of São Vicente, Cape Verde Islands, 16°46'N25°02'W, 57-61 m, dredge, sandy bottom, 19-VI-1982.

Description. – Shape, size and consistency: two small fragments of soft consistency. Colour(spirit): beige. Ectosome: not detachable, spicules in confusion. Choanosome: uni – paucispicular lines are cemented by spongin at the nodes; many spicules in confusion. Spicules: characteristic long, thin strongyles, averaging 300/8 μm.

Ecology. – Collected from sandy bottom at 50-60 m.

Distribution. – Mediterranean – Atlantic.

Discussion. – Burton (1956) already reported the species from the west coast of Africa. It is common in the Mediterranean.

Haliclona perlucida (Griessinger, 1971) comb. nov.
(figs. 9, 10)

Reniera perlucida Griessinger, 1971: 127, pl. 11 fig. 1, text-figs. 2c, 4d-e; Pulitzer-Finali, 1983: 578, fig. 72.

Material. – CANCAP 2 stat. 47, Punta de Gran Tarajal, SE Fuerteventura, Canary Islands, 28°11'N 14°02'W, 100-125 m, Agassiz-trawl, 27-VIII-1977. CANCAP 5 stat. D5, Ilheu da Vila,

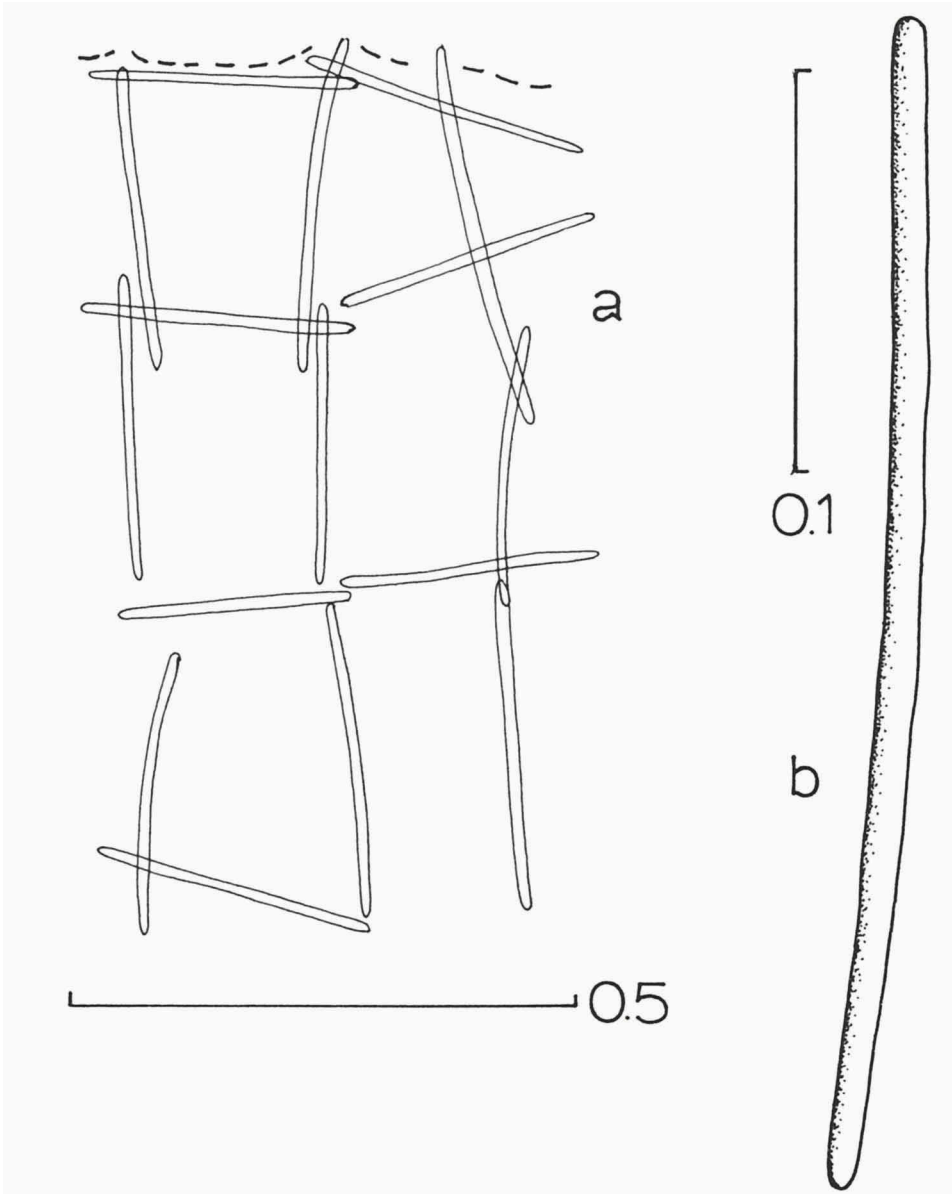


Fig. 8. *Haliclona cratera*, a. cross section, b. spicule.

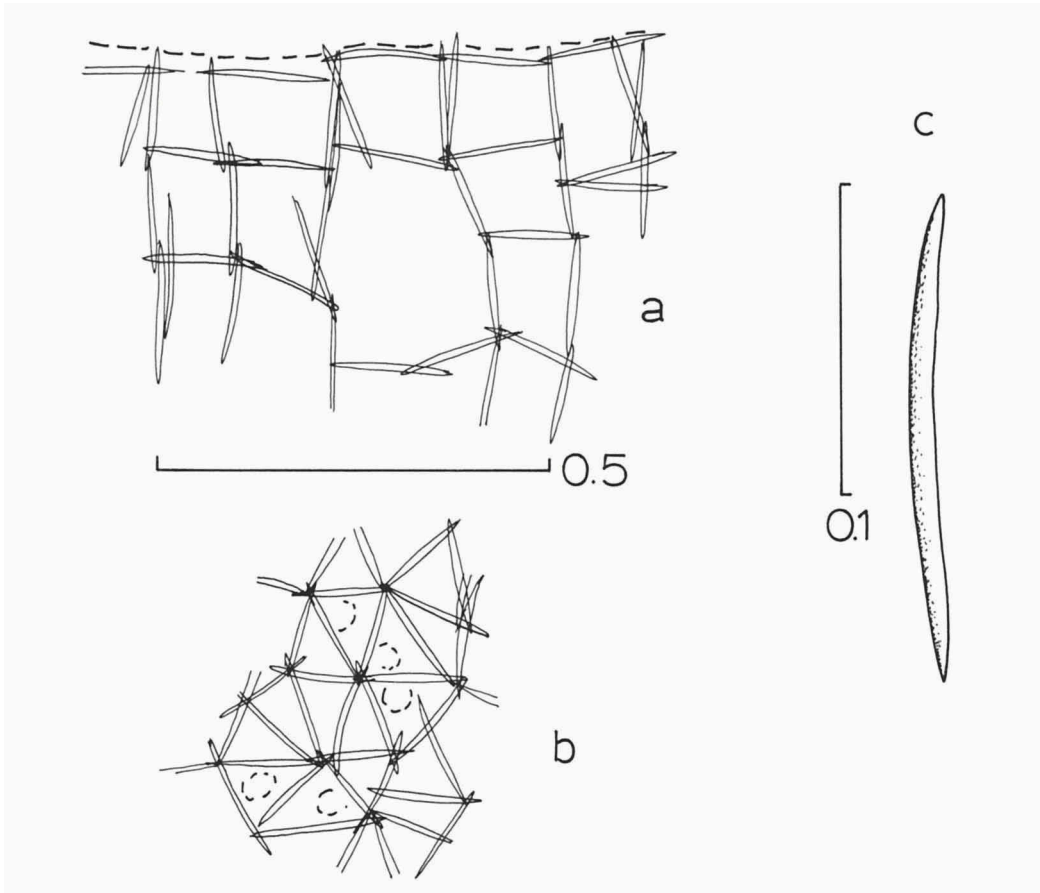


Fig. 9. *Haliclona perlucida*, a. cross section, b. tangential view of ectosome, c. spicule.

SW coast São Miguel, Azores, 37°42'N 25°27'W, 15 m, diving, 31-V-1981. Azores stat. 5, E coast Santa Maria, Maia, 36°57'N 25°01'W, rocky flat, shore collecting, J. C. den Hartog & M. S. S. Lavaleije, X-1979.

Description. – Shape, size and consistency; thickly incrusting to massive, with slightly elevated oscular rims; often broken into pieces; size of fragments up to 6 × 3 × 2 cm, so overall size probably dozens of cm, oscules 4 mm in diameter; surface smooth; consistency brittle, fragile. Colour(spirit): yellow-white. Ectosome: a regular tangential unispicular reticulum without spongin; this delicate, detachable "skin" is often partly lost. Choanosome: densely spiculated, except for rather numerous subdermal holes; skeleton largely unispicular, but occasionally paucispicular lines are found. Spicules: curved, slim oxea of fairly large size: 140-220 by 7.5-12 μm.

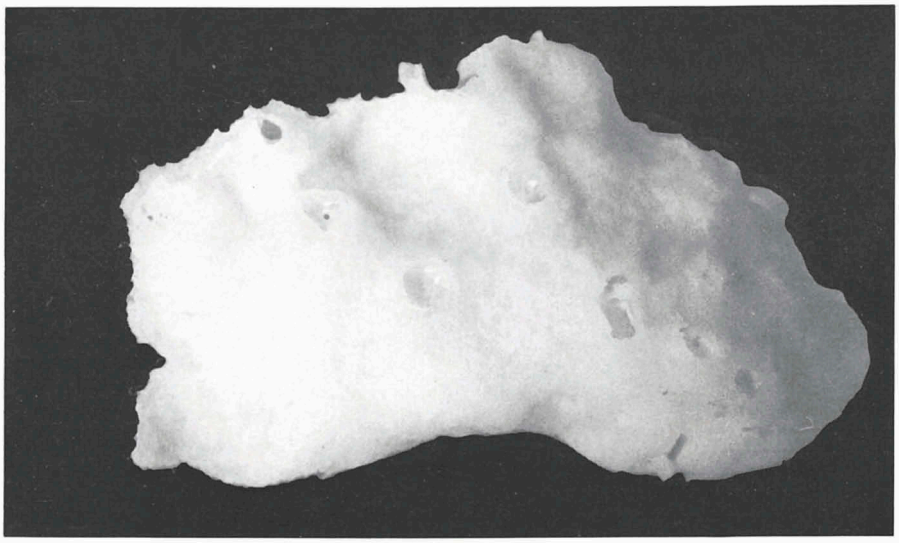


Fig. 10. *Haliclona perlucida*, habit (natural size).

Ecology. – A wide range, from the intertidal to as deep as 100-125 m, on rocks.

Distribution. – Mediterranean, Azores, Canary Islands.

Discussion. – The present material is similar to material described by Pulitzer-Finali (1983). In habit and skeletal characters the West Indian *Adocia implexiformis* Hechtel (1965) resembles the present species, but the life colour of that common form is purple and its consistency is softer (cf. also Van Soest, 1980: 18). *A. implexiformis* is here transferred to *Haliclona*.

Haliclona semitubulosa (Lieberkühn, 1859)
(fig. 11)

Halichondria semitubulosa Lieberkühn, 1859: 363.
Reniera semitubulosa; Schmidt, 1862: 75.
Pellina semitubulosa; Schmidt, 1870: 41; Griessinger, 1971: 147, figs. 2e, 10a.
Reniera stirpescens Topsent, 1893: 16, fig. 2.
Haliclona stirpescens; Burton, 1956: 125.

Material. – CANCAP 5 stat. K10, Faja da Caldeira, N coast São Jorge, Azores, 38°38'N 27°56'W, cobble beach and lagoon, 13-VI-1981.

Description. – Shape, size and consistency: fragmentary, but presumably fistulose, with incrusting base; tube fragments 0.5-1 cm in diameter, with many

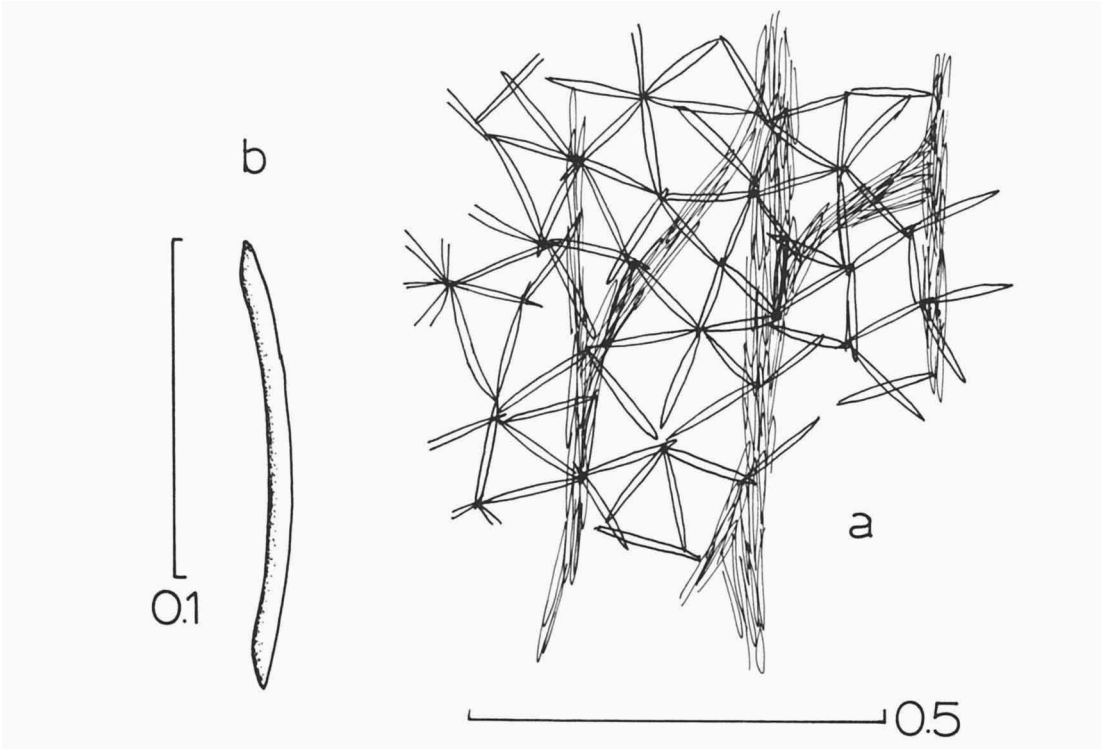


Fig. 11. *Haliclona semitubulosa*, a. tangential view of fistule wall with supporting spicule tracts, b. spicule.

thin proliferations; consistency extremely fragile. Colour(spirit): white. Ectosome: a three-dimensional single spicule reticulum overlies subdermal tracts or lines of 2-6 spicules in cross section. Choanosome: unknown, absent in fistules. Spicules: curved oxea of 120/7 μm.

Ecology. – On sheltered rocks in shallow sublittoral.

Distribution. – Mediterranean-Atlantic.

Discussion. – The species occurs to the north up to the British Channel coast (a specimen in the British Museum (NH) with an unpublished combination of names on its label (BMNH 1954: 8: 12: 242), off Plymouth, conforms to this species). Van Soest & Sass (1981) referred to British and Atlantic specimens as *Pellina fistulosa* (Bowerbank, 1866). However, through the kindness of Miss S. M. K. Stone we have now been able to study the type of *Isodictya fistulosa* (BMNH 1910: 1: 1: 270), and found it to conform to *Haliclona (Isodictya) mcandrewi* (Bowerbank, 1866); it is without the characteristic fistule architecture of "*Pellina*". *Pellina* is here included in *Haliclona*, and in

the family Haliclonidae, not in the Oceanapiidae, because the genus was formerly misinterpreted by Van Soest (1980) (cf. also below).

Haliclona angulata (Bowerbank, 1866)
(figs. 12, 13)

Halichondria angulata Bowerbank, 1866: 233.
Gellius angulatus; Ridley & Dendy, 1887: 44.
Gellius luridus sensu Topsent, 1928: 315 (not: Lundbeck, 1902).
Haliclona angulata; Burton, 1956: 124.
Non: *Gellius luridus* sensu Boury-Esnault, 1971: 332 (= *Gellius marismedi* Pulitzer-Finali, 1978).

Material. – HNlMS "Onversaagd" (CANCAP 1) stat. 46, SE of Madeira, 32°43'N 16°44'W, 218 m, tent traps overnight, 10/11-III-1976. CANCAP 5 stat. 56, S of São Miguel, Azores, 37°41'N 25°26'W, 180 m, bottom fine sand, Van Veen grab, 31-V-1981.

Description. – Shape, size and consistency: small transparent, globular specimens of about 1 cm in cross section, with apical oscule of 3 mm; surface fairly smooth; consistency slightly compressible, very fragile. Colour (spirit): transparent white. Ectosome: an irregular reticulum makes up the skeleton. Choanosome: the skeleton is predominantly confused, with irregular lines of single or two spicules, microscleres abundant, Spicules: long thin, slightly curved oxea: 380/10 μm; sigmata small, shallow-curved: 20μm; toxa with recurved apices: 75 μm.

Ecology. – On sandy bottom at greater depths.

Distribution. – Atlantic and Mediterranean, north to the British Isles and the Azores, south to the Madeira Archipelago.

Discussion. – The identification is certain, because the material has been compared with Bowerbank's type (BMNH 1910: 1: 1: 173). The species is the type of the genus *Orina* Gray (1867), which we consider, like *Gellius*, artificial because the discriminating character (possession of microscleres) is obviously primitive. We would not object to using these artificial groupings as subgeneric "taxa" until more clarity has been acquired on the phylogenetic relationship of *Haliclona* s.l.

Topsent's (1928) record of *Gellius luridus* Lundbeck (1905) is referable to the present species *teste* a slide of his specimen in the Paris Museum (MNHN D.T. 1261). Boury-Esnault's (1971) record of *G. luridus* apparently concerns the species later described as new by Pulitzer-Finali (1978), viz. *G. marismedi*. Cruz (unpublished data) found this species off Tenerife.

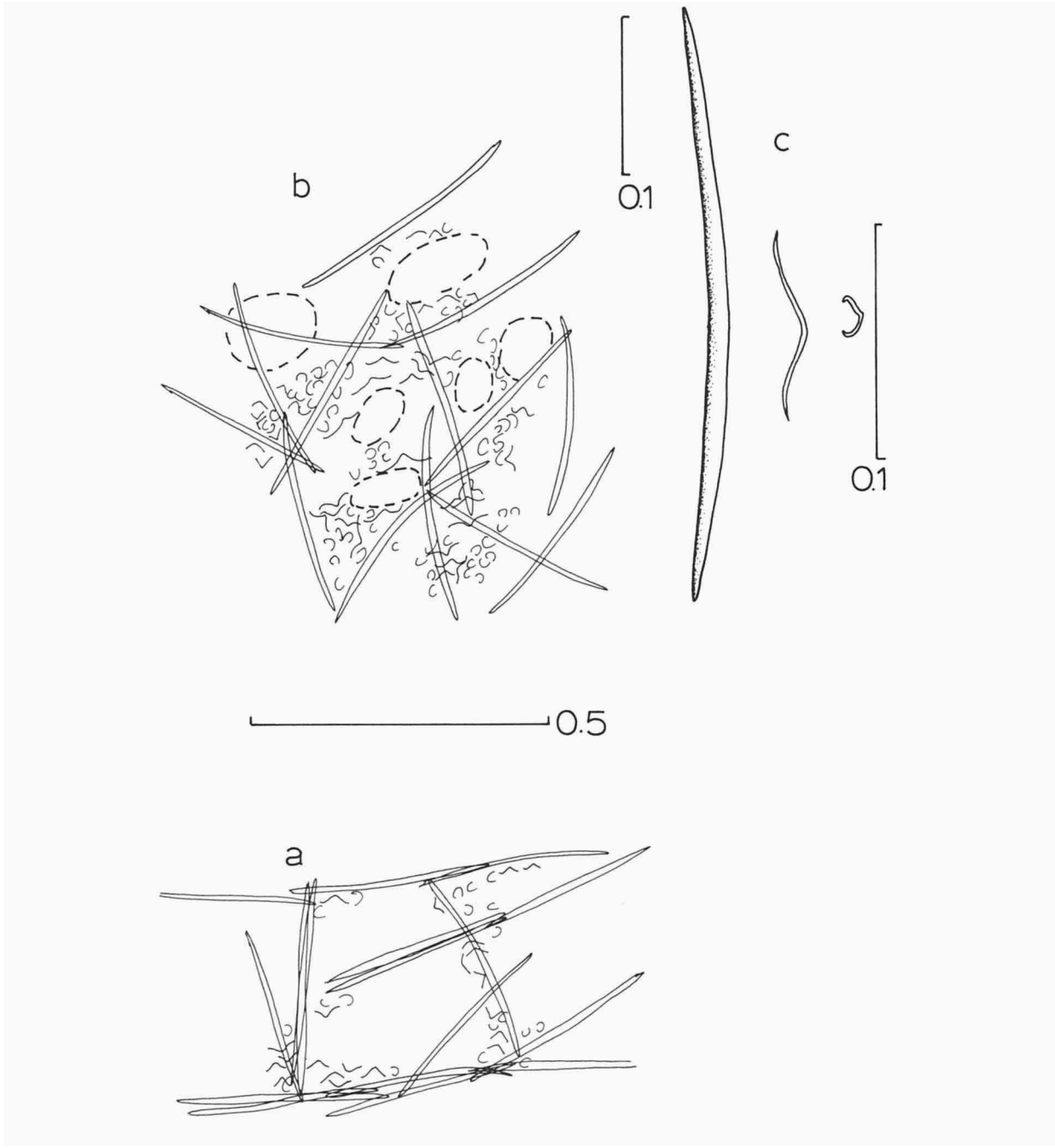
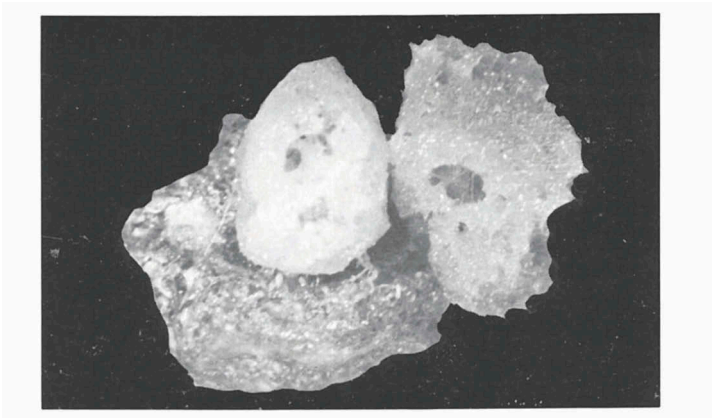


Fig. 12. *Haliclona angulata*, a. cross section, b. tangential view of ectosome, c. spicules.



Figuur 13. *Haliclona angulata*, habit (natural size).

Haliclona binaria (Topsent, 1927) comb. nov.
(fig. 14)

Gellius binarius Topsent, 1927: 18; Topsent, 1928: 317, pl. II fig. 20, pl. IX fig. 4.

Material. – CANCAP 2 stat. 99, off Punta Restinga, S of Hierro, Canary Islands, 27°37'N 18°00'W, 160 m, Van Veen grab, 3-IX-1977.

Description. – Shape, size and consistency: small, irregular lumps of 2 × 1 × 1 cm, with irregularly undulating, rough surface; oscules flush or slightly raised, 3 mm in diameter; consistency soft, easily torn. Colour (spirit): grey-brown. Ectosome: the skeleton consists of a confused mass of megascleres, which obscures an underlying isodictyal reticulation. Choanosome: an irregular isodictyal reticulation of primary lines, 2-4 spicules in cross section and single interconnecting spicules. Spicules: robust, slightly curved oxea: 330/10 μm; sigmata, angularly bent in the middle, in two size categories: 40 μm and 70 μm.

Ecology. – Deeper water.

Distribution. – Azores, Canary Islands.

Discussion. – This is a clearly defined species, differing from the sympatric *Haliclona (Gellius) fibulata* (Schmidt, 1868) in the possession of two sigma-categories (and probably also in colour). The arctic *Gellius laurentinus* Lambe (1900) is also a close relative. The identity of the present material was checked against a slide made from the holotype (MNHN D.T. 1271).

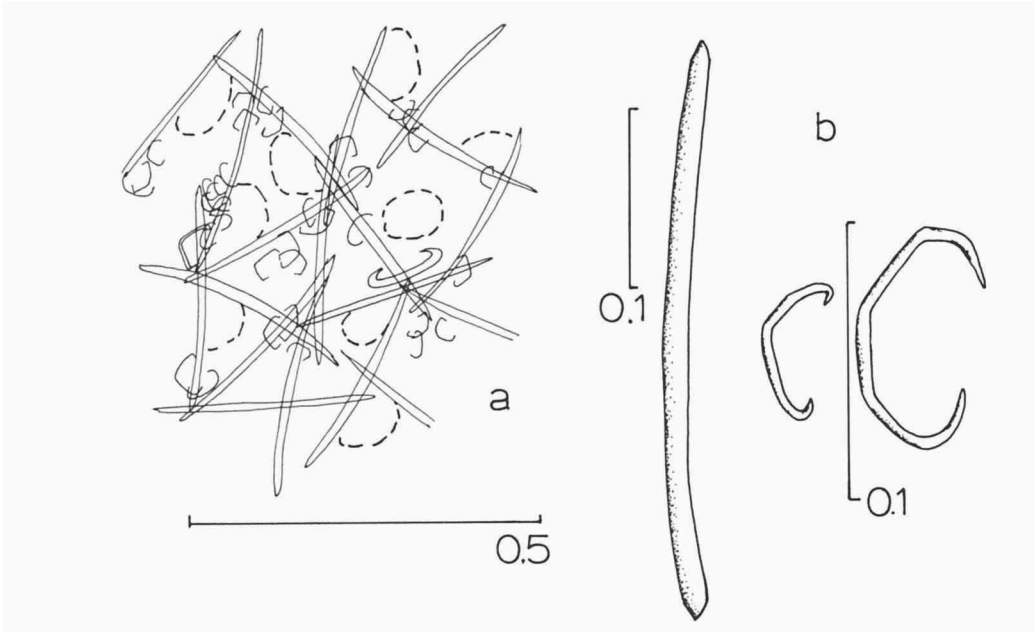


Fig. 14. *Haliclona binaria*, a. tangential view of ectosome, b. spicules.

Haliclona lacazei (Topsent, 1893) comb. nov.
(figs. 15, 16)

Gellius lacazei Topsent, 1893: 35.

Material. – HNlMS "Onversaagd" (CANCAP 1) stat. 144, off Cap Blanc du Nord, Morocco, 33°13'N 08°49'W, 100 m, Van Veen grab, sand bottom with big stones, 28-III-1976.

Description. – Shape, size and consistency: broad-based tube, 2.5 cm high, 1 cm in diameter, with a thick-walled oscule of 0.5 cm in diameter; surface smooth, fine-grained; consistency rather soft, fragile. Colour (spirit): light yellow. Ectosome: some tangential spicules may represent the ectosomal skeleton. Choanosome: the skeleton consists of an irregular mostly unispicular reticulum of megascleres, which near the periphery is organized in a ladder-like system of paucispicular primary lines interconnected by single spicules. Microscleres extremely abundant but not organized into dragmata. Spicules: megascleres robust, slightly curved, abruptly pointed oxea, averaging 320/14 μm; microscleres thin rhaphides (possibly derivates of toxa): 75 μm.

Ecology. – On sandy bottom.

Distribution. – Mediterranean – Atlantic.

Discussion. – The species conforms to Topsent's (1892b) genus *Rhaphisia*.

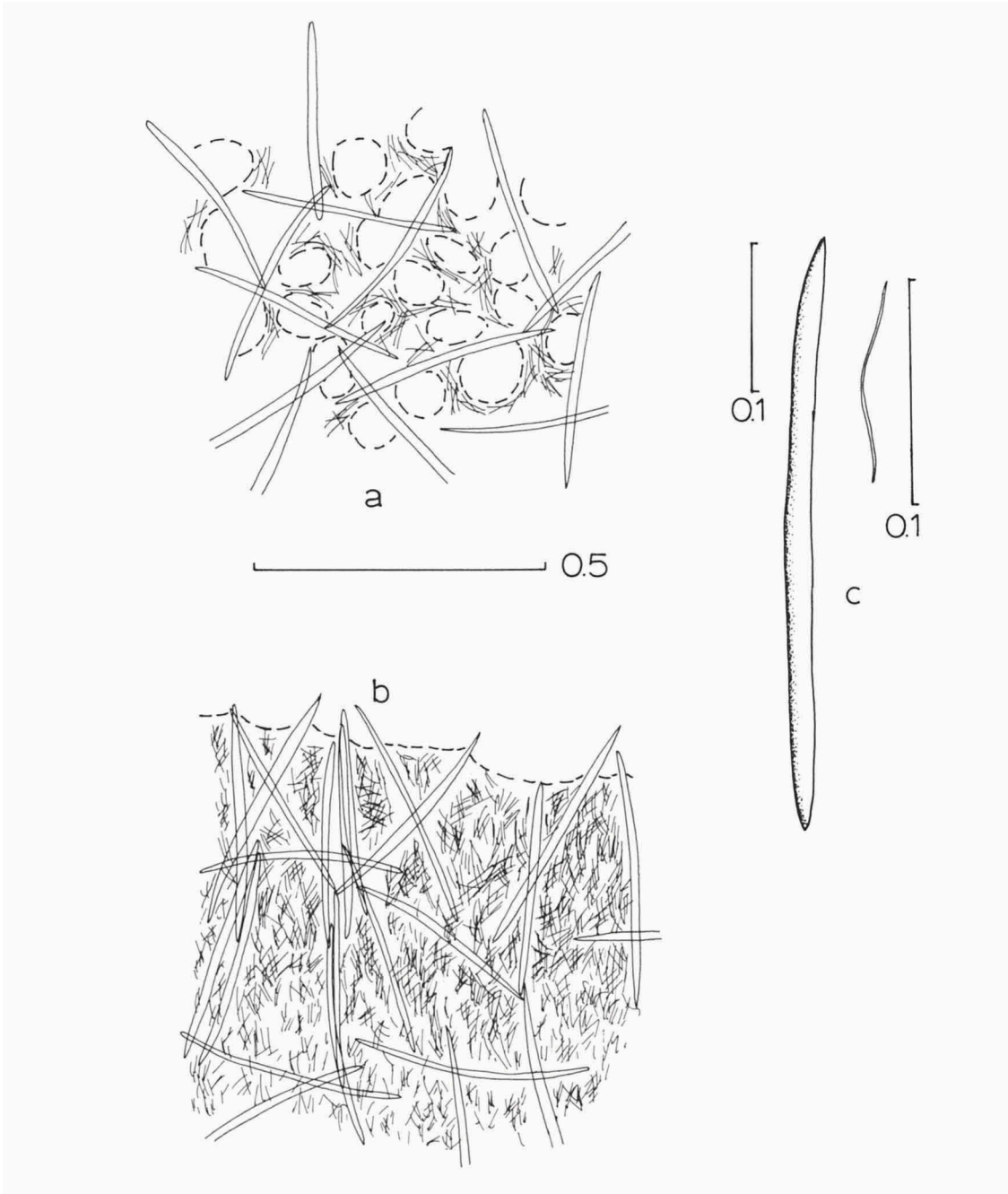


Fig. 15. *Haliclona lacazei*, a. tangential view of ectosome, b. cross section showing abundance of microscleres, c. spicules.

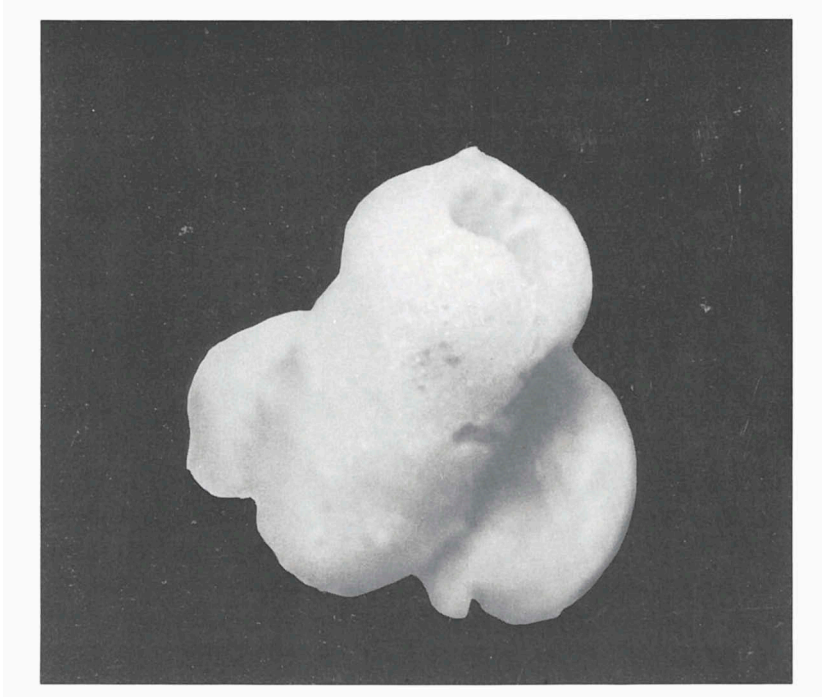


Fig. 16. *Haliclona lacazei*, habit (natural size).

De Laubenfels (1936a) misinterpreted the genus, referring it to the Halichondrida and assigning unrelated species to it. The type species of *Rhaphisia* is *R. laxa* (Topsent, 1892b), a species so similar to the present one, that Pulitzer-Finali (1978) synonymized the two. A re-examination of a slide of the holotype of *R. laxa* (MNHN D.T. 299) revealed the presence of two sizes of rhaphides (75-100 μm and 30-40 μm), both without exception in dragmata. In *lacazei* there is only one rhaphide-category and they are not in dragmata.

Thrinacophora spissa Topsent (1892a) is very similar to *Rhaphisia laxa* (checked on a slide made from the holotype, MNHN D.T. 1051), but has robust toxa in addition to the trichodragmata. In a later paper Topsent (1904) referred the species to *Rhaphisia*. It is possible that the rhaphides constitute a derived character, independently acquired through modification of the (primitive) toxa. If that has been the case, then *Rhaphisia* may be a good (sub)-genus. In view of the great similarity in architecture and megasclere size it is at least likely, that the three species with rhaphides are closely related.

OTHER *HALICLONA* SPECIES IN THE AREA STUDIED

Haliclona citrina (Topsent, 1892b) and *H. mediterranea* Griessinger (1971) are both reported from the Azores region by Boury-Esnault & Lopez (in the press).

H. simulans (Johnston, 1842) was found near Tenerife by Cruz (pers. comm.).

H. rosea sensu Burton (1956) has been reported from West Africa; this is a problematic record, since the specimen concerned is most probably not conspecific with *Isodictya rosea* Bowerbank (1866). *H. labyrinthica* sensu Burton (1956) from West Africa is probably the same ill-known species, and definitely not conspecific with *Reniera labyrinthica* Schmidt (1862), which is known to be a *Hymeniacidon*. Quite recently, Cruz (pers. comm.) found the same species off Tenerife, and his material shows definite similarities with the subtropical western Atlantic *Haliclona tubifera* (George & Wilson, 1919) (see also Van Soest (1980), as *Reniera tubifera)*.

H. coriacea sensu Burton (1956) conforms to *H. implexa* (cf. above). *H. fulva* sensu Burton (1956) is either that species or possibly *H. perlucida* (Griessinger, 1971). *H. fulva* is also found near Tenerife (Cruz, pers. comm.).

H. stirpescens sensu Burton (1956) quite probably conforms to *H. semitubulosa* (cf. above).

H. perforata Lévi (1959) is only known from one record from West Africa.

H. coerulescens (Topsent, 1918) (as *Reniera*) is only known from São Tomé; it is characterized by its blue colour and has spicules of 130-150 by 3-4 μm in size (measured in a slide made from the holotype, MNHN D.T. 2059). De Laubenfels' (1936b) record of this species from the West Indies is incorrect (cf. Van Soest, 1980). A close relative of this species might be *Reniera curacaoensis* Van Soest (1980).

H. aquaeductus (Schmidt, 1862) is reported from the Azores by Boury-Esnault & Lopez (in the press) (as *Reniera*).

H. plana (Topsent, 1893), *H. mucosa* (Griessinger, 1971), and *H. valliculata* (Griessinger, 1971) were found near Tenerife by Cruz (pers. comm.)

H. flagellifer (Ridley & Dendy, 1886) was reported from depths greater than 200 m in the Azores region by Topsent (1904) (as *Gellius*), but since this species is known from shallower depths elsewhere in its range (NW Atlantic (cf. Lambe, 1900), and the West Indies (cf. Van Soest, 1980)), it is here predicted to occur more shallow in the studied area, too.

H. fibulata (Schmidt, 1862) was reported from the Azores by Topsent (1892a, 1904) (as *Gellius*) and from Tenerife (Cruz, pers. comm.). It is a common species in the Mediterranean, which was recently found in the British

Isles (Wales, pers. comm. W. C. Jones, and SW. Ireland, De Weerdt, in preparation).

H. abbreviata (Topsent, 1918) (as *Gellius*) was reported only once from West Africa (cf. above).

H. spissa (Topsent, 1892a) (as *Thrinacophora*) was described from the Azores region (cf. above).

H. marismedi (Pulitzer-Finali, 1978) (as *Gellius*) was found near Tenerife by Cruz (pers. comm.).

Other *Haliclona* (s.l.) species described from the area studied must be referred to other genera: *H. parasimulans* Lévi (1959) and *H. limbata* (Montagu, 1818) sensu Topsent (1904) to *Acervochalina, Reniera tufa* Ridley & Dendy (1887) to *Pachypellina*, and *Gellius macrosigma* Topsent (1892a) to the Poecilosclerid genus *Coelosphaera.*

Genus **Dendroxea** Griessinger, 1971

Dendroxea lenis (Topsent, 1892b) (figs. 17, 18)

Reniera lenis Topsent, 1892b: xix.

Material. – CANCAP 5 stat. D8, N coast São Jorge, E of Punta da Caldeira, Azores, 38°37'N 28°54'W, 15 m, diving, exposed coastal area with large boulders. 4-VI-1981.

Description. – Shape, size and consistency: thin, smooth incrustations, each about 3 × 1 × 0.5 cm; surface level, without apparent oscules; consistency limp, soft, somewhat viscous. Colour(spirit): light brown. Ectosome: distinct pore-fields overlie subdermal holes; no special dermal skeleton, just some loose tangential spicules. Choanosome: skeleton consisting of almost plumose, branching spicular tracts, which seem to thin out towards the surface; between the primary lines there is a renieroid reticulation of single spicules and many irregularly strewn loose spicules; the spicule tracts rise up from a basal densely reticulated mass of spicules. Spicules: thin, slim oxea, averaging 100/3 μm.

Ecology. – On rocks in the sublittoral.

Distribution. – Mediterranean, Azores, Canary Islands.

Discussion. – The identification was made using a slide of the type specimen (MNHN, unnumbered); this contained more spongin, but was otherwise similar. Cruz (pers. comm.) has observed the species off Tenerife. The genus *Dendroxea* seems to be valid, though only the type species can be assigned to it with certainty. Possibly, *Reniera carmabi* Van Soest (1980) from Curaçao is also a *Dendroxea*.

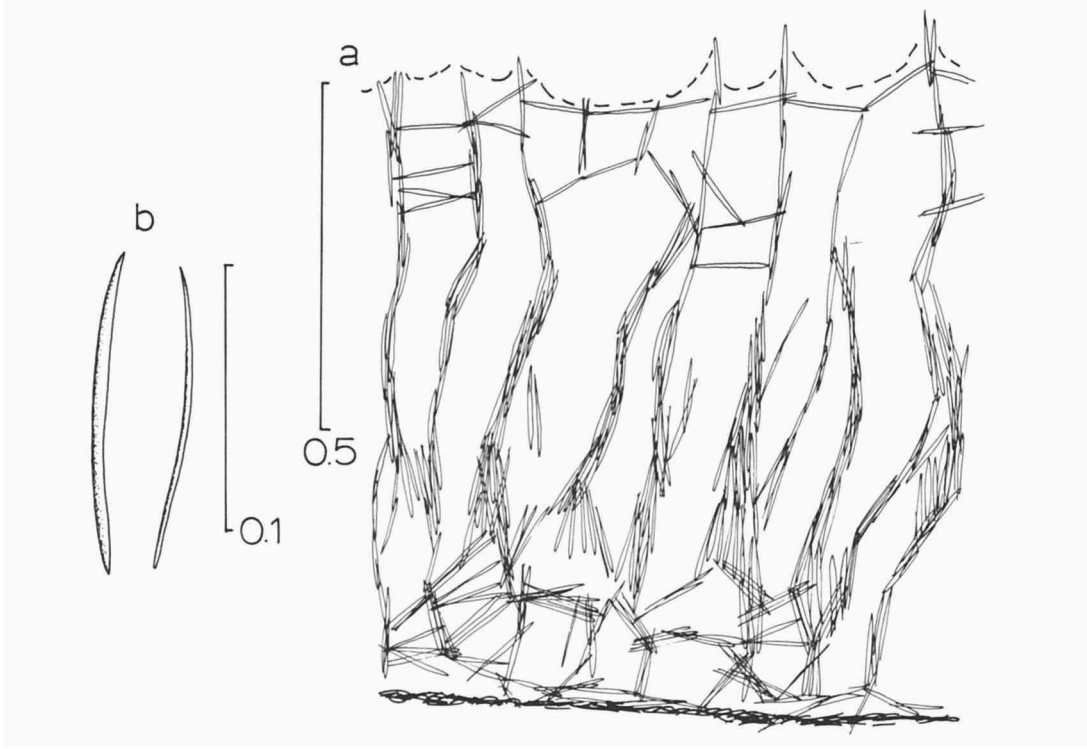


Fig. 17. *Dendroxea lenis*, a. cross section through entire animal, b. spicules.

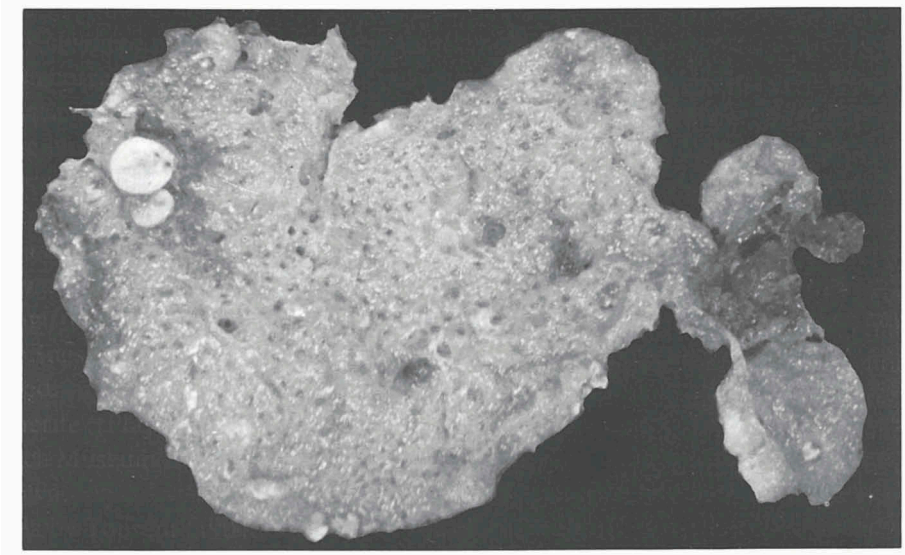


Fig. 18. *Dendroxea lenis*, habit (×2).

Genus **Acervochalina** Ridley (1884)

Acervochalina fertilis (Keller, 1879) comb. nov.
(figs. 19, 20)

Chalinula fertilis Keller, 1879: 318, pls. 18-20; Griessinger, 1971: 163, fig. 13a.

Material. – CANCAP 5 stat. K10, N coast São Jorge, Faja da Caldeira, Azores, 38°38'N 27°56'W, littoral, cobble beach and lagoon, 13-VI-1981.

Description. – Shape, size and consistency: a single, massively incrusting specimen with irregular lobes; size 10 × 2.5 × 1.5 cm; oscules flush, 2-3 mm in diameter; surface hispid; consistency, soft, limp, highly compressible. Colour (spirit): purplish grey-brown. Ectosome: spicules and fibre terminations pierce the organic dermis, no special ectosomal skeleton. Choanosome: the skeleton is a loosely arranged open reticulation of paucispicular primary lines (2-6 spicules in cross section) and interconnecting uni- paucispicular lines (1-4 spicules in cross section), normally of more than one spicule in length. All skeletal lines are enveloped in moderate quantities of spongin. Spicules: short, robust, gradually but sharply pointed oxea of 100-120 by 7-10 μm in average size.

Ecology. – On rocks in the littoral.

Distribution. – Mediterranean, Azores, Canary Islands (cf. below). This is the first record from outside the Mediterranean.

Discussion. – Topsent (1938) synonymized this species with *Chalinula renieroides* Schmidt (1868), the type species of the genus *Chalinula* Schmidt (1868), but we agree with Griessinger (1971), that this is incorrect. Schmidt's description and also Topsent's redescription make it clear that this species very probably does not have the characteristic interconnecting lines of more than one spicule in length. The species remains ill-known but probably conforms to *Haliclona*. Griessinger (1971) and Boury-Esnault & Lopez (in the press) continue to use the genus name *Chalinula* for *fertilis* and *limbata*, but this is incorrect in view of the characters described in *C. renieroides*. *Acervochalina* Ridley (1884) was erected for *Spongia limbata* Montagu (1818) and thus constitutes the earliest available replacement name. Van Soest's (1980) synonymization of *Acervochalina* and *Haliclona* is here refuted.

The present species was recently collected on Tenerife (Playa de las Teresitas, 2m, specimen in the collections of the Zoölogisch Museum Amsterdam, reg. no. POR. 5191); its life colour was purple-brown.

Acervochalina limbata is reported from the studied area by Topsent (1904: Azores). Other *Acervochalina* species in the area are: *Haliclona parasimulans*

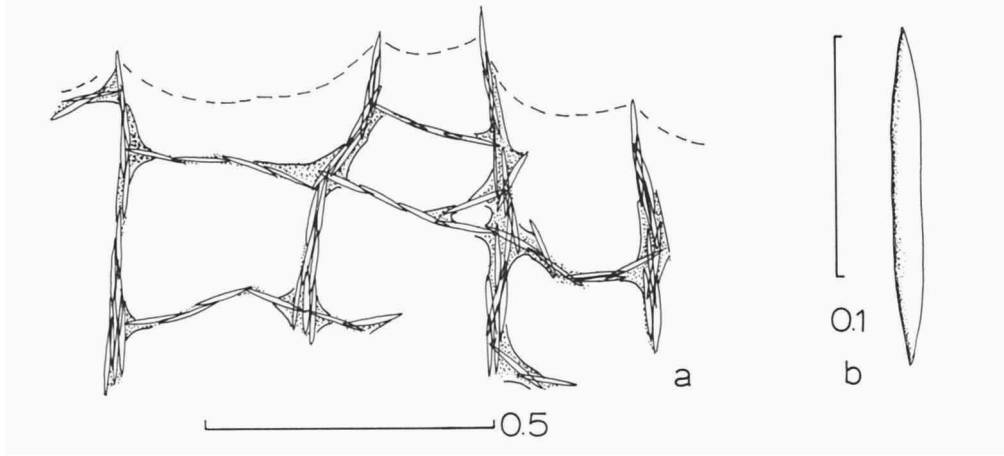


Fig. 19. *Acervochalina fertilis*, a. cross section, b. spicule.

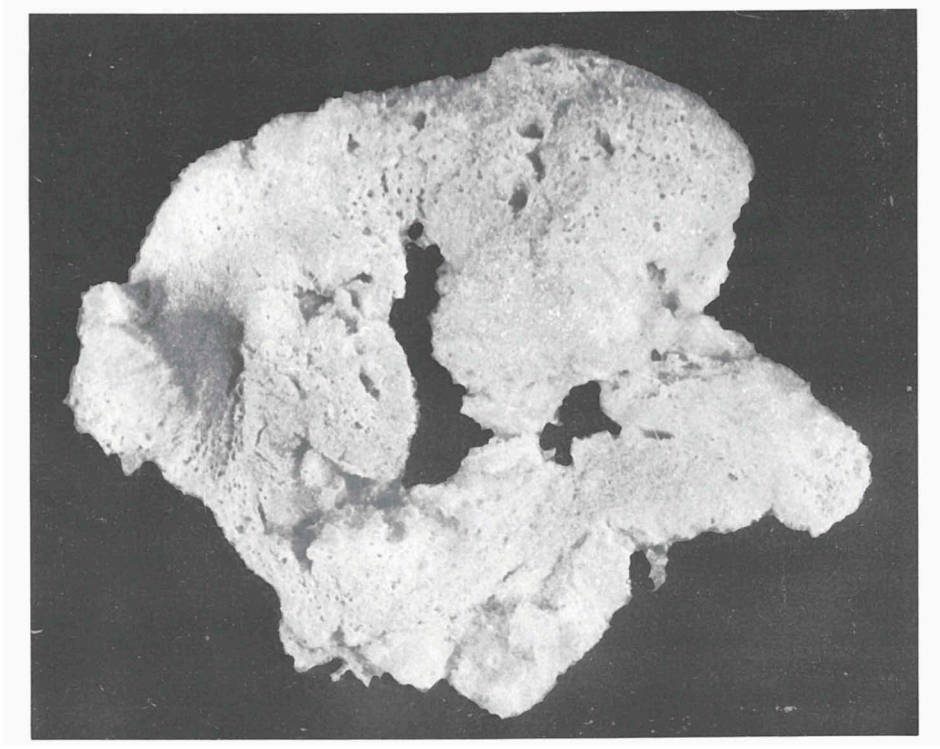


Fig. 20. *Acervochalina fertilis*, habit (natural size).

Lévi (1959), described from West Africa, but recently also found on Tenerife (Cruz, pers. comm.), and *"Chalinula"* spec. nov. of Boury-Esnault & Lopes (in the press) from the Azores.

A twin species of *A. fertilis* seems to be *Haliclona molitba* De Laubenfels (1950), from the West Indian region (cf. Van Soest, 1980); differences are the considerably thinner spicules in the latter.

Family Niphatidae Van Soest, 1980

The family Niphatidae is not represented in the material of the CANCAP-expeditions, but is known from the area by three species. *Gelliodes fayalensis* Topsent (1892a) and *G. bifacialis* Topsent (1904) were reported from the Azores, and *G. bifacialis* was also found near Porto Santo. Slides of the type specimens (MNHN D.T. 1058, 1264) revealed that they are typical *Gelliodes* species, probably related to *G.leucosolenia* De Laubenfels (1934) from deep water in the West Indies.

A third Niphatiid is *Aka infesta* (Johnson, 1899), originally reported from Madeira, together with two probable synonyms (*Acca insidiosa* Johnson (1899) and *A. rodens* Johnson (1899)). This species excavates corals (e.g. *Dendrophyllia, Lophelia*) and mollusc shells. It was described from various Atlantic and Mediterranean localities under the name *Cliona labyrinthica* Hancock (1845): e.g. Canary Islands (Cruz & Bacallado, 1983a), Ireland (Stephens, 1914), Sweden (Alander, 1942, as *Aka*). We think, that *Aka* De Laubenfels (1936a) (replacement name for the preoccupied *Acca* Johnson, 1899) shows important similarities with the boring sponge genus *Siphonodictyon* Bergquist (1965). This will be elaborated in a future paper.

Family Callyspongiidae De Laubenfels, 1936a

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

Siphonochalina Schmidt, 1868: 7.

Callyspongia simplex Burton, 1956
(figs. 21, 22)

Callyspongia simplex Burton, 1956: 126, fig. 2
Callyspongia aspinosa Lévi, 1959: 135, pl. VI fig. 8, text-fig. 29.
Callyspongia septimaniensis Griessinger, 1971: 164, fig. 15c.

Material. – HNlMS "Onversaagd" (CANCAP 1) stat. 14, SE coast Madeira, near Caniçal, 32°44'N 16°44'W, diving, 0-22 m, 2-III-1976. HNlMS "Onversaagd" (CANCAP 1) stat. 16, SE

coast Madeira, Ponta de San Lourenço 32°44'N 16°44'W, rocky shore with tide pools, 3-III-1976. HNlMS "Onversaagd" (CANCAP 1) stat. 27, SE coast Madeira, near Agua de Peña, 32°41'N 16°46'W, diving to 25 m, 9-II-1976. HNlMS "Onversaagd" (CANCAP I) stat. 39, SE coast Madeira, near Caniçal, 32°44'N 16°44'W, diving and snorkling, 0-22 m, 10-III 1976. HNlMS "Onversaagd" (CANCAP 1) stat. 58, SE coast Madeira, near Caniçal, 32°44'N 16°44'W, diving to 20 m, 12-III-1976. HNlMS "Onversaagd" (CANCAP 1) stat. 66, SE coast Madeira, Ponta do Furado, 32°44'N 16°41'W, diving to 30 m, 3-III-1976. CANCAP 2 stat. D3, S coast Fuerteventura, near Punta da Gran Tarajal, Canary Islands, 28°12'N 14°01'W, diving 5-15 m, rocky bottom and sand, 29-VIII-1977. CANCAP 3 stat. 17, S of Porto Santo, 33°02'N 16°21'W, 50-110 m, dredge, sandy-stony bottom, 15-X-1978.

CANCAP 3 stat. 30, S of Porto Santo, 33°01'N 16°21'W, 65-135 m, dredge, 6-X-1978. CANCAP 3 stat. D01, E of Baixo, near Porto Santo, 33°N16'23'W, diving 0-15 m, 15-X-1978. CANCAP 3 stat. D02, E of Baixo, near Porto Santo, 33°N 16°23'W, diving 0-20 m, 16-X-1978. CANCAP 6 stat. 136, S of São Vicente, Cape Verde Islands, 16°46'N 25°02'W, 57-61 m, dredge, sandy bottom, 19-VI-1982.

Description. – Shape, size and consistency: predominantly ramose, upright or repent, branching, but occasionally massively incrusting (littoral); oscules in rows along the branches or on the apices of volcanoe-shaped cones, 2-6 mm in diameter; size of branching specimens up to 20 cm, diameter of branches 0.5-1 cm; surface smooth; consistency compressible, resilient, but sometimes rather limp. Colour(spirit): reddish brown. Ectosome: the usual tangential double-meshed reticulum; large meshes triangular with sides of 120 μm, small meshes 40 μm on the average. Choanosome: the skeleton consists of a rectangularly meshed system of primary fibres, 20-35 μm in diameter, lying at distances of 170-200 μm, and having a core of 2-3 spicules, and secondary interconnecting fibres of 7.5-15 μm in diameter, with a core of one spicule, forming meshes of 60-200 μm in size; some peripheral condensation is evident; compared to the average West Indian *Callyspongia* the coring is heavy, the spicules are comparatively large, and loose interstitial spicules are not infrequent. Spicules: curved oxea, gradually tapering to sharp points: 50 by 2-4 μm.

Ecology. – On various substrates from the littoral down to at least 100 m.

Distribution. –Mediterranean-Atlantic.

Discussion. – The present material was compared to Burton's type in the Copenhagen Museum. *C. simplex* is unlike any West Indian species of *Callyspongia*, perhaps with the exception of *C. arcesiosa* De Laubenfels (1936a), which is smaller in habit, but differs in the much more delicate architecture and overall fragility. Lévi's and Griessinger's specimens are considered conspecific, notwithstanding the discrepancies with our material, which were apparent in the holotype slides of *C. aspinosa* (MNHND.CL. 1363) and *C. septimaniensis* (D.I.M.G. 10).

Burton (1956) reported *Siphonochalina coriacea* Schmidt (1868) from the studied area (as *Haliclona*); this material is not conspecific with Schmidt's

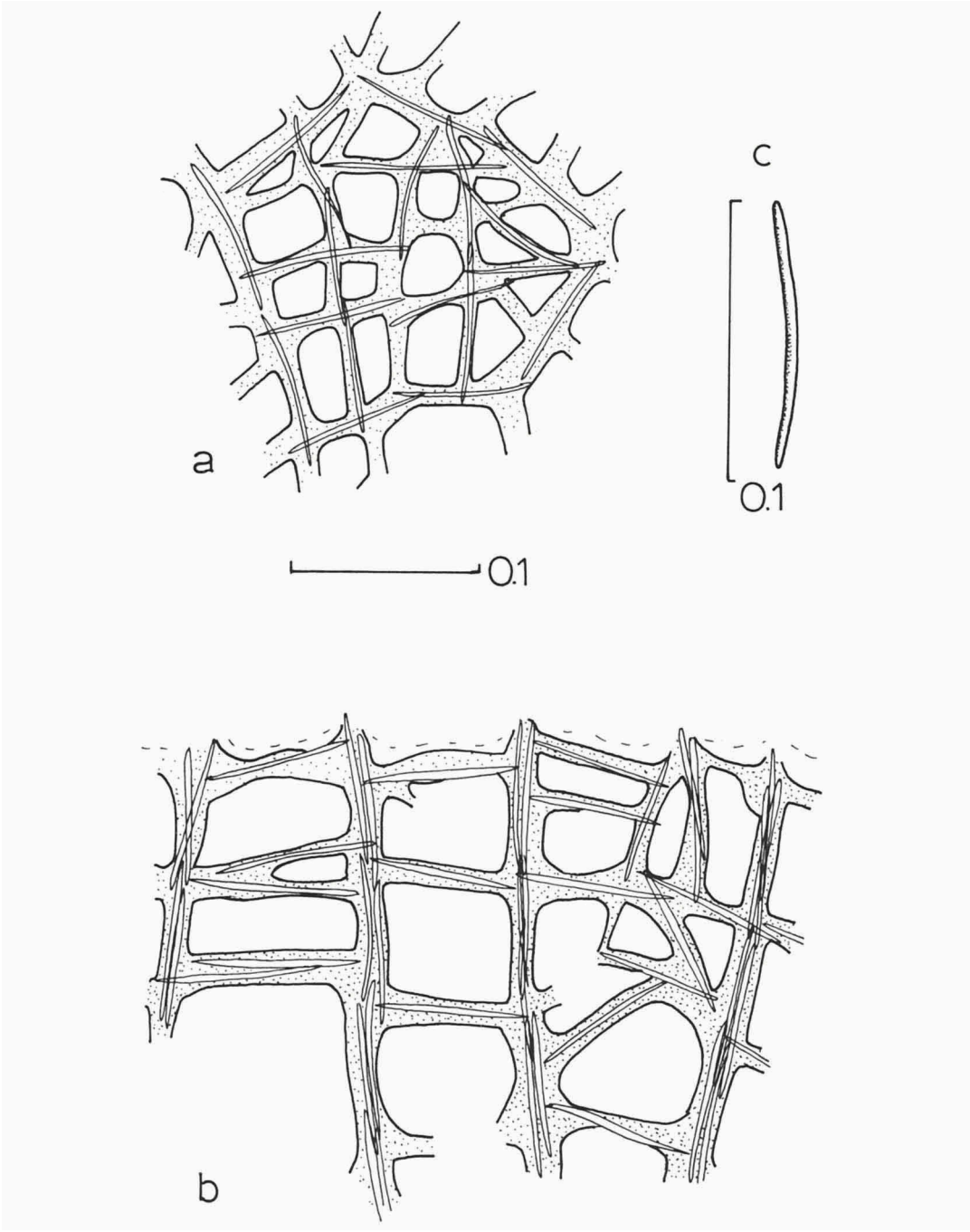


Fig. 21. *Callyspongia simplex*, a. tangential view of ectosomal skeleton, b. cross section, c. spicule.

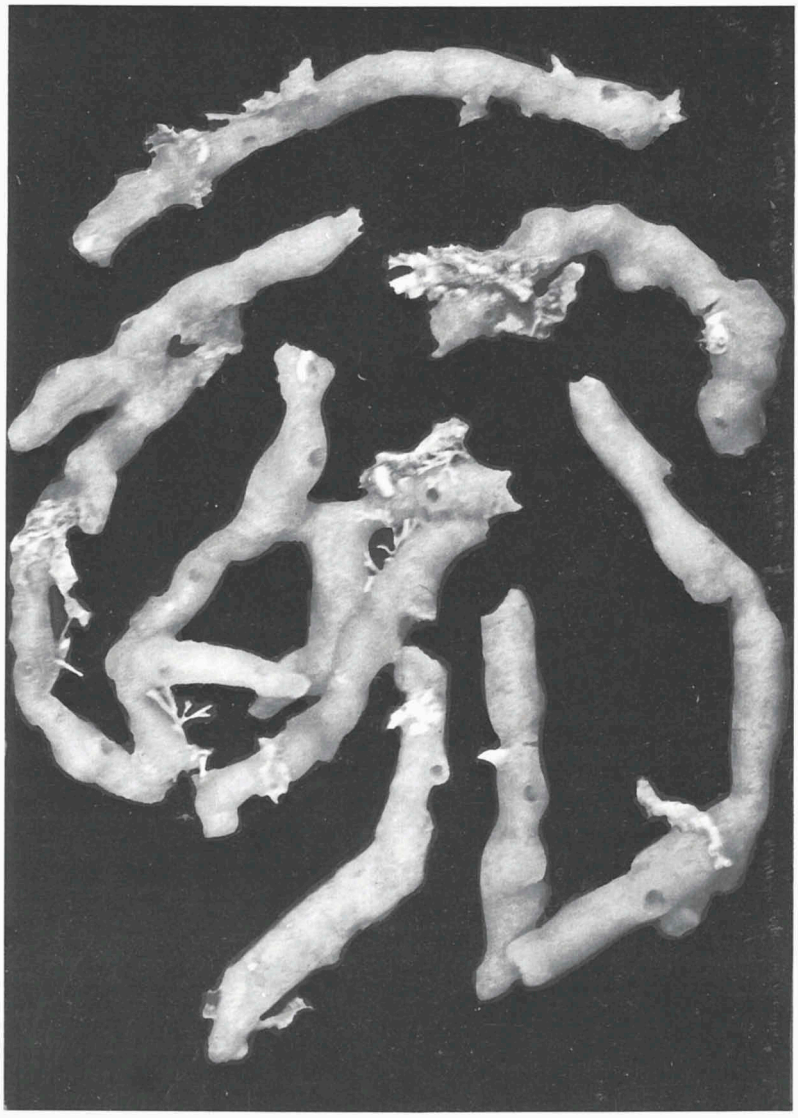


Fig. 22. *Callyspongia simplex*, habit (×0.5).

species, but conforms to *Haliclona implexa* (cf. above). *Siphonochalina coriacea* is a *Callyspongia* species, as could be verified from a slide of Schmidt's type in the Paris Museum (MNHN D.T.2283). Since *coriacea* is the type of *Siphonochalina*, this genus falls into the synonymy of *Callyspongia* (contrary to Van Soest, 1980). *Callyspongia coriacea*, which has only been reliably

described from the Mediterranean, differs from the present species sharply in the tube-shaped habit.

Family Petrosiidae Van Soest, 1980

Genus **Petrosia** Vosmaer, 1885

Petrosia ficiformis (Poiret, 1789) (figs. 23, 24)

Spongia ficiformis Poiret, 1789: 61.

Material. – HNlMS "Onversaagd" (CANCAP 1) stat. 109, SE coast Madeira, near Agua de Peña, 32°41'N 16°46'W, diving to 25 m, 17-III-1976. CANCAP 2 stat. D7, Puerto Naos, S coast Hierro, Canary Islands, 27°29'N 18°00'W, diving 10-15 m, rocky bottom, 7-IX-1977. CANCAP 2 stat. D9, Tecerone, S coast Hierro, Canary Islands, 27°41'N 18°02'W, diving 10-15 m, rocky bottom, 9-IX-1977. CANCAP 2 stat. 47, Punta da Gran Tarajal, SE Fuerteventura, Canary Islands, 28°11'N 14°02'W, 100-125 m, Agassiz-trawl, 27-VIII-1977. CANCAP 3 stat. D6, Enseada das Cagarras, S coast Selvagem Grande, 30°08'N 15°52'W, diving 5-20, 21-X-1978. CANCAP 5 stat. D10, S of Santa Cruz, E coast Flores, Azores, 39°26'N 31°09'W, diving to 15, sheltered cove in large bay, 9-VI-1981. CANCAP 6 stat. 174, NW of São Vicente, Cape Verde Islands, 16°55'N 25°02'W, 75 m, trawl, sand, 22-VI-1981.

Description. – Shape, size and consistency: the specimens vary from thick knolls of up to 6 × 3.5 × 5 cm, and ramose-repent forms of 2 cm in diameter, to laterally flattened plates and flabelliform masses of up to 13 × 13 × 10 cm; some massive specimens seem to consist of coiled, fused branches and oscular cones; oscules flush or with a slightly raised thin rim, 0.5-1 cm in diameter; surface smooth but rough to the touch; consistency slightly compressible to stony, crumbly. Colour(spirit): grey-white, greenish or mottled with brownish and greenish tinges. Ectosome: a distinct, detachable crust, consisting of a more or less unispicular tangential reticulum or feltwork of spicules, carried by the brushed endings of choanosomal spicule tracts; there is much variation in this subdermal supporting system: in some specimens there are clearly isotropic, round meshes, forming a neat reticulation, in others the tracts are ill-defined and form a confused mass, with many loose spicules; the smallest category of spicules is concentrated at the surface. Choanosome: the specimens referable to this species show a large variation, especially in choanosomal skeletal structure and spicule sizes; at first it was thought that several species were represented, but comparison with Mediterranean specimens of *P. ficiformis* in the collections of the Zoölogisch Museum Amsterdam, and with data in the literature (e.g. Rützler, 1965, and Pulitzer-Finali, 1978)

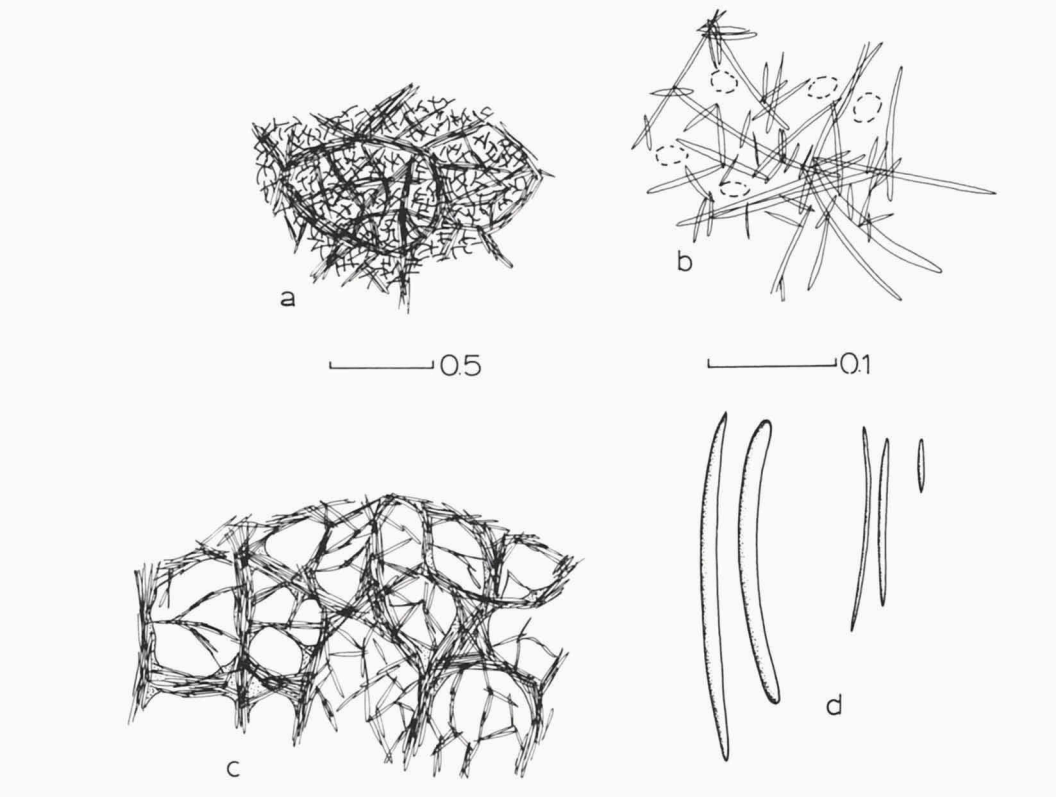


Fig. 23. *Petrosia ficiformis*, a. tangential view of ectosomal region, b. detail of a., c. cross section, d. spicules.

convinced us, that all specimens belong to a single species. The skeleton is made up of thick spicule tracts of a varying number of spicules in cross section, enclosing wide, irregular meshes, filled with a reticulation of single spicules; mesh size in the interior 500-1000 μm, but towards the periphery this is condensed; the strength of the choanosomal tracts is largely determined by spicule size. Spicules: these vary in shape, categories and sizes; some specimens have only two size categories, others have three; some specimens have many strongylote modifications, others have only oxea; the following categories and sizes may be found: small oxea, concentrated in the ectosome: 45/1 μm, 50/3.5 μm, 65/5 μm; middle-sized oxea: 120-200 by 1.5-2.5 μm, 140/7.5 μm; large sized oxea: 240 by 10-15 μm.

Reproduction. – Three specimens contained numerous eggs of 80-200 μm in size, some of which were in cell division.

Ecology. – On volcanic rocks from 5-125 m.

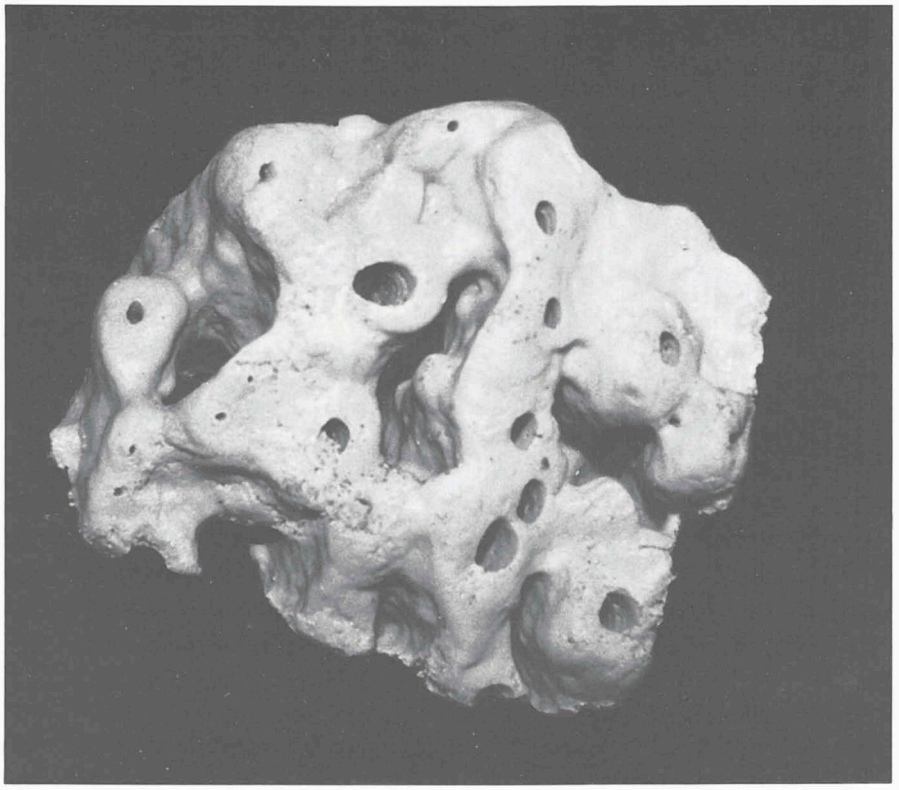


Fig. 24. *Petrosia ficiformis*, habit (×0.4).

Distribution. – Mediterranean, Azores, Canary Islands.

Discussion. – The large variation in characters such as spicule size and skeletal architecture was already noted by previous authors, but is still striking, since Haplosclerid species descriptions and generic and familial allocations depend so heavily on these characters.

The present species resembles in many details the West Indian species *Cribrochalina dura* (Wilson, 1902) as extensively redescribed by Wiedenmayer (1977). The only noteworthy difference probably is its persistent repent habit. The species is here transferred to *Petrosia*. It is quite possible that Wilson's name is a junior synonym of *Cribrochalina cretacea* Schmidt (1870) (a fragment of the type is present in the collections of the British Museum (NH)). It remains to be determined whether the type species of *Cribrochalina*, viz. *C. infundibulum* Schmidt (1870) (a junior synonym of *Spongia vasculum* Lamarck, 1814), also conforms to *Petrosia*. If so, then the name *Petrosia* is threatened by the older name *Cribrochalina*.

Petrosia canariensis spec. nov.
(figs. 25-27)

Holotype. – RMNH Por. 1306, CANCAP 2 stat. 118, off Punta Orchilla, SW Hierro, Canary Islands, 27°42'N 18°09'W, 200-1000 m, dredge, rocky bottom, 5-IX-1977.

Description. – Shape, size and consistency: club-shaped, not unlike typical *Petrosia ficiformis*, but somewhat more irregular in overall shape, with the apical oscule placed asymmetrically; size 6 cm high, 6 cm across; consistency stony, crumbly. Colour (spirit): off-white. Ectosome: a close-meshed reticulum of the smaller category of strongyles. Choanosome: a fairly tight mass of strongyles makes up the skeleton; towards the periphery some organization into short bundles of a few strongyles each is found, but the general aspect is

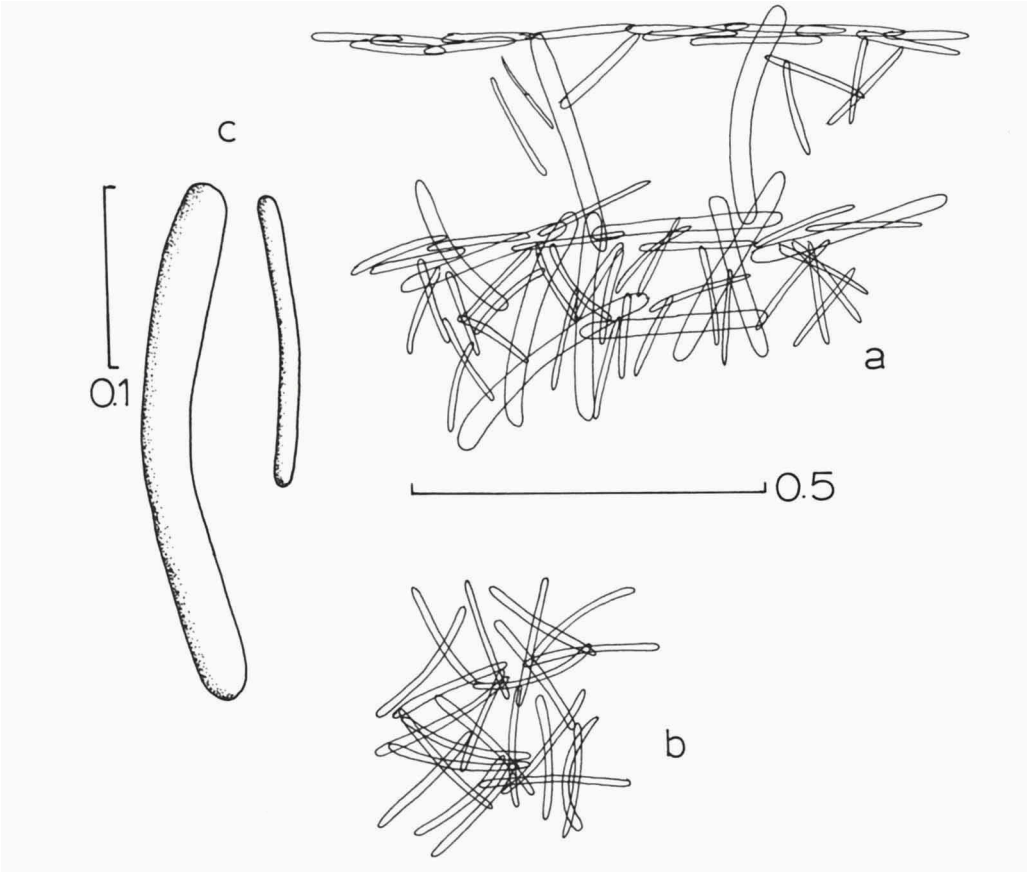


Fig. 25. *Petrosia canariensis* spec. nov., a. cross section, b. tangential view of ectosomal crust (detail), c. spicules.

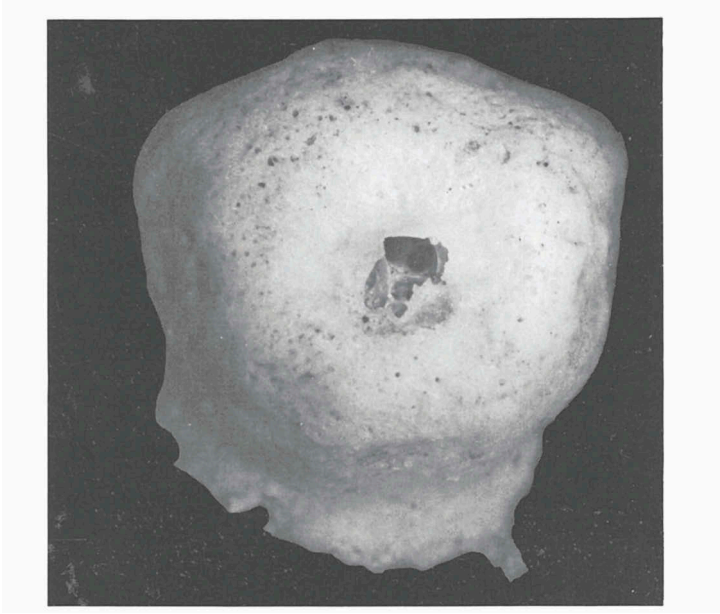


Fig. 26. *Petrosia canariensis* spec. nov., holotype RMNH 1306 (×0.5).

confused with high spicular density. Spicules: strongyles in two distinct size categories: 135/8 μm (concentrated in the ectosome) and 290/24 μm.

Ecology. – On volcanic rocks in deeper water.

Distribution. – Known only from the type locality (cf. fig. 27).

Discussion. – The present specimen differs from all other *Petrosia* species known from the Atlantic by the exclusive possession of strongyles, and as such it should perhaps have been assigned to the genus *Strongylophora* (Dendy, 1922). However, it is customary to confine the use of that genus name to species with characteristic kidney-shaped microstrongyles; possibly, *Strongylophora* is at the most a subgenus of *Petrosia*.

OTHER PETROSIID SPECIES IN THE AREA STUDIED

Several *Petrosia* species have been reported: *P. variabilis* (Ridley, 1884) sensu Topsent (1892a) was found below 400 m in the Azores region; it is probably a *Xestospongia* De Laubenfels (1932), because a slide of Topsent's material contained only a single spicule category. *P. friabilis* (Topsent, 1892a) from 98 m in the Azores region also conforms to *Xestospongia*. *P. crassa* sensu Topsent (1904, 1928) (not: *P. crassa* Carter, 1876) from the Azores and Cape Verde Islands is probably conspecific with *P. ficiformis*, although its smallest spicule category of thick strongyles (37/22 μm) reminds of *Strongylophora*. *P. crassa* is a related but separate North Atlantic species, differing from *P. ficiformis* in the coarser structure: more irregular, more friable, larger oscules

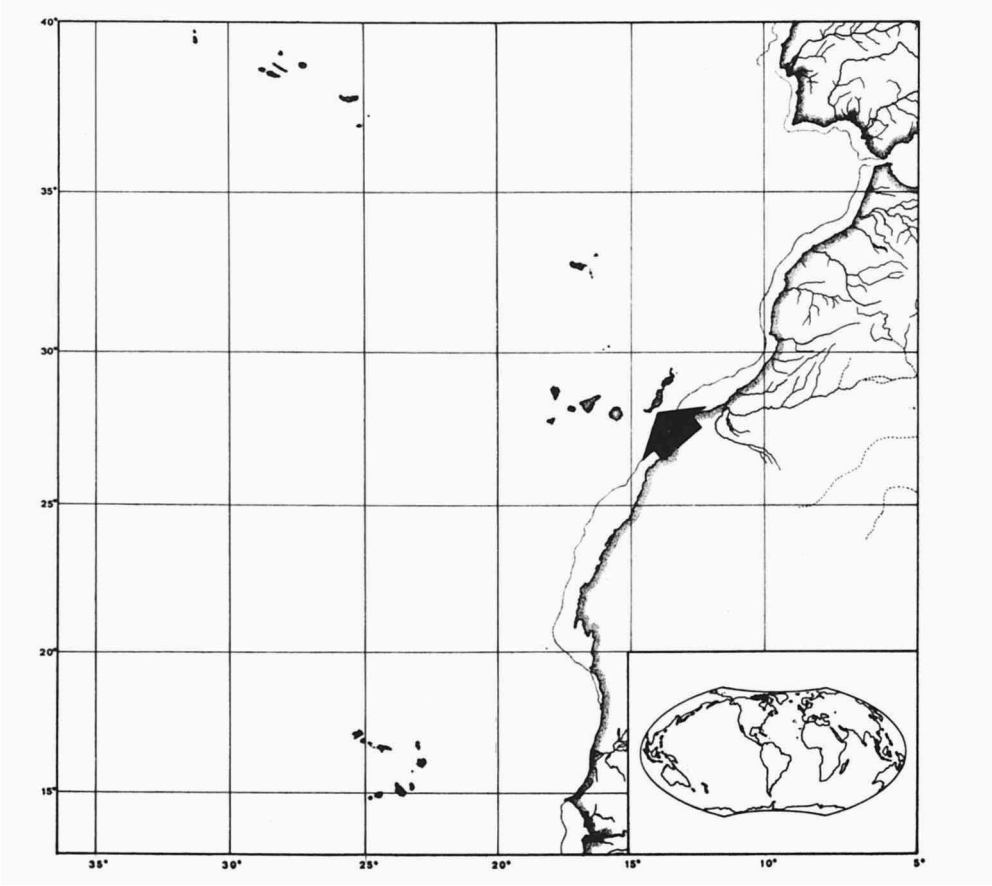


Fig. 27. *Petrosia canariensis* spec. nov., approximate position of type locality.

(with typical reticulate structure as shown by Lundbeck, 1902), larger and especially thicker spicules; the lack of spongin causes a much more confused choanosomal skeleton with only vague tracts and many loosely strewn spicules.

Family Oceanapiidae Van Soest, 1980

Genus **Oceanapia** Norman, 1869

Oceanapia cancap spec. nov.
(figs. 28-30)

Holotype. – RMNH Por. 1307, CANCAP 3 stat. 89, S of Selvagem Pequeña, 30°01'N 16°01'W, 200-260m, dredge, 22-X-1978.

Description. – Shape, size and consistency: four fistulate fragments, presumably belonging to a single specimen; two fragments branch into two or

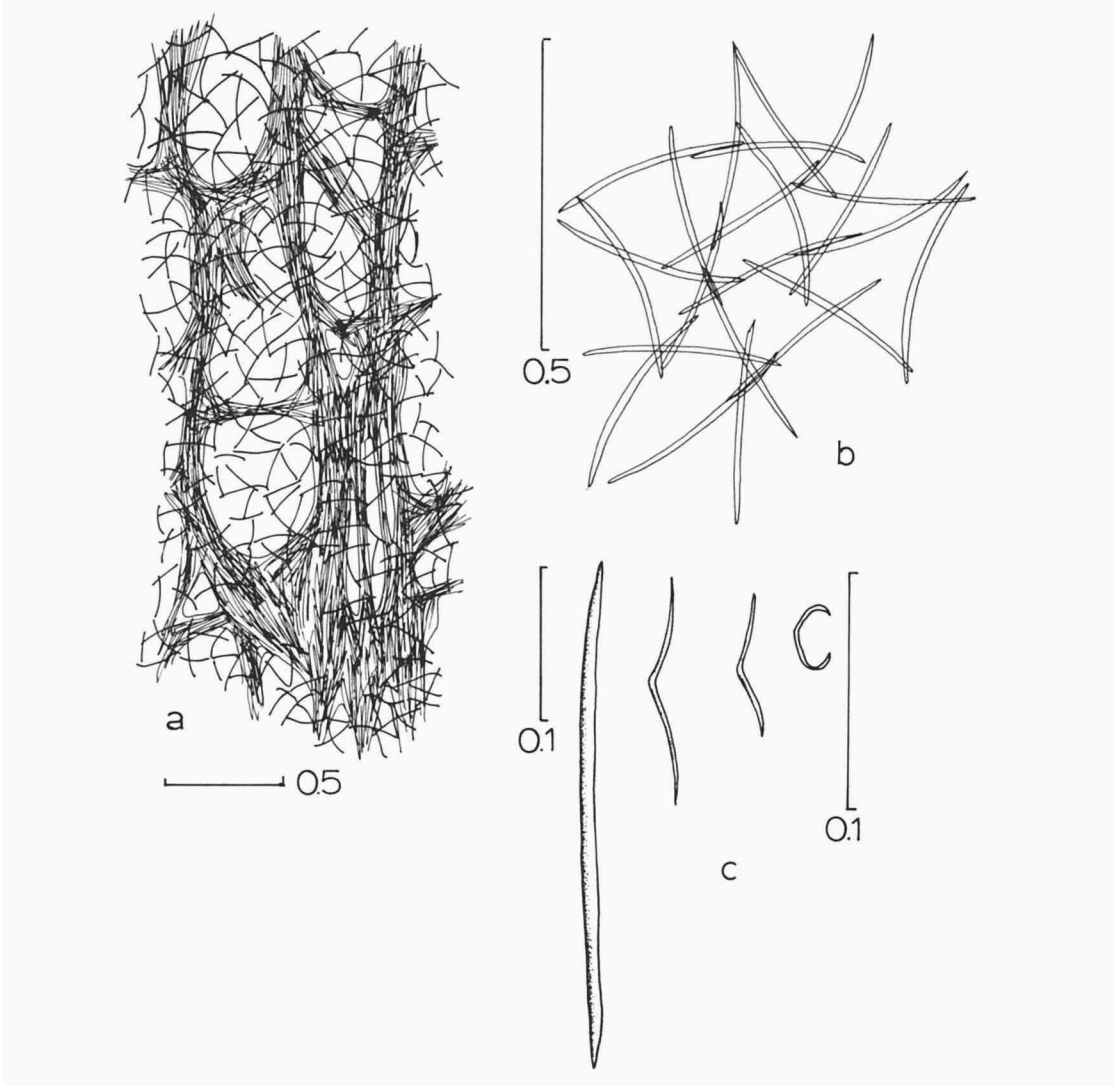


Fig. 28. *Oceanapia cancap* spec. nov., a. tangential view of fistule wall and underlying supporting tracts, b. detail of ectosomal skeleton, c. spicules.

more smaller fistules at their terminations; size of the largest fragment 8 cm long, 1-5 cm in diameter; consistency fragile, limp. Colour (spirit): red-brown. Ectosome: a unispicular tangential reticulum of megascleres, supported by longitudinal, branching and anastomosing tracts of 5-10 spicules in cross section. Choanosome: ill-developed in the hollow fistules; the main body of the specimen is lacking so no details of the choanosomal architecture can be

Fig. 29. *Oceanapia cancap* spec. nov., holotype RMNH 1307 (×0.4).

given. Spicules: long thin oxea: 320/8 μm; thin sigmata: 20 μm; thin toxa: 50-75 μm.

Etymology. – The new species is named after the CANCAP-expeditions of the Rijksmusem van Natuurlijke Historie, Leiden.

Ecology. – On soft bottom at greater depth.

Distribution. – Known only from the type locality (cf. fig. 30).

Discussion. – The species conforms to the genus *Biminia* Wiedenmayer (1977) in the combined presence of *Oceanapia* – habit, and sigmata and toxa. We do not think that *Biminia* is generically distinct from the type species of *Oceanapia*, viz. *O. robusta* Bowerbank (1866). *Biminia stalagmitica* (Wieden-

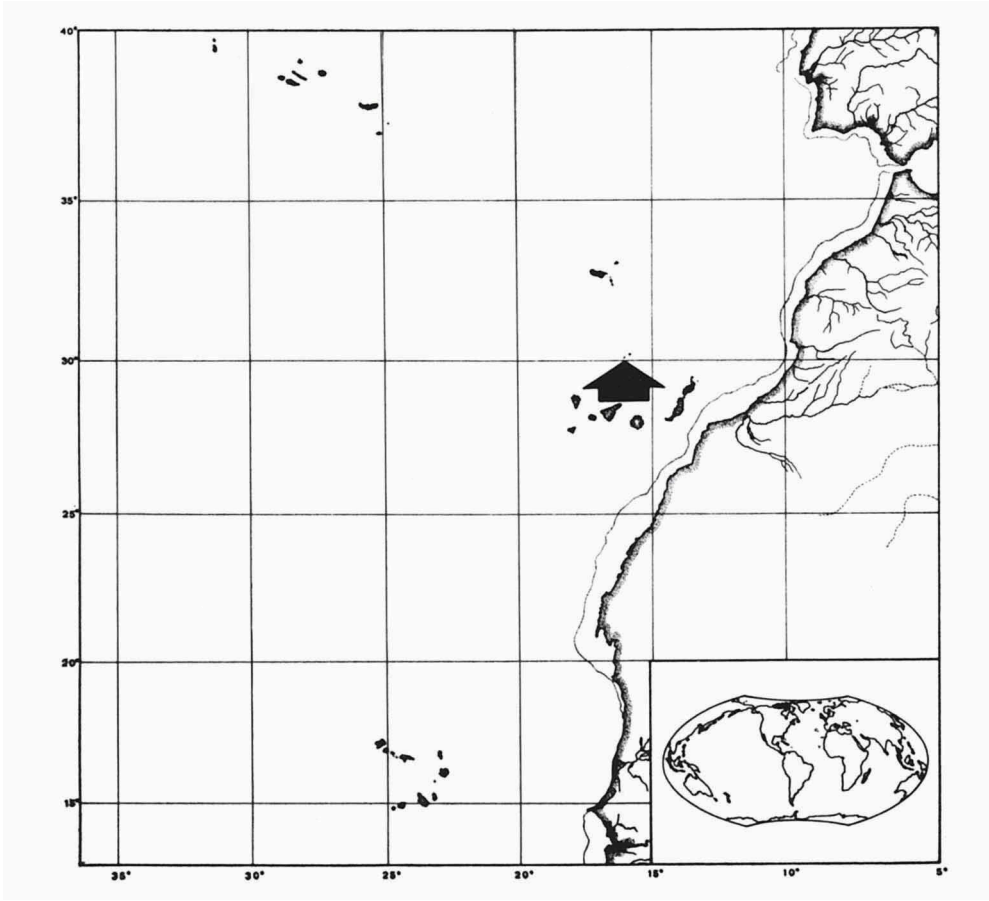


Fig. 30. *Oceanapia cancap* spec. nov., approximate position of type locality.

mayer, 1977) and the new species are possibly quite close, differing mostly in spicule sizes. It is possible that they make up a closely related group of vicariant species, together with *Oceanapia toxophila* (Dendy, 1922) from the Indian Ocean, and *Biminia macrotoxa* Hooper (1984) from Australian water, reflecting the Tethyan distribution of their common ancestor. On the other hand, these forms may prove to be unrelated, since the possession of sigmata and toxa *per se* is considered as the retention of primitive characters, on the basis of which no close relationship can be inferred.

Oceanapia intersepta (Topsent, 1928) comb. nov. (figs. 31, 32)

Chalina intersepta, Topsent 1928: 328, pl. 11 fig. 23, pl. IX figs. 5, 12.

Material. – CANCAP 6 stat. 133, S of São Vicente, Cape Verde Islands, 16°47′N 25°06′W, 50-60 m, sand bottom, 19-VI-1982. CANCAP 6 stat. 146, SW of São Vicente, Cape Verde Islands, 16°48′N 25°06′W, 75 m, coarse sand, 20-VI-1982, 2 specimens.

Description. – Shape, size and consistency: globular fistules with apical oscule; size up to 2 cm high, 1.5 cm in diameter; surface smooth with tough ectosome; very spongy, compressible, easily torn. Colour (spirit): light brown. Ectosome: the skeleton is a tangential, tight-meshed, unispicular reticulum of curved oxea; spongin variable, but not prominent, only cementing the

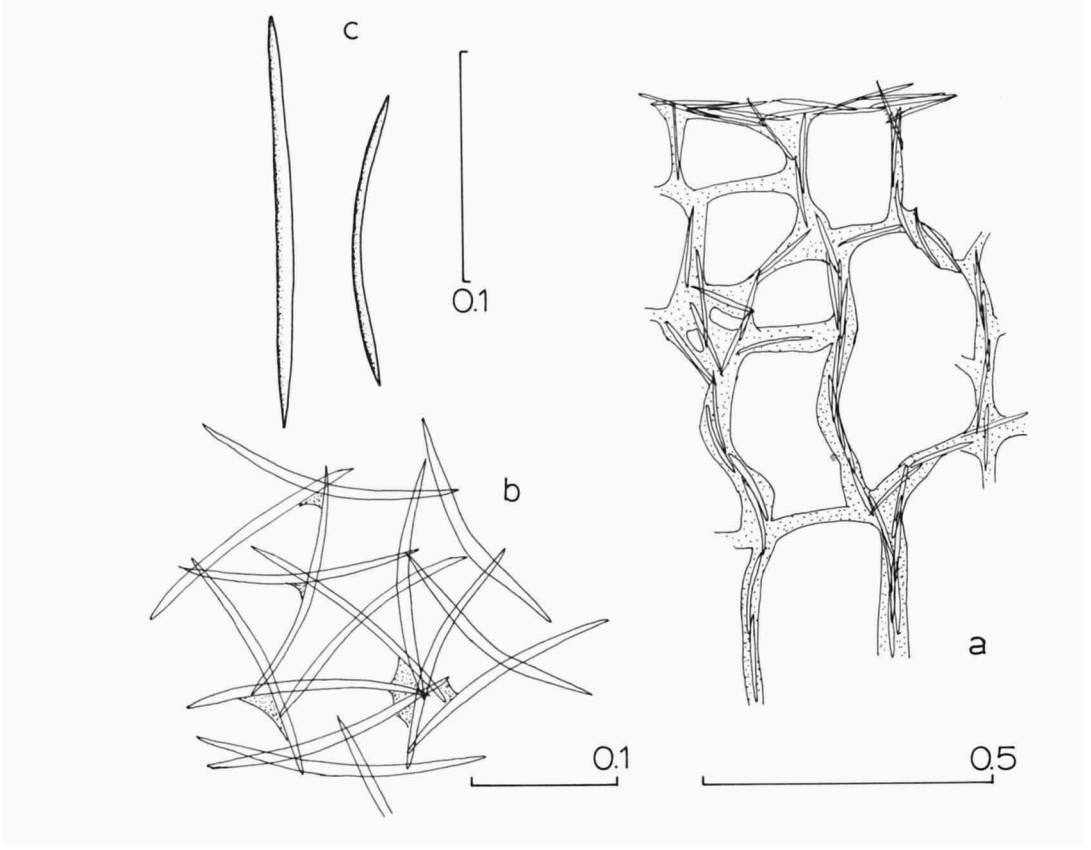


Fig. 31. *Oceanapia intersepta*, a. cross section, b. tangential view of ectosomal skeleton, c. spicules.

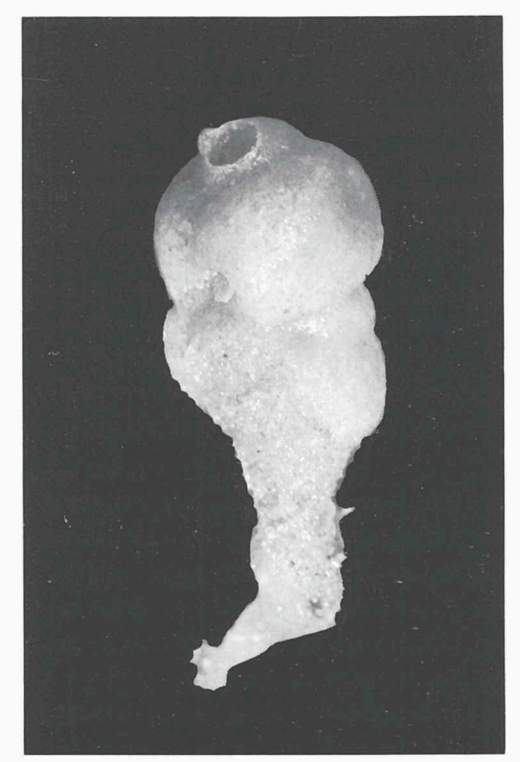


Fig. 32. *Oceanapia intersepta*, habit (×1.2).

spicules. Choanosome: the skeleton consists of a very loose, irregular reticulation of spongin fibres cored by 1-4 spicules; meshes vary between 100 and 800 μm; fibres are 5-40 μm in diameter, without distinction into primary and secondary fibres; the coring of the fibres is quite variable in the different specimens; loose spicules are scattered in small quantities, without apparent reticulation. Spicules: curved oxea of variable size: 100-200 by 2-8 μm.

Reproduction. – In the specimen from stat. 133 larvae (bearing minute oxea) of 300 μm in diameter were present (cf. also Topsent's type description).

Ecology. – Sandy bottoms at 50-75 m.

Distribution. – Cape Verde Islands.

Discussion. – Comparison with a slide made from the holotype (MNHN D.T. 1145) revealed that this is identical with our material from stat. 133. It is quite possible, that *Oceanapia* species with strongly developed spongin fibres and feebly developed interstitial spiculation constitute a monophyletic group. Atlantic species belonging to this group are *Oceanapia oleracea* (Schmidt, 1870), *O. bartschi* (De Laubenfels, 1934), and also the species described as

Pellina nodosa (George & Wilson, 1919) by Van Soest (1980). The latter species formed the basis of Van Soest's (1980) inclusion of the genus *Pellina* in the family Oceanapiidae. The type species of *Pellina, Halichondria semitubulosa* Lieberkühn (1859), however, is *Haliclona* – like and lacks the *Oceanapia* – characters (cf. also above). *O. oleracea, O. bartschi, O. nodosa* (new transfer), and *O. intersepta* may conveniently be put into a subgenus *Rhizochalina* Schmidt (1870) to distinguish them from pulpy *Oceanapia*.

The occurrence in this species of embryos containing microspicules points to a viviparous reproduction in a family which was presumed to be oviparous by Bergquist (1980).

OTHER OCEANAPIIDS IN THE AREA STUDIED

Oceanapia oleracea (Schmidt, 1870) was reported from West Africa by Burton (1956: as *O. carotta* Schmidt, 1870); it is characterized by numerous fistules and "roots", and the unstable presence of sigmata. *O. fistulosa* (Bowerbank, 1873) was reported from the Azores by Topsent (1892a, 1904, 1928) (as *Phloeodictyon* or *Rhizochalina*); a probable synonym is *O. tuber* sensu Burton (1956) (not: Lundbeck, 1902) from West Africa (specimen examined in the Copenhagen Museum); it is a characteristic yellow-brown sponge with a limited number of long, fragile single fistules. *O. reticulata* Topsent (1904) from the Azores, reported from West Africa as *O. coriacea* by Burton (1956) (not: *Phloeodictyon coriacea* Topsent, 1928), is a North Atlantic deep water species with characteristic reticulated cortex. The North Atlantic *O. robusta* (Bowerbank, 1866) was reported from the Azores region by Topsent (1904); Topsent (1892a) reported this species from the same area as *Gelliodes cavicornis*. Several other *Oceanapia* species have been found in the North Atlantic deeper waters, but these are beyond the scope of our study. *O. oleracea* and *O. fistulosa* also occur in the West Indian region (Van Soest, 1980); *O. robusta* has a close relative in the West Indies in the species *O. hondurasensis* (Carter, 1882) (cf. Van Soest, 1980).

Foliolina peltata Schmidt (1870), a characteristic pagoda-shaped species, was reported from West Africa by Burton (1956) (material was checked in the collections of the British Museum (NH)); it was first described from the West Indies.

Reniera tufa Ridley & Dendy (1887), from the Cape Verde Islands, was referred to the genus *Pachypellina* Burton (1934) by Van Soest (1980). It is probably closely related to *Pachypellina parietalis* (Topsent, 1893) (Mediterranean) and *P. podatypa* (De Laubenfels, 1934) (West Indies).

Species		Can/Mad	Az	CV/WA	Med	NA	WI
Haliclona cinerea (Grant, 1829)	*	x	x	x	x	x	-
Haliclona neens (Topsent, 1918)	*	-	x	x	-	-	-
Haliclona citrina (Topsent, 1892)	(1)	-	x	-	x	-	-
Haliclona mediterranea Griessinger, 1971	(1)	-	-	-	x	-	-
Haliclona cf. tubifera (George & Wilson, 1919)		x	-	x	-	-	x
Haliclona abbreviata (Topsent, 1918)		-	-	x	-	-	-
Haliclona simulans (Johnston, 1842)	(2)	x	-	-	x	x	-
Haliclona implexa (Schmidt, 1862)	*	-	x	-	x	-	-
Haliclona cratera (Schmidt, 1862)	*	-	-	x	x	-	-
Haliclona indistincta (Bowerbank, 1866)		-	x	-	x?	x	-
Haliclona perlucida (Griessinger, 1971)	*	x	x	-	x	-	-
Haliclona coerulescens (Topsent, 1918)		-	-	x	-	-	-
Haliclona aquaeductus (Schmidt, 1862)	(1)	-	x	-	x	-	-
Haliclona fulva (Topsent, 1893)	(2)	x	-	x	x	-	-
Haliclona plana (Topsent, 1893)	(2)	x	-	-	x	-	-
Haliclona semitubulosa (Lieberkühn, 1859)	*	-	x	x	x	x	-
Haliclona valliculata (Griessinger, 1971)	(2)	x	-	-	x	-	-
Haliclona mucosa (Griessinger, 1971)	(2)	x	-	-	x	-	-
Haliclona binaria (Topsent, 1927)	*	x	x	-	-	-	-
Haliclona angulata (Bowerbank, 1866)	*	x	x	-	x	x	-
Haliclona marismedi (Pulitzer-Finali, 1978)	(2)	x	-	-	x	-	-
Haliclona fibulata (Schmidt, 1862)	(2)	x	x	-	x	x	-
Haliclona lacazei (Topsent, 1893)	*	-	-	x	x	-	-
Haliclona spissa (Topsent, 1892)		-	x	-	-	-	-
Haliclona perforata Lévi, 1959		-	-	x	-	-	-
Dendroxea lenis (Topsent, 1892)	*	x	x	-	x	-	-
Acervochalina parasimulans (Lévi, 1959)	(2)	x	-	x	-	-	-
Acervochalina fertilis (Keller, 1879)	*	x	x	-	x	-	-
Acervochalina limbata (Montagu, 1818)		-	x	-	x	z	-
'Chalinula' sp.	(1)	-	x	-	-	-	-
Aka infesta (Johnson, 1899)		x	x	-	x	x	-
Gelliodes fayalensis Topsent, 1892		-	x	-	-	-	-
Gelliodes bifacialis Topsent, 1904		x	x	-	-	-	-
Callyspongia simplex Burton, 1956	*	x	-	x	x	-	-
Petrosia ficiformis (Poiret, 1789)	*	x	x	x	x	-	-
Petrosia crassa (Carter, 1876)		-	x	-	-	x	-
Petrosia canariensis spec.nov.	*	x	-	-	-	-	-
Xestospongia friabilis Topsent, 1892)		-	x	-	-	-	-
Oceanapia cancap spec.nov.	*	x	-	-	-	-	-
Oceanapia robusta (Bowerbank, 1866)		-	x	-	-	x	-
Oceanapia fistulosa (Bowerbank, 1873)		-	x	x	-	-	x
Oceanapia reticulata (Topsent, 1904)		-	x	x	-	-	-
Oceanapia oleracea (Schmidt, 1870)		-	-	x	-	-	x
Oceanapia intersepta (Topsent, 1928)	*	-	-	x	-	-	-
Foliolina peltata Schmidt, 1870		-	-	x	-	-	x
Pachypellina tufa (Ridley & Dendy, 1887)		-	-	x	-	-	-

Table 1. Distribution of marine shallow-water (200 m) Haplosclerida from the south-eastern and central parts of the North Atlantic Ocean. Species marked with * are described in the text. Data from Boury-Esnault & Lopez (1) and Cruz (2) are included. Can/Mad = Canary Islands and Madeira Archipelago, Az = Azores, CV/WA = Cape Verde Islands and West Africa (down to the equator), Med = Mediterranean, NA = North Atlantic, WI = West Indies.

4. BIOGEOGRAPHY

Table 1 lists all the Haplosclerid sponge species known from shallow depths (above approx. 200 m) in the south-central and south-eastern parts of the North Atlantic Ocean (Azores, Madeira archipelago, Canary Islands, Cape Verde Islands, and the coasts of West Africa down to the equator). For each of the species the distribution in neighbouring parts of the North Atlantic Ocean is given (Mediterranean, N Atlantic north of Portugal, West Indian region). Several general distribution patterns can be recognized:

1. MEDITERRANEAN – ATLANTIC DISTRIBUTION

Species having their distributional centres in the (western) Mediterranean and/or the neighbouring coasts of Western Europe, but also occurring in the neighbouring areas of the Atlantic to the north and/or to the south. They do not occur in the West Indian region. A large proportion of the species found in the studied area (23 out of 46) conforms to this pattern, although of a few species sufficient information is still lacking.

The species that conform to this pattern are: *Haliclona cinerea, H. simulans, H. citrina, H. mediterranea, H. implexa, H. aquaeductus, H. indistincta, H. cratera, H. perlucida, H. fulva, H. plana, H. semitubulosa, H. valliculata, H. angulata, H. lacazei, H. fibulata, Dendroxea lenis, Acervochalina fertilis, A. limbata, Aka infesta, Callyspongia simplex, Petrosia ficiformis.*

Several of these species have possible twin species in neighbouring parts of the North Atlantic, especially the West Indies: *Haliclona mediterranea (H. hogarthi), H. perlucida (H. implexiformis), H. semitubulosa (?Pellina subterranea), Dendroxea lenis (Reniera carmabi), Acervochalina fertilis (Haliclona molitba), Petrosia ficiformis (Cribrochalina dura).*

It is assumed that these twin species reflect a former Tethyan distribution of a common ancestor. Other species, such as most *"Gellius"* species, *Haliclona cratera* and *Callyspongia simplex* do not seem to have such closely related twins, and thus constitute species that presumably have envolved from Mediterranean or NE Atlantic ancestors after separation of the eastern and western Tethys (early Cenozoic).

2. CENTRAL- AND SE NORTH ATLANTIC ENDEMICS

Species known from the studied area but not from outside of it. Examples

are: *Haliclona neens, H. abbreviata, H.coerulescens, H. binaria, H. spissa, Acervochalina parasimulans, "Chalinula"* sp. of Boury-Esnault & Lopez, *Gelliodes fayalensis, G. bifacialis, Petrosia canariensis* spec. nov., *Xestospongia friabilis, Oceanapia cancap* spec. nov., *O. reticulata, O. intersepta.*

Most of these are not well known; they may be more wide-spread in the Mediterranean-Atlantic region, or they may be known under other names in that region. Genuine endemics are probably quite rare, although tropical West Africa may harbour some. *Oceanapia cancap* spec. nov. may have a West Indian twin in *Biminia stalagmitica.*

3. AMPHI-ATLANTIC DISTRIBUTION

Although there are only a few species, this type of distribution is apparently genuine: *Oceanapia oleracea, O. fistulosa* and *Foliolina peltata* are good examples. More problematic is *Haliclona* cf. *tubifera*, which could be a morphologically indistinguishable twin of the American species, in stead of a conspecific population. In general, the Amphi-Atlantic distribution pattern may be considered evidence of a slow evolutionary rate in certain sponge genera. The alternative explanation, *viz.* transport of genetic material across the Atlantic Ocean, is considered unlikely, in spite of convincing evidence in other benthic animal groups assembled by Scheltema (e.g. 1977). From studies published so far, it can be concluded that sponge larvae tend to settle within hours, or a few days at the most, after release. The Amphi-Atlantic distribution is thought to be a Tethyan distribution with the added complication of extinction (through lowering of sea water temperatures and salinity crises since Miocene times) in the Mediterranean.

In his discussion of the affinities of the Mediterranean sponge fauna, Vacelet (1980) concluded that the strongest links of this fauna as a whole are with the neighbouring East Atlantic, particularly with the northern, Lusitanian region. Our results show, that a greater knowledge of the sponge fauna of the Mauretanian and Senegalese regions will probably raise the number of species shared with the Mediterranean considerably.

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