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NEW RECORDS OF *XESTOSPONGIA* SPECIES (HAPLOSCLERIDA: PETROSIIDAE) FROM THE CURAÇAO REEFS, WITH A DESCRIPTION OF A NEW SPECIES

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ABSTRACT

Three species of the sponge genus *Xestospongia* (Haplosclerida) are newly recorded for the south Caribbean island of Curaçao, *Xestospongia arenosa* n. sp., *X. caminata* Pulitzer-Finali (1986) and *X. deweerdtae* Lehnert & Van Soest (1999). The species are described and compared with *Xestospongia* species already known from Curaçao and other Caribbean localities. A key to the Curaçao species of *Xestospongia* is provided.

Key words: Porifera, *Xestospongia*, new species, new records, Curaçao

INTRODUCTION

The systematics of sponges of the reefs of Curaçao is relatively well-studied in consecutive studies of Arndt (1927), Van Soest (1978, 1980, 1981, 1984), Hajdu & Van Soest (1992), Alvarez et al. (1998), and De Weerdt (2000). Still, ongoing sampling activities for ecological (e.g., Meesters et al., 1991) or natural products research (e.g., De Weerdt et al., 1999) occasionally yield specimens of rarer species, not yet recorded or adequately described. In recent years, various collecting activities, notably during the EC-MAS3 'Symbiosponge' project, secured specimens of three species of *Xestospongia* (Haplosclerida, Petrosiidae) not previously described from the Curaçao reefs and one of these appears new to science. Below, the new species and the other new records are described.

MATERIALS AND METHODS

Specimens described and discussed below were collected by Van Soest during field work in 1980, by De Weerdt in 1986 and 1987, and by De Kluijver and Gomez in 1998. All specimens are incorporated in the collections of the Zoological Museum of Amsterdam, Porifera collection (ZMA Por.). Skeleton and spicules were studied from thick sections, spicule mounts, and SEM mounts. Representative photos were made using a photomicroscope and a digitalized SEM.

SYSTEMATIC DESCRIPTIONS

Class Demospongiae
Order Haplosclerida
Family Petrosiidae
Genus *Xestospongia* De Laubenfels, 1932

Xestospongia arenosa n. sp.
Figs. 1-3

Xestospongia spec. Van Soest, 1981: 21; Erhardt & Baensch, 1998: 104.

MATERIAL
Holotype: ZMA Por. 6404, Curaçao, Cornelisbaai, 14 m, coll. W.H. de Weerdt, 09-XII-1986; paratypes: ZMA 15407, Curaçao, off Piscadera Baai, near Buoy 4, 20-25m, coll. R.W.M. van Soest, 24-XII-1980; ZMA 6409, Curaçao, Fuikbaai, 3 m, coll. W.H. de Weerdt, 13-I-1987; ZMA 14317 (fragment), Curaçao, Piscadera Baai W, 41.4 m, coll. M.J. de Kluijver, field nr. 98/CU/JUN04/MK/182, 04-VI-1998; ZMA 14375, Curaçao, Inlaat Waterfactory, 40.2 m, coll. R. Gomez, field nr. 98/CU/MAY31/RG/033, 31-V-1998.

DESCRIPTION. - Clusters of short irregular tubes and closed digitations and smaller fistules rising from a massive base, which is usually entirely covered by sediment, rubble and shells (Figs. 1A-D). Colour: variously quoted as white (holotype and paratype 15407), dirty white, or transparent. On the in situ photos of paratypes 14317 (Fig. 1C) and 6409 (Fig. 1D), the colour is transparent pale blueish to whitish. Surface where visible smooth but irregularly folded and ridged. Rims of the tubes thin-walled and with irregular outline. Size of holotype 9 x 8 x 4 cm, individual tubes are up to 2.5 cm diameter, with wide gaping vent up to 1.5 cm in diameter. The collector's notes indicate this was part of a specimen approximately 6 x the size of the collected fragment. Largest of the paratypes is 14 x 10 x 5 cm. Consistency firm, brittle but compressible, easily fragmented, slightly rough to the touch.
Ectosomal skeleton (Figs. 2A,C, 3B): a detachable uni- paucispicular reticulation of rather irregularly intercrossing oxeas.
Choanosomal skeleton (Figs. 2B, D, 3A): basically consisting of a reticulation of single spicules, but in most parts irregular and confused. The walls of the tubes and fistules are supported in places by longitudinal spicule tracts of two-three spicules which are, however, not continuous over greater lengths. No further distinction in primary and secondary lines. No visible spongin, although some may be present at the nodes. Spicular density is relatively light.
Spicules (Fig. 3C): long, curved oxeas with rather abrupt endings, occasionally blunt or rounded, of quite variable size, 342-431.2-508 x 7-10.1-14 μm (n=25). The range of sizes in the paratypes is similar, e.g., 354-488 x 9-14 μm in ZMA 6409, 413-496 x 11-13 μm in ZMA 15407, and 415-514 x 12-14 μm in ZMA 14317.

ECOLOGY. - The holotype was collected at 14 m depth on a horizontal patch of the reef off Cornelisbaai. It was for a large part embedded in sand and small coral rubble. A similar habitat off Piscadera Baai was recorded for paratype 15407, whereas paratype 6409 was collected in shallow depth off Fuikbaai in sandy bottom covered by *Halimeda*. Paratypes 14137 and 14375 were collected in a deep reef situation (40-41 m) on the slope off Piscadera Baai, almost completely covered in sand and rubble (see Figs. 1C-D). From these collecting localities it may be deduced that the species is an infaunal specialist of coarse sandy patches among reef corals.

CHEMISTRY AND CELL BIOLOGY. - In the framework of the 'Symbiosponge' project, the methanolic extract of this sponge was tested against *Artemia salina* larvae, cultures of yeast and two bacterial strains, and against a spectrum of fungal parasites. In all tests, not a single bioactive reaction was noted. The sponge tissue contains comparatively few bacteria, but an unusual filamentous bacterium was observed on the outside of some sponge cells.

REMARKS. - This species is an atypical *Xestospongia* in its possession of a largely unispicular skeleton. Assignment to *Xestospongia* rather than to *Haliclona* (Haplosclerida, Chalinidae) is based on the irregular skeleton, the absence of any primary lines and ladder-like interconnecting spicules and the large size of the oxeas. Also, the consistency, though compressible, is typically that of a petrosid and not of a chalinid. The species most similar to our new species is *Xestospongia wiedenmayeri* Van Soest, 1980, also described from Curaçao, and

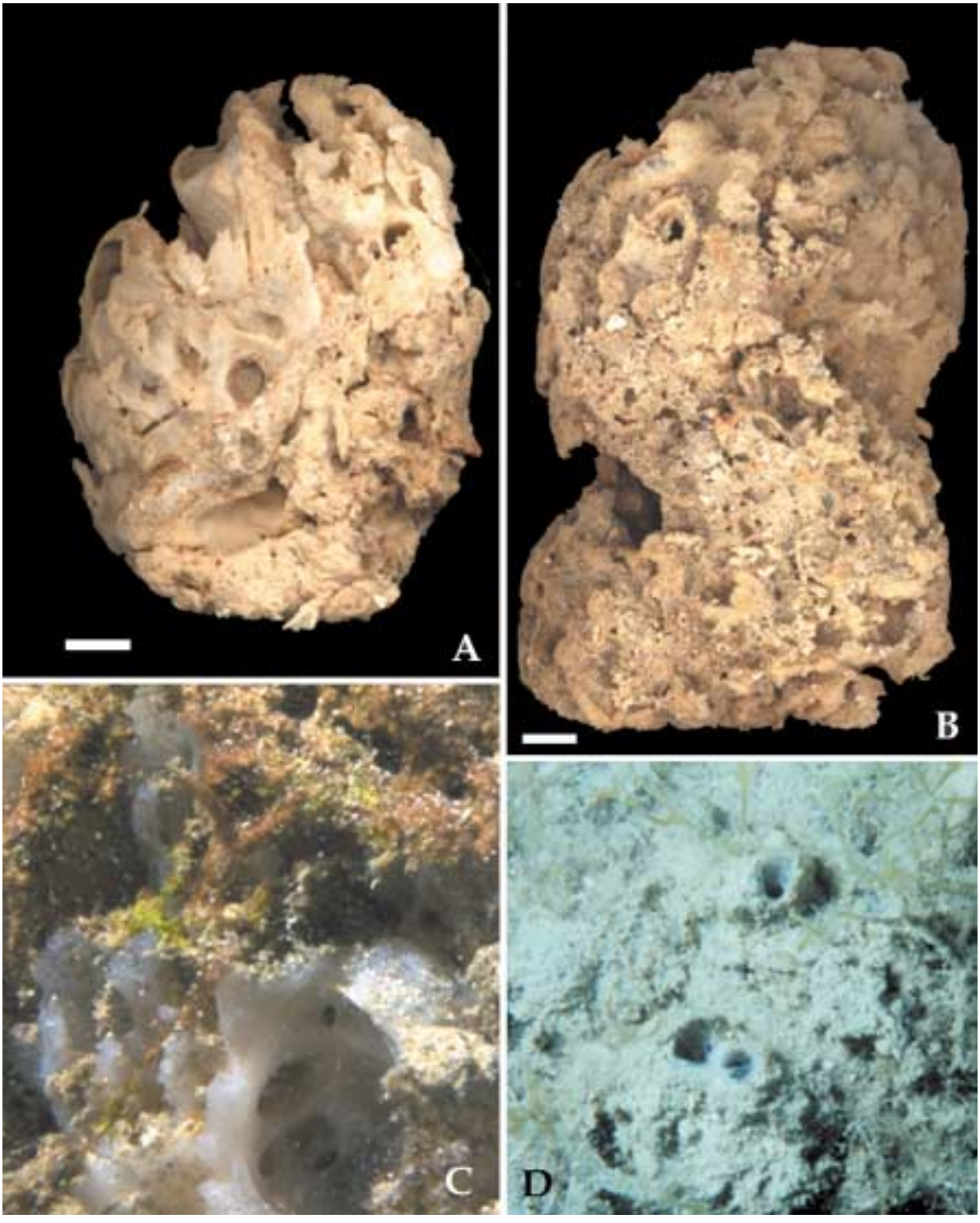


Fig. 1. *Xestospongia arenosa* n. sp. A, holotype ZMA Por. 6404. B, one of the paratypes, ZMA Por. 15407. C, paratype ZMA Por. 14317, in situ. D, paratype ZMA Por. 6409, in situ (scale bars: A, B = 1 cm).

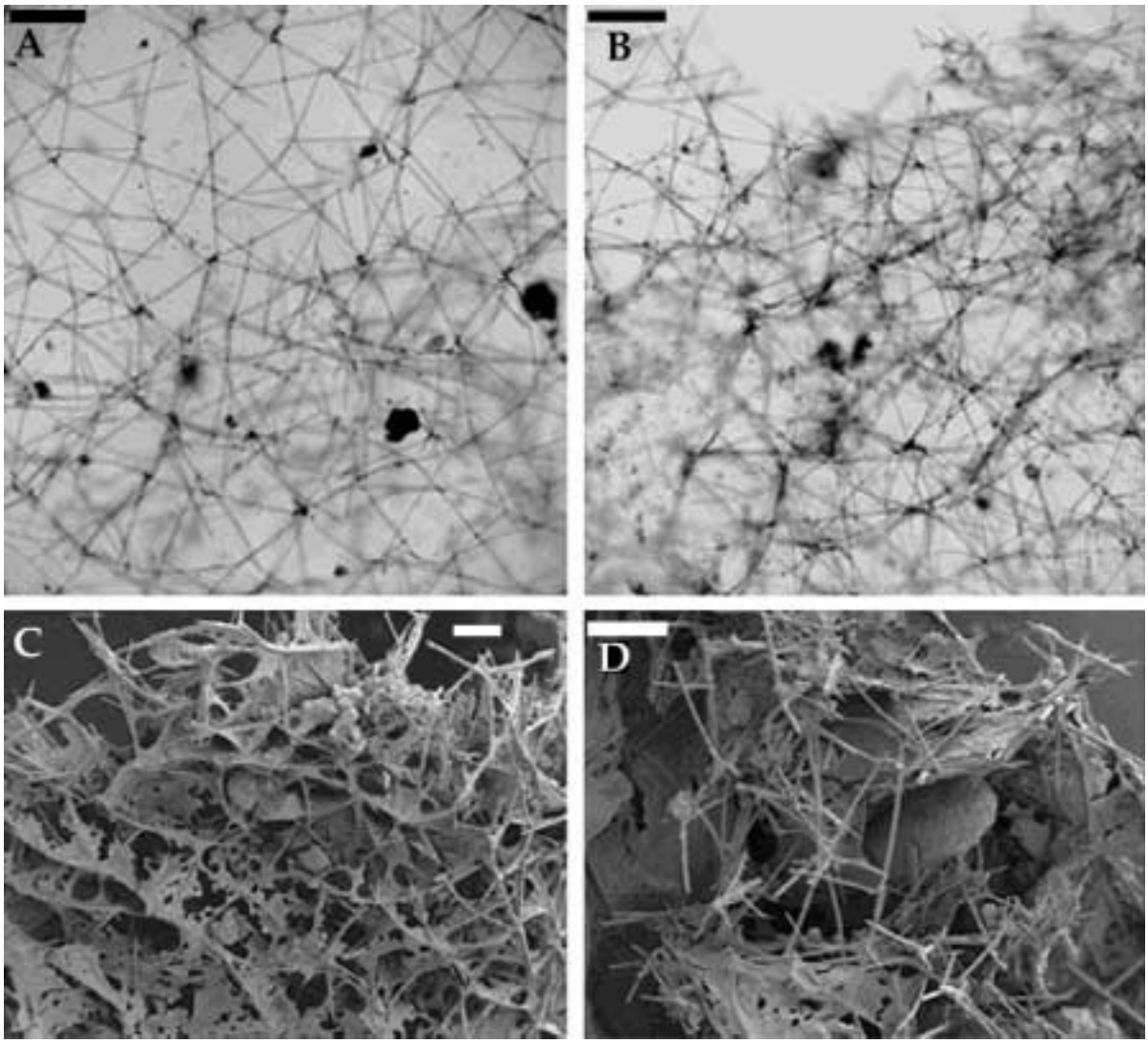


Fig. 2. *Xestospongia arenosa* n. sp., images of the skeleton. A, photomicrograph of ectosomal skeleton (scale bar = 250 μm). B, ditto of choanosomal skeleton (scale bar = 250 μm). C, SEM photo of ectosomal skeleton (scale bar = 250 μm). D, SEM photo of peripheral choanosomal skeleton (scale bar = 100 μm).

sharing its largely unispicular skeleton. The specimens and microscopical slides of the new species were compared to holotype and paratype material of *X. wiedenmayeri* (ZMA 3920, 3610). Although the descriptions of the two species appear similar, the following differences were noted in the comparison: the life colour and colour in alcohol are clearly different, *X. wiedenmayeri* being dark red-brown. The latter is also crumbly, brittle, and where it forms tube-like structures it is thick walled, not thin-walled as *X. arenosa* n. sp. Although both are described from Curaçao from localities not too far apart, the habitats are clearly different as *X. wiedenmayeri* is a typical mangrove specialist, living on *Rhizophora* roots. The skeletons are both largely unispicular, but that of *X. arenosa* n. sp. is quite lightly spiculated, whereas *X. wiedenmayeri* has a solid skeleton of tightly meshed spicules. The spicules of *X. wiedenmayeri*, though overlapping in size, are shorter and fatter (230-348.7-428 x 11.5-15.3-18 μm).

The new species differs from all other *Xestospongia* species of the Caribbean in the com-

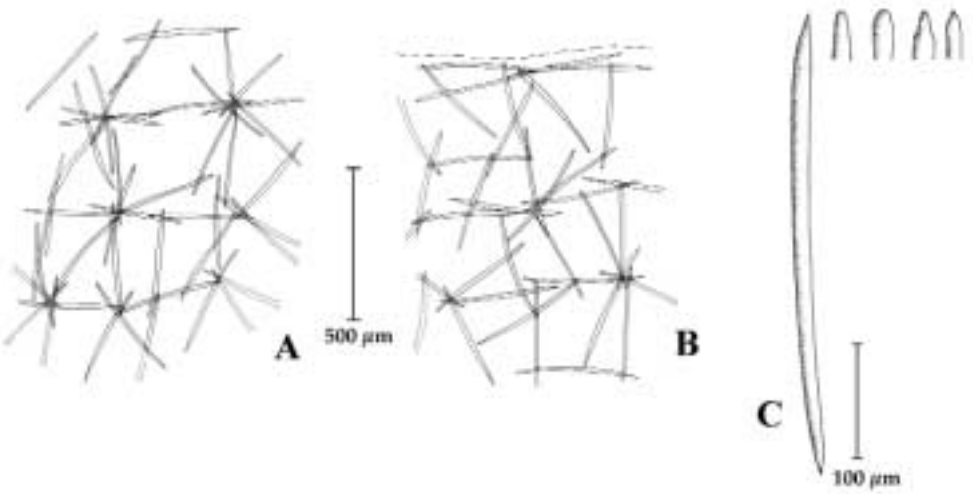


Fig. 3. *Xestospongia arenosa* n. sp., drawings of skeleton and spicules. A, choanosomal skeleton. B, ectosomal skeleton. C, spicule and variation of apices

bination of its unispicular skeleton, large spicule size, and habit.

Xestospongia caminata Pulitzer-Finali, 1986
Figs. 4A-B, 5A-B

Xestospongia caminata Pulitzer-Finali, 1986: 157, figs. 74-75.

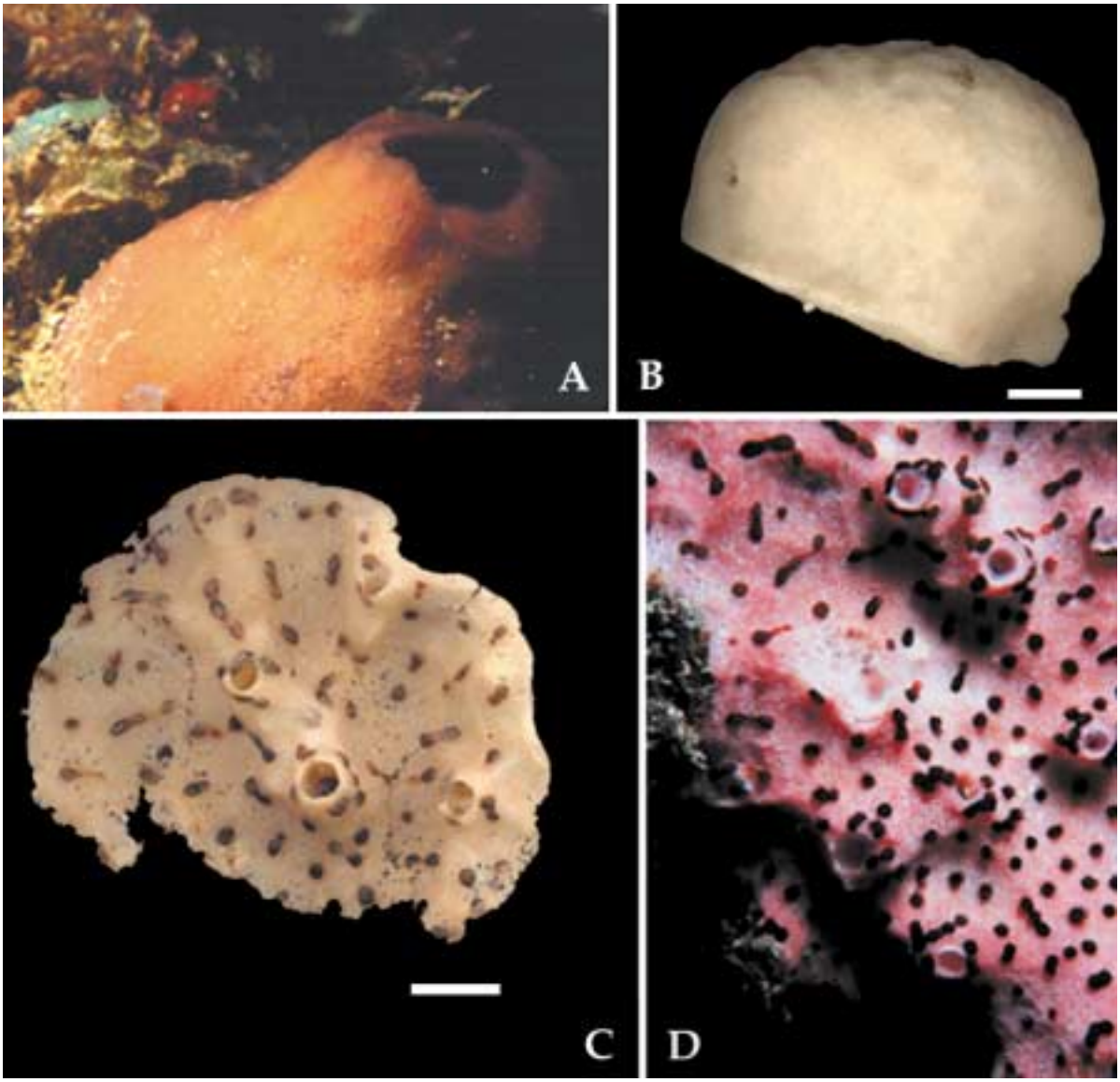
MATERIAL
ZMA Por. 15106, Curaçao, near the wreck of the 'Superior Producer', 32.8 m, field nr. 98/CU/MAY23/MK/138, coll. M.J. de Kluijver, 23-V-1998; Genoa Museum nr. MSNG 47704, holotype from Port Royal, Jamaica, 10-25 m.

DESCRIPTION. - Thick massive cushion with a single large oscule in life (Fig. 4A). Colour brown outside, white inside. Surface smooth, consistency hard, crumbly. The specimen was for the most part used up for chemical extraction. The voucher (Fig. 4B) is 7 x 5 x 4 cm, with a few small apertures, but lacking the large oscule.
The ectosomal skeleton (Fig. 5A) is represented by a few loose tangential oxeas, not forming a continuous reticulation. These are arranged over a well-developed subectosomal system of thick spicule tracts of 30-150 µm thickness (comprising four- >20 spicules) forming rounded meshes of 100-300µm in diameter.
Choanosomal skeleton (Fig. 5B) well-developed subectosomally, but grading into an irregular mass of oxeas, separated by a large number of larger and smaller holes and canals. Spicules oxeas, curved, with abruptly pointed ends, occasionally blunt or stylote, 232-250.9-372 x 9-11.8-15 µm.

ECOLOGY. - On a sandflat among reef corals, at 32 m, attached to coral substrate half buried in the sediment.

BIOACTIVITY.- In the framework of the 'Symbiosponge' project, the methanolic extract of this sponge was tested against *Artemia salina* larvae, cultures of yeast and two bacterial strains, and against a spectrum of fungal parasites. Activity was noted against *Artemia.*

REMARKS. - The correspondence with the holotype is considerable, including the cushion-shape, smooth, dense surface, and large oscules. Colour of the Jamaican specimen is quoted as 'purplish brown externally, tawny internally', which does not depart very far from the brown/white colours of the Curaçao specimen. The skeletal structure was compared to a slide made from the holotype and the two sponges match closely. Spicules in the holotype are slightly shorter, 200-280 x 5-14 µm,



Figs. 4A-B. *Xestospongia caminata*. A, photographed in situ. B, preserved fragment of A, ZMA Por. 15106 (scale bar = 1 cm). C-D. *Xestospongia deweerdtae*. C, preserved specimen, ZMA 6368 (scale bar = 1 cm), D, the same specimen photographed in situ.

but are otherwise similar in shape and thickness.

Xestospongia deweerdtae Lehnert & Van Soest, 1999
Figs. 4C-D, 5C-D

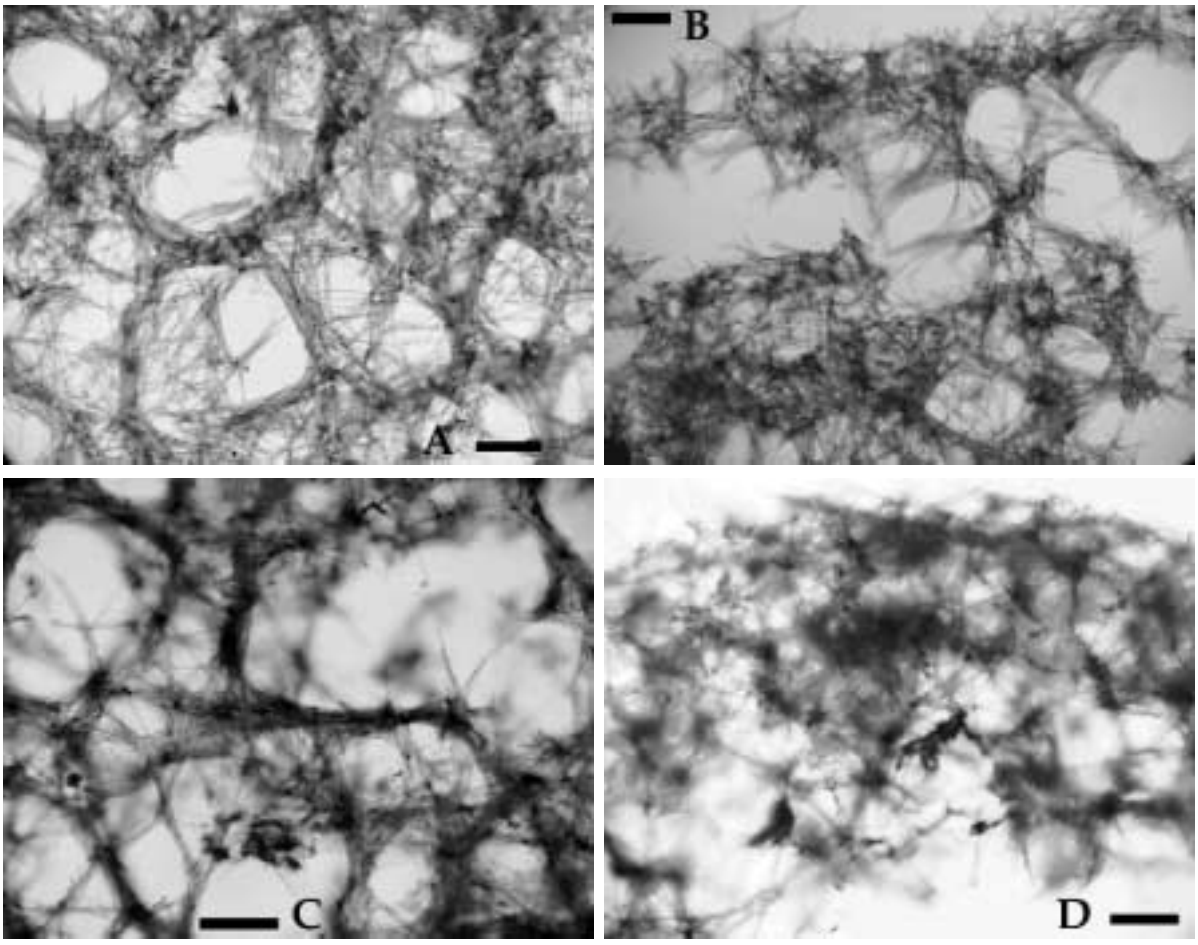
Xestospongia deweerdtae Lehnert & Van Soest, 1999: 163, figs. 44-47.

MATERIAL

ZMA Por. 6368, Curaçao, Lijhoek, 10-12 m, in cave of vertical reef wall, coll. W.H. de Weerdt, 15-I-1987.

DESCRIPTION. - Thinly encrusting, making a circular patch of 6 cm diameter and about 2 mm thickness, with five oscules of max. 5 mm diameter raised on volcano-shaped elevations of ca. 1 cm high (Fig. 4C). Surface densely covered with blackish zoanthids (Fig. 4D). Colour: intense rose-pink.

Ectosomal skeleton (Fig. 5C) largely unispicular, regular. Choanosomal skeleton (Fig. 5D) a regular



Figs. 5A-B. *Xestospongia caminata*, photomicrographs of skeleton. A, ectosomal skeleton (scale bar = 250 μm). B, choanosomal skeleton (scale bar = 250 μm). C-D. *Xestospongia deweerdtae*, photomicrographs of skeleton. C, ectosomal skeleton (scale bar = 250 μm). D, choanosomal skeleton (scale bar = 250 μm).

system of spicule tracts with 8-20 spicules in cross section enclosing meshes of 300-700 μm. Spicules: straight strongyles (juvenile stages are oxeote), 306-353.0-402 x 14 μm.

ECOLOGY. - In reef cave at 10-12 m; elswhere (Jamaica) it lives on the deep fore reef (76-82 m).

REMARKS. - The present specimen is closely similar to the holotype ZMA Por. 13584 and paratype ZMA 13585 from Jamaica, including the relatively smooth surface, elevated oscules and regular skeletal system of strongyles. Spicules in the Jamaican material are slightly shorter and distinctly fatter (272-346 x 16-32 μm). The presence of the striking blackish zoanthids is not recorded for the Jamaican specimens. Still, overall similarity is considerable and conspecificity is very likely.

OVERVIEW OF CURAÇAO *XESTOSPONGIA* SPECIES

With these three new records, the Curaçao *Xestospongia* fauna is augmented to seven species. Curaçao species recorded previously, are:

Xestospongia muta (Schmidt, 1870), red-brown, crater-like sponges with characteristic longitudinal ridges and hard consistency. This is a common inhabitant of the reefs, especially in deep reef localities (Van Soest, 1980,1981; unpublished SYMBIOSPONGE results).

Xestospongia wiedenmayeri Van Soest (1980), dark red-brown hollow branches and masses, with smooth surface and crumbly-brittle consistency. This is a rare inhabitant of the mangroves, known with certainty only from Piscadera Baai, where it has not been observed recently.

Xestospongia subtriangularis (Duchassaing, 1850), orange-brown, erect, branching, with smooth surface. This is a rather rare species occurring in bays and lagoons, especially Spaanse Water (Van Soest, 1980; Kuenen, 1994). This species is an atypical *Xestospongia* because of its small spicules. A separate genus, *Neopetrosia* De Laubenfels (1949), has been proposed for such sponges.

Xestospongia carbonaria (Lamarck, 1814), recorded from Curaçao by Arndt (1927: 152 as *Pachychalina*) and Van Soest (1980: 83 as *Pellina*) likewise is rare, known only from a single record from the mangroves of Spaanse Water. Its spicules are comparable in size to those of *X. subtriangularis*.

KEY TO *XESTOSPONGIA* SPECIES OF CURAÇAO (BASED ON GROWTH FORM AND COLOUR)

1a. Sponge branching-erect, orange-brown .... *X. subtriangularis*
b. Sponge massive, cushion-shaped, repent, tubular or crater-like, but not erect 2

2a. Crater-like with longitudinal grooves and ridges, reddish brown ..... *X. muta*
b. Massive, cushion-shaped or repent 3

3a. Black, or brown-black cushions with repent branches and fistules ..... *X. carbonaria*
b. Not black 4

4a. Whitish transparent sponges with irregular tubes with numerous fistules ..... *X. arenosa*
b. Brownish or reddish sponges with smooth surface . 5

5a. Irregularly lobed hollow masses dark brown .... *X. wiedenmayeri*
b. Flattened or rounded massive lobes or crusts 6

6a. Lobate, with large flush oscules, brown outside, cream or tan inside ..... *X. caminata*
b. Massive encrusting with small elevated oscules, uniformly pinkish ..... *X. deweerdtae*

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