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HALICLONA (HALICHOCLONA) VANSOESTI N. SP., A NEW CHALINID SPONGE SPECIES (PORIFERA, DEMOSPONGIAE, HAPLOSCLERIDA) FROM THE CARIBBEAN

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ABSTRACT

A new sponge species, *Haliclona (Halichoclona) vansoesti* n.sp., belonging to the family Chalinidae of the order Haplosclerida, is described from Curaçao and other Caribbean localities. The subgenus name *Halichoclona* de Laubenfels is for the first time applied to a species of the "fistulosa" group ("Pellina" of authors), one of eight species groups which came out as monophyletic groups during an earlier phylogenetic analysis of the genus *Haliclona*. Justification for devoting a separate paper to a single species follows from recent findings of interesting secondary metabolites produced by this sponge. Chemistry and cell biology research necessitates to have a proper name for the species available.

INTRODUCTION

In the framework of a cooperative research programme of several European institutes, MAS3-CT97-0144 "SYMBIOSPONGE", dealing with sponge natural products, a still undescribed sponge species has recently been collected in Curaçao by M.J. de Kluijver and R. Gomez in which interesting chemical substances have been

found. These secondary metabolites are presently being analysed by the Laboratoire de Chimie Bio-Organique, Université Libre de Bruxelles, while cell biological observations are made by the Institute for Molecular Cell Biology, University of Amsterdam. This urges the need for a valid, taxonomically sound scientific description of the species. The species belongs to the sponge family Chalinidae of the order Haplosclerida

(Demospongiae), the Caribbean representatives of which are currently under monographic study by W.H. de Weerd. The species was already known from earlier findings, both from Curaçao and other Caribbean localities, but it was never found in such high numbers as it has now been observed to occur in the deeper (30-50 m) parts of the reefs of Curaçao. In the present paper we describe the species and compare it with other chalinids from the area, as well as from the other side of the North Atlantic Ocean.

Taxonomically, the Chalinidae belong to one of the most difficult groups of marine sponges, with possibly more than 150 species occurring world-wide, but with extremely subtle differences between species. Taxonomic characters are scarce and often subject to high variability. Some species, like *Chalinula molitba* (de Laubenfels, 1949), show such a high variation in both shape and skeletal morphology that identification on the basis of these characters is hardly possible for the non-specialist, whilst other species, like the new species described below, are remarkably constant and easy to identify. The characters that are currently being used for identification at the species level are the shape of the sponge, consistency, colour, texture of the surface, size and form of the megascleres, which are oxeads or strongyles only, and size and shape of the microscleres, if present (usually sigmas and/or toxas, less frequently raphides and rarely microxeads). At the genus level the family has been subject of highly controversial ideas among spongologists, but is now considered to consist of eight monophyletic groups (de Weerd, 1989), the taxonomic status and nomenclature of which will be treated into detail in a forthcoming paper (de Weerd, in prep.). The species described below belongs to the subgenus *Halichoelona* de Laubenfels (earlier called the "*fistulosa*" group by de Weerd, 1989 and de Weerd et al., 1991), of the genus *Haliclona* Grant.

Because of the difficult taxonomy of the Chalinidae, both at species and at genus level, there are still large areas containing species which cannot be identified at present, since study of type material of described species is a first requirement. This applies especially to the Pacific and Indian Oceans and adjacent waters. Other areas are much better known, due to

recent revisionary studies, especially the North East Atlantic and Arctic (de Weerd, 1986, 1989), Mediterranean (Griessinger, 1971), and Caribbean (van Soest, 1980; de Weerd et al., 1991, and de Weerd in prep.). It is because of the relatively good knowledge of chalinids occurring in the North Atlantic that the species treated here is without hesitation considered as a species new to science.

MATERIALS AND METHODS

The material was collected by the following persons and/or institutes: Off Curaçao by R.W.M. van Soest (1980), P. Willemsen (1992), and M.J. de Kluijver and R. Gomez (1998). At St. Vincent and Martinique by W.H. de Weerd and others during expeditions in 1989 to the Lesser Antilles by the Harbor Branch Oceanographic Institute/Biomedical Research (HBOI/BMR) with R/V *Seward Johnson*. In Jamaica sponges were collected by H. Lehnert in 1993.

Part of the material consists of voucher specimens, the chemical substances of which are currently being analysed in the Laboratoire de Chimie Bio-Organique, Université Libre de Bruxelles, Belgium. The vouchers are preserved in 70% ethylalcohol and housed in the sponge collection of the Zoological Museum Amsterdam (ZMA). Other material is also preserved in 70% ethylalcohol and deposited in the ZMA and in the collection of the National Museum of Natural History (NMNH), Washington D.C., catalogued under numbers of the United States National Museum (USNM).

The present description is based on external morphology, skeletal architecture and shape and size of the spicula. For study of the skeletal architecture hand-cut tangential sections of the ectosome and perpendicular sections of the choanosome were made; the sections were air-dried, mounted with Canada balsam on a microscope slide and studied under a Leitz high power light microscope. Spicule preparations were obtained by etching a small piece of sponge in 100% nitric acid (HNO₃), after which the residue was rinsed twice with water, once with hydrogen peroxide (H₂O₂), then twice with 96% ethylalcohol. The spicula were air-dried on microscope slides and prepared for study with the light microscope, as

well as put on aluminium stubs and coated with gold for study with the Scanning Electron Microscope (SEM). Spicule sizes are based on measurements of 25 fully developed spicules in each specimen.

SYSTEMATICS

Phylum Porifera Grant
Class Demospongiae Sollas
Order Haplosclerida Topsent
Family Chalinidae Gray

Definition: Haplosclerida with a delicate reticulated choanosomal skeleton of uni-, pauci- or multiplicular primary lines, which are regularly connected by uni- or paucispicular secondary lines. Ectosomal skeleton, if present, a unispicular, tangential reticulation.

Genus *Haliclona* Grant

Definition: Chalinidae with unispicular secondary lines.

Subgenus *Halichocona* de Laubenfels, 1932

Definition: Choanosomal skeleton consisting of a subisotropic, somewhat confused reticulation, commonly intersected by many choanosomal spaces. Ectosomal skeleton of the same structure as the choanosome, usually very loosely overlaying the choanosome, from which it may be separated by extensive subectosomal spaces. Spongin absent or very scarce, at the nodes of the spicules. Megascleres usually acerate or hastate oxeas. Microscleres, if present, microxeas or sigmas. Sponges commonly somewhat crisp and brittle, only slightly compressible.

Remarks: The name *Halichocona* was created by de Laubenfels in 1932 for the single species *H. gellindra*, but it has never been used since this publication. It is applied here as a result of a study by W.H. de Weerd of all the type material of the 25-odd described chalinid genera (de Weerd, in prep.) and an earlier phylogenetic analysis of North Atlantic representatives of the family (de Weerd, 1989). This analysis had an outcome of eight monophyletic species groups, one of which was tentatively named the “*fistulosa*” group (the genus “*Pellina*” of e.g. Griessinger, 1971), with the

subisotropic skeleton as one of the synapomorphic (shared derived) characters. Since this type of skeleton occurs in the holotype of *H. gellindra* (USNM 22063, examined), but in none of the other nominal genera, the name *Halichocona*, as a subgenus of the genus *Haliclona* Grant, is available for the “*fistulosa*” group.

Other species assigned to *Halichocona*: *Haliclona* (*Halichocona*) *albifragilis* (Hechtel, 1965, Caribbean), *H. (H.) magnifica* de Weerd, Rützler & Smith, 1991 (Caribbean), *H. (H.) fulva* (Topsent, 1893, Mediterranean-Atlantic), *H. (H.) perlucida* (Griessinger, 1971, Mediterranean-Atlantic), *H. (H.) semitubulosa* sensu Topsent (1925) and Griessinger (1971, Mediterranean, cf. de Weerd, 1986) *H. (H.) magna* (Vacelet, 1969, Mediterranean), *H. (H.) fistulosa* (Bowerbank, 1866, East Boreal).

***Haliclona* (*Halichocona*) *vansoesti* n. sp.**
(Figs. 1-3)

Material examined.- CURAÇAO: Holotype: ZMA POR. 13391 (W side Piscadera Baai, reef slope, on dead corals, 45 m, 4-VI-1998, coll. M. J. de Kluijver, # 98/CU/JUN04/MK/181); Paratypes: ZMA POR. 13392 (Slangebaai, reef slope, 37.5 m, 7-VI-1989, coll. M. J. de Kluijver, # 98/CU/JUN07/MK/191); ZMA POR. 13393 (Slangebaai, 52.1 m, 20-V-1998, coll. M. J. de Kluijver, # 98/CU/MAY20/MK/124); ZMA POR. 13394 (Slangebaai, 52 m, 20-V-1989, coll. M. J. de Kluijver, # 98/CU/MAY20/MK/125); ZMA POR. 13395 (Slangebaai, 51.2 m, 25-V-1998, coll. M. J. de Kluijver, # 98/CU/MAY25/MK/144). Additional material: ZMA POR. 4604 (W side Piscadera Baai, buoy 4, 20-25 m, 24-XII-1980, coll. R.W.M. van Soest); ZMA POR. 7585 (W side Piscadera Baai, buoy 1, 25 m, in sand, 2-I-1981, coll. R.W.M. van Soest); ZMA POR. 10096 (Carmabi, Piscadera Baai, 14 m, July 1992, coll. P. Willemsen, # C92A12).
ST. VINCENT: USNM 41824, 42493 (W Chateau Belair Bay, N Wall, 13°18.01'N, 61°15.38'W, 2-10 m, in crevices, 1-IV-1989, coll. HBOI/BMR Exped. Lesser Antilles March/April 1989, R/V Seward Johnson, fragm. of HBOI 1-IV-89-3-6); ZMA POR. 7584 (W

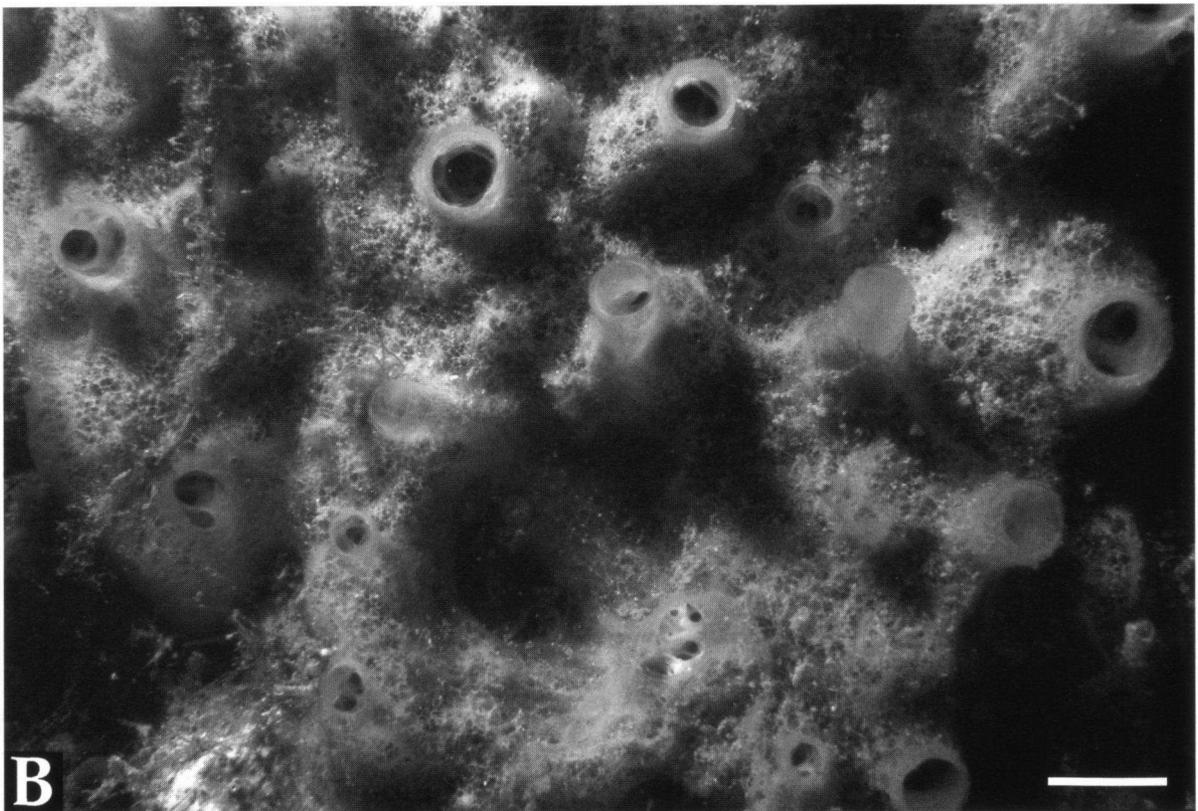
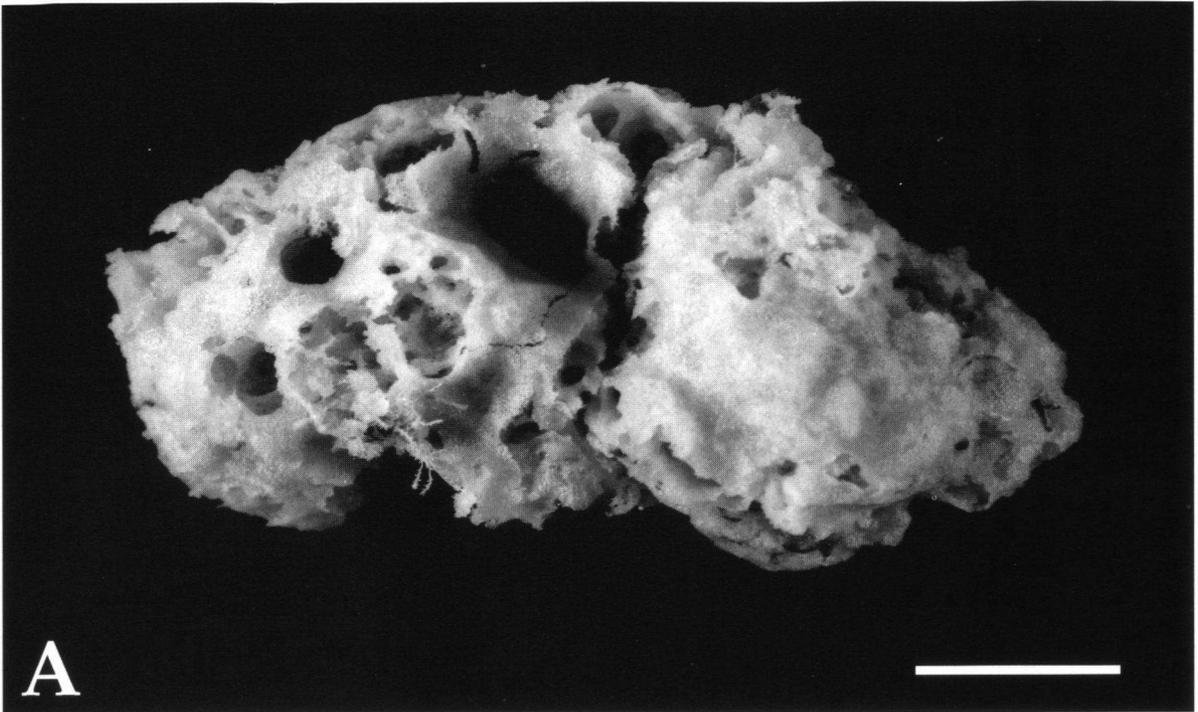


Fig. 1. *Haliclona (Halichoclona) vansoesti* n.sp. Habitus. A, preserved specimen, USNM 41824, (scale bar = 2 cm). B, in situ photograph of holotype (ZMA POR. 13391) before collecting (scale bar = 1 cm). Photo: M.J. de Kluijver.

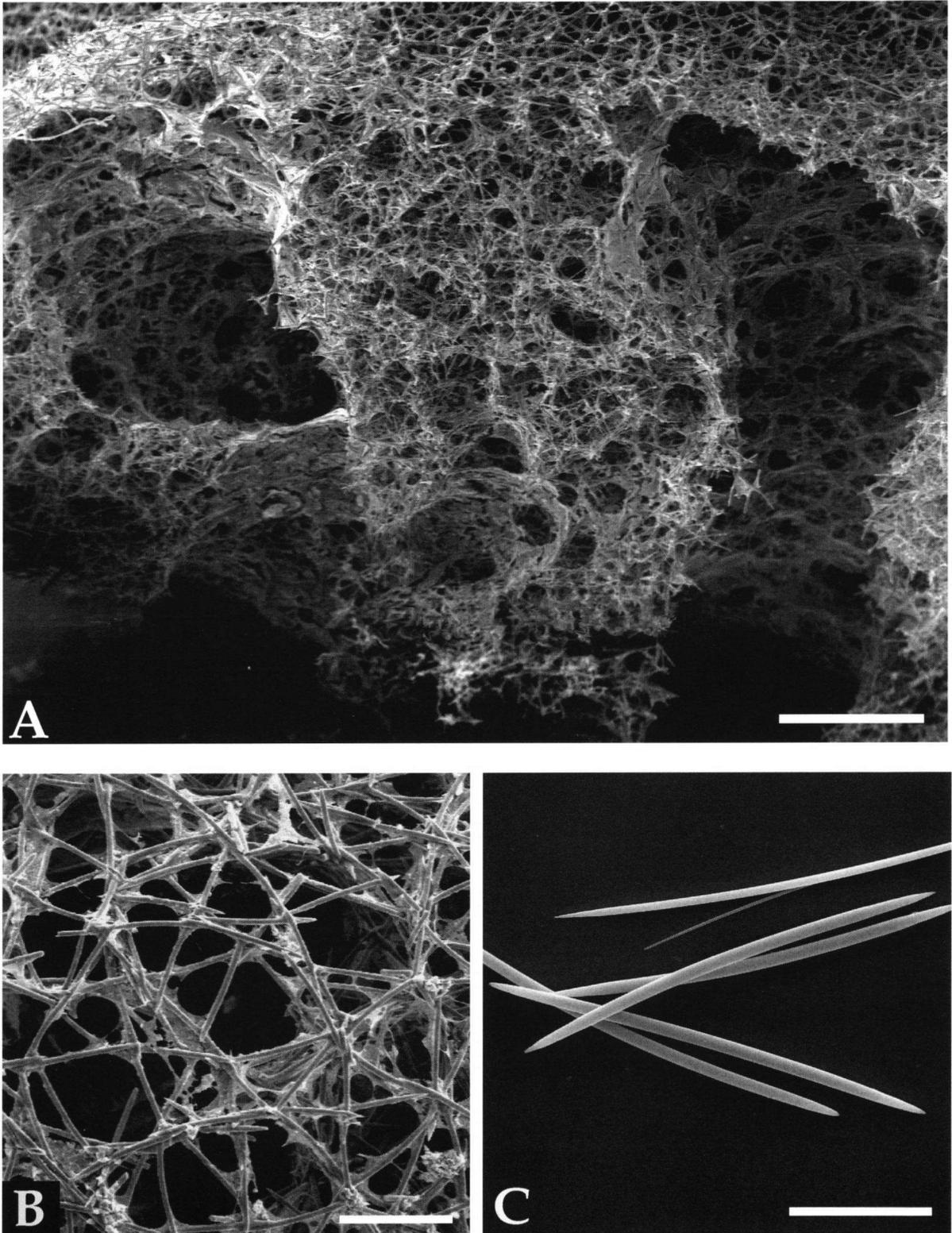


Fig. 2. *Haliclona* (*Halichoelona*) *vansoesti* n.sp. (ZMA POR. 7584). Scanning electron microscope photographs. A, perpendicular view showing cavernous structure of the choanosome (scale bar = 1000 μ m). B, ectosomal skeleton (scale bar = 150 μ m). C, oxeas (scale bar = 50 μ m).

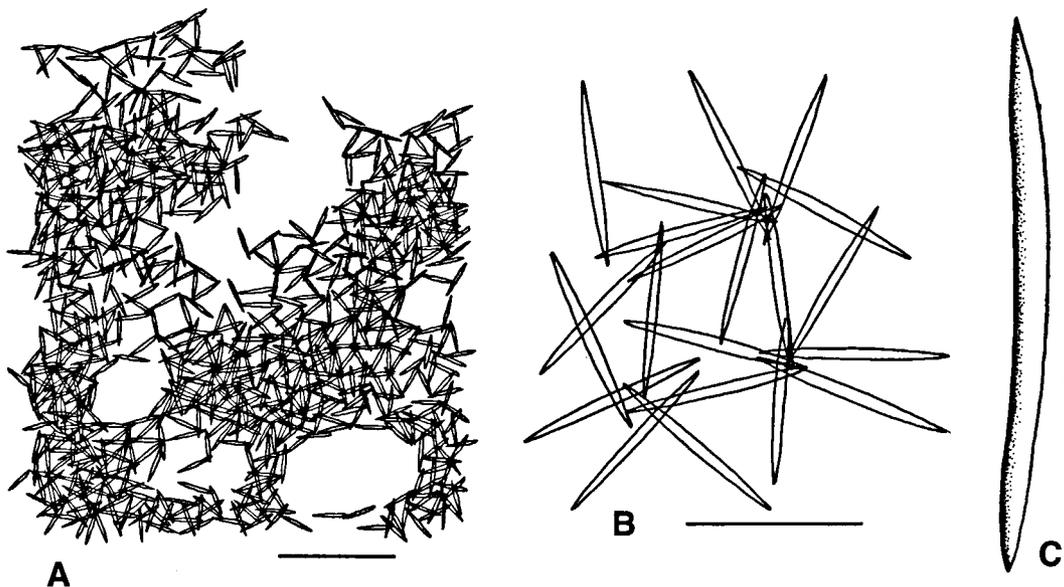


Fig. 3. *Haliclona (Halichoelona) vansoesti* n.sp. A, perpendicular section of choanosome. B, tangential view of ectosomal skeleton. C, oxea (scale bars: A = 250 μm , B = 150 μm , C = 50 μm).

Château Belair Bay, N Wall, 13°17.65'N, 61°15.38'W, 15-20 m, under coral overhead, 31-III-1989, coll. HBOI/BMR Exped. Lesser Antilles March/April 1989, R/V Seward Johnson, fragm. of HBOI 31-III-89-2-6).

MARTINIQUE: USNM 41825 (Cap Enrage, 14°38.65'N, 61°09.3'W, 18-27 m, rock reef slope, on the sponge *Aiolochoira crassa*, 6-VII-1989, coll. W.H. de Weerd, HBOI/BMR Exped. Lesser Antilles June/July 1989, R/V Seward Johnson).

JAMAICA: ZMA POR. 13350 (Discovery Bay, blue hole near Columbus Park, 10 m, 19-II-1993, coll. H. Lehnert, # J30).

Description: *Shape and size:* thick cushions with a loose, cavernous structure, to about 15 cm in diameter and 2-3 cm thick, with large, circular to elliptical oscula, 0.8-1 cm in diameter, on slightly raised elevations, with raised, transparent rims.

Consistency: crisp, fragile, only slightly compressible.

Surface: smooth; the ectosomal skeleton is extremely loosely connected to the choanosome, losing contact in many places where it forms irregularly raised 'roofs' over the acquiferous canals and slightly raised collars around small (0.5-1

mm) openings in the ectosome.

Colour: choanosome light purple, ectosome white, semi-transparent.

Ectosomal skeleton: a delicate, tangential, subisotropic reticulation, extremely loosely lying on the choanosomal skeleton.

Choanosomal skeleton: a subisotropic reticulation, of a denser structure than the ectosome, but with many subectosomal and choanosomal spaces.

Spongin: not observable.

Spicula: oxeas, slightly curved, hastate, 120-175.9(22.7)-221.6 x 3.6-7.2(1.7)-10.7 μm .

Ecology: in reef environments, occupying (and possibly also excavating) reef crevices, also growing under coral overhangs, on dead corals and other hard substrata, as well as overgrowing other sponges; known depth range 2-52 m. In Curaçao reefs the species shows a marked increase in abundance with increasing depth in sheltered localities, with an extreme high abundance in Slangebbaai in the depth range 45-50 m (see Fig. 4). In front of the CARMABI the species shows a peak at 25-30 m, and becomes less abundant after 35 m.

Distribution: Curaçao, Jamaica, St. Vincent, Martinique.

Etymology: the new species is named after Dr Rob W.M. van Soest, Institute for Systematics and Population Biology (Zoological Museum), University of Amsterdam, the Netherlands, coordinator of the MAS3-CT97-0144 project dealing with secondary metabolites of sponges.

REMARKS

Halichoelona vansoesti is well characterized by the combination of the crispy consistency, cavernous structure, the two-colour combination of the purple choanosome and white, semi-transparent ectosome, and the extremely loose connection between the choanosomal and ectosomal skeletons. None of the other Caribbean chalinids exhibits a comparable combination of features. The two other Caribbean species belonging to the subgenus *Halichoelona*, *H. (H.) albifragilis* (Hechtel, 1965) and *H. (H.) magnifica* de Weerd et al., 1991, are also crisp, which is one of the characteristics of *Halichoelona*, but *H. (H.) albifragilis* forms small, thinly encrusting patches at the undersides of stones and corals, with an opaque white of light cream color, and it has smaller oxeas (ca. 115-170 x 2-8.5 µm). *H. (H.) magnifica* is a species of mangrove and seagrass habitats where it forms large, thick-walled tubes, and its oxeas are, though of comparable length (ca. 145-220 µm), somewhat thinner (ca. 3.5-6.5 µm), but especially more fusiform and slightly flexuous.

When compared with eastern Atlantic and Mediterranean chalinids, the new species is most similar to *Haliclona (Halichoelona) fistulosa* (Bowerbank, 1866), which has an eastern Boreal distribution (cf. de Weerd, 1986, 1989). This species is roundish massive, with many fistules, a yellowish-brown to purplish choanosome and a whitish, transparent ectosome, thus also exhibiting a two-colour combination of interior and exterior, though less conspicuous than in *H. (H.) vansoesti*. It is not cavernous, less fragile, and both the ectosomal and choanosomal skeleton have a denser structure; the oxeas are of similar length (140-220 µm), but thicker (5-12 µm). It is not unlikely that the two species would turn out to be closely related in a new phylogenetic analysis. So far,

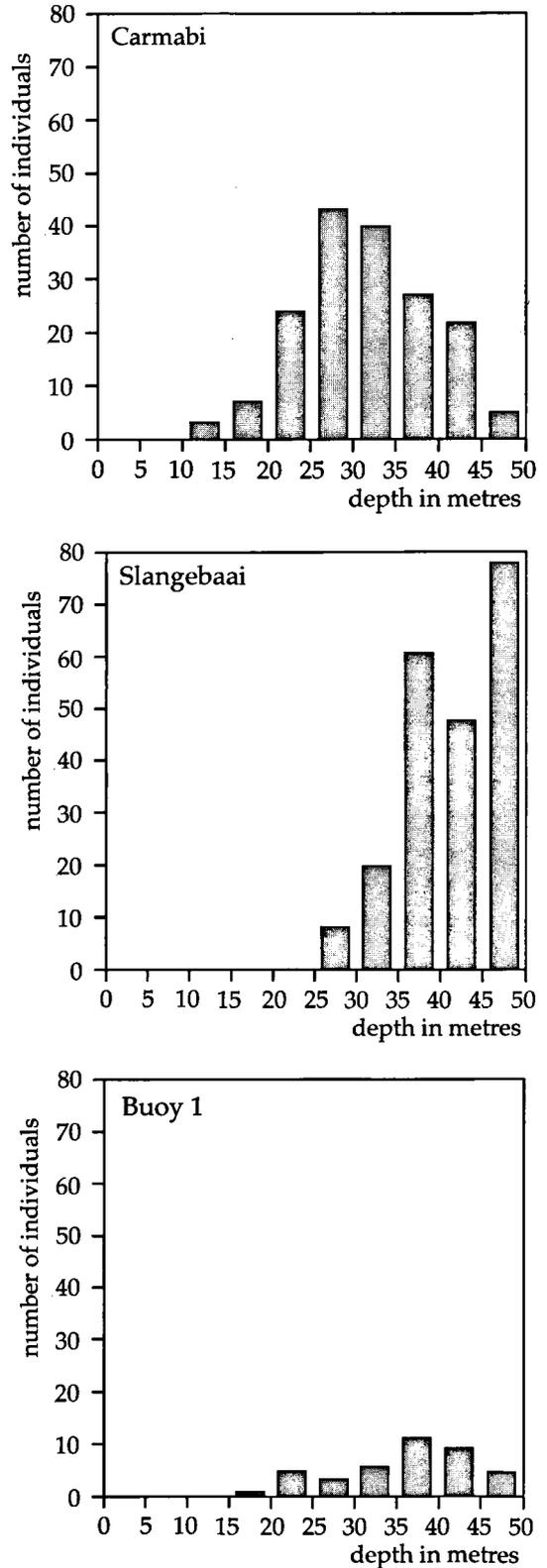


Fig. 4. Number of specimens of *Halichoelona vansoesti* counted during a search period of 10 minutes at three different localities in Curaçao.

from preliminary studies of chalinids of the Pacific and Indian Oceans, no material from these areas was encountered that showed similarities with *H. (H.) vansoesti*.

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