

Two new species of *Dendroxea* GRIESSINGER (Porifera : Demospongiae) from the Mediterranean Sea

by Giuseppe CORRIERO, Lidia SCALERA LIACI & Roberto PRONZATO

Abstract

Two new species of Porifera, *Dendroxea pseudodidiscoides* (Tremi Archipelago, Adriatic Sea) and *D. adumbrata* (Ustica Island, Tyrrhenian Sea), are described. They show a close affinity with the Atlanto-Mediterranean species *D. lenis* (TOPSENT, 1892), even though they are both characterized by the occurrence of a peculiar spicular type.

Keywords : Porifera, *Dendroxea*, new species.

Riassunto

Sono descritte due nuove specie di poriferi appartenenti al genere *Dendroxea* : *D. pseudodidiscoides*, rinvenuta nell'Arcipelago delle Tremiti (Mare Adriatico) e *D. adumbrata*, rinvenuta nell'Isola di Ustica (Mar Tirreno). Le due nuove specie mostrano una stretta affinità con *D. lenis* (TOPSENT, 1892), ma sono caratterizzate da un nuovo tipo spicolare.

Parole chiave : Porifera, *Dendroxea*, specie nuove.

Introduction

Dendroxea is a monospecific genus erected by GRIESSINGER (1971) on the basis of *Reniera lenis* described by TOPSENT (1892).

Although its oxeas are typical of renierids, *Dendroxea* is characterized by a particular organization of its skeletal framework, with dense branching plurispicular tracts rising up from a basal densely reticulated layer of spicules. Because of this skeletal arrangement, this genus, very distinct from the Renieridae, recalls some encrusting Axinellidae species.

The Mediterranean records of *D. lenis* are scarce. The species was found in Banyuls (TOPSENT, 1892; VAN LENT & DE WEERDT, 1987), Marseille (GRIESSINGER, 1971), Naples (PULITZER-FINALI, 1977) and Blanes (URIZ, 1979); *D. lenis* was also recorded from the Atlantic Sea (Canary Island and Azores) by CRUZ & BACALLADO (1984) and DE WEERDT & VAN SOEST (1986) respectively. All these authors agree upon the systematic assignment of *Dendroxea* among the Haplosclerida. URIZ (1979), on the basis of the authors descriptions, established the synonymy between *Isodictya indistincta*

(BOWERBANK) and *Dendroxea lenis*, extending the distributional area of the species to the British coasts.

In this paper two new species of *Dendroxea*, collected from three Mediterranean localities, are described.

Material and Methods

Several specimens of the two new species were collected by scuba, fixed in formaldehyde (4%) and preserved in ethanol (70%). Slides of dissociated spicules and transversal sections of paraffin embedded sponges were prepared to study the spicular arrangement and skeletal structure. The fine morphology of some spicules was studied using a 115 Philips Scanning Electron Microscope.

Slides of dissociated spicules and hand sections were also prepared for some specimens of *D. lenis*.

Systematic description

Dendroxea pseudodidiscoides sp. nov.
(Figs 1A, 2A, 3A, 4)

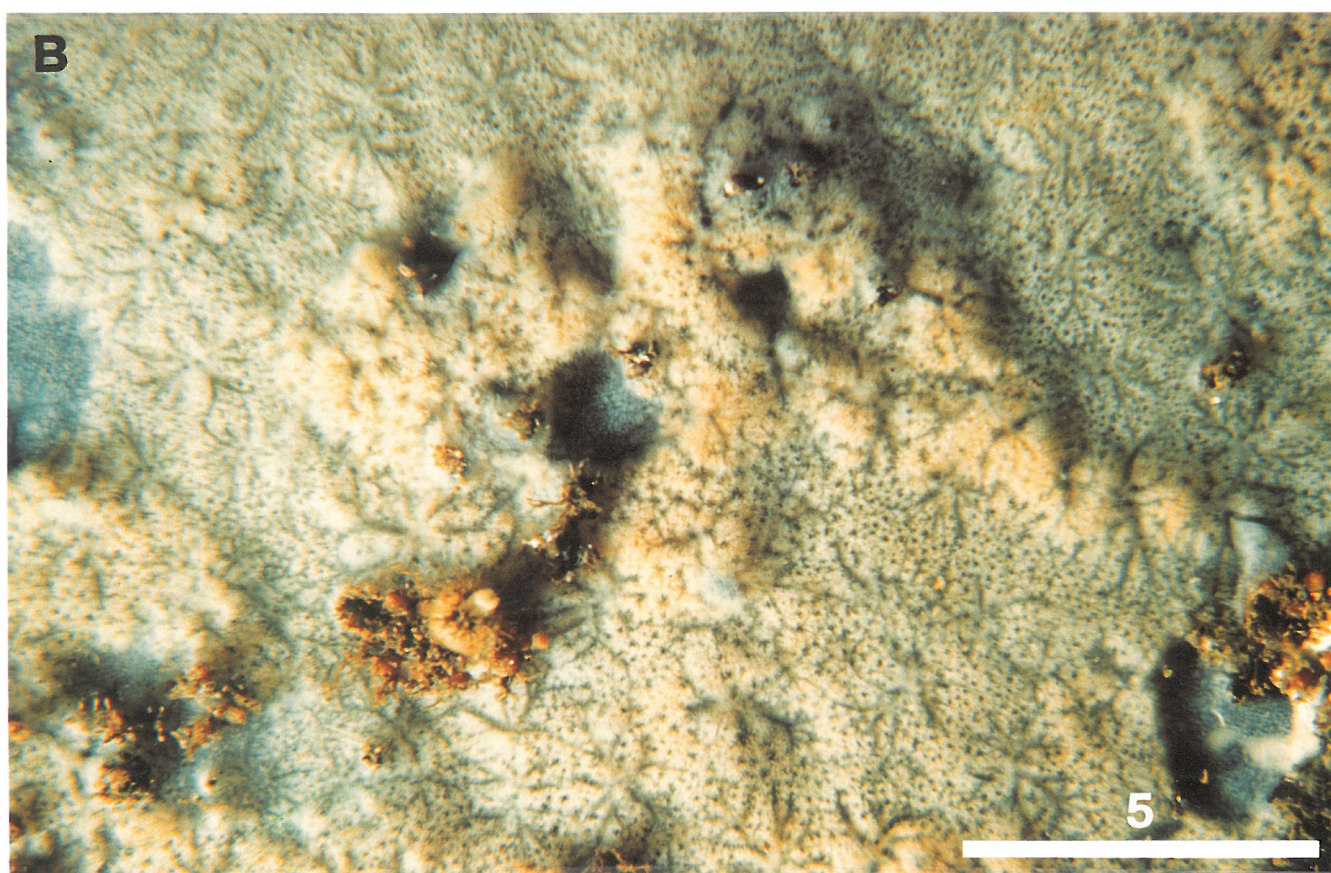
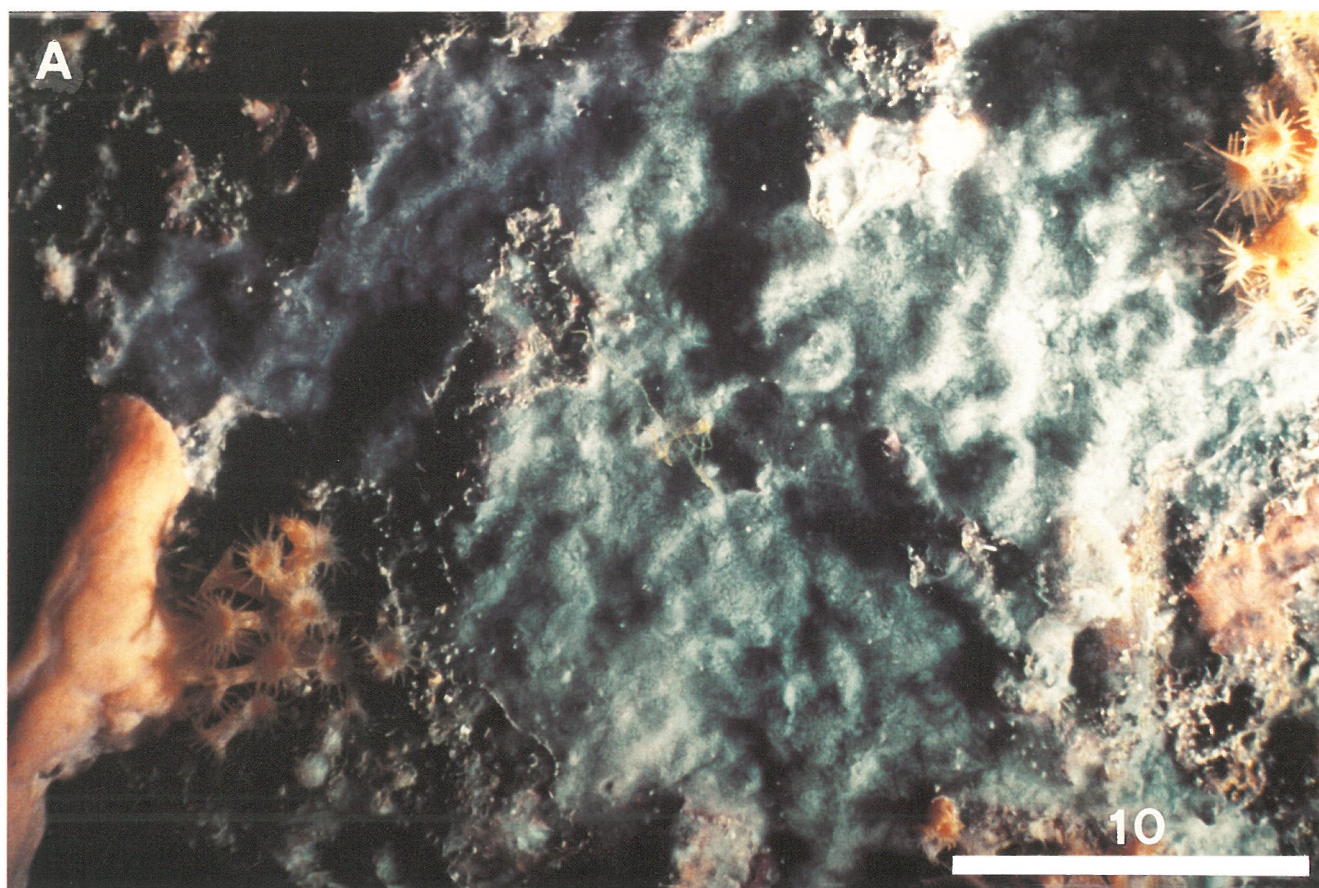
Holotype TR7a; paratypes : TR7b; TR6f, v; TR4d, r. Superficial cave of the "Bue Marino", S. Domino Island, Tremiti Archipelago, Adriatic Sea, 0.5-2 m depth, lat 42°6' N, long 15°29' E.

Collected by G. CORRIERO and M. PANZA, Nov. 4, 1993.

The holotype and the slides of the species are deposited in the Museo di Zoologia ed Anatomia Comparata dell'Università di Bari (Italy); the paratypes are part of the first author's collection.

SHAPE, SIZE AND COLOR

Encrusting, 0.6-1 mm thick. Surface finely bristly and irregularly patterned. A wide system of choanosomal holes is sometimes evident under the surface of the sponge. Consistency soft. Color : from blue to light blue in live specimens (Fig. 1A), gray in ethanol. The size of the specimens ranges from 6 (TR4d) to 50 cm² (TR7a) of covered area.



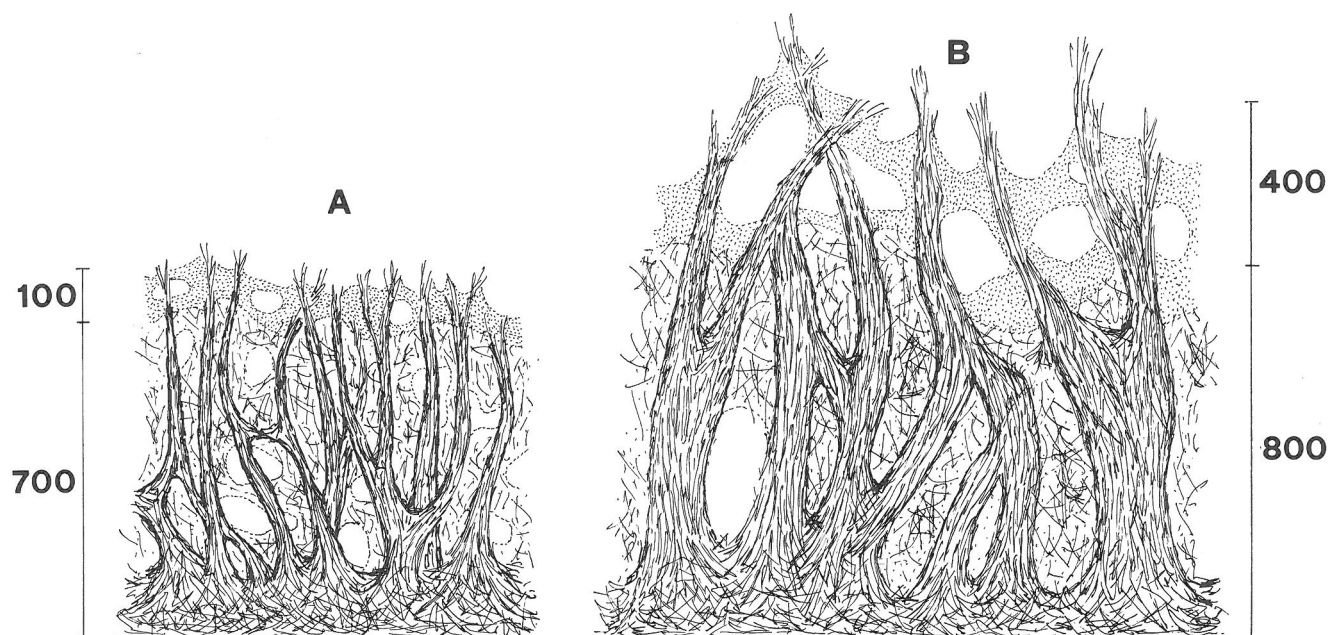


Fig. 2. - Skeleton architecture. - A. *Dendroxea pseudodidiscoides* sp. nov. - B. *Dendroxea adumbrata* sp. nov. In both species the dotted area indicates the ectosome. The numbers indicate the thickness of the ectosome (top) and of the choanosome (bottom), measured in μm .

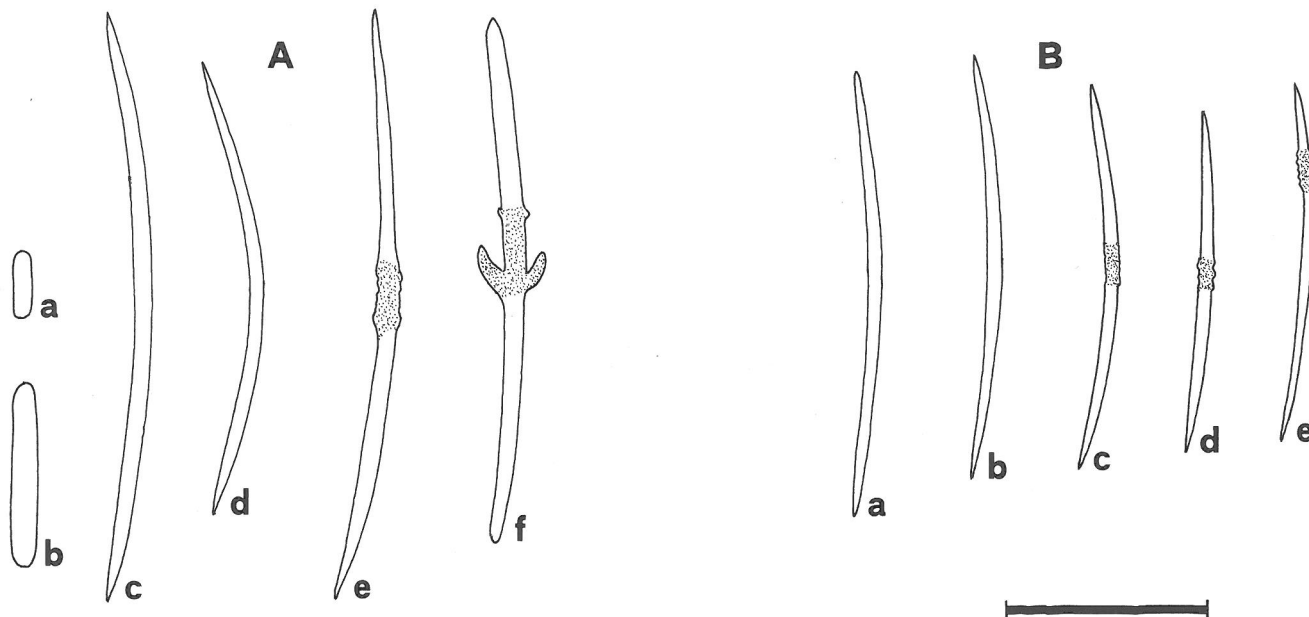


Fig. 3. - Spiculation of the two new species. Scale bar = 50 μm .

A. *Dendroxea pseudodidiscoides* sp. nov. (a-b = microstrongyles, c-d = oxeas, e-f = pseudodidiscorhabds).
 B. *Dendroxea adumbrata* sp. nov. (a-b = oxeas, c-d-e = pseudodidiscorhabds).

◁

Fig. 1. - *Dendroxea pseudodidiscoides* sp. nov. (A) and *Dendroxea adumbrata* sp. nov. (B) in their natural surrounding (type localities). Scale bars in cm.

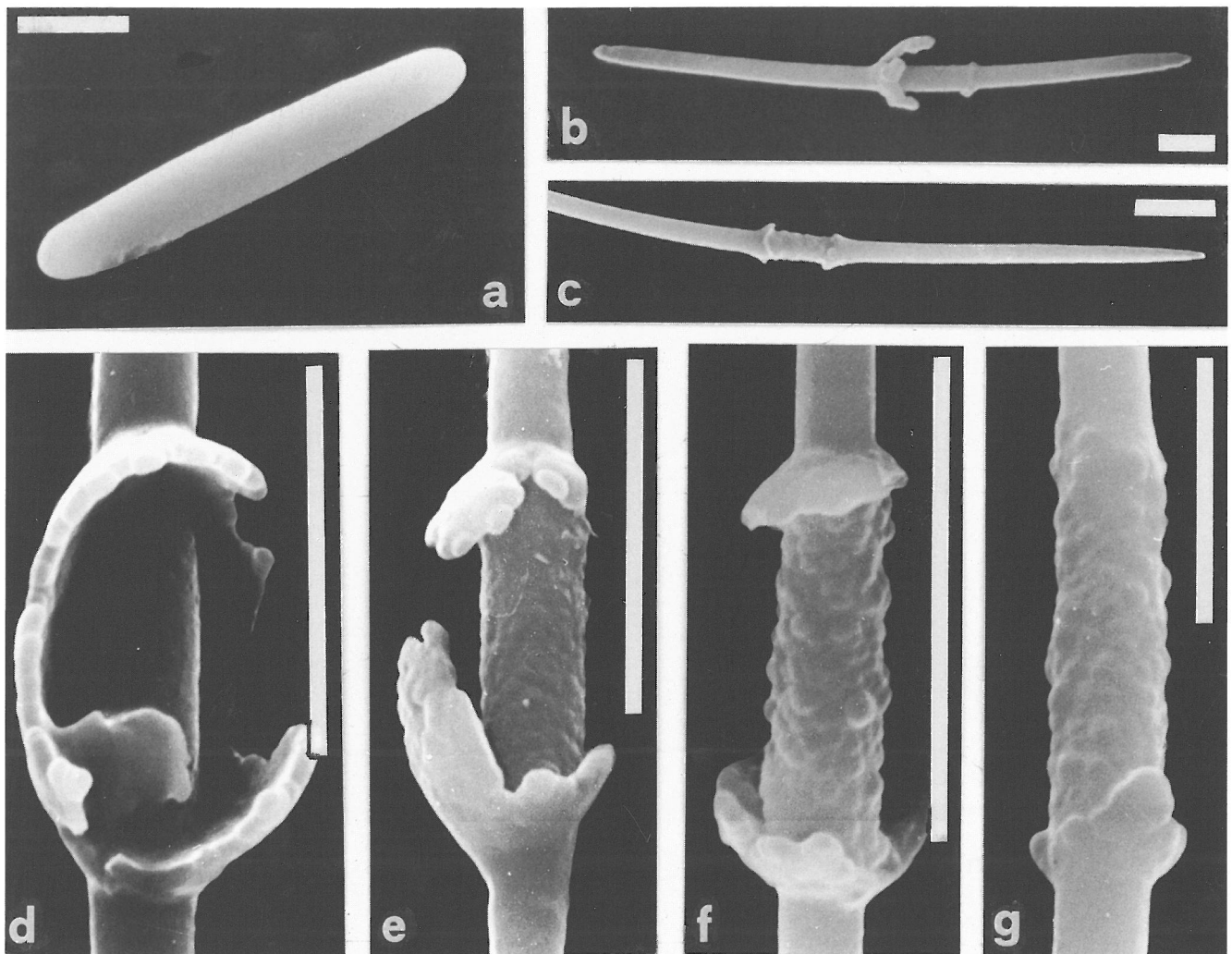


Fig. 4. - *Dendroxea pseudodidiscoides* sp. nov. a = microstrongyle, b-c = pseudodidiscorhabds, d-g = details of pseudodidiscorhabds, with discs varying from an egg shaped swelling (g) to simple rings (d). Scale bars = 10 µm.

SKELETON

Choanosomal multispicular, branching tracts, embedded in a conspicuous matrix of spongin, rising up from a basal layer of disoriented spicules. Disoriented spicules also occur between the tracts. The choanosomal skeleton supports a thin ectosome devoid of spicules (Fig. 2A).

SPICULATION

Microstrongyles 12-40 (26.7 ± 5.9) / 3-7 (5.8 ± 3.1) µm (Figs 3A, a, b; 4a). Oxeas 96-165 (134 ± 11.3) / 2.5-5 (3.5 ± 0.6) µm, slightly curved, sometimes centrangulate (Figs 3A, c, d). A constant number of oxeas, about 5-10% for each specimen examined, shows, in the middle of the shaft, a pair of irregular and frayed discs (Figs 3A, e, f; 4b, c). The tract of the spicular shaft between the discs show a coarse surface (Figs 4d, e, f, g). On the basis of the affinity of these spicules with the didisco-

rhabds of the genus *Didiscus*, and in agreement with the new definition proposed by WIEDENMAYER (1994, p. 66), we have called them "pseudodidiscorhabds". Pseudodidiscorhabds show four main forms which may reflect different developmental phases: a) pseudodidiscorhabds in which the discs are fused together to form an egg-shaped swelling, to 7.5 µm large, at the middle of the shaft (Fig. 4d); b) pseudodidiscorhabds in which the two discs are separated with their concave surfaces facing each other, and with the discs displaying a frayed rim (Fig. 4e); c) pseudodidiscorhabds in which one or both discs are reduced to simple rings (Fig. 4f); d) pseudodidiscorhabds in which one or both discs are absent and only lumped swellings with a coarse surface occur (Fig. 4g). No significant differences between the size of the oxeas and the size of the pseudodidiscorhabds have been observed. Oxeas, pseudodidiscorhabds and microstrongyles are mixed throughout the skeleton.

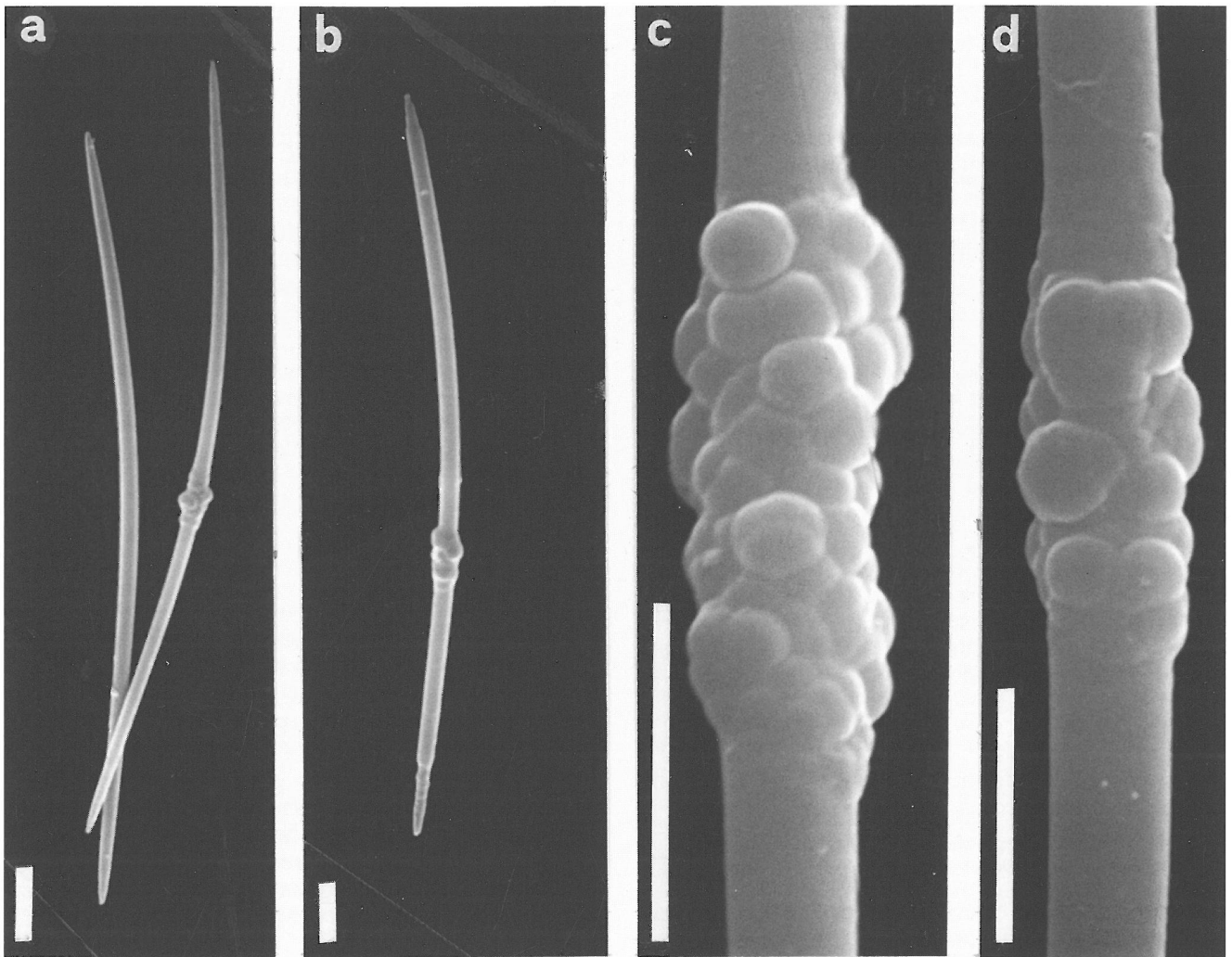


Fig. 5. - *Dendroxea adumbrata* sp. nov. a = oxea and pseudodidiscorhabd, b = pseudodidiscorhabd, c-d = details of lumped swellings on pseudodidiscorhabds. Scale bars = 10 µm.

ECOLOGY

The specimens were collected at 0.5-2 m of depth on the rocky walls of a shallow submarine cave. They reach the maximum size and the highest density in the middle of the cave, about 50 m away from the opening, where a sharp decrease of the light intensity occurs.

ETYMOLOGY

The specific name refers to the occurrence of the peculiar pseudodidiscorhabds.

REMARKS

Dendroxea pseudodidiscoides is characterized by the occurrence of pseudodidiscorhabds and microscleres. Pseudodidiscorhabds, with irregular discs and /or lumped swellings, show no differences in size from oxeas. Microscleres are microstrongyles. Skeleton frame, size and shape of oxeas agree with the peculiar characters of the genus.

Dendroxea adumbrata sp. nov. (Figs 1B, 2B, 3B, 5)

Holotype : UT50; paratypes : UT51, UT52, UT53, UT54 Grotta della Colombaia, Ustica island, Tyrrhenian Sea, 1 m depth, lat 38°42' N, long 13°11' E; MR1 "3 PP cave", La Ciotat, near Marseille, 13 m depth.

Holotype collected by G. CORRIERO and A. DELLE PIANE, Aug. 22, 1994.

The holotype and the slides of the species are deposited in the Museo di Zoologia ed Anatomia Comparata dell'Università di Bari (Italy); the paratypes are part of the first author's collection.

SHAPE, SIZE AND COLOR

Encrusting or thin cushion-shaped species (1-2 mm thick). Surface finely bristly and with marked superficial exhalant system converging in little oscula (Fig. 1B). Color : from gray to pale blue in live specimens (Fig. 1B), grayish in ethanol.

Consistency soft. The size of the specimens ranges from 3 (UT46) to 15 cm² (UT40) of covered area.

SKELETON

The choanosome consists of multispicular branching tracts, with abundant spongin which rises up from a basal layer of disoriented spicules. Disoriented spicules also occur between the tracts. The ectosome is a membrane without spicules (Fig. 2B).

SPICULATION

Microscleres are lacking. Slightly curved oxeas 92-135 (112.5 ± 9) / 1.6-3.5 (2.9 ± 0.5) μm (Figs. 3B, a, b; 5a). For each examined specimen, about 5-20% of the oxeas are modified into pseudodidyscorhabds showing lumped swellings with a coarse and granulose surface, very close to that of *D. pseudodidyscoides*, but without the occurrence of discs (Figs. 3B, c, d, e; 5a, b, c, d). No significant differences between the size of the oxeas and the size of the pseudodidyscorhabds have been observed. Oxeas and pseudodidyscorhabds are scattered throughout the skeleton.

ECOLOGY

The species was found on hard substrata from shallow, semi-dark caves.

ETYMOLOGY

The specific name refers to the occurrence of just sketched pseudodidyscorhabds.

REMARKS

The occurrence of pseudodidyscorhabds with lumped swellings, but without clearly evident discs, characterizes this species. Pseudodidyscorhabds show the same size of oxeas. Microscleres are lacking. Skeleton frame, size and shape of oxeas agree with the peculiar characters of the genus.

Dendroxea lenis (TOPSENT, 1892)

Two specimens preserved in the collections of the Museo di Storia Naturale Giacomo Doria, Genova (Italy), (PNA. 138, Banco S. Croce Bay of Naples, 20 m depth, and IS.A. 16 Monte Vico, Ischia Island 1-10 m depth).

One specimen preserved in the collections of the Museo di Zoologia ed Anatomia Comparata dell'Università di Bari (Italy), MR2 "3 PP cave", La Ciotat, near Marseille, 15 m depth.

SHAPE, SIZE AND COLOR

Encrusting (1-1.5 mm thick) species. Surface finely bristly. Color : pale blue in formaldehyde; grayish, in ethanol. Consistency soft.

SKELETON

The choanosomal skeleton consists of plurispicular branching tracts, rising up from a basal layer of disoriented spicules. Disoriented spicules also occur between the tracts. The ectosome lacks spicules.

SPICULATION

The spicules are slightly curved oxeas 94-171 (135.4 ± 15.1) / 3.5-7 (5 ± 0.7) μm in the specimens from the Bay of Naples, 65-150 (108 ± 17.8) / 4-11 (8 ± 2.1) μm in the specimen from Marseille.

ECOLOGY

The specimen from Marseille was collected at the entrance of a semi-dark cave; the specimens from the Bay of Naples on rocky boulders (PNA. 138) and in a shallow cave (IS.A. 16).

REMARKS

Skeletal feature, shape and size of the oxeas of the specimens described here are in agreement with GRIESSINGER's description of *D. lenis*.

The type specimen, originally located at the Laboratoire Arago, Banyuls-sur-Mer (GRIESSINGER, 1971), seems to be lost (N. BOURY-ESNAULT & J. VACELET, personal communication). As a consequence, after an official confirmation of this evidence, a neotype should be deposited somewhere. The unnumbered slide occurring at the Museum of Natural History of Paris (MNHN, unnumbered) cannot be considered as a holotype.

Discussion

The species described here fit in perfectly with the features of the genus *Dendroxea*. All three exhibit an encrusting shape and have oxeas which are very similar in size and shape. With regard to the skeletal architecture, the lack of spicules in the ectosome is a character shared by the three species, together with the presence of a choanosomal skeleton made by branching multispicular tracts; only *D. pseudodidyscoides* shows a peculiar feature, since it seems to be constantly thinner than the other two.

The most important diagnostic feature to distinguish *D. pseudodidyscoides* and *D. adumbrata* from *D. lenis* is the constant occurrence, in both new species, of the remarkable pseudodidyscorhabds. Microstrongyles are also present in *D. pseudodidyscoides*.

The pseudodidyscorhabds of *D. pseudodidyscoides* show irregular and frayed discs and/or lumped swellings with a coarse surface, while in *D. adumbrata* they lack discs, showing only lumped swellings.

The encrusting shape and the occurrence of small and thin oxeas seem to be constant characters of the genus *Dendroxea*. This allows us to exclude URIZ's

proposal (1979), which suggests the synonymy between *Isodictya indistincta*, an encrusting to massive shaped species with oxeads up to 200 µm large and up to 10 µm thick, and *D. lenis*.

The similarity between pseudodidiscorhabds and the didiscorhabds of the genus *Didiscus* is only apparent. In fact, pseudodidiscorhabds are megascleres, whereas didiscorhabds are microscleres. Moreover, didiscorhabds are always associated with a spiny surface (which can be more or less evident), while pseudodidiscorhabds are usually accompanied by coarse and lumped swellings.

According to GRIESSINGER (1971), the branching skeletal architecture of *Dendroxea* is very similar to that showed by some encrusting Axinellida. Due to its loose reticulation, the placement of *Dendroxea* among the Haplosclerida cannot be confirmed, and more definitive data are required to corroborate the ordinal assignment of this genus.

Acknowledgments

Prof. J. VACELET and Dr. N. BOURY-ESNAULT kindly donated a specimen of *D. adumbrata* and a specimen of *D. lenis* from Marseille. We thank Mr. M. PANZA and the Naturalistic Guides of Ustica Marine Reserve for their help in sampling collection. Two anonymous referees improved the manuscript with useful comments. This work was supported by MURST 40% and CNR funds.

References

- CRUZ, T. & BACALLADO, J.J., 1981. Contribución al conocimiento de los espongiarios de las islas Canarias. 1. Demosponjas "Homosclerophorida y Astrophorida" del litoral de Tenerife. *Boletín del Instituto español de oceanografía*, 6 (4) : 75-87.
- GRIESSINGER, J.M., 1971. Etude des Réniérides de Méditerranée (Demosponges Haplosclérides). *Bulletin du Muséum national d'Histoire naturelle*, 3 (3) : 97-182.
- LENT, F. VAN, DE WEERDT, W.H., 1987. The Haplosclerid sponge fauna of Banyuls-sur-Mer (Mediterranean) with the description of a new species. In : VACELET, J. & BOURY-ESNAULT, N. (Eds), Taxonomy of Porifera from the N.E. Atlantic and Mediterranean Sea. NATO ASI Series G, 13. Ecological Sciences, Springer-Verlag, Berlin, pp. 125-148.
- PULITZER-FINALI, G., 1977. Report on a Collection of Sponges from the Bay of Naples. III. Hadromerida, Axinellida, Poecilosclerida, Halichondrida, Haplosclerida. *Bollettino dei musei e degli istituti biologici della (R.) Università di Genova*, 45 : 7-89.
- TOPSENT, E., 1892. Diagnoses d'éponges nouvelles de la Méditerranée et plus particulièrement de Banyuls. *Archives de Zoologie expérimentale et générale*, série 2, 10 : XVII-XXVIII.
- URIZ, M.J., 1979. *Dendroxea indistincta* (BOWERBANK), nuevo nombre para *Dendroxea lenis* (TOPSENT) GRIESSINGER (*Porifera : Haplosclerida*). Primer Simposio de Bentos, San Sebastian 9-11 Abril : 87-99.
- WEERDT, W.H., DE & VAN SOEST, R.W.M., 1986. Marine shallow-water Haplosclerida (Porifera) from the south-eastern part of the North Atlantic ocean. *Zoologische Verhandelingen*, 225 : 1-49.
- WIEDENMAYER, F. Contributions to the knowledge of Post-Paleozoic neritic and archibenthal sponges (Porifera). The stratigraphic record, ecology, and global distribution of intermediate and higher taxa. *Schweizerische Palaeontologische Abhandlungen*, 116 : 1-147.

GIUSEPPE CORRIERO

Istituto di Zoologia ed Anatomia Comparata dell'Università
Via Amendola 165/A
70126 Bari, Italy

LIDIA SCALERA LIACI

Istituto di Zoologia ed Anatomia Comparata dell'Università
Via Amendola 165/A
70126 Bari, Italy

ROBERTO PRONZATO

Istituto di Zoologia dell'Università
Via Balbi 5
16126 Genova, Italy