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# ***Petrosia pulitzeri* n.sp. (Porifera, Demospongiae) from Mediterranean caves**

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## INTRODUCTION

An exhaustive revision of the family Petrosiidae van Soest, 1980 was made by Desqueyroux-Faundez (1987) in her study of the sponge fauna of New Caledonia. In the Mediterranean, most records of Petrosiidae were generally referred to *Petrosia ficiformis* (Poiret, 1789), since another species - *Petrosia clavata* (Esper, 1794) - was usually synonymized with the former. However, Pulitzer-Finali (1983) referred to *P. clavata* three specimens showing only oxeas from Naples and Portofino, basing the attribution on the redescription of this species by Ehlers (1870) and Topsent (1934). An extensive study of the variability and taxonomic status of different *Petrosia*-like sponges has recently been performed by Bavestrello *et al.* (1994). These authors concluded that four different types of *Petrosia*-like sponges are present in the Mediterranean. Two of them (identified in that paper as type A and B) correspond to *P. clavata* and *P. ficiformis*, whose specific distinction was also discussed by Bavestrello & Sarà (1992) according to morphological and electrophoretic analyses. A third type corresponds to a *Petrosia* living in caves, characterized by numerous conical processes, that shall be described as a new species. The present paper deals with the description of the fourth type (identified with the letter C in the 1994 paper of Bavestrello *et al.*).

## MATERIALS AND METHODS

The studied specimens were collected by Dr. Pulitzer-Finali from the Island of Crete and by the present author from the Gulf of Naples, in both cases by diving. They all came from marine caves. Spicule preparations were made by dissolving small fragments of the sponge in 65% nitric acid, both in test-tubes and directly on slides, rinsing with water, dehydrating with 90% ethanol and mounting with Eukitt. Tangential and transversal sections cut by hand from medium-dry specimens were mounted with the same resin to study the skeletal architecture. Both dissociated spicules and sponge sections were dried directly on stubs, gold sputtered and examined by a Philips 515 SEM.

## TAXONOMIC ACCOUNT

Order PETROSIDA Bergquist, 1980

Family PETROSIIDAE van Soest, 1980

Genus *Petrosia* Vosmaer, 1885

*Petrosia pulitzeri* n. sp.

### *Material examined*

1. CRT 10, Crete, Sournia, superficial cave, 2-5 m, 20.9.1969, leg. Pulitzer-Finali, holotype deposited at the Museo di Storia Naturale of Genova under the number CE 48715.

2. CRT 43, Crete, Agios Nikolaos, superficial cavity, 0.5-1 m, 22.9.1969, leg. Pulitzer-Finali, paratype, Genoa Museum No. CE 48716.

## ABSTRACT

*Petrosia pulitzeri* n. sp. (Demospongiae, Petrosiidae) is described from three specimens collected from totally submerged marine caves from the Island of Crete and the Gulf of Naples. They are massive or encrusting, white or yellowish in conditions of reduced light, and stony hard in consistency. They show a skeleton formed by stout tracts of closely packed spicules (mostly strongyles) with a peripheral mesh condensation. The new species is close to *Petrosia ficiformis*, but shows spicular and skeletal differences.

**KEY WORDS:** Demosponges - Systematics - Mediterranean - Marine caves.

3. ML 29, Gulf of Naples, Grotta at the Cala di Mitigliano, vertical rocky wall, 15 m, 20.6.1980.

### Description

Specimen ML 29 is cushion-shaped, about 2 cm wide and 1 cm high. CRT 10 is cylindrical, 3.5 cm long, with a

diameter of 1-1.5 cm (Fig. 1A). CRT 43 forms two small incrustations (1-2 mm thick, less than 8 mm across) on a piece of calcareous rock. The sponge surface is rather coarse, with rounded tubercles less than 1 mm high, or with series of low ridges arranged to form roundish meshes. The ectosome is clearly separated from the

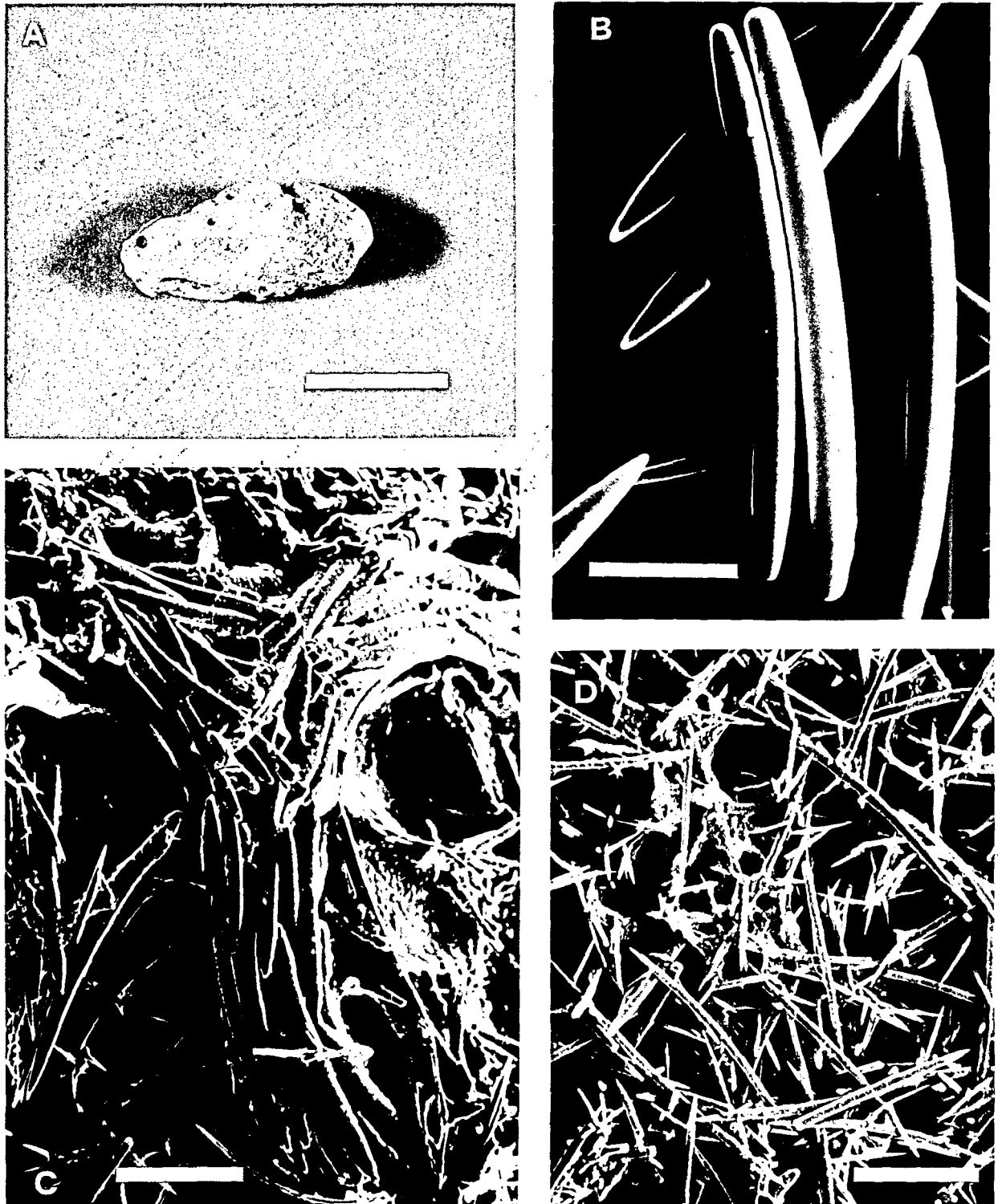


Fig. 1 - *Petrosia pulitzeri* n. sp. A, Holotype. Bar, 2 cm. B, Spicules. Bar, 50  $\mu$ m. C, Choanosomal skeleton. A multispicular tract of densely packed oxeas and strongyles. Bar, 100  $\mu$ m. D, Ectosomal skeleton with thin oxeas of different sizes. Bar, 100  $\mu$ m.

choanosome but not easily detachable. The colour in life is white or yellowish, in conditions of reduced light. Oscules are scattered, round, 1-2 mm wide and bordered by a low rim. Other minor vents (0.2-0.3 mm across) are scattered on the sponge surface. Consistency is stony hard in specimen ML 29, and slightly softer in the other two.

**Skeletal arrangement** – The ectosome appears as a felt-work of tangentially arranged oxeas (of different sizes) which do not form any reticulation, supported by the choanosomal spicule tracts (Fig. 1D). The choanosome appears as a dense reticulation of stout tracts of closely packed spicules (Figs 1C, 2a), mostly strongyles of the bigger size, forming roundish meshes rather variable in size. The tract thickness varies between 100 and 300  $\mu\text{m}$  (mean 218  $\mu\text{m}$ ), while mesh diameter ranges from 300 to 700  $\mu\text{m}$  in the deeper part of the choanosome, decreasing to 200  $\mu\text{m}$  near the surface, due to a peripheral condensation of the skeleton. Loose, interposed spicules are abundant.

**Spicules** – Spicule types are oxeas and strongyles, but intermediate forms – as the shape of the extremities – are mostly frequent (Fig. 3c). Spicules cannot be divided into size classes according to length (they show continuous variation), whereas width allows discrimination of two categories of thin and thick spicules. Four types of spicules can be distinguished: (a) Large strongyles: straight or gently curved, with rounded or sometimes slightly tapered ends (Figs 1B, 3a). (b) Small strongyles: curved or bent, rarely straight, the shorter ones showing typical reniform shape (Fig. 3b). (c) Large oxeas: very similar in their general shape and size to the large strongyles; their extremities are tapered and sometimes slightly stepped; one of them may be blunt (Fig. 3c); axial canal often visible on the whole length of the spicule. (d) Thin oxeas: regularly curved, with sharpened, conical ends (Fig. 3d).

Strongyles are generally thicker than oxeas, but since the measures are largely overlapping, it seems more consistent to report them together as in Table I, considering only two categories of thick and thin spicules. More than 200 spicules per type and per specimen have been measured.

#### Distribution and ecology

*Petrosia pulitzeri* n. sp. appears to be restricted to the warmer waters of the Mediterranean Sea. In fact, it was never found in the extensive surveys recently performed in the Ligurian Sea to ascertain the variability of *Petrosia ficiformis* (Bavestrello *et al.*, 1994). The three studied specimens come from totally submerged caves, superficial in Crete and slightly deeper in the Gulf of Naples. Specimen ML 29 was collected in conditions of semi-darkness in a zone of relatively intense water-movement, at a distance of about 10 m from the entrance to the cave. *Petrosia pulitzeri* is present also on the Ionian coast of

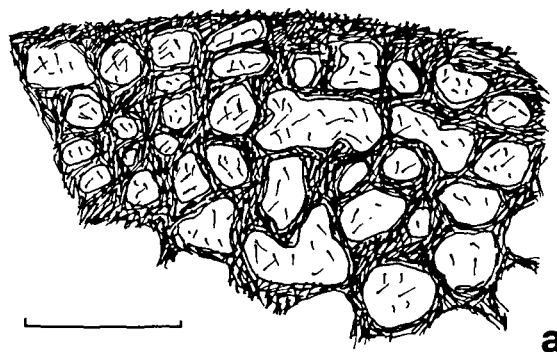
TABLE I - *Petrosia pulitzeri* n. sp. spicule sizes (oxeas and strongyles) of the three studied specimens.

Specimens		Length			Width		
		min	max	mean	min	max	mean
ML29	thick	26.5	268	122.8	3.0	21.0	11.8
	thin	45.0	240	129.9	1.3	15.0	4.8
CRT10	thick	41.0	265	146.2	5.5	27.0	12.5
	thin	51.0	259	132.6	1.2	16.0	6.0
CRT43	thick	44.0	272	146.4	5.1	20.0	11.3
	thin	40.0	193	108.3	0.8	6.5	2.8

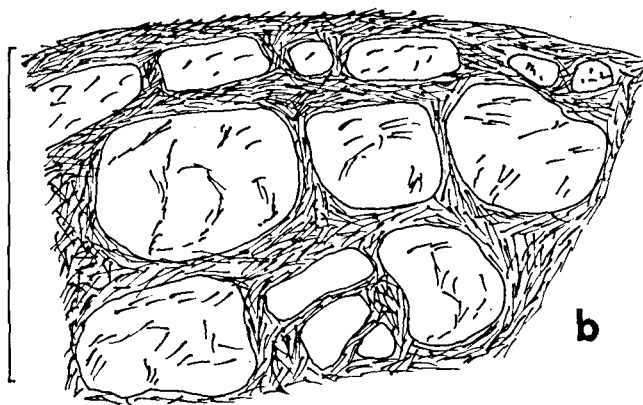
Sicily and in the Adriatic Sea, according to spicule slides of the present author's collection, formerly identified as *P. ficiformis*.

#### Etymology

The new species is named after Dr. Gustavo Pulitzer-Finali in recognition of his relevant contribution to sponge taxonomy and for his having first collected, at Crete in 1969, two specimens that he attributed to *P. ficiformis* (Pulitzer-Finali, 1983).



a



b

Fig. 2 - Comparison between perpendicular sections of peripheral skeletons of *Petrosia pulitzeri* n. sp. (a) and *Petrosia ficiformis* (b). Bar, 2.5 mm.

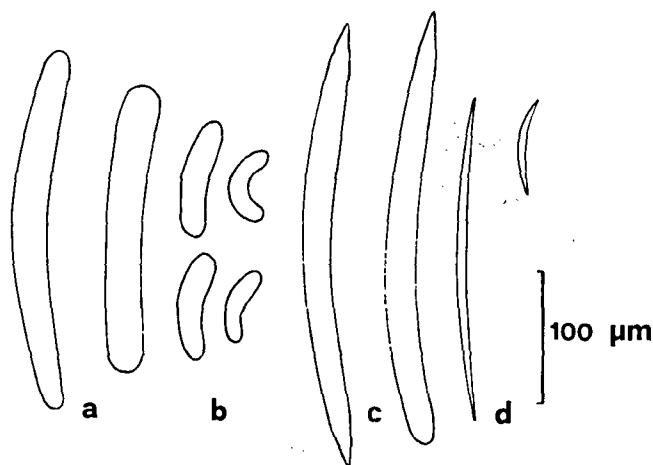


Fig. 3 - Types of spicules of *Petrosia pulitzeri* n. sp.: a, large strongyles; b, small, reniform strongyles; c, thick oxeas; d, thin oxeas.

#### CONCLUSIVE REMARKS

According to the general aspect of the spicules, *P. pulitzeri* could have been ascribed to the genus *Strongylophora* Dendy, 1905. However, several authors, e.g., Lévi & Lévi (1983), de Weerd & van Soest (1986) regard *Strongylophora* at most as a sub-genus, and Desqueyroux-Faundez (1987) as a synonym of *Petrosia*. In fact, there are no substantial differences in the skeletal frame between *Petrosia* and *Strongylophora*. Even species like *P. pulitzeri*, where strongyles are apparently the most characteristic spicule category, are attributable to *Petrosia*.

*Petrosia pulitzeri* differs from the sympatric, Mediterranean, *P. ficiformis* (Poiret) in the shape and size of the spicules. A comparison of the percent distribution of spicule width between a specimen of *P. ficiformis* (P/E 12) from Portofino (Ligurian Sea) and three specimens of *P. pulitzeri* (CRT 43, CRT 10, ML 29) is shown in Figure 4. The compared specimens do not come from the same area, but spicule size variations related to geographic factors are not reported for Petrosida. Nevertheless, the recorded differences clearly outnumber those referable to seasonal variations (Bavestrello *et al.*, 1994). The two species differ also in mesh size, spicule tract thickness and, finally, in the structure of the choanosomal skeleton which is more dense in *pulitzeri* than in *ficiformis* (Fig. 2a, b). A rather close species is *Petrosia (Strongylophora) durissima* (Dendy, 1905) from the Indian Ocean, which differs from the present one in shape (it was described as slightly ramose), consistency (hard and stony and rather

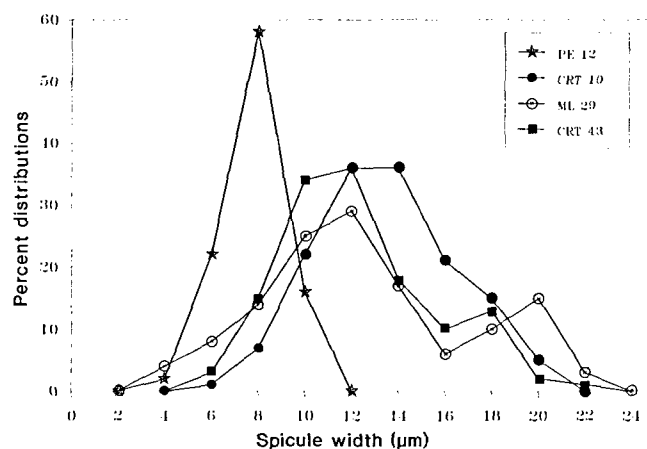


Fig. 4 - A comparison of the percent distribution of spicule width between a specimen of *P. ficiformis* (P/E 12) and three specimens of *P. pulitzeri* (CRT 43, CRT 10 and ML 29).

cavernous internally), skeleton (dermal reticulation of large strongyles with heaps of small strongyles at the nodes). *Petrosia durissima* lacks also large and long thin oxeas. The Atlantic species *Petrosia canariensis* de Weerd & van Soest, 1986, has strongyles of similar size but is devoid of oxeas.

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