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CLIONID SPONGES FROM THE COAST OF TUNISIA

by

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ABSTRACT

Seven species of clionid sponges from Tunisian shallow-water habitats are described and illustrated : *Cliona celata, C. viridis, C. nigricans, C. carteri, C. schmidti, C. vastifica* and *Cliothosa hancocki*. Two of these *(Cliona celata* and *C. carteri)* have not previously been reported from Tunisia. *Cliona nigricans* is considered a distinct species and not a mere growth form of *C. viridis*.

RESUME

Sept espèces d'éponges clionides sont décrites et illustrées, *Cliona celata, C. viridis, C. nigricans, C. carteri, C. schmidti, C. vastifica* et *Cliothosa hancocki*. Deux de ces espèces *(Cliona celata et C. carteri)* sont signalées pour la première fois en Tunisie. *Cliona nigricans* est considérée comme une espèce distincte et non une simple forme de croissance de *C. viridis*.

INTRODUCTION

Members of the family Clionidae (Porifera) are well known for their habit of excavating limestone substrates and living more or less cryptically in their burrows. Thus they are easily overlooked but, nvertheless, they play an important part in the erosion of calcium carbonate shorelines. During three recent surveys of Tunisian shallow-water habitats (October 1969, May-July 1970, August-September 1971), the auhor observed and collected seven species of clionid sponges. Two of these, *Cliona celata* and *C. carteri* have not previously been recorded from Tunisia. The substrata containing the burrowing sponges con-

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sisted mainly of well cemented sandstone with a varying content (7-57% weight) of Hcl-insoluble materials, mostly quartz grains. This did not noticeably impede the excavating efficiency although the size and arrangement of chambers produced by the sponges was sometimes modified.

The following species descriptions are intended as a field guide to permit identification by workers who are not specialists in sponge systematics. The spicule complement of all species is illustrated. The synonymy includes reference to the first describer and to a recent revision or comprehensive description of the species. Ranges of spicule dimensions (50 measurements each) are given, with mean values in parentheses. Spelling of locality names follows that of the Tunisian road map issued by the Service Topographique (Secrétariat d'Etat aux Travaux Publics et à l'Habitat), Tunis (1967). The specimens on which these descriptions are based deposited at the Institut National Scientifique et Technique d'Océanographie et de Pêche (Salammbô, Tunisia). Methods of preparation of burrowing sponges for systematic study are given by Rützler (1974).

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DESCRIPTION OF SPECIES

Cliona celata Grant

Figure 1

Cliona celata Grant 1826 : 78-81. — Topsent 1900 : 32-55, pl. 1, figs. 5-9; pl. 2, fig. 1. — Volz 1939 : 4-8, fig. 1; pl. 1, figs. 1, 2; pl. 2, fig. 3.

Description. — Color : Yellow to golden yellow, changing to greyish brown or ochre in alcohol. Shape and size : The papillae are circular, well separated from each other, 0.5-3.0 mm in diameter. No papillary canal is developed, chambers start immediately below the surface. Chambers measure 2.5-4.5 mm, maximum penetration observed was 14 mm below the substratum surface. Spicules : Only tylostyles and a few styles occur in the material studied (figure 1a). They are bent in the upper third.

The tylostyles heads are usually subterminal, sometimes removed considerably from the rounded end of the spicule (figure 1b). The spicules measure 220.0-400.0 (328.0) × 3.2-6.9 (5.4) µm. The tylostyle heads are 9.6-14.4 (11.5) µm long, 7.2-11.0 (8.3) µm wide.

Remarks. — Only the alpha-stage of this sponge was observed. In some specimens the chambers are not well defined, due to a high content of quartz grains in the substratum rock. Inside coralline algal crusts the chambers show the typical development.

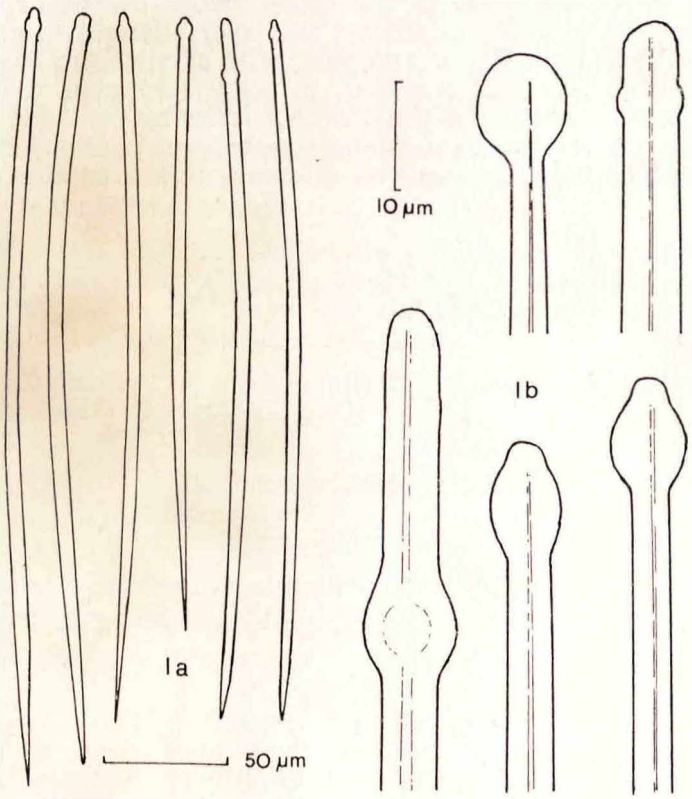

Fig. 1 : *Cliona celata*, spicules. Tylostyles (a), tylostyle heads (b).

Material. — Rass Maamoura (Northeast of Nabeul), 2 m, 13 May 1970 (in oyster shell); 0.5-1 m, 26 May 1970 (in coralline encrusted rock). Rass Salakta, 2 m, 24 August 1971 (in rock).

Distribution. — Mediterranean Sea, Atlantic Ocean, Indian Ocean, Pacific Ocean.

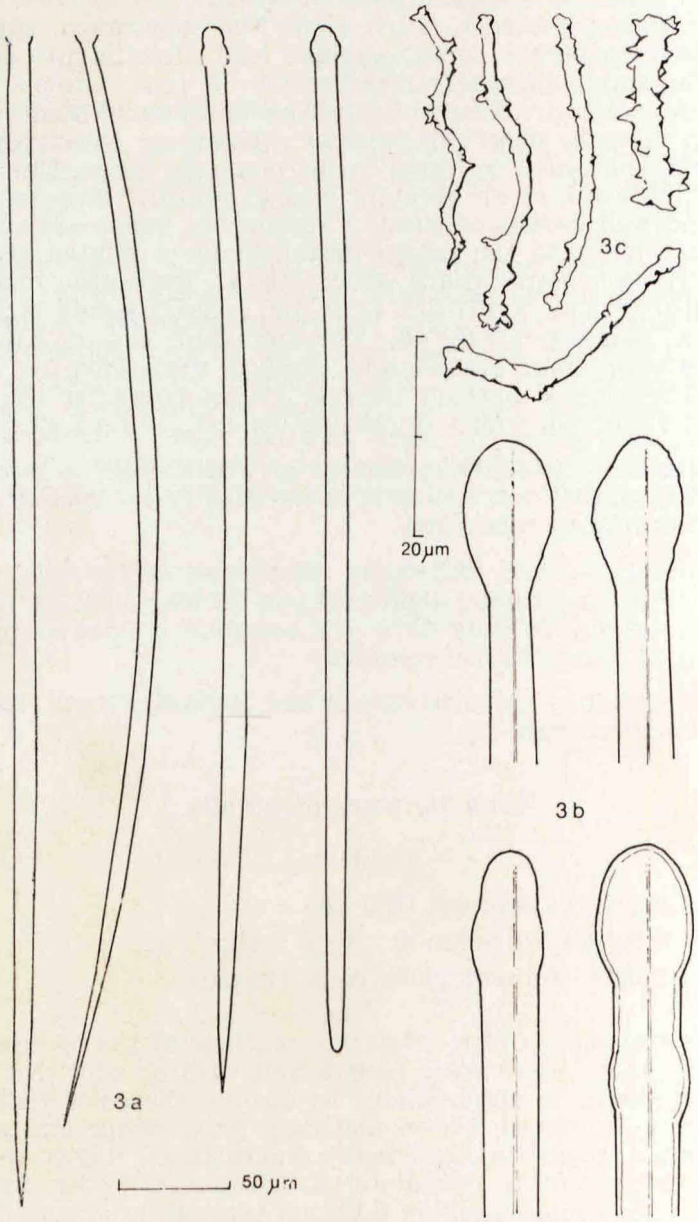

Fig. 3 : *Cliona nigricans,* spicules. Tylostyles (a), tylostyle heads (b), spirasters (c).

There is an average of 2.6 papillae per cm^2. Contracted specimens show a meandrous surface pattern. Chambers of 2-3 mm reach 40 mm into the substratum. Many of the chamber walls are broken down and the burrowed rock is very brittle. Loose sand particles are frequently embedded in the tissue. No tru gamma-stage was observed. Spicules : The spiculation of this species is similar to that of *Cliona viridis* but the tylostyles are much more robust. Tylostyles (figure 3 a, b) measure 320.0-600.0 (485.0) × 8.0-10.0 (9.3) µm, tylostyl heads 12.5-16.3 (14.5) × 10.5-16.3 (12.5) µm. Spirasters (figure 3 c) can be straight, most have 1-5 (3.1) bends. They are 14.4-41.6 (28.5) µm long, 1.3-4.0 (2.6) µm wide (including spines).

Remarks. — Studying specimens identified by O. Schmidt, Topsent (1900 : 87-88) could establish the identity of *Papillina nigricans* and *Osculina polystomella*. He also found spirasters in this material which Schmidt (1862, 1868) had overlooked. From the similarity of the spicule complement he concluded that these sponges were merely advanced, free-living stages of *Cliona viridis*. This view is not shared here because the present material includes papillate (alpha-) stages of *Cliona nigricans* which are clearly different from *Cliona viridis*. The papillae are much larger, fleshy, strongly protruding and remain distinct even when connected by encrusting tissue. *Cliona viridis*, on the other hand, forms thin smooth incrustations whenever a number of papillae are fused together. Spicule dimensions and depth distribution are also different. Both species contain zooxanthellae.

Material. — Korbous, 3-10 m, June 1970 (in coralline encrusted rock, in coralline encrusting *Posidonia* rhizome); 5 m, 24 June 1970 (in rock).

Distribution. — Mediterranean (distribution elsewhere uncertain).

Cliona carteri (Ridley)

Figure 4

Vioa carteri Ridley 1881 : 129-130, pl. 11, fig. 2.

Cliona viridis var. *carteri*. — Topsent 1900 : 98-102, pl. 3, fig. 4.

Description. — Color : Scarlet in life, eventually changing to grey in alcohol. Shape and size : The papillae are circular, well spaced, there is no tendency to fusion. They measure 0.3-2 mm. Papillery perforations can have a flaring shape and lead directly into the chambers. Papillary canals of 2-4 mm length also occur. Chambers are large, ovoid or irregular, and filled

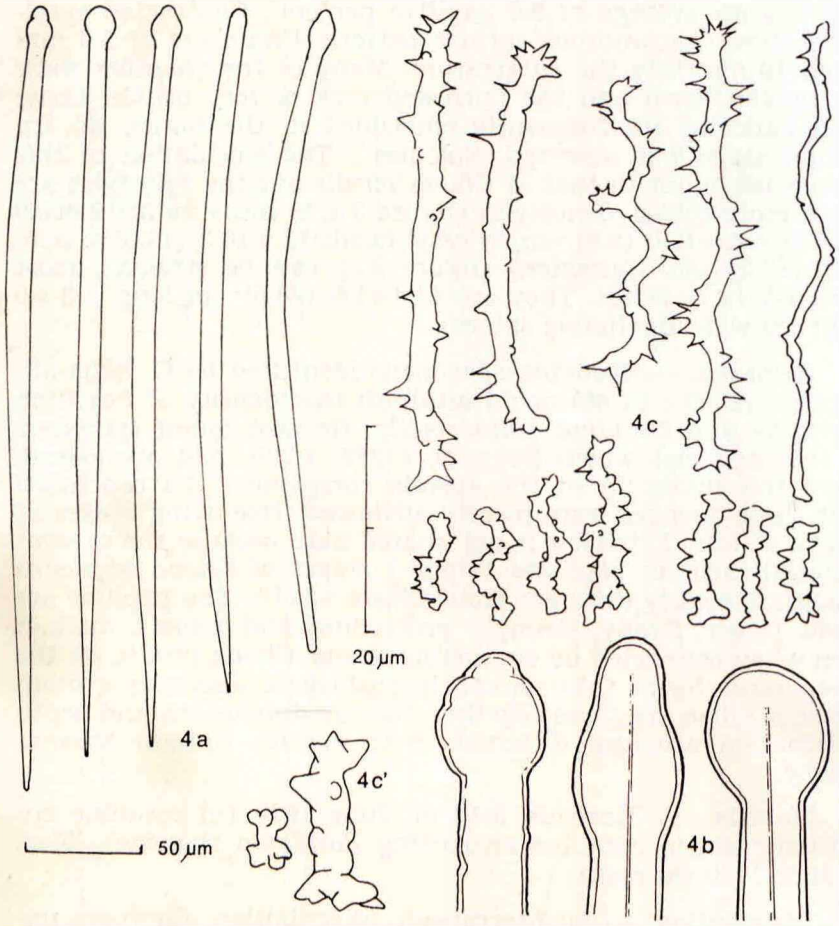

Fig. 4 : *Cliona carteri,* spicules. Tylostyles (a), tylostyle heads (b), spirasters (c).

with tissue. Their longest diameter is usually parallel to the substratum surface, thus recalling the burrow of *Cliona vermifera,* a species not found in Tunisia. The chambers measure 2-12 (8.6) × 2-7 (5.0) × 2-5 (3.6) mm (lenght × width × height), the burrow extends 12 mm into the substratum. Spicules : The tylostyles (figure 4 a, b) are robust, with fusiform shafts, and distinct heads which are frequently mucronate or subterminal. They measure 250.0-370.0 (302.0) × 6.3-12.0 (9.3) µm, heads : 11.3-14.0 (13.0) × 11.5-15.0 (13.0) µm. There are two categories of spirasters (figure 4 c). Short and comparatively thick ones occur in the papillae : 7.5-30.0 (15.3) × 3.8-6.3 (4.5) µm (including spines). A few are straight, most have 1-4 (2.4) bends. The chambers contain longer and thinner spirasters, straight or

with 1-5 (4.0) bends 27.5-45.5 (36.8) × 2.5-5.0 (3.8) µm (including spines).

Remarks. — Color, burrow size and shape and size and position of the spirasters make this a distinct species with can not be confused with *Cliona viridis*. It has only rarely been recorded in the literature and only one specimen was found during the present study. *Cliona carteri* has recently been found in the Gulf of Taranto and in the Channel of Otranto (Italy) (Sarà 1964 : 306); no description was given.

Material. — Korbous, 4 m, 24 June 1970 (in coralline encrusted rock).

Distribution. — Mediterranean Sea, Atlantic Ocean (off South Brasil only).

Cliona schmidti (Ridley)

Figure 5

Vioa schmidtii Ridley 1881 : 130.

Cliona schmidti. — Topsent 1900 : 77-84. pl. 2, fig. 15; pl. 3, fig. 5. — Volz 1939 : fig. 4; pl. 3, fig. 3.

Description. — Color : Both papillae and chambers are deep purple, a color that remains in alcohol preserved or dry specimens. Shape and size : Papillae are circular, do not fuse and measure 0.3-1.5 mm. There is a short papillary canal of 0.5-2.0 mm. Chambers measure 1-2 mm. The burrow extends 17 mm in to the substratum. Spicules : The tylostyles (figure 5 a, b) are straight or slightly bent. Their heads are distinct but frequently mucronate. Tylostyles measure 222.0-300.0 (261.0) × 5.0-7.5 (5.8) µm, heads are 6.3-17.5 (12.0) × 7.5-11.3 (9.8) µm. Microscleres (figure 5 c) are of two types. Short, stout spirasters occur mainly in the papillae : 35.0-62.5 (43.0) × 10.0-17.5 (13.5) µm (including spines). Longer and rather thin spiny rods, straight, irregularly bent or wavy are found mainly in the choanosome. They measure 25.0-90.0 (52.5) × 2.5-7.5 (4.5) µm (including spines).

Material. — Korbous, 0.5-1.5 m, 11 June 1970 (in coralline alga); 3 m, 24 June 1970 (in coralline encrusted rock). Caves Romaines (West of El Haouaria), 10 m, 14 June 1970 (in coralline encrusted rock). Ile Plane, 1 m, 5 September 1971 (in base of *Astroides calycularis*).

Distribution. — Mediterranean Sea, Red Sea, Indian Ocean, Pacific Ocean, Tropical West-Atlantic Ocean.

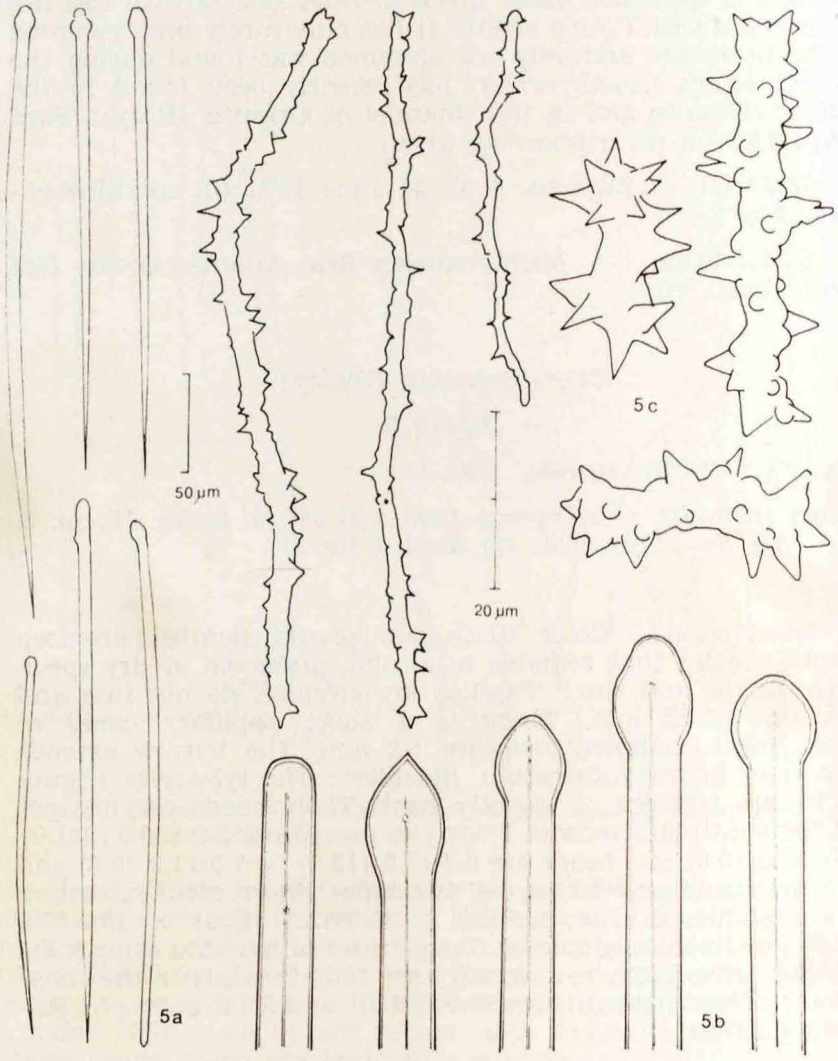

Fig. 5 : *Cliona schmidti*, spicules. Tylostyles (a), tylostyles heads (b), spirasters (c).

Cliona vastifica Hancock

Figure 6

Cliona vastifica Hancock 1849 : 342, pl. 15, fig. 12. — Topsent 1900 : 56-70, pl. 2, figs. 3-9. — Topsent 1932 : 558-559, fig. 3. — Topsent 1934 : 99-101. — Volz 1939 : 8-12, fig. 2; pl. 1, fig. 3; pl. 2, fig. 3; pl. 3, fig. 1.

Description. — Color : Orange in life, pale gray in alcohol. Shape and size : The papillae are inconspicuous, well spaced, circular, 0.2-0.8 mm in diameter. No papillary canal is developed. Chambers are 0.6-1 mm, depth of substratum penetration 8 mm. Spicules : Tylostyles (figure 6 a) are straight, slender, with spheroid terminal heads. They measure 197.5-277.5 (231.8)

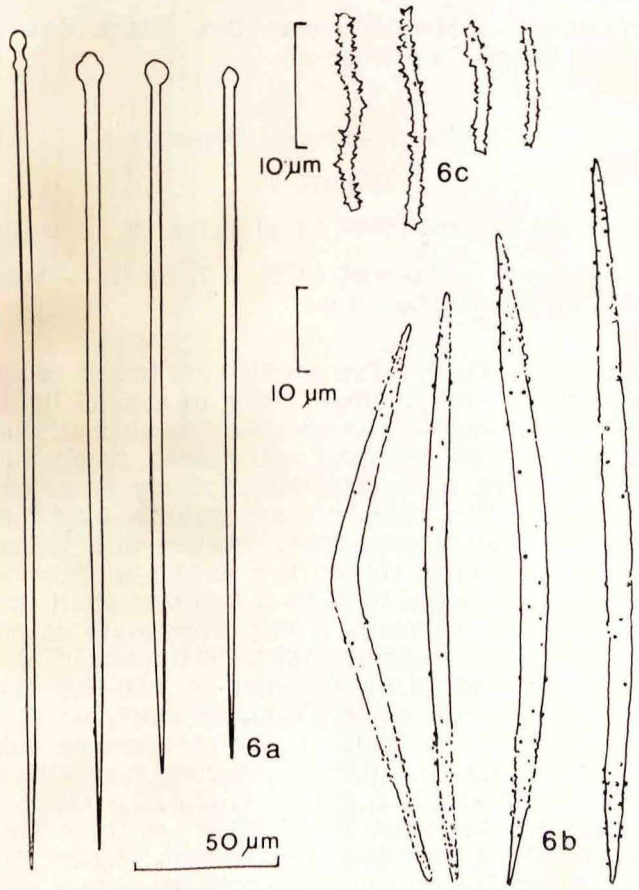

Fig. 6 : *Cliona vastifica*, spicules. Tylostyles (a), microspined oxea (b), spiny microrhabds (c).

× 3.0-4.0 (3.5) µm, heads : 7.2-8.0 (7.8) × 4.8-8.0 (6.2) µm. Tylostyles are not very abundant. More numerous micro-spined oxea (figure 6 b) measure 48.0-92.8 (67.0) × 1.6-3.2 (2.2). They only occur in the chambers and are slightly bent in the center. Spiny microrhabds (figure 6 c) are found in the papillae and in the chamber tissue. They are straight or slightly bent once or twice and have blunt ends. Microhabds (including spines) measure 9.6-19.2 (14.4) × 1.0-1.6 (1.1) µm.

Remarks. — The present material contains only one specimen which is typical for the species. Aberrant forms as previously described from the Gulf of Gabès (Topsent 1932, 1934) were not encountered.

Material. — Rass Salakta, 2 m, July 1970 (in coralline encrusted rock).

Distribution. — Mediterranean Sea, Black Sea, Atlantic Ocean, Indian Ocean, Pacific Ocean.

Cliothosa hancocki (Popsent)

Figure 7

Thoosa Hancocci Topsent 1888 : 81, pl. 7, fig. 12.

Cliothosa hancocki. — Topsent 1928 : 1-7, fig. 1. — Volz. 1939 : 25-29, fig. 8; pl. 4, figs. 2-4.

Description. — Color : The papillae are bright yellow; some specimens with an orange tinge. Color in alcohol light brown. Chamber tissue is yellow, greyish ochre in alcohol. Shape and size : The papillae are circular, well spaced, rarely fused, 1.2-5.5 mm in diameter. A conspicuous papillary canal can reach 12 mm in length. The chambers are minute, 0.3-1.2 mm and densly spaced. Infested rock appears soaked with yellow tissue. Maximum penetration of the burrow is 15 mm. Spicules : Robust tylostyles (figure 7 a, b) have a fusiform shaft and a distinct spheroid head, which is mostly mucronate or even subterminal. Tylostyles measure 280.0-490.0 (423.3) × 7.5-13.8 (10.8) µm, their head 13.8-20.0 (16.0) × 10.0-15.0 (13.3) µm. The microscleres consist of two kinds of amphiasters. Ramose amphiasters (figure 7 c) occur in the choanosome only. They have a thin shaft and 4-11 (6.3) long slender rays with furcated tips. They measure 20.0-32.5 (25.8) × 13.8-30.0 (20.5) µm (including rays), the shafts are 2.5-5.0 (3.5) µm thick The second kind of microscleres, nodulose amphiasters (figure 7 d), only occurs in the papillae or can be absent in certain specimens. Nodulose amphiasters measure 15.0-25.0 (21.3) × 12.5-16.3 (14.8) µm; there are 6-10 (7.3) nodules.

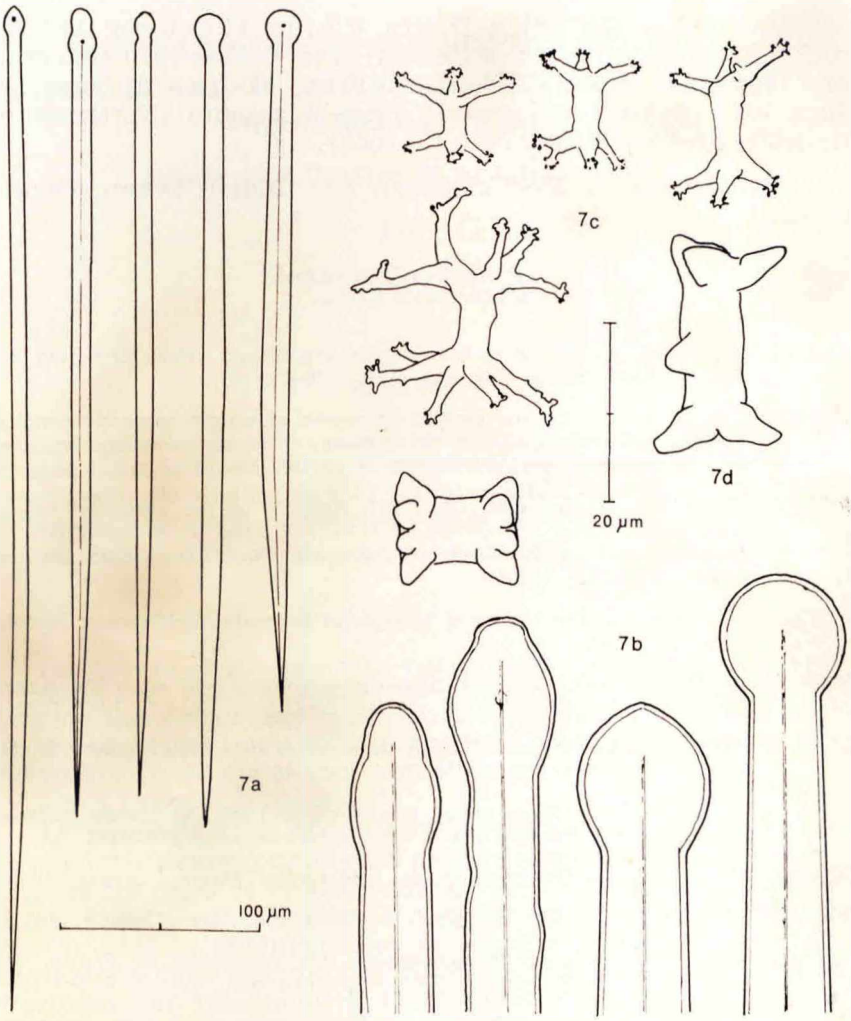

Fig. 7 : *Cliothosa hancocki*, spicules. Tylostyles (a), tylostyle heads (b), ramose amphirasters (c), nodulose amphirasters (d).

Remarks. — The fact that certain specimens of *Cliothosa hancocki* can lack nodulose amphiasters has been discussed by Topsent (1928). These spicules were present only in one specimen of our material. A third small type of amphiasters noted by Volz (1939) was never found.

Material. — Off Adjim, Djerba, 0.5-1 m, 11 October 1969 (in rock). Kerkouane (North of Kelibia), 1 m, 6 June 1970 (in coralline encrusted rock). Korbous, 0.5-10 m, 10 June, 11 June, 24 June 1970 (in rock and gravel). Rass Maamoura (Northeast of Nabeul), 0.5-1 m, 26 May 1970 (in rock).

Distribution. — Mediterranean Sea, Indian Ocean, Pacific Ocean.

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