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New records for the sponge fauna (Porifera: Demospongiae) of the Pacific coast of Mexico (eastern Pacific Ocean)

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Abstract.—Some sponge species of Demospongiae hitherto known only from the northeastern East Pacific (*Penares cortius, Penares saccharis, Higginsia higginissima*) or from the West and Central Pacific (*Adocia turquoisia,* and *Chelonaplysilla violacea*) are reported for the first time from the Pacific coast of Mexico. Moreover, the species *Pseudaxinella mexicana* and *Cyamon catalina* are proposed to be transferred to the genera *Axinella* and *Trikentrion,* respectively, by the lack of the axial condensation typical of the genus *Axinella* in the former, and by the presence of sagittal triacts, oxeas, rhaphides as microscleres in the latter. These records are redescribed on the basis of observations of new material. In addition, an identification key for all species of *Penares* in the Eastern Pacific Ocean is provided.

The sponge fauna of the Mexican Pacific coast is one of the least studied of the East Pacific Ocean (de Laubenfels 1935, Dickinson 1945). In fact, we can consider the East Pacific fauna as one of the least known of the world (de Laubenfels 1950, 1954, 1961; Bergquist 1967) if we compare it with other areas such as the Caribbean Sea, Mediterranean Sea or the northeastern Atlantic Ocean. Before the 1950s, the registers of sponges in this area are fragmented in several expeditions such as S. *Alert* (Ridley 1881), H.M.S. *Challenger* (Ridley & Dendy 1887) and *Albatross* (Lendenfeld 1889, Wilson 1904). Later, some studies on the sponges of this region were done, mainly on the coasts of Canada (Lambe 1893, 1895, 1900) and U.S.A. (de Laubenfels 1930, 1932; Bakus 1966, Ristau 1978, Sim & Bakus 1986, Bakus & Green 1987), and to a lesser degree in Mexico (de Laubenfels 1935, Dickinson 1945, Hofknecht 1978). Until fairly recently (Green & Gómez 1986, Gómez & Bakus 1992, Gómez 1998, Sarà et al. 2001, Carballo & Gómez 2001), little was known about species composition, diversity, ecology and other characteristics of the littoral sponge fauna from this zone. This work is part of a larger investigation on the littoral sponges in the Mexican Pacific coast.

Materials and Methods

The method of collecting sponges and the environmental conditions are described in Sarà et al. (2001). Scanning electron microscopy (SEM) and spicule preparation followed the techniques described by Gómez (1998) and Carballo (1994), respectively. Spicule dimensions are based on 20 measurements from each spicule type, with means given between parentheses. Sponge material and spicule slides have been deposited in the Colección Nacional del Phylum Porifera Gerardo Green of the Instituto de Ciencias del Mar y Limnología, UNAM, Mexico D. F. (CNPGG), and, in the sponge collection of the Laboratorio de Ecología del Bentos of the Instituto de Ciencias del Mar y Limnología, UNAM, in Mazatlán, Mexico (LEB-ICML-UNAM).

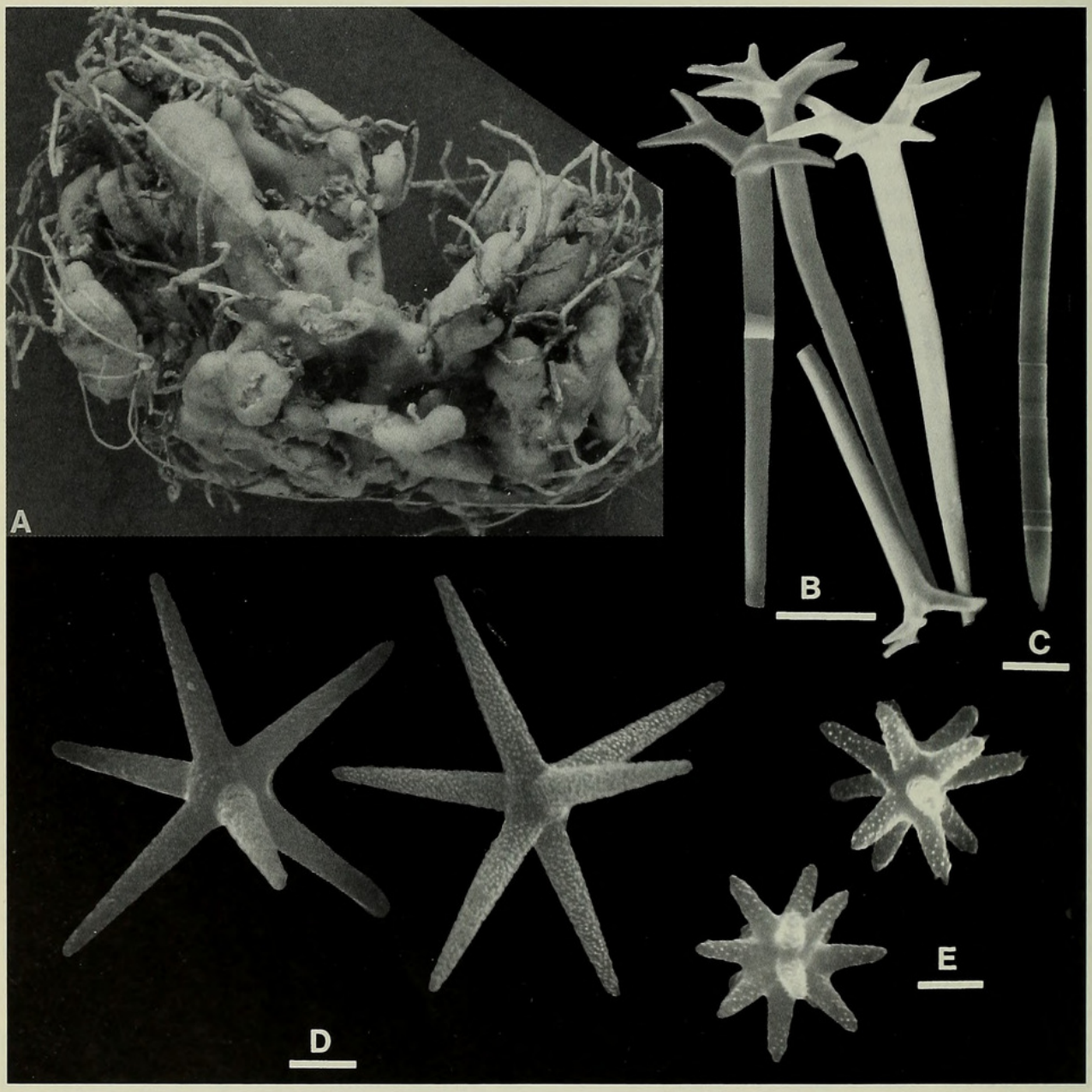

Fig. 1. *Penares cortius* de Laubenfels, 1930. A) Specimen 12 cm long, B) Several dichotriaene, C) Microrhabd, D) Oxyasters II, E) Oxyasters I. Scale bars: B) 150 μm, C) 15 μm; D), E) 3.2 μm.

Results

Class Demospongiae
Order Astrophorida Lévi, 1973
Family Ancorinidae Schmidt, 1870
Genus *Penares* Gray, 1867
Penares cortius de Laubenfels, 1930
Fig. 1, Table 1

Penares cortius de Laubenfels, 1930:26, 1932:36, fig. 15.—Dickinson, 1945:40, pl. 76–77.—Sim & Bakus, 1986:21.—Bakus & Green, 1987:83.

Material examined.—CNPGG-0018, Guerrero, 16°15′24″N, 98°40′00″W, 15 Apr 1982, adhered to hydrozoans at 45 m depth.

Description.—Massive, with numerous lobes, 12 by 7 by 6 cm long, wide, and thick. Beige color alive with some dark brown tinges, lighter almost white in spirit. Consistency firm, slightly compressible but brittle. Surface minutely punctiform, smooth to the naked eye, rough to the touch. The oscules are located at the sides of the lobes, 2 to 3 mm in diameter.

Table 1.—Comparative spicule measurements (μm) of *Penares* species in different localities of the Eastern Pacific.

	Locality	Dichotriaene rhabd/clad	Oxea length/diam	Microrhabd length/diam	Oxyaster
P. cortius de Laubenfels, 1930	California USA	400 x 50/310 ± 50	950 x 22	50–160 x 3–8	9–25
P. cortius Dickinson, 1945	Gulf of California	Same measurements as de Laubenfels 1932			
P. cortius Sim & Bakus, 1986	California USA	200–430 x 10–20/100–200	550–1000 x 5–15	80–140	12–40
P. cortius Bakus & Green, 1987	California USA	110–320 x 17–48/—-	560–990 x 9–22	I. 27–120 x 2–5 II. 84–190 x 6–10	6–19
P. cortius Present records	Central East Pacific	792–1268 x 45–60/142–228 x 21–49.5	984–1856 x 7.5–59	54–180 x 3–9	7.5–21
P. foliaformis Wilson, 1904	Galápagos	900–140/–	2300–70	60–160 x 5–8	16–24
P. saccharis de Laubenfels, 1930	California USA	320–435 x 20–30/120–210 x 10–30	780 ± 22	35–145 x 1–3	Absent
P. saccharis Desqueyroux-F. & Soest, 1997	Galápagos	300 x 30/150–28	I. 467–900 x 12–28 II. 66–170 x 3–8	22–50 x 2–3	Absent
P. saccharis Present records	Central East Pacific	120–257 x 17–35/130–297 x 13–43	I. 516–1000 x 17–36 II. 116–217 x 7.5–13	38–130 x 2.5–5	Absent
P. apicospinatus Desqueyroux-F. & Soest, 1997	Galápoagos	712–1650 x 32–56/184–412 x 32–68	I. 1426–3130 x 21–48 II. 68–169 x 4–9	I. 67–120 x 2–6 II. 19–42 x 1–4	I. 17–37 II. 6–13

Spicules.—Dichotriaene: rhabds 792–(962)–1268 by 45–(52.5)–60 μm, clads 142–(210)–228 by 21–(34)–49.5 μm, smaller modified dichotriaenes are present but possibly are transitional forms; oxeas fusiform: 984–(1153)–1856 by 7.5–(33)–59 μm; oxyaster I: with 10 or more spined rays: 7.5–(9)–12 μm in diameter, oxyaster II: with 6 to 8 finely rugose rays: 15–(18)–21 μm in diameter; microrhabds smooth, microxeas, very few centrotylote, and few tending to strongyle: 54–(124)–180 by 3–(4.7)–9 μm.

Skeleton.—The dichotriaena rhabds are perpendicular to the surface, and aligned in rows like a stratified layer, due to the several aligned cladomes at different levels, and shafts directed inwards as they traverse the body. Cladomes are parallel to the surface with the rays interlaced with each other, on top of them lies a subisodyctial reticulation of small oxeas. The cortex is 500–900 μm thick.

Distribution.—California (USA) (de Laubenfels 1930, 1932); Gulf of California (Mexico) (Dickinson 1945); East coast of Canada to Southern California (USA) Intertidal to 160 m (Sim & Bakus 1986, Bakus & Green 1987).

Remarks.—This is the southeastern-most record up to date for *P. cortius*. Our specimens present triaenas and oxeas larger than those found in the localities further north; however, this could be due to different environmental conditions where the different specimens were collected, i.e., tropical versus cold waters (Canada and Gulf of California) or differences in depth (Table 1). Moreover, we observed microxeas which had not been described in the species previously. *Penares cortius* displays considerable variation in some spicules; specimens with two oxyaster categories have been described (Bakus & Green 1987), which can reach up to 40 μm (Sim & Bakus 1986).

Penares saccharis (de Laubenfels, 1930)
Fig. 2, Table 1

Papyrula saccharis de Laubenfels, 1930: 26, 1932:37, fig. 16.

Penares saccharis sensu Desqueyroux-Faúndez & Van Soest, 1997:394, fig. 21–26.

Material examined.—CNPGG-0020, Guerrero, 16°47′N, 99°54′W, 13 Feb 1982, 30 m depth, sand bottom. CNPGG-0021, Guerrero, 16°13′24″N, 98°44′36″W, 16 Feb 1982, 45 m depth, sand-mud bottom. CNPGG-0022, Guerrero, 16°15′24″N, 98°40′00″W, 15 Apr 1982, 45 m depth, sand bottom. Adhered to calcareous fragments.

Description.—Massive to encrusting with small lobules, spreading 25 to 60 mm long, 15 to 35 mm wide, 9 to 20 mm thick. Mustard yellow alive, dark brown in spirit, pale yellow in dry state. Consistency slightly compressible, soft. Surface smooth with hispid areas, oscules dispersed 500 μm to 2 mm in diameter. Oval pores regularly distributed measure 19 by 48 to 19 by 90 μm.

Spicules.—Dichotriaene: rhabds 120–(180)–257 by 17–(26)–35 μm, clads 130–(200)–297 by 13–(29)–43 μm, some have modified cladomes; oxeas large and fusiform: 516–(744)–1000 by 17–(23.7)–36 μm, several modified to styles; oxeas small some bicurvates: 116–(171)–217 by 7.5–(10)–13 μm; microrhabds: smooth, straight, and bent twice, some centrotylotes, 38–(60)–130 by 2.5–(3.7)–5 μm. No asters found.

Skeleton.—A cortex 60 to 150 μm thick is carried out by the cladomes of dichotriaenes over which microxeas lay down tangentially to the surface without a homogeneous pattern. The choanosomal skeleton consists of a radial palisade of oxeas, styles (modified oxeas), and dichotriaene rhabds.

Distribution.—East Pacific Ocean: California (USA) (de Laubenfels 1932); Islas Galápagos (Ecuador) (Desqueyroux-Faúndez & Van Soest 1997).

Remarks.—In general terms, our specimens are quite similar to those from upper California and the Galápagos. The two category sizes of oxeas observed by Desqueyroux-Faúndez & Van Soest (1997) are also found in all of our specimens (Table 1).

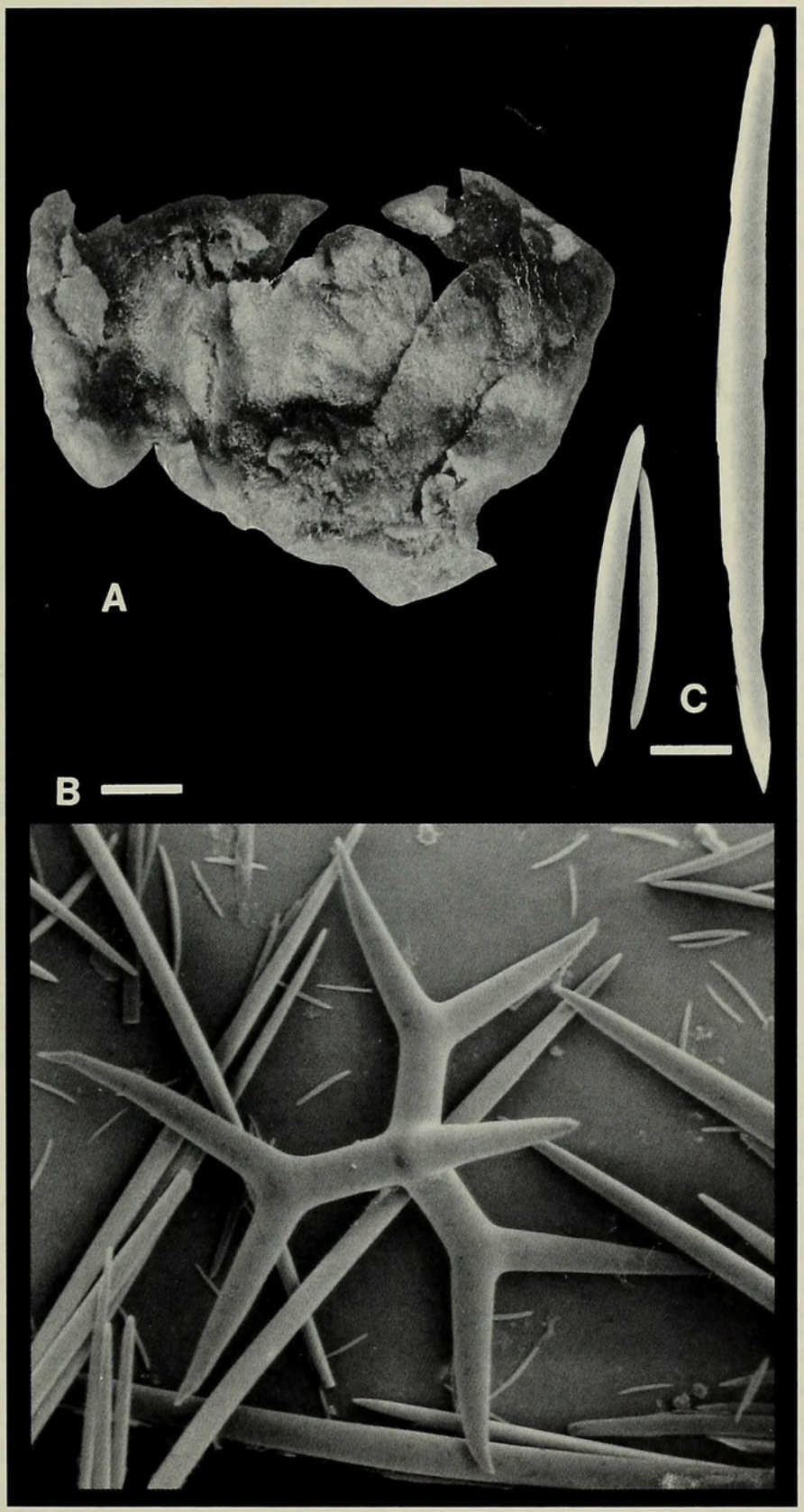

Fig. 2. *Penares saccharis* (de Laubenfels, 1930). A) Specimen 4.5 cm long, B) Dichotriaene, different categories of oxeas, and microhabds, C) Different categories of oxeas. Scale bars: B) 100 μm, C) 60 μm.

Compared with the preceding *P. cortius, P. saccharis* differs in the absence of oxyasters, the dichotriaene rhabdome is shorter than in P. cortius (180 μm vs. 960 μm), and the shape of the two is clearly different

Key to species of *Penares* from the Eastern Pacific

1. The rhabdome of the triaena is notoriously larger in size than the overall size of the cladome, asters are present 2
1. The rhabdome of the triaena is similar in size to the overall size of the cladome, asters are absent ..... *P. saccharis*
2. Smooth microrhabd, without small oxeas 3
2. Rugose and/or microspined microrhabd, small oxeas present 4
3. Robust triaena's rhabdomes (140 μm thick), with a single category of asters ..... *P. foliaformis*
3. Thinner triaena's rhabdome (50 μm thick in average), with a two size category of asters ..... *P. cortius*
4. Two size categories of microrhabds, the small oxeas have microspined apices .. .. *P. apicospinatus*
4. Three size categories of microrhabds, the small oxeas are smooth ..... *P. scabiosus*

Discussion of the Genus *Penares*

There are five distinct *Penares* species recorded along the Eastern Pacific: *P. cortius* de Laubenfels, 1930, and *P. saccharis* (de Laubenfels, 1930 as *Papyrula*) from upper California and the Gulf of California; *P. foliaformis* Wilson, 1904; *P. apicospinatus* Desqueyruox-Faúndez & Van Soest, 1997, and *P. scabiosus* Desqueyruox-Faúndez & Van Soest, 1997 from the Galápagos. They all have markedly different characters: *P. foliaformis* has an irregular leaf shape of the triaena's cladomes, a very thick rhabd (140 μm), and a single category of oxyasters with smooth rays, *P. saccharis* has the triaena's rhabdome similar in size to the cladome's overall size, and no oxyasters, *P. apicospinatus* has microspined apices on the small oxeas, microspined microrhabds, *P. scabiosus* has three size categories of microrhabds, a very small one measuring 15 μm and *P. cortius* typically presents smooth microrhabds instead of microxeas. However, our specimens also have microxeas and two size categories of oxyasters not described by other authors (Table 1).

Order Halichondriida Lévi, 1973
Family Desmoxyidae Hallmann, 1917
Genus *Higginsia* Higgin, 1877
Higginsia higginissima Dickinson, 1945
Fig. 3

Higginsia higginissima Dickinson, 1945: 28, pl. 49–51.

Material examined.—CNPGG 0023, Guerrero, 16°13′24″N, 98°44′36″W, 16 Feb 1982, 45 m depth, sand-muddy bottom.

Description.—Ramose sponge, stocklike growth, peduncle and branches have a height of 8 cm by 3 to 5 cm wide, single branches are 0.5 to 1.5 cm in diameter. Color is bright orange alive, pale brown in spirit. Consistency slightly compressible, cartilaginous. Surface lumpy and slightly hispid, densely covered with detritus; lumps measure 1.5–4.5 mm in diameter, the oscules are located on top of some lumps 300–600 μm in diameter. Microscopic pores 12–31 μm in diameter are observed when excess detritus is removed.

Spicules.—Oxeas I, hastate and curved: 431–(506)–619 by 15–(32)–43.5 μm; oxeas II thinner, fusiform: 396–(577)–680.5 by 6–(11)–25 μm; two categories of curved styles: 381–(387)–458 by 5–(10)–14 μm and 498–(529)–696 by 25–(30)–39 μm; microscleres: smooth, angulated, centrotylote microxeas: 33–(91)–113 by 0.7–(2.7)–4.5 μm and acanthomicroxeas sometimes centrotylote, angulated or straight: 73–(103)–147 by 4–(5.4)–7 μm.

Skeleton.—Cortex not detachable, constituted by a gross layer of detritus, less than 1 mm in thickness, 475 μm on average. The

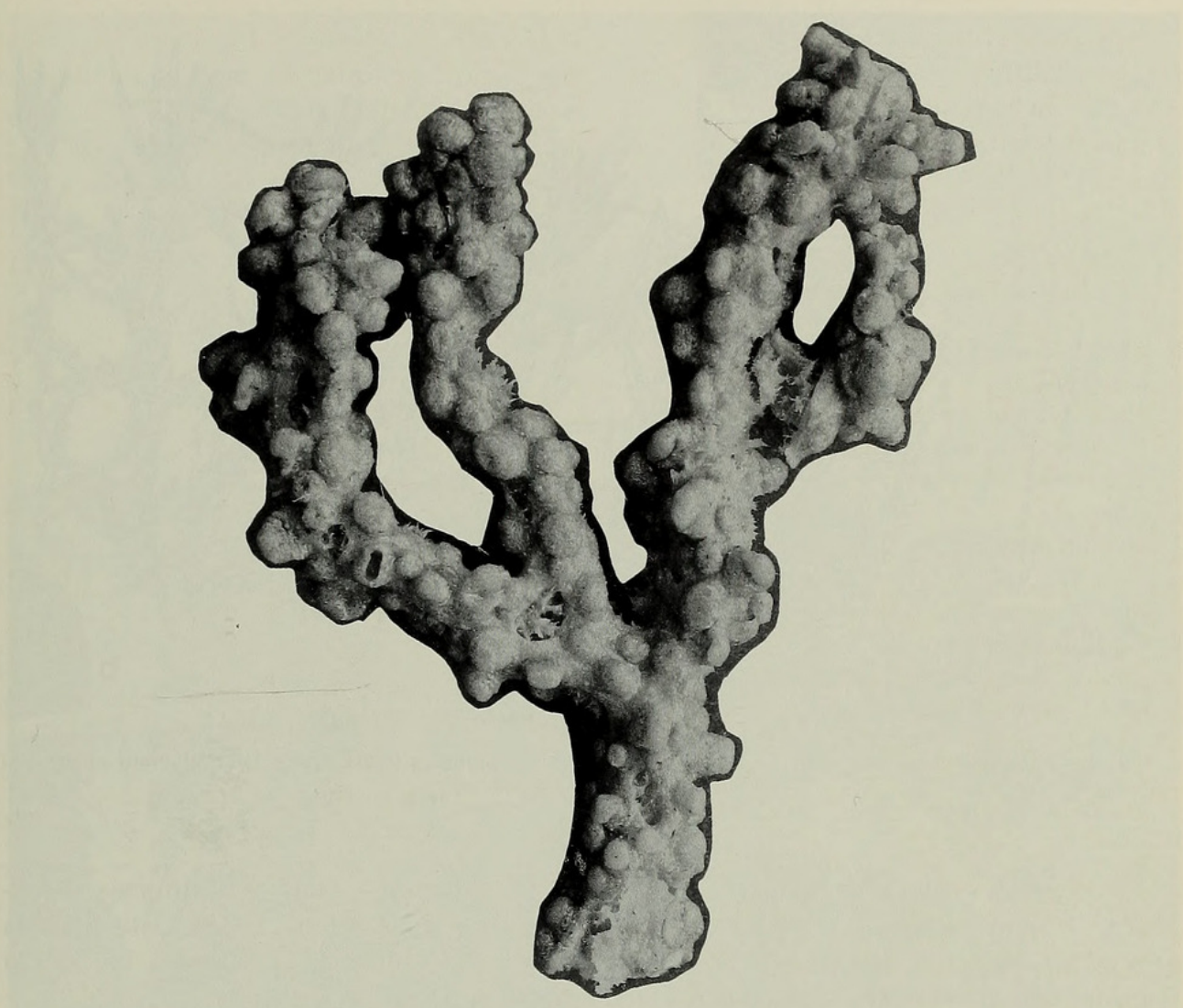

Fig. 3. *Higginsia higginissima* Dickinson, 1945. Specimen 8 cm in height.

choanosomal skeleton is an ill-defined plumoreticulation with vague pseudoplumose spicule tracts, microscleres are more evident here than in the ectosomal layer.

Distribution.—Gulf of California (Mexico) (Dickinson 1945). Abundant on subtidal rocky shores (Hofknecht 1978). This is the southernmost record for *H. higginissima* in Mexican waters and the third description along the East Pacific.

Remarks.—*Higginsia higginissima* is well characterized by its general shape. However, Dickinson's photograph is misleading as no stocklike growth is evident. There are two size categories of megascleres. Microscleres are microxeas, or microstrongyles, centrotylote or not, angulated or straight.

Family Axinellidae Ridley & Dendy, 1887
Genus *Pseudaxinella* Schmidt, 1875

Pseudaxinella mexicana (de Laubenfels, 1935), new combination
Fig. 4

Axinella mexicana de Laubenfels, 1935: 6.—Dickinson, 1945:27

Material examined.—289-LEB-ICML-UNAM, Isla el León Echado (Guaymas, Sonora), 27°55′34″N, 110°57′12″W, 6 Nov 2000, 17 m depth. 318-LEB-ICML-UNAM, Isla del Peruano (Guaymas, Sonora), 27°54′35″N, 110°58′17″W, 3 Nov 2000, 15 m depth. 331-LEB-ICML-UNAM, Isla Tiburón (Kino, Sonora), 28°46′14″N, 112°23′09″W, 27 Apr 2001, 13 m depth.

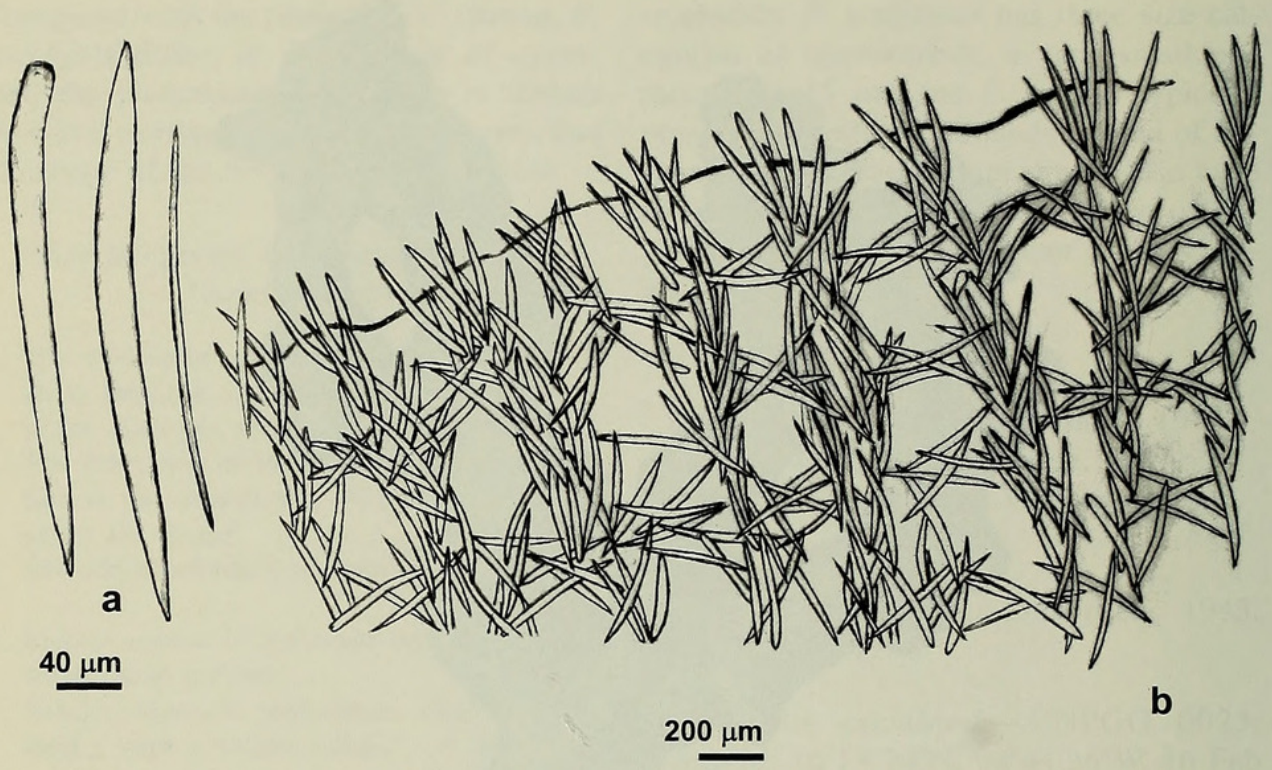

Fig. 4. *Pseudaxinella mexicana* (de Laubenfels, 1935). A) Spicules (style, oxeas), B) Diagram of the peripheral skeleton.

Description.—Thickly encrusting sponge (0.5 to 1.5 cm thick), covering a maximum area of 11 by 6 cm. Bright orange in life, and beige in alcohol. Oscules conspicuous, 0.6–2 cm apart, circular or oval 1.4–(2.5)–5.1 mm in diameter, either flush or slightly elevated (0.75–3 mm high). The consistency is firm and crumbly, fragile in dry, it crumbles easily. The surface is hispid under the stereo microscope. Ectosome not detachable, with ostia 200–580 μm wide, regularly distributed. Choanosome with canals of 0.87–1.38 mm in diameter.

Spicules.—Curved oxeas with asymmetric ends, 110–(368)–480 by 7–(18)–29 μm. Styles, slightly curved in the rounded end, 190–(315.5)–410 by 8–(16.1)–30 μm.

Skeleton.—Skeletal architecture is characterized by parallel and plumose, anastomosing, ascending spicule tracts 100–(205)–250 μm thick, which can protrude the surface. The spicule tracts are pauci–multispicular, forming meshes with an amplitude of 250–(358)–500 μm. Without any axial condensation.

Distribution.—Gulf of California (Mexico) (de Laubenfels 1935), Isla Partida (Gulf of California) (Dickinson 1945). On rocks at 15–17 m depth.

Remarks.—The material studied is conspecific with the sponge described by de Laubenfels (1935) and Dickinson (1945) as *Axinella mexicana.* It is a very characteristic encrusting species with oxeas larger than the styles. The species has a skeleton formed by plumose and parallel tracts of oxeas and styles, but because of the lack of the axial condensation typical of the genus *Axinella* we propose to assign it to the genus *Pseudaxinella.*

Order Poecilosclerida Topsent, 1928
Family Raspailiidae Hentschel, 1923
Genus *Trikentrion* Ehlers, 1870

Trikentrion catalina (Sim & Bakus, 1986), new combination
Fig. 5

Cyamon catalina Sim & Bakus, 1986:18, 20–21, fig. 4.

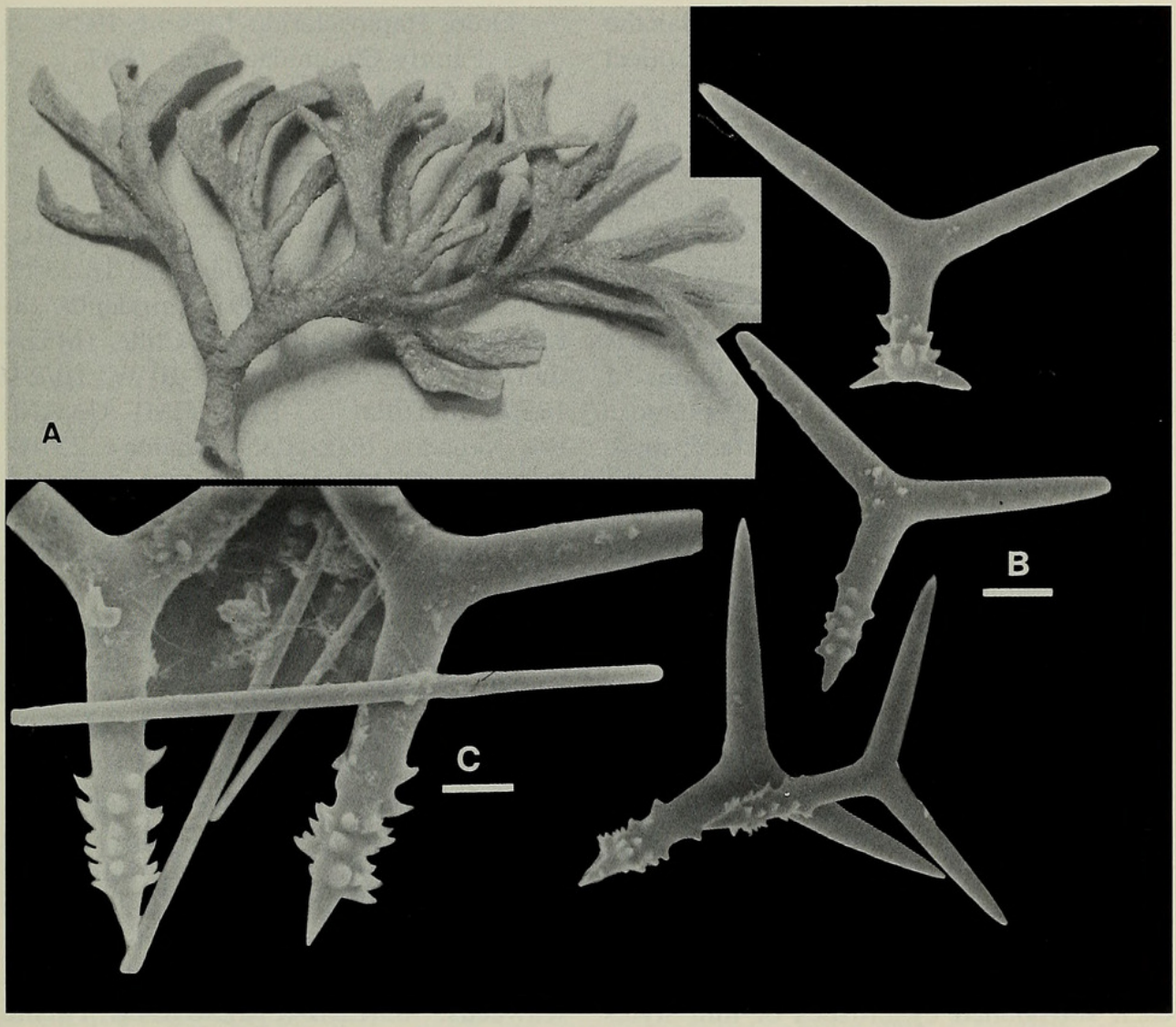

Fig. 5. *Trikentrion catalina* (Sim & Bakus, 1986). A) Specimen 9 cm in height, 11 cm wide, B) Sagittal triacts, with round and acute points, C) Detail of the spined ray; styles and rhaphides can be observed. Scale bars: B) 45 μm, C) 15 μm.

Material examined.—Holotype USNM 33631 off east Bird Rock, Santa Catalina Island, California, 33°27′N, 118°29′W. CNPGG-0024, Guerrero, 16°13′24″N, 98° 44′36″W, 16 Feb 1982, sand muddy bottom 45 m depth. CNPGG-0025, Guerrero, 16° 15′24″N, 98°40′00″W, 15 Apr 1982, sandy bottom 45 m depth. CNPGG-0026, Nayarit, 21°43′48″N, 105°36′36″W, 8 Jan 1983, muddy-clay bottom 94 m depth. CNPGG-0027, Nayarit, 21°21′N, 105°26′06″W, 9 Jan 1983, sandy bottom 44 m depth. CNPGG-0028, Nayarit, 22°20′06″N, 105°45′30″W, 8 Jan 1983, muddy-sand bottom 14 m depth.

Description.—Foliaceous and elongated branches in a treelike shape, sustained by a peduncle (2–6 mm in diameter, 2.5 cm long). Branches may bifurcate but never anastomose (3–12 mm wide by 2–4 mm thick), 2 to 28 in number in one peduncle, total height is 5.5–11 cm, 1.5–12 cm wide. Color is red alive, beige with light brown tinges in spirit. Consistency: firm, easily bends to some extent. Surface strongly hispid due to projecting spicules 2 mm outside the surface, giving a velvety appearance. Oscules disposed along the branches 200–500 μm in diameter.

Spicules.—Thin styles with no differences between the smaller and the larger size; measurements: 593–(876)–3800 by 6–(10)–20 μm; oxeas hastate 111–256 by 5–18 μm

some tending to styles but different than the first ones; sagittal triacts with one spined ray, generally equidistant in shape, rays in the ectosome measure: 84–(152)–216 by 20–(26.6)–30 μm, rays in the choanosome: 67–(87.5)–136 long by 11–(18)–26 μm, some smaller rays 37–50 μm occur in the choanosome; rhaphides in trichodragmata: 40–(70)–78 long by 12–(14)–16 μm wide.

Skeleton.—The choanosomal skeleton is made of condensed armoured columns of triacts from which extra axial plumose tracts project through to the surface, these are 60 to 120 μm in diameter composed of thin styles. No specialized ectosomal skeleton is present.

Distribution.—Upper California (USA) 46 to 50 m depth (Sim & Bakus 1986). This is the first record of *Trikentrion catalina* in Mexico.

Remarks.—The present species has been allocated to *Trikentrion* instead of *Cyamon* because of the presence of sagittal triacts, oxeas, rhaphides as microscleres, and a branching growth form, as well as the arrangement of the extra-axial skeleton of plume-reticulate fibers with long projecting styles embedded in the peripheral fibers, each surrounded by brushes of thin styles forming the specialized raspailiid skeleton. These characters are different from *Cyamon,* which is characterized by sagittal tetracts or pentacts, no oxeas, nor microscleres, encrusting or massive growth forms, and a basal layer with plumose tracts of long thick styles standing erect, as well as an extra-axial skeleton with a few long thin styles also projecting (Hooper 1991). Moreover, *Trikentrion* has only one spined ray, and *Cyamon* has three. The description of our specimen matches well with the holotype of *Cyamon catalina* Sim & Bakus, 1986; the only difference is in the flabelliform shape, which is continuous in the holotype, but separate in our specimens. It is worth mentioning that the presence of oxeas and rhaphides arranged in trichodragmata is not mentioned by Sim & Bakus (1986).

Order Haplosclerida Topsent, 1928
Family Chalinidae Gray, 1867
Genus *Adocia* Gray, 1867
Adocia turquoisia de Laubenfels, 1954
Fig. 6

Material examined.—2-LEB-ICML-UNAM, Cerritos (Mazatlán), 23°18′27″N, 106°29′25″W, 31 Nov 1997, 3 m depth. 28-LEB-ICML-UNAM, Punta Chile (Mazatlán), 23°12′29″N, 106°25′40″W, 10/24/1999, intertidal. 33-LEB-ICML-UNAM, Isla Venados (Mazatlán, Sinaloa), 23°10′15″N, 106°26′42″W, 25 Oct 1999, intertidal. 37-LEB-ICML-UNAM, Isla Lobos (Mazatlán, Sinaloa), 23°13′49″N, 106°27′43″W, 25 Oct 1999, 3 m depth. 46-LEB-ICML-UNAM, Cerritos (Mazatlán), 27 Oct 1999, intertidal, between *Caulerpa racemosa.* 109-LEB-ICML-UNAM, Marina del Cid (Mazatlán), 23°10′09″N, 106°25′44″W, 27 Nov 1999, 4 m depth. 118-LEB-ICML-UNAM, Cerritos (Mazatlán), 18 Feb 2000, intertidal. 133-LEB-ICML-UNAM, 17 Feb 2000, Isla Lobos (Mazatlán), intertidal. 330-LEB-ICML-UNAM, 23 Jan 2001, Los Arcos (Puerto Vallarta, Jalisco), 20°32′05″N, 105°18′04″W, intertidal, between red seaweeds. 383-LEB-ICML-UNAM, Puente de la Ventana (Manzanillo, Colima), 19°02′08″N, 104°20′34″W, 15 Nov 2001, 2 m depth. 384-LEB-ICML-UNAM, Península de Santiago (La Boquita, Manzanillo, Colima), 19°05′41″N, 104°25′22″W, 16 Nov 2001, 4 m depth, on rocks.

Description.—Encrusting to semi-encrusting sponge (0.5 to 1.7 mm thick), spreading over rocky substrate covering areas of 2 by 2.3 to 19 by 20 cm. It may also grow out to patches up to 40 cm in diameter. Some specimens have small vertical projections 0.5–2.7 mm high rising from the base. In calm water specimens ramose in shape have been found, up to 18 cm high and 2.8 to 7 mm thick. In these specimens small digitations frequently branch off from the main body of the sponge. Color green or bluish-green. The color disappears completely in spirit. The surface is punctate,

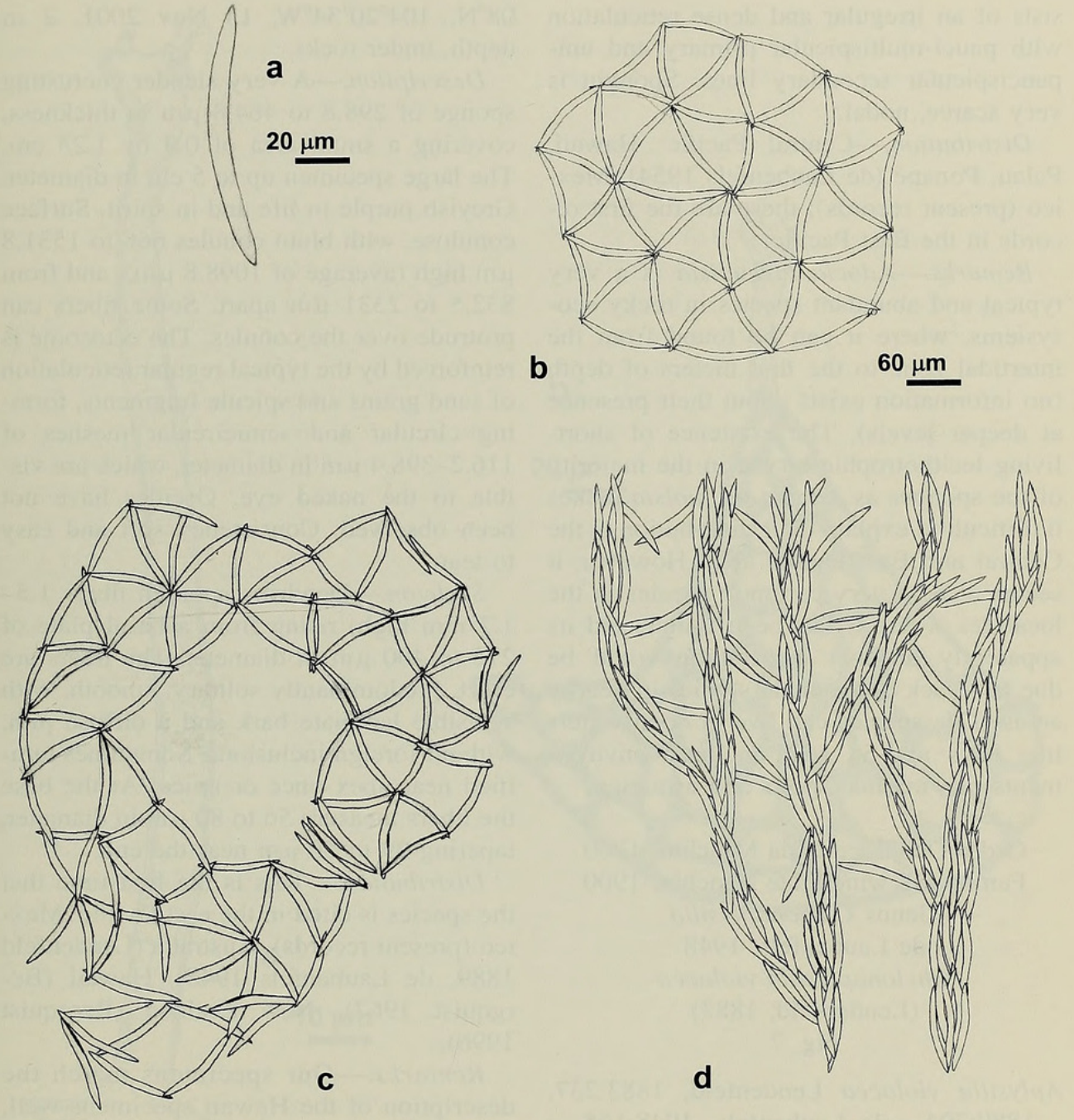

Fig. 6. *Adocia turquoisia* de Laubenfels, 1954. A) Oxea, B) Tangential view of ectosomal skeleton, C) Choanosomal skeleton in encrusting specimens, D) Choanosomal skeleton in ramose specimens. Same scale for B, C, D.

smooth, slightly shaggy in some places, with subectosomal spaces 25 to 900 μm in diameter. Ectosome not easily detachable. The oscules may be flush with the surface or be situated at the summits of chimney-shaped elevations. They are about 400 μm to 5 mm in diameter. The sponge is soft, somewhat elastic when living, and fragile.

Spicules.—Slightly curved oxeas, with asymmetric tips, sometimes with a rounded end: 62.5–(93.0)–120 by 2.5–(4)–6.3 μm.

Skeleton.—The ectosomal skeleton is a unispicular and isotropic tangential reticulation of oxeas. The choanosomal skeleton in the encrusting specimens is a somewhat confused reticulation of uni-paucispicular primary and secondary lines. In the ramose specimens, the choanosomal skeleton con-

sists of an irregular and dense reticulation with pauci-multispicular primary and unipaucispicular secondary lines. Spongin is very scarce, nodal.

Distribution.—Central Pacific: Hawaii, Palau, Ponapé (de Laubenfels 1954). Mexico (present records); these are the first records in the East Pacific.

Remarks.—*Adocia turquoisia* is a very typical and abundant species in rocky ecosystems, where it can be found from the intertidal zone to the first meters of depth (no information exists about their presence at deeper levels). The existence of short-living lecithotrophic larvae in the majority of the sponges as *Adocia turquoisia* makes it difficult to explain their distribution in the Central and East Pacific area. However, it seems to be a very common species in the localities where it has been found, and its apparently disjunct distribution could be due to a lack of faunistic studies in nearby areas. This species can live in open waters like bays and in semi-enclosed environments like marinas, ports and estuaries.

Order Dendroceratida Minchin, 1900
Family Darwinellidae Minchin, 1900
Genus *Chelonaplysilla*
de Laubenfels, 1948
Chelonaplysilla violacea
(Lendenfeld, 1883)
Fig. 7

Aplysilla violacea Lendenfeld, 1883:237, 1889:704.—de Laubenfels, 1948:165.—Bergquist, 1967:237.

Material examined.—98-LEB-ICML-UNAM, Islas Isabeles (Nayarit), 21°46′35″N, 105°51′42″W, 21 Nov 1999, 20 m depth, on a dead coral. 358-LEB-ICML-UNAM, Ensenada de Bacochibampo (Guaymas, Sonora), 27°54′37″N, 110°57′12″W, 6 Nov 2000, 5 m depth, on a dead bivalve shell. 382-LEB-ICML-UNAM, Isla Lobos (Mazatlán, Sinaloa), 23°13′49″N, 106°27′43″W, 17 Oct 2001, 5 m depth, on rocks. 377-LEB-ICML-UNAM, Puente de la Ventana (Manzanillo, Colima), 19°02′08″N, 104°20′34″W, 15 Nov 2001, 2 m depth, under rocks.

Description.—A very slender encrusting sponge of 298.8 to 464.8 μm in thickness, covering a small area of 0.9 by 1.23 cm. The large specimen up to 5 cm in diameter. Greyish purple in life and in spirit. Surface conulose, with blunt conules 666 to 1531.8 μm high (average of 1098.8 μm), and from 832.5 to 2331 μm apart. Some fibers can protrude over the conules. The ectosome is reinforced by the typical regular reticulation of sand grains and spicule fragments, forming circular and semicircular meshes of 116.2–398.4 μm in diameter, which are visible to the naked eye. Oscules have not been observed. Consistency soft and easy to tear.

Skeleton.—Dendritic spongin fibres 1.5–1.7 mm high, rising from a basal plate of 275 to 400 μm in diameter. The fibers are erect, predominantly solitary, smooth, with a visible laminate bark and a diffuse pith, without foreign inclusions. Sometimes ramified near apex once or twice. At the base the fibers measure 56 to 80 μm in diameter, tapering 29 to 50 μm near the end.

Distribution.—This is the first time that the species is cited in the east Pacific. Mexico (present records), Australia (Lendenfeld 1889, de Laubenfels 1948), Hawaii (Bergquist 1967), New Zealand (Bergquist 1996).

Remarks.—Our specimens match the description of the Hawaii specimens well, but differ in some aspect with the New Zealand and Australian specimens. In New Zealand the species is described as encrusting, sometimes with short vertical lobes, and with erect fronds or lamellae in Australia (Bergquist 1967, 1996). Several hypotheses could be advanced to explain this wide-range, and apparently disjunct distribution, as it has been explained for *Adocia turquoisia.* However, a possibility that cannot be discarded is that the supposed wide-range species could actually be complexes of cryptic species, highly conservative from a morphological point of

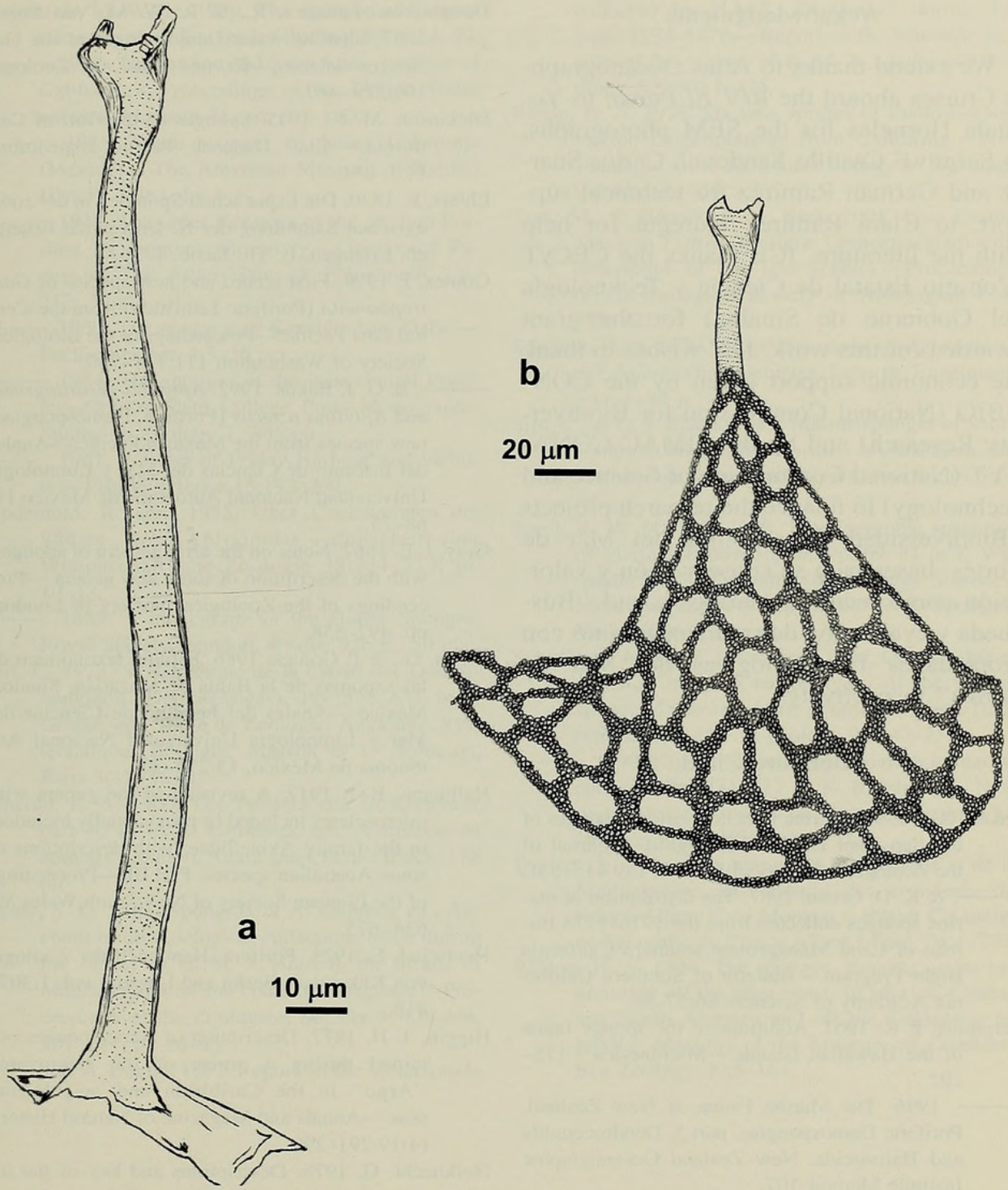

Fig. 7. *Chelonaplysilla violacea* (Lendenfeld, 1883). A) Clean fiber ramified near the end, and basal portion, B) Ectosomal reticulation of sand grains, showing a dense accumulation in a conule, and a subjacent fiber protruding from the conule.

view but genetically well separated (Solé-Cava & Thorpe 1986, 1990). The fact that our specimens match the Hawaii specimens better than New Zealand and Australian specimens seems to confirm this supposition. On the other hand, using cladistic biogeography, a very high association between the sponge fauna of the East Pacific with Australian and New Zealand fauna has been obtained (Soest 1998).

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