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New and Little-Known Poecilosclerid Sponges from the Mexican Pacific Ocean

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Jose Maria Aguilar-Camacho and Jose Luis Carballo (2012) New and little-known poecilosclerid sponges from the Mexican Pacific Ocean. *Zoological Studies* **51**(7): 1139-1153. Five species belonging to the order Poecilosclerida are described based on material from the Mexican Pacific Ocean. Two of them are little known from this region: *Biemna rhadia* de Laubenfels 1930 and *Discorhabdella urizae* Maldonado, Carmona, van Soest and Pomponi 2001. Three species are new to science: *Phorbas reginae* sp. nov., a black massive sponge with 2 categories of acanthostyles, tornotes, and arcuate isochelae; *Ectyonopsis sigmata* sp. nov., a red encrusting sponge with acanthostyles, acanthostrongyles, ectosomal tornotes, anchorate isochelae, and sigmas; and *Myxillodoryx nicolae* gen. nov., sp. nov., a pinkish-red, cushion-shaped sponge with ectosomal tylotes, choanosomal acanthostyles, arcuate tridentate isochelae, unguiferate multidentate isochelae, and sigmas. The new genus *Myxillodoryx* gen. nov. is characterized by having 2 types of isochelae: arcuate and unguiferate multidentate. Based on the former classification of the order Poecilosclerida, we allocated this genus to the family Coelosphaeridae even if this species has 1 diagnostic feature of the family Myxillidae (unguiferate multidentate chelae). We emended the genus *Ectyonopsis* Carter 1883a to include species bearing anchorate or unguiferate isochelae and sigmas as microscleres. We propose to transfer 2 species described in the genus *Stelodoryx* (*S. phyllomorpha* Lévi 1993 and *S. chlorophylla* Lévi 1993) to the genus *Monanchora*, because they have ectosomal monactinal spicules instead of the typical ectosomal diactinal spicules of the genus *Stelodoryx*. http://zoolstud.sinica.edu.tw/Journals/51.7/1139.pdf

Key words: Porifera, Taxonomy, Poecilosclerida, Mexican Pacific, Isochelae.

Current knowledge of the Mexican Pacific sponge fauna is relatively poor (van Soest et al. 2011). At this time, the largest demosponge order known from the region is Hadromerida which harbors the family Clionaidae with 22 valid species (Carballo and Cruz-Barraza 2010). The order Poecilosclerida, one of the most diverse in the Demospongiae with approximately 2500 species described worldwide (van Soest et al. 2012), is one of the least studied so far (Carballo and Cruz-Barraza 2010). Identification and differentiation between species belonging to this order are relatively simple due to the extensive number of different spicule categories and the specific position in the skeleton (van Soest 2002a). Currently, chelae morphology is a diagnostic feature for subordinal classification. Species with palmate isochelae in combination with echinating acanthostyles are assigned to the suborder Microcionina, species with tridentate (arcuate or anchorate) isochelae belong to the suborder Myxillina, and those with palmate (an) isochelae and smooth mycalostyles are classified in the suborder Mycalina (Hajdu et al. 1994).

In this study, we describe 5 species belonging to the order Poecilosclerida. *Biemna rhadia* de Laubenfels 1930 is described based on material from the Gulf of California and the US Pacific coast. *Discorhabdella urizae* Maldonado, Carmona, van Soest and Pomponi 2001 constitutes the 1st record

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from the Gulf of California. We propose a new genus and 3 new species to science: *Phorbas reginae* sp. nov., *Ectyonopsis sigmata* sp. nov., and *Myxillodoryx nicolae* gen. nov., sp. nov. The new genus *Myxillodoryx* is characterized by having 2 types of isochelae: arcuate and unguiferate. We emended the genus *Ectyonopsis* to include species bearing anchorate or unguiferate isochelae and sigmas as microscleres. A comparative table for all species belonging to the genus *Phorbas* from the Pacific Ocean is included. Tables for all species belonging to the genera *Ectyonopsis* and *Stelodoryx* are included with some taxonomic remarks.

MATERIALS AND METHODS

Specimens were collected from the Mexican Pacific coast by snorkeling, diving, and bottom trawling in deeper waters. Spicule and skeleton preparation for light and scanning electron microscopy (SEM) followed the techniques described by Boury-Esnault and Rützler (1997). Twenty-five spicules in different categories chosen at random were measured for each specimen. The minimum-(average)-maximum for each spicule category were determined.

Deposition and revision of materials were made in the following museums: AHF, Allan Hancock Foundation (LA, CA, USA); LACM, Los Angeles County Museum (LA, CA, USA); LEB-ICML-UNAM, Colección de Esponjas del Pacífico Mexicano (Mazatlan, Mexico); MBC, Marine Biodiversity Center (LACM); MCNM, Museo de Ciencias Naturales Madrid (Madrid, Spain); USNM, National Museum of Natural History (Washington., DC, USA).

RESULTS

SYSTEMATICS
Order Poecilosclerida Topsent, 1928
Suborder Myxillina Hajdu, van Soest and Hooper, 1994
Family Hymedesmiidae Topsent, 1928
Genus *Phorbas* Duchassaing and Michelotti, 1864

***Phorbas reginae* sp. nov.**
(Figs. 1A, 2A-E)

Etymology: Named for Regina Wetzer,

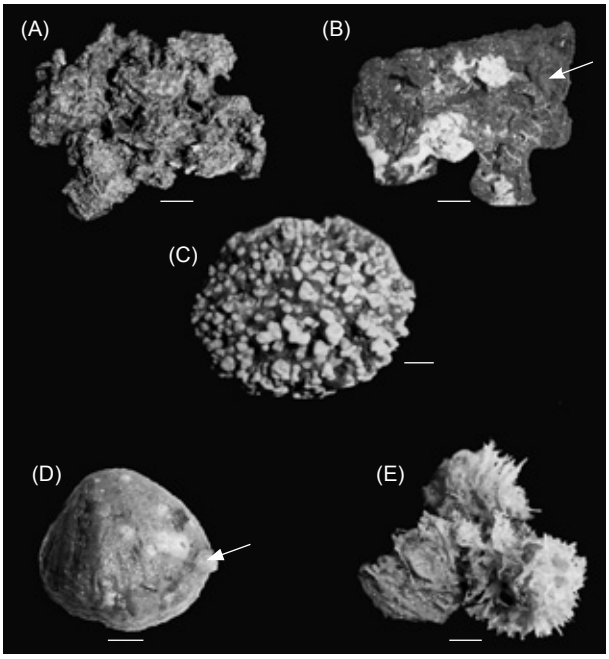

Fig. 1. Photographs of preserved sponges from this study. (A) *Phorbas reginae* sp. nov.; (B) *Ectyonopis sigmata* sp. nov.; (C) *Myxillodoryx nicolae* gen. nov., sp. nov.; (D) *Discorhabdella urizae* Maldonado et al. 2001; (E) *Biemna rhadia* de Laubenfels, 1930. Arrows indicate the encrusting habit form. Scale bars: A-C, E = 3 mm; D = 2 mm.

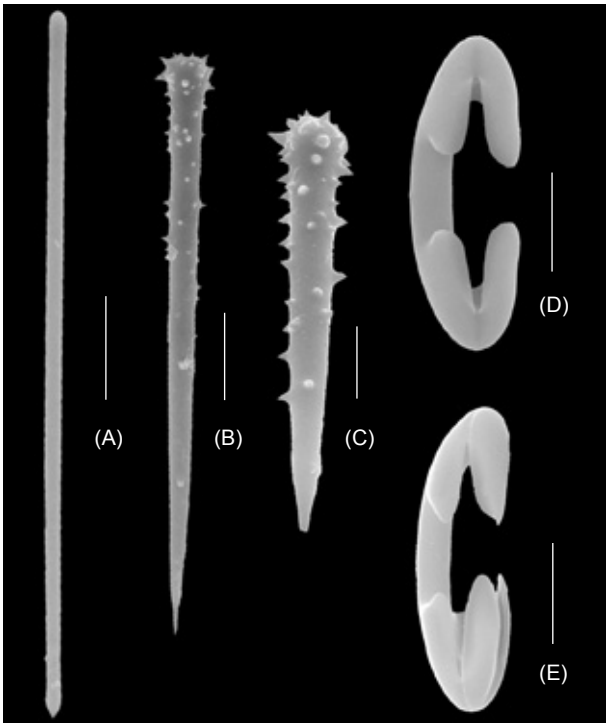

Fig. 2. *Phorbas reginae* sp. nov. Images of spicules under SEM. (A) Tylotornote; (B) acanthostyle I; (C), acanthostyle II; (D, E) arcuate isochelae. Scale bars: A = 35 μm; B = 20 μm; C = 10 μm; D = 5 μm; E = 4 μm.

Curator of Marine Invertebrates at the Natural History Museum of Los Angeles County (LA, CA, USA).

Material examined: *Holotype*: LACM # 1937-52, 9 Mar. 1937, East San Francisco I., Gulf of California (South Baja California, Mexico) 86 m (24°47.6'N, 110°32.3'W). *R/V Boat III*. AHF 650-37.

Description: Massive-sponge growing on polychaete tubes or rocks, size 6-8 cm long, 3 cm thick. Oscula and ostia absent. Surface hispid with spicule projections (2-4 mm high), evenly distributed. Consistency flexible and difficult to tear. Color in alcohol black (Fig. 1A).

Skeleton: Tornotes straight or with modified tylotornotes 170-(178.6)-200 × 2-(2.6)-3.75 μm (Fig. 2A). Acanthostyles in 2 sizes. The 1st long with swollen head, 115-(127.6)-150 × 5-(6.1)-7.5 μm (Fig. 2B). The 2nd short covered with short spines 45-(58.1)-65 × 2.5 μm (Fig. 2C). Arcuate isochelae with 3 teeth and reduced alae 15-(18.1)-22.5 μm (Fig. 2D, E). Ectosomal skeleton a dense layer (30 μm thick) of acanthostyles and tornotes. Choanosomal skeleton a reticulum of ascending spongin fibres (70-150 μm thick). Acanthostyles within or echinating primary fibres. Arcuate isochelae dispersed with no special organization.

Remarks: *Phorbas reginae* sp. nov has straight tornotes, 2 categories of acanthostyles, and arcuate isochelae. The only species assigned to this genus in the eastern Pacific are *P. californiana* (de Laubenfels 1932) from California and *P. hoffmani* (Bakus 1966) from San Juan Is. (Washington state, USA). These 2 species lack arcuate isochelae in their skeleton (Table 1), while *P. reginae* sp. nov. has this spicule (Table 1). *Phorbas tanitai* Hajdu and Teixeira 2011 (originally described as *Anchinoe purpureus* Tanita 1961) is a purple, thick-encrusting sponge, described from the Kurushima Strait (Japan) at 50 m in depth. It has straight tornotes (140-170 × 3-4 μm), 2 categories of acanthostyles (I: 200-250 × 11-15 μm; II: 75-83 × 6-7.5 μm), and arcuate isochelae (15 μm long). *Phorbas tanitai* Hajdu and Teixeira 2011 has longer and wider (200-250 × 11-15 μm) acanthostyles I than *P. reginae* sp. nov. (115-150 × 5-7.5 μm). Other species belonging to the genus *Phorbas* in the Pacific Ocean have spiculae elements of different lengths or categories than *P. reginae* sp. nov. (Table 1).

Family Myxillidae Dendy, 1922
Genus *Ectyonopsis* Carter, 1883a

Diagnosis (emended): Myxillidae with ectosomal diactinal spicules. Choanosomal di- or monactinal spicules: acanthostrongyles, and acanthostyles. Microscleres anchorate or unguiferate isochelae and sigmas. Choanosome with an isotropic reticulum.

Ectyonopsis sigmata sp. nov.
(Figs. 1B, 3A-E)

Etymology: Named “sigmata” because it is the only species of the genus bearing sigmas.

Material examined: *Holotype*: MNCN 1.01/365, 15 Nov. 2001, Puente Ventana (Manzanillo, Colima, Mexico) 2 m (19°2'8''N, 104°20'34''W). *Paratype*: 402-LEB-ICML-UNAM, 15 Nov. 2001, Puente Ventana (Manzanillo, Colima, Mexico) 2 m (19°2'8"N, 104°20'34"W).

Description: Thinly encrusting or cushion-shaped sponge growing on rocks, size 3-4 cm long and 8-20 mm thick. Oscula and ostia not visible. Surface hispid with irregular projections (500-700 μm high) unevenly distributed. Consistency flexible and elastic. Color in life red. Orange when preserved (Fig. 1B).

Skeleton: Ectosomal tornotes straight 150-(159.4)-170 × 2.5 μm (Fig. 3A). Choanosomal acanthostyles straight with prominent spines 140-(152.8)-175 × 5-(5.6)-7.5 μm (Fig. 3B). Unusual choanosomal acanthostrongyles 95-(111.5)-130 × 2.5-(4.1)-5 μm (Fig. 3C). Anchorate isochelae with 3 teeth 10-(13.9)-17.5 μm (Fig. 3D). Sigmas C- and S-shaped 15-(25.6)-30 μm (Fig. 3E). Ectosomal skeleton a tangential layer of tornotes (20-40 μm thick). Choanosomal skeleton a regular isotropic reticulation formed of ascending multispicular primary fibres (30-40 μm in diameter) of acanthostyles and acanthostrongyles, interconnected by bi- or multispicular secondary fibres (10-25 μm in diameter). Reticulum forming rectangular or quadrangular meshes (25-60 μm wide). Microscleres dispersed with no special organization.

Remarks: *Ectyonopsis sigmata* sp. nov. is the only species of this genus which bears sigmas in the skeleton. In addition, *E. sigmata* sp. nov. has shorter megascleres than those described for other species (Table 2).

Discussion of the genus Ectyonopsis: Carter

Table 1. Comparative table of *Phorbas* species from the Pacific Ocean. Values are presented as the minimum-(average)-maximum (μm)

Species[a]	Ectosomal spicules (length × width)	Acanthostyles (length × width)
P. reginae sp. nov.	115-(127.6)-150 × 5-(6.16)-7.5 II. 45-(58.1)-65 × 2.5-(2.5)-2.5	170-(178.6)-200 × 2-(2.6)-3.75
P. arborescens (Ridley, 1884 as *Hymedesmia*)	Tornotes 200 × 4	100-170 × 6-7
P. arbuscula (Lendenfeld, 1888 as *Clathrissa*)	Not reported	120 × 9
P. bergmontae Hajdu and Texeira, 2011	Strongyles 250-285 × 3-4	125-165 × 3-5
P. areolatus (Thiele, 1905 as *Hymedesmia*)	Amphioxeas 225 × 8	I. 120 × 7 II. 240 × 16
P. caespitosus (Carter, 1885 as *Echinonema*)	Tornotes 190.5	84.5
P. californiana (de Laubenfels, 1932 as *Myxilla*)	Tylostrongyles 235-240 × 4-8; Tylostyles 250-265 × 8-12	150 × 7
Lee et al. 2007[b]	Subtylostyles-tylostyles 162-289 × 2-7 Subtylostrongyles 222-294 × 3-10	166-311 × 3-7
P. clathratus (Lévi, 1963 as *Pronax*)	Tornotes 110-190 × 8-5	I. 125-180 × 10-11 II. 90-95 × 7
P. clathrodes (Dendy, 1922 as *Plumohalichondria*)	Tornotes 176 × 4	160 × 8
P. dayi (Lévi, 1963 as *Pronax*)	Tornotes 400-450 × 11-15	750-850 × 17-18
P. domini (Boury-Esnault and van Beveren, 1982 as *Pronax*)	Tornotes 242.4-350.4 × 6.4-12.2	I. 294.4-377.6 × 19.2-22.4 II. 179.2-211.2 × 9.6-12.8
P. epizoaria (Lévi, 1958 as *Pronax*)	Tornotes 140-165 × 2-3	I. 50-150 II. 75-125 × 3-6
P. fibrosus (Lévi, 1963 as *Pronax*)	Tornotes 150-140 × 3-5	I. 90-130 × 7-9 II. ~55-75 × 7
P. fictitioides (Dendy and Frederick, 1924 as *Anchinoe*)	Tornotoxeas 400 × 6	I. 140 × 13 II. 350 × 10
P. frutex Pulitzer-Finali, 1993	Anisotornotes 155-170 × 3.5	60-150 × 4.5-9
P. fulvus (Bergquist and Fromont, 1988 as *Pronax*)	Oxeas 128-147 × 3.5-8	I. 120-180 × 4-7.5 II. 60-102 × 4-5
P. gravidus (Dendy, 1896 as *Plumohalichondria*)	Oxeas 140 × 2.7	60 × 4
P. gukhulensis Sim and Kim, 2004	Tornotes 295-410 × 5-10	I. 145-200 × 7-10 II. 300-420 × 9-11
P. hoffmani (Bakus, 1966 as *Podotuberculum*)	Stylote or subtylote 213~260 × 5-8	211-318 × 9-14
P. intermedia Bergquist, 1961	Tylotes 130~180 × 4.5-6.5	I. 140-220 × 5-9 II. 70-100 × 4-7
P. lamellatus (Lévi, 1963 as *Pronax*)	Tornotes 160 × 4	225-80 × 10-13
P. mollis (Kirkpatrick, 1903 as *Clathria*)	Amphitornote 165 × 5.5	130 × 11
P. palmatus Pulitzer-Finali, 1993	Tylostyles 160-185 × 3.5	160-190
P. papillatus (Dendy, 1922 as *Hamigera*)	Tylotes 300 × 5	350 × 10
P. paucistylifer Koltun, 1958	Strongyles 384-509 × 8-12	156-364 × 10-15
P. tanitai Hajdu and Texeira, 2011	Tornotes 140-170 × 3-4	I. 200-250 × 11-15 II. 75-83 × 6-7.5
P. purpureus (Carter, 1886 as *Plumohalichodria*)	Tornotes 190.5 × 9	84.6 × 12.7
P. ramosus (Lendenfeld, 1888 as *Echinonema*)	Oxeas 160 × 4	74 × 6
P. roxasi (de Laubenfels, 1935 as *Lissodendroyx*)	Tylotes 220 × 13	155 × 8
P. scabida (Vacelet, Vasseur and Lévi, 1976 as *Pronax*)	Subtylostyles 190-205 × 2.5	I. 150-200 × 7.5 II. 80-95 × 7
P. salebrosus Koltun, 1958	Tornotes 343-468 × 8-12	145-499 × 10-13
P. stylifer Burton, 1959	Tornotes 212 × 4	I. 120 × 8 II. 320 × 12
P. tenuispiculatus (Dendy, 1896 as *Plumohalichondria*)	Oxeas 200 × 2	I. 250 × 2.5 II. 80 × 4
P. uncifer (Dendy, 1896 as *Plumohalichondria*)	Oxeas 160 × 2.7	180 × 8

Table 1. (continued)

Species[a]	Microscleres (length)	Shape; locality; depth
P. reginae sp. nov.	15-(18.1)-22.5	Massive black; Gulf of California (Mexico); 86 m
P. arborescens (Ridley, 1884 as *Hymedesmia*)	Arcuate isochelae 25	Erect, pedicellate, ramose, pale brownish; Port Jackson Australia; 0-9 m
P. arbuscula (Lendenfeld, 1888 as *Clathrissa*)	Not reported	Lobulated or digitated-sponge, reddish-orange when alive; Port Jackson, East Australia; depth unknown
P. bergmontae Hajdu and Texeira, 2011	Arcuate isochelae 20-24	Thickly encrusting, brown when preserved; North Cape, New Zealand; 29 m
P. areolatus (Thiele, 1905 as *Hymedesmia*)	Arcuate isochelae 25	Encrusting, reddish brown; Calbuco, Chile; 40 m
P. caespitosus (Carter, 1885 as *Echinonema*)	Arcuate isochelae 14.8	Massive, drab-red; Port Phillip, South Australia; 33 m
P. californiana (de Laubenfels, 1932 as *Myxilla*)	Absent	Massive, pale gray; Laguna Beach, CA, USA; intertidal
Lee et al. 2007 [b]	Absent	
P. clathratus (Lévi, 1963 as *Pronax*)	Arcuate isochelae I. 24 II. 15-16	Massive-encrusting, yellow; South Africa; 10-45 m
P. clathrodes (Dendy, 1922 as *Plumohalichondria*)	Arcuate isochelae 25	Stipite, flagellate, laminated or encrusting, darkish red; Seychelles; depth unknown
P. dayi (Lévi, 1963 as *Pronax*)	Arcuate isochelae I. 40-45 II. 33-35	Massive sponge, red when alive; South Africa; 287 m
P. domini (Boury-Esnault and van Beveren, 1982 as *Pronax*)	Arcuate isochelae 25.6-32	Ramose sponge; ochre when preserved; Kerguelen Is.; 155 m
P. epizoaria (Lévi, 1958 as *Pronax*)	Arcuate isochelae 11-14	Encrusting sponge, orange when alive; Shab Suleim, Red Sea; 15 m
P. fibrosus (Lévi, 1963 as *Pronax*)	Absent	Massive sponge, color not reported; South Africa; 14 m
P. fictitioides (Dendy and Frederick, 1924 as *Anchinoe*)	Arcuate isochelae 24	Flagelated or lamella shaped, pale gray or yellow; Sandy I., Western Australia; depth unknown
P. frutex Pulitzer-Finali, 1993	Arcuate isochelae I. 33-37 II. 18.5	Ramose-shaped, red, yellow, or orange; Shimoni, Kenya 16 m
P. fulvus (Bergquist and Fromont, 1988 as *Pronax*)	Arcuate isochelae I. 23-38 II. 9-16 Sigmas 12.5-20	Thinly encrusting, brown or yellow; Sponge Garden, New Zealand; 18 m
P. gravidus (Dendy, 1896 as *Plumohalichondria*)	Arcuate isochelae 23 Sigmas 30	Massive-shaped, brown; southeastern Australia; depth unknown
P. gukhulensis Sim and Kim, 2004	Arcuate isochelae 25-30	Massive-shaped, red when alive; Gageodo, Korea; 20 m
P. hoffmani (Bakus, 1966 as *Podotuberculum*)	Absent	Encrusting, brownish orange; San Juan Washington, USA; from intertidal to subtidal
P. intermedia Bergquist, 1961	Arcuate isochelae 25-43 Sigmas 18-38 Raphides 40-70	Massive or encrusting sponge, yellow; Rangitoto I., New Zealand; intertidal
P. lamellatus (Lévi, 1963 as *Pronax*)	Absent	Encrusting sponge, ochre when alive; South Africa; 24 m
P. mollis (Kirkpatrick, 1903 as *Clathria*)	Arcuate isochelae 17.5 Sigmas 38 × 2	Lamellate-shaped, brown or gray; East London, South Africa; 155 m
P. palmatus Pulitzer-Finali, 1993	Arcuate isochelae 18-25	Lamellate, color not reported; eastern Africa, northern Kenya; 110 m
P. papillatus (Dendy, 1922 as *Hamigera*)	Arcuate isochelae 28	Massive or cushion-shaped sponge, greenish yellow; Seychelles Is.; depth unknown
P. paucistylifer Koltun, 1958	Arcuate isochelae 31-46	Globullated or vase-shaped, pale gray; Ohkotsk Sea, Russia; 3-92 m
P. tanitai Hajdu and Texeira, 2011	Arcuate isochelae 15	Massive or encrusting sponge, purple when preserved; Kurushima Strait, Japan; 50 m
P. purpureus (Carter, 1886 as *Plumohalichodria*)	Absent	Lobulated, pinkish or purple when alive; Western Port, Australia; depth unknown
P. ramosus (Lendenfeld, 1888 as *Echinonema*)	Arcuate isochelae 14	Digitate-shaped, color not reported Port Jackson, Australia; depth unknown
P. roxasi (de Laubenfels, 1935 as *Lissodendroyx*)	Arcuate isochelae I. 36 II. 16 Sigmas 70	Amorphous, pale gray; Port Galera, the Philippines; 12 m
P. scabida (Vacelet, Vasseur and Lévi, 1976 as *Pronax*)	Arcuate isochelae 20	Laminated, red when alive; Tulear, Madagascar; 18-31 m
P. salebrosus Koltun, 1958	Arcuate isochelae 24-32	Massive gray; Kuril I., Russia; 90-110 m
P. stylifer Burton, 1959	Arcuate isochelae 28-68	Lamellate irregular, pale brown; Gulf of Aden, Yemen; 173-220 m
P. tenuispiculatus (Dendy, 1896 as *Plumohalichondria*)	Absent	Encrusting, white; southeastern Australia; depth unknown
P. uncifer (Dendy, 1896 as *Plumohalichondria*)	Arcuate isochelae 40 Sigmas 33	Thinly encrusting, pale yellow; southeastern Australia; depth unknown

[a]On the right side, the original genus was the species described; [b]additional information of the original description.

(1883a) created the genus *Ectyonopsis* for a species from Australia, which has acanthostyles and acanthostrongyles that form a choanosomal isotropic structure. The presence of these 2 spicules is similar to the genus *Antho* Gray 1867 (Family Microcionidae). However, this species has anchorate isochelae, a stable character in the family Myxillidae, and sigmas, which are not found in *Antho*. Lévi (1963) created the genus *Ectyonancora* for 2 species from South Africa which have acanthostyles, acanthostrongyles, ectosomal tornotes, and anchorate isochelae. van Soest (2002a) synonymized these 2 genera because they shared these spicules. We agree with this taxonomic decision, but in addition, we include the presence of sigmas as microscleres in the genus *Ectyonopsis*. Bakus (1966) created the genus *Stelotrochota* for an encrusting sponge from San Juan Archipelago I. (Washington State, USA). This species has choanosomal acanthostrongyles and an anisotropic choanosomal skeleton. The ectosomal spicules are stylotes or subtylotes with microspined heads. The microscleres are anchorate or unguiferate isochelae with 5 teeth. van Soest (2002a) synonymized *Stelotrochota* with *Ectyonopsis* because these 2 genera have choanosomal acanthostrongyles and anchorate isochelae. However, we think that the lack of acanthostyles and the presence of ectosomal subtylotes with microspined heads in *Stelotrochota* are different morphological features than found in species belonging to the genus *Ectyonopsis*. We think that the genus *Stelotrochota* should be resurrected.

Family Coelosphaeridae Dendy, 1922
Genus *Myxillodoryx* gen. nov.

Definition: Coelosphaeridae with ectosomal diactinal spicules (tylotes) and choanosomal monactinal spicules (acanthostyles). Microscleres isochelae in 2 shapes: 1st arcuate tridentate and 2nd unguiferate multidentate. C-shaped sigmas also present. Ectosomal skeleton a dense layer of diactinal spicules. Choanosomal skeleton with an isotropic organization.

Type species: *Myxillodoryx nicolae* sp. nov.

Etymology: The genus *Myxillodoryx* is a compound word which refers to *Myxill-* (family Myxillidae) by the presence of unguiferate isochelae and *-doryx* (genus *Lissodendoryx*) by the incidence of arcuate isochelae.

Myxillodoryx nicolae sp. nov.
(Figs. 1C, 4A-F, 5A-C)

Etymology: Named for Nicole Boury-Esnault for her extensive contribution to sponge taxonomy and cytology.

Material examined: *Holotype*: MNCN 1.01/654, 19 Feb. 2009, CFE (South Baja California, Mexico) 3 m (24°48'45"N, 112°05'59"W).

Paratypes: 2015-LEB-ICML-UNAM, 19 Feb. 2009, CFE (South Baja California, Mexico) 3 m (24°48'45"N, 112°05'59"W); 2016-LEB-ICML-UNAM, 19 Feb. 2009, CFE (South Baja California, Mexico) 3 m (24°48'45"N, 112°05'59"W).

Description: Encrusting sponge growing on rhodoliths, size 15-25 mm long and 2-3 mm thick. Surface smooth. Oscula absent. Ostia circular to oval-shaped (100-300 μm long) evenly distributed. Color in life red or pinkish, becoming white when preserved (Fig. 1C).

Skeleton: Ectosomal tylotes straight with smooth heads 220-(253.2)-280 × 2.5

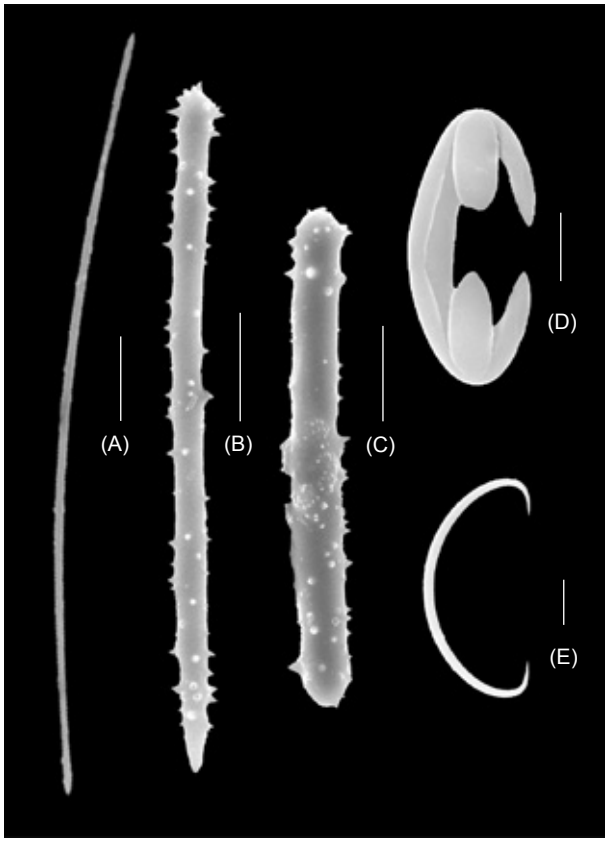

Fig. 3. *Ectyonopsis sigmata* sp. nov. Images of spicules under SEM. (A) Ectosomal tornote; (B) choanosomal acanthostyle; (C) acanthostongyle; (D) anchorate isochela; (E) sigma. Scale bar: A = 25 μm; B = 20 μm; C = 20 μm; D, E = 2 μm.

-(4.6)-7.5 μm (Fig. 4A). Choanosomal acanthostyles straight or curved with short spines 125-(142.6)-155 × 2.5-(2.6)-3.75 μm (Fig. 4B). Arcuate isochelae with 3 teeth 30-(34.6)-45 μm (Fig. 4C). Unguiferate isochelae with 6 or 7 teeth 7.5-(10.8)-15 μm (Figs. 4D, 5A-C). Sigmas C-shaped: 17.5-(36.2)-50 μm (Fig. 4E, F). Ectosomal skeleton a dense layer of tylotes (10-35 μm in thick). Choanosomal skeleton an irregular isotropic reticulation of ascending primary multispicular fibres interconnected by secondary bi- or multispicular fibres. Microscleres dispersed with no special organization (Table 3).

Remarks: The genus *Myxillodoryx* was created because the type species bears isochelae in 2 shapes: arcuate and unguiferate. We allocated this species to the family Coelosphaeridae by the presence of ectosomal diactinal spicules (tylotes) and arcuate chelae. Rützler et al. (2007) described several species of the genus *Lissodendoryx* from the Caribbean. Those authors reported the presence of arcuate polidentate chelae (Rützler et al. 2007). However, the unguiferate multidentate isochelae of *Myxillodoryx nicolae* gen. nov., sp. nov. are similar to the species of the genus *Stelodoryx* (family Myxillidae) (Fig. 5A-C). We think that the systematics of the order Poecilosclerida needs some special attention, and the shape of the isochelae used in the classification can vary among families and genera.

The only species in the Eastern Pacific bearing unguiferate isochelae is *Stelodoryx oxeata* Lehnert, Stone and Heilmer 2006 (Table 4). This is a green massive or encrusting sponge described from Amchitka (Alaska, USA) from 176-712 m in depth. It has choanosomal oxeas (517-558 × 20-30 μm), tornotes with a microspined base (230-270 μm × 9-11 μm), unguiferate isochelae (9-13 μm), and centrotylote sigmas (8-12 μm).

Table 2. Comparative table of *Ectyonopsis* species described worldwide. Values are presented as the minimum-(average)-maximum (μm)

Species	Acanthostyles (length × width)	Acanthostrongyles (length × width)	Ectosomal spicules (length × width)
Ectyonopsis sigmata sp. nov.	140-(152.8)-175 × 5-(5.6)-7.5	95-(111.5)-130 × 2.5-(4.1)-5	150-(159.4)-170 × 2.5-(2.5)-2.5
E. flabellata (Lévi, 1963)	225-300 × 20-25	220-250 × 22-25	Tornotes 145-180 × 7
E. panis (Boury~Esnault and van Beveren, 1982)	256-512 × 12.8-25.6	211.2-313.6 × 12.8-19.2	Tornotes 272-364.8 × 6.4-12.8
E. pluridentata (Lévi, 1963)	430-470 × 22-27	325-375 × 22-26	Tornotes 260-320 × 4
E. ramosa Carter, 1883[a] a van Soest, 2002a	177-270 × 20-24	Similar to acanthostyles	Tornotes 165-188 × 4-6
E. ruthae (Mothes and Lerner, 1995)	234-441 × 12-22	198-270 × 12-14	Tornotes 216-270 × 6-8
Stelotrochota hartmani Bakus, 1966	Absent	185-224 × 15-22	Tylotes with microspined base 139-66 × 6-9

Species	Anchorate isochelae (length)	Sigmas (length)	Shape; locality; depth
Ectyonopsis sigmata sp. nov.	10-(13.9)-17.5	15-(25.6)-30	Massive or encrusting, red; Manzanillo, Colima, Mexico; 2 m
E. flabellata (Lévi, 1963)	I. 40-57 II. 27-32	Absent	Flagellate to laminated, brown or ochre; South Africa; 25-40 m
E. panis (Boury~Esnault and van Beveren, 1982)	24.7-32.5	Absent	Massive sponge; Nuagueuses Is. (NW of Kerguelen Is.); 100-130 m
E. pluridentata (Lévi, 1963)	I. 85 II. 35-37	Absent	Massive sponge, ochre; South Africa and Bengala; 79-900 m
E. ramosa Carter, 1883[a] a van Soest, 2002a	I. 21-30	Absent	Ramose, brown; South Australia; depth unknown
E. ruthae (Mothes and Lerner, 1995)	39~54	Absent	Massive, pinkish; Elephant I., Antarctica; 110 m
Stelotrochota hartmani Bakus, 1966	Anchorate or unguiferate 39-51	Absent	Encrusting, pale gray; San Juan Archipelago, Washington state, USA; 58-101 m

[a]Additional information from the original description.

The main difference with *Myxillodoryx nicolae* sp. nov is the shape of the choanosomal megascleres: oxeas in *S. oxeota* vs. acanthostyles in *M. nicolae* sp. nov. In addition, the microscleres are shorter in *S. oxeota* than in *M. nicolae* sp. nov. (anchorate isochelae 9-13 μm and sigmas centrotylotes 8-12 μm in *S. oxeota* vs. isochelae in 2 categories of I, arcuate with 3 teeth 30-50 μm, II, unguiferate isochelae with 6 or 7 teeth 7.5-15 μm, and sigmas C-shaped 17.5-50 long in *M. nicolae* sp. nov.).

Discussion of the genus Stelodoryx: The genus *Stelodoryx* was created by Topsent (1904) for the type species *S. procera*. The principal characteristic of this genus is the presence of choanosomal monactinal spicules and ectosomal diactinal spicules. Microscleres are polydentate anchorate isochelae. Desqueyroux-Faundez and van Soest (1996) considered that the presence of anchorate isochelae with more than 3 teeth was a synapomorphic feature of a special group of the genus *Myxilla*, and they proposed the establishment of *Stelodoryx* as a subgenus of *Myxilla*. van Soest (2002a) recognized *Stelodoryx* as a valid genus and synonymized the genera *Pseudomyxilla* Koltun 1955 and *Onychomyxilla* Topsent 1927, because they shared some diagnostic features such as ectosomal and choanosomal spicules and anchorate isochelae with more than 5 teeth. However, there are species in the genus that have up to 3 categories of unguiferate isochelae. Species with anchorate tridentate isochelae and unguiferate multidentate chelae include *S. multidentata* (Boury-Esnault and van Beveren 1982) and *S. argentinae* Bertolino et

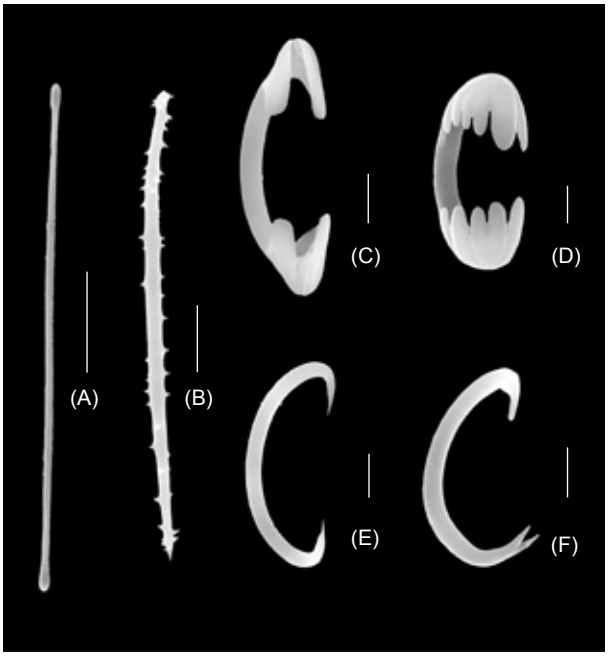

Fig. 4. *Myxillodoryx nicolae* gen. nov., sp. nov. Images of spicules under SEM. (A) Ectosomal tylote; (B) choanosomal acanthostyle; (C) arcuate isochela; (D) unguiferate isochela; (E) sigma; (F) centrotylote sigma. Scale bars: A = 50 μm; B = 40 μm; C = 5 μm; D = 2 μm; E = 8 μm; F = 10 μm.

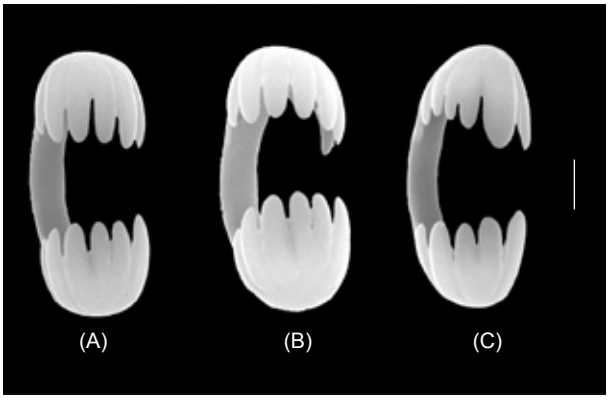

Fig. 5. *Myxillodoryx nicolae* gen. nov., sp. nov. Images of unguiferate isochelae under SEM. (A) Lateral; (B) dorsal, (C) lateral. Scale bars = 3 μm.

Table 3. *Myxillodoryx nicolae* gen. nov., sp. nov. spicule measurements (μm). Values are presented as the minimum-(average)-maximum

Material examined	Tylotes (length × width)	Acanthostyles (length × width)	Arcuate isochelae (length)	Sigmas (length)	Unguiferate isochelae (length)
MNCN 1.01/654	230-(246.5)-275 × 2.5-(4.2)-7.5	130-(140.6)-150 × 2.5-(2.8)-3.75	30-(33.6)-40	17.5-(34.8)-40	7.5-(12.3)-15
LEB-2015	220-(234.4)-255 × 2.5-(5.5)-7.5	125-(139.1)-150 × 2.5-(2.6)-3.75	30-(37.1)-45	17.5-(34.4)-50	7.5-(9.8)-15
LEB-2016	230-(262.5)-280 × 2.5-(3.1)-7.5	135-(145.5)-155 × 2.5-(2.7)-3.75	30-(34.4)-40	30-(37.5)-45	10-(11.1)-15

al. 2007. The diagnosis of the genus *Stelodoryx* by Topsent (1904) and van Soest (2002a) including ectosomal diactinal spicules matches all the species currently assigned to the genus (Table 4). However, 2 species (*S. phyllomorpha* Lévi, 1993 and *S. chlorophylla* Lévi, 1993) have styles and tylostyles (monactines) as ectosomal spicules. Therefore, we proposed to transfer these 2 species to the genus *Monanchora* Carter 1883b (family Crambeidae). Species belonging to this genus have ectosomal and choanosomal monactinal spicules. Microscleres if present are unguiferate isochelae, sigmas, and microxeas (van Soest 2002b). This diagnosis was previously used for the species *Monanchora alaskensis* (Lambe 1895) originally described in the genus *Chondrocladia* Thomson 1873. Koltun (1959) transferred this species to the genus *Stelodoryx* because it had unguiferate isochelae and an irregular isotropic choanosomal skeleton, and van Soest (2002a) transferred it to the genus *Monanchora* because it has ectosomal and choanosomal monactinal spicules (styles).

Family Crambeidae Lévi, 1963
Genus *Discorhabdella* Dendy, 1924

Discorhabdella urizae Maldonado, Carmona, van Soest and Pomponi, 2001
(Figs. 1D, 6A-F)

Synonymy

Discorhabdella urizae Maldonado et al. 2001:1268

Holotype: USNM 51470, no date, Gulf of Chiriquí (Panama). Depth unknown (not examined).

Material examined: 2063-LEB-ICML-UNAM, 11 Apr. 2011, 33 Station Talud XIV (Gulf of California, Mexico) 344 m (27°47'52"N, 111°09'30"W).

Table 4. Comparative table of *Stelodoryx* species described worldwide. Values are presented as the minimum-(average)-maximum (μm)

Species	Choanosomal spicules (length × width)	Ectosomal spicules (length × width)
S.multidentata (Boury-Esnault and van Beveren, 1982)	Styles 455-520 × 12-19	Tylotes 255-312 × 5-7
S. oxeata Lehnert, Stone and Heilmer, 2006	Oxeas 517-588 × 20-30	Tornotes with microspined base 230-270 × 9-11
S. dubia Burton, 1928	Acanthostyles I. 280 × 20 II. 70 × 11	Tornotes 140 × 4
S. pluridentata (Lundbeck, 1905)	Styles 320-500 × 9-19	Strongyles or subtylotes 226-320 × 5-10
S. argentinae Bertolino, *Shetjer*, *Calcinai*, *Cerrano*, *Bremec*, 2007	Styles I. 287.5-412.5 × 10-15 II. 188.7-260 × 2.6	Anisostrongyles 209-262.5 × 5-10
S. flabellata Koltun, 1959	Acanthostyles or acanthostrongyles 322-425 × 12-20	Tylotes 250-312 × 4-6
S. toporoki Koltun, 1958	Styles 509-1140 × 21-31	Tylotes 218-300 × 8-10
S. lissostyla (Koltun, 1959)	Styles 332-421 × 11-13	Tylotes 260-332 × 5-6
S. vitiazi (Koltun, 1955)	Acanthostyles 436-520 × 21-29	Strongyles with microspined base 190-291 × 4-7
S. cribigera (Burton, 1932) Desqueyroux-Faundez and van Soest, 1996[a]	Styles 345-532 × 8-24	Tylotornotes with microspined base 179-307 × 6-8
S. procera Topsent, 1904	Styles 350-400 × 12 620-700 × 12	Tylotes with microspined base 235-300 × 5
S. pectinata (Topsent, 1890)	Acanthostyles I. 448-504 × 12 II. 224-266 × 8	Tylotes 420-500 × 4-5
Monanchora chlorophylla (Lévi, 1993)[b]	Styles with mucronated base 650-780 × 25-35	Styles/Tylostyles 450 × 8-9
Monanchora phyllomorpha (Lévi, 1993)[b]	Styles 700-750 × 25-30	Styles with microspined base 450-530 × 4

Description: Thinly encrusting sponge growing on bivalve shell, size 4 cm long and 2 mm thick. Oscula and ostia absent. Surface hispid with spicule projections protruding externally and evenly distributed. Texture flexible and elastic. Color in alcohol translucent (Fig. 1D).

Skeleton: Choanosomal acanthosubtylostyles straight with swollen and microspined base 220-(423.3)-610 × 17.5-(25.8)-35 μm (Fig. 6A). Ectosomal tylotes straight or curved with swollen and smooth base 175-(197.5)-220 × 2.5-(4.75)-7.5 μm (Fig. 6B). Pseudoastrose acanthostyles typically recurved with prominent spines and club-shaped base 30-(38.8)-45 μm (Fig. 6C). Anchorate isochelae with 3 teeth 35-(36.6)-42.5 μm (Fig. 6D). Microxeas recurved with prominent spines 15-(21.6)-22.5 μm (Fig. 6E). Sigma-like microscleres C-shaped 15-(17.1)-20 μm (Fig. 6F). Ectosomal skeleton almost absent; bundles of tylostyles unevenly distributed. Choanosomal skeleton

Table 4. (continued)

Species	Microscleres (length)	Shape; locality; depth
S.multidentata (Boury-Esnault and van Beveren, 1982)	Unguiferate isochelae I. (5-12 teeth) 32-58 II. (3 teeth) 5-17	Cushion or encrusting, color not reported; Kerguelen Is.; 125 m
S. oxeata Lehnert, Stone and Heilmer, 2006	Unguiferate isochelae I. (4 teeth) 54-110 II. (6 teeth) 23-32 Sigmas centrotylotes 8-12	Vase or massive, green; Amchitka, Alaska, USA; 176-712 m
S. dubia Burton, 1928	Unguiferate isochelae (5 teeth) 11 Sigmas 42	Clavulated, yellow or brown; South Ceylon, Sri Lanka; 95-115 m
S. pluridentata (Lundbeck, 1905)	Unguiferate isochelae (6 or 7 teeth) 71-97	Cushion-shaped, brown; North Iceland 44-80 m
S. argentinae Bertolino, *Shetjer*, *Calcinai*, *Cerrano*, *Bremec*, 2007	Unguiferate isochelae 40.8-65 Anchorate isochelae: No data	Massive, black; Argentina 360 m
S. flabellata Koltun, 1959	Unguiferate isochelae (5 or 6 teeth) 56-72	Funnel-shaped, red; Kara Sea, Russia; 2700 m
S. toporoki Koltun, 1958	Unguiferate isochelae (4 or 5 teeth) I. 119-157 II. 31-40	Stalked or flabellated, yellow; Sea of Okhotsk, Russia; 113-303 m
S. lissostyla (Koltun, 1959)	Unguiferate isochelae (3 or 4 teeth) I. 26-30 II. 13-17	Tube-shaped, red; Sea of Japan; depth unknown
S. vitiazi (Koltun, 1955)	Anchorate isochelae (4 teeth) 26-46	Stalked-sponge, gray; Sea of Okhotsk, Russia; 115-820 m
S. cribigera (Burton, 1932) Desqueyroux-Faundez and van Soest, 1996[a]	Anchorate isochelae I. (5-9 teeth) 48-89 II. (5 teeth) 35-86	Massive, brown; Galápagos Is., Chile, Falkland I., Patagonia, Argentina; 20-200 m
S. procera Topsent, 1904	Anchorate isochelae (5 teeth) 45	Pedicel, red or gray; San Jorge, Azores; 200-1200 m
S. pectinata (Topsent, 1890)	Unguiferate anisochelae (8 or 10 teeth) I. 36-45 II. 18-22	Fleshy crust, brown; Vilafranca I.; 919-2460 m
Monanchora chlorophylla (Lévi, 1993)[b]	Unguifetate isochelae I. 55-60 II. 30-35 III. 13-14	Laminate, green or blue; New Caledonia; 600-540 m
Monanchora phyllomorpha (Lévi, 1993)[b]	Unguiferate isochelae (5 teeth) I. 45-55 II. 30 Unguiferate isochelae (7 teeth) 18-25	Foliaceus sponge, ochre; New Caledonia; 1175-1160 m

[a]Additional information from the original description. [b]Species originally described in the genus *Stelodoryx* and transferred to the genus *Monanchora* (present study).

with hymedesmoid structure. Main acantho-subtylostyles and pseudoastrose acanthostyles erect on a dense spongin layer (10-30 μm thick). Microscleres dispersed with no special organization.

Remarks: *Discorhabdella urizae* is distributed in the Gulf of Chiriqui (Pacific Panamanian coast) and in the Gulf of California. The spicule measurements of the material examined match the description by Maldonado et al. (2001). However, there is a variation in the shape and length of the anchorate isochelae (35-42.5 μm long and 3 teeth in Mexican specimens vs. 26-29 μm long and 5 teeth in Panamanian specimens) (Table 5).

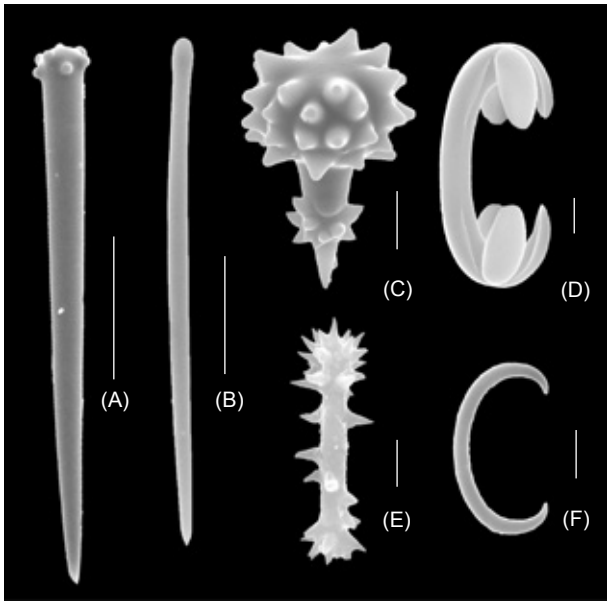

Fig. 6. *Discorhabdella urizae* Maldonado et al. 2001. Images of spicules under SEM. (A) Choanosomal subtylostyles; (B) ectosomal tylostyle; (C) pseudoastrose acanthostyle; (D) anchorate isochela; (E) microxeas; (F) sigma. Scale bars: A = 90 μm; B = 25 μm; C = 10 μm; D-G = 5 μm.

Suborder Mycalina Hajdu, van Soest and Hooper, 1994
Family Desmacellidae Ridley and Dendy, 1886
Genus *Biemna* Gray, 1867

***Biemna rhadia* de Laubenfels, 1930**
(Figs. 1E, 7A-D)

Synonymy

Biemna rhadia de Laubenfels 1930: 26, 1932: 63; Dickinson 1945: 26; Bakus 1966: 428; Lee et al. 2007: 65A.

Holotype: USNM 21501, 1925, Monterrey Bay California (USA), 700 m (not examined).

Material examined: D-62 L356664, 3 Aug. 1936, Partida I., (Gulf of California, Mexico) 82 m. *R/V Velero* Sta. AHF 557-36 (Dickinson 1945). MBC # 11499, Bakus # 9, 11 Aug. 1958, Caution Point, San Juan I. (Washington state, USA) 54 m. *Additional Material*: 2067-LEB-ICML-UNAM, 9 Apr. 2011, 20 Station Talud XIV (Gulf of California, Mexico) 414 m (28°46'29"N, 111°45'40"W).

Description: Sponge fragments 2-3 cm long and 1-2 cm thick. Oscula and ostia not visible. Surface hispid. Texture flexible and difficult to tear. Color in alcohol pale brown (Fig. 1E).

Skeleton: Choanosomal styles long, straight or curved with smooth base, 620-(996.5)-1480 × 17.5-(23.6)-35 μm (Fig. 7A). Sigmas C- or S-shaped in 2 categories: I, 260-(336.4)-400 × 7.5-(10.2)-15 μm (Fig. 7B) and II, 12.5-(54.2)-110 μm (Fig. 7D). Raphides thin and straight 110-(164.2)-240 μm (Fig. 7C) (Table 6). Ectosomal skeleton a dense layer of bundles of rhapides and spicule tyles (60-70 μm thick). Choanosomal skeleton a plumose reticulum of primary multispicular fibres irregularly anastomosed (100-150 μm in diameter). Large and small sigmas within primary fibres. Spongin abundant.

Remarks: *Biemna rhadia* (de Laubenfels 1930) is distributed in the Gulf of California and

Table 5. *Discorhabdella urizae* spicule measurements (μm). Values are presented as the minimum-(average)-maximum

Material examined	Subtylostyles (length × width)	Ectosomal tylostyles (length × width)	Pseudoastroses acanthostyles (length × width)	Anchorate isochelae (length)	Sigmas (length)	Spined microxeas (length)
LEB~2063	220-(423.3)-610 × 17.5-(25.8)-35	175-(197.5)-220 × 2.5-(4.75)-7.5	30-(38.8)-45	35-(36.6)-42.5	15-(17.1)-20	15-(21.6)-22.5
Maldonado et al. 2001[a]	380-750 × 19-42	180-220 × 5-7	23-37	26-29	13-16	19-26

[a]Spicules measurements from original description.

occurs on the West coast of the US (Bakus 1966). The material examined matches the descriptions by de Laubenfels (1932) and Lee et al. (2007). Bakus (1966) described this species from San Juan I. (Washington state, USA), but probably, the large sigmas were overlooked in some specimens (Table 6).

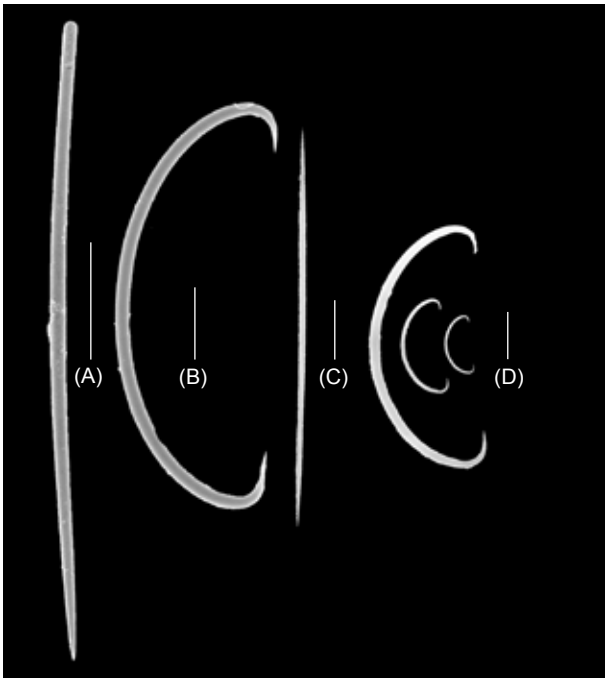

Fig. 7. *Biemna rhadia* de Laubenfels, 1930. Images of spicules under SEM. (A) Choanosomal style; (B) sigma I; (C) raphide; (D) sigma II. Scale bars: A = 240 μm; B = 50 μm; C = 20 μm; D = 10 μm.

DISCUSSION

This study reveals 2 little-known species and 3 others which are new to science belonging to the order Poecilosclerida. Four species belong to the suborder Myxillina and one to the suborder Mycalina. So far there are only 2 studies of these suborders in the Mexican Pacific: Dickinson (1945), who described 13 species from the Gulf of California, and recently, Carballo and Cruz-Barraza (2010) who described 8 species of the genus *Mycale*.

Biemna rhadia de Laubenfels 1930 is a deep-sea species distributed along the northwestern coast of the US and also found in the Gulf of California. *Phorbas reginae* sp. nov. is the only deep-water species of the genus *Phorbas* in the eastern Pacific. *Discorhabdella urizae* Maldonado, Carmona, van Soest and Pomponi 2001 was described from the Pacific coast of Panama. In this study, the distribution range of this species has increased, and now includes the Gulf of California. The other 2 species are distributed off the Pacific coast of Mexico.

The phylogeny and systematics of the order Poecilosclerida are based on the presence and morphology of the chelae (Hajdu et al. 1994). However, there are families where the chelae are lacking such as the Raspailiidae, Rhabderemiidae (suborder Microcionina), Tedaniidae (suborder

Table 6. *Biemna rhadia* spicule measurements (μm). Values are presented as the minimum-(average)-maximum

Material Examined	Styles (length × width)	Sigmas I (length × width)	Sigmas II (length)	Raphides (length)
AHF-557-36	620-(789.2)-1220 × 20-(24.2)-30	300-(338.2)-400 × 7.5-(9.6)-12.5	12.5-(50.2)-80	160-(181.6)-210
MBC # 11499	700-(884.2)-1040 × 17.5-(21.5)-30	320-(340.2)-380 × 7.5-(9.3)-12.5	12.5-(49.6)-90	150-(167.7)-180
LEB-2067	910-(1201.2)-1480 × 20-(26.4)-35	260-(322.1)-380 × 7.5-(12.3)-15	12.5-(62.3)-110	110-(160.5)-240
de Laubenfels, 1932[a]	1300 × 20	300 × 13	90 × 4 25 × 1	120-210 × 1-2
Dickinson, 1945[a]	500-1500 × 25-28	400	20	150 × 1
Bakus, 1966[a]	664-1305 × 15-33	185-414 [b]	I. 12-28 II. 42-110	106-197 × 1.3-3.2
Lee et al. 2007[a]	600-1305 × 20	260-330	I. 13-25 II. 29-91	90-210

[a]Spicules measurements from original description. [b]In some specimens analyzed, the long sigmas were missing.

Myxillina), and Desmacellidae (suborder Mycalina) (Hooper and van Soest 2002). In addition, the presence of anchorate isochelae was reported from genera belonging to a family of a different suborder, i.e., Cladorhizidae, in the suborder Mycalina (Lopes et al. 2012). In that case, the diagnostic features which separate these genera are based on the morphology of the ectosomal and choanosomal spicules.

We also found some taxonomic inconsistencies in the systematics of the order. Differences between *Monanchora* and *Stelodoryx* are based on the ectosomal spicule shape (monactinal vs. diactinal); therefore, the species described in the genus *Stelodoryx* with ectosomal monactines spicules (styles and tylostyles) such as *S. phyllomorpha* and *S. chlorophylla*, may be moved to the genus *Monanchora* (family Crambeidae). These 2 genera share the presence of unguiferate isochelae and monactinal choanosomal spicules.

We propose *Myxillodoryx* as a new genus because the type species bears 2 shapes of isochelae: arcuate and unguiferate. *Myxillodoryx nicolae* gen. nov., sp. nov., has choanosomal acanthostyles and ectosomal tylotes. The ectosomal skeleton is a dense layer of tylotes, and the choanosomal skeleton has an isotropic organization. Currently, species of the suborder Myxillina with these morphological characteristics and bearing arcuate isochelae are assigned to the genus *Lissodendoryx* (family Coelosphaeridae). Species with unguiferate multidentate isochelae are assigned to the genus *Stelodoryx* (family Myxillidae). We allocate this genus in the family Coelosphaeridae by the presence of ectosomal tylotes and arcuate chelae.

The family Crellidae Dendy 1922 is characterized by the presence of ectosomal oxeas and choanosomal acanthostyles. Microscleres are arcuate chelae and occasionally sigmas (van Soest 2002c). However species of the genus *Crellomima* Rezvoi 1925 have unguiferate multidentate chelae. This study reveals that the chelae shapes used in the current classification vary among families and genera in the suborder Myxillina.

The genus *Ectyonopsis* Carter 1883a is emended on the basis that *E. stigmata* sp. nov. bears sigmas in the skeleton. Consequently, there are some morphological features separating the genus *Stelotrochota* Bakus 1966 from *Ectyonopsis* 1883a. In that case, we proposed resurrecting the genus *Stelotrochota* Bakus 1966 which is monotypic.

In addition to the morphological data, the use of molecular tools in the systematics of sponges has increased in recent years. Genetic studies using nuclear and mitochondrial markers reveal that the order Poecilosclerida may be polyphyletic (Morrow et al. 2012). Species bearing and lacking isochelae (family Tedaniidae) are in a monophyletic tree. The family Raspailiidae is proposed to be included in a resurrected order Axinellida and the family Desmacellidae appears to be paraphyletic (Morrow et al. 2012).

These tools have also revealed a high number of cryptic species which would make sponges one of the most diverse groups in the benthic community (Blanquer and Uriz 2007). However, we think that morphological verification is the 1st step in sponge research, including phylogeny, phylogeography, or biogeography.

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