Zootaxa 541: 1–15 (2004)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

541

New species of the gorgoniian genus *Pacifigorgia* (Coelenterata: Octocorallia: Gorgoniidae) from Pacific Panama

ODALISCA BREEDY[1] & HECTOR M. GUZMAN[2]

[1]*Museo de Zoología, Escuela de Biología, Universidad de Costa Rica, P.O. Box 1962-2100, San José, Costa Rica, odalisca@racsa.co.cr*

[2]*Smithsonian Tropical Research Institute P.O. Box 2072, Balboa, Panama, guzmanh@naos.si.edu*

Abstract

Four new shallow water species of the genus *Pacifigorgia* were found in recent surveys along the Pacific coast of Panama. One of the species was only found in dense patches at two shallow seamount-like localities inside the Coiba National Park, Gulf of Chiriquí. Two other species were patchily distributed at several localities in the Gulf of Chiriquí. A fourth species was widely distributed around the gulfs of Chiriquí and Panama encompassing a broad range of habitats and depths. The new species are described and illustrated in detail with scanning electron micrographs (SEM) of the sclerites, and colour photographs of the colony forms. The suspected occurrence of a particular *Pacifigorgia* species for this region is confirmed and two other new records are added to the species list. With the new four species, a total of 15 are established for Panama, making 31 species for the eastern Pacific to date.

Key words: Cnidaria, Coelenterata, eastern Pacific, gorgonians, Gorgoniidae, octocorals, *Pacifigorgia*, Panama, soft corals, coral reefs, new species

Introduction

The genus *Pacifigorgia* Bayer, 1951 (Gorgoniidae) is one of the most diverse and abundant shallow water octocoral taxa along the eastern Pacific with 27 known species, a large number of which occur in Panama (Breedy & Guzman 2002, 2003a, 2003b). Historically, the taxonomy of *Pacifigorgia* from Panama has changed: Verrill (1868) described four species under the genus *Leptogorgia*; Hickson (1928) reported seven species under the genus *Gorgonia*; Bayer (1951) identified one more in establishing the genus *Pacifigorgia*; and later, Breedy & Guzman (2002) recognised five of these twelve species as valid for the genus. The species which were the subject of the previous studies came from undeter-

Accepted by P. Alderslade.: 19 May 2004; published: 18 Jun. 2004

mined sites from Las Perlas archipelago and other coastal islands in the Gulf of Panama; important collecting sites during the last two centuries. At present, we recognise that nearly fifty percent of the total number of *Pacifigorgia* species is known from Panama, though not all have been recently observed (Breedy & Guzman 2002, 2003a, 2003b). The species from Panama include *Pacifigorgia adamsii* (Verrill, 1868); *Pacifigorgia bayeri* Breedy, 2001; *Pacifigorgia eximia* (Verrill, 1868); *Pacifigorgia irene* Bayer, 1951; *Pacifigorgia rubicunda* Breedy & Guzman, 2003; *Pacifigorgia rubinoffi* Breedy & Guzman, 2003; *Pacifigorgia stenobrochis* (Valenciennes, 1846); and *Pacifigorgia tabogae* (Hickson, 1928). In addition, we confirm the occurrence of *Pacifigorgia senta* Breedy & Guzman, 2003b which was expected for the area (see Breedy & Guzman 2003b), and here report two new records: *Pacifigorgia cairnsi* Breedy & Guzman, 2003 and *Pacifigorgia firma* Breedy & Guzman, 2003. Moreover, we found four new species of *Pacifigorgia* during the course of recent octocoral inventories in the gulfs of Chiriquí and Panama. Herein, we describe the new species from multiple specimens collected at several localities, and present detailed illustrations of the type colonies and the sclerites. Consequently, we establish a total of 15 *Pacifigorgia* species for Panama, making 31 species for the eastern Pacific.

Material and methods

Specimens were collected by scuba diving, down to 40 m in depth, at different localities in the gulfs of Chiriquí and Panama, Pacific Panama. Colonies were air dried or fixed in 70% ethanol. Sclerites were prepared for light and scanning electron microscopy (SEM) following the standard techniques for structural analysis (Bayer 1961, Breedy & Guzman 2002). Anthocodial and coenenchymal sclerites were obtained by dissection of polyps and branches (base and tip of the colonies), respectively. The colour of the sclerites was observed using transmitted light. In addition, we compared the new species with type material deposited at Muséum National d'Histoire Naturelle, Paris (MNHN); Museum of Comparative Zoology, University of Harvard (MZC); National Museum of Natural History, Smithsonian Institution (USNM); Rijksmuseum van Natuurlijke Historie, Leiden (RMNH); The Natural History Museum (formerly the British Museum) (BM); and Yale Peabody Museum of Natural History, Yale University (YPM). Holotypes were deposited in the Museo de Zoologia, Universidad de Costa Rica (UCR), and paratypes in the UCR, MCZ, and the Smithsonian Tropical Research Institute (STRI), Panama.

Family Gorgoniidae Lamouroux, 1812

Pacifigorgia Bayer, 1951
Synonymy. See Breedy & Guzman 2002: 793

Type species. *Gorgonia stenobrochis* Valenciennes, 1846, by original designation (Bayer 1951: 94).

Description. See Breedy & Guzman 2002: 793

Distribution. In the Eastern Pacific, the genus occurs from southern California to Chile and the Galápagos Islands; off the Atlantic coast, only one species has been found (*Pacifigorgia elegans*) from Trinidad to Brazil (Bayer 1951), and observed in Venezuela (pers. obs.).

***Pacifigorgia catedralensis*, new species**
(Figs. 1A–B, 2A–E)

Material examined. ***Holotype*:** UCR 1514, Roca Catedral, Gulf of Chiriquí, 5–15 m, H.M. Guzman, 3 May 2003.

***Paratypes*:** MCZ 57050, same data as holotype; UCR 1515, STRI 616A, same data, but 2 May 2003.

Description. Colonies wider than high, up to 150 mm in height, and 200 mm in width, composed of multiple fans. New fans radiate from the base of the main axis or from different parts of the colony at different levels, and extend in various directions to produce complex arrangements. Colour when preserved or alive is purple, which fades when dry. Under a dissecting microscope, the surface of the branches show a layer of dark purple sclerites on a white, more densely packed layer of sclerites. Colonies develop a strong, elongate holdfast, and the fans grow directly from this, or are elevated above the substrate on short, thick stems. Network is regular and of closed meshes (about 6–7 meshes/cm^2), with sizes up to 10 mm in length and 3 mm in width (Fig. 1B). Mesh branches are squarish in section, up to 2.0 mm thick. No distinct midribs were observed, but some thick branches at the base, up to 5 mm in width, extend for a short distance, up to 15 mm, into the fans. End-branchlets are short, less than 2 mm in length. A few free-twigs project perpendicular to the fans, and reach up to 3 mm in length. The polyps are retracted within dome-shaped coenenchymal mounds which are slightly raised, and closely packed. They are arranged in pairs in longitudinal rows along the branches. Polyps are white with pink, and light purple rods arranged in points. Coenenchymal sclerites are mainly dark purple, white or colourless, and some partially tinted (up to half or up to three quarters of the sclerite). They are mostly wide, strongly tuberculated capstans and spindles. A combination of wide, dark purple capstans and spindles, and small colourless capstans (half the size of the large ones) was always observed in microscopic preparations. The occurrence of large, wide, anthocodial rods with smooth margins is very characteristic in this species.

Holotype. The holotype (Fig. 1A) is 110 mm in height, and 150 mm in width. It is formed by two main fans joined at a 90° angle, and two small secondary fans that radiate perpendicularly to one of the main fans. The colony is attached to a small basalt rock by the holdfast. The main fan rises directly from the substrate with a thick branch (5 mm in

diameter) which divides in two (about 3 mm in diameter), and extends a short distance into each fan. The preserved colony is purple, with polyps partially expanded showing the anthocodial rods arranged in clearly marked points. Coenenchymal sclerites are mostly wide spindles (up to 0.12 mm in length and 0.05 mm in width) with 4–6 complete whorls of tubercles or a complex arrangement of warts, and oval forms (up to 0.10 mm in length and 0.05 mm in width) (Fig. 2A). Most of these sclerites have both ends rounded and blunt, but others have one or both ends more pointed. Capstans are also wide (up to 0.10 mm in length and 0.05 mm in width) with warty tubercles, some with elongated, warty ends, or asymmetric, with one blunt end and the other acute (Fig. 2B). Four-radiates (up to 0.06 mm by 0.06 mm) with warty tips (Fig. 2C), and various immature types of sclerites are commonly found when sampling (Fig. 2D). Anthocodial sclerites are large rods (up to 0.13 mm in length and up to 0.03 mm in width) with smooth or lobed margins (Fig. 2E).

Habitat. This species was the shallow dominant species at Roca Catedral, growing on basaltic rocks in strong currents, together with less abundant colonies of *Pacifigorgia smithsoniana* new species.

Etymology. The species is named after the type locality, Roca Catedral.

Remarks. This species has some similarity to *Pacifigorgia tabogae* (Hickson, 1928) with respect to the colour of the anthocodial sclerites (pink) and their points arrangement, but the morphology of both the colony and the sclerites is different.

Distribution. Only reported for the type locality..

Pacifigorgia ferruginea, new species

(Figs. 1C–D, 3A–E)

Material examined. ***Holotype*:** STRI 423, Islas Ladrones, Gulf of Chiriquí, 15 m, H. Guzman and O. Breedy, 27 August 2002.

***Paratypes*:** MCZ 57051, STRI 422B, UCR 1503 same data as holotype; STRI 521, Islas Ladrones, 5 m, H.M. Guzman, 15 April 2003; STRI 764, 765, Isla Galera, Gulf of Panama, 5 m, H.M. Guzman, 7 August 2003; UCR 1046, 1050, 1504, Isla Canal Afuera, Gulf of Chiriquí, 3–12 m, H.M. Guzman, 10 December 2001.

Description. Colonies wider than high, up to 110 in height, and 150 mm in width, composed of one or more fans. New fans radiate from different parts of the main fan and grow parallel. Colour when preserved is dark purple intermingled with orange, when alive it is a characteristic rust-colour, acquiring a lighter hue when dry. Orange sclerites, sparsely distributed on the surface of the branches, give the impression of rust on the colony, which is very distinctive for this species. Colonies have a strong holdfast, and the fans grow directly from this. Networks are regular and of closed meshes (6–7 meshes/cm²) (Fig. 1C), and about 2–5 mm in diameter. Some meshes are notably elongated and thin, about 15 mm in length and 1–1.5 mm in width. Small colonies have larger meshes. Mesh branches are squarish in section, up to 1.0 mm in diameter. No distinct midribs were

observed, but some thick branches (up to 5 mm in width) at the colony base extend for a short distance (up to 15–20 mm) into the fans. End-branchlets are pointed, up to 7 mm in length. Free-twigs are around 3 mm in length, but in some colonies they reach up to 7 mm. The polyps are retracted within dome-shaped coenenchymal mounds which are slightly raised, and close together, with dark purple sclerites forming a thin ring around the polyp apertures. They are crowded on the branches and mostly arranged in pairs; although four rows occur on thick branches. Polyps are white with rods arranged in thin points, and with sparse intermediate (mesenterially arranged) rods. The rods are mostly colourless, pale pink or pale yellow; darker hues also occur. In some specimens (paratype, UCR 1050) the rods are light purple, especially in the centre with a lighter halo. Coenenchymal sclerites are large, wide capstans and spindles, with whorls of tubercles, and can be dark purple, orange to dark orange, and bicoloured with one end dark orange and the other dark purple. A combination of small orange capstans and large, wide, dark purple capstans and spindles is always observed in microscopic preparations. The majority

Holotype. The holotype (Fig. 1C) is a dry colony, 120 mm in height, and 140 mm in width, composed of a main fan, two small secondary fans, and some free branches at the base. The encrusting holdfast is attached to a small calcareous rock. No midribs cross the fans, but some thick, flat branches (up to 8 mm in diameter) extend from the holdfast for some distance, and the small secondary fans radiate perpendicularly from them, producing a star-like arrangement. Coenenchymal sclerites are dark purple, dark orange, orange, and some multicoloured. Spindles (up to 0.15 mm in length and 0.06 mm in width) have 4–6 complete whorls of tubercles, elongated warty ends (Fig. 3A), and are acute at both tips, or asymmetrical, with one blunt end. Capstans may be very large (up to 0.10 mm in length and 0.06 mm in width), with strong, warty tubercles, or small, and always orange (about 0.04 mm in length and 0.03 mm in width) (Fig. 3B). Some four-radiates (up to 0.09 mm in length by 0.09 mm in width) with warty ends (Fig. 3C) and various immature sclerites (Fig. 3D) are commonly found in the samples. Anthocodial sclerites are light yellow to colourless. They are flat, wide rods (up to 0.09 mm in length and up to 0.03 mm in width) with lobed or scalloped margins (Fig. 3E).

Remarks. Although some similarity exists in the size and shape of sclerites of *P. ferruginea* and *P. smithsoniana* new species, the latter is more variegate in colour and has more barrel-like sclerites. A marked difference is also found in the anthocodial rods, which are longer in *P. smithsoniana* and are without wide lobed margins. When alive, the species are very different, notably the remarkable rusted aspect of the colonies of *P. ferruginea*.

Habitat. This species was abundant at Isla Ladrones growing on vertical walls from 14 to 15 m in depth, together with a species of *Leptogorgia*.

Etymology. An adjective (L), *ferrugineus* = rust-coloured, rusty.

Distribution. Only reported for the type localities.

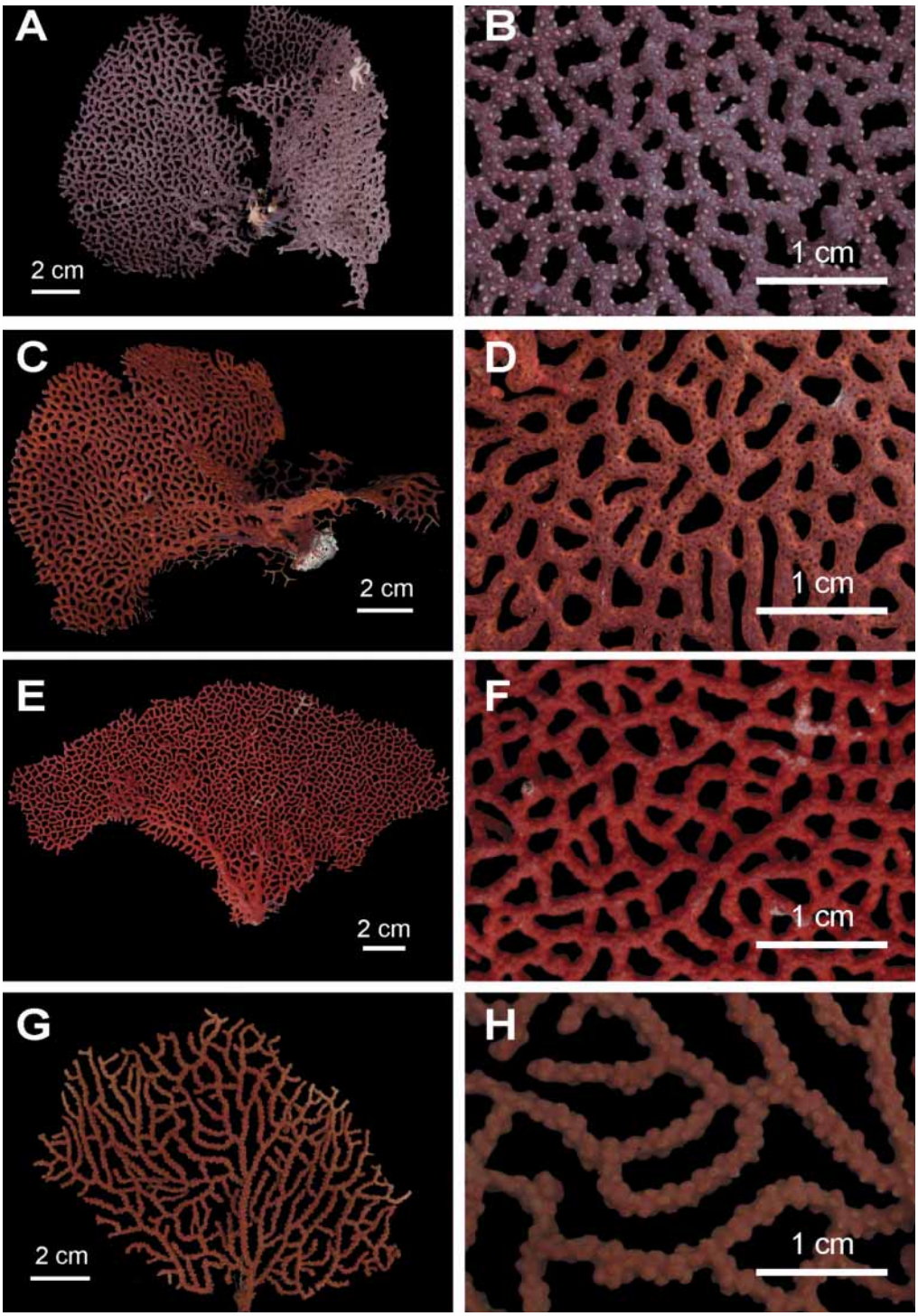

FIGURE 1. A–B, *Pacifigorgia catedralensis*, new species (UCR 1514) (preserved specimen); C–D, *Pacifigorgia ferruginea*, new species (STRI 423) (dry specimen); E–F, *Pacifigorgia smithsoniana*, new species (UCR 1406) (dry specimen); G–H, *Pacifigorgia sculpta*, new species (UCR 1497) (preserved specimen).

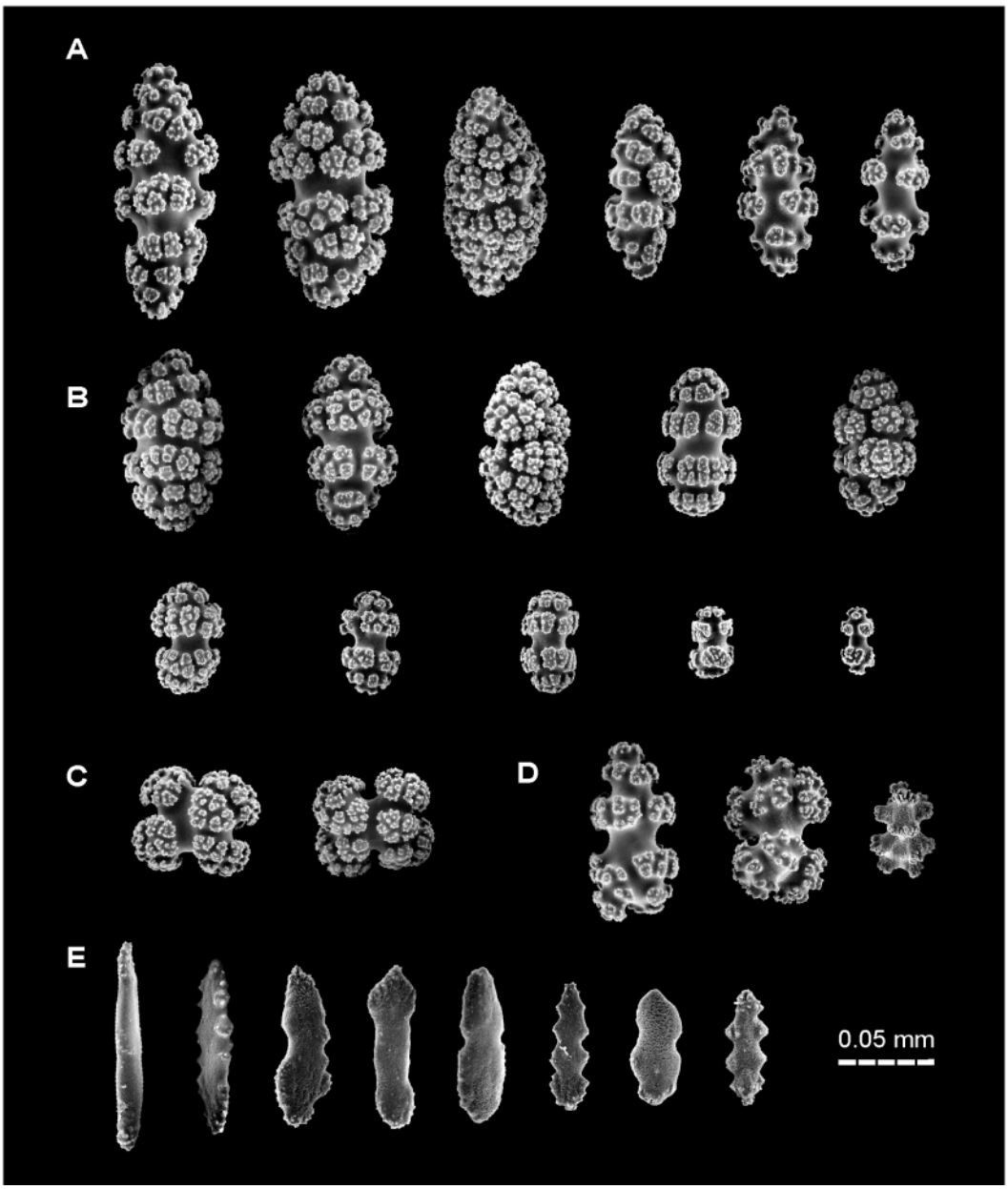

FIGURE 2. *Pacifigorgia catedralensis*, new species (UCR 1514); SEM–micrographs of the sclerites: A–D, from the coenenchyme; E, from the anthocodia .

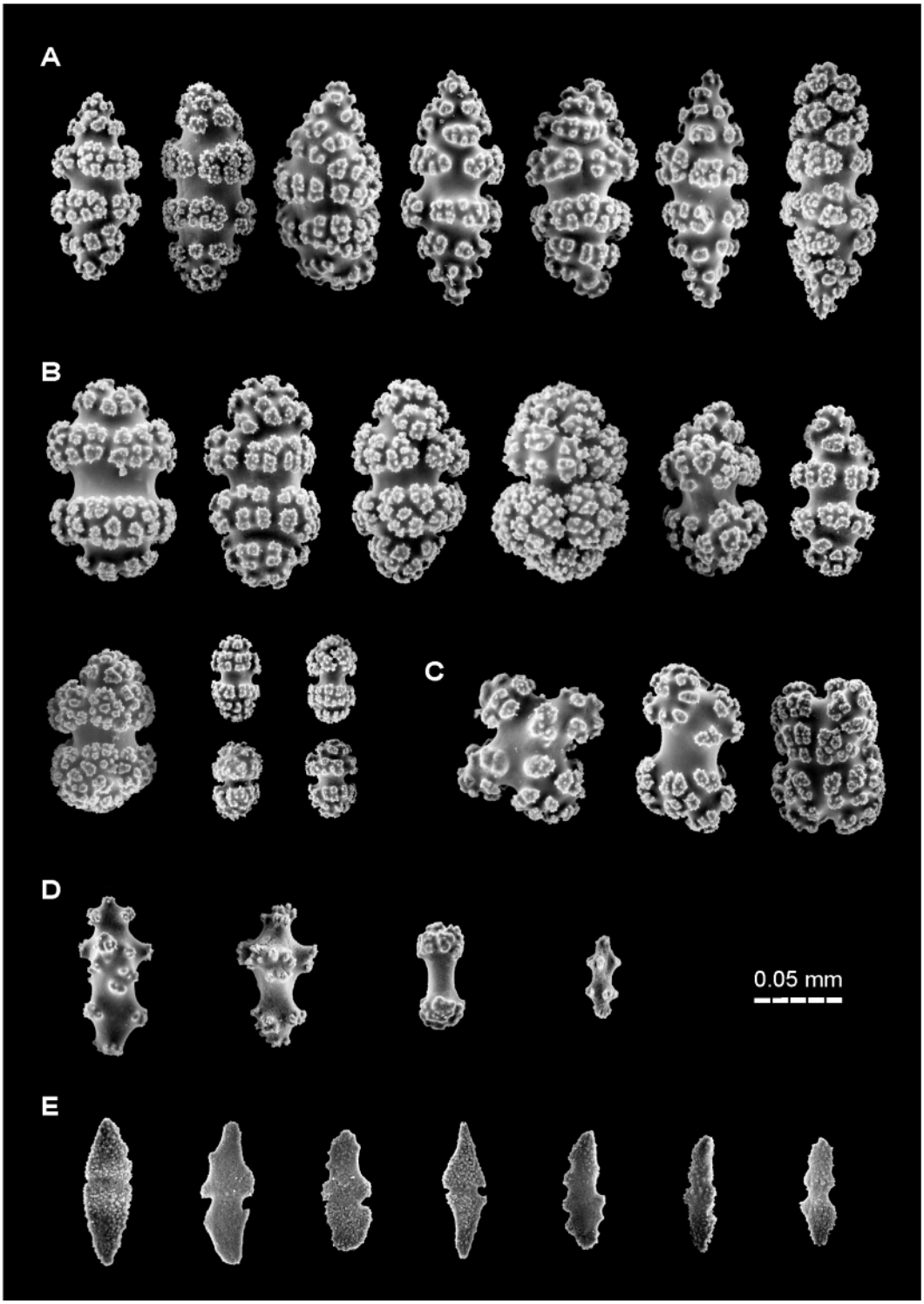

FIGURE 3. *Pacifigorgia ferruginea*, new species (STRI 423); SEM-micrographs of the sclerites: A–D, from the coenenchyme ; E, from the anthocodia.

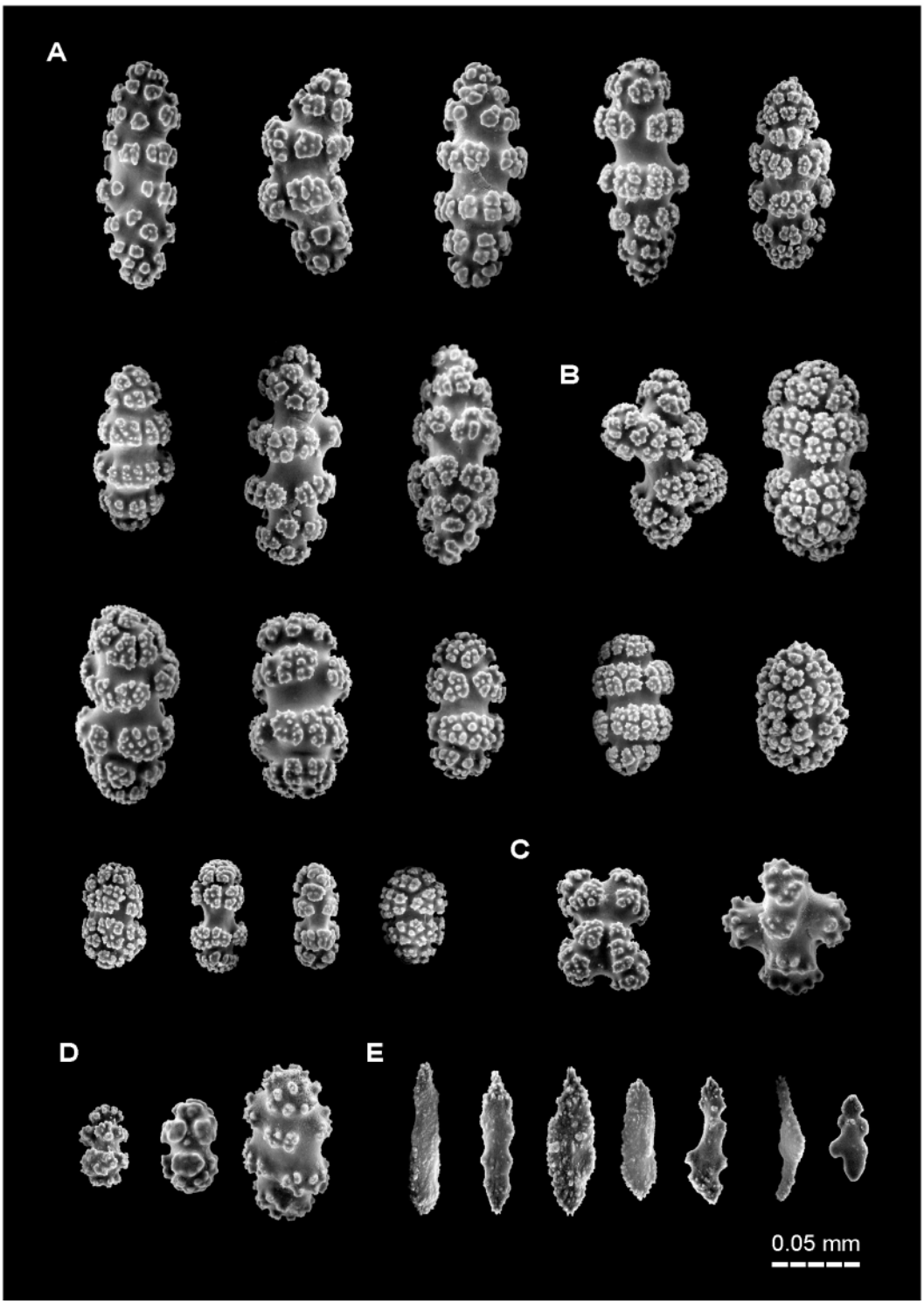

FIGURE 4. *Pacifigorgia smithsoniana*, new species (UCR 1406); SEM-micrographs of the sclerites: A–D, from the coenchyme ; E, from the anthocodia.

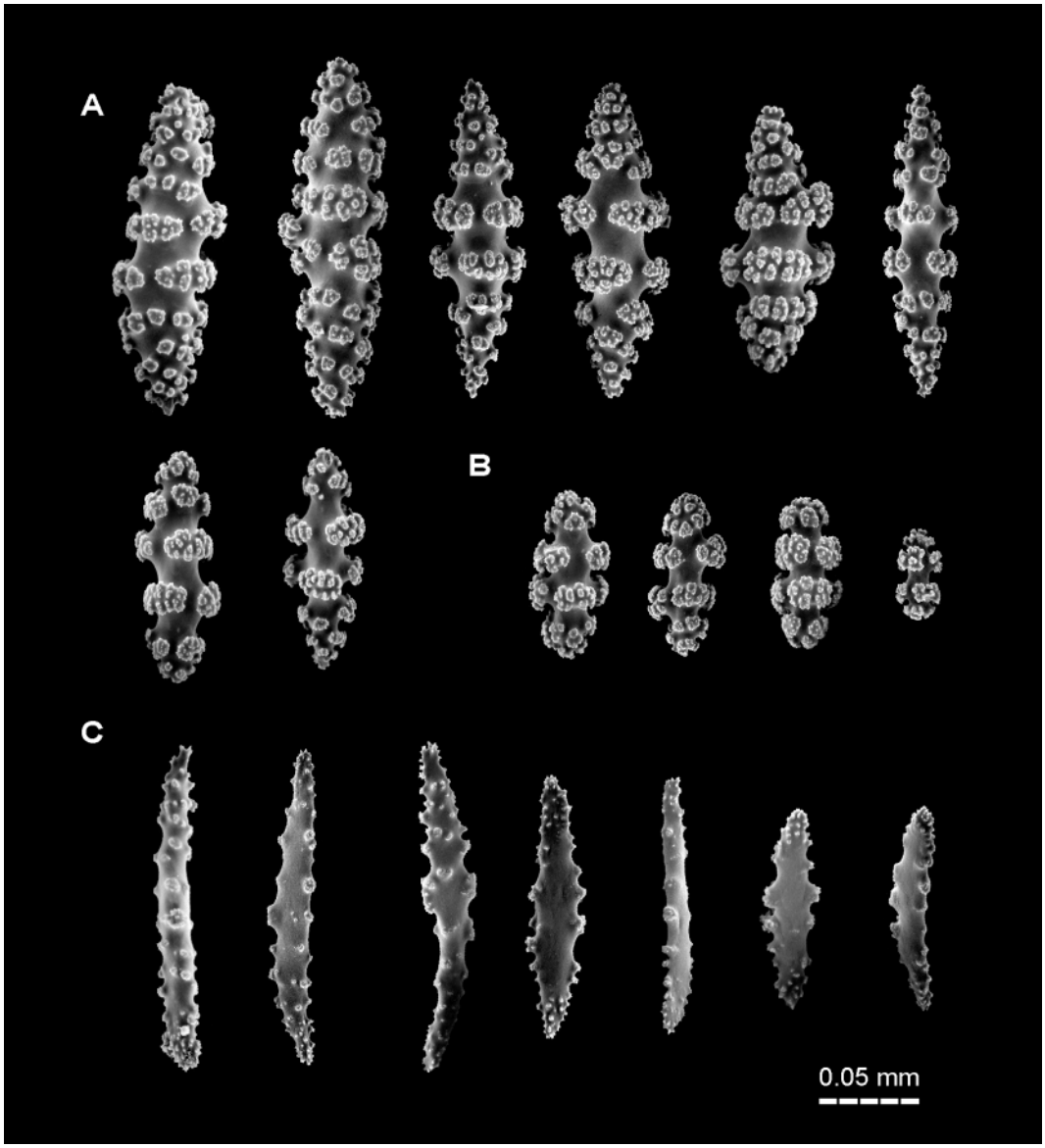

FIGURE 5. *Pacifigorgia sculpta*, new species (UCR 1497); SEM-micrographs of the sclerites: A–C, from the coenenchyme; C, from the anthocodia.

***Pacifigorgia smithsoniana,* new species**
(Figs. 1E–F, 4A–E)

Material examined. ***Holotype*:** UCR 1406, Islote Frijol South, Gulf of Chiriquí, 2–5 m, H.M. Guzman, 24 April 2002.

***Paratypes*:** MCZ 57052, Punta Jicarón Nor-West, Gulf of Chiriquí, 3–6 m, H.M. Guzman, 18 April 2002; STRI 486, Bajo Foul, Península de Azuero, 15 m, H.M. Guzman, 11 April 2003; STRI 565, Islas Viudas, Gulf of Chiriquí, 4–6 m, H.M. Guzman, 18 April 2002; STRI 672, 673, Isla Pacora, Gulf of Chiriquí, 2–10 m, H.M. Guzman, 7 May 2003; UCR 1216, Punta Jicarón Nor-West, 3–6 m, H.M. Guzman, 18 April 2002; UCR 1422, 1423, Isla Brincano, Punta South-West, 3–15 m, H.M. Guzman, 27 April 2002; UCR 1429, 1430, Bajo Urracá, 3–20 m, H.M. Guzman, 27 April 2002.

Description. Colonies wider than high, up to 150 in height, and 220 mm in width, composed of one or more fans. New fans arise from the others and grow parallel to them. Colour when wet preserved is reddish-orange and dark red when dry; when alive they range from red to dark red. Colonies of different coloured hues can be found on the same site, even on the same rock. Colonies have a strong holdfast, and the fans commonly arise directly from this, but some colonies have short stems up to 10 mm in length. Networks are regular and of closed meshes (Fig. 1F), mostly angular, up to 7 mm in length and 3 mm in width (about 8–9 meshes/cm²). Mesh branches are squarish in section, up to 2.0 mm in diameter. There are no distinct midribs, but some thick basal branches (up to 10 mm in width) can be traced for short distances into the fans. End-branchlets are more rounded than squarish in section, up to 5 mm in length, and have pointed tips. Free-twigs are short (up to 3 mm in length). The polyps are retracted within dome-shaped, coenenchymal mounds which are slightly raised, and closely crowded on the branches. They are mostly arranged in two to four alternating rows along the branches; more on thick branches. There is a very thin rim of orange sclerites around the polyp apertures. Polyps are white with rods arranged in weak points, some very small biscuit-like rods are found at the base of the tentacles. Coenenchymal sclerites are different combinations and abundances of pink, and hues of red, from reddish-orange to pale yellow, and also multicoloured; many of them show a yellowish halo. The surface of the branches contains dark yellow capstans sparsely distributed on a solid layer of orange and reddish-orange, larger capstans and spindles. In some specimens, however, almost all sclerites have the same colour, generally reddish-orange, but a shine from yellow sclerites on the branches can always be seen. The coenenchymal sclerites are mostly wide capstans and spindles, robustly tuberculate, becoming barrel-like. Anthocodial sclerites are light yellow rods.

Holotype. The holotype (Fig. 1E) is a dry, deep red colony, mostly a single fan, and 120 mm in height, and 200 mm in width. The holdfast was broken at the time of collection. No complete midribs are present, but a thick branch (up to 10 mm in width) at the base subdivides in two thinner ones, which extend up to 70 mm into the fan. At the base of the colony the black axis is visible. Some short branches spread at right angles to form three very small secondary fans at different levels of the colony. The coenenchymal sclerites are mostly wide capstans and spindles, strongly ornamented, mainly reddish-orange, but some are mixtures of these colours. The spindles (up to 0.14 mm in length and 0.05 mm in width) have a complex ornamentation, mostly arranged as four whorls of warty tubercles.

The ends are elongate, pointed or rounded, and abundant asymmetric forms occur with one blunt end and the other acute (Fig. 4A): a few spindles are arched. The capstans are mostly large (up to 0.10 mm in length and 0.05 mm in width), with strong, warty tubercles. The most characteristic capstans are light red with a clearly marked waist and two tyre–like whorls of tubercles (Fig. 4B), which are frequently found in sclerite samples. Less abundant smaller capstans, dark yellow (about 0.05 mm in length and 0.04 mm in width) with wide tubercles (Fig. 4B) are also present. Four-radiates (up to 0.06 by 0.06 mm) with warty ends (Fig. 4C), and various immature types of sclerites are present (Fig. 4D). Anthocodial sclerites are yellow, sometimes pale. They are long rods (up to 0.11 mm in length and up to 0.03 mm in width) mostly with smooth or wavy margins, and some with short lobe-like projections (Fig. 4E).

Habitat. This species occurs scattered in patches among other more abundant species, such as *P. rubinoffi*, *P. rubicunda*, and *P. firma*.

Etymology. In honour of the Smithsonian Tropical Research Institute located in the Republic of Panama; for decades of support to basic research in tropical marine coastal ecosystems.

Distribution. Only reported for the type localities.

Pacifigorgia sculpta, new species

(Figs. 1G–H, 5A–C)

Material examined. ***Holotype*:** UCR 1497, Islote Frailes, Península de Azuero, 10–30 m, H.M. Guzman, 9 December 2001.

***Paratypes*:** MCZ 57053, Islote Frailes, 10–30 m, H.M. Guzman, 9 December 2001; STRI 389–390, Isla Jicarita, Gulf of Chiriquí , 20 m, H.M. Guzman, 8 August 2002; STRI 410–412, Isla Seca Grande, Gulf of Chiriquí, 20 m, H.M. Guzman and O. Breedy, 26 August 2002; STRI 454, Isla Roncadores, Gulf of Chiriquí, 10–20 m, H.M. Guzman and O. Breedy, 30 August 2002; STRI 476, 482, 497, Bajo Foul, Península de Azuero, 15 m, H.M. Guzman, 11 April 2003; STRI 602, Islote Frailes, 20 m, H.M. Guzman, 1 May 2003; STRI 628, Roca Catedral, 5–15 m, H.M. Guzman, 3 May 2003; STRI 650, Bajo Brincanco, Gulf of Chiriquí, 10–30 m, H.M. Guzman, 5 May 2003; STRI 718, 721–722, 729–731, 734, Bajo Trollope, Gulf of Panama, 10–20 m, H.M. Guzman, 6 August 2003; UCR1037, 1042, Islote Frailes, 10–20 m, H.M. Guzman, 6 August 2003; UCR 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1505, Roca Niagara, Gulf of Panama, 10–20 m, H.M. Guzman, 13 December 2001; UCR 1361–1365, 1506, Piedra Hacha, 20–30 m, H.M. Guzman, 22 April 2002; UCR 1498, Isla Jicarita, Gulf of Chiriquí, 20–30 m, H.M. Guzman, 19 April 2002; UCR 1499, 1501, 1508, Islote Frailes, 10–30 m, H.M. Guzman, 12 December 2001.

Description. Colonies wider than high, up to 120 mm in height and 200 mm in width. Most of the colonies are composed of a single fan, but some have two or three secondary fans that radiate from different parts of the main fan and grow parallel. Colour when preserved or alive is dark orange or reddish brown with lighter hues at the tips, and light ochre when dry. Colonies have a large holdfasts, and fans grow directly from this or sprout from short stems (up to 7 mm in diameter). Network is irregular. Meshes are very open (about 2–3 meshes/cm²), mostly elongate, up to 45 mm in length, and 25 mm in width. Mesh branches are squarish in section, from 3 mm thick at their base to 1 mm at their tips. No midribs cross the fans, just some thick branches (up to 6 mm in diameter) at the base that diminish and merge with the fan. End-branchlets are long; up to 25 mm in length. Free-twigs are abundant, up to 15 mm in length; they stick out from the fans, twist and grow parallel as free branches. The polyps are retracted within dome-shaped coenenchymal mounds, which are prominent and arranged mostly in pairs along the sides of the branches. In dry specimens, the lateral distribution of the calices is more evident, and bands of coenenchyme are clear between them. The polyps are yellowish with rods arranged in strong, thick points, with some untidily arranged intermediate rods. The anthocodial rods are long, colourless or pale yellow (up to 0.18 mm in length and 0.02 mm in width). The coenenchymal sclerites are very ornamented, and are mostly large spindles (up to 0.22 mm in length, and 0.06 mm in width) with up to 8 complete whorls of tubercles, and warty ends. They are red-orange to pale yellow and bicoloured, and together with *P. senta*, include the longest spindles found in the genus. Capstans are less abundant in the slide samples; they are scarcely ornate, with only short tubercles.

Holotype. The holotype (Fig. 1G) is a single fan, 100 mm in height and 135 mm in width. Part of the holdfast was left behind when the specimen was collected. The preserved colony is reddish brown colony. Mesh branches are thick, about 2 mm in diameter. Numerous free twigs radiate from the fan as free branchlets. End-branchlets reach 12 mm. Coenenchymal sclerites are red-orange, pale yellow and bicoloured. They are mostly large spindles (up to 0.18 mm in length, and 0.06 mm in width) with 4–8 complete whorls of delicately sculpted tubercles, and with elongated warty ends, blunt, or acute (Fig. 5A). There are also small, pale yellow capstans (up to 0.05 mm in length and 0.03 mm in width), and larger ones (up to 0.08 mm in length by 0.04 mm in width) with short, moderately warty tubercles (Fig. 5B). Anthocodial sclerites are pale yellow. They are thin, long rods (up to 0.17 mm in length and 0.02 mm in width) with dentate margins and have acute, small warts, concentrated at the ends (Fig. 5C).

Remarks. This species is very similar to *P. senta*, however, *P. senta* attains a larger size, the mesh branches are thinner, the meshwork finer (up to 23 mm long), and the colony has a more delicate appearance in comparison to the more robust *P. sculpta*. Dry specimens of *P. senta* are brittle and the sclerites fall off easily, which is not the case in dry specimens of *P. sculpta*. Sclerites in both species are the largest recorded for the genus. Spindles in *P. senta* and in *P. sculpta* reach the same size (up to 0.22 mm in length, and

0.06 mm in width), however, in *P. senta*, the spindles have more whorls of tubercles (up to 10) than in *P. sculpta* (up to 8); thus sclerites of the latter have larger spaces between the whorls (and very warty tubercles). Capstans of both species are of similar shapes, but smaller sizes are reported for *P. senta* (up to 0.06 mm in length) (Breedy & Guzman 2003b). The colour of coenenchymal sclerites is definitely different. In all of the specimens of *P. sculpta* examined, two layers of differently coloured sclerites are clearly defined: reddish-orange sclerites in the inner coenenchyme and pale yellow on the surface. In *P. senta*, on the other hand, all sclerites are of the same colour; brownish pink to colourless. Anthocodial rods are also different, being shorter (up to 0.14 mm in length) and less spiny in *P. senta*. We have found *P. sculpta* at several localities in the Gulf of Chiriquí, and also from two sites in the Gulf of Panama, down to 30 m in depth.

Breedy & Guzman (2003b) pointed out that Stiasny (1943) dealt with a species from Isla del Rey, Gulf of Panama, sent to him by Hickson, which agrees with *P. senta*. Therefore, it was expected that *P. senta* would be found to occur in Panama. *Pacifigorgia senta* has been collected from deeper waters, down to 40 m in Costa Rica. In recent collections made by dredging 35–60 m in depth, in Panamá, specimens of *P. senta* were indeed found, thus the occurrence of *P. senta* is herein reported and confirmed. Curiously, both *P. senta* and *P. sculpta*, were collected together in the same dredge, what indicates that they may occur together.

Habitat. Found from 10–40 m in depth, on vertical basaltic walls, living together with large *P. eximia* colonies and many other octocorals. Though abundant in some places, this species is never the dominant species.

Etymology. An adjective (L), *sculptus* = carved, in allusion to the ornamentation of the spindles.

Distribution. Found widely distributed along Gulf of Panama, Gulf of Chiriquí, and Península de Azuero.

Acknowledgements

We are grateful to Phil Alderslade (Museum and Art Gallery of the Northern Territory, Darwin) and Leen Van Ofwegen (RMNH) for a critical review of the manuscript. This project was partially sponsored by the Fundación AVINA, the Smithsonian MSN Research Opportunity Program, and the Smithsonian Tropical Research Institute. Specimens were collected during several expeditions to the gulfs of Chiriquí and Panama onboard of the R/V Urracá, and we thank the Captain and crew for unconditional assistant and support. We thank Carlos Guevara and Alexis Lam for field support. We thank Ardis Johnston (MCZ) for receiving our paratypes, and her constant encouragement. We are grateful to Sheila Halsey and Andrew Cabrinovic (BM), Leen Van Ofwegen (RMNH), Eric Lazo-Wasem (YPM), and Stephen Cairns (USNM) for the loan of specimens and their hospitality during our work at these museums. Our appreciation to Marie José d'Hondt (MNHN) for the loan

of specimens; to Enrique Freer for providing the electronic microscopy facilities at the Centro de Investigación en Estructuras Microscópicas, (UCR); to Percy Denyer (UCR) for preparing the figures; and to Jorge Brenes (UCR) for advice with the Latin language.

References

Bayer, F.M. (1951) A revision of the nomenclature of the Gorgoniidae (Coelenterata: Octocorallia) with an illustrated key to the genera. *Journal of the Washington Academy of Sciences*, 41, 91–102.

Bayer, F.M. (1961) *The shallow water Octocorallia of the West Indian Region. A manual for marine biologists*. Martinus Nijhoff, The Hague, 400 pp.

Breedy, O. (2001) A new species of *Pacifigorgia* from the eastern Pacific (Coelenterata: Octocorallia: Gorgoniidae). *Bulletin of the Biological Society of Washington*, 10, 181–187.

Breedy, O. & Guzman, H.M. (2002) A Revision of the genus *Pacifigorgia* (Coelenterata: Octocorallia: Gorgoniidae). *Proceedings of the Biological Society of Washington*, 115, 787, 844.

Breedy, O. & Guzman, H.M. (2003a) A new species of *Pacifigorgia* (Coelenterata: Octocorallia: Gorgoniidae) from Panama. *Zootaxa*, 128, 1–10.

Breedy, O. & Guzman, H.M. (2003b) Octocorals from Costa Rica. The genus *Pacifigorgia* (Coelenterata: Octocorallia: Gorgoniidae). *Zootaxa*, 281, 1–60.

Hickson, S. J. (1928) The Gorgonacea of Panama Bay together with a description of one species from the Galapagos Islands and one of Trinidad. *Videnskavelige Meddelelser fra den naturhistoriske Forening i Kovenhavn for Aarene*, 85, 325–422.

Lamouroux, J.V.F. (1812) Extrait d'un mémoire sur la classification des Polypiers coralligènes non entièrement pierreux. *Nouveau Bulletin des Sciences, par la Société Philomatique, Paris*, 3(63), 181–188.

Stiasny, G. (1943) Gorgonaria von Panama. Aus der Sammlung Dr. Th. Mortensen, Zoologisk Museum, Kopenhagen. *Videnskavelige Meddelelser fra den naturhistoriske Forening i Kovenhavn for Aarene*, 107, 59–103.

Valenciennes, A. (1846) *Zoophytes*. *In:* Abel Dupetit-Thouars, Voyage autour du monde sur la frégate la Vénus, pendant les années 1836–1839. Atlas de Zoologie, pls. 1–15.

Verrill, A.E. (1868) Notes on Radiata in the Museum of Yale College, Number 6: Review of the corals and polyps of the West Coast of America. *Transactions of the Connecticut Academy of Arts and Sciences*, (Second Edition), 1, 377–422.

