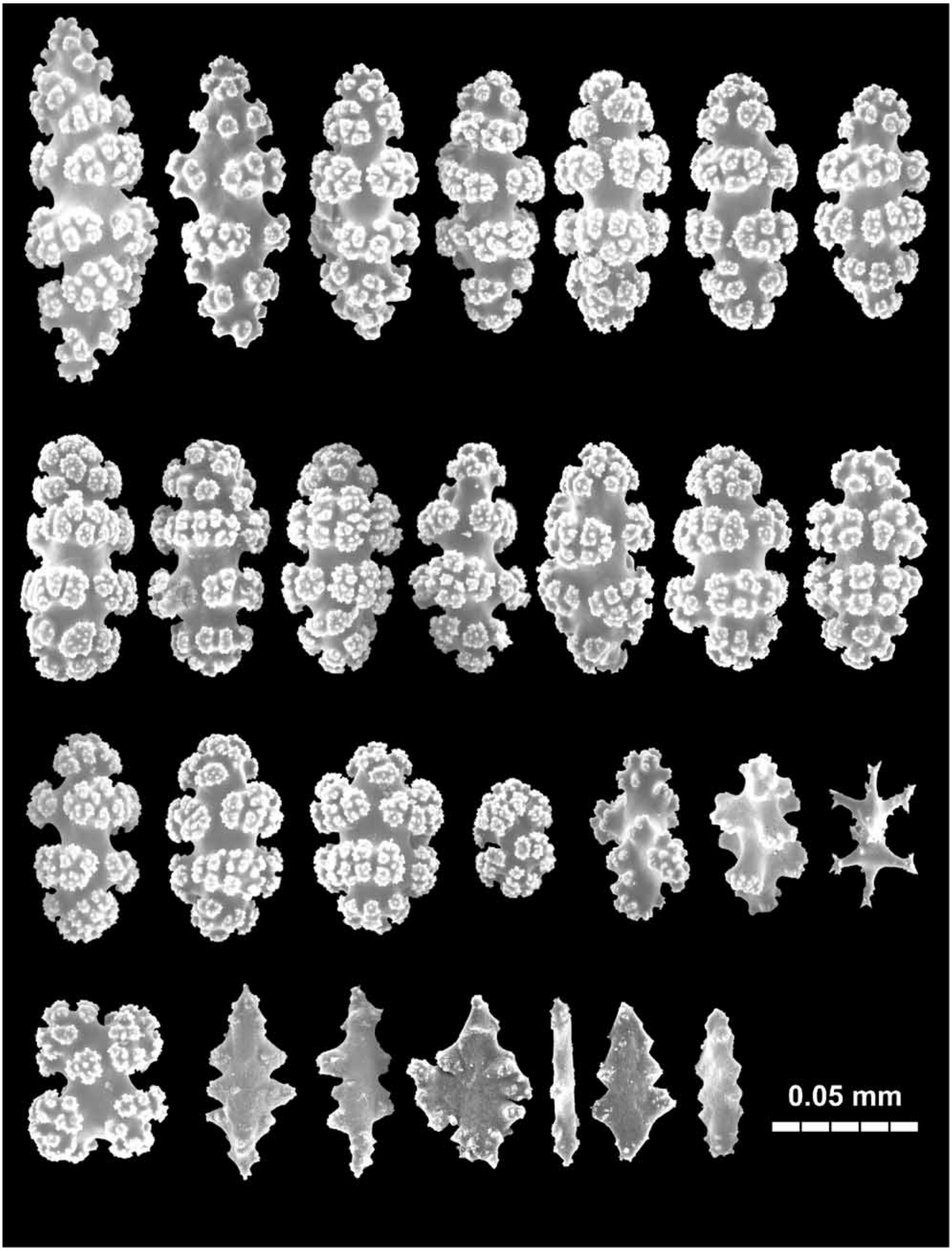

FIGURE 48. *Leptogorgia parva* (ZSM 20043890) SEM of sclerites.

Description of syntypes. The syntypes are two colonies, one is 5 cm in length, and 10 cm in width, and the other is 6 cm in length, and 6 cm in width, the latter matches the figured specimen (Bielschowsky 1929)

(Fig. 47A, C). Colonies have very short stems, 3–4 mm in diameter, subdividing almost directly from the holdfasts into 2–3 main branches, which are slightly flattened and about 2 mm in diameter. Ramification is irregularly pinnate. Free branchlets are up to 30 mm in length, about 1 mm in diameter, with acute, pointed ends. Colour is purplish red (Fig. 47A–C). Polyps are whitish, arranged in 2 lateral rows along the branches that are separated by very marked longitudinal grooves, which produce quill-like folds of coenenchyme in some branches (Fig. 47B). Polyps are more scattered and irregularly distributed on the thicker branches, more closely placed at the end branches. Polyp-mounds are prominent, dome-shaped with labiate apertures, around 0.5 mm long (Fig. 47B). Coenenchymal sclerites are red, and pink, some with an orange hue, and a few are pale yellow (Fig. 47D). They are mostly capstans, reaching up to 0.08 mm in length and 0.045 mm in width (Figs. 47D, 48). Spindles are up to 0.12 mm in length and 0.04 mm in width, with 3–4 whorls of tubercles. Crosses measuring about 0.058 mm by 0.058 mm, with round tuberculate ends are also present (Figs. 47D, 48). Anthocodial rods are orange, closely set in points below the polyp tentacles. They reach up to 0.08 mm in length and 0.03 mm in width, (although some are wider and up to 0.05 mm) with lobed margins and small tubercles on the surface (Figs. 47D, 48).

Distribution. Only reported for Panama: type locality. We have not found this species during our recent collections from the shallow waters of Panama (Table 2, Fig. 35).

Remarks. This species is similar to *L. taboguilla* in the branching pattern, the prominent polyp-mounds, and the colour of the colony and sclerites, but the wide band of anthocodial rods in the points of *L. taboguilla* is more conspicuous and composed by longer rods than in *L. parva*. Similarities between this species, *L. aequatorialis* and *L. obscura* were discussed under *L. aequatorialis* (Table 1).

***Leptogorgia peruviana* (Verrill, 1868)**
(Fig. 49–51)

? *Plexaura reticulata* Ehrenberg, 1834: 141; Philippi 1866: 119.
Gorgonia (*Litigorgia*) *peruviana* Verrill, 1868: 414 [Nomen nov.].
Litigorgia peruana Verrill, 1868a: 405 (1st. ed.) [Unjustified emendation]
Leptogorgia peruana Verrill, 1868b: 405; 1869b: 421; Nutting 1910: 5; Kükenthal 1924: 336; Bielschowsky 1929: 135.
Lophogorgia peruana Harden 1979: 80.

Material examined. Syntype series. YPM 1654a–d, ZMUC ANT-185, dry, no depth given, Callao, Peru, F. M. Bradley, 1866–1867.

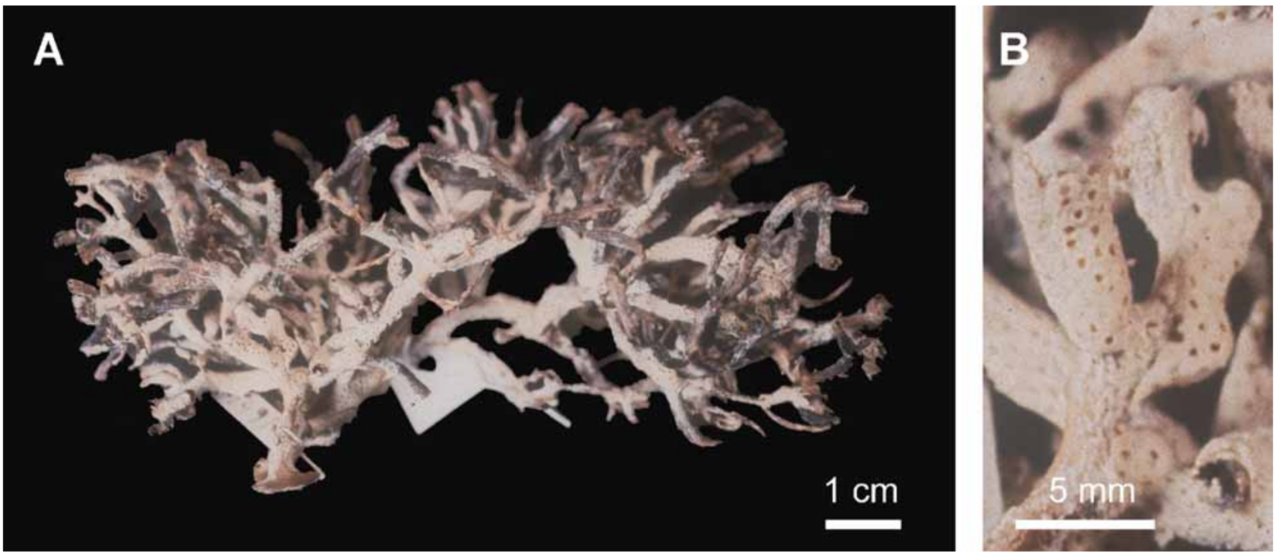

FIGURE 49. *Leptogorgia peruviana*, **A,** YPM 1654b; **B**, detail of branches (YPM 1654b).

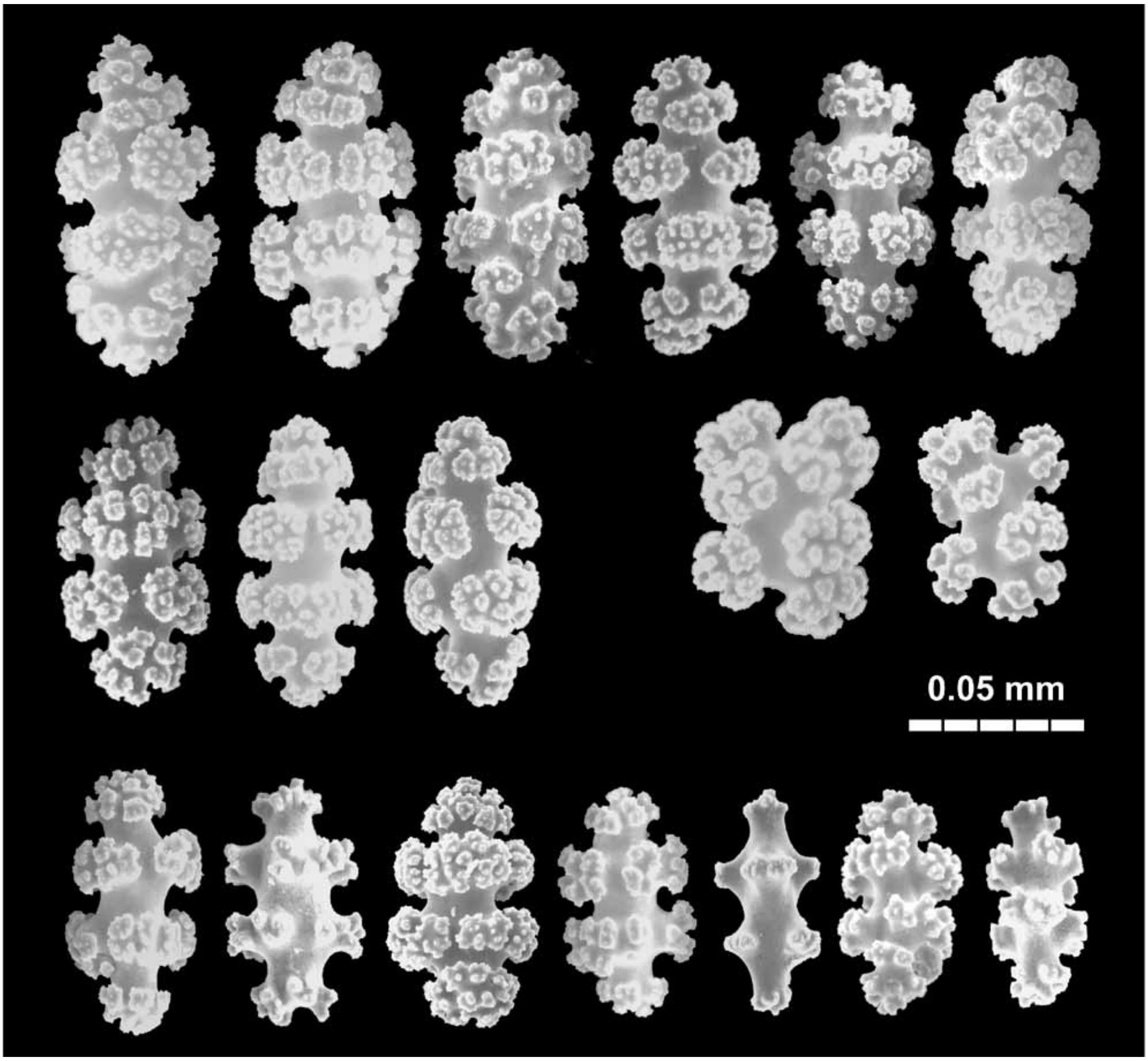

FIGURE 50. *Leptogorgia peruviana* **(**YPM 1654b), SEM of coenenchymal sclerites.

Description of syntypes. Colonies examined range from 6 cm to 8 cm in length, and from 50 mm to 135 mm in width (Fig. 49A). Colonies are low and bushy; they arise from short stems, 2–4 mm in length and up to 4 mm in width and they have encrusting holdfasts. Stems give off several main branches, 3–5 mm in diameter, which immediately subdivide irregularly into numerous, unevenly pinnate branches. Branches and branchlets are all thick and round in cross section, 2–3 mm in diameter throughout. The tips of the branches seem to be crooked, but it is difficult to observe since all of the syntype series is infected with polychaete tubes (Fig. 49A, B). Colour is whitish. All specimens are dry; the coenenchyme is brittle easily falls off leaving nude, flat, dark axes. Polyp-mounds are small, flat and numerous, closely arranged all around the branches (Fig. 49B). Coenenchymal sclerites are all white and mostly capstans reaching up to 0.07 mm in length, and 0.04 mm in width (Fig. 50). Spindles are up to 0.10 mm in length and 0.05 mm in width, and some have a slightly bent tip. Some cross-like sclerites up to 0.07 mm in length, and 0.07 mm in width occur in the samples (Fig. 50, right at second row). No anthocodial sclerites were found in the examined specimens. The figured specimen measures 60 mm in length, and 135 mm in width.

Distribution. It is only reported from the type locality, Callao, Peru (Table 2, Fig. 51).

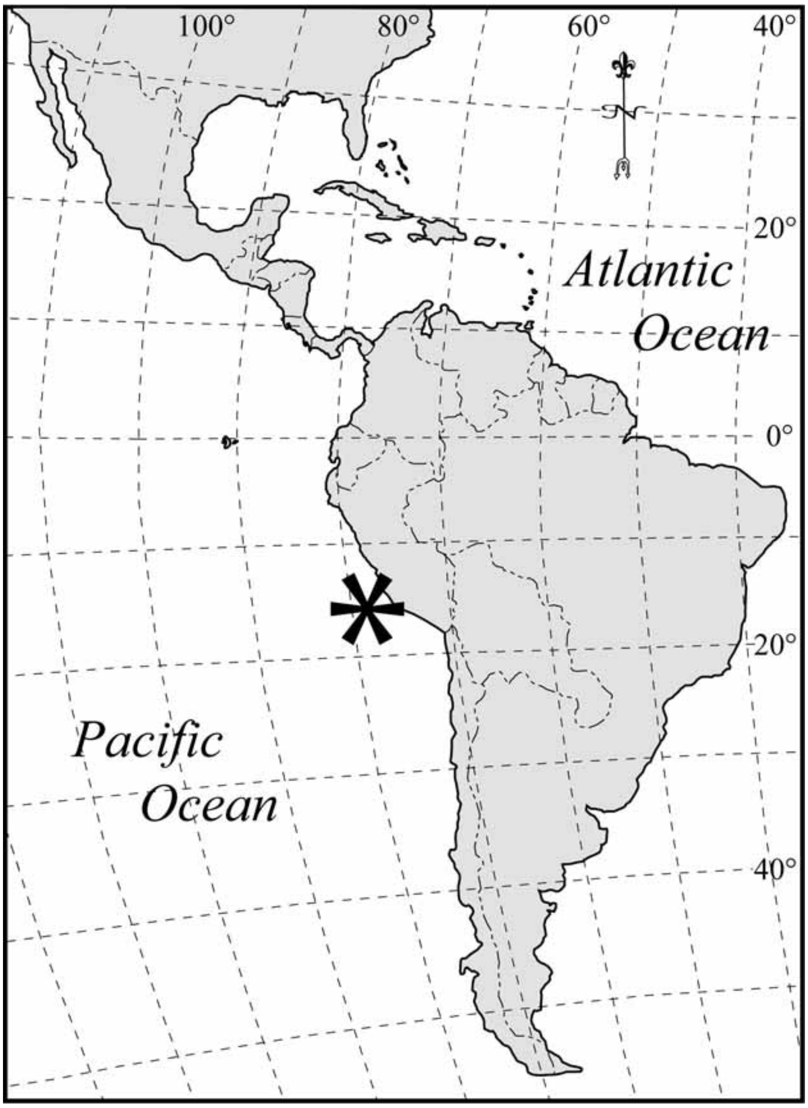

FIGURE 51. Geographical distribution of *Leptogorgia peruviana*.

Remarks. Philippi (1866) received a specimen from Callao that according to him matched Ehrenberg's (1834) description of *Plexaura reticulata* (from an unknown locality). Besides mentioning that the specimen was white, Philippi did not offer any description of this species. Neither Philippi's nor Ehrenberg's specimens were available for examination. In those days the genus *Plexaura* Lamouroux, 1812 contained seven species which Verrill (1912) sorted and at the same time restricted the genus *Plexaura* to West Indian species, designating *Plexaura homomalla* (Esper, 1872) as the type species (Bayer 1961). However, in 1868, this delimitation was not clear, and Verrill assumed that the specimens collected from Callao were *Plexaura reticulata*. As he decided to transfer the species to *Gorgonia*, where the species name *reticulata* was already in use, he gave a new name, *Gorgonia* (*Litigorgia*) *peruviana*, to this species (Verrill 1868a). Later Verrill (1868b) placed the species in the genus *Leptogorgia*, and unjustifiably considered it necessary to once more, give it a new name, *Leptogorgia peruana*. This species is well represented by a syntype series YPM 1654 from Callao, Peru, and the specimen ZMUC-ANT 185 also belongs to the YPM 1654 series. No other specimen that fits this species has been found in any other museum collection or collected in recent expeditions.

All the syntypes were infested with polychaetes in the upper branches. The natural form of this species is only observed in the lower part of the colonies and close to the base, the rest of the branches are formed by the remains of the polychaete's tubes. Verrill (1868b) remarks that the branchlets of this species are hollow "due perhaps to some parasite". Since no other uninfected specimen exists, this feature seems to be a character to recognize this species for the time being.

The species is similar to *L. cofrini* in the size of the colony and the bushy type of branching, but differs in that *L. peruviana* has wider, flattened branches, with flat polyp-mounds that are smaller and more numerous all around the branches than in *L. cofrini*. Sclerites are very different in these two species (Table 1).

Leptogorgia pumila (Verrill, 1868)

(Figs. 52–55)

Gorgonia (*Litigorgia*) *pumila* Verrill, 1868: 415.
Litigorgia pumila Verrill, 1868a: 396–397 (1st. ed.).
Leptogorgia pumila Verrill, 1868b: 396–397; 1869b: 421; Nutting 1910: 5;
Not *Leptogorgia pumila* Bielschowsky 1918: 29; 1929: 97–98; Kükenthal 1919: 771; 1924: 326–327 (= *Pacifigorgia sculpta* Breedy & Guzman, 2004).

Material examined. Lectotype: ZMUC ANT-186, dry, Zorritos, Peru, no depth given, F. H. Bradley, 1866, donor Verrill (YPM 1573).

Other material examined: CALIFORNIA: CASIZ 96905, dry, Santa Maria, Baja California south, no depth given, RV Zaca, 1932; CASIZ 97968, preserved, Cape San Lucas, Baja California, 1965, no further data. COSTA RICA: UCR 1535, preserved, Playa Platanares, Puerto Jiménez, 16 m, O. Breedy & J. Cortés, 12 March 2004; UCR 1557, preserved, Isla Chora, 15 m, O. Breedy, 1st April 1998; UCR 1558, preserved, Bajo Sámara, 16 m, O. Breedy, 29 March 1998; UCR 1587, preserved, Punta Aguja, Golfo de Nicoya, 13 m, O. Breedy, 22 November 2002; UCR 1588, preserved,·Marino Ballena National Park, 24 m, O. Breedy & J. Cortés, 27 March 2003; UCR 1589 (2 specimens), preserved, Marino Ballena National Park, 19 m, O. Breedy, 25 April 2002. PANAMA: STRI 456, dry, Isla Roncadores, Golfo de Chiriqui, 10–20 m, H. Guzman & O. Breedy, 30 August 2002; STRI 467, dry, Bajo Foul, Peninsula de Azuero, 5–20 m, H. Guzman, 11 April 2003; STRI 538, dry, Bajo Bolaño, Golfo de Chiriqui, 25 m, H. Guzman, 16 April, 2003; STRI 567, dry, Islas Viudas, Golfo de Chiriqui, 10–20 m, H. Guzman, 18 April, 2003; STRI 748–749, Roca Trollope, Golfo de Panama, 10–20 m, H. Guzman, 6 August 2003; STRI-C15, STRI-C23, dry, Isla Coiba, Golfo de Chiriqui, 4–7 m, H. Guzman, 3 August 2002; UCR 1227–1234, 1271, 1272, dry, Isla Jicarita, Golfo de Chiriqui, 10–30, H. Guzman, 19 April 2002; UCR 1320, 1321, dry, Islote Punta Soledad, 10 m, H. Guzman, 20 April 2002; UCR 1424, dry, Punta Brincanco SW, Golfo de Chiriqui, 3–15 m, H. Guzman, 27 April 2002; ZSM 20044791, preserved, no depth given, A. Agassiz, Hassler Expedition, 1871–1872 (not *L. pumila* Verrill). PERU: MCZ 4004, dry, Paracas Bay, Paracas Peninsula, no depth given, A. Agassiz, Hassler Expedition, 1871–1872 (not *L. pumila* Verrill). UNKNOWN LOCALITY: MNHN, dry, (not *L. pumila* Verrill), only data on label; MNHN, dry, (no *L. pumila* Verrill), only data on label.

Lectotype description. The lectotype is a small fragment 6.5 cm in height, and 2.5 cm in width (Fig. 52B). Ramification is irregularly pinnate. Branches are from cylindrical (thicker branches) to slightly flattened and from 3.0 mm to 2.0 mm in diameter. Unbranched terminal twigs reach up to 28 mm in length, and are lobed at the tips. Polyps are sparsely distributed in almost two rows at each side along the branches. Polyp-mounds are raised, dome-shaped, up to 1.0 mm wide at the base, with slit-like apertures (Fig. 52B). Coenenchymal sclerites are pink and light yellow (Fig. 52C). The largest are spindles up to 0.15 mm in length and 0.05 mm in width, with 4–7 whorls of tubercles, some have a slightly bent axis (Figs. 52C, 53). Capstans reach up to 0.10 mm in length and 0.06 mm in width (Figs. 52C, 53, 54). Furthermore, tuberculate cross-like sclerites about 0.08 mm in length and 0.06 mm in width, and rectangular, oblong shapes up to 0.10 mm in length and 0.05 mm in width, are present, some of these are just spindles that are twinned (Fig. 54). Anthocodial sclerites are long flat rods, longer than any spindle, reaching up to 0.15 mm in length and 0.03 mm in width, with smooth or serrated margins, and occasionally lobed (Figs. 52C, 54). These are very characteristic of this species.

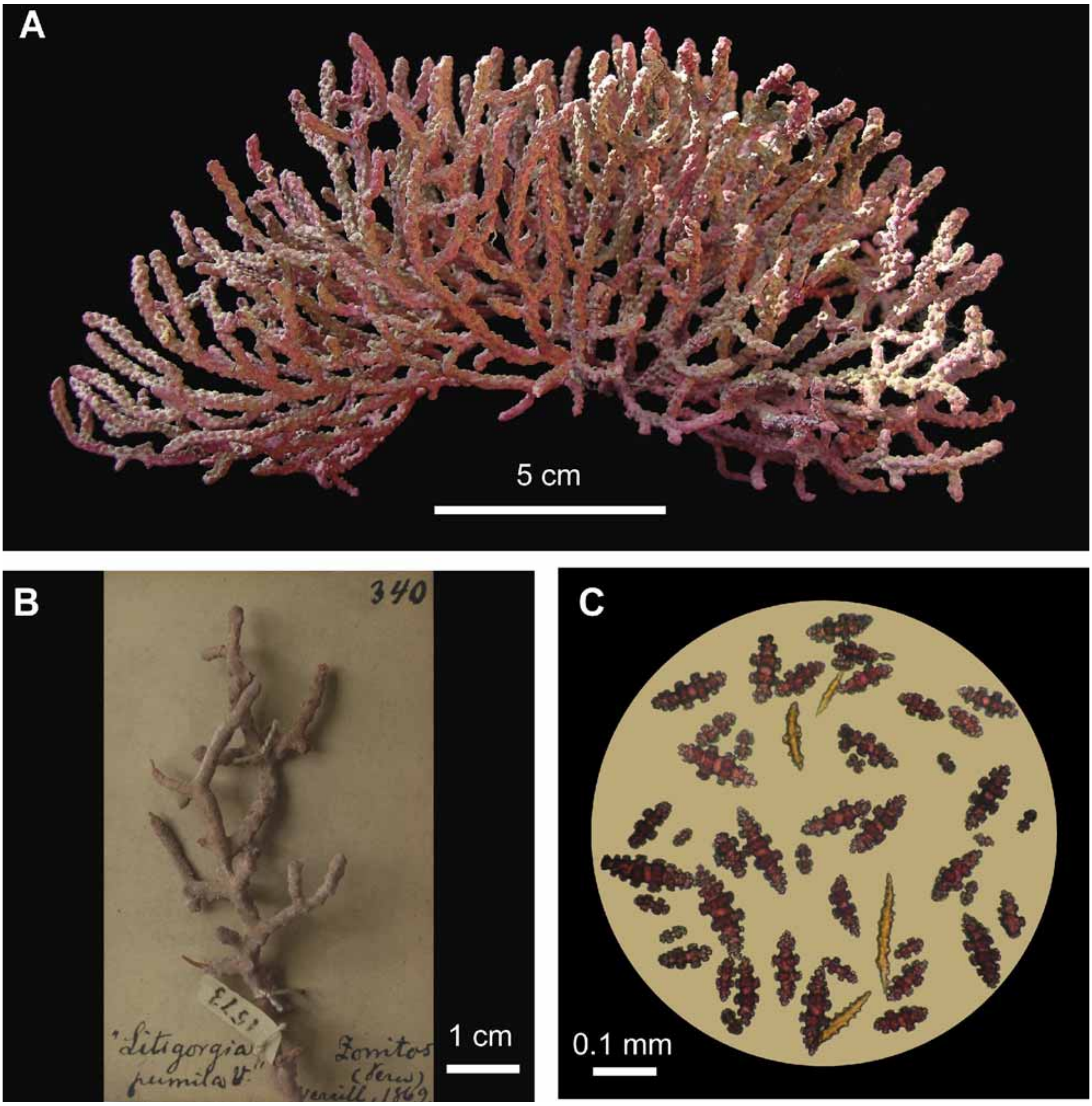

FIGURE 52. *Leptogorgia pumila*, **A,** UCR 1233; **B**, ZMUC ANT 186, lectotype; **C**, light micrograph of sclerites (ZMUC ANT 186).

Other material. The examined specimens reach up to 10 cm in height, and 15 cm in width. Colonies are bushy, densely branched in various planes arising from encrusting holdfasts. Short stems, up to 5.0 mm in diameter, and up to 10.0 mm in length, subdivide in several main branches, 2.0–3.0 m in diameter, in an irregular pinnate style (Fig. 52A). Branches and pinnae arise almost perpendicular to the main branches, and then curve upwards or downwards out of the plane of the colony. Branches are flattened in cross section. Unbranched terminal twigs reach up to 3 cm in length. Polyps are sparsely distributed in two rows along each side along the branches they are absent on the holdfast, and more disperse on thick branches. Polyp-mounds are raised, dome-shaped with slit-like apertures (Fig. 52A). Polyps are whitish, but they look orange due to the broad band of orange anthocodial rods arranged in crown and points below the tentacles, and even in dry colonies, orange spots can be observed on the top of the polyp-mounds. Colonies are light purple, fading to a dull pink when dry (Fig. 52A). Coenenchymal and anthocodial sclerites are as in the lectotype. The combination of large pink sclerites, small pale yellow capstans, and long, amber, anthocodial rods is very characteristic in the samples of this species.

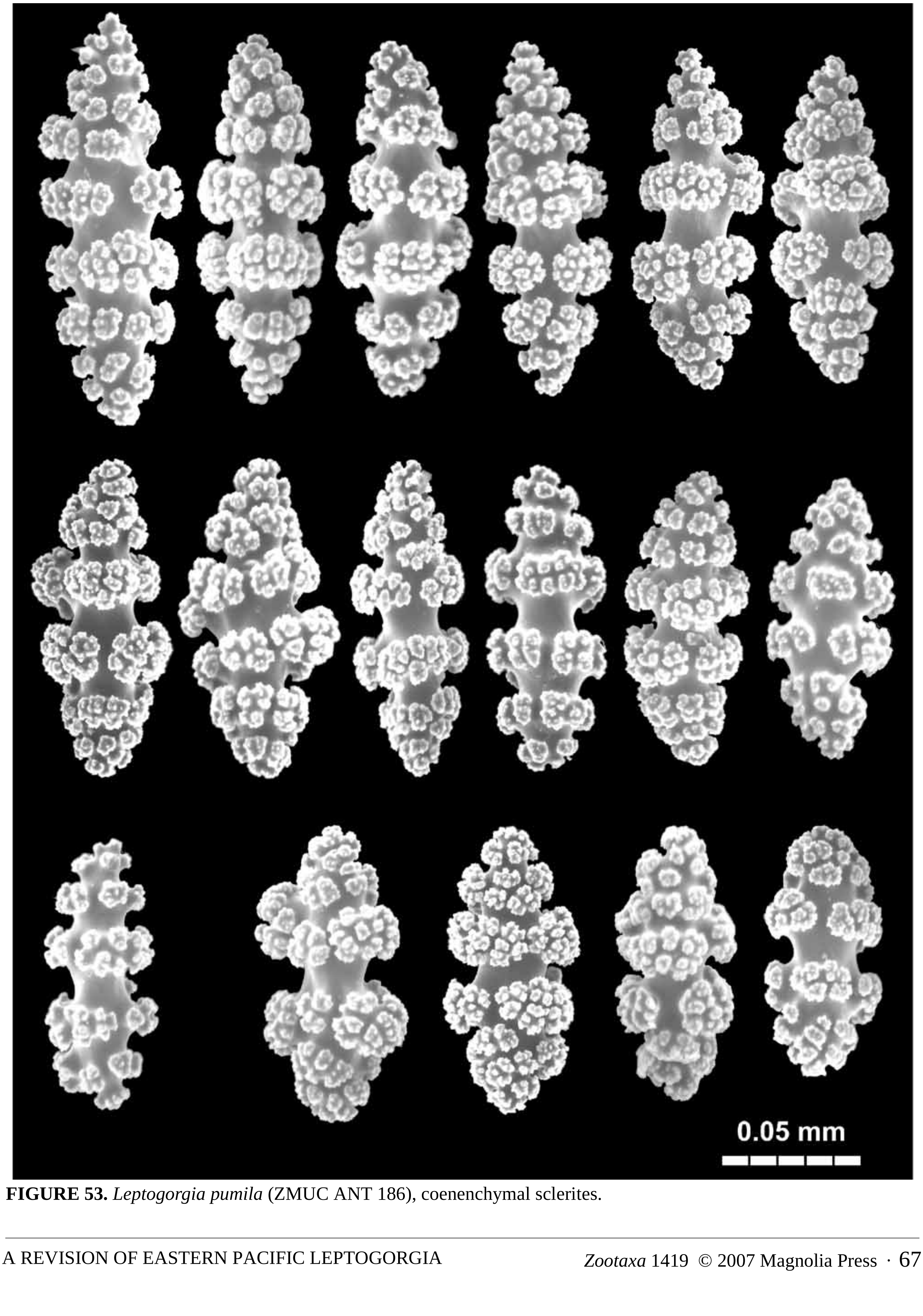

FIGURE 53. *Leptogorgia pumila* (ZMUC ANT 186), coenenchymal sclerites.

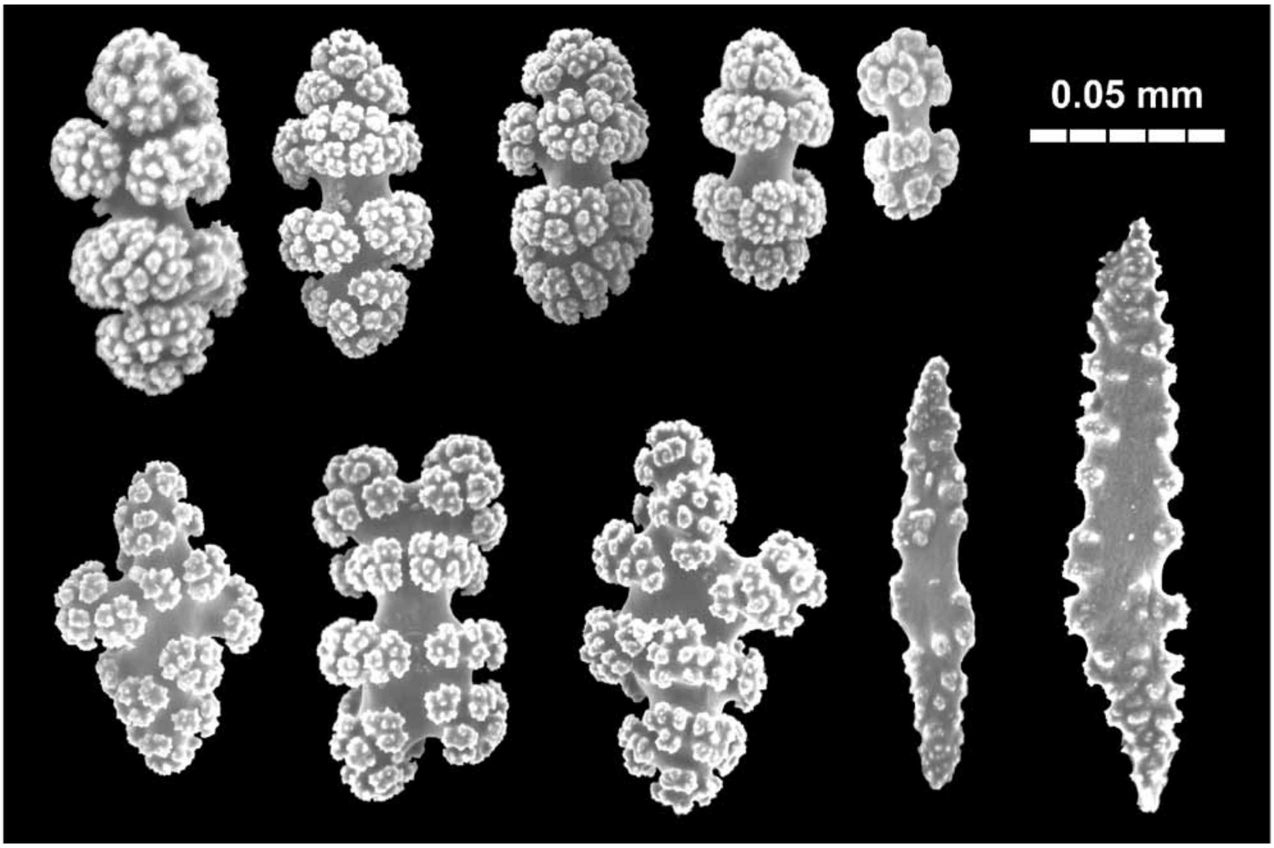

FIGURE 54. *Leptogorgia pumila* (ZMUC ANT 186), coenenchymal sclerites, and anthocodial rods.

Distribution. Zorritos, Peru: type locality. Panama, Costa Rica, and Baja California (Table 2, Fig. 55).

Remarks. Verrill (1868b) described this species with specimens from Zorritos, Peru, he mentioned that the largest specimen was 13 cm in height, and about the same in width. It can therefore be assumed that he had more than one specimen, however, no type material was found neither in the YPM, nor in the MCZ. Only a small fragment of a colony attached to a piece of cardboard (Verrill left a large collection of this type of "cardboard slides") was found in the ZMUC labeled as a "cotype" (ZMUC 186) with an original YPM label (YPM 1573) in Verrill's handwriting attached to the slide, distinguishing it as a type. However, in the YPM collection, another label without a corresponding specimen says "*Lophogorgia ramulus* (Valenciennes, 1846)" from the Archipielago Las Perlas, Panama.

In Verrill's description of *L. pumila* he noticed that some branches anastomose which can not be observed in the type fragment. The main branches agree in width given by Verrill (1.5 mm), but the branchlets are thicker than the ones in the description (1–1.2 instead of 0.8 mm). Verrill's recorded distribution and arrangement of polyps does however agree with the type fragment. The description of the colours of the colony and sclerites given by Verrill could be interpreted as colony pink and sclerites pink and some light yellow, and anthocodial rods light orange, which matches the type fragment. According to Verrill, this species is allied to *L. ramulus*, but he separated them based on the thickness of the branches (thicker in *L. ramulus*), arrangement of polyps (more separate), and the lack of anastomosis in *L. ramulus*. However, the sclerites of both species are very different, being enough reason to separate them.

Bielschowsky (1929) reported this species from Panama, and indicated that two specimens were deposited in the Zoology Museum of Munich. We examined the figured specimen, (that also appears in Kükenthal (1924)) but the colony does not match Verrill's description, since the specimen is a fan with a loose mesh, not a colony with some anastomosis. Her specimen fits well in *Pacifigorgia sculpta* Breedy & Guzman, 2004, a sea fan very common in Panama from shallow to deep waters (Breedy & Guzman 2004).

We found four specimens in the MNHN, under *L. pumila*, but, one is *Pacifigorgia stenobrochis* (Valenciennes, 1846), and the other belongs to another species, perhaps a variety of *Leptogorgia rigida*.

Verrill's (1868b) description of this species is not accurate, lacks illustrations, and lacks holotype designation, for these reasons we, herein, designate ZMUC ANT-186 as the lectotype to fix the identity of the species and avoid confusion.

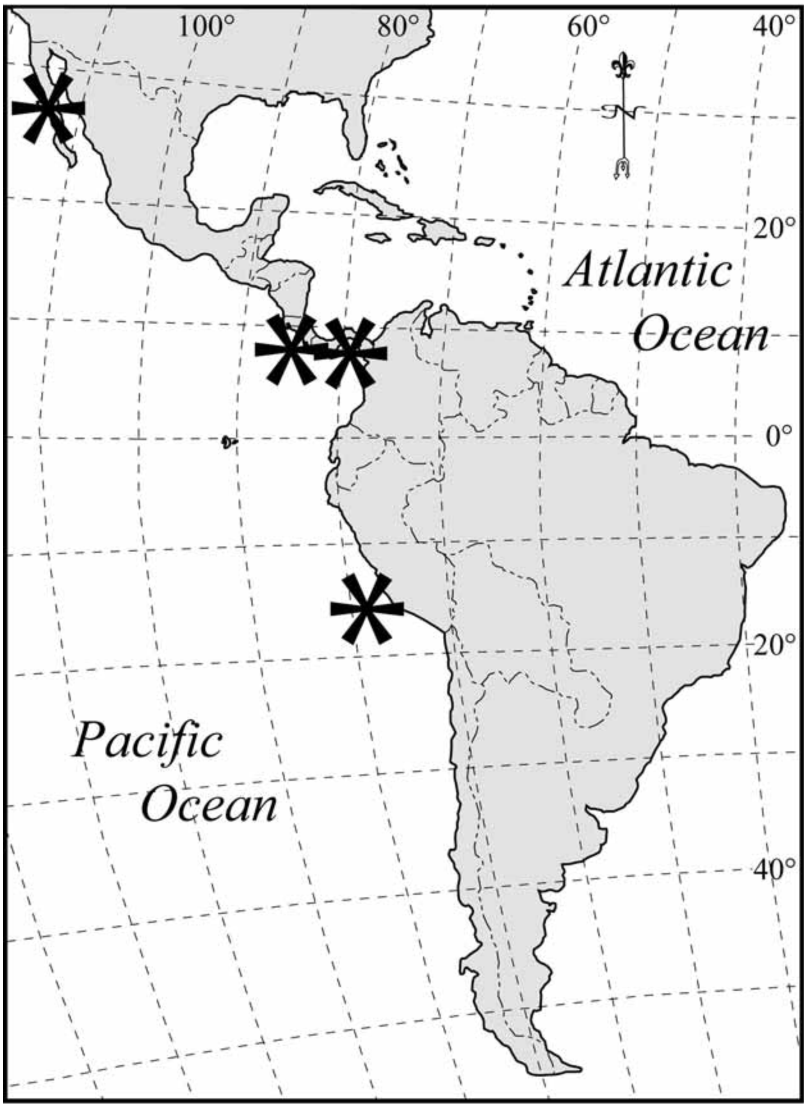

FIGURE 55. Geographical distribution of *Leptogorgia pumila*.

Leptogorgia ramulus (Milne Edwards & Haime, 1857)
(Figs. 56–61)

Gorgonia ramulus Valenciennes, 1855: 12 [Nomen nudum.]; Milne Edwards & Haime, 1857: 160; Verrill 1864: 33; 1866: 326.
Gorgonia humilis Verrill, 1863: 6 [non Dana].
Gorgonia (*Litigorgia*) *ramulus* Verrill, 1868: 415.
Litigorgia ramulus Verrill, 1868a: 394–396 (1st ed).
Leptogorgia ramulus Verrill 1868b: 394–396; 1869b: 421; Studer 1883: 4; Nutting 1910: 5; Bielschowsky 1918: 29; 1929: 121; Kükenthal 1919: 914; 1924: 336.
Lophogorgia ramulus Prahl *et al*. 1986: 20.

Material examined. Holotype: MNHN no catalogue number, dry, Panama, P. Duchassaing, 1851, no further data.

Other material examined: PANAMA: MCZ 714, dry, no depth given, F. M. Bradley, 1866–1867; YPM 558a–d, YPM 557 f–j; dry, no depth given, F. M. Bradley, 1866–1867. PERU: MCZ 4967 (MCZ 716), dry, no depth given, Zorritos, F. M. Bradley, 1866–1867; YPM 1615a–c, dry, no depth given, Zorritos, Peru, F. M. Bradley, 1866–1867.

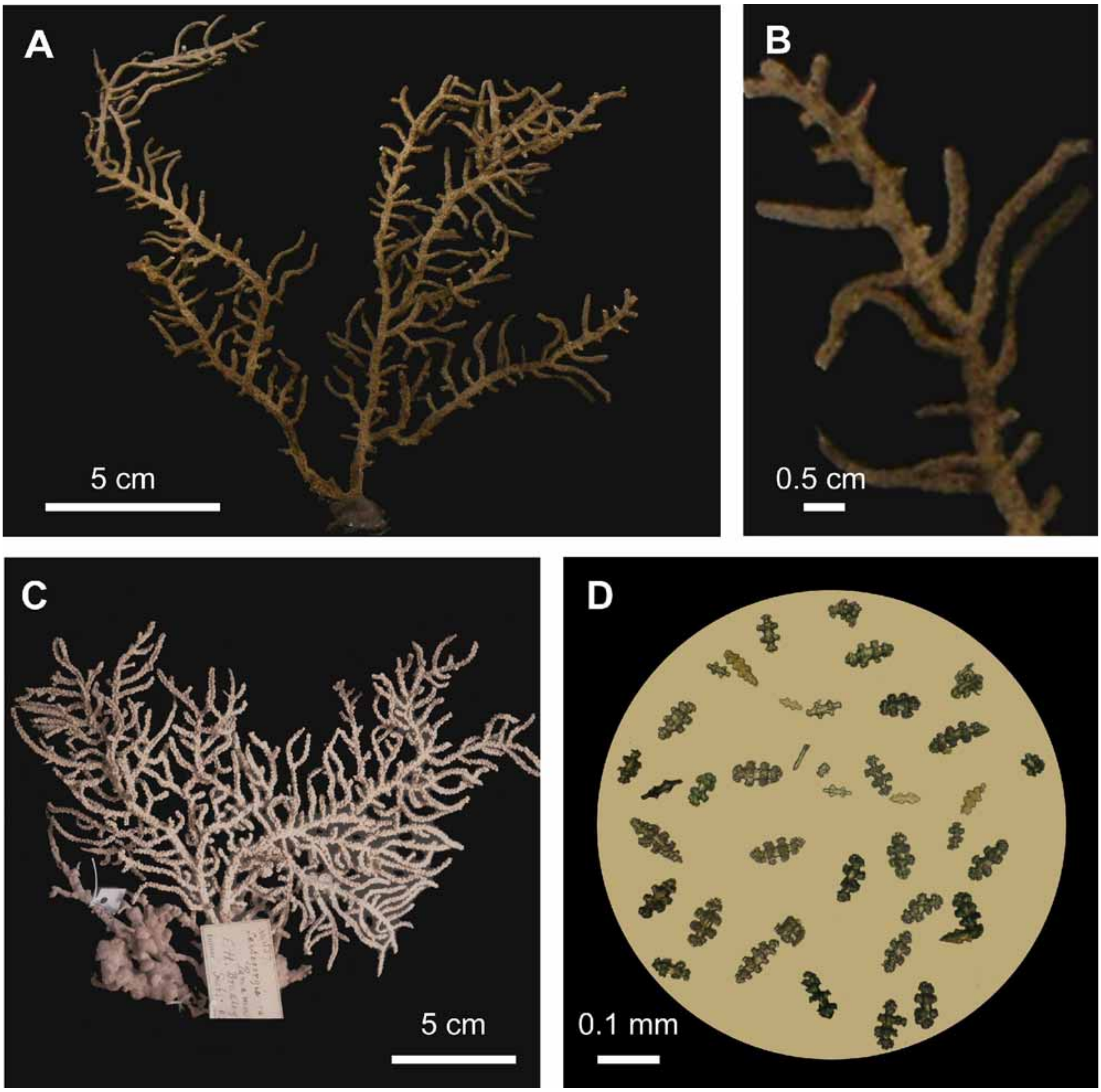

FIGURE 56. *Leptogorgia ramulus*, **A**, MNHN, holotype; **B**, detail of a branch **(**MNHN); **C**, YPM 557; **D**, light micrograph of sclerites (MNHN).

Holotype description. Colony is 14 cm in length, and 14 cm in width formed by two main branches that arise together from the very base (Fig. 56A, B). Since the base of the colony is cemented to a stand, no detail of the holdfast or the stem is visible. The branches vary from cylindrical to slightly flatted and of about 4 mm in diameter. Ramification is irregularly pinnate. Main branches diverge and subdivide giving off ascending branches, 2 mm in diameter that arise at angles of less than 45°, and further subdivide up to four times in the same pinnate manner (Fig. 56A, B). Free branchlets are up to 3 mm in length, about 2 mm in diameter, with

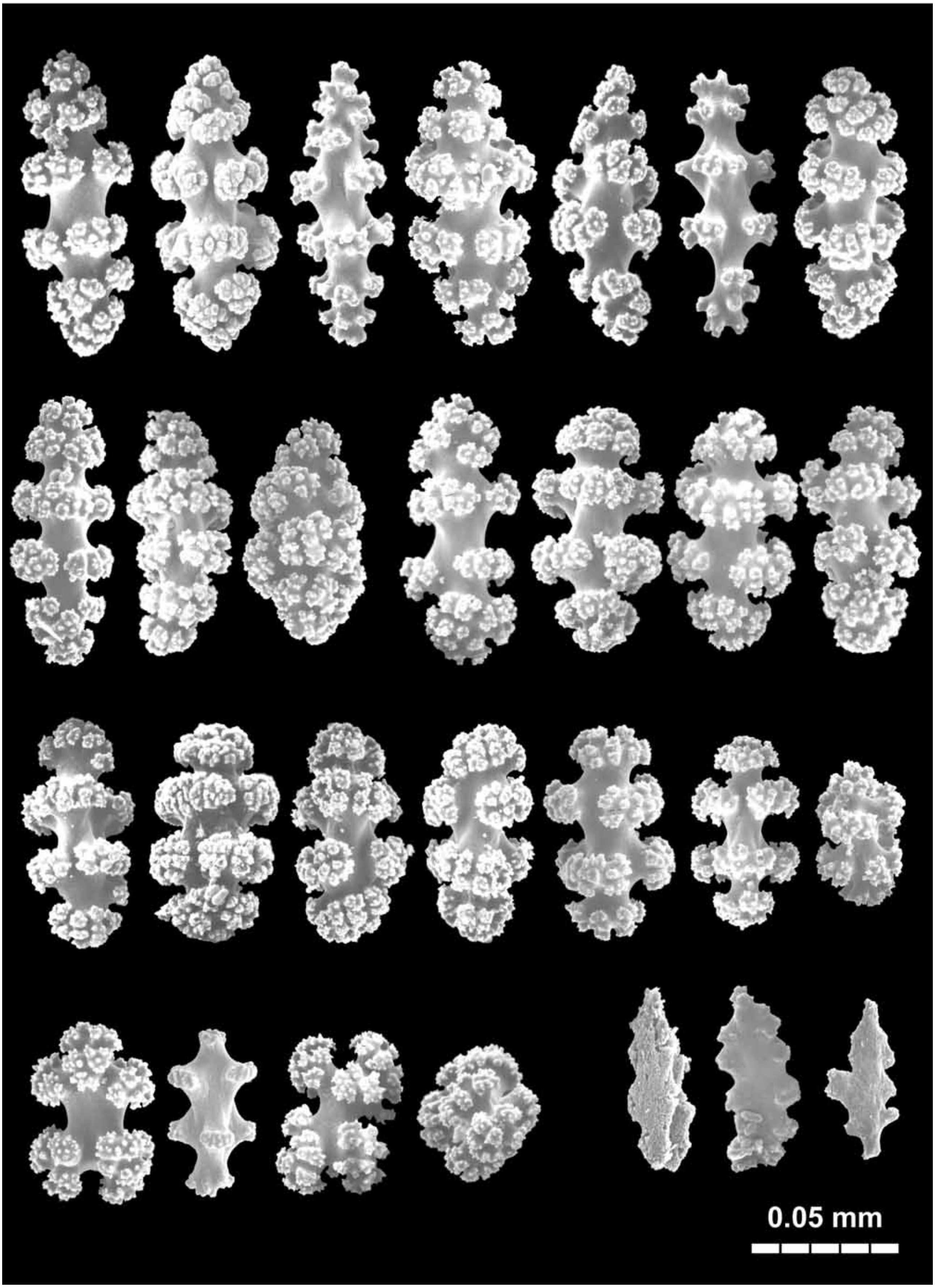

FIGURE 57. *Leptogorgia ramulus*, (MNHN, holotype), SEM of coenenchymal sclerites, and anthocodial rods.

acute ends. Colour is bluish grey, as the result of being shelved for more than a hundred years. Originally it was probably much whiter (Fig. 56A, B). The polyps are closely arranged in about four lateral rows along the branches separated by two by longitudinal grooves. Polyps are more scattered and irregularly distributed on the thicker branches. Polyp-mounds are prominent, dome-shaped, with oval apertures around 0.2 mm in diameter (Fig. 56B). Coenenchymal sclerites vary from a very pale yellow to colourless (Fig. 56D). They are mostly capstans and spindles with blunt ends. Spindles reach up to 0.11 mm in length and 0.05 mm in width, with 4–6 whorls of tubercles (Figs. 56D, 57). Capstans reach up to 0.08 mm in length and 0.05 mm in width (Figs. 56D, 57). Crosses measuring about 0.06 mm by 0.06 mm, with strongly tuberculate ends, are not very abundant (Fig. 57). Anthocodial sclerites are lobed rods of a characteristic light orange. They can reach up to 0.09 mm in length and 0.03 mm in width, but are mostly around 0.07 mm in length (Figs. 56D, 57).

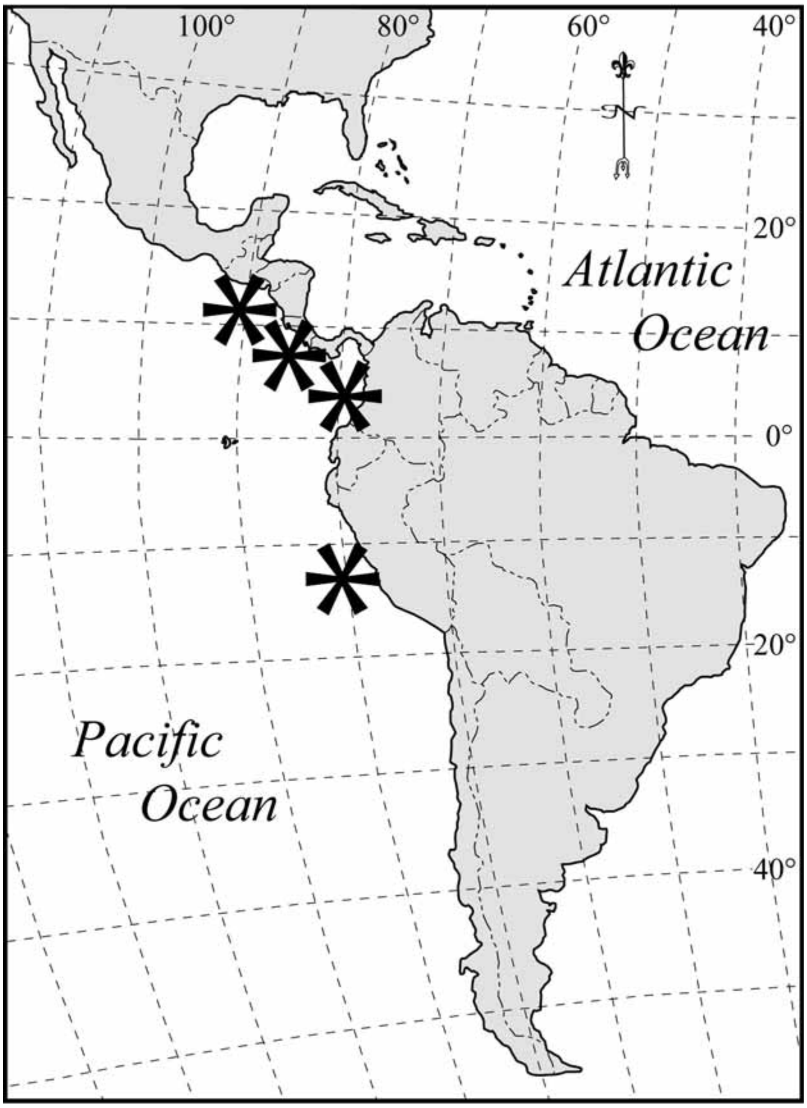

FIGURE 58. Geographical distribution of *Leptogorgia ramulus*.

Other material. The examined specimens range from 4 cm to 35 cm in length, and from 6 cm to 32 cm in width. Colonies are mostly bushy and densely branched in various planes (Figs. 56C, 59A, B) although some small colonies are flabelliform and grow in one plane. Main branches subdivide from short stems, up to 20 mm in length, or just sprout directly from a common spreading holdfast. Branching and polyp-arrangement are very consistent with the holotype. Colour is whitish grey, as in the typical form (Fig. 56C), but also shows variation from red rose to Bordeaux (Fig. 59A) and a mixture of these colours in the same colony has been observed (Fig. 59B). The coloured colonies are not evenly tinted; some parts are of lighter hues of pink to white (Fig. 59A). This feature is very characteristic of the species. Coenenchymal sclerites are as in the holotype, and have the same sizes, but in the coloured variety, there is a dominance of wide capstans, and almost all the sclerites are rose-pink (Figs. 59C, 60). The anthocodial rods have the same light orange colour as the holotype in both varieties, but in the pink colonies, they are mostly around 0.08 mm in length, larger than the ones recorded for the white holotype (Fig. 60).

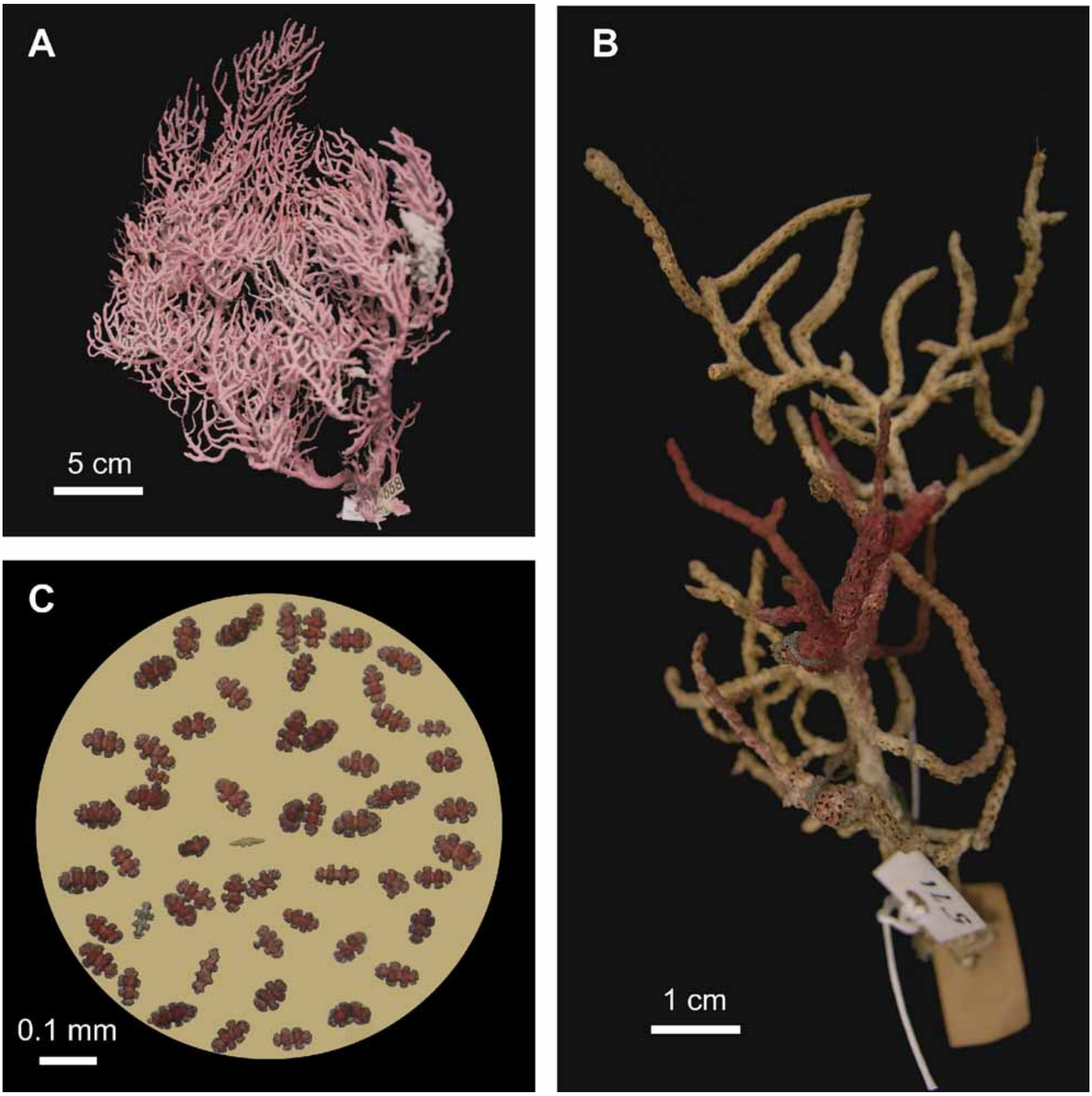

FIGURE 59. *Leptogorgia ramulus*, pink variety, **A**, YPM 558A; **B**, YPM 571; **C**, light micrograph of sclerites (YPM 558).

Distribution. Panama: type locality. Archipielago Las Perlas, Panama; Corinto, Nicaragua; San Salvador, El Salvador (Verrill 1868b); Zorritos, Peru; Bahía Málaga, Colombia (Prahl *et al*. 1986). We have not found any specimen of *L. ramulus*, neither white nor pink in our recent surveys in Panama (Table 2, Fig. 58, 61).

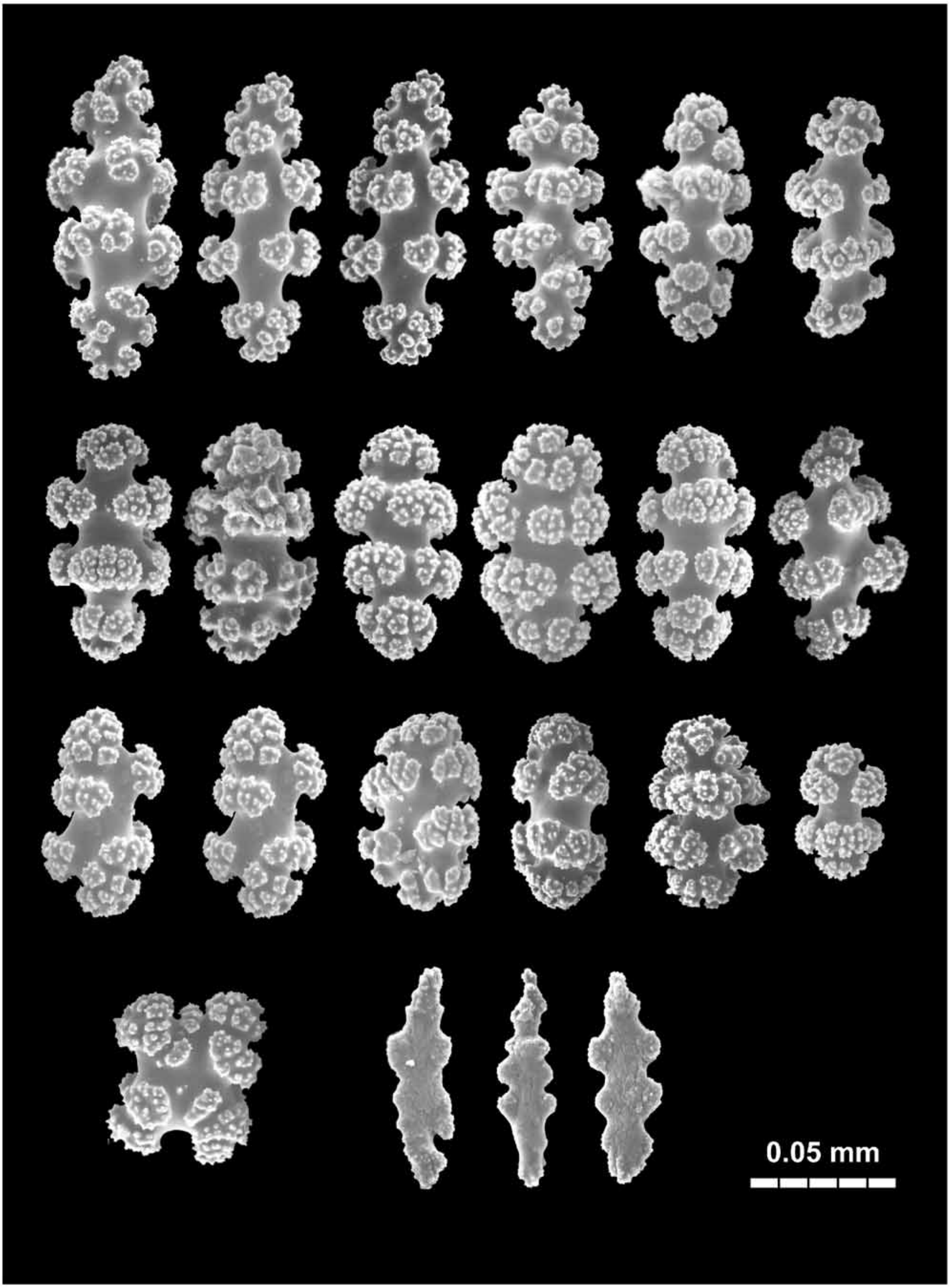

FIGURE 60. *Leptogorgia ramulus*, pink variety, (YPM 558A), SEM of coenenchymal sclerites, and anthocodial rods.

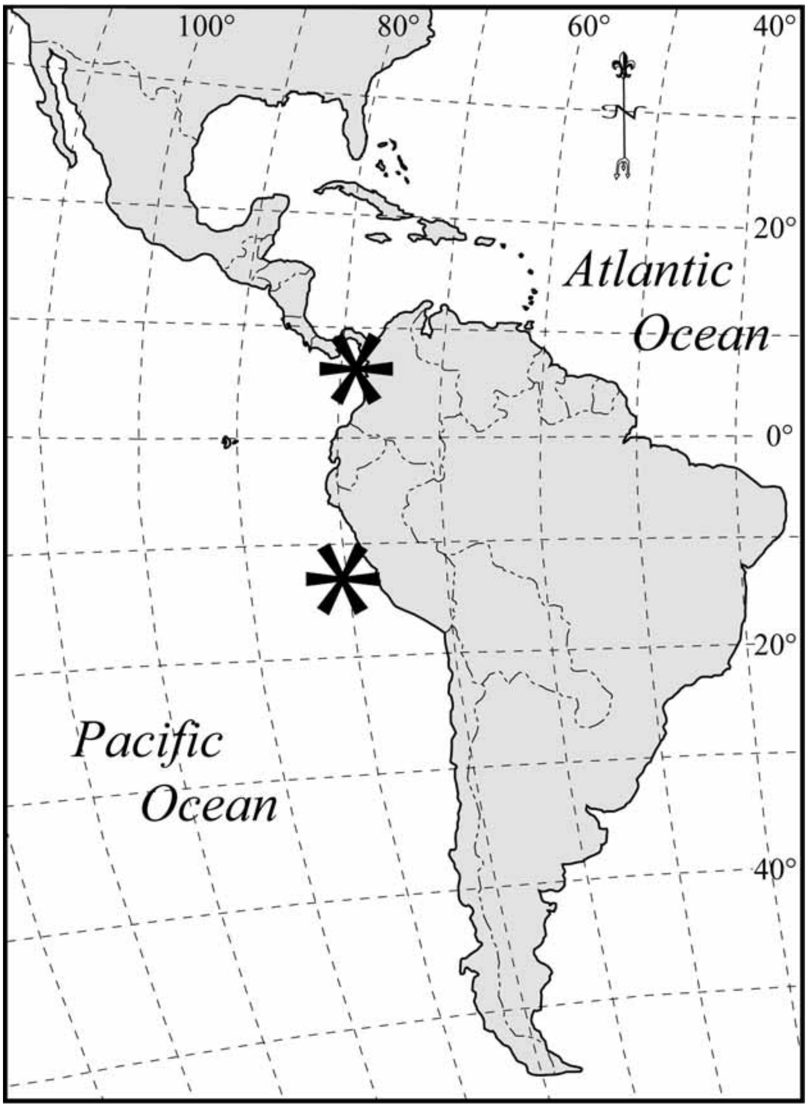

FIGURE 61. Geographical distribution of *Leptogorgia ramulus*, pink variety.

Remarks. This species was first mentioned in Valenciennes (1855), without any description or illustrations. Milne Edwards & Haime (1857) gave the first brief description without illustrations. The only specimen identified as *Gorgonia ramulus* in the MNHN is considered the holotype of Valenciennes (1855). Verrill (1868b) redescribed this species with specimens from Archipielago Las Perlas (Panama), Corinto (Nicaragua), San Salvador (El Salavador), Zorritos (Peru), and Acapulco (Mexico). He added details of a pink variety for this species, but mixed it up with specimens belonging to *L. pumila*, and *L. labiata*. In fact, Verrill (1870) established *L. labiata* for the Mexican specimens and regarded those colonies as a northern dwarf variety of *L. ramulus*. We found a large collection of pink and white specimens of *L. ramulus*, and recognized that Verrill's pink variety is different from both *L. labiata*, and *L. pumila*, but very similar to the white variety if *L. ramulus*. Indeed, both colours appear together in the same colony in some of the examined specimens (Fig. 59B). Therefore, we consider the pink colonies as a different colour morph of the white species or the contrary, and keep them as the same species.

The pink phenotype of *L. ramulus* differs from *L. labiata* in the size and arrangement of the polyp-mounds. In *L. ramulus* they are smaller and sparsely placed while in *L. labiata*, they are larger, and set very close together. These species are allied to *L. pumila*, they branch in a similar pinnate manner, but in *L. pumila* branches are thicker in cross section, and the polyp-mounds more prominent and closer. Clear differences among these species are in the sclerites, especially in the anthocodial rods. In *L. pumila* they are large and of a characteristic orange colour, while in *L. ramulus* and *L. labiata* they are smaller and light amber in the former and light yellow in the latter (Table 1).

Verrill (1868b) suggested that perhaps *Lophogorgia panamensis* Duchassaing and Michelotti was the pink phenotype of this species, but after we examined the holotype (MZUF c.159) we discovered that it is a species of *Eugorgia*.

Leptogorgia regis **Hickson, 1928**
(Figs. 62–65)

Leptogorgia regis Hickson, 1928: 409–410; Stiasny 1943: 81–82.

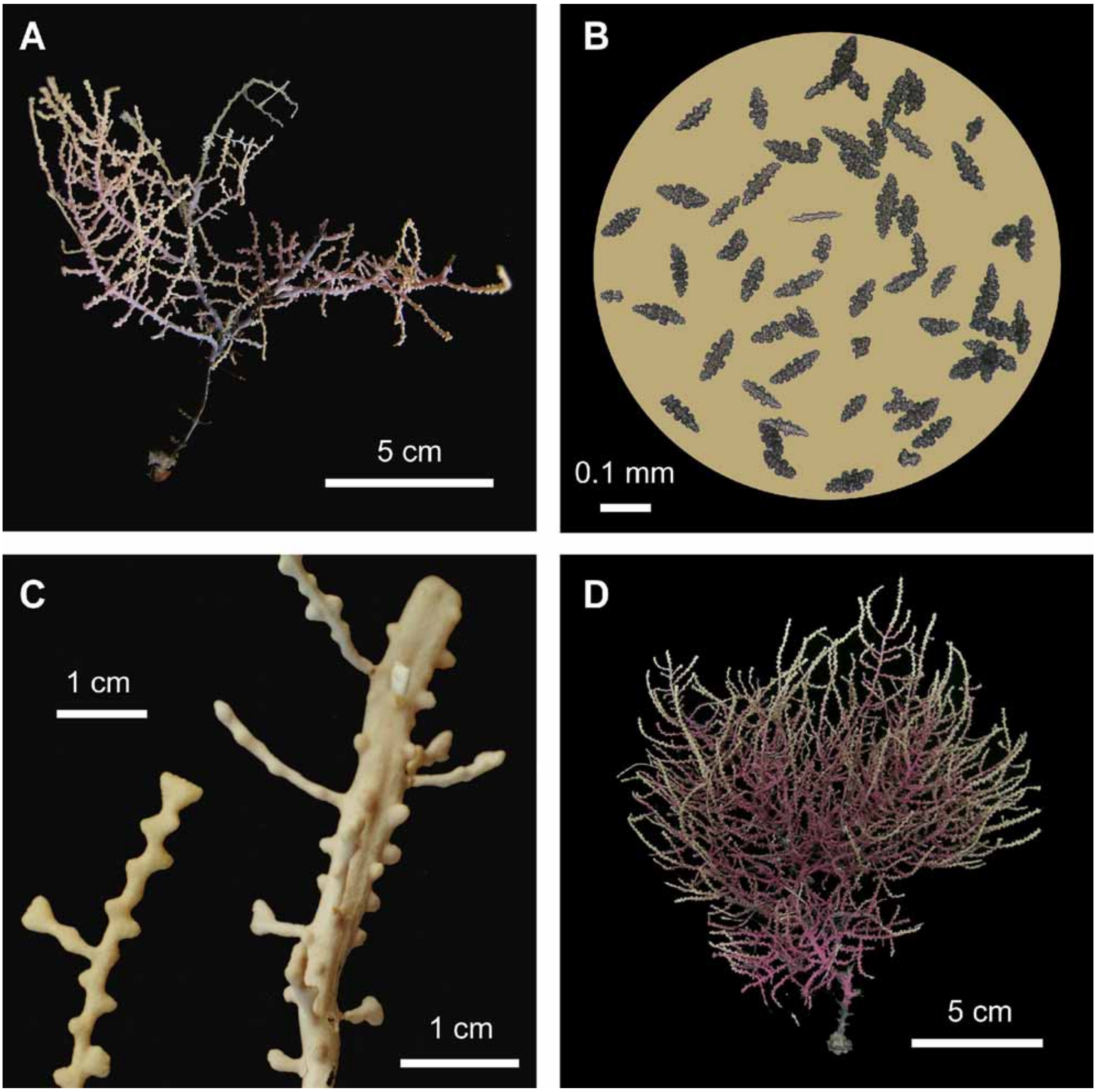

FIGURE 62. A, *Leptogorgia regis* (ZMUC 123); **B**, light micrograph of sclerites (ZMUC 123); **C**, detail of branches (BM 146.1.14.56); **D**, UCR 1563.

Material examined. Syntype series: BM 1946.1.14.57, preserved, Isla San Jose, Archipielago Las Perlas, 45 m, T. Mortensen, 1916–1917; BM 146.1.14.56, ZMUC ANT-123, preserved, S. W. Isla del Rey, Archipielago Las Perlas, Panama, 18.2 m, T. Mortensen, 26 January 1916.

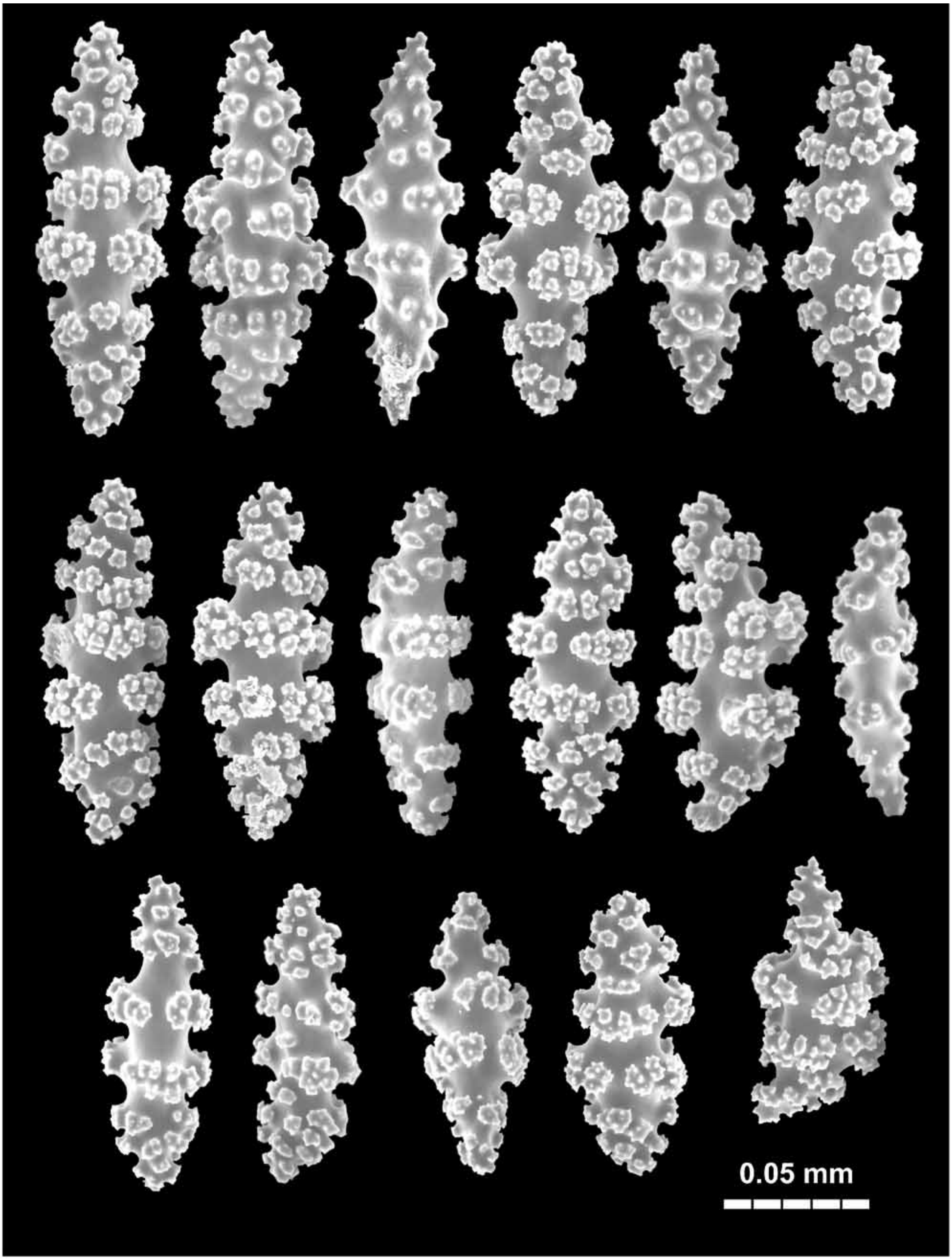

FIGURE 63. *Leptogorgia regis* (ZMUC 123), SEM of coenenchymal sclerites.

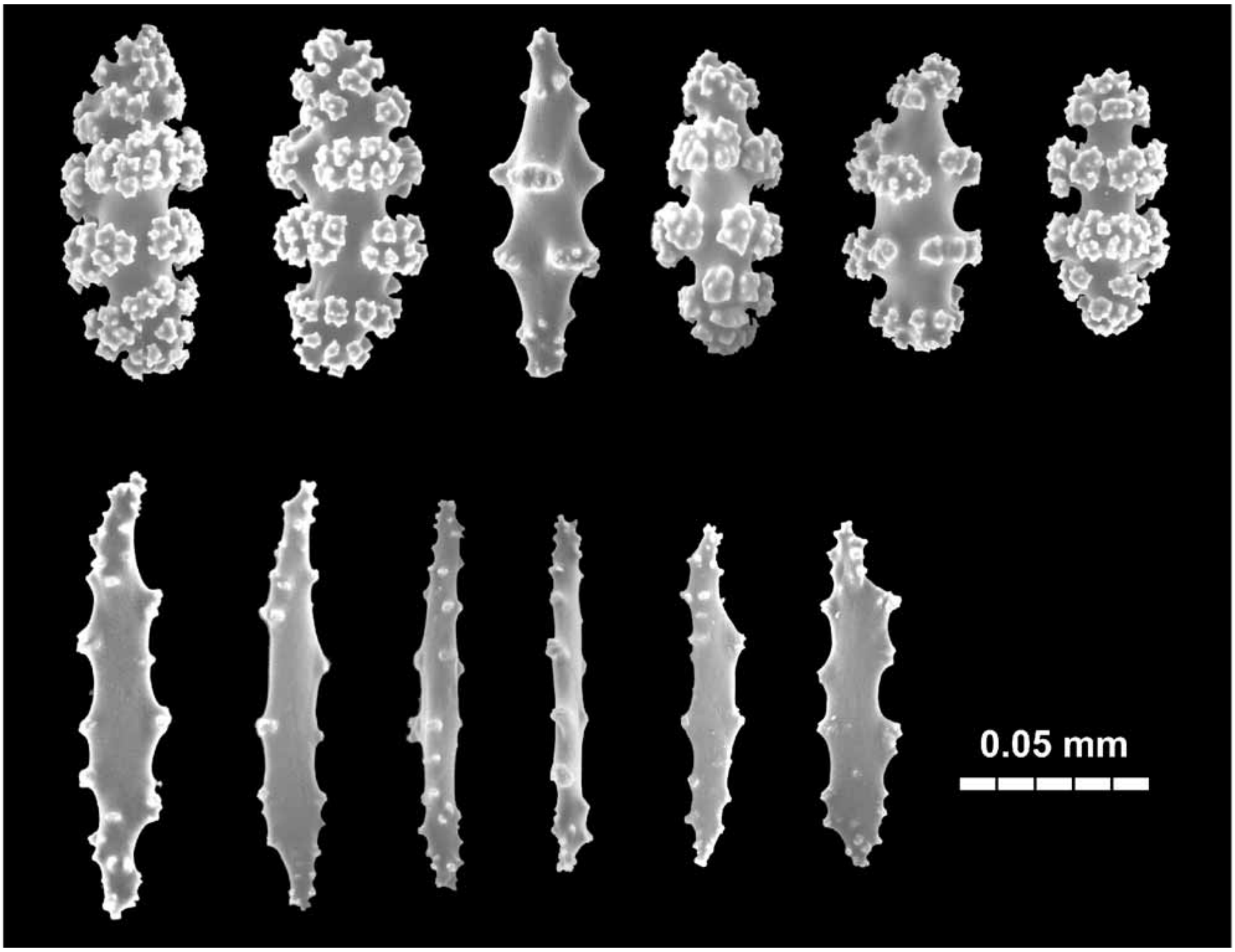

FIGURE 64. *Leptogorgia regis* (ZMUC 123), SEM of coenenchymal sclerites, and anthocodial rods.

Other material examined. COSTA RICA: UCR 635–637, preserved, Isla Cocinera, Archipielago Murcielago, on the beach, O. Piedra, 20 June 1965; UCR 1563, dry, S Carrillo, Bahia Santa Elena, R/V Urraca Expedition, trawl 5, 73–57 m, Y. Camacho, 11 July 2005; UCR 1564, 1590–1591, dry, Bahia Santa Elena, R/V Urraca Expedition, trawl 3, 51–54 m, Y. Camacho, 9 July 2005; UCR 1562, 1565–1566, 1592, dry, Bahia Santa Elena, R/V Urraca Expedition, trawl 4, 50–52 m, Y. Camacho, 9 July 2005; UCR 1593, dry, S Carrillo, Bahia Santa Elena, R/V Urraca Expedition, trawl 27, 65–66 m, Y. Camacho, 11 July 2005; UCR 1594, preserved, Golfo de Nicoya, R/V Urraca Expedition, trawl 46, 44–46 m, Y. Camacho, 12 July 2005.

Description of syntypes. The syntype series comprises 4 small fragments, and a complete colony. The complete colony is 11.5 cm in height and 15 cm in width (Fig. 62A). Arising from a small holdfast, the decorticated stem is 3 mm in diameter, and reaches up to 15 mm before branching starts. Branching is profuse in all directions, the thick branches are slightly flattened, reaching up to 2.0 mm in diameter, and numerous short branchlets stick out from them and rebranch producing clusters of thinner branchlets up to 1.0 mm in diameter and more rounded in cross section. Branches and branchlets are truncated at the ends; terminal twigs are very variable and can be up to 25 mm in length (Figs. 62A, C). Polyps are sparsely distributed all around the branches (Fig. 62C). Polyp-mounds are raised and conical (projecting about 0.6 mm with polyps retracted). They are irregularly placed around the thick branches where they resemble thorns, while on the thin branches they are arranged alternately on opposite sides at intervals of 0.5 mm (Fig. 62A, C). Polyps are whitish with bilabiate apertures. Coenenchyme is thin, as stated by Hickson (1928) and could easily be damaged or lost. Colour of the colony may vary from pale to dark orange to pinkish white, darker at the base and fading up to the tips, while some colonies are totally white (Fig. 62A, C). The sclerites vary from pale orange or yellow to whitish (Fig. 62B). Coenenchymal sclerites are mostly spindles; small capstans occur rarely. Spindles reach up to 0.14 mm in length, and 0.05 mm in width, with 3–8 whorls of tubercles (Figs. 62B, 63, 64). A few capstans occur, up to 0.06 mm in length and 0.03 mm in width (Figs. 62B, 64). Anthocodial sclerites are long, flat, light yellow rods, up to 0.12 mm in length and 0.03 mm in width with dentate margins (Figs. 62B, 64). Several specimens of *L. regis* collected by trawling along the Pacific of Costa Rica, reach up to 20 cm in height and 20 cm in width, and agree in all aspects with the type series. Some of these specimens are of darker hues of orange than the syntypes (Fig. 62D).

Distribution. Islas San José and del Rey, Archipielago Las Perlas, Panama: type localities. Bahía Santa Elena, and Golfo de Nicoya, Costa Rica (Table 2, Fig. 65).

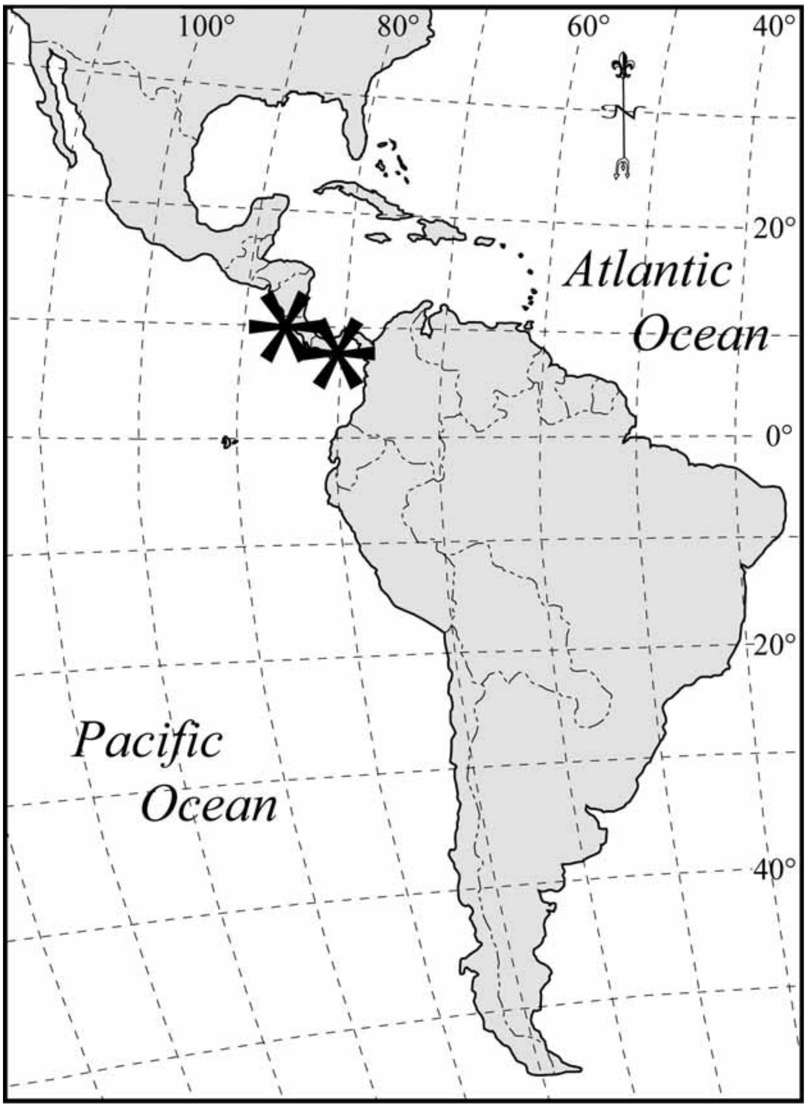

FIGURE 65. Geographical distribution of *Leptogorgia regis*, *Leptogorgia cofrini*, and *Leptogorgia taboguilla*.

Remarks. This species was characterized by Hickson (1928) and Stiasny (1943). The illustration of sclerites given by Stiasny is insufficient and his measurements inadequate for identification, while the illustration of a colony given by Hickson (1928) is appropriate for comparative purposes. Hickson did not designate a holotype, but his type series is consistent.

This species is very distinctive from the other *Leptogorgia* species because of the branching pattern that rather resembles some species of the genus *Eugorgia* (e.g. *Eugorgia rubens* Verrill, 1868b).

Leptogorgia rigida Verrill, 1864
(Figs. 21, 66–68)

Leptogorgia rigida (pars) Verrill, 1864: 32.
Gorgonia (*Leptogorgia*) *rigida* (pars) Verrill, 1866: 327.
Gorgonia (*Eugorgia*) *rigida* Verrill, 1868: 415.
Litigorgia rigida Verrill, 1868a: 401 (1st. ed.).
Leptogorgia rigida Verrill 1868b: 401; 1869b: 421; Studer 1883: 4; Nutting 1910: 5; (not) Thomson 1916: 31–32; Bielschowsky 1918: 29; 1929: 102; Kükenthal 1919: 771; 1924: 326; Stiasny 1951: 62.
Euplexaura rigida Hickson, 1928: 347.
Euplexaura taboguilla var. *tabogae* Hikson, 1928: 346–349; Stiasny 1943: 62–63.

Material examined. Lectotype (here designated): MCZ 4059, dry, Cape San Lucas, Baja California Sur, Mexico, no depth given, J. Xantus, 1860. Paralectotypes: MCZ 4051 (MCZ 186), 4057 (MCZ 186) (2 specimens), 7004 (MCZ 186) (2 specimens), dry, Acapulco, A. Agassiz, no date; MCZ 349, 4058 (MCZ 349), 4054 (MCZ 350) (3 specimens), dry, Acapulco, Vanbrunt, 1863; YPM 957 a–d, dry, Cape San Lucas, no depth given, J. Xantus, 1860; YPM 1642a, 1642b, preserved, Archipielago Las Perlas, no depth given, F. H. Bradley, 1866; USNM 1674, 1675 (7 specimens), 2388, 33602 (72 specimens), 33605, dry, Cape San Lucas, no depth given, J. Xantus, 1860.

Other material examined. MEXICO: M 366, dry, Isabel Island, E. López, voucher collection, no further data. COSTA RICA: UCR 619–622, preserved, Isla Chora, 7 m, H. Guzman, 18 March 1984; UCR 774 (2 specimens), preserved, S Isla Colorada, 6 m, J. Cortés, 3 May 1994; UCR 786, preserved, Los Pedrones, Cape Blanco, 7 m, L. Mena, 18 April 1999; UCR 1511, preserved, San Pedrito, Archipielago Murcielago, 20 m, O. Breedy, 12 April 1996; UCR 1512–1513, preserved, Peñón Abrazo de la Muerte, 20 m, 12 April 1996; UCR 1548, preserved, E Islas Negritos, Golfo de Nicoya, 12 m, O. Breedy & J. Cortés, 21 November 2002; UCR 1667 (5 specimens), preserved, W Islas Negritos, 6 m, O. Breedy & J. Cortés, 21 November 2002; UCR 1536, preserved, off Islas Negritos, 6 m, C. Gamboa, 24 July 2000; UCR 1668 (2 specimens), preserved, Isla Chora, 20 m, O. Breedy, 30 May 1997. PANAMA: UCR 1121–1124, dry, Islote Frailes, 5–20 m, H. Guzman, 12 December 2001; UCR 1314–1315, 1322, dry, Islote, Golfo de Chiriqui, 10 m, H. Guzman, 20 April 2002; UCR 1425–1426, dry, Bajo Urraca, Golfo de Chiriqui, 10–30 m, H. Guzman, 27 April 2002; UCR 1539, preserved, Roca Prosper, 10 m, H. Guzman, 11 December 2001; STRI 396, dry, Islote Larry, Golfo de Chiriqui, 25 m, H. Guzman, 16 April 2003; STRI 603, dry, Islote Frailes, 20 m, H. Guzman, 1 May 2003; ZMUC ANT-114, preserved, off Taboguilla Island, Panama, no depth given, T. Mortensen, 11 November 1915.

Lectotype description. Dark bluish-purple colony 22.5 cm in height and 13.5 cm in width (Fig. 66A, B). Three main branches arise in various planes from a thick stem, 60 mm in diameter and 40 mm in length; a small fragment of the holdfast is preserved. Branches are slightly flattened at the base, 8–9 mm in diameter, with distinct longitudinal grooves. Branching is pinnate, producing pinnae 2.0–3.0 mm in diameter that are irregularly arranged, separated by short distances (around 10–20 mm), and branch at acute angles (around 35–45°). The pinnae rebranch giving off secondary pinnae, up to 1–1.5 mm in diameter with somewhat enlarged and blunt ends. Unbranched terminal twigs reach up to 30 mm in length (Fig. 66A, B). The polyps are retracted within slightly raised dome-shaped polyp-mounds with small oval apertures (around 0.2 mm). Polyp-mounds are distributed all around the branches, and do not crowd the branches. They are closer together on the large branches, and arranged in 3–4 longitudinal rows with naked median spaces alongside of the median grooves (Fig. 66B). Sclerites of the coenenchyme are all deep purplish red (Fig. 66C). They are mostly stout ovals, or capstans with short waists, up to 0.08 mm in length and 0.06 mm in width (Figs. 66C, 68). Spindles are long and tuberculate, up to 0.12 mm in length, and 0.05 mm in width, with 3–4 whorls of tubercles(Figs. 66C, 68). Few spindles with a slightly curved end are also present. Some cross-shaped small sclerites occasionally occur, about 0.04 by 0.04 mm, with compound tubercles and blunt ends (Figs. 66C, 68).

Anthocodial sclerites are pink, somewhat flattened rods, up to 0.08 mm in length, and 0.02 mm in width, with lobed-like marginal projections (Figs 66D, 68). We choose MCZ 4059 as the lectotype.

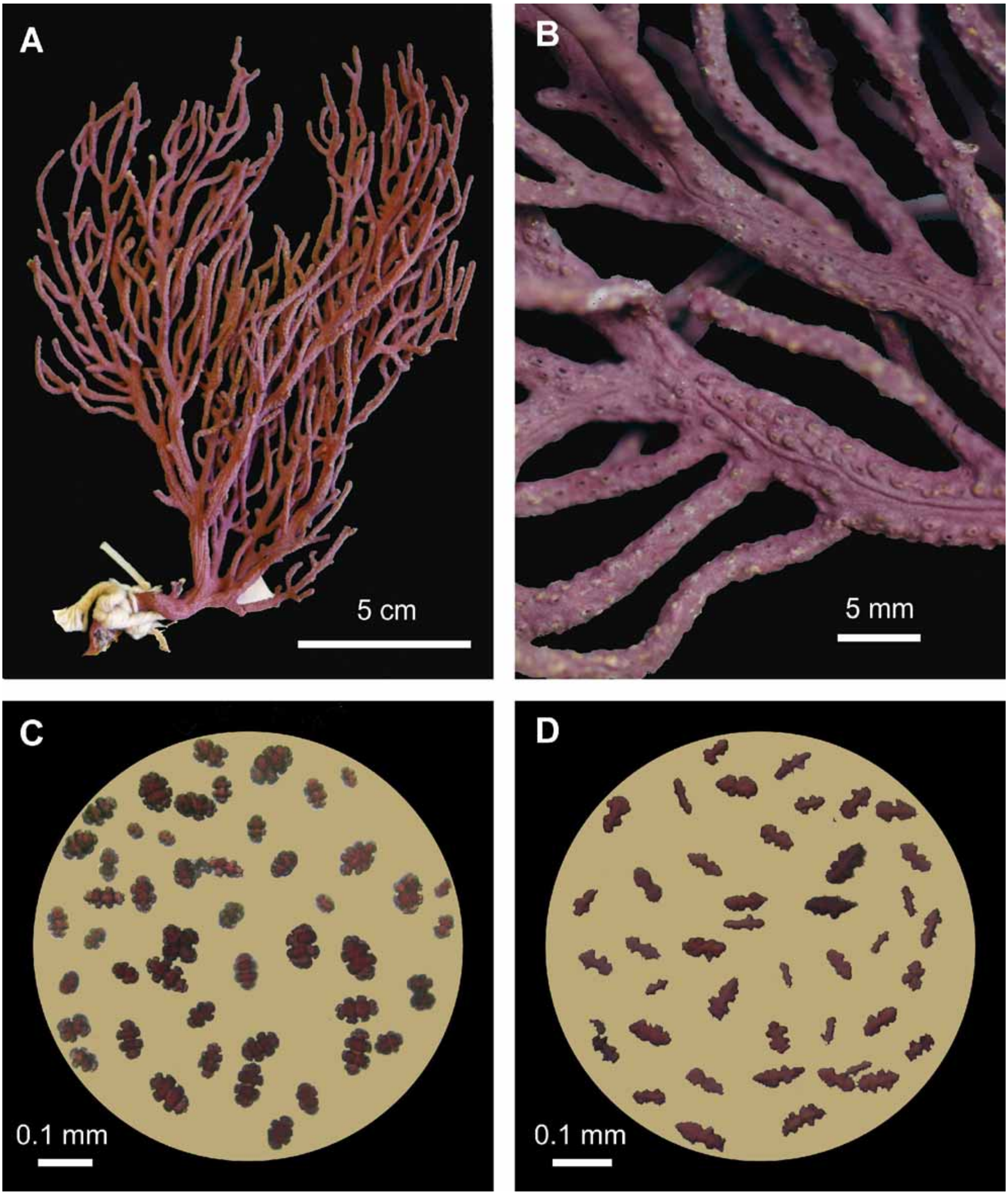

FIGURE 66. *Leptogorgia rigida*, MCZ4056, lectotype; **A**, colony; **B**, detail of branches; **C,** light micrograph of coenenchymal sclerites; **D,** light micrograph of anthocodial rods.

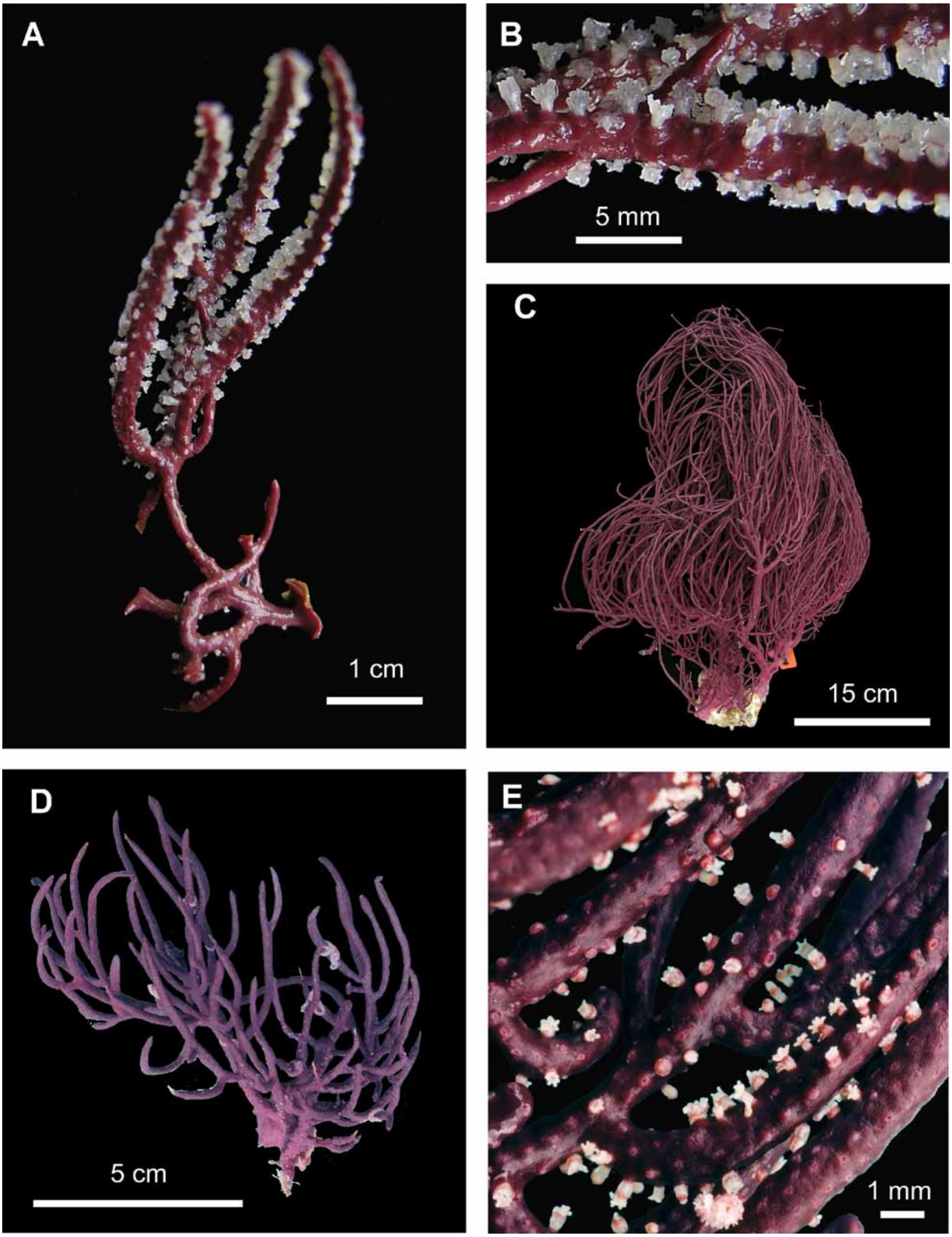

FIGURE 67. *Leptogorgia rigida*, **A**, ZMUC ANT 114 (previously *Euplexaura taboguilla* var. *tabogae*); **B**, detail of a branch, and polyps (ZMUC ANT 114); **C,** UCR 1425; **D**, UCR 1512; **E**, detail of a branch, and polyps (UCR 1512).

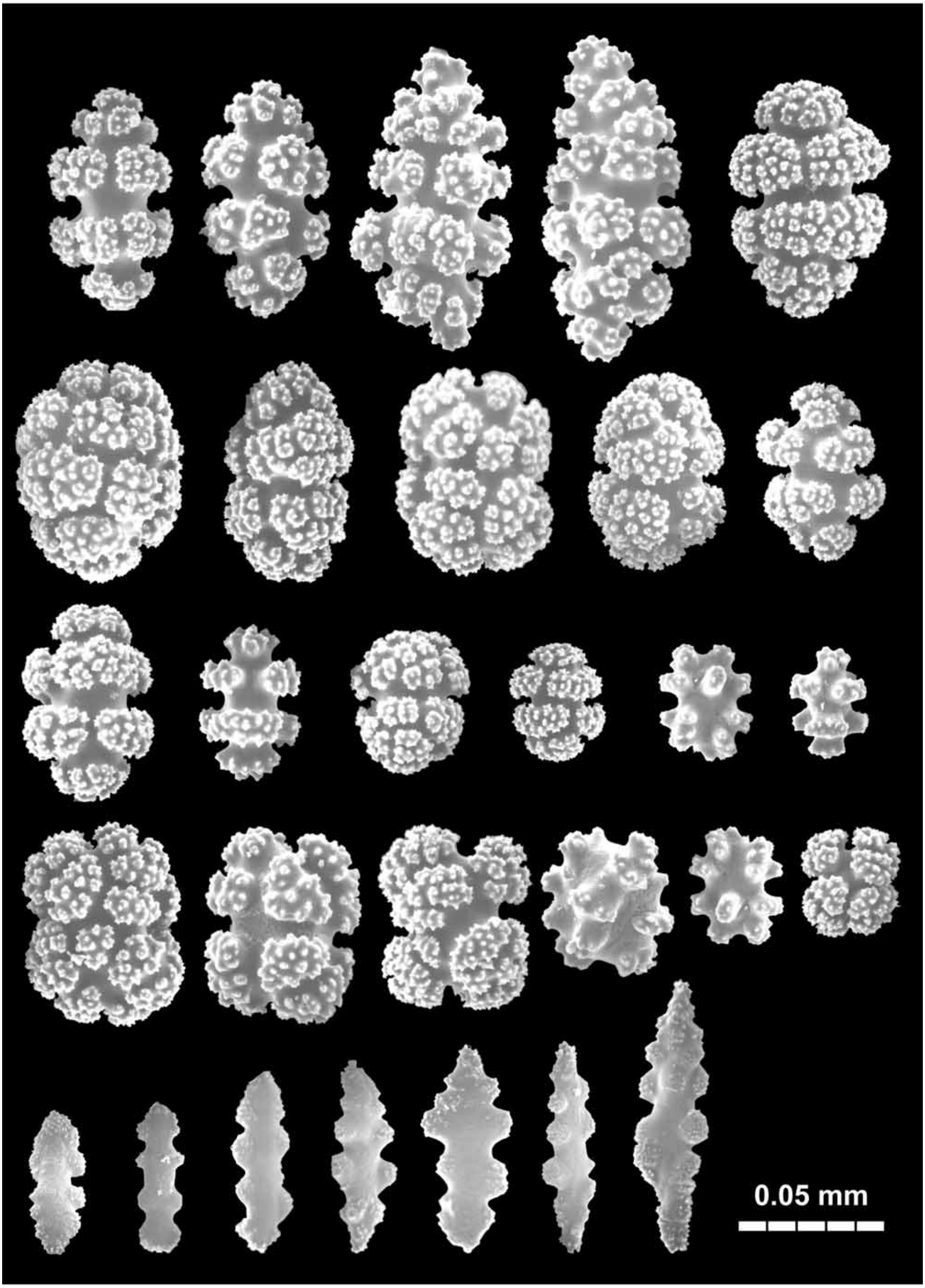

FIGURE 68. *Leptogorgia rigida*, MCZ4056, lectotype, SEM of coenenchymal sclerites, and anthocodial rods.

Other material. Colonies examined range in length from about 5 cm to 55 cm, and 5 cm to 40 cm in width (Fig. 67A, C, D). They grow upright with mosly pinnate branching that is sparse and flabelliform in small colonies, and copious, multiplanar in large specimens (Fig. 67C). Branches arise from single or multiple main stems that, in the case of large colonies, are slightly flattened with marked longitudinal grooves. Stems can reach up to 25 mm in diameter at the base of the holdfast. They subdivide in an irregular pinnate manner producing secondary branches. These rebranch pinnately in one plane. Branches are mostly cylindrical and tapered. Their tips can be somewhat enlarged and blunt, or pointed; both forms can be found in the same colony. In large colonies, the unbranched terminal twigs measure about 20–25 cm in length, giving an untidy appearance (Fig. 67C). Colour is deep purplish red throughout, fading to a violet hue in some dry specimens (Fig. 67A, C, D). Polyps are generally whitish, with anthocodial rods arranged in points (Fig. 67B, E), but they can be pink, white, or pale yellow. Retracted polyps form slightly raised dome-shaped mounds, or are completely flush with the coenenchyme, leaving small oval slits on the surface of the branches. Coenenchymal sclerites are mainly compact capstans, as in the lectotype. In some of the examined specimens, the occurrence of spindles is high (e.g. UCR 1426, 1122, 1123). All the sclerites have a lighter colour, and a few small colourless capstans. Anthocodial sclerites are as in the lectotype, but vary in colour from pink to yellow, and can reach up to 0.09 mm in length.

Distribution. Cape San Lucas, La Paz, Baja California, and Acapulco, Mexico; San Salvador: type localities. Panama, and Costa Rica. Thompson (1916) lists a specimen of *L. rigida* from "off East London", but it probably is *Leptogorgia gilchristi* (Pallas, 1766) (G. Williams, pers. com. 2006) (Table 2, Fig. 21).

Remarks. As it was mentioned above, this species was described by Verrill (1864) from a mixture of specimens, with no holotype designation nor any illustration. Later, Verrill (1868b) redescribed the species with some detail, however, we consider the need to designate a lectotype to fix the identity of *L. rigida*.

Hickson (1928) proposed *Euplexaura taboguilla* var. *tabogae* as a variety of *L. taboguilla* based on a single specimen from Taboga Island, but after examining this specimen we concluded that it is actually *L. rigida*, thus we herein synonymize the two species.

Specimens from Costa Rica are small, do not reach more than 12 cm in length, and branching is untidy (Fig. 67D). Specimens from Mexico, in general, have thicker branches, and show the typical pinnate pattern of the others from Central America.

The deep bluish purple colour of the colony and the sclerites of this species, and the conspicuous ovals and stout capstans, distinguish this species from the others, including *L. taboguilla*, which has the same colour, but a very different pattern of branching. Comparison of this species to *L. californica*, *L. cuspidata*, and *L. exigua* is discussed above (Table 1).

***Leptogorgia taboguilla* (Hickson, 1928) comb. nov.**
(Figs. 65, 69–70)

Euplexaura taboguilla Hickson, 1928: 343–346; Stiasny 1941: 266–268; 1943: 62.

Material examined. Syntype series: BM 1961.3.9.282 (fragments), ZMUC ANT 113 (2 specimens), preserved, Taboguilla Island, Panama, 5.4 m, T. Mortensen, 27 November 1915.

Other material examined. COSTA RICA: UCR 1663, preserved, 10 m, Salinas Bay, J. Cortés, November 2005. PANAMA: STRI 402, dry, Islote Larry, 3–10 m, H. Guzman, 25 August 2002; STRI 455, dry, Isla Roncadores, 10–20 m, H. Guzman, 30 August 2002; STRI 538–540, dry, Bajo Bolano, Golfo de Chiriqui, 25 m, H. Guzman, 16 April 2003; STRI 646, dry, Bajo Brincanco, 8–10 m, H. Guzman, 5 May 2003; STRI 670, dry, Isla Pacora, Golfo de Chiriqui, 6 m, H. Guzman, 7 May 2003; UCR 1088, dry, Isla Santa Cruz, Golfo de Chiriqui, 5–10 m, H. Guzman, 10 December 2001; UCR 1236, 1238–1244 dry, Isla Jicarita, 10–30 m, H. Guzman, 19 April 2002; UCR 1352, dry, Piedra Hacha, 10–25 m, H. Guzman, 22 April 2002; UCR 1427, dry, Bajo Urraca, 10–30 m, H. Guzman, 27 April 2002; UCR 1436, dry, Islote Almohada, 5–15 m, H. Guzman, 29 April 2002.

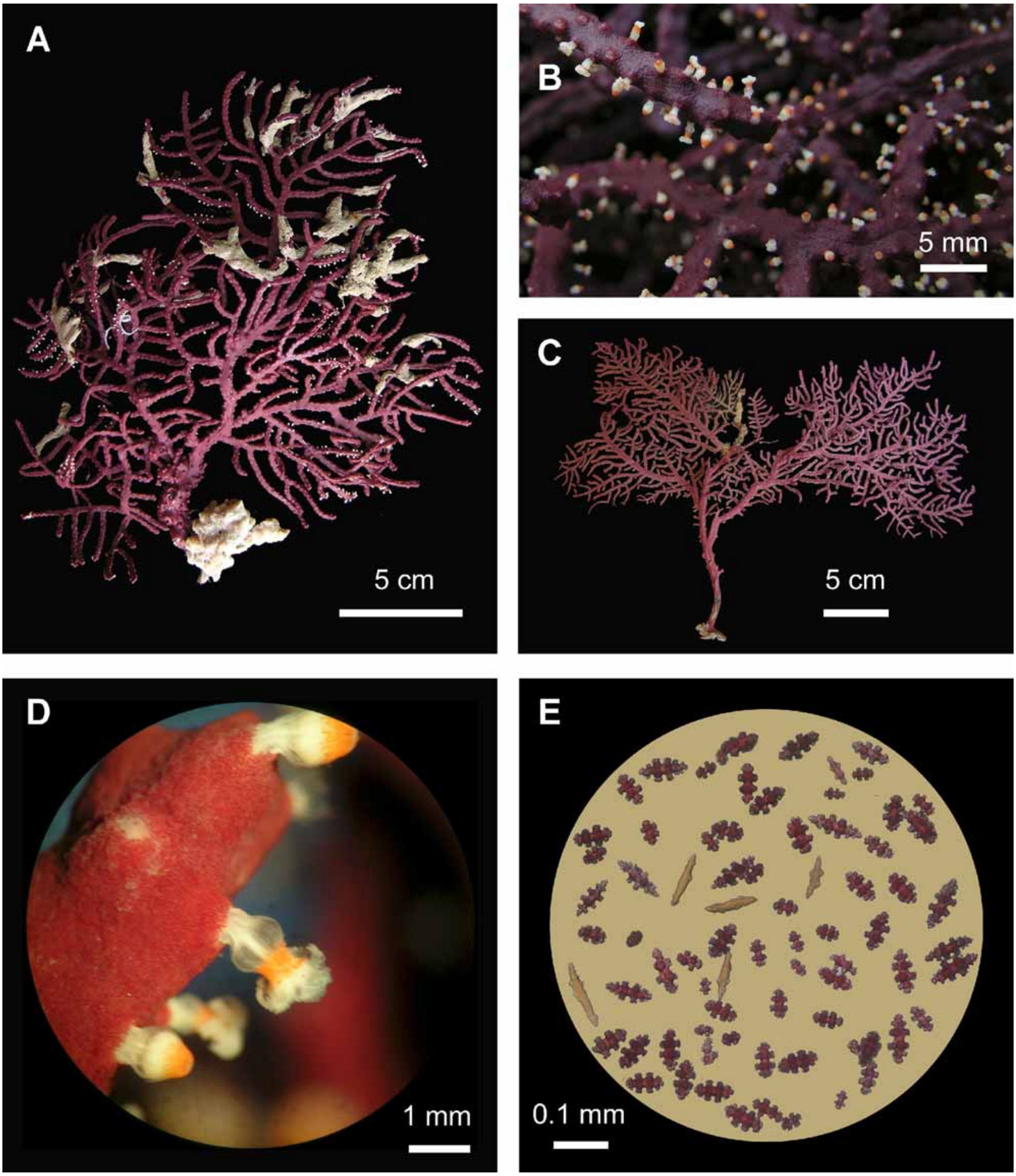

FIGURE 69. *Leptogorgia taboguilla*, **A**, ZMUC ANT 113; **B**, detail of branches (ZMUC ANT 113); **C,** UCR 1352; **D**, detail of polyps (ZMUC ANT 113); **E,** light micrograph of coenenchymal sclerites and anthocodial rods (ZMUC ANT 113).

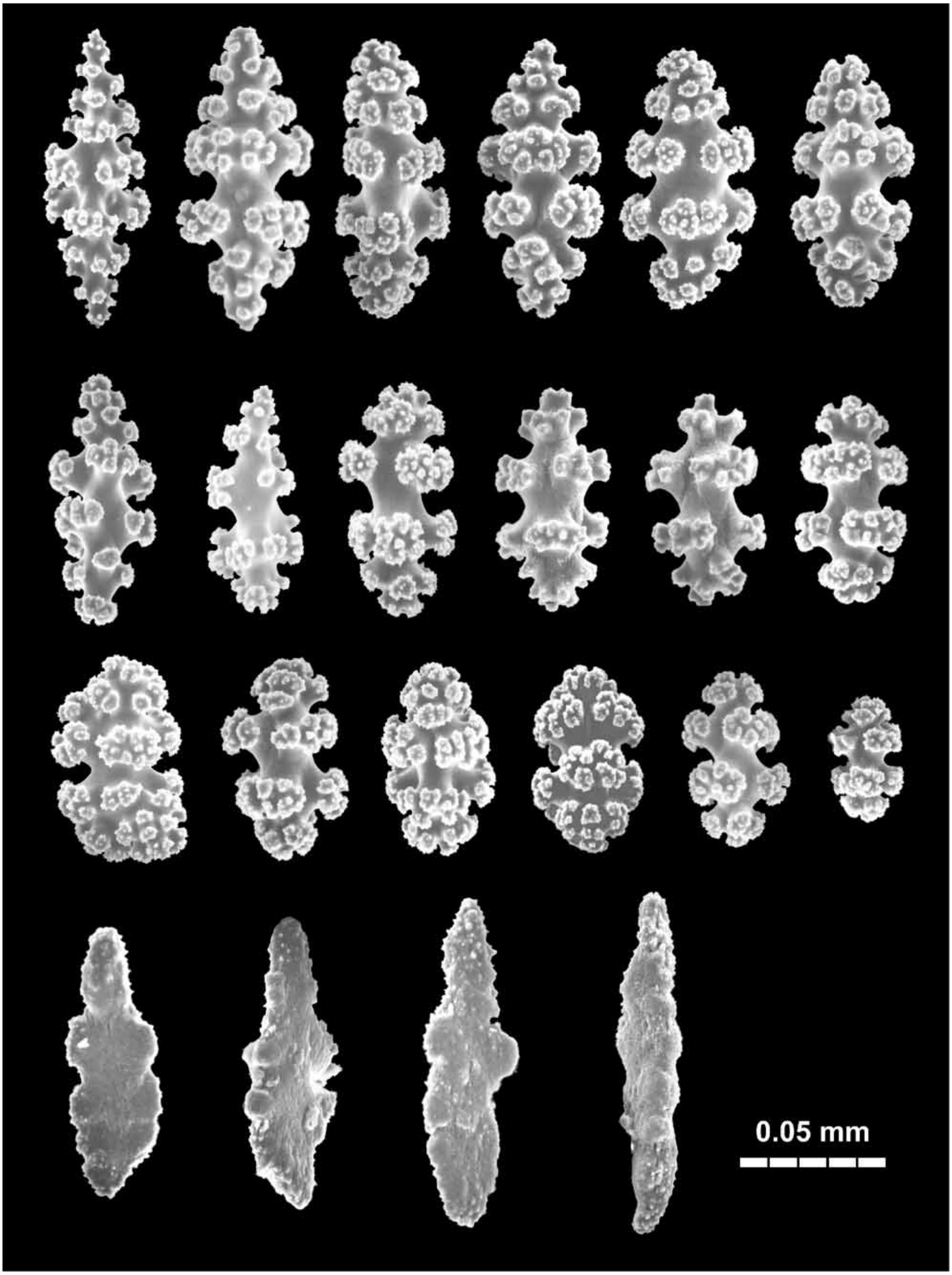

FIGURE 70. *Leptogorgia taboguilla* (ZMUC ANT 113), SEM of coenenchymal sclerites, and anthocodial rods.

Description of syntypes. The syntypes series consists of two colonies and a fragment. One colony is 14 cm in height, 12 cm in width, copiously branched is and without a holdfast The other is 20 cm in height, 18 cm in width (Fig. 69A), and the branching is more planar. The base of this colony is incrusted with calcareous algae and cirripedes, and some of the branches are covered with an encrusting sponge. The fragment is 10 mm in height and 5 mm in width, and it was probably part of one of the other colonies. The examined specimens reach up to 30 cm in height, 25 cm in width. Colonies are bushy, densely branched in various planes arising from spreading holdfasts (Fig. 69C). Stems are slightly flattened, 10–12 mm in diameter and up to 5 cm in length They subdivide into several main branches, 3–4 mm in diameter, in an irregular pinnate style. Branches are flattened in cross section, and in many colonies, they show a conspicuous sinuous or divergent growth style enhanced by the course of longitudinal grooves. Main branches can reach up to 10 mm in diameter and some colonies resemble bonsai trees. Unbranched terminal twigs reach up to 25 mm in length and 2–3 mm in diameter; some tips are pointed, but most of them are clubbed. Polyps are distributed all around the branches and sparsely placed. Polyp-mounds are prominent, dome-shaped, with slit-like apertures (Fig. 69B). Polyps are whitish with a wide band of orange anthocodial rods arranged in points below the tentacles (Fig. 69B, D). Colonies are reddish purple. Coenenchymal sclerites are purplish red (Fig. 69E) and the largest ones are spindles up to 0.11 mm in length and 0.05 mm in width, with 4–8 whorls of tubercles (Figs. 69E, 70). Some have a slightly bent axis. Capstans reach up to 0.08 mm in length and 0.04 mm in width (Figs. 69E, 70). Hickson (1928) reported, "curious dumb-bell shaped spicules" (his illustration p. 344, text-figure 4 shows a dumb-bell sclerite characteristic of the genus *Ellisella*) which are not present in the samples. Anthocodial sclerites are very representative, they are long flat rods, longer than any spindle reaching up to 0.14 mm in length, and 0.03 mm in width, with smooth or serrated margins; some are lobed (Figs. 69E, 70).

Distribution. Taboguilla Island, Panama: type locality. Golfo de Chiriqui and Peninsula de Azuero, Panama; Salinas Bay, Costa Rica (Table 2, Fig. 65).

Remarks. Hickson (1928) described this species, and wrongly placed it under the genus *Euplexaura*. He did not designate a holotype, but the type series is consistent in all aspects with his description.

Leptogorgia taboguilla resembles, in external morphology, some Caribbean species of *Pseudopterogorgia* Kükenthal, 1919, but the scaphoid sclerites characteristic of this genus are not present in this species. This species is very distinct from the other species that present pinnate branching, prominent polyp-mounds and thick branches (*L. labiata*, *L. parva*, *L. pumila*, *L. ramulus*), and is easily recognised by the dark purple colour, flat branches, and the conspicuous ring of orange sclerites at the base of the polyp-tentacles. The large and conspicuous anthocodial rods of this species are similar to the ones of *L. diffusa* and *L. pumila*, but the branching pattern and the arrangement of the polyps are different (Table 1).

Final remarks

The taxonomy of *Leptogorgia* is based on morphological criteria; the form and color of the colony and the sclerites (Table 1). In the eastern Pacific species of the genus *Leptogorgia*, we found a high phenotypic variation which has also been acknowledged in several southern African (Williams 1992, Williams & Lindo 1997), West African (Grasshoff 1988, 1992), and tropical western Atlantic (Bayer 1961) species. Perhaps *Leptogorgia* is the most plastic genus of Gorgoniidae. Information of the physical environment upon which the taxonomists could improve taxonomical decisions is still scarce (Bayer 1961, Rees 1972, Velimirov 1976, West 1993). The growth forms and polyp arrangements in the colonies show a large range of variation. In some cases, these characteristics are very distinct among species and allow field identification, e.g. *L. diffusa*, *L. taboguilla*, *L. laxa*, and *L. regis*. The colour of the colonies is determined by the colour of the sclerites and the specific arrangement of them in the coenenchyme. In the living animals, the colour of a colony changes if the polyps are expanded or withdrawn, e.g. *L. alba* looks pink when the polyps are expanded and white when the polyps are contracted. Colonies of almost all examined species are of one colour, but in some cases, this is evenly intermingled with another, e.g. *L. californica*, pink and yellow. *Leptogorgia cuspidata*, is the only examined species that has rings surrounding the polyp-mounds that are a different colour from the rest of the coenenchyme; yellow spots on purple coenenchyme, or the contrary, purple spots on yellow coenenchyme. This alternating pattern has been observed in West African species, e.g. the Mauritanian species *Leptogorgia albipunctata* Stiasny, 1936, where white spots occur on violet coenenchyme, and the contrary (Grasshoff 1992). Although differences in all the former features are necessary to determine a species, the coenenchymal sclerites, and especially the anthocodials are definitely the structures that mostly show changes and define a species.

According to Williams & Lindo (1997), of the approximately 54 species of *Leptogorgia*, 36 are distributed in the Atlantic Ocean, five are endemic to southern Africa, one is known from the subantarctic, and 12 species are found in the Panamic Province of the eastern Pacific. We herein recognise 21 valid species and one dubious for the eastern Pacific: 16 for Panama, 11 for Costa Rica, 7 for Mexico, 6 for El Salvador, 4 for Peru, 4 for Ecuador, including the only report for Galápagos Islands, 3 for Colombia, 3 for California, 2 for Nicaragua, and 2 for Chile. The present distribution is shown in Table 2. Our sampling effort has been concentred in Costa Rica and Panama; perhaps this has biased the results leading to the higher number of species being recorded from these two regions.

Acknowledgements

Our sincere gratitude to Phil Alderslade (Museum and Art Gallery of the Northern Territory), Leen van Ofwegen (National Museum of Natural History Naturalis, Leiden), Gary Williams (CAS), Stephen Cairns (USNM), and Jorge Cortés (CIMAR) for their advice, critical review, and suggestions. We acknowledge the following people and institutions for their generosity in making available the specimens and information used in this study: BM: Andrew Cabrinovic and Sheila Halsey; CAS: Gary Williams and Bob Van Syoc; CDRS: Cleve Hickmann; MZUT: Lisa Levi; MZUF: Cecilia Volpi; MNHN: Marie-José d'Hondt; MCZ: Ardis Johnston and Van Wallace; USNM: Stephen Cairns; YPM: Eric Lazo-Wasem; ZMHC: Peter Stiewe; ZMUC: Ole Tendal; ZSM: Bernhard Ruthensteiner and Eva Lodde. Our appreciation to: Enrique Freer (CIEMIC); Eleazar Ruiz, Ana Fonseca (CIMAR); Carlos Guevara (STRI); Rita Vargas, and Cristian Trejos (UCR) for their invaluable contribution to make possible this project. Thanks to Percy Denyer (Escuela Centroamericana de Geología, CR) for producing the digital plates. Our gratitude to the governments of Costa Rica and Panama for allowing the visits and collections in the National Parks and reserves. This project was partially sponsored by the Smithsonian Institution's Marine Science Network, STRI's Environmental Science Program, the Vicerrectoría de Investigación, Universidad de Costa Rica, the USNM through its Short Term Visitors Program, and the MCZ Ernst Mayr Grant.

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