

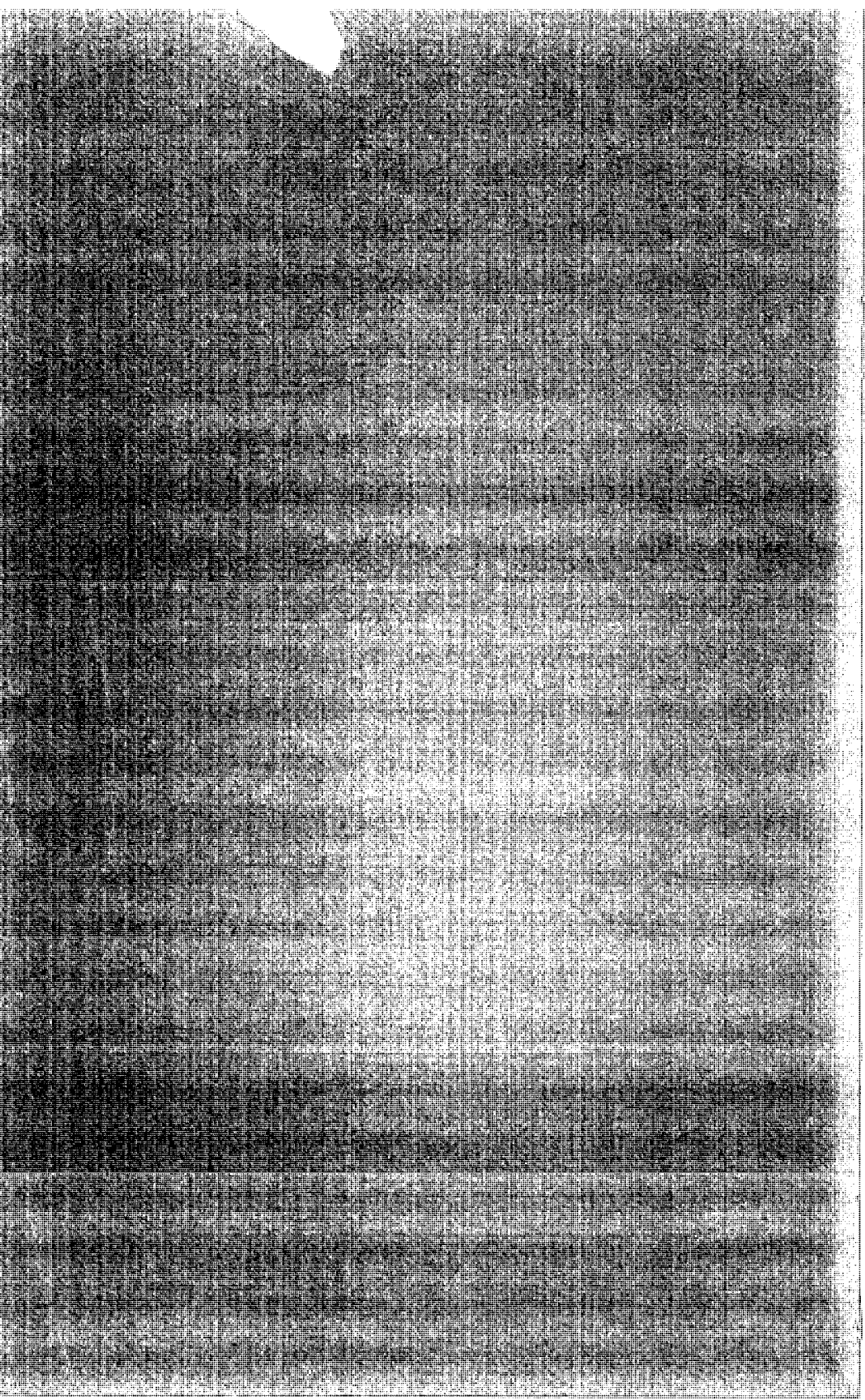
GEOLOGY STUDIES

Volume 13

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Some Octocorallia of Isla de Lobos, Veracruz, Mexico

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University of Wisconsin

ABSTRACT.—*Eunicea* (*Euniceopsis*) *clavigera* Bayer, *E. (E.) calyculata* (Ellis & Solander) forma *coronata* Bayer, *Muricea atlantica* (Kükenthal), *Plexaura homomalla* (Esper), *P. flexuosa* Lamouroux, *Plexaurella dichotoma* (Esper) and *Pseudopterogorgia acerosa* (Pallas) were collected from the Isla de Lobos reef, Veracruz, Mexico, during a study made in August, 1965, by the Coastal Studies Institute of Louisiana State University. Size, color, zonation, and shape of spiculation is diagnostic; in addition, size, color, and shape of the colonies is equally important.

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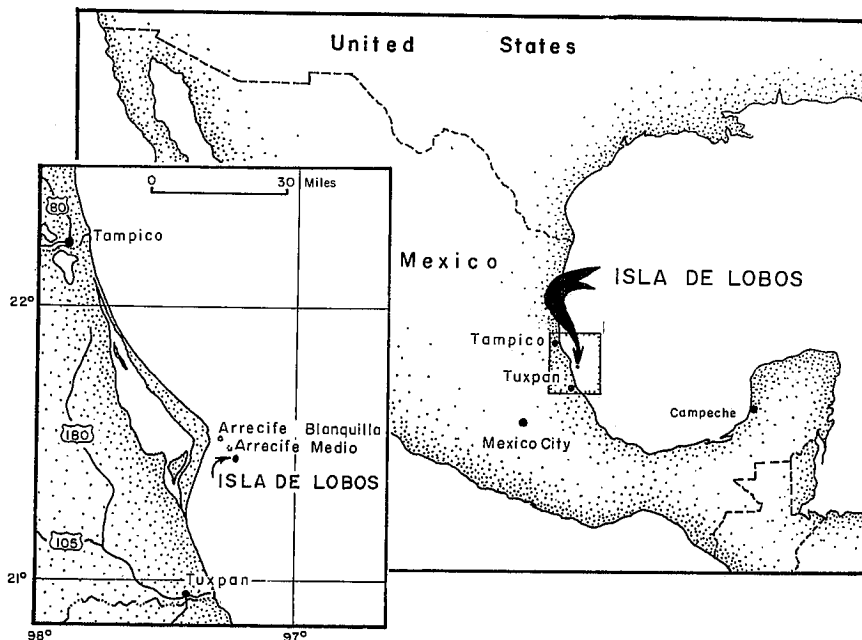
INTRODUCTION AND ACKNOWLEDGMENTS

Isla de Lobos is located in the western portion of the Gulf of Mexico about 65 miles southwest of Tampico, Tamaulipas, about 35 miles north-northeast of Tuxpan, Veracruz, and about 8 miles south-southeast of Cabo Rojo, latitude about 21° 27' N. and longitude about 97° 14' W. (See locality map, Text-fig. 1).

Material on hand represents part of the invertebrate collection made during a five week biologic and sediment study of the reef. Isla de Lobos was selected for this study by the Coastal Studies Institute at Louisiana State University, Baton Rouge, Louisiana, because it is the most northern reef in the western portion of the Gulf of Mexico which has a sand cay.

Although Octocorallia occur at depths from 75 feet to the reef crest, and 7 species are known, they make up a minor portion of the invertebrate population on the island.

Dr. William G. McIntire originated the study and thanks are accorded him for his assistance as project administrator. Thanks are also expressed to Dr. J. Keith Rigby for making it possible for the writer to participate in both field and laboratory investigations related to the project. The study is a by-product of research of the Coastal Studies Institute, Louisiana State University, under sponsorship of the Geography Branch of the Office of Naval Research, Contract Nonr 1575 (03) NR 388 002.

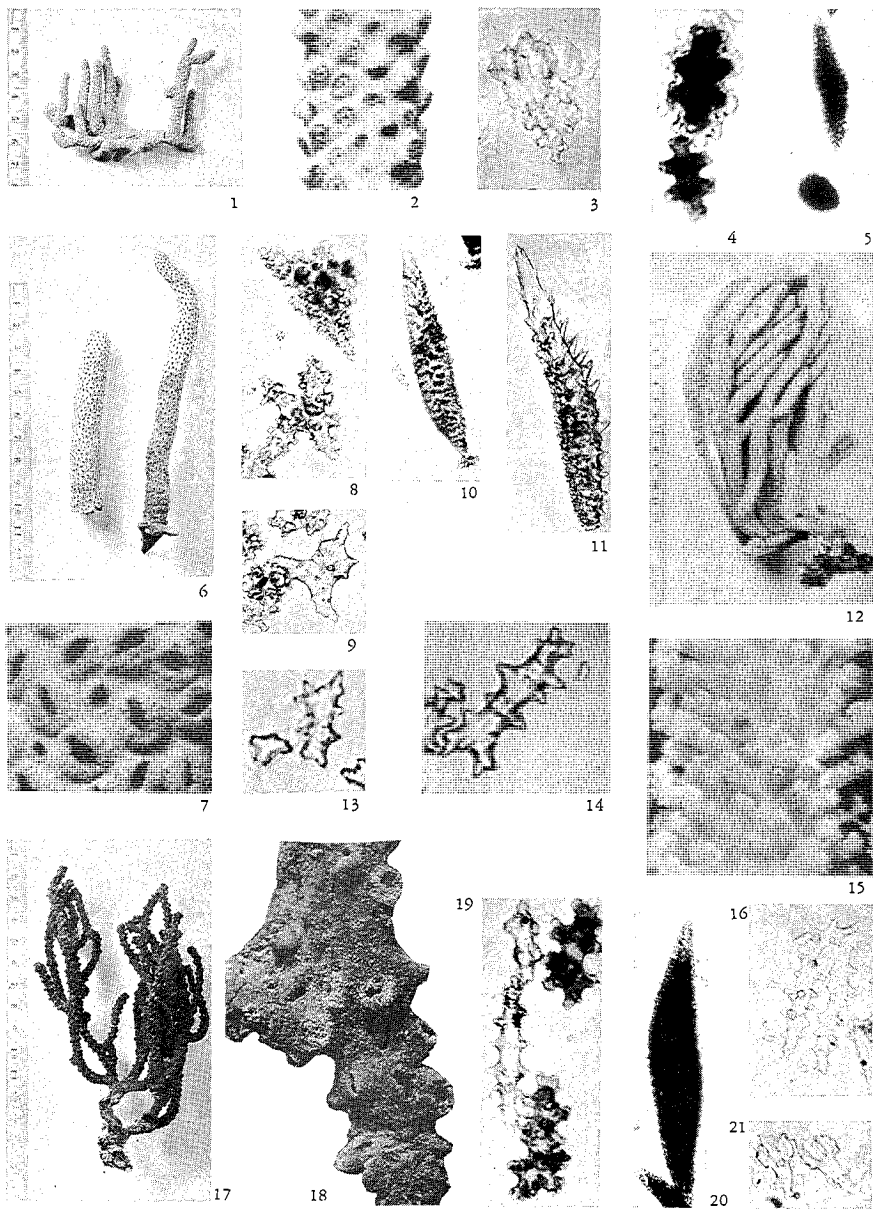


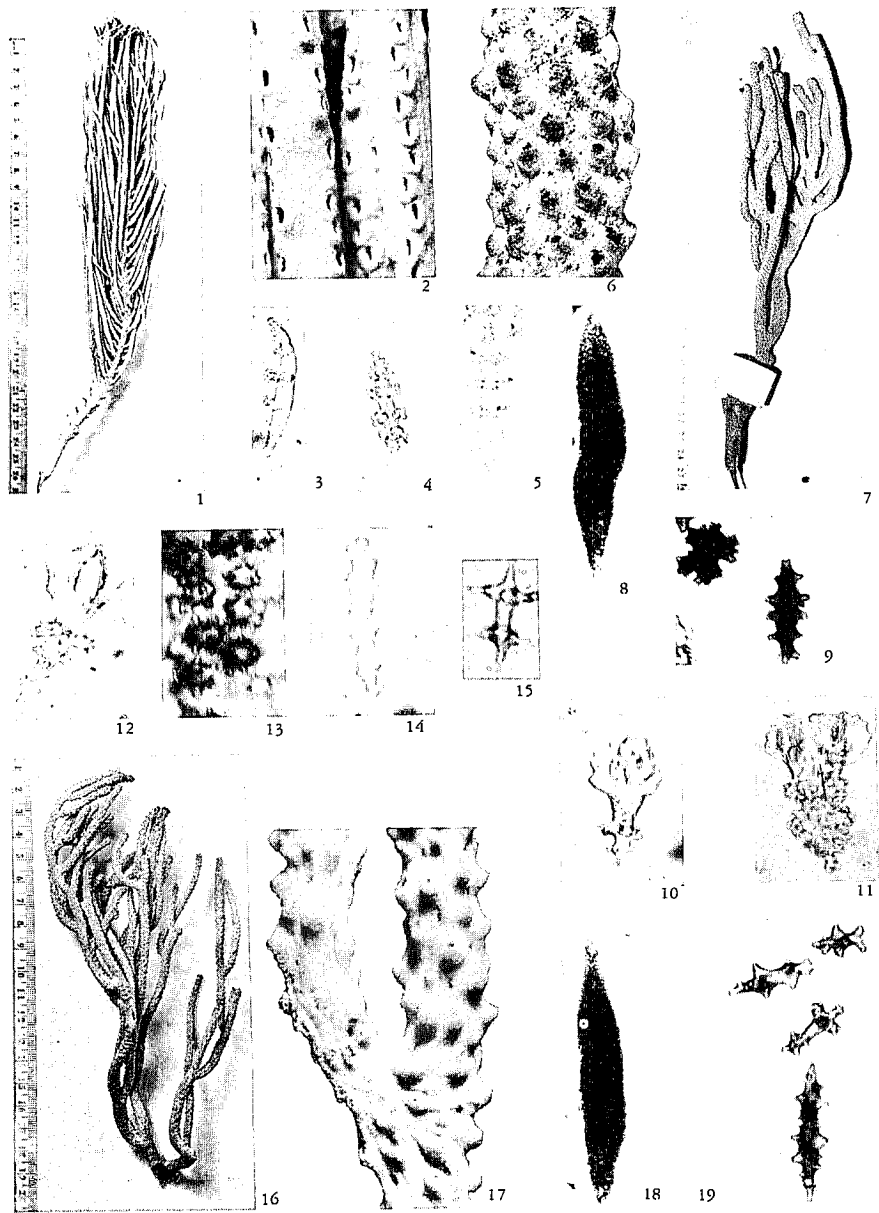
TEXT-FIGURE 1.—Index map. The reef associated with Isla de Lobos was the major area of investigation, but reconnaissance observations were also made on the associated Blanquilla and Medio reefs.

EXPLANATION OF PLATE 1

ALCYONARIANS OF ISLA DE LOBOS

- FIGS. 1-5.—*Plexaura flexuosa* Lamouroux, 1821. 1. partial colony. 2. enlargement of branch showing calycae with retracted anthocodia, x3.5. 3. club of outer layer x107. 4. rod and radiate of inner layer, x92. 5. ovoid and spindle of middle layer, x14.
- FIGS. 6-9.—*Plexaurella dichotoma* (Esper), 1791. 6. partial branches. 7. enlargement of branch showing calycae and dimorphism of zooids, x3.5. 8. quadriradiate of outer layer, x46. 9. quadriradiate with complex warts from middle and inner layer, x46.
- FIGS. 10-16.—*Muricea atlantica* (Kükenthal), 1919. 10. large spindle of outer and middle layer, x14. 11. spined spindle of anthocodial neck, x46. 12. complete colony. 13-14. rods of inner layer of spiculation, x92. 15. enlargement of branch showing long, spiny calycae and anthocodia, x3.5. 16. opercular spindles, x107.
- FIGS. 17-21.—*Eunicea* (*Euniceopsis*) *calyculata* (Ellis & Solander), 1786, forma *coronata* Bayer, 1961. 17. colonial view. 18. enlargement of single branch, x3.5. 19. irregular rods and spindles of inner layer, x92. 20. spindle of middle layer, x14. 21. clubs of outer layer, x107.





SYSTEMATIC ZOOLOGY

Family PLEXAURIDÆ Gray, 1859

Genus EUNICEA Lamouroux, 1816

Remarks.—See Bayer (1955, 1956, 1961) and Deichmann (1936) for a definition of the genus and keys to the species.

EUNICEA (EUNICEOPSIS) CLAVIGERA Bayer, 1961

Plate 2, figs. 12 to 19

?*Eunicea turgida* Ehrenberg, 1834, p. 364.

?*Plexaura turgida* Verrill, 1864, p. 35.

Eunicea (*Euniceopsis*) *clavigera* Bayer, 1961, p. 147.

Description.—A few branches only of *Eunicea* (*Euniceopsis*) *clavigera* Bayer were collected. Longest branch 21 cm. long and 7 mm. wide, branchlets 3 mm. wide, proportionally long and slender. Colony shows lateral branching; seldom, if ever, dichotomous. Colony as a whole is bushy, branching roughly in the same plane. Dry color light yellow-brown. Numerous zooids, randomly disposed over the branches and branchlets. In a state of dry preservation, zooids are raised on the lower lip.

Chestnut brown gorgonian core has soft, chambered axis strung irregularly through center. Cortex made of gorgonian laid down in tight, concentric layers.

There are three distinct layers of spiculation. Innermost layer forms a sheath of small purple sclerites around core. These are mostly thick spindles displaying numerous compound tubercles but also slender spindles displaying sparse conical projections and occasionally small capstans, rods and radials. Size ranges from 0.08 to 0.30 mm. Middle layer mostly occupied by large spindles which are toxoid, sigmoid, arcuate or straight; they are colorless with an occasional purple hue or purple core. Length ranges up to 3.4 mm., and averages between 2 to 3 mm., 4.5 to 8.4 times as long as wide. Sclerites adjacent to purple sheath frequently pale purple, not always simple spindles, but may be compound spindles and double clubs. Outer layer of spiculation composed of colorless foliate and wart clubs ranging from 0.1 to 0.26 mm., but averaging about 0.18 mm. in length. Opercular sclerites are small irregular rods, 0.06 to 0.20 mm. in length.

Remarks.—Four branches were collected south of the reef crest (field locality #38) at a depth of 60'. This is close to the base of the reef and is a zone essentially of *Montastrea* (Scleractinian) with intervening sand aprons.

The material on hand varies from the three specimens described by Bayer (1961) in that the clubs at the outer layer are double the size given by him.

EXPLANATION OF PLATE 2

ALCYONARIANS OF ISLA DE LOBOS

Figs. 1-5.—*Pseudopterogorgia acerosa* (Pallas), 1766. 1. single pinnate branch. 2. enlargement of pinnules, x3.5. 3. scaphoid of outer layer, x107. 4. colorless spindle of inner layer, x107. 5. violet spindle of inner layer, x107.

Figs. 6-11.—*Plexaura homomalla* (Esper), 1792. 6. enlargement of branch, x3.5. 7. partial colony. 8. spindle of middle layer, x14. 9. radiate and spindle-rod of inner layer, x92. 10-11. clubs of outer layer, x107.

Figs. 12-19.—*Eunicea* (*Euniceopsis*) *clavigera* Bayer, 1961. 12. club of outer layer, x107. 13. complex "warts" of large spindles, x214. 14. opercular rod, x214. 15. micro-scleres, relation undetermined (common to several of the species on hand), x214. 16. partial colony. 17. enlargement of branch, x3.5. 18. spindle of middle layer, x14. 19. rods, and spindles of inner layer, x92.

EUNICEA (EUNICEOPSIS) CALYCVLATA (Ellis & Solander),1786, forma *CORONATA* Bayer, 1961

Plate 1, figs. 17 to 21

Eunicea (Euniceopsis) calyculata (Ellis and Solander), 1786, forma *coronata* Bayer, 1961, p. 158.

Description.—Colonies 10-18 cm. high. Main stem short or nonexistent, major branches begin almost immediately and show lateral branching with branchlets, usually, but not always, located all on same side of branch. Branches about 7 mm. and branchlets about 4 mm. in diameter. Medium to dark brown, almost black.

Verrucae highest on lower side. Infolded anthocodia occasionally visible from exterior.

Inner layer of coenenchyme tight, concentric layers of chestnut brown gorgonian with a soft, chambered axis. Colorless or pale violet spindles and rods with some radiates and clubs form a sheath about the core; range from 0.08 to 0.24 mm. in length. Arranged within organic sheath as rows of sclerites running parallel to axis. Middle layer of spiculation of colorless slender spindles with a few clubs and fat spindles, range from 1.4 to 2.0 mm. long, 3.5 to 6.1 times longer than wide. Spicules adjacent to violet sheath often pale violet and small. Outer layer contains small wart clubs 0.09 to 0.14 mm. long. Opercular sclerites slender rods or clubs with small, irregular, knobby warts, range from 0.05 to 0.17 mm. long.

Remarks.—Several colonies were collected from 60 feet deep, in an area composed principally of *Montastrea* with intervening sand aprons.

Genus *MURICEA* Lamouroux, 1821

Remarks.—See Deichmann (1936) and Bayer (1961) for a definition of the genus and keys to the species.

MURICEA ATLANTICA (Kükenthal), 1919

Plate 1, figs. 10 to 16

Gorgonia muricata Lamarck, 1815, p. 163; not *Gorgonia muricata* Pallas, 1766, p. 198.

Muricea muricata Verrill, 1907, p. 301, figs. 144-145, pl. 33B, fig. 2a, pl. 33C, fig. 2d, pl. 36, fig. 2(7); Deichmann, 1936, p. 100, pl. 6, fig. 1, pl. 9, figs. 1-3; Stiasny, 1941a, p. 262, figs. 9-10; Aurivillius, 1931, p. 105, fig. 20.

Eumuricea atlantica Kükenthal, 1919, p. 907; Ries, 1929, p. 399, pl. 8, fig. 4.*Eunicensis dentata* Dubrowsky, 1934, p. 11, figs. 11-15, 21-22, 24-48; pl. 1.*Muricea atlantica* Bayer, 1961, p. 184, fig. 56, pl. 5, fig. 4.

Description.—Single colony collected, now dry, is 20 cm. high and 10 cm. wide. Present dry and original wet color white to straw yellow. Some branches, broken from another colony, are 22 cm. long. Main stem of complete colony splits almost immediately above base into two horizontal branches about 6 cm. long which give rise to about six vertical branches. Vertical branches have 3 to 4 lateral or dichotomous branches; some fusion occurs at convergences. Branches 1 cm. wide, branchlets 5 mm. wide. Branches and branchlets show a slight tendency to remain in same plane, but colony has bushy nature. Verrucae numerous, crowded over root area, stem, branches and branchlets. Verrucae remain extended, about 3 mm. long, inclined upward.

Core soft chambered and unjointed axis surrounded by loculated, chestnut brown and concentric-layered gorgonia, flattened in same general plane of branching.

Spiculation in three layers as in *Eunicea* though such zonation not quite as distinctive. Inner layer or sheath adjacent to core made up of small spindles, ovoids, and octaradiate capstans, 0.12 to 0.54 mm. long. Middle layer made of small, slender spindles which bear only a moderation of simple conical projections. Large spindles, less than 2.0 mm. long, make up base of lower lip of calyces; similar spindles continue *en echelon* out to crown, becoming smaller and more spinose on outside, and developing terminal spines, particularly on the near crown spindles. On the inside they are covered with complex warts. Upper lip of calyces principally a flexible tissue wall, but bear slender spindles about 0.4 mm. long and moderately covered with conical projections. Opercular sclerites small spindles or scaphoids, 0.1 to 0.3 mm. long and covered with cusped processes. All spicules colorless.

Remarks.—This species was collected on the southwest side of Isla de Lobos in 10-15 feet of water. This is field locality #43 and is about 100 feet from the reef crest in an area predominantly of dead *Diploria* and *Montastrea* covered with a mat of brown and green algae.

Genus *PLEXAURA* Lamouroux, 1812

Remarks.—See Bayer (1961) for a definition and key to the genus.

PLEXAURA HOMOMALLA (Esper), 1792

Plate 2, figs. 6 to 11

? *Gorgonia humosa* Esper, 1791, v. 2, p. 36, pl. 6.

Gorgonia homomalla Esper, 1792, p. 104, pl. 29.

Plexaura homomalla Verrill, 1907, p. 304, fig. 147, pl. 35A, fig. 3; Kükenthal, 1924, p. 117; Stiasny, 1935a, p. 66; Bayer, 1956, p. F210; Bayer, 1961, p. 95.

Plexauroopsis tricolor Stiasny, 1935b, p. 69, fig. R, pl. 3, fig. 12.

Plexaura flexuosa Stiasny, 1941b, p. 105.

Description.—Some variety exists in the external appearance of two specimens on hand identified as *Plexaura homomalla* (Esper). Branch from west side of Isla de Lobos is 26 cm. long, and terminal branches are 4 mm. in diameter, proportionally long and slender. Branch from Arrecife Blanquilla is 6 cm. long, and terminal branches are 2.5 mm. wide. Branchlets are all on one side of main branch rising vertically and zooids absent on lower side. Verrucae numerous with raised lower lip tilting upward.

Central core composed of concentric layers of gorgonia with a soft, chambered irregular center. Inner sheath composed of stubby violet capstans, spindles and radials, 0.05 to 0.24 mm. long. Sclerites of middle layer colorless, violet cored, or violet spindles, less than 2.0 mm. in length and 3.0 to 6.5 times as long as wide, curved, toxoid or straight. Outer layer of spiculation made of foliate clubs and unilateral spindles, colorless and 0.14 to 0.58 mm. long. Anthocodial sclerites irregular rods and spindles 0.09 to 0.26 mm. long, acutely slender.

Remarks.—The partial colony from Isla de Lobos was collected from 10-15 feet of water in the lee reef, about 100 feet from the west reef crest (field station #42). This is a region mostly covered with an algae mat on dead coral. The smaller specimen collected from Arrecife Blanquilla had apparently been washed about the tidal flat judging from the worn condition of the specimen.

PLEXAURA FLEXUOSA Lamouroux, 1821

Plate 1, figs. 1 to 5

Plexaura flexuosa Lamouroux, 1821, p. 135, p. 70, figs. 1-2; Gordon, 1925, p. 19, pl. 4, fig. 4a-c; Stiasny, 1935b, p. 57, pl. 4, fig. 18, pl. 7, figs. 35-36; Bayer, 1961, p. 104, fig. 23, pl. 4, fig. 4, pl. 16-17; not *Plexaura flexuosa* Stiasny, 1941b, p. 105.

Plexaura flexuosula Kükenthal, 1924, p. 118.

Plexaura salicordnoides Milne, Edwards and Haimes, 1857, I, p. 153, pl. B2, fig. 2.

Plexaura mutica Duchassaing and Michelotti, 1860, p. 28, p. 3, figs. 9-10; Gordon, 1925, p. 17, pl. 3, figs. 1, 8, pl. 4, fig. 1.

Plexaura edwardsi Stiasny, 1935, p. 51, fig. 10, pl. 4, figs. 19-20, pl. 7, fig. 34.

Eunicella masquesarum Kükenthal, 1919, p. 906; Stiasny, 1938, p. 27, pl. 3, figs. 9-10; pl. 8, figs. 30, 33.

Eunicea humilis Stiasny, 1935b, p. 74, fig. T; pl. 3, fig. 14; pl. 7, fig. 32.

Eunicea hicksoni Stiasny, 1935a, p. 115.

Description.—Specimen, identified as *Plexaura flexuosa* Lamouroux, is only a partial colony. Yellow branch in dry state. Main branch 7 cm. long and 6 mm. wide, and considered to have lain horizontally near the bottom since branchlets are all on one side, perpendicular to branch, and lower side is void of zooids. Longest branchlet 4 cm. long and 6 cm. wide, branching dichotomously and sometimes laterally.

Verrucae prominent, numerous and seemingly randomly arranged. Eight points of the anthocodiae easily visible on exterior, only slightly recessed below rim.

Gorgonian core has the usual soft, chambered axis while gorgonian itself is the usual chestnut brown in tight, concentric layers.

Inner layer of spiculation purple sheath of short, squatty spindles and rods, 0.05 to 0.20 mm. long. Middle layer of spiculation shows gradation in color as well as in form of sclerites; from inward out, deep purple to colorless, and large sclerites sigmoid, toxoid, arcuate or straight spindles, maximum size noted 1.85 mm., ovoids, radiates and clubs nearly as large. Smaller spindles, radials, ovoids and clubs occur as well, average length 0.9 mm. Forms of the sclerites show no preference in color, but are randomly mixed and colorless, violet hued or deep violet. Outer layer composed exclusively of colorless leaf clubs, 0.14 to 0.19 mm. long. Sclerites of anthocodial points slender, irregular spindles and rods, 0.09 to 0.22 mm. long.

Remarks.—This specimen was collected as a loose sample in the littoral zone of the north-west portion of the reef in 2 to 4 feet of water on the leeside of the tidal flat (traverse #5).

Genus *PLEXAURELLA* Kölliker, 1865

Remarks.—See Bayer (1956, 1961) for summary of the genus and a key to the species.

PLEXAURELLA DICHOTOMA (Esper), 1791

Plate 1, figs. 6 to 9

Gorgonia dichotoma Esper, 1791, p. 59, pl. 14.

Eunicea anceps Duchassaing and Michelotti, 1860, p. 25, pl. 3, figs. 1-2.

Plexaurella dichotoma Hargitt and Rogers, 1901, p. 285; Verrill, 1907, p. 310, figs. 156-157, pl. 33B, fig. 1b, pl. 36A, fig. 2, pl. 36A, fig. 1; Kunze, 1916, p. 569, figs. N-P, pl. 28, fig. 5; Bayer, 1956, p. F212; Bayer, 1961, p. 170, fig. 50, pl. 6, figs. 6-7, pl. 23, 24, 25.

Plexaurella cylindrica Verrill, 1912, p. 384, pl. 32, fig. 7, pl. 34, fig. 4, pl. 35, figs. 4, 14.

Plexaurella braziliana Verrill, 1912, p. 385, pl. 34, figs. 3-3a, pl. 35, figs. 12-12a, 15.

Plexaurella obesa Verrill, 1912, p. 383, pl. 31, fig. 3; pl. 32, fig. 9; pl. 34, fig. 6.

Plexaurella heteropora Kunze, 1916, p. 567, figs. K-M, pl. 27, fig. 4.

Plexaurella currata Kunze, 1916, p. 582, figs. B'-E', pl. 27, fig. 9.

Description.—*Plexaurella* much like saguaro cactus in appearance with thick stalk and lateral branches. Branches on hand 8 to 12 cm. long and 1 to 1.4 cm. wide. Verrucae small rims about zooid, numerous and randomly arranged. In present dry, and perhaps in original wet condition, apertures are narrow slits 0.8 to 1.2 mm. long. Several small circular zooids probably represent dimorphism (see Plate 1, fig. 7). Colony pale brown when dry.

Central cortex composed of gorgonia with a soft, chambered, irregular axis. Gorgonia portion mostly composed of lenticular calcite rods with thin gorgonia layers separating them. In cross section, six canals visible running parallel and adjacent to axis; smaller canals run through spiculated coenenchyme connecting zooids.

Spiculation is rather uniform with colorless quadriradiates predominating, but with some spindles, triradiates, and sexradiate capstans. Size varies from less than 0.20 to 0.47 mm. Anthocodial rods are approximately 0.06 mm. long.

Remarks.—Branches of *Plexaurella dichotoma* were collected from 10 to 15 feet deep on the lee of Isla de Lobos, about 100 feet from the seaward side of the reef crest (field locality #42) as well as from the south side on the windward edge.

Family GORGONIIDAE Lamouroux, 1812

Genus *PSEUDOPTEROGORGIA* Kükenthal, 1919

Remarks.—See Bayer (1961) for a definition of the genus and a key to the species.

PSEUDOPTEROGORGIA ACEROSA (Pallas), 1766

Plate 2, figs. 1 to 5

Gorgonia acerosa Pallas, 1776, p. 172; Esper, 1792, v. 2, p. 106, pl. 31.

Gorgonia setosa Esper, 1791, v. 2, p. 66, pl. 17.

Pterogorgia pinnata Milne-Edwards and Haime, 1857, v. I, p. 168, not *Gorgonia pinnata* Linnaeus, 1758, p. 802.

- Pterogorgia bipinnata* Bielschowsky, 1929, p. 213, fig. 37, pl. 4, fig. 21, not *Pterogorgia bipinnata* Verrill, 1864, p. 31.
- Pterogorgia acerosa*, forma *typica* and forma *arbuscula* Bielschowsky, 1929, p. 209, figs. 32-34, pl. 4, figs. 18-20, not *Pterogorgia acerosa*, var. *elastica* Bielschowsky, 1929, p. 210, fig. 35, pl. 5, fig. 23, not *Pterogorgia acerosa*, var. *rigida* Bielschowsky, 1929, p. 212, fig. 36, pl. 5, fig. 24.
- Pterogorgia acerosa* Deichmann, 1936, p. 198, pl. 21, figs. 17-20.
- Pterogorgia ellisiana* Deichmann, 1936, p. 199, pl. 21, figs. 21-24, not *Pterogorgia ellisiana* Milne-Edwards and Haime, 1857, v. I, p. 169.
- Pterogorgia acerosa*, var. *elastica*, Stiasny, 1941b, p. 112.
- Antillogorgia acerosa* Bayer, 1951, p. 91-102; Bayer, 1956, p. F212.
- Pseudopterogorgia acerosa* Bayer, 1961, p. 240, fig. 76, pl. 9, fig. 3.

Description.—Colony somewhat bushy, about 1.3 mm. high and 1 mm. wide, stands erect, and colored white, pale yellow-brown or pale violet. Two main stems and numerous branches, heavily pinnate. Single branch collected is 28 cm. long; pinnules range from 12 cm. near stem to 3 cm. at tip of branch. Branches and pinnules generally, but not strictly, arranged in same plane. Both branches and pinnules round in cross section but may tend to be compressed in plane of alignment.

Zooids not observed on stems, but where present on branches, they are on upper surface toward stem and form small clusters. Zooids arranged *en echelon* or in parallel rows on lateral edges of pinnules, occasionally cross from one edge to the other. Branches about 7 mm. at thickest parts and pinnules 3 mm. Pinnules occasionally show dichotomous branching.

Central chord soft, chambered and unjointed thread 0.04 mm. in diameter, surrounded by concentric layers of red-brown, horny gorgonia which makes up about a quarter of the diameter of a pinnule. Some lenticular layers of calcite occasionally included within gorgonia layer. Zooids imbedded in coenenchyme without verrucae.

Spiculation consists of two layers. Outer layer made of colorless scaphoids, spindles and rods while inner layer made of colorless and violet spindles or rods. Scaphoids smooth on convex side with 4 to 8 sets of processes on concave side. Size ranges from 0.14 to 0.18 mm. in length. Most spindles are smooth in the middle with four sets of warts clustered on each end. Anthocodial sclerites small irregular rods, 0.06 to 0.10 mm. long.

Remarks.—Collected from the southwest side (leeside, field station #43) of Isla de Lobos in 10 to 15 feet of water and about 100 feet seaward from the reef crest. In general, the area consists of dead *Diploria* and *Montastrea* covered with a mat of brown and green algae.

This species is common throughout the greater part of the western Atlantic.

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