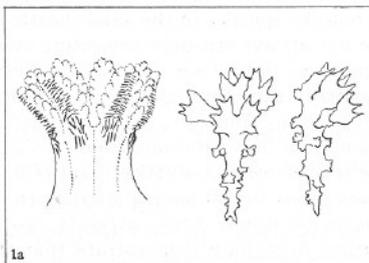


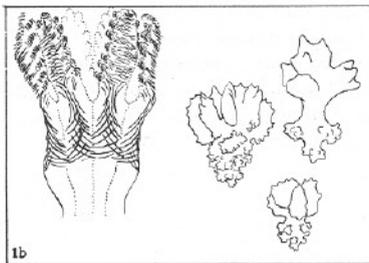
KEY 13

ILLUSTRATED KEY TO THE SPECIES OF *Eunicea*

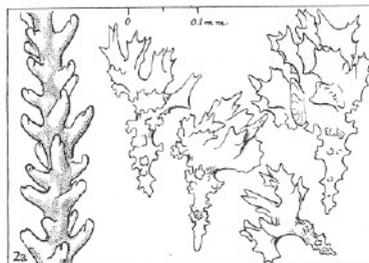
- 1a. Strongest part of anthocodial armature lies on tentacle backs; body wall below tentacles with few or no spicules. Surface of rind contains clubs in the form of torches (subgenus *Eunicea* s.s.): 2



- 1b. Strongest part of anthocodial armature lies in body wall below tentacles where numerous spindles form a distinct crown. Surface of rind contains leaf-clubs or wart-clubs (subgenus *Euniceopsis*): 7

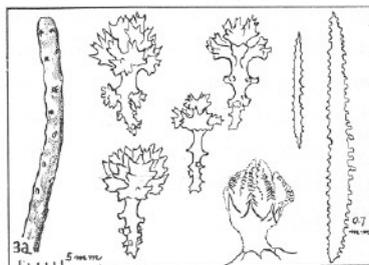


- 2a. Calyces long, tubular, 5-8 mm. tall. Torches large, irregular, spinose: *Eunicea laxispica* (Lamarck)



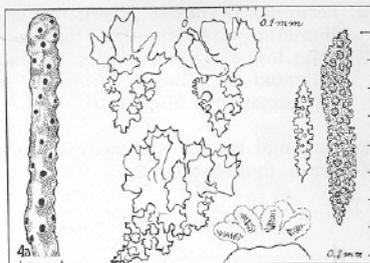
- 2b. Calyces less than 5 mm. tall, mammiform, shelf-like, or absent: 3

- 3a. Branches slender, 2.0-2.5 mm. in diameter. Calyces not projecting, apertures 8-lobed. Anthocodiae with a weak crown containing 1-3 pairs of curved rods 'en chevron' in each sector, below the tentacular armature. Torches very thorny. Cortical spindles slender: *Eunicea pinta* Bayer & Deichmann

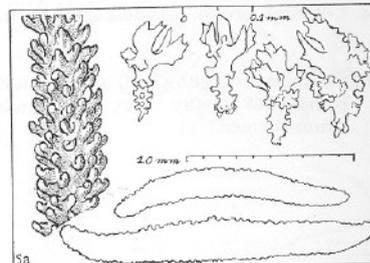


- 3b. Branches usually more than 3 mm. in diameter. Calyces more or less projecting, mammiform, shelf-like, sometimes obscure or absent. Proximal rods of tentacular armature somewhat larger than the rest but not forming a crown. Torches more foliate: 4

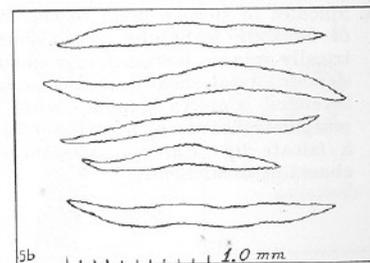
- 4a. Calyces with inconspicuous lower lip or not projecting at all. Most or all spindles of middle cortex purple, rarely reaching 1 mm. in length, usually no more than 0.8 mm. Some of the torches transformed into ornate leafy spheroids: *Eunicea palmeri* spec. nov.



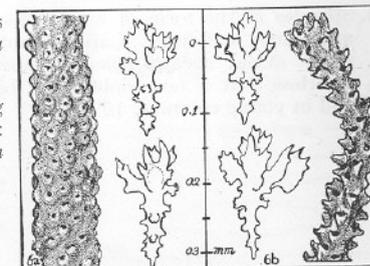
- 4b. Calyces verruciform, hemispherical or short-tubular. Spindles of middle cortex both purple and white, often exceeding 1 mm. in length. Surface layer containing mostly torches, leafy spheroids rare: 5



- 5a. Calyces mammiform or short-tubular, with a tumid lower lip. Dry colonies pale or medium brown. Large spindles of middle cortex rather stout, 5-8 times as long as wide: *Eunicea mammosa* Lamouroux



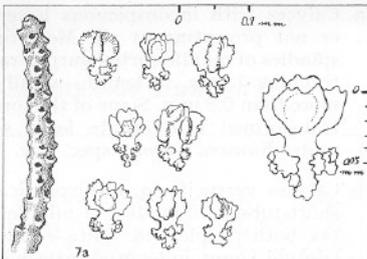
- 5b. Calyces hemispherical or shelf-like. Dry colonies dark brown or blackish. Large spindles of middle cortex more slender, 10-13 times as long as wide: 6



- 6a. Colonies broadly flabellate; branches stout. Calyces hemispherical: *Eunicea succinea* (Pallas), typical form

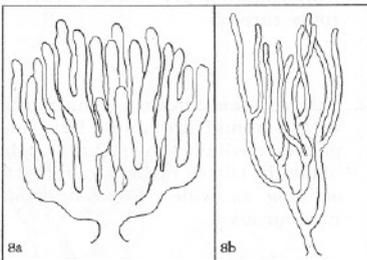
- 6b. Colonies taller, bushy or straggling; branches slender. Calyces shelf-like: *Eunicea succinea* forma *plantaginea* Lamarck

7a. Terminal branches 3 mm. or less in diameter, quite flexible. Calyces forming low elevations, lower lip faintly indicated or absent: *Eunicea fusca* Duchassaing & Michelotti



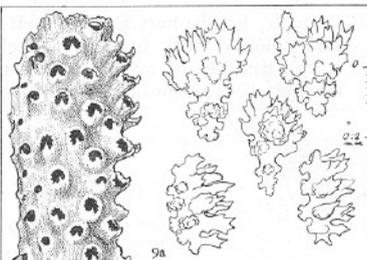
7b. Terminal branches usually more than 3 mm. in diameter: 8

8a. Colonies broad, candelabrum-formed: 9

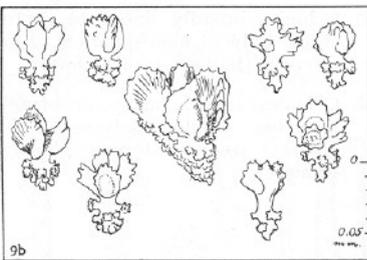


8b. Colonies straggling, tall and ascending, sometimes bushy, but not candelabrum-formed: 11

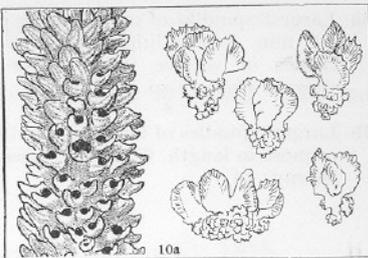
9a. Spicules of surface layer in the form of aculeate leaf-clubs and asymmetrically spinose bodies. Large spindles slender. Axial sheath spicules mostly lavender. Calyces gaping, with 8 marginal lobes of which the lower forms a falcate lip: *Eunicea laciniata* Duchassaing & Michelotti



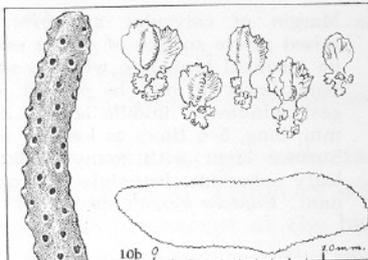
9b. Spicules in the form of wart-clubs or non-spiny leaf-clubs. Large spindles stout. Axial sheath spicules mostly colorless, but a few violet near base and in young colonies: 10



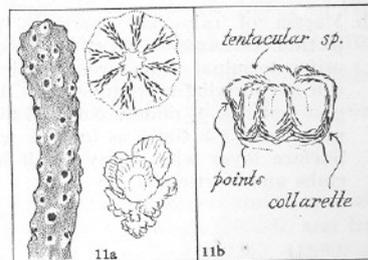
10a. Colonies very stout, terminal branches 10-15 mm. in diameter. Calyces with well-developed lower lip: *Eunicea tournefortii* Milne Edwards & Haime, typical form



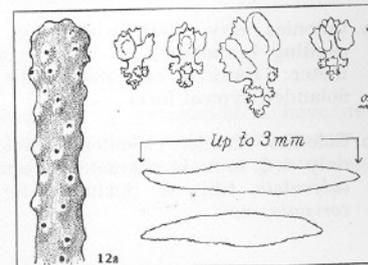
10b. Colonies moderately stout, terminal branches 6-10 mm. in diameter. Calyces with poorly developed lower lip that may be visible only near branch tips: *Eunicea tournefortii*, forma *atra* Verrill



11a. Crown composed of rather few spindles up to about 0.3 mm. long, the proximal ones not forming a conspicuous collaret. Axial sheath spicules mostly colorless except in young colonies and near base of large specimens, where some pale violet forms occur: *Eunicea asperula* Milne Edwards & Haime

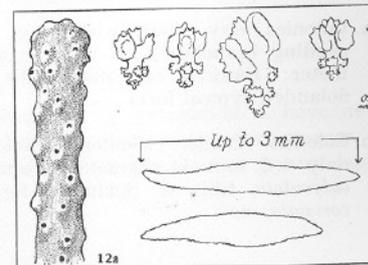


11b. Crown composed of numerous spindles 0.3-0.7 mm. long, or more, proximal ones strongly oblique or transverse, forming a collaret. Lavender spicules occur throughout axial sheath in colonies of all sizes: 12

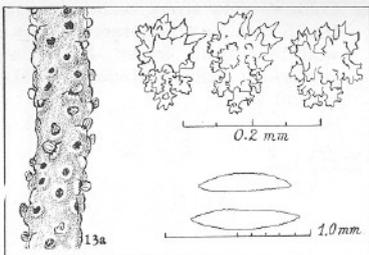


12a. Largest spindles of middle cortex 2-3 mm. long, slender $5\frac{1}{2}$ to 7 times as long as wide. Surface layer of cortex with small clubs about 0.1 mm. long: *Eunicea clavigera* spec. nov.

12b. Largest spindles of middle layer not more than 2 mm. long. Clubs of surface layer commonly longer than 0.15 mm.: 13

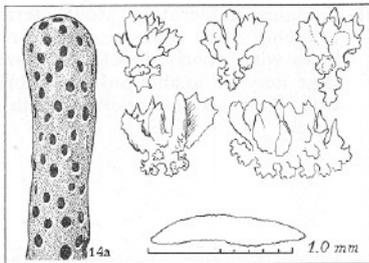


13a. Largest spindles of middle layer up to 0.8 mm. long. Clubs and spheroidal bodies of surface layer coarse and thorny: *Eunicea* sp. indet.

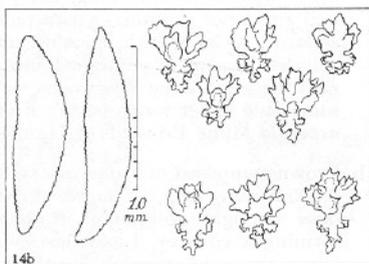


13b. Largest spindles of middle layer 1 mm. or more in length. Clubs not especially thorny: 14

14a. Margin of calycular apertures not raised above surface of cortex except on terminal branches, where a small, blunt lower lip may be present. Largest spindles of middle layer 1.2-1.5 mm. long, 5-6 times as long as wide. Surface layer with many unilateral leafy spheroids, leaf-clubs not abundant: *Eunicea knighti* spec. nov.

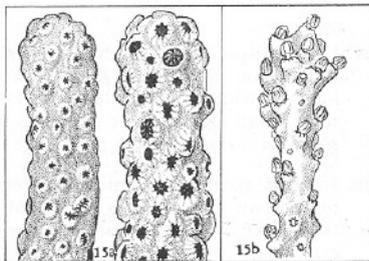


14b. Margin of calycular apertures projecting throughout most of colony, orifice terminal or up-turned but lower rim not forming a prominent lip. Largest spindles of middle cortex 1.5-2.0 mm. long, 3-5 times as long as wide. Surface layer with many small leaf-clubs and wart-clubs: 15



15a. Colonies very stout, with long, ascending branches 8-16 mm. in diameter: *Eunicea calyculata* Ellis & Solander, typical form

15b. Colonies smaller, slender, branches only 4-5 mm. in diameter: *Eunicea calyculata* Ellis & Solander, forma *coronata*, nov.



Subgenus *Eunicea* s.s.

Diagnosis. Anthocodial armature consists of small, flattened rods located mostly in the tentacles.

28 *Eunicea (Eunicea) laxispica* (Lamarck), 1815

(Fig. 27; Pl. XX)

Gorgonia laxispica LAMARCK 1815b, p. 163. (l'Océan américain?)

Eunicea laxispica, STIASNY 1951, p. 52, pl. 9 fig. A, pl. 16 figs. 1-3. (Guadeloupe.)

Diagnosis. Openly branched colonies with exceptionally tall, tubular calyces up to 8 mm. in height (Fig. 27 a). Tentacles with small rods (Fig. 27 c-d), transverse or oblique except at the base (Fig. 27 b). Axial sheath containing numerous acute spindles with complex tubercles, purple in color (Fig. 27 e); middle layer of rind containing elongate spindles up to 1.8 mm. long and about 9 times as long as wide (Fig. 27 g); surface layer containing ornate torches of large size, reaching about 0.3 mm. in length (Fig. 27 f). Color of colonies in alcohol, cream white.

Material. The collections of the U.S. National Museum contain a specimen from NEW PROVIDENCE, collected by Conrad Limbaugh (50553), and fragments from two localities off PUERTO RICO, *Fish Hawk* (42147, 42590) and the Johnson-Smithsonian Exp. (43794, 43795).

Distribution. Bahamas; Antilles.

Remarks. This distinctive species appears to be uncommon. I have never collected it, and the material in the U.S. National Museum is rather meager. Its rarity in collections may be due to the fact that it lives in somewhat greater depths than do most *Euniceas*.

29 *Eunicea (Eunicea) pinta* Bayer & Deichmann, 1958

(Figs. 28a, 29)

Eunicea pinta BAYER & DEICHMANN 1958, p. 232, figs. 1,4-5.

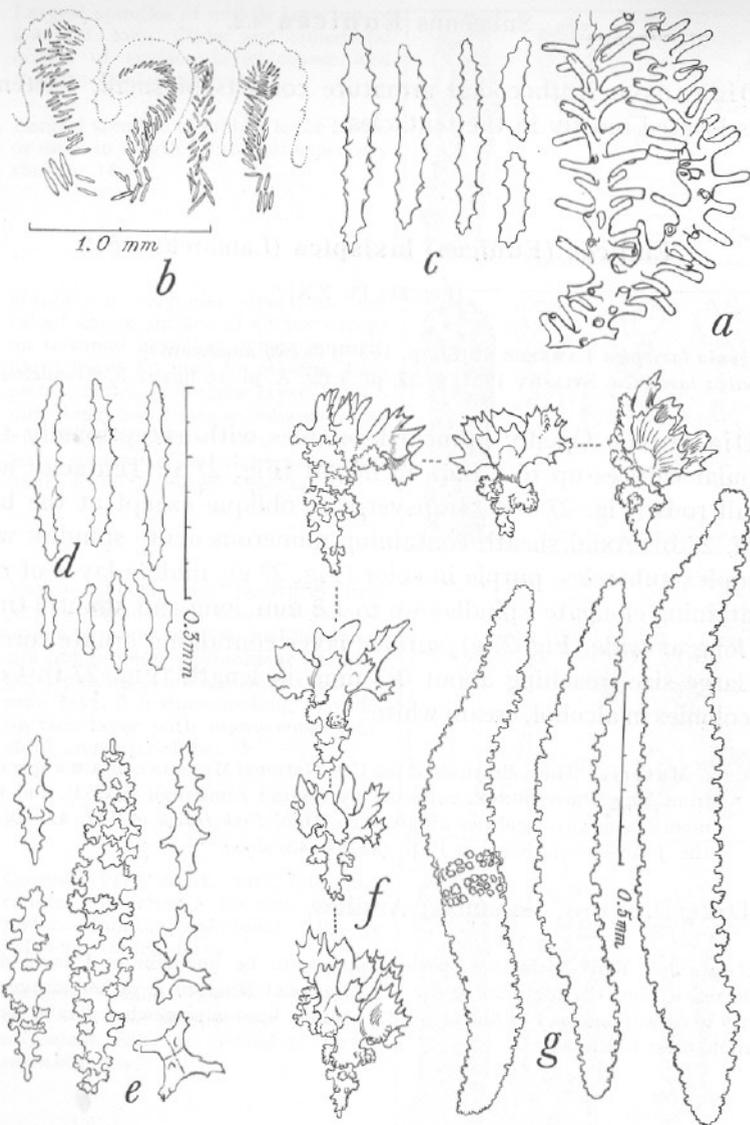


FIGURE 27. *Eunicea laxispica* (Lamarck): a, part of a branch, after STIASNY. b-c, spicules of a specimen from New Providence (USNM 50553); b, arrangement of spicules in tentacles; c, tentacular rods. d-g, spicules of a specimen from Puerto Rico (43795); d, anthocodial rods; e, spicules of axial sheath; f, torches of outer rind; g, spindles of middle rind. (Enlargement of b and e indicated by scales adjacent; that of c-f by 0.3 mm. scale at d.)

Diagnosis. Colonies tall and openly branched, dichotomous and lateral; terminal branches 2.0–2.5 mm. in diameter. Polyps with a crown of 1–3 pairs of bent rods beneath each tentacle, and small rods transverse in the tentacle backs. Torches with large, spinose heads and slender handles. Middle layer with colorless needles and slim spindles 1.0–1.8 mm. in length; inner layer with purple spindles and capstans.

Description. The colonies are very tall and straggling, with long, flexible terminal branches 2.0–2.5 mm. in diameter and up to 50 cm. in length, arising laterally or dichotomously at wide angles (Fig. 28 a). Projecting calyces are not developed but the anthocodiae are mostly preserved exsert. The crown (Fig. 29 b) contains

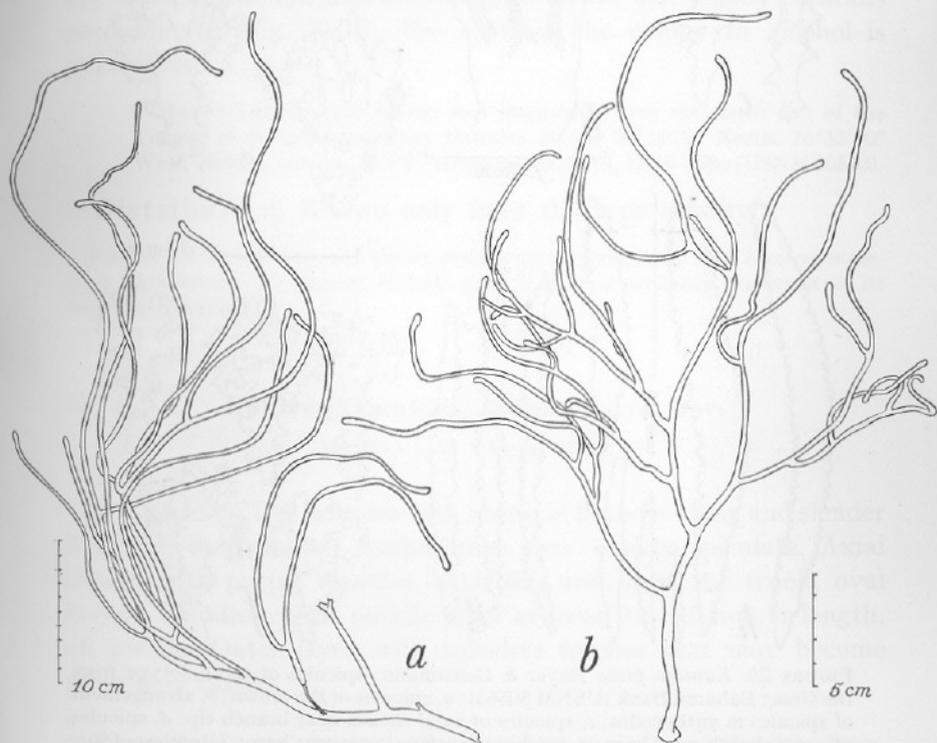


FIGURE 28. *Eunicea pinta* Bayer & Deichmann; a, colony. *Plexaura nina* Bayer & Deichmann; b, colony. (Reductions as indicated by scales.)

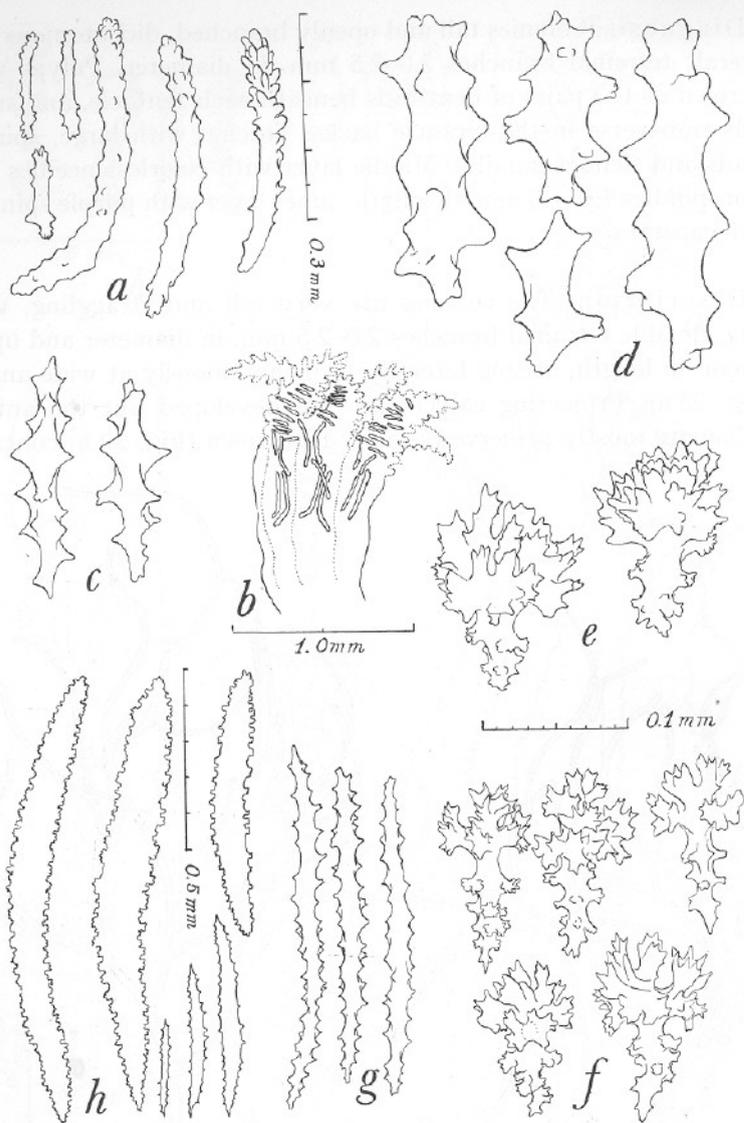


FIGURE 29. *Eunicea pinta* Bayer & Deichmann; spicules of the holotype from the Great Bahama Bank (USNM 50563): a, spicules of the crown; b, arrangement of spicules in anthocodia; c, spicules of axial sheath near branch tip; d, spicules of axial sheath near base; e, torches of surface layer near base; f, torches of surface layer near branch tip; g, aculeate needles of middle rind near branch tip; h, spindles of middle rind near base (needles like those in g, and smaller spindles, are more numerous than large spindles). (Enlargement of a and g indicated by 0.3 mm. scale at a; that of b by adjacent 1.0 mm. scale; that of c-f by 0.1 mm. scale above f; that of h by 0.5 mm. scale adjacent.)

a pair of bent rods about 0.4 mm. long beneath each tentacle and numerous small, flat rods transversely placed in the tentacle backs (Fig. 29 a). The spinose torches of the outer layer (Fig. 29 f) are very characteristic and unlike those of any other known species. The middle layer of rind contains abundant colorless needles about 0.5 mm. in length (Fig. 29 g), and slender, curved spindles with complex tubercles; distally, the spindles measure about 1.0×0.05 mm., increasing in length and girth toward the base of the colony where they may measure 1.8×0.2 mm. (Fig. 29 h). All spicules of the middle and outer layers of cortex are colorless. The axial sheath contains bright purple spindles and capstans. Distally, the spindles are about 0.2 mm. in length (Fig. 29 c), increasing somewhat in size toward the middle of the colony. As the base is approached, the spindles become quite blunt, and stubby capstans predominate (Fig. 29 d). The color of the colony in alcohol is pure white.

Material. The type colony and fragments, from the south end of the Tongue of the Ocean, GREAT BAHAMA BANK, $23^{\circ}34'00''$ North, $76^{\circ}33'00''$ West, 36 fms., bottom 74.2°F ., Albatross sta. 2649, 12.IV.1886 (USNM 50563).

Distribution. Known only from the type locality.

Remarks. The spicules of *Eunicea pinta* suggest relationship with *Eunicea mammosa* Lamouroux. Its slender, flexible growth form is probably the result of its deep-water habitat.

30

Eunicea (Eunicea) palmeri spec. nov.

(Fig. 30 a-j; Pl. I fig. 4, II fig. 4)

Diagnosis. Tall colonies with terminal branches long and slender 3-4 mm. in diameter. Anthocodiae very weakly spiculate. Axial sheath with purple spindles, capstans, and, near the trunk, oval bodies. Spindles of the middle layer at most 0.8-1.0 mm. in length, all purple. Outer layer with colorless torches that may become extremely ornate.

Description. Colonies with exceptionally soft and flexible, long, slender branches 3-4 mm. in diameter and up to 35 cm. in length.

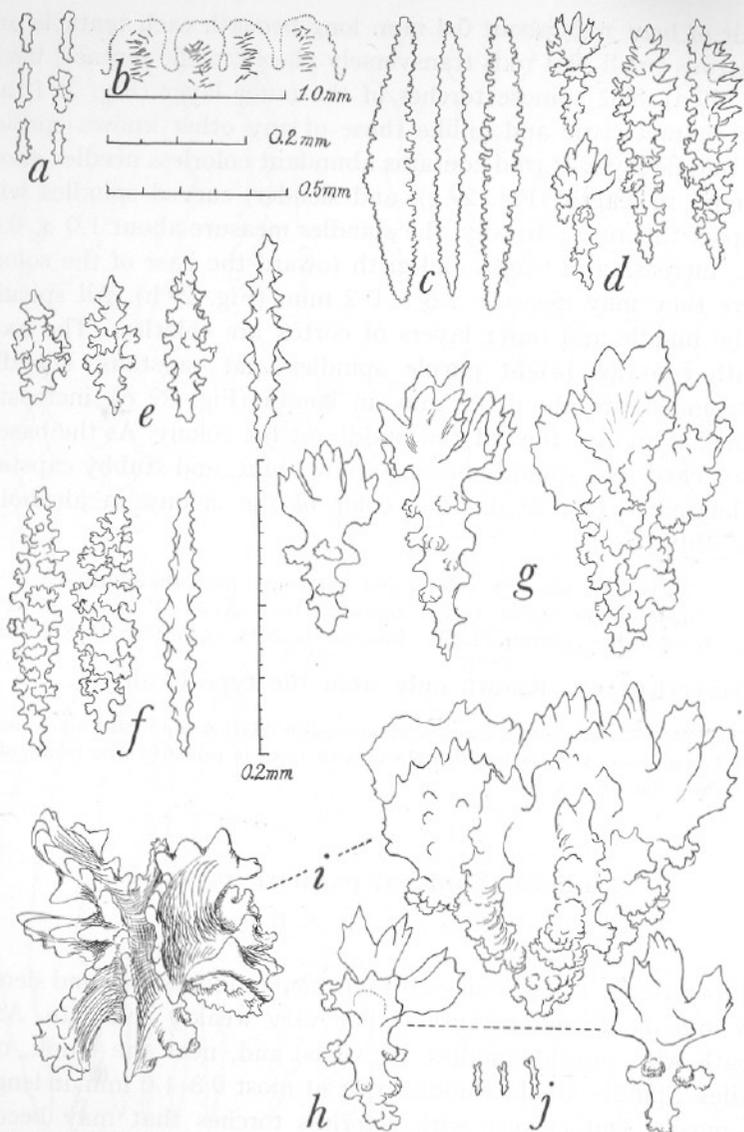


FIGURE 30. *Eunicia palmeri* spec. nov. a-g. spicules of the holotype from Florida (USNM 50747): a, flat rodlets of tentacles; b, arrangement of spicules in tentacles; c, spindles of middle rind; d, torches and unilaterally spined forms of outer rind; e, spicules of axial sheath near branch tip; f, spicules of axial sheath near base; g, torches at greater enlargement. h-j, spicules of a specimen from Key West (50679): h, ordinary torches of outer layer; i, large torches of outer layer, one from the side, one from above; j, tentacular rodlets. (Enlargement of a, d, e, f, i indicated by 0.2 mm. scale at b; that of b by 1.0 mm. scale at b; that of c by 0.5 mm. scale at b; that of g-i by 0.2 mm. scale to right of f.)

Small colonies may be branched in one plane, in an irregular candelabrum form with rather few branches (Pl. II fig. 4); larger colonies tend to become quite bushy (Pl. I fig. 4). Calyces are developed in some specimens, chiefly near the branch tips, as a low, shelf-like lip beneath each aperture, but in other specimens they are not present at all. The anthocodiae are very weakly spiculated, having only a few tiny, flat rods (Fig. 30 a-b) crosswise in the tentacles. The axial sheath contains deep reddish purple spindles, some of them slender and acute, sculptured with simple processes, others stout, not so sharp, and covered with complex tubercles (Fig. 30 e); toward the base of the colonies they increase in size (Fig. 30 f), and some coarse, oval bodies may occasionally be found. The middle layer of rind has slender, purple spindles usually about 0.8 mm. long but reaching 1.0 mm. in some specimens (Fig. 30 c). The outer layer of rind contains purple spindles with strong thorns on one side, and colorless torches with sharply lacinate heads (Fig. 30 d, g); toward the base of the colonies many of the clubs may be very coarse and stout, with short, tuberculate handles and elaborately foliate and lacinate heads (Fig. 30 i). In some colonies, these exceptionally ornate clubs are very abundant and may be found even in the terminal branches. The color of fresh and alcoholic specimens is purplish gray, purplish brown, or grayish brown; the deep purple spindles may be seen at the surface among the colorless torches. Dry colonies are brown; the coenenchyme becomes so friable that the specimens are easily damaged.

Material. Holotype: FLORIDA, seaward side of Soldier Key, Biscayne Bay, depth 3-4 feet at low tide, F. M. Bayer coll., 10.IV.1948 (USNM 50747). Other material: 7 alcoholic specimens from the same locality (USNM 50388, 50389, 50743); dry colonies from Caesar's Creek, upper Florida Keys, J. E. Benedict, 1901 (USNM 50690), and from Key West, Dr. Edward Palmer, 1884 (USNM 50679).

Distribution. At present known only from the Florida Keys, from Soldier Key to Key West.

Ecology. *Eunicia palmeri* is abundant in 3-6 feet of water on the seaward shore of Soldier and Ragged Keys, where it grows together with *Pseudopterogorgia acerosa*, *P. americana*, *Plexauella dichotoma*, and others. Colonies at Soldier Key have been found infested with a creeping ctenophore, *Coeloplana*.

Remarks. This species is easily recognized by the spindles of the middle rind, which are all colored purple and rarely reach a length of 1 mm. The peculiar, ornate clubs with broad head and short handle are also very distinctive, but are uncommon in some colonies. The weak spiculation of the anthocodiae is a noteworthy feature.

31 *Eunicea (Eunicea) mammosa* Lamouroux, 1816

(Fig. 31; Pl. II fig. 1)

Gorgoniae muricatae Variet. ESPER 1796, *Forts. I*, p. 152, pl. 39A. ("Ohne bestimmte Anzeige des Aufenthalts.")

Eunicea mammosa LAMOUROUX 1816, p. 438, pl. 17.

Gorgonia madrepora DANA 1846, p. 671. (West Indies.)

Gorgonia mammosa, DANA 1846, p. 672. (West Indies.)

Eunicea Esperi DUCHASSAING & MICHELOTTI 1860, p. 20, pl. 2 figs. 4-5. (St. Thomas.)

Eunicea Ehrenbergi DUCHASSAING & MICHELOTTI 1860, p. 21, pl. 2 figs 6-7. (Guadeloupe.)

Eunicea mammosa, KÜENTHAL 1924, p. 120, fig. 86.

Eunicea mammosa, STIASNY 1935d, p. 81, pl. 7 fig. 33. (Dry Tortugas.)

Diagnosis. Colonies spread mostly in one plane, the branching lateral and dichotomous (Pl. II fig. 1). Calyces short, tubular and bluntly rounded so as to appear mammiform, close-set and directed upward. Anthocodial armature tentacular, no crown below tentacles (Fig. 31 e-f). Axial sheath containing acute purple spindles, some sculptured with simple spinules, others with complex tubercles (Fig. 31 b); middle rind containing coarsely tuberculate spindles reaching a length of about 1.5 mm. and 5 to 8 times as long as wide, purple, white, or bicolored (Fig. 31 a); outer rind with colorless torches up to about 0.2 mm. long (Fig. 31 c-d).

Material. Collected by Hummelinck at BONAIRE, Lac, sandy reef, 1-2 m. deep, sta. 1068A, 1.X.1948, fragments in alcohol (USNM 50499).

The collections of the U.S. National Museum contain several specimens from the FLORIDA KEYS (50342), BAHAMAS (14367, 14510, 50136, 50247, 50320, 50552, 50726), CUBA (34521), SABA BANK (50331), OLD PROVIDENCE (49767), and also from GRAND CAYMAN (51384), and JAMAICA, Little Pelican Cay, Portland Bight (51356), Gun Cay, Port Royal Cays (51385); MEXICO, Mujeres Hbr., Quintana Roo (51751, 51752).

Distribution. Florida Keys and the Antilles.

Remarks. Most specimens of this species are pale yellowish brown in color. The close-set calyces have a turgid, obese appearance not seen in other *Euniceas*. Among different colonies there is a certain amount of variation in diameter of bran-

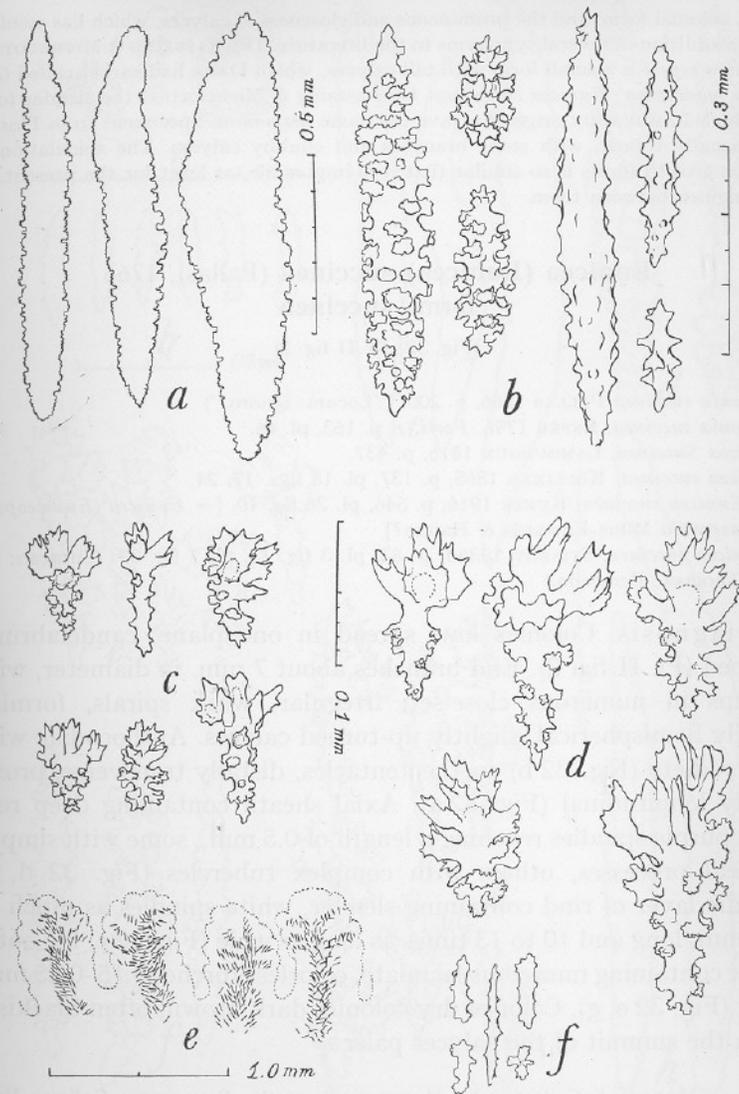


FIGURE 31. *Eunicea mammosa* Lamouroux, spicules. a-d, of a specimen from Andros, Bahamas (USNM 50247): a, spindles of middle rind; b, spicules of axial sheath; c, torches of outer rind; d, torches at greater magnification; e, arrangement of spicules in the tentacles of another specimen from the same locality; f, tentacular rods. (Enlargement of a indicated by 0.5 mm. scale adjacent; that of b, c, f by 0.3 mm. scale at left; that of d by 0.1 mm. scale at left; that of e by 1.0 mm. scale below.)

ches, colonial form, and the prominence and closeness of calyces, which has resulted in the addition of several synonyms to the literature. DUCHASSAING & MICHELOTTI's *Eunicea esperi* is a small form with tall calyces, which DANA had earlier called *Gorgonia madrepora*; *Eunicea ehrenbergi* Duchassaing & Michelotti is the slender form to which LAMOUREUX originally gave the name *mammosa*. Specimens from Florida are usually robust, with stout branches and chubby calyces. The spiculation of all the growth forms is so similar that it is impossible, at least for the present, to distinguish between them.

32 **Eunicea (Eunicea) succinea** (Pallas), 1766

forma **succinea**

(Fig. 32; Pl. II fig. 2)

Gorgonia succinea PALLAS 1766, p. 200. ("Locum: ignoro.")

Gorgonia succinea, ESPER 1796, *Forts. I*, p. 163, pl. 46.

Eunicea Succinea, LAMOUREUX 1816, p. 437.

Eunicea succinea, KÖLLIKER 1865, p. 137, pl. 18 figs. 17, 24.

not *Eunicea succinea*, KUNZE 1916, p. 546, pl. 26 fig. 10. [= *Eunicea (Euniceopsis) asperula* Milne Edwards & Haime?]

?*Eunicea succinea*, STIASNY 1935d, p. 83, pl. 3 fig. 13, pl. 7 fig. 37. (Curaçao; St. Thomas; Bermuda.)

Diagnosis. Colonies low, spread in one plane, candelabrum-shaped (Pl. II fig. 2). End branches about 7 mm. in diameter, with polyps in numerous close-set, irregular, weak spirals, forming nearly hemispherical, slightly up-turned calyces. Anthocodiae with flat rodlets (Fig. 32 b) in the tentacles, distally transverse, proximally longitudinal (Fig. 32 a). Axial sheath containing deep reddish purple spindles reaching a length of 0.5 mm., some with simple, conical processes, others with complex tubercles (Fig. 32 d, f); middle layer of rind containing slender, white spindles as much as 2.0 mm. long and 10 to 13 times as long as wide (Fig. 32 c, h); outer layer containing numerous lacinate, colorless torches 0.15–0.25 mm. long (Fig. 32 e, g). Color of dry colonies dark brown, often blackish, with the summit of the calyces paler.

Material. Collected by Hummelinck at St. EUSTATIUS, Gallows Bay, rocks, 2m., sta. 1116B, 15.VII.1949, 4 dry specimens (USNM 50317); and St. BARTHÉLEMY, Fourche, rock debris, 1.5 m., sta. 1124, 2.VI.1949, 5 dry spec., fragments in alcohol (USNM 50318).

Also examined were specimens from St. CHRISTOPHER; Frigate Bay, Smithsonian-Bredin Exp., 14.V.1956 (USNM 50326), and TOBAGO, Milford Bay (51414).

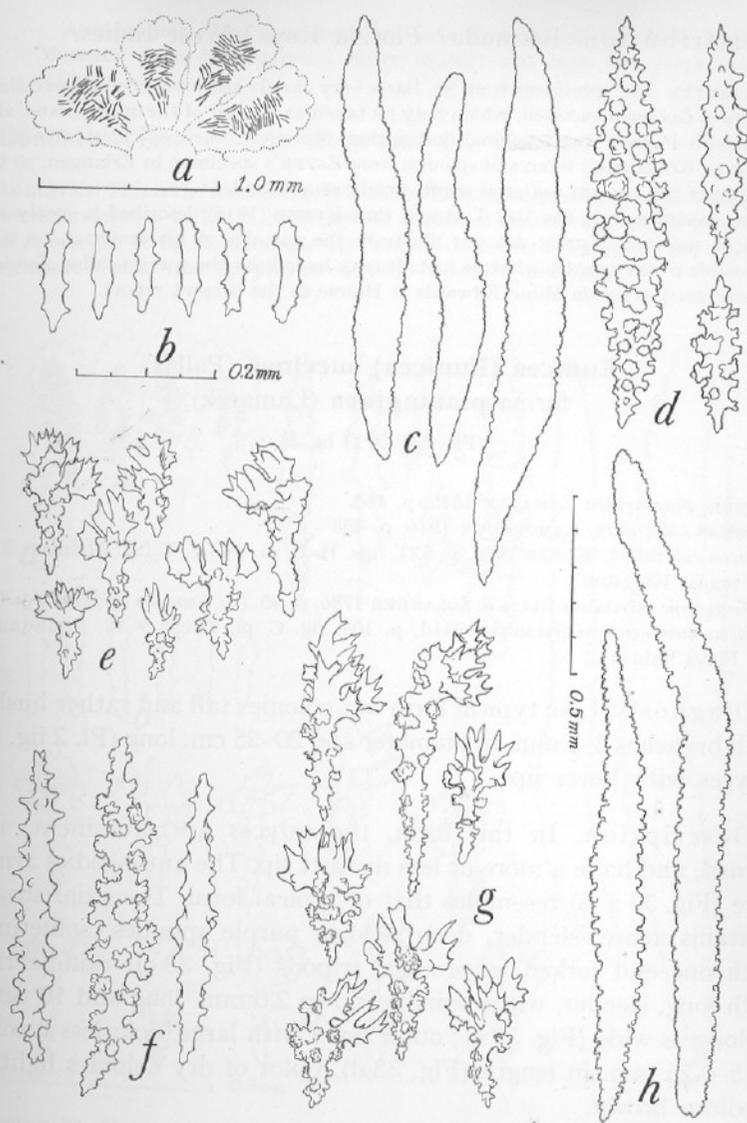


FIGURE 32. *Eunicea succinea* (Pallas), typical form. a-e, a specimen from St. Barts (USNM 50318): a, arrangement of spicules in the tentacles; b, tentacular spicules; c, spindles of the middle rind near branch tip; d, spindles of axial sheath near branch tip; e, torches of outer rind near branch tip. f-h, a specimen from St. Eustatius (50317): f, spindles of axial sheath near branch tip; g, torches of outer rind near branch tip; h, spindles of middle rind near branch tip. (Enlargement of a indicated by 1.0 mm. scale below; that of b and d-g by 0.2 mm. scale at b; that of c and h by 0.5 mm. scale at h.)

Distribution. Bermuda? Florida Keys? West Indies.

Remarks. The specimens from St. Barts very closely resemble ESPER's excellent picture of *Gorgonia succinea*, which may be taken as typical of the species, and also agree with PALLAS' brief original description. Moreover, their spicules correspond well with KÖLLIKER's figures of spicules from ESPER's specimen in Erlangen, so the identity of the present material seems firmly established.

The specimen from the Dry Tortugas that KUNZE (1916) described is surely not *Eunicea succinea*. KUNZE did not illustrate the spicules of his material, so it is impossible to say exactly what he had. It may have been the species called *Eunicea (Euniceopsis) asperula* Milne Edwards & Haime in the present report.

32a ***Eunicea (Eunicea) succinea* (Pallas)
forma *plantaginea* (Lamarck)**

(Fig. 33; Pl. II fig. 5)

Gorgonia plantaginea LAMARCK 1815, p. 163.

?*Eunicea calyculata*, LAMOUROUX 1816, p. 438

Eunicea calyculata, KUNZE 1916, p. 523, figs. H-L, pl. 24 fig. 4. (St. Thomas; Tortugas; Kingston.)

not *Gorgonia calyculata* ELLIS & SOLANDER 1786, p. 95. (= *Eunicea calyculata*.)

Eunicea hummelincki STIASNY 1941d, p. 109, fig. C; pl. 2 figs. 9-12. (Blanquilla; Playa Valuchu.)

Diagnosis. Like typical form but colonies tall and rather bushy, with branches 3-5 mm. in diameter and 20-25 cm. long (Pl. 2 fig. 5); calyces with lower lip.

Description. In this form, the calyces are prominent, up-turned, and have a more or less distinct lip. The anthocodial armature (Fig. 33 a-b) resembles that of typical form. The axial sheath contains acute, slender, deep reddish purple spindles, sometimes with one end forked to produce tripods (Fig. 33 c); middle rind with long, slender, white spindles up to 2.0 mm. long and 10 times as long as wide (Fig. 33 e); outer layer with large, colorless torches 0.15-0.25 mm. in length (Fig. 33 d). Color of dry colonies light or medium brown.

Material. From Hummelinck's collection, a branch of the type of *Eunicea hummelincki* Stiasny, through the courtesy of Dr. L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie at Leiden: BLANQUILLA, Playa Valuchu, sand with scattered pieces of rock, 3 m., 21.VI.1936, "auf derselben Fussplatte als das 2. Stückchen von *Plexaura flexuosa* Lmx."

Also studied were specimens in the collections of the U.S. National Museum, from the FLORIDA KEYS (50367) and from ST. JOHN (44095, 50266).

Distribution. Florida Keys and the Antilles.

Remarks. This is the form commonly called *Eunicea calyculata* (Ellis & Solander). However, reference to ELLIS & SOLANDER's original description, and a glance at their figure (pl. 18 fig. 2, although not labeled, conforms precisely to the description), make it clear that the present material is entirely different.

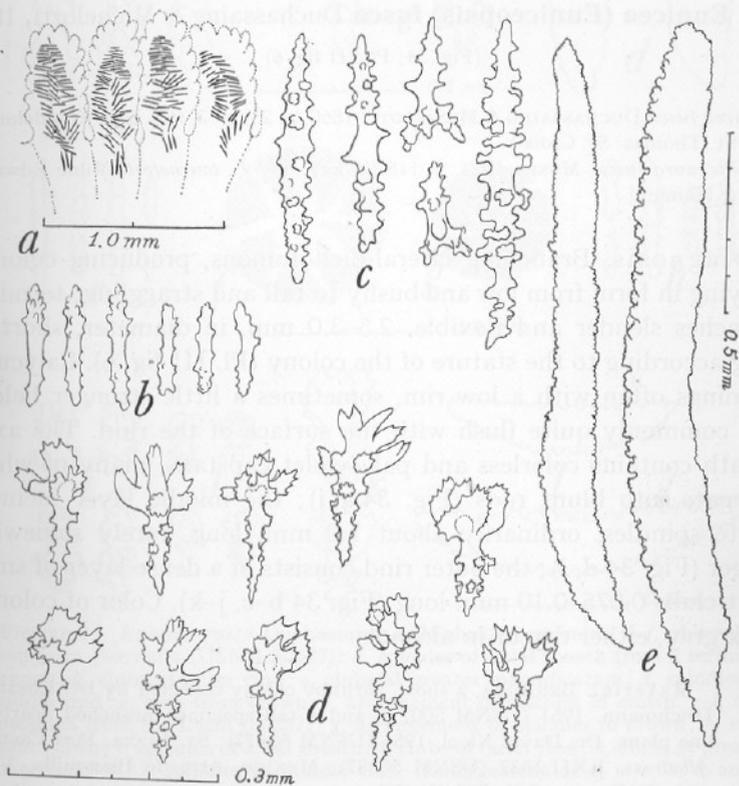


FIGURE 33. *Eunicea succinea* (Pallas) forma *plantaginea* (Lamarck); spicules of a specimen from St. John (USNM 50266): a, arrangement of spicules in tentacles; b, tentacular rods; c, spicules of the axial sheath near the branch tips; d, torches of outer rind; e, spindles of middle rind. (Enlargement of a indicated by 1.0 mm. scale below; that of b, c, d by 0.3 mm. scale at d; that of e by adjacent 0.5 mm. scale.)

Subgenus *Euniceopsis* Verrill

Euniceopsis VERRILL 1907, p. 311. (Type species, *Eunicea tourneforti* Milne Edwards & Haime, by original designation.)

Diagnosis. Anthocodial armature consists of stout spindles forming a strong subtentacular crown that may be a distinct operculum, and tentacular rods that often extend into the pinnules.

33 *Eunicea (Euniceopsis) fusca* Duchassaing & Michelotti, 1860

(Fig. 34; Pl. III fig. 6)

Eunicea fusca DUCHASSAING & MICHELOTTI 1860, p. 25, pl. 3, figs. 5-6. (Guadeloupe; St. Thomas; St. Croix.)

not *Plexaura fusca*, MOSER 1921, p. 115 [in key]. [= *E. tourneforti* Milne Edwards & Haime?]

Diagnosis. Branching lateral-dichotomous, producing colonies varying in form from low and bushy to tall and straggling; terminal branches slender and flexible, 2.5-3.0 mm. in diameter, short or long according to the stature of the colony (Pl. III fig. 6). Calycular openings often with a low rim, sometimes a little stronger below, but commonly quite flush with the surface of the rind. The axial sheath contains colorless and pale violet capstans, many of which elongate into blunt rods (Fig. 34 a, i); the middle layer includes white spindles, ordinarily about 1.0 mm. long, rarely somewhat longer (Fig. 34 d, l); the outer rind consists of a dense layer of small wart-clubs 0.075-0.10 mm. long (Fig. 34 b-c, j-k). Color of colonies dark grey, either dry or in alcohol.

Material. BERMUDA, a short, shrubby colony collected by Dr. Elisabeth Deichmann, 1951 (USNM 50077), and a tall specimen branched nearly in one plane, Dr. David Nicol, 1956 (USNM 50677); ST. LUCIA, Port Castries, *Albatross*, 3.XII.1887 (USNM 50387); MEXICO, Arrecife Blanquilla, Veracruz, F. Bonet, 12.V.1957 (51456).

Distribution. Bermuda to the Lesser Antilles.

Remarks. The specimens of *Eunicea fusca* that I have seen are of very diverse outward appearance, tall and slender to short and shrubby, yet in the girth of the final branches, prominence of calyces, and details of spiculation they are identical.

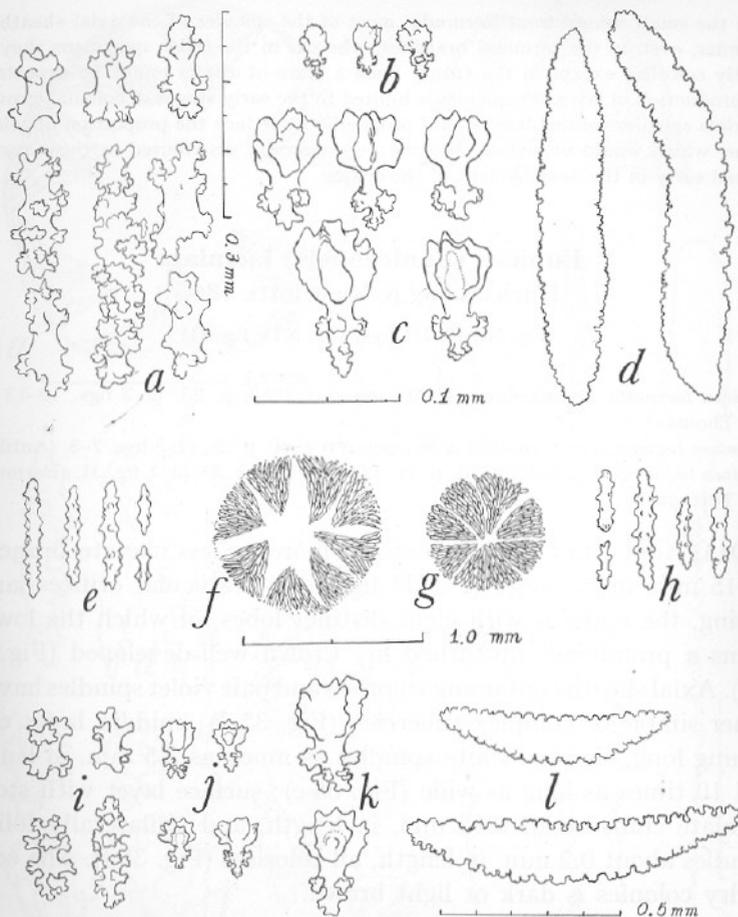


FIGURE 34. *Eunicea fusca* Duchassaing & Michelotti, spicules. a-f, of a specimen from Bermuda (USNM 50077): a, spicules of axial sheath from a terminal branch; b, clubs of outer rind; c, clubs at greater magnification; d, spindles of middle rind; e, rods from crown; f, arrangement of spicules in crown. g-l, of a specimen from St. Lucia (50387): g, arrangement of spicules in crown; h, rods from crown; i, spicules of axial sheath; j, clubs of outer rind; k, clubs at greater magnification; l, spindles of middle rind. (Enlargement of a, b, e, h, i, and j indicated by 0.3 mm. scale at a; that of j and g by 1.0 mm. scale below; that of c and k by 0.1 mm. scale at c; that of d and l by 0.5 mm. scale at l.)

In the small colony from Bermuda, most of the spicules of the axial sheath are lavender, even in the terminal branches, whereas in the taller specimens they are mostly colorless except in the trunk. Such a state of affairs might be expected if the production of lavender spicules is limited to the early stages of colonial growth; colorless spicules formed later would progressively reduce the proportion of colored forms, which would ultimately become very sparsely distributed in those regions formed early in the development of the colony.

34 **Eunicea (Euniceopsis) laciniata**
Duchassaing & Michelotti, 1860

(Fig. 35; Pl. III figs. 1-2, XIV fig. 11)

Eunicea laciniata DUCHASSAING & MICHELOTTI 1860, p. 23, pl. 2 figs. 12-13 (St. Thomas.)

?*Eunicea lugubris* DUCHASSAING & MICHELOTTI 1860, p. 25, pl. 3 figs. 7-8. (Antilles.)

Eunicea lugubris, STIASNY 1935d, p. 78, fig. U, pl. 5 fig. 23, pl. 7 fig. 31. (Bermuda; Tortugas.)

Diagnosis. Colonies with stout, more or less clavate branches 10-15 mm. in diameter (Pl. III figs. 1-2). Calycular orifices large, gaping, the margins with eight distinct lobes, of which the lowest forms a prominent, up-turned lip. Crown well-developed (Fig. 35 a-c). Axial sheath containing colorless and pale violet spindles having either simple or complex tubercles (Fig. 35 d); middle layer containing long, slender, white spindles as much as 2.5 mm. in length and 10 times as long as wide (Fig. 35 e); surface layer with stout, lacinate clubs about 0.15 mm. in length, and unilaterally foliate spindles about 0.2 mm. in length, all colorless (Fig. 35 f). The color of dry colonies is dark or light brown.

Material. FLORIDA, off Elliott Key, 15.V.1948, small dry specimen (USNM 50373); ST. CHRISTOPHER, Smithsonian-Bredin Exp., 12.IV.1956, large dry spec. (USNM 50330); MEXICO, Isla de Enmedio, Veracruz, F. Bonet, 17-18.V.1957 (51459).

Distribution. Bermuda, if STIASNY's record is correct; Florida Keys and the Antilles.

Remarks. *Eunicea laciniata* seems not to have been recognized since DUCHASSAING & MICHELOTTI's original description of it, except under the possibly synonymous name *lugubris*. It may be recognized by its distinctive external form, and its identity verified by the large, lacinate clubs and spindles of the outer rind and the slender spindles of the middle layer.

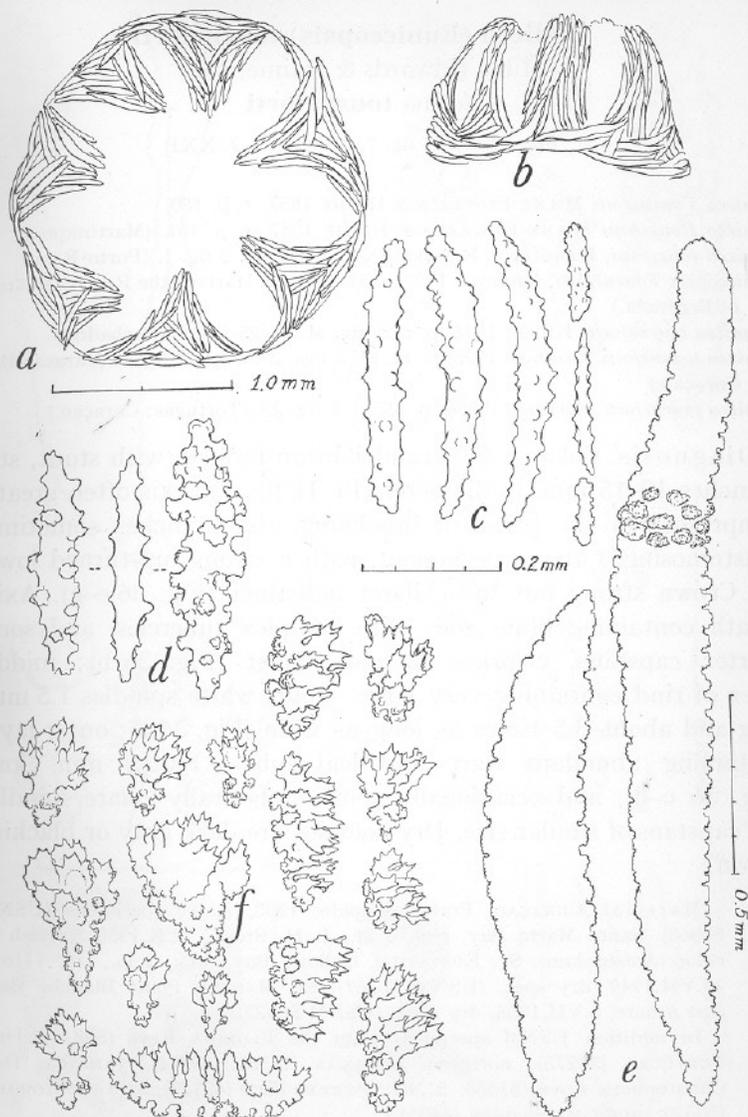


FIGURE 35. *Eunicea laciniata* Duchassaing & Michelotti; a specimen from Florida (USNM 50373): a, arrangement of spicules in crown, from above; b, arrangement of spicules in crown, less completely retracted polyp, from side; c, crown spicules; d, spindles of axial sheath; e, spindles of middle rind; f, spicules of outermost layer of cortex. (Enlargement of a and b indicated by 1.0 mm. scale at a; that of c, d, f by 0.2 mm. scale at c; that of e by 0.5 mm. scale adjacent.)

Eunicea (Euniceopsis) tourneforti

Milne Edwards & Haime, 1857

forma ***tourneforti***

Fig. 36; Pl. II fig. 7, XIV fig. 1-7, XXI)

Eunicea Tourneforti MILNE EDWARDS & HAIME 1857, 1, p. 150.*Eunicea Rousseaui* MILNE EDWARDS & HAIME 1857, 1, p. 151. (Martinique.)*Eunicea rousseaui*, HARGITT & ROGERS 1901, p. 283, pl. 3 fig. 1. (Porto Rico.)*Euniceopsis Tourneforti*, VERRILL 1907, p. 313. (Castle Harbor; the Reach; and reefs of Bermuda.)? *Eunicea tourneforti*, KUNZE 1916, p. 528, fig. M, pl. 25 fig. 5. (Barbados.)*Eunicea tourneforti*, GORDON 1925, p. 19, pl. 3 figs. 3-3a; pl. 4 fig. 3. (Caracas Bay, Curaçao.)*Eunicea tourneforti*, STIASNY 1935d, p. 85, pl. 5 fig. 22. (Tortugas; Curaçao.)

Diagnosis. Colonies flat, candelabrum-formed, with stout, stiff branches 10-15 mm. in diameter (Pl. II fig. 7); axis often greatly compressed in the plane of branching, the branches sometimes anastomosing. Calyces prominent, with a strong, up-turned lower lip. Crown strong but the collaret indistinct (Fig. 36 e-g). Axial sheath containing blunt rods with complex tubercles, and some shorter capstans, colorless or pale violet (Fig. 36 b); middle layer of rind containing very large, stout, white spindles 1.5 mm. long and about 3.5 times as long as wide (Fig. 36 a); outer layer containing abundant wart- and leaf-clubs 0.1-0.15 mm. long (Fig. 36 c-d), and occasionally some unilaterally foliate spindles and capstans of similar size. Dry colonies are dark gray or blackish brown.

Material. CURAÇAO, Frater Arnoldo, 1950, 2 dry specimens (USNM 50368). Santa Marta Bay, reef, 3 m., J. H. Stock, 12.X.1958, greyish in color (Amsterdam). ST. EUSTATIUS, Gallows Bay, rock, 2 m., sta. 1116B, 15.VII.1949, dry spec. (USNM 50267). ST. MARTIN, Point Blanche Bay, cast ashore, 5.VII.1955, dry spec. (USNM 50427).

In addition USNM specimens from the FLORIDA KEYS (50316), DRY TORTUGAS (50275), northern BAHAMAS (14556, 49786), JAMAICA, Don Christopher's Cove (51358, 51388), PUERTO RICO (42137), ST. CHRISTOPHER (50329), and GUADELOUPE (44051).

Distribution. Bermuda; Florida Keys; Bahamas; Greater and Lesser Antilles.

Ecology. "It is found in . . . inner waters, where there are strong currents, but is more common and larger on the outer reefs." (VERRILL 1907, p. 313.)

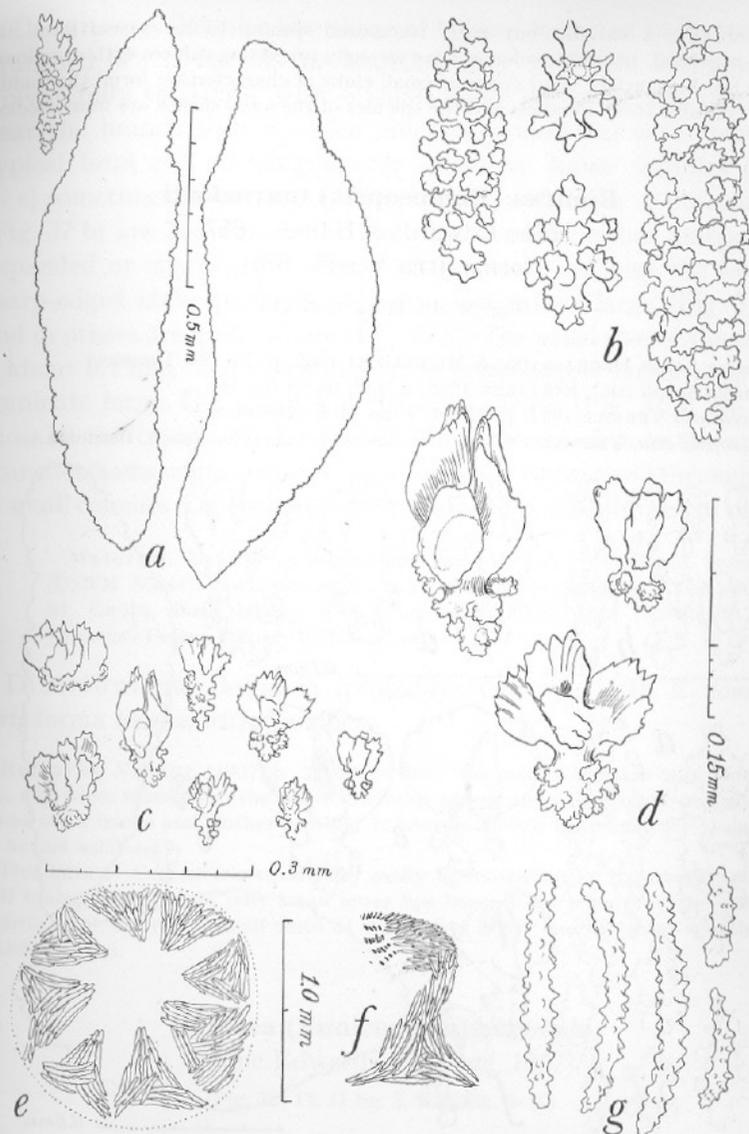


FIGURE 36. *Eunicea tourneforti* Milne Edwards & Haime, typical form. a-d, spicules of a specimen from St. Eustatius (USNM 50267): a, spindles of middle rind; b, spicules of axial sheath; c, clubs of outer rind; d, outer clubs at greater magnification. e-g, a specimen from Florida (50275): e, arrangement of spicules in crown, from above; f, arrangement of spicules in one segment of crown, from side (tentacular part twisted to show side view); g, crown spicules. (Enlargement of a indicated by 0.5 mm. scale; that of b, c, g by 0.3 mm. scale at c; that of d by 0.15 mm. scale to right; that of e and f by 1.0 mm. scale.)

Remarks. A variable but easily recognized species. In its typical form, the stout-branched, flabellate colonies have strongly projecting calyces with prominent lower lip. The surface layer contains small clubs of characteristic form, the middle layer contains stout spindles, and the spicules of the axial sheath are mostly colorless.

35a

Eunicea (Euniceopsis) tourneforti

Milne Edwards & Haime, 1857

forma ***atra*** Verrill, 1901

(Fig. 37; Pl. II fig. 6, XXIV)

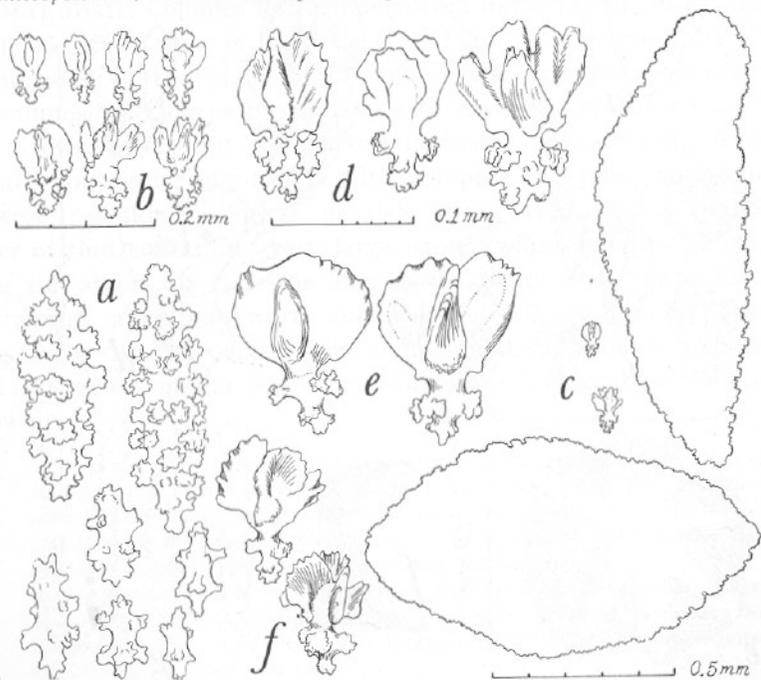
? *Eunicea Sayoti* DUCHASSAING & MICHELOTTI 1860, p. 22. (St. Thomas.)? *Eunicea Sagoti* [sic], KÖLLIKER 1865, p. 137, pl. 18 fig. 16.*Eunicea atra* VERRILL 1901, p. 52, pl. 9 figs. 4-5. (Bermuda.)*Euniceopsis atra*, VERRILL 1907, p. 315, figs. 164-165. (The Reach, Bermuda.)

FIGURE 37. *Eunicea tourneforti* Milne Edwards & Haime, forma *atra* Verrill; spicules of a specimen from Bermuda (USNM 50080): a, spicules of axial sheath; b, clubs of outer rind; c, spindles of middle rind, with two outer clubs drawn to same scale; d, clubs at greater magnification; e, outer clubs of a specimen from Bermuda (51720); f, outer clubs of a specimen from St. Croix (51723). (Enlargement of a and b indicated by 0.2 mm. scale below b; that of c by 0.5 mm. scale below c; that of d, e, f by 0.1 mm. scale at d.)

Diagnosis. Colonies like those of typical form but more loosely branched (Pl. II fig. 6), the branches only 6-10 mm. in diameter. Polyps fully retractile, with a small lower lip, especially in those near the branch tips. Spicules practically identical with those of typical form and showing similar variation. Large spindles (Fig. 37 c) sometimes stouter than in nominate form; clubs of outer layer (Fig. 37 b) are 3-winged leaf-clubs with the folia either marginally expanded or sharp-edged (Fig. 37 d); in some colonies the broad, sharp-edged clubs predominate and grow rather large (Fig. 37 e), and in others are quite ornate (Fig. 37 f). The usual size of the clubs is about 0.1 mm., but a few may grow considerably larger as in the nominate form. The spicules of the axial sheath (Fig. 37 a) are like those of the typical form, mostly or entirely colorless in the upper branches, some white and some pale purple at the base and throughout in small colonies. Dry colonies dark gray or blackish brown in color.

Material. BERMUDA, Whalebone Bay (USNM 50080), and Somerset (USNM 50341), both specimens collected by Dr. Elisabeth Deichmann; St. CROIX, Buck Island, R. E. Schroeder, VIII. 1960 (USNM 51743); JAMAICA, Pigeon Island (USNM 51390).

Distribution. Bermuda (probably sympatric with *E. tourneforti* forma *tourneforti*); Jamaica.

Remarks. VERRILL (1907, p. 315) says that "the coenenchyma is inky black in life, and when taken from the water it exudes a large amount of black mucus that stains one's hands and clothes like ink. It also discolors a large quantity of alcohol or formal solution."

This form of *Eunicea tourneforti* may easily be recognized by its straight, rather stiff branches that show only small lower lips beneath the apertures, the characteristic black color, the small clubs of the surface layer, and the stout spindles of middle of rind.

36

Eunicea (Euniceopsis) asperula

Milne Edwards & Haime, 1857

(Fig. 38; Pl. II fig. 3, XIV fig. 8-10)

Eunicea asperula MILNE EDWARDS & HAIME 1857, I, p. 150. (Martinique.)? *Eunicea succinea*, KUNZE 1916, p. 546, pl. 26 fig. 10. (Tortugas.)

Diagnosis. Tall colonies with irregularly dichotomous ramification (Pl. II fig. 3), the branches rather few, long, and ascending,

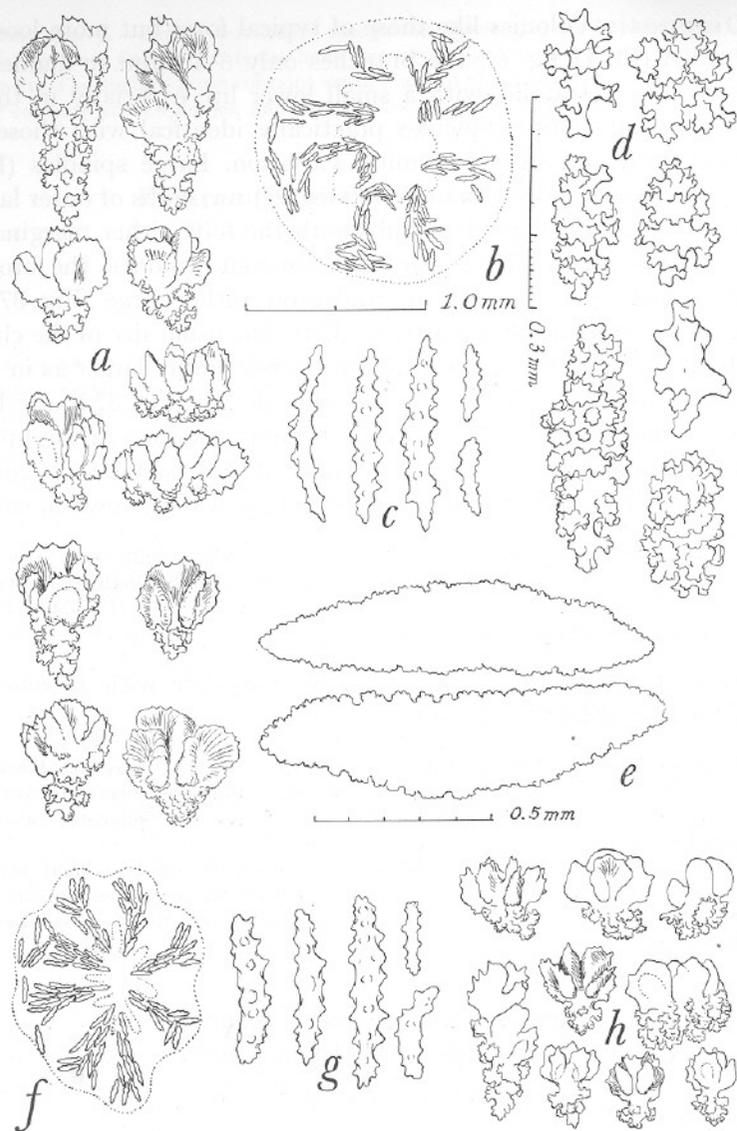


FIGURE 38. *Eunicia asperula* Milne Edwards & Haime. *a-e*, a specimen from Key West, Florida (USNM 50752): *a*, leaf-clubs and foliate spheroids of outer rind; *b*, arrangement of spicules in crown, from above; *c*, anthocodial spicules; *d*, spicules of axial sheath; *e*, spindles from middle rind. *f-h*, a specimen from Florida (3102): *f*, arrangement of spicules in crown; *g*, anthocodial spicules; *h*, clubs and foliate spheroids of outer rind. (Enlargement of *a*, *c*, *d*, *g*, *h* indicated by 0.3 mm. scale at left of *d*; that of *b* and *f* by 1.0 mm. scale at *b*; that of *e* by 0.5 mm. scale below.)

mostly 3–4 mm. in diameter but occasionally larger. Calyces closely crowded, with a short lower lip. Anthocodiae with a weak armature of small rods (Fig. 38 *c*, *g*) in a triangular field below each tentacle (Fig. 38 *b*, *f*). Axial sheath containing blunt rods sculptured with complicated tubercles, and numerous short capstans that may develop into multiradiate, spheroidal bodies (Fig. 38 *d*); all types colorless in the upper parts of the colony, but near the base some of the spicules may be pale violet. Middle layer of rind with white spindles of moderate size, rarely longer than 1.0 mm. and usually not much more than 0.8 mm. (Fig. 38, *e*); outer layer of rind with stubby wart- and leaf-clubs ordinarily about 0.15 mm. long, and many leafy spheroids which, in some specimens, have the foliations thick and smooth, in others thin and serrate (Fig. 38, *a*, *h*). Color of dry colonies gray, brownish gray, or blackish; texture very hard and brittle.

Material. The specimens are all from the older collections of the U.S. National Museum and were taken from the southwest coast of FLORIDA (50753) and the upper Florida Keys at Caesar's Creek (50751) to Key West (50752).

Distribution. South Florida and the Keys to the Lesser Antilles.

Remarks. The various specimens examined show great variation in regard to spicules, but agree in these basic points: (1) the axial sheath contains blunt spindles or rods, and capstans that develop into profusely sculptured spheroids, colorless in the terminal branches, partly pale violet near the base; (2) the spindles of the middle rind are of moderate size; and (3) the outer layer of rind contains numerous small leaf-clubs and foliate spheroids.

Although KUNZE did not figure the spicules of his "*Eunicia succinea*" it is fairly certain from the description and the photograph of the colony that he had *Eunicia asperula* in hand.

37

Eunicia (Euniceopsis) clavigera spec. nov.

Figs. 39–40; Pl. IV fig. 3)

?*Eunicia turgida* EHRENBERG 1834, p. 364. (No locality given.)

?*Plexaura turgida*, VERRILL 1864b, p. 35. (Florida Reefs.)

Diagnosis. Colonies with long, ascending branches up to 5 mm. in diameter, slightly clavate. Anthocodiae with a strong crown of spindles 'en chevron' but without collaret. Calyces well-separated, moderately prominent, low-conical, with aperture terminal or directed upward. Axial sheath containing acute, slender spindles,

light purple in color, some with simple and some with complex processes; middle layer containing large spindles 2–3 mm. in length, all white or white with purple core; outer layer with many small leaf-clubs about 0.1 mm. long, and infrequent small leafy spheroids.

Description. Although the three specimens before me differ in external appearance, the difference is mostly one of size. In all of them, the terminal branches are proportionately long, slightly clavate (Pl. IV fig. 3); the polyps retract within low but distinct,

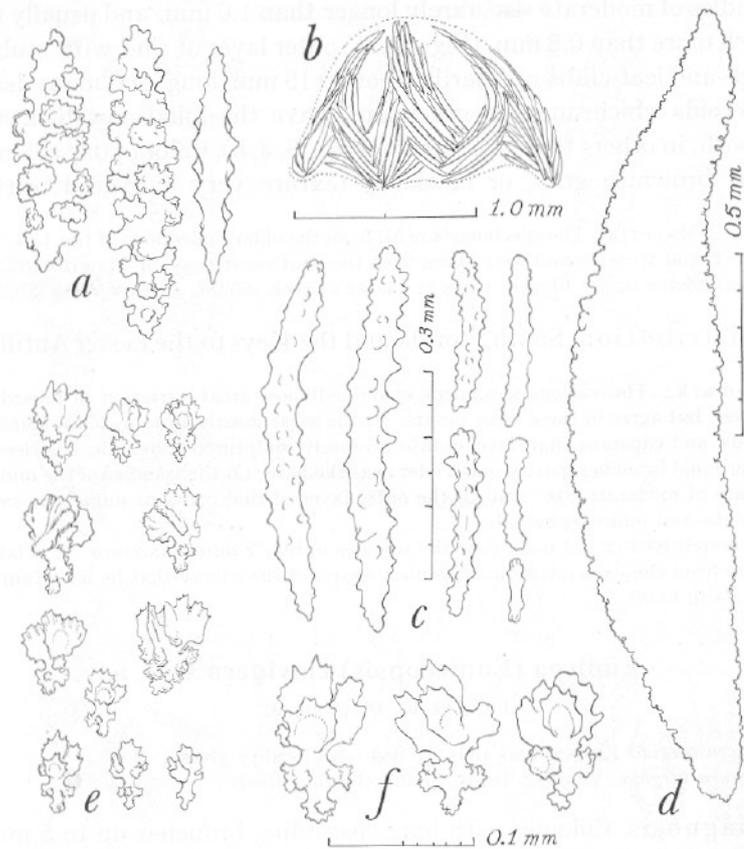


FIGURE 39. *Eunicea clavigera* spec. nov.; spicules of a specimen from Bermuda (USNM 50076): a, spindles of axial sheath; b, arrangement of spicules in crown, side view; c, anthocodial spicules; d, spindle of middle rind; e, clubs of outer rind; f, outer clubs at greater magnification. (Enlargement of a, c, and e indicated by 0.3 mm. scale at c; that of b by 1.0 mm. scale below; that of d by 0.5 mm. scale adjacent; that of f by 0.1 mm. scale below.)

mound-like or bluntly conical calyces with more or less up-turned mouths; the anthocodiae are armed with a strong crown of spindles (Figs. 39 c, 40 c) in chevrons below the tentacles, which has no collaret below it (Figs. 39 b, 40 b); the surface of the rind is packed with minute clubs about 0.1 mm. long (Figs. 39 e–f, 40 e–f); the middle layer of cortex contains the large spindles (Figs. 39 d, 40 d) characteristic of *Euniceopsis* but they are longer (up to 3.0 mm.)

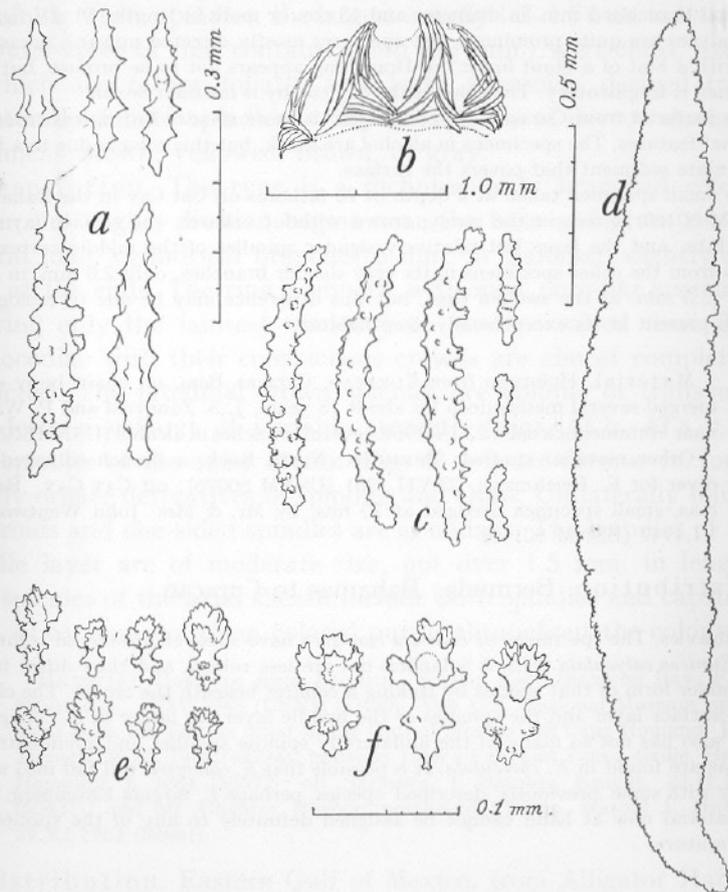


FIGURE 40. *Eunicea clavigera* spec. nov.; spicules of the holotype from Curaçao (USNM 50265): a, spindles of axial sheath; b, arrangement of spicules in the crown, side view; c, anthocodial spicules; d, spindle of middle rind; e, clubs of outer rind; f, clubs at higher magnification. (Enlargement of a, c, and e indicated by 0.3 mm. scale at a; that of b by 1.0 mm. scale below; that of d by 0.5 mm. scale to left; that of f by 0.1 mm. scale below.)

and more slender ($5\frac{1}{2}$ to 7 times as long as wide) than those of *E. tourneforti* and *E. calyculata*, not so slender as those of *E. laciniata*, and larger in all respects than those of *E. fusca*, *asperula*, and *knighti*; and the axial sheath contains acute purple spindles, some with simple, conical projections and others with compound tubercles (Figs. 39 a, 40 a).

The specimen from Bermuda (USNM 50076) is the largest, with erect, clavate terminal branches 5 mm. in diameter and 15 cm. or more in length (Pl. IV fig. 3). The calyces are quite prominent, the apertures mostly directed upward, occasionally with a hint of a blunt lower lip. Branching appears not to be profuse, but the specimen is fragmentary. The color of the dry colony is medium brown.

The material from Curaçao (USNM 50265) is more slender but agrees in other external features. The specimens in alcohol are black, but this color is due to a fine, particulate sediment that covers the surface.

The small specimen taken at a depth of 70 fathoms off Cat Cay in the Bahamas (USNM 50160) agrees in the strong crown without collaret, the surface layer of tiny clubs, and the large but relatively slender spindles of the middle cortex. It differs from the other specimens in its very slender branches, only 2.0 mm. in diameter (3.5 mm. at the swollen tips), but this difference may be due to ecological factors present at its exceptionally deep habitat.

Material. Holotype from CURAÇAO, Caracas Baai, on chain buoy submerged several meters deep for about 15 years, J. S. Zaneveld and P. Wageenaar Hummelinck coll., 22.IV.1955, several branches in alcohol (USNM 50265).

Other material studied: BERMUDA, North Rock, a branch collected by diver for E. Deichmann, 23.VII.1951 (USNM 50076); off CAT CAY, Bahamas, small specimen dredged at 70 fms. by Mr. & Mrs. John Wentworth, VI.1947 (USNM 50160).

Distribution. Bermuda; Bahamas to Curaçao.

Remarks. The specimens of *Eunicea clavigera* have some characters in common with *Eunicea calyculata* (Ellis & Solander) but are less robust, and they differ from the slender form of that species by lacking a collaret beneath the crown. The clubs of the surface layer and the spindles of the middle layer are larger in *E. clavigera*, which also has not so many of the unilaterally spinose spindles and asymmetrical clubs as are found in *E. calyculata*. It is possible that *E. clavigera* will fall into synonymy with some previously described species, perhaps *E. turgida* Ehrenberg, but the material now at hand cannot be assigned definitely to any of the species in the literature.

38

***Eunicea (Euniceopsis) knighti* spec. nov.**

(Figs. 41-42; Pl. III figs. 5, 7)

Diagnosis. Colonies tall, with several elongate, ascending,

slightly clavate branches about 5 mm. in diameter (as little as 3 mm. and as much as 7 mm., sometimes in the same colony; Pl. III figs. 5, 7). Polyps fully retractile, usually forming no projecting calyces at all and visible as gaping, oval orifices; rarely a slightly projecting rim beneath each aperture, chiefly near the ends of branches. Axial sheath containing colorless and pale or medium purple capstans and rods, mostly blunt; middle layer of rind containing white spindles, the largest usually 1.2-1.5 mm. in length; the outer layer of rind contains small (0.1 mm.) wart-clubs, many of which are rather foliate, and leafy spheroids derived from unilaterally foliate spindles or capstans. Color of dry or alcoholic specimens brown, yellowish brown, or gray.

Description. The type is a dichotomously branched colony 29 cm. in height; division begins near the base and gives rise to several long, cylindrical branches 6 mm. in diameter, slightly clavate at the ends. The rind is smooth, with open, pore-like apertures showing only the faintest tendency to produce raised rims. The anthocodiae with their conspicuous crowns are almost completely retracted. The proximal crown spicules are oblique or transverse and form a collaret of variable strength (Figs. 41 b, 42 a, c, e). The spicules of the outer cortex (Fig. 41 e-f) are diverse in form, chiefly ornate derivatives of spindles and clubs. Unilaterally foliate spheroids and one-sided spindles are abundant. The spindles of the middle layer are of moderate size, not over 1.5 mm. in length. The spicules of the axial sheath include both spindles and capstans (Fig. 41 a), many of them colored purple throughout the colony.

Material. Holotype from FLORIDA, Soldier Key, Biscayne Bay, F. M. Bayer coll., 19.IV.1948 (USNM 50430). Also U.S. National Museum specimens from the Florida coast in the Gulf of Mexico: off Cape Romano, J. Q. Tierney, 28.IX.1948 (44234); between John's Pass and Pass-a-Grille, Henry Hemphill, I. 1884 (50692); off Sarasota, J. Brookes Knight, 23.II.1951 (50431); and off Alligator Harbor, northwest Florida, Harold J. Humm, 29.XI.1952 (50681).

Distribution. Eastern Gulf of Mexico, from Alligator Harbor south to the Florida Keys and northward to the vicinity of Biscayne Bay.

Remarks. *Eunicea knighti* may be recognized by the unilaterally foliate spheroids, spindles and capstans of the outer rind, along with the absence of projecting ca-

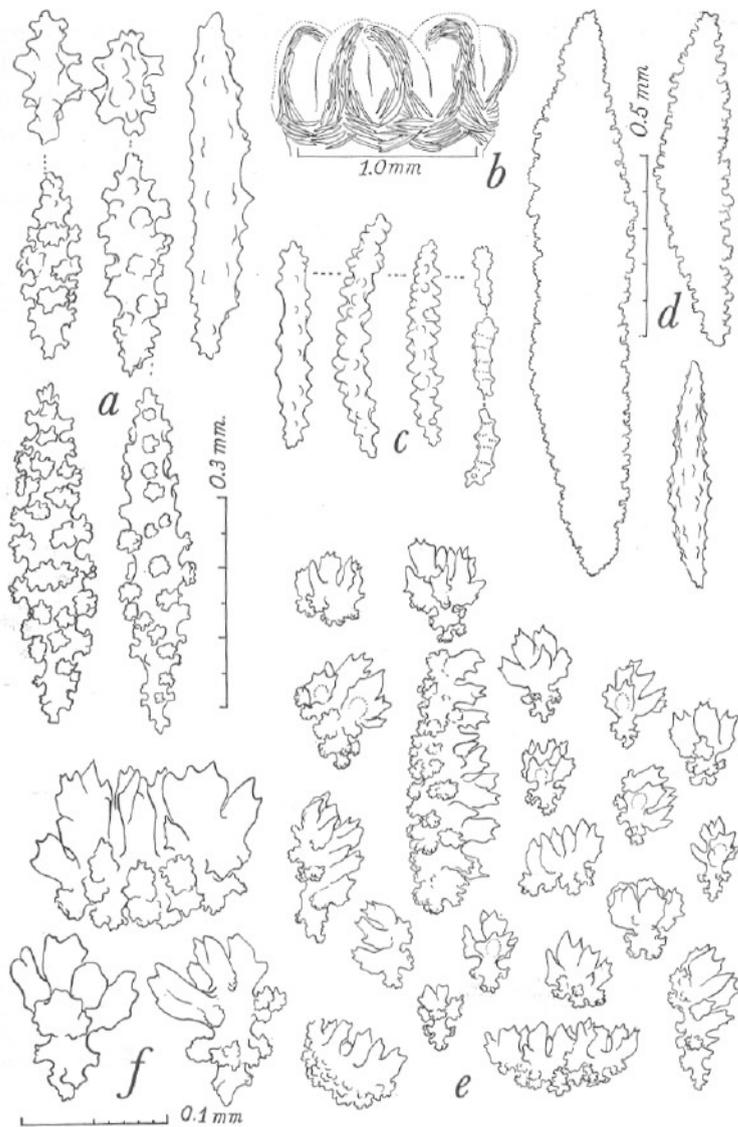


FIGURE 41. *Eunicea knighti* spec. nov.; spicules of the holotype from Florida (USNM 50430): a, spicules of axial sheath; b, arrangement of spicules in the crown, side view; c, anthocodial spicules; d, spindles of middle rind; e, spicules of outer rind; f, two clubs and foliate spheroid at greater magnification. (Enlargement of a, c, and e indicated by 0.3 mm. scale at a; that of b by 1.0 mm. scale below; that of d by 0.5 mm. scale; that of f by 0.1 mm. scale below.)

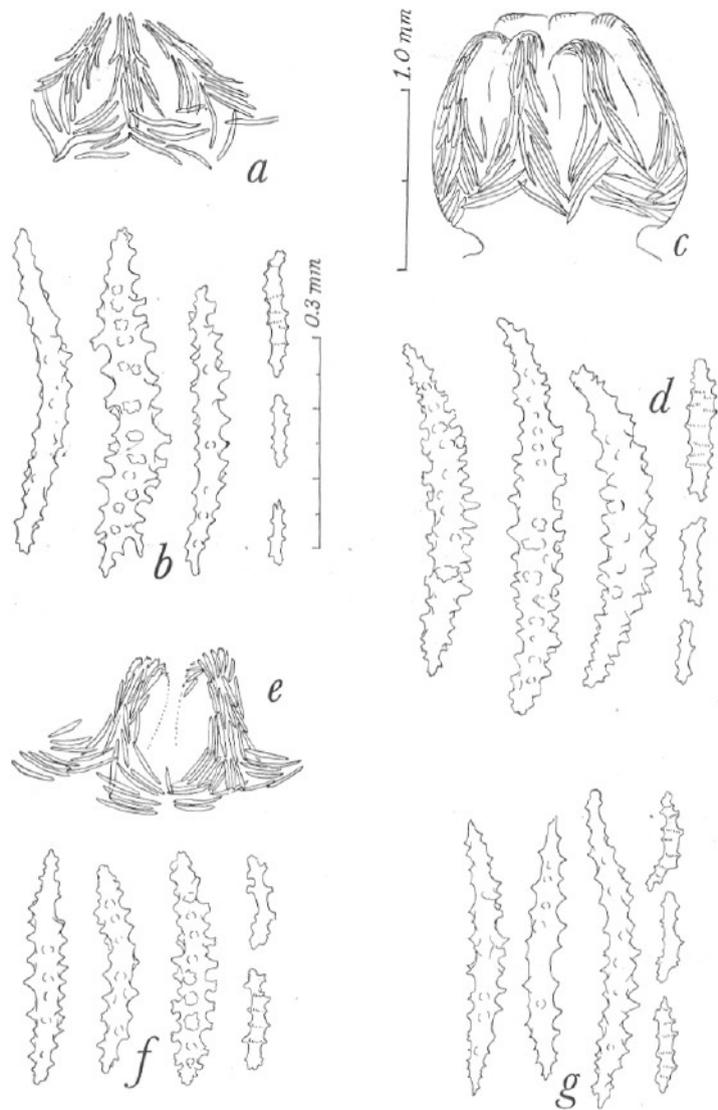


FIGURE 42. *Eunicea knighti* spec. nov.; variations in the crown: a-b, three sectors and spicules of crown from a specimen from Apalachee Bay, Gulf of Mexico; c-d, crown and crown spicules of a specimen from Key West, Florida (USNM 44235); e-f, two sectors and spicules of crown of a specimen from Dry Tortugas (50759); g, crown spicules of a specimen from the Gulf coast of Florida (50692). (Enlargement of a, c, and e indicated by 1.0 mm. scale at c; that of b, d, f, and g by 0.3 mm. scale at b.)

lyces. In some colonies there may be rims developed on the proximal edge of the apertures near the branch tips. The branches commonly are quite stout, 5 mm. or more in diameter, but some colonies are slender, and specimens with stout branches may also have some slender ones.

This species seems to be quite common along the Gulf coast of Florida. It is not rare at Soldier Key in Biscayne Bay, where it closely resembles the common *Plexaurella* with which it is associated.

39 *Eunicea* (*Euniceopsis*) *calyculata* (Ellis & Solander), 1786
forma *calyculata*

Figs. 43-46; Pl. III fig. 3, XXII, XXIII)

- Gorgonia calyculata* ELLIS & SOLANDER 1786, p. 95 [pl. 18 fig. 2].
Gorgonia multicauda LAMARCK 1815b, p. 162. (Habite l'Océan américain.)
Eunicea clavaria LAMOUREUX 1816, p. 437. (Antilles.)
Eunicea clavaria, LAMOUREUX 1821, p. 36, pl. 18 fig. 2.
Eunicea multicauda, MILNE EDWARDS & HAIME 1857, I, p. 148.
Eunicea grandis VERRILL 1900, p. 570, pl. 69 figs. 3, 3a. (Bermuda reefs.)
Eunicea crassa HARGITT & ROGERS 1901, p. 283, pl. 2 figs. 1-9. (Porto Rico.)
Euniceopsis grandis, VERRILL 1907, p. 313, figs. 161-162, pl. 33A, pl. 33B fig. 1a, pl. 36A fig. 3 [not pl. 36B as stated]. (Bermuda.)
Eunicea multicauda, KUNZE 1916, p. 532, figs. N-R, pl. 25 fig. 6. (Barbados.)
Eunicea sparsiflora KUNZE 1916, p. 537, figs. S-T, pl. 25 fig. 7. (Barbados.)
 not *Eunicea calyculata*, KUNZE 1916, p. 523, figs. H-L, pl. 24 fig. 4.
Eunicea multicauda, var. GORDON 1925, p. 18, pl. 3 fig. 2, pl. 4 fig. 2. (Caracas Bay, Curaçao.)
Eunicea multicauda Gordoni STIASNY 1935d, p. 81, fig. V, pl. 7 figs. 38-39. (Tortugas; Curaçao.)

Diagnosis. Colonies tall, terminal branches stout, cylindrical, 8-16 mm. in diameter (Pl. III fig. 3). Anthocodiae densely spiculate, the spindles often exceeding 0.6 mm. in length (Figs. 43 f, 44 f, 45 f); crown with a more or less distinct collaret (Figs. 43 e, 44 e, 45 e). Calyces low, usually gaping, more or less up-turned but without projecting lower lip. Axial sheath with white and pale violet blunt spindles, rods, and capstans (Figs. 43 a, 44 a, 45 a); middle layer with large, white spindles up to 2.0 mm. in length, 3.5 to 5 times as long as wide and often resembling rice grains in proportions (Figs. 43 b, 44 b, 45 b); outer rind with small wart-clubs 0.08-0.13 mm. in length, and a few small leafy spheroids (Figs. 43 c-d, 44 c-d, 45 c-d). Color of dry colonies light or dark brown.

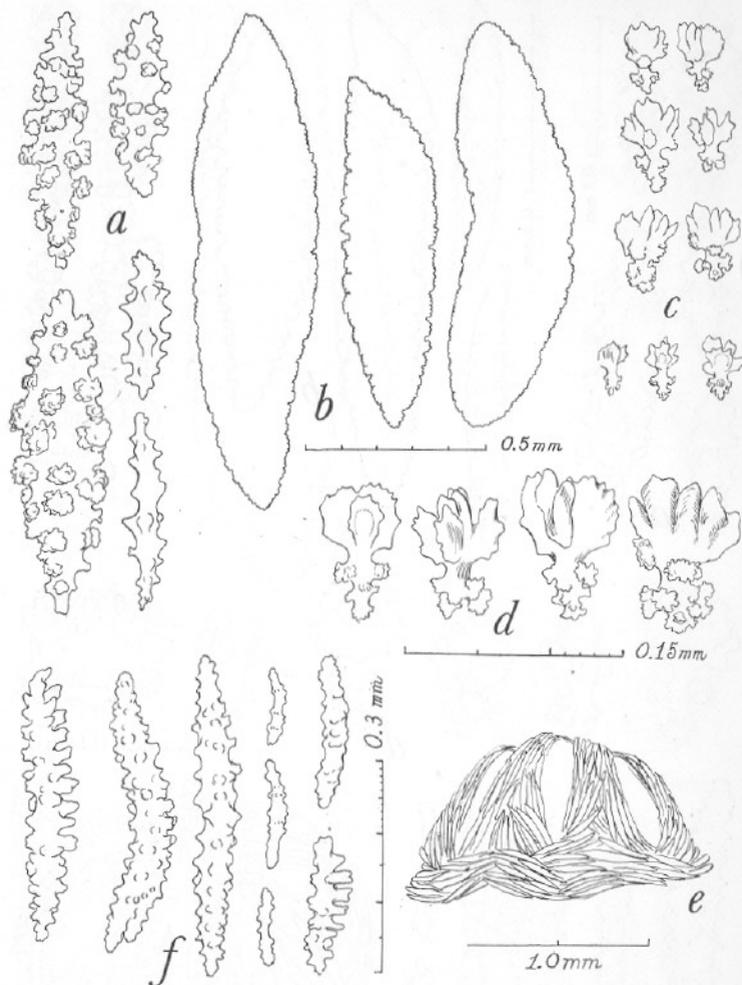


FIGURE 43. *Eunicea calyculata* (Ellis & Solander), typical form; a specimen from Nassau, Bahamas (USNM 14389): a, spicules of axial sheath; b, spindles of middle rind; c, clubs of outer rind; d, clubs at greater magnification; e, side view of crown; f, anthocodial spicules. (Enlargement of a, c, and f indicated 0.3 mm. scale at right of f; that of b by 0.5 mm. scale adjacent; that of d by 0.15 mm. scale adjacent; that of e by 1.0 mm. scale adjacent.)

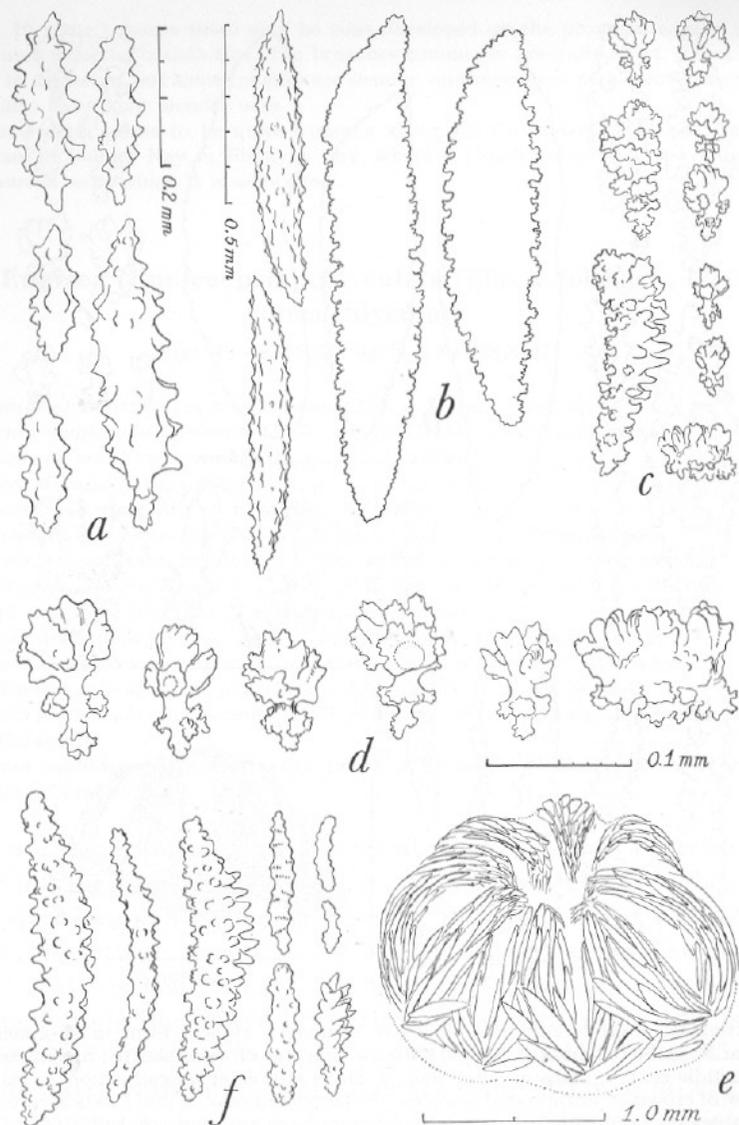


FIGURE 44. *Eunicea calyculata* (Ellis & Solander), typical form; a specimen from Bermuda (USNM 50079): *a*, spicules of axial sheath; *b*, spindles of middle rind; *c*, spicules of outer rind; *d*, clubs and spheroid of outer layer, at greater magnification; *e*, oblique view of crown; *f*, anthocodial spicules. (Enlargement of *a*, *c*, and *f* indicated by 0.2 mm. scale at *a*) that of *b* by 0.5 mm. scale adjacent; that of *d* by 0.1 mm. scale below; that of *e* by 1.0 mm. scale below.)

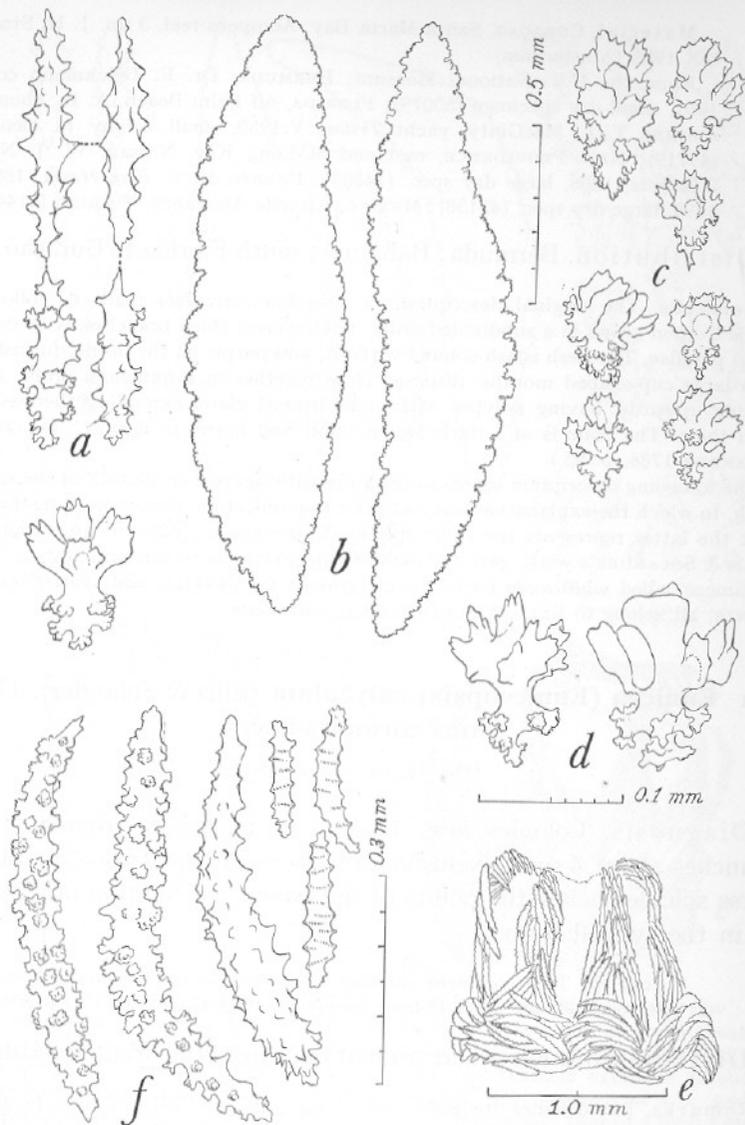


FIGURE 45. *Eunicea calyculata* (Ellis & Solander), typical form; a specimen from off Palm Beach, Florida (USNM 49719): *a*, spicules of axial sheath; *b*, spindles of middle rind; *c*, spicules of outer rind; *d*, clubs of outer rind at greater magnification (third club-shaped spicule underneath the letter *a*); *e*, side view of crown; *f*, anthocodial spicules. (Enlargement of *a*, *c*, and *f* indicated by 0.3 mm scale at *f*; that of *b* by 0.5 mm. scale adjacent; that of *d* by 0.1 mm. scale below; that of *e* by 1.0 mm. scale below.)

Material. CURAÇAO, Santa Marta Bay, Acropora reef, 3 m., J. H. Stock, 8.X.1958 (Amsterdam).

From the U.S. National Museum: BERMUDA, Dr. E. Deichmann coll., 1951, small dry specimen (50079); FLORIDA, off Palm Beach, A. R. Thompson and T. L. MacGinty, yacht *Triton*, V.1950, small colony in alcohol (49719); NEW PROVIDENCE, east end of Long Key, Nassau, W. J. Nye, *Albatross*, 1886, large dry spec. (14389); PUERTO RICO, *Fish Hawk*, 1898-1899, large dry spec. (42138); MEXICO, Arrecife Alacranes, Yucatan (51447).

Distribution. Bermuda; Bahamas; south Florida to Curaçao.

Remarks. The original description of *Gorgonia calyculata* reads as follows: "This Gorgon grows in a subdivided order, having erect thick branches, with truncated papillae. The flesh is ash-colored without, and purple on the inside, furnished with large cup-shaped mouths, disposed close together in a quincunx order, and looking upwards, having polypes with eight fringed claws extending themselves from them. The bone is of a dark brown color, and horny in nature." (ELLIS & SOLANDER 1786, p. 95.)

The foregoing description agrees so precisely with figure 2 on plate 18 of the same work, to which the explanation was lost prior to publication, that there is no doubt that the latter represents the same species. LAMOUREUX (1821) in his edition of ELLIS & SOLANDER's work, gave the name *Eunicea clavaria* to this same figure. The specimens called *multicauda* by LAMARCK, *grandis* by VERRILL, and *sparsiflora* by KUNZE, all belong to ELLIS & SOLANDER's *G. calyculata*.

39a *Eunicea (Euniceopsis) calyculata* (Ellis & Solander), 1786
forma *coronata* nov.

(Fig. 46; Pl. III fig. 4)

Diagnosis. Colonies low, 15-20 cm. in height; diameter of branches about 4 mm. exclusive of calyces. A broad zone of transverse spicules below the points of the crown. Spiculation otherwise as in the typical form.

Material. Two complete colonies from the Campeche Bank, MEXICO, 21°35' North, 90°45' West, 18 fms., *Oregon* sta. 1047, 13.V.1954 (USNM 50686).

Distribution. Known at present only from the original locality.

Remarks. Two colonies dredged by the 'Oregon' in the Gulf of Campeche agree with *Eunicea calyculata* in all particulars except their small size and broad collaret (Fig. 46 e). The calyces are prominent and up-turned as they often are in typical *E. calyculata*, and the anthocodiae are exsert in preservation. The spindles of the axial sheath (Fig. 46 a), the large spindles of the middle layer (Fig. 46 b), the clubs and spheroids of the outer layer (Fig. 46 c-d), and the spicules of the crown (Fig. 46 f) are like those of the typical form.

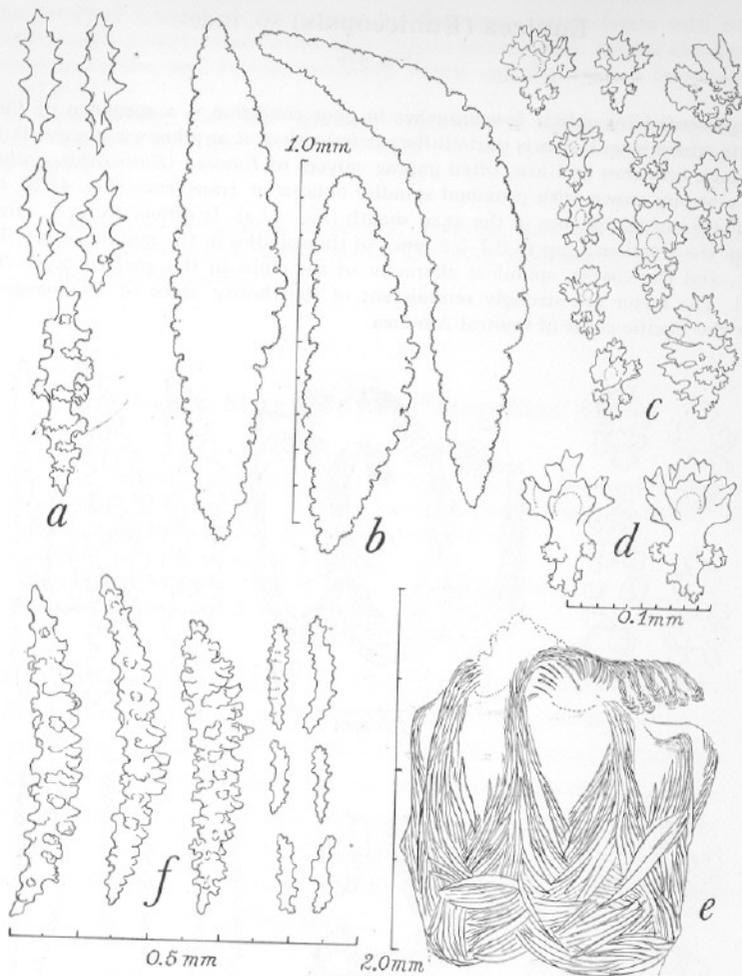


FIGURE 46. *Eunicea calyculata* (Ellis & Solander), forma *coronata* nov.; a specimen from Campeche Bank (USNM 50686): a, spicules of axial sheath; b, spindles of middle rind; c, spicules of outer rind; d, clubs of outer rind, at greater magnification; e, side view of crown, one tentacle extended to show arrangement of spicules; f, anthocodial spicules. (Enlargement of a, c, and f indicated by 0.5 mm. scale at f; that of b by 1.0 mm. scale; that of d by 0.1 mm. scale; that of e by 2.0 mm. scale at left.)

Eunicea (Euniceopsis) sp. indet.

(Fig. 47)

Represented by only a few branches in poor condition is a specimen of *Euniceopsis* whose spiculation is quite different from that of any known species. It has the thick branches and low, often gaping calyces of *Eunicea (Euniceopsis) calyculata*, a strong crown with proximal spindles oblique or transverse (Fig. 47 b), and distinctly purple spicules in the axial sheath (Fig. 47 a). It differs from *E. calyculata* in the small size (up to 0.7–0.8 mm.) of the spindles in the middle cortex (Fig. 47 d), and the coarse, spinulose character of the clubs in the surface layer (Fig. 47 e). The latter are strongly reminiscent of the thorny clubs of *Psammogorgia* from the Pacific coast of Central America.

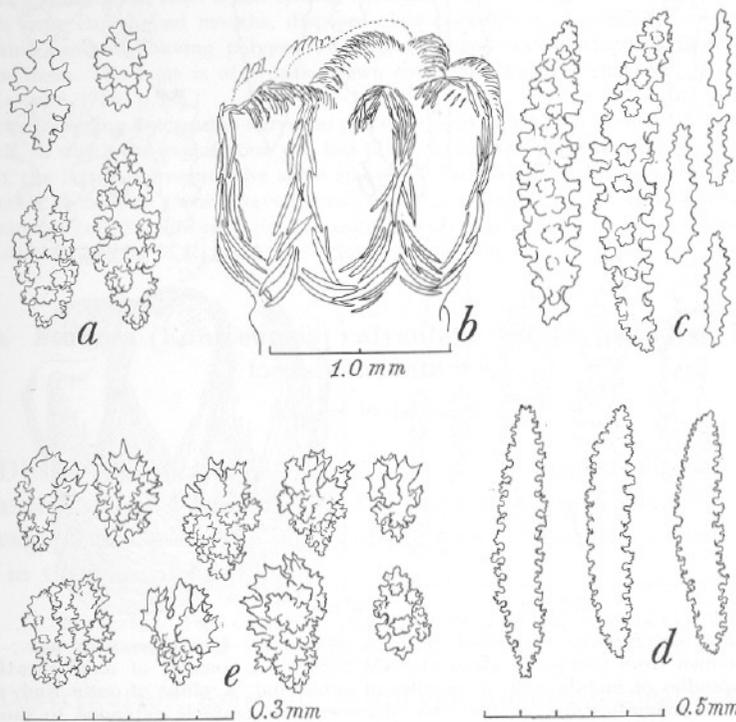


FIGURE 47. *Eunicea* sp. indet., from St. Martin's Reef, Florida Banks (USNM 16353): a, spicules of axial sheath; b, side view of crown; c, anthocodial spicules; d, spindles of middle rind; e, sclerites of outer rind. (Enlargement of a, c, and e indicated by 0.3 mm. scale below e; that of b indicated by 1.0 mm. scale below; that of d by 0.5 mm. scale below.)

In details of spiculation, the present material agrees most closely with *Eunicea knighti*, which contains many unilaterally foliate forms, but *E. knighti* also has well-formed leaf-clubs, and its asymmetrically foliate spindles reach a larger size (cf. Fig. 41 e–f).

It seems likely that this specimen represents a distinct species, but the scanty material available is not sufficient for the proper establishment of a new species.

Material. Fragments in alcohol, FLORIDA, from off the northwest end of St. Martin's Reef, 28°50' North, 83° West, collected by Lt. F. J. Moser, 1887 (USNM 16353).

Genus *Muriceopsis* Aurivillius, 1931

Muriceopsis AURIVILLIUS 1931, p. 114. (Type species, *Muriceopsis tuberculata* Aurivillius (not Esper) = *Eunicea humilis* Milne Edwards & Haime = *Gorgia sulphurea* Donovan, by original designation.)
Plexauropsis (part), STIASNY 1935d, p. 69.
 not *Plexauropsis* VERRILL 1907, p. 309. [= *Pseudoplexaura*.]
Muriceopsis, DEICHMANN & BAYER 1959, p. 3.

Diagnosis. Arborescent colonies of either pinnate or bushy form, with slender branches and slightly projecting shelf-like or lip-like calyces. Axial sheath with slender, sharply pointed spindles, colorless or deep purple. Outer cortex contains large spindles with tall, complicated folia and spines on the outer surface, often more pointed at one end and sometimes distinctly club-like; deeper region of cortex with spicules symmetrically ornamented; no layer of small clubs at the surface of the rind.

Distribution. Bermuda? Florida Keys to Brazil; West Africa?

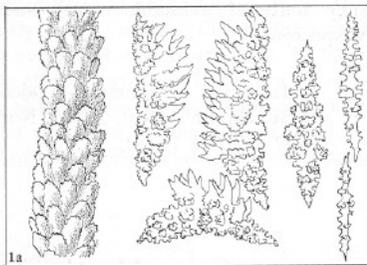
Remarks. The one-sided spindles that look like nudibranchs, which predominate in the outer rind, are very characteristic of the genus. *Muriceopsis* is apparently related to *Muricea* but the calyces are not so well developed, the spicules are smaller, and those of the axial sheath are not infrequently of a purple color.

VERRILL's genus *Plexauropsis* was based upon a specimen of *Pseudoplexaura porosa* and cannot be maintained.

KEY 14

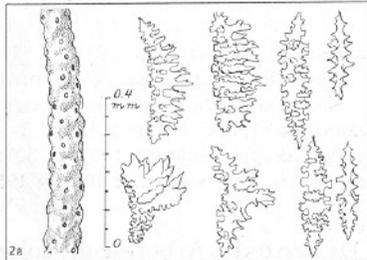
ILLUSTRATED KEY TO THE SPECIES OF *Muriceopsis*

1a. Colonies densely bushy. Polyps with distinctly projecting nariform calyces:
Muriceopsis sulphurea (Donovan)

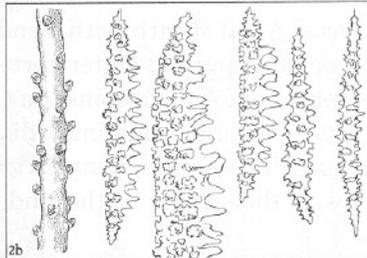


1b. Colonies pinnately branched, plumose; calyces low or absent: 2

2a. Colonies in the form of large, composite plumes. Outer cortex with stout, unilaterally spinose clubs and spindles up to about 0.4 mm. in length. Reef-dwelling species: *Muriceopsis flavida* (Lamarck)



2b. Colonies in the form of small feathers. Unilaterally spinose spindles of outer cortex are long and slender, up to 1.0 mm in length. Deep-water species: *Muriceopsis petila* spec. nov.

41 *Muriceopsis sulphurea* (Donovan), 1825

(Fig. 48 a-b; Pl. II fig. 8)

Gorgonia citrina, LAMARCK 1815b, p. 84. (l'Océan américain?)not *Gorgonia citrina* ESPER 1792, 2, p. 129, pl. 38. [= *Pterogorgia citrina*.]*Gorgonia sulphurea* DONOVAN 1825, 4, p. 126. (The Brazilian Sea.)*Muricea sulphurea*, EHRENBERG 1834, p. 358.*Eunicea humilis* MILNE EDWARDS & HAIME 1857, 1, p. 149, pl. B² fig. 1. (Bahia.)*Muricea humilis*, + vars. *humilis*, *mutans*, and *macra* VERRILL 1912, p. 377, fig. 1, pl. 29 figs. 1-1a, pl. 32 figs. 4-5, pl. 35 fig. 2. (Abrolhos Reefs to Guarapary, Brazil.)*Muricea acropora* VERRILL 1912, p. 379, pl. 32 fig. 3, pl. 35 figs. 1-1a. (Mar Grande, Bahia, Brazil.)*Muriceopsis tuberculata*, AURIVILLIUS 1931, p. 115. (St. Barthélemy.)not *Gorgonia tuberculata* ESPER 1792, 2, p. 127, pl. 37.not *Eunicea humilis*, STIASNY 1935d, p. 74, fig. T, pl. 3 fig. 14, pl. 7 fig. 32. [= *Plexaura flexuosa* LAMOUTOUX.]*Muriceopsis sulphurea*, DEICHMANN & BAYER 1959, p. 6, pls. 1, 3. (Brazil.)

Diagnosis. Colonies low and shrub-like, with irregular pinnate branching (Pl. II fig. 8); twigs about 3 mm. in diameter, with polyps forming shelf-like or nariform calyces. Axial sheath containing slender spindles about 0.3 mm. in length, yellow, rarely purple (Fig. 48 a); outer rind with stout, ornately foliate, unilaterally developed "nudibranch-like" spindles, and some smaller torches or clubs not arranged in a special stratum at the surface (Fig. 48 b). Color yellow in both dry or alcoholic material.

Material. A number of USNM specimens from the coast of BRAZIL (5282, 5285, 5303, 49660, 49661). ST. LUCIA, Gros Inlet (51416). PUERTO RICO, Vega Baja (51931, 52031). From the Leiden Museum a specimen collected in 1886 by A. J. van Koolwijk, questionably at ARUBA.

Distribution. Brazil, Aruba?, St. Lucia, St. Barts, Puerto Rico

Ecology. The coelentera of one of the specimens examined contained the shells of larval pelecypods and gastropods in some abundance; the polyps must have been feeding heavily upon larval mollusks just before it was collected.

Remarks. This characteristic but variable species has received several names because of its different growth forms. These vary from low, scrubby colonies only 4-5 cm. in height to rather elongate, spindly forms 18-20 cm. tall, which approach the appearance of *M. flavida*. The calyces of *M. sulphurea* are more prominent than those of *flavida*, and its spicules are more coarsely and profusely sculptured.

42 *Muriceopsis flavida* (Lamarck), 1815

(Fig. 48 c-f; Pl. IV fig. 1)

Gorgonia flavida LAMARCK 1815b, p. 158. (Habite l'Océan des Antilles.)*Muricea flexuosa*, HARGITT & ROGERS 1901, p. 283, fig. F. (Gallardo Bank, P. Rico.)*Plexauroopsis?* *flavida*, STIASNY 1935d, p. 71, fig. S, pl. 1, fig. 5. (Curaçao.)*Plexauroopsis flavida*, STIASNY 1941d, p. 106, pl. 1 figs. 5-6. (Los Frailes.)*Plexauroopsis puertorealis* STIASNY 1941d, p. 107, fig. B, pl. 1 figs. 7-8. (Los Frailes.)*Muriceopsis flavida*, DEICHMANN & BAYER 1959, p. 8, pl. 4. (Florida, Antilles, Cuba, Puerto Rico, Guadeloupe, Tobago; Mauritius?)

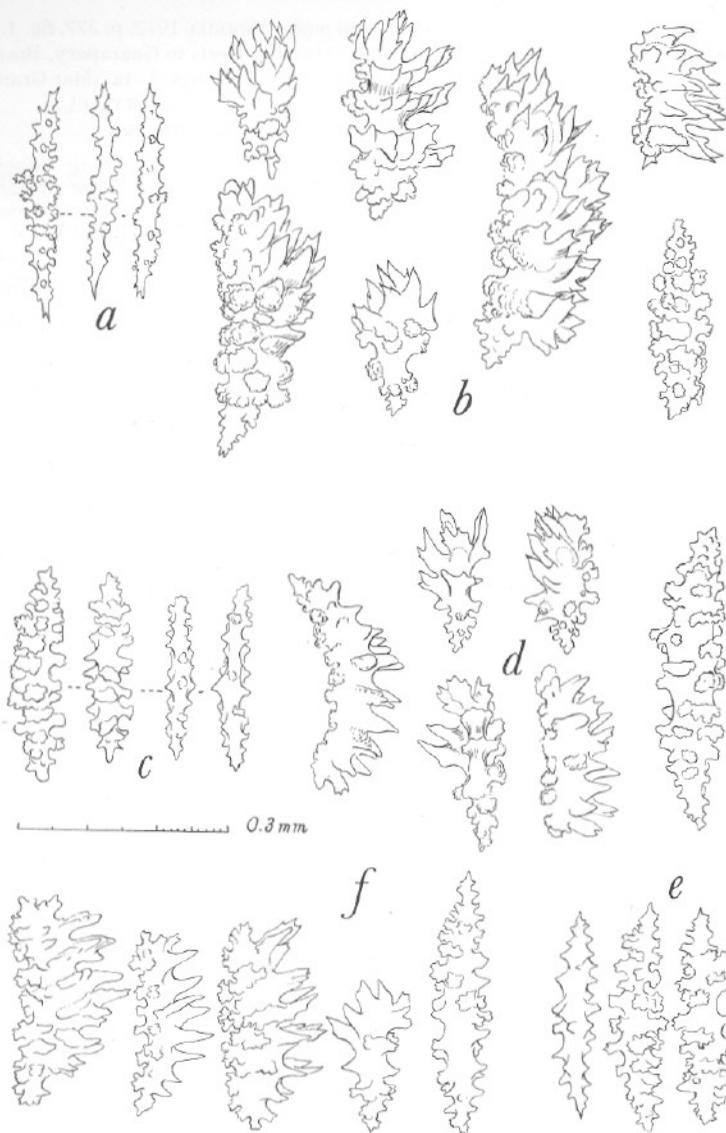


FIGURE 48. *Muriceopsis sulphurea* (Donovan), spicules of a specimen from Brazil (USNM 5286): a, spindles of axial sheath; b, spicules of the outer rind. *Muriceopsis flavida* (Lamarck), spicules of a specimen from St. Thomas (50245): c, spindles of axial sheath; d, spicules of outer rind; spicules of the type specimen in the Paris Museum: e, spindles of axial sheath; f, spicules of outer rind. (All figures drawn to the same scale.)

Diagnosis. Tall, plumose, pinnately branched colonies (Pl. IV fig. 1) with cylindrical branchlets bearing polyps all around; calycular apertures commonly with a small, shelf-like lip below. Axial sheath with slender, acute spindles up to 0.3 mm. in length, purple (Fig. 48 c, e); outer rind with stout, unilaterally spinose spindles about 0.3 mm. in length, and asymmetrical clubs measuring 0.20–0.25 mm. (Fig. 48 d, f). Color of colonies olivaceous yellow, grayish yellow, or purple, depending upon the proportion of yellow and purple sclerites in the rind.

Material. LOS FRAILES, La Pecha, sandy rock debris, 1–2 m., sta. 1215, Hummelinck coll., 19.VI.1936, dried fragments (USNM 50324). Puerto Real, sandy debris, 3–4 m., sta. 1214, Hummelinck coll., 18.VI.1936, fragments of the type of *Plexauropsis puertorealis* Stiasny (USNM 50253). A part of Stiasny's type of *Plexauropsis flavida*, through the courtesy of Dr. L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie at Leiden.

In addition to the above a large number of USNM specimens; among these are: a fragment of Lamarck's type in the Paris Museum, received through the kindness of Prof. Gilbert Ranson; specimens from south FLORIDA (50256); the BAHAMAS (14374, 50137, 50263, 50321), PUERTO RICO (42593), ST. JOHN (50133, 50245), SABA BANK (50343), GUADELOUPE (44053), DOMINICA (50344), ST. LUCIA, south of Marigot Bay (51415), and GRAND CAYMAN (51391).

Distribution. Bermuda?, south Florida and the West Indies.

Remarks. STIASNY'S *Plexauropsis puertorealis* is in very close agreement with *Muriceopsis flavida*, of which the purple specimens do not significantly differ from yellow ones. STIASNY'S *Plexauropsis flavida* seems to be identical with LAMARCK'S *Gorgonia flavida*.

43

***Muriceopsis petila* spec. nov.**

(Fig. 49; Pl. IV fig. 2)

Diagnosis. Colonies branched in an open, pinnate manner (Pl. IV fig. 2); branches slender, of uniform diameter (1.5–2.0 mm.); polyps on all sides, more or less exsert in preservation, forming low, conical calyces. Axial sheath containing slender, violet or colorless spindles about 0.35 mm. in length (Fig. 49 a, d); outer cortex with colorless, elongate, unilaterally spinose spindles up to 1.0 mm. long, some of them stouter at one end and of club-like

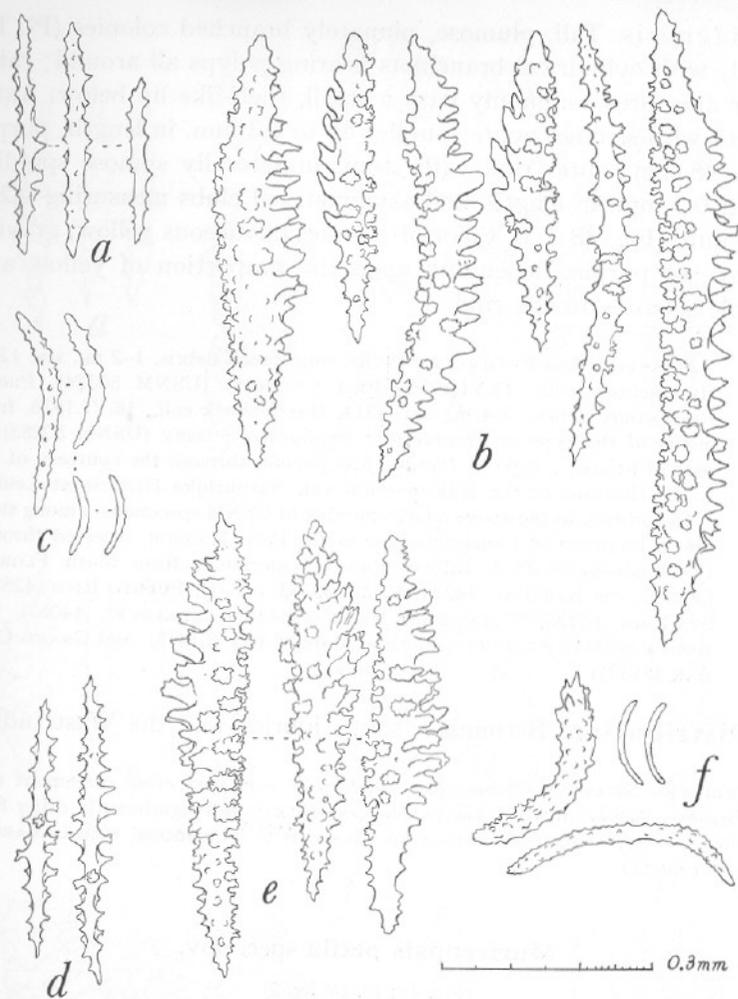


FIGURE 49. *Muriceopsis petila* spec. nov., spicules. *a-c*, of a paratype specimen from Cat Cay, Bahamas (USNM 50383): *a*, spindles of axial sheath; *b*, spicules of outer rind; *c*, anthocodial spicules. *d-f*, of the holotype from off Fernandina, Florida (50382): *d*, spindles of axial sheath; *e*, spicules of outer rind; *f*, anthocodial spicules. (All figures drawn to the same scale.)

form (Fig. 49 b, e). Anthocodiae armed with curved rods up to 0.3 mm. in length, those in the pinnules about 0.1 mm. (Fig. 49 c, f). Color of alcoholic specimens pale lavender, due to the purple color of the axial sheath spicules which shows through the colorless spicules of the outer rind.

Description. The type is a stem (branch?) about 15.5 cm. tall, bearing numerous pinnate twigs 3-4 cm. in length, arising at intervals of 5-15 mm. The twigs are cylindrical, the polyps situated on all sides and exert in preservation. The axial sheath contains slim, acute spindles 0.3-0.4 mm. in length (Fig. 49 d), and the outer rind has unilaterally spinose spindles and weakly clavate forms (Fig. 49 e). The anthocodiae have a strong armature of bent rods (Fig. 49 f) arranged to form a crown; the spicules of the points are spinose at the distal end; the tentacles are packed with c-shaped rodlets.

The specimen from 'Albatross' station 2649 is a larger colony, about 30 cm. tall, with its base of attachment. Although the branching is distinctly pinnate, the branchlets all arise from the upper side of the main branches; they are as much as 10 cm. in length, and the interval between them is usually about 10 mm. but may be as great as 30 mm.

The specimens from Cat Cay are fragmentary but show the typical pinnate manner of branching and conform well in regard to spiculation.

Material. Holotype from FLORIDA, off Fernandina, 30° 58' 30" North, 79° 38' 30" West, 294 fms., bottom 46.3° F., *Albatross* sta. 2668, 5.V.1886 (USNM 50382). Paratypes from CAT CAY, Bahamas, dredged in 70 fms. by Mr. & Mrs. John Wentworth, VI.1947, 3 specimens (USNM 50383); GREAT BAHAMA BANK, south end of the Tongue of the Ocean, 23°34'00" North, 76°33'00" West, 36 fms., bottom 74.2° F., *Albatross* sta. 2649, 12.IV. 1886 (USNM 50384).

Distribution. Fernandina, Florida, to the Great Bahama Bank, 36-294 fathoms.

Genus *Plexaurella* Kölliker, 1865

Plexaurella VALENCIENNES 1855, p. 10. [Nomen nudum.]

Plexaurella KÖLLIKER 1865, p. 138. (Type species, *Gorgonia dichotoma* Esper, by subsequent designation: KUNZE 1916, p. 555.)

Plexaurella, KUNZE 1916, p. 553.

Diagnosis. Stout, dichotomously branched plexaurids with predominantly or exclusively quadriradiate 'butterfly' spicules in the rind; axial sheath spicules not purple in color. Polyps with a few rods, usually minute, in the anthocodiae; rarely a strong crown.

Distribution. The western Atlantic from Bermuda to Brazil.

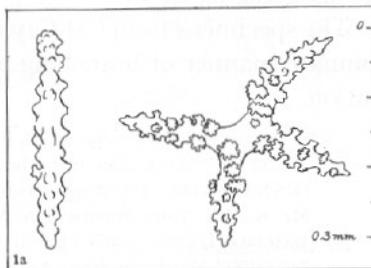
Remarks. The quadriradiate spicules are highly characteristic. When the ordinary spindles of other genera occur in twin form, the resultant quadriradiates are similar to the normal spicules of *Plexaurella* but are infrequent among the ordinary spindles, which predominate.

KÜKENTHAL (1924) accepts nine species, and does not include those described from Brazil by VERRILL (1912). I am able to distinguish only six species but others may be demonstrable when adequate studies are made on a large series of specimens.

KEY 15

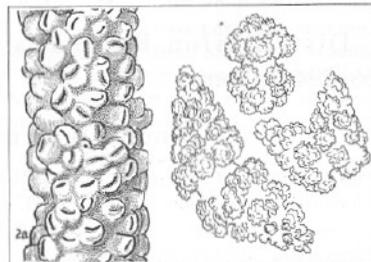
ILLUSTRATED KEY TO THE SPECIES OF *Plexaurella*

- 1a. Polyps strongly armed with stout rods about 0.3 mm. long. Quadriradiates with slender arms. Colonies with a few long branches 10–15 mm. in diameter. Rind elevated around apertures: *Plexaurella nutans* (Duchassaing & Michelotti)



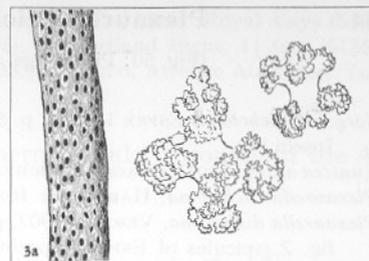
- 1b. Polyps weakly armed, the rods only 0.05–0.07 mm. long. Arms of quadriradiates stout: 2

- 2a. Calyces protuberant, non-retractile. Cortex with coarsely sculptured bent spindles, double heads, and small butterflies: *Plexaurella grandiflora* Verrill



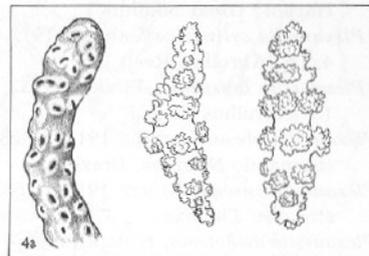
- 2b. Calyces not protuberant, but rind may be elevated around apertures: 3

- 3a. Most of the spicules of the middle layer sexradiates with two arms more strongly developed; butterflies with short rays; axial sheath with symmetrical sexradiates. Colonies with long, rodlike branches 5–7 mm. in diameter; rind smooth, apertures porelike: *Plexaurella grisea* Kunze



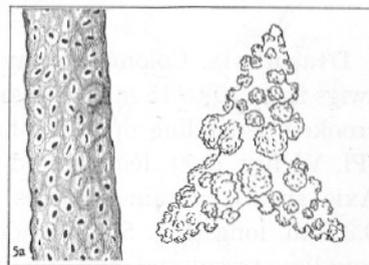
- 3b. Most of the spicules of the middle layer are quadriradiate butterflies or double spindles that are straight or bent at the waist: 4

- 4a. Terminal branches slender, diameter 6 mm. or less; colonies forming low, shrubby bushes, sometimes taller and slender. Rind sclerites are chiefly straight or bent spindles about 0.3 mm. long: *Plexaurella pumila* Verrill

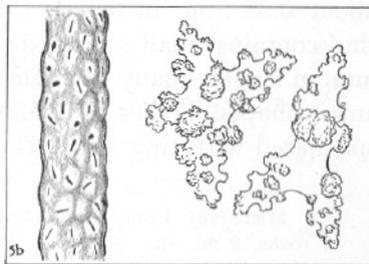


- 4b. Terminal branches stouter, 7–18 mm. in diameter: 5

- 5a. Large sclerites of middle rind are coarsely sculptured triradiates and butterflies with rays 0.2 mm. long. Branches 7–18 mm. in diameter. Rind usually elevated around apertures: *Plexaurella dichotoma* (Esper)



- 5b. Large sclerites of middle rind are more sparsely sculptured and have rays 0.15 mm. long. Branches about 9 mm. in diameter, rind elevated around apertures: *Plexaurella fusifera* Kunze



Plexaurella dichotoma (Esper), 1791

(Fig. 50; Pl. VI figs. 6-7, XXIII, XXIV, XXV)

Gorgonia dichotoma ESPER 1791, 2, p. 59, pl. 14. (Von den südlichen americanischen Inseln.)*Eunicea anceps* DUCHASSAING & MICHELOTTI 1860, p. 25, pl. 3 figs. 1-2. (St. Thomas.)
Plexaurella dichotoma, HARGITT & ROGERS 1901, p. 285. (Porto Rico.)*Plexaurella dichotoma*, VERRILL 1907, p. 310, figs. 156-157, pl. 33B fig. 1b, pl. 36A fig. 2 (spicules of ESPER's specimen), pl. 36A fig. 1 (spicules of the type of *Eunicea anceps* Duchassaing & Michelotti). (Bermuda: outer reefs; Castle Harbor; Great Sound.)? *Plexaurella cylindrica* VERRILL 1912, p. 384, pl. 32 fig. 7, pl. 34 fig. 4, pl. 35 figs. 4, 14. (Abrolhos Reefs.)? *Plexaurella braziliana* VERRILL 1912, p. 385, pl. 34 figs. 3-3a, pl. 35 figs. 12-12a, 15. (Abrolhos Reefs.)*Plexaurella obesa* VERRILL 1912, p. 383, pl. 31 fig. 3; pl. 32 fig. 9; pl. 34 fig. 6. (Fernando Noronha, Brazil.)*Plexaurella curvata* KUNZE 1916, p. 582, figs. B'-E', pl. 27 fig. 9. (Barbados; Kingston; St. Thomas.)*Plexaurella dichotoma*, KUNZE 1916, p. 569, figs. N-P, pl. 28 fig. 5. (Barbados.)*Plexaurella heteropora*, KUNZE 1916, p. 567, figs. K-M, pl. 27 fig. 4. (Barbados.)

Diagnosis. Colonies bushy, dichotomously branched, the end twigs from 10 to 15 mm. in diameter, long and straight or short and crooked depending upon the habitat, only slightly clavate if at all (Pl. VI figs. 6-7). Rind raised around the apertures in most cases. Axial sheath contains spindles, triradiates and quadriradiates about 0.3 mm. long (Fig. 50 b); middle layer contains straight and bent spindles, triradiates and quadriradiates with strong tubercles, all about 0.35 mm. in length (Fig. 50 a, e); the outermost layer of rind contains small sexradiate capstans that are mostly about 0.1 mm. in length; many of them have two rays enlarged, producing antler-shaped bodies (Fig. 50 c, f); the anthocodiae are weakly spiculated with tiny flat rods (Fig. 50 d, g).

Material. From Hummelinck's collection: ST. EUSTATIUS, Gallows Bay, rocks, 2 m., sta. 1116B, 15.VII.1949, 1 dry specimen (USNM 50420). ST. MARTIN, Little Bay, rocks, 3 m., J. H. Stock, 7.II.1959 (Amsterdam). ANGUILLA, north of Sandy Ground, rocky beach with sandy reef, 1-3 m., sta. 1142, 19.VI.1949, 4 dry and 2 alcoholic spec. (USNM 50410, 50669, 50745).

Additional USNM specimens: FLORIDA, Biscayne Bay (50319), Key Largo (50419); DRY TORTUGAS (50269, 50390); BAHAMAS (14390); GRAND CAYMAN

(51393); JAMAICA (7523), Lime Cay and Gun Cay, Port Royal Cays (51360, 51392), Pigeon Island (51394, 51395), off Portland Bight, 11 fms. (51359); ST. THOMAS (50418); BARBUDA (50333); MEXICO, Arrefice Alacranes, Yucatan (51435, 51446); BRAZIL (5278).

Distribution. Bermuda; southern Florida, throughout the Antilles, to the reefs of Brazil.

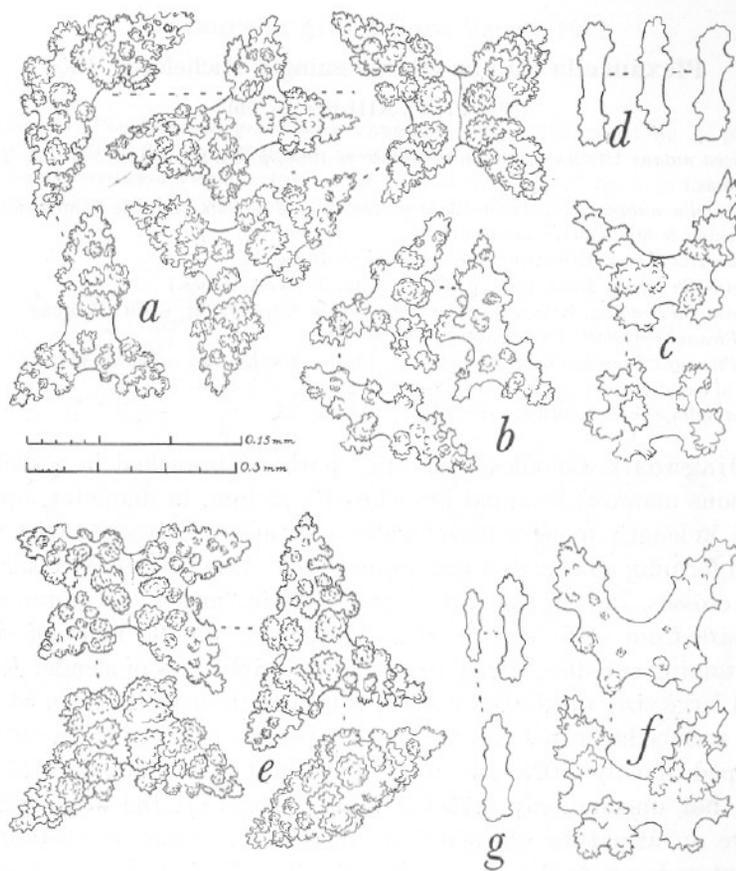


FIGURE 50. *Plexaurella dichotoma* (Esper), spicules, a-d, of a specimen from Anguilla (USNM 50410): a, spicules of middle rind; b, spicules of axial sheath; c, spicules of outermost rind; d, anthocodial rods. e-g, of a specimen from New Providence, Bahamas (14390): e, spicules of middle rind; f, spicules of outermost rind; g, anthocodial rods. (Enlargement of a, b, and e indicated by the 0.3 mm. scale below a; that of c, d, f, g by the 0.15 mm. scale below a.)

Remarks. It has been a common practice to assign almost any *Plexaurella* to the species *dichotoma*. I am an unwilling conformist in this practice, for what I treat here as *dichotoma* may be a complex of species which the material available is insufficient to separate. All stout specimens with a tendency to produce rimmed apertures and with large, coarsely tuberculate butterfly-spicules with thick rays (like VERRILL's figures of the type spicules) have been called *dichotoma*. KUNZE's *P. dichotoma grisea* has entirely different spicules and has been treated as a separate species, perhaps identical with his *P. teres* and *P. vermiculata*. It remains to be determined whether or not this is actually the *vermiculata* of LAMARCK.

45 *Plexaurella nutans* (Duchassaing & Michelotti), 1860

(Fig. 51; Pl. XIII figs. 2a, 2b)

Eunicea nutans DUCHASSAING & MICHELOTTI 1860, p. 24, pl. 3 figs. 3-4. (St. Thomas.)

Plexaurella nutans, KÖLLIKER 1865, p. 138, pl. 18 fig. 15. (Spicule from Duchassaing & Michelotti's material.)

Plexaurella crassa, KÖLLIKER 1865, p. 138, pl. 18 fig. 12.

Plexaurella affinis BELL 1889, p. 48, pl. 3 fig. 3. (West Indies.)

Plexaurella friabilis, KUNZE 1916, p. 560, figs. A-C, pl. 27 fig. 1. (St. Thomas.)

not *Plexaura friabilis* LAMOUREUX 1816, p. 430.

not *Plexaura friabilis*, VERRILL 1866, p. 186 [= *Euplexaura capensis* Verrill; Cape of Good Hope.]

Plexaurella kunzei KÜKENTHAL 1924, p. 102, fig. 73.

Diagnosis. Colonies very tall, sparingly branched in a dichotomous manner; terminal branches 10-15 mm. in diameter, up to 1 m. in length, more or less clavate; apertures widely separated, the rind forming an elevated rim around each. Axial sheath with spindles, crosses, and capstans, the latter often in "antler" form, ranging in size from 0.15 to 0.25 mm. (Fig. 51 a); middle layer of rind containing spindles, triradiates, and quadriradiates of slender form and large size, up to 0.45 mm. in total length or width (Fig. 51 b); the surface layer includes the usual capstans, many of them antler-shaped, mostly 0.075-0.10 mm. in greatest dimension (Fig. 51 d), but not uncommonly 0.15-0.2 mm. (Fig. 51 c); the anthocodiae have an armature unusually strong for the genus, consisting of blunt rods up to 0.3 mm. in length (Fig. 51 e). Color in alcohol, putty-gray or light brown.

Material. USNM specimens: FLORIDA, Biscayne Bay, F. M. Bayer coll. (50322), Cape Romano, J. Q. Tierney (44236); near the DRY TORTUGAS, Oregon (50130); JAMAICA (51361).

Distribution. Southern Florida, Gulf of Mexico and West Indies.

Remarks. *Plexaurella nutans* is at once recognized by its striking outward appearance, by the slender build of its large spindles and crosses in the middle cortex, and by the unusually strong anthocodial armature of rods larger than those of any other *Plexaurella*.

46 *Plexaurella grandiflora* Verrill, 1912

(Fig. 52; Pl. VI fig. 5)

Plexaurella (*Pseudeunicea*) *grandiflora* VERRILL 1912, p. 388, pl. 31 fig. 6, pl. 32 fig. 10, pl. 34 fig. 1, pl. 35 figs. 3-3a. (Mar Grande, Brazil.)

Plexaurella verrucosa VERRILL 1912, p. 387, pl. 31 fig. 4, pl. 32 fig. 6, pl. 34 fig. 5, pl. 35 figs. 13-13a. (Candeias, Pernambuco, Brazil.)

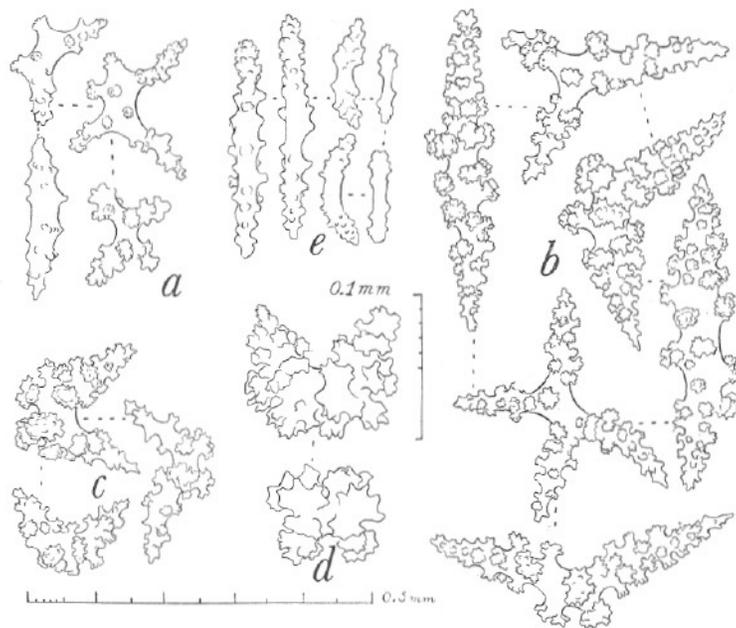


FIGURE 51. *Plexaurella nutans* (Duchassaing & Michelotti), spicules of a specimen from Dry Tortugas (USNM 50130): a, spicules of axial sheath; b, spicules of middle rind; c, larger spicules of outer rind; d, smaller spicules of surface layer; e, anthocodial rods. (Enlargement of a-c and e indicated by 0.5 mm. scale at lower left; that of d by 0.1 mm. scale adjacent.)

Diagnosis. Colonies dichotomously branched, the terminal branches 9–15 mm. in diameter including the crowded calyces (Pl. VI fig. 5). Polyps close-set, forming tall, tubular, bilabiate calyces into which the anthocodiae retract. Axial sheath with double spindles, double heads, and small butterflies, mostly about 0.1–0.2 mm. in greatest dimension (Fig. 52 b); middle layer with closely and coarsely sculptured double heads (0.15 mm.), double spindles either straight or bent at the waist (0.3–0.35 mm.), and small butterflies (Fig. 52 a); outer layer of rind with small double heads about 0.1 mm. long, often asymmetrically developed (Fig. 52 c); tentacles with flat rods reaching a length of 0.07 mm. (Fig. 52 d). Color of dry colonies, light or medium brown.

Material. Eight USNM specimens with very prominent calyces, from BRAZIL, Parahyba do Norte (5270) and Mar Grande, Bahia (5271–5276, 5312); also 8 specimens with calyces less prominent from Parahyba do Norte (5263, 5267, 5269, 5315, 5316) and Candeias, Pernambuco (5265, 5319, 5320); all collected by Richard Rathbun, 1876.

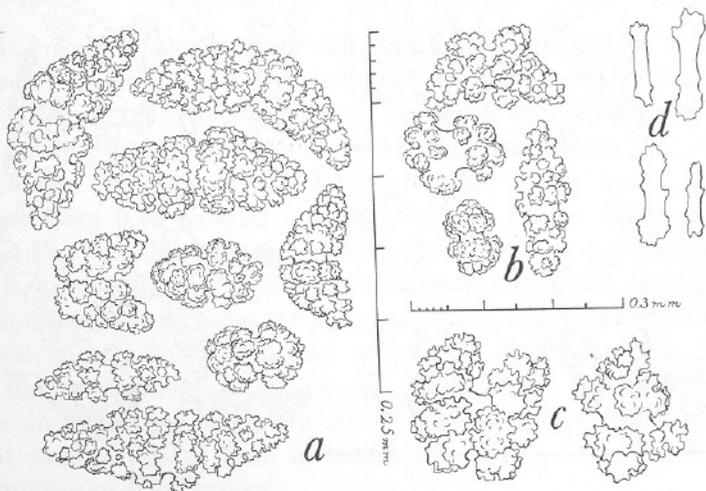


FIGURE 52. *Plexaurella grandiflora* Verrill, spicules of a specimen from Brazil (USNM 5276): a, spicules of middle rind; b, spicules of axial sheath; c, spicules of outer rind; d, anthocodial rods. (Enlargement of a and b indicated by 0.3 mm. scale below b; that of c and d by 0.25 mm. scale at right of a.)

Distribution. Reefs of Brazil; probably endemic.

Remarks. *Plexaurella grandiflora* is one of the most distinctive species of the genus. In appearance, it is not unlike the stoutest specimens of *Eunicea mammosa*, although its branching is characteristically dichotomous. The geographic distributions of the two species are not known to overlap and confusion is unlikely.

The specimens that Verrill called *Plexaurella verrucosa* are more slender than typical *grandiflora*, with calyces less prominent but still protruding and bilabiate. The spicules are practically identical with those of *grandiflora* (as can be seen even from Verrill's original figures), making it impossible to maintain the two as separate species.

47

Plexaurella grisea Kunze, 1916

(Fig. 53; Pl. VI fig. 4)

?*Plexaurella anguiculoides* BELL 1889, p. 48, pl. 3 fig. 4 (West Indies.)

?*Plexaurella vermiculata*, BELL 1889, p. 45, pl. 3 fig. 5. (West Indies.)

Plexaurella dichotoma, var. *grisea* KUNZE 1916, p. 573, figs. Q–R, pl. 28 fig. 6. (Barbados.)

?*Plexaurella teres* KUNZE 1916, p. 575, figs. S–T. (Fundort unbekannt.)

?*Plexaurella vermiculata*, KUNZE 1916, p. 576, figs. U–W, pl. 28 fig. 7 (Barbados.).

Diagnosis. Colonies tall, the branches 7–12 mm. in diameter, cylindrical, straight and stiff (Pl. VI fig. 4). Margins of apertures slightly elevated or not at all. Axial sheath containing sexradiates about 0.15 mm. in diameter, and some flattened rods (Fig. 53 b, f); middle rind with stout sexradiates, some of them with two of the rays longer, and also some short-rayed, stubby butterfly-spicules (Fig. 53 a, e); outermost layer with small sexradiates, most of them with two rays a little longer than the others, producing antler-spicules (Fig. 53 d, h); anthocodiae with flat rodlets about 0.06 mm. in length (Fig. 63 c, g).

Material. Several items from the USNM: ST. CHRISTOPHER, coral reef opposite Frigate Bay, coll. D. V. Nicholson, Smithsonian-Bredin Exp., 12.IV.1956, large specimen closely corresponding with Kunze's description of *Plexaurella dichotoma* var. *grisea* (50534); SWAN ISLAND, C. H. Townsend, II.1887 (50688); TOBAGO, Milford Bay, between Pigeon Point and Crown Point (51417).

Questionably referred to *P. grisea* are specimens from the southwest coast of FLORIDA, Henry Hemphill, I.1884 (50535), and from Bache Shoal off Elliott Key, F. M. Bayer, IV.1948 (50536).

Distribution. Florida Keys? Antilles and Caribbean.

Remarks. The specimen from St. Christopher agrees so well with KUNZE's description of the spicules of *P. dichotoma* var. *grisea* that the differences in gross characteristics must be given minor consideration. The present specimen is more slender (diameter of branches 7–8 mm. as compared with 9.0–11.5 mm. in KUNZE's), erect, without any tendency toward raised margins around the apertures. As is well known, the growth form may be influenced by ecological factors, and the elevation around the apertures may vary according to preservation.

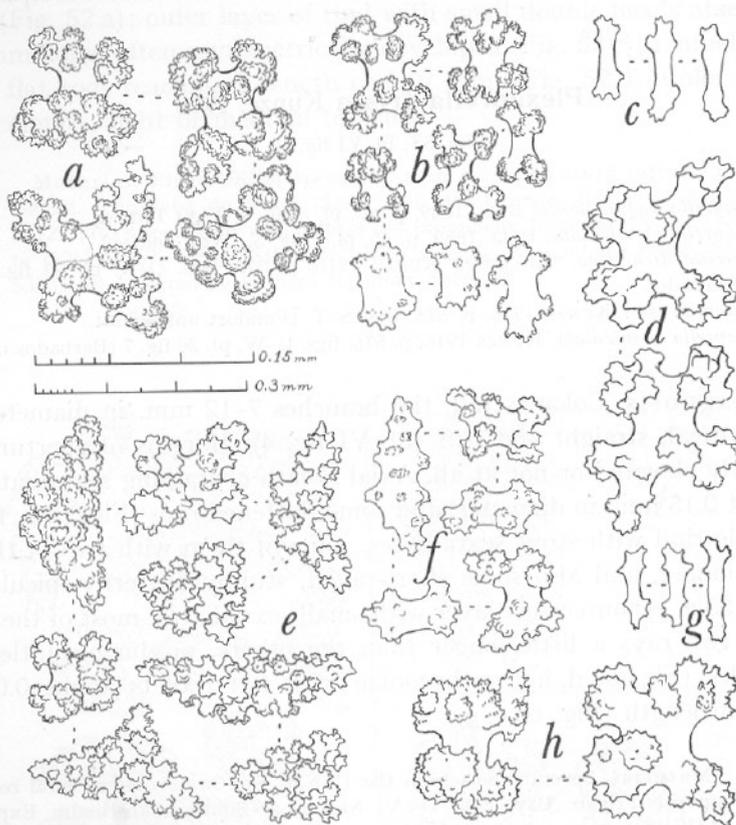


FIGURE 53. *Plexaurella grisea* Kunze, spicules. *a-d*, of a specimen from St. Christopher (USNM 50534): *a*, spicules of middle rind; *b*, spicules of axial sheath; *c*, anthocodial rods; *d*, spicules of outer rind. *e-h*, of a specimen from Florida (50535): *e*, spicules of middle cortex; *f*, spicules of axial sheath; *g*, anthocodial rods; *h*, spicules of outer cortex. (Enlargement of *a-b* and *e-f* indicated by 0.3 mm. scale above *e*; that of *c-d* and *g-h* by 0.15 mm. scale below *a*.)

The specimens from Florida localities differ in several regards, but all specimens with abundant sexradiates, stubby butterfly-forms, and smooth, straight and stiff branches are for the present being included under the name *grisea*. It is possible that the Florida material represents BELL's *P. anguiculoides*, but additional material is needed before the species can be distinguished clearly.

48

***Plexaurella pumila* Verrill, 1912**

(Fig. 54 a-d; Pl. VI figs. 1-3)

Plexaurella pumila VERRILL 1912, p. 386, pl. 31 fig. 5, pl. 32 fig. 8, pl. 34 fig. 2. (Periperi Point, Bahia, Brazil.)

Plexaurella minuta KUNZE 1916, p. 565, figs. G-J, pl. 27 fig. 3. (Mexico.)

?*Plexaurella tenuis* KUNZE 1916, p. 579, figs. x-z, A', pl. 27 fig. 8. (St. Thomas.)

Diagnosis. Colonies low or of moderate height, laterally branched, the terminal branches 3.5–4.5 mm. in diameter, often clavate (Pl. VI figs. 1–3). Surface of rind raised as a rim around the calycular orifices. Axial sheath with straight, blunt spindles warty in transverse belts, measuring 0.2 mm. in length, and a few small butterfly-spicules (Fig. 54 c); near the base these becomes stouter and capstans are more numerous (Fig. 54 b); middle rind with belted spindles, either straight or bent, about 0.3 mm. in length, and a few triradiates and butterfly-forms (Fig. 54 a); outermost layer contains minute sexradiates about 0.05–0.1 mm. in length (Fig. 54 d).

Material. A number of USNM specimens, all from BRAZIL: 8 from Mapelle, Bahia (5260–5262, 5279–5281, 5317, 5318); 2 from Candeias Reef, Pernambuco (5264, 5266); and 1 from Parahyba do Norte (5268); all collected by Richard Rathbun, 1876.

Distribution. Reefs of Brazil; if the two records given by KUNZE (1916) are correct, the species extends northward through the Lesser Antilles and the Caribbean coast of Mexico.

Remarks. KUNZE's *Plexaurella minuta* undoubtedly belongs to VERRILL's species; it is a small colony typical of the form found in Brazil. *Plexaurella tenuis*, which agrees with *P. pumila* in diameter of branches and in the size and form of the spicules of all layers, closely resembles some of the taller specimens from Brazil but is even more elongate.

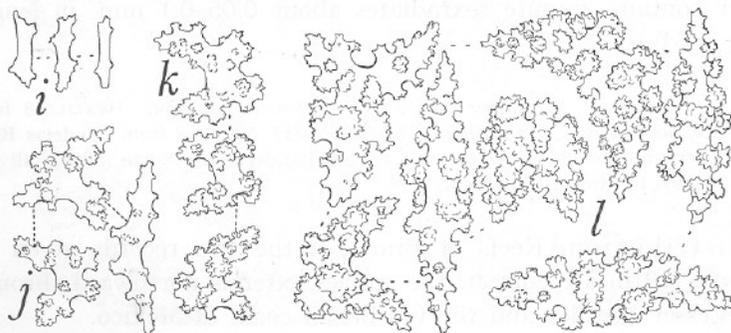
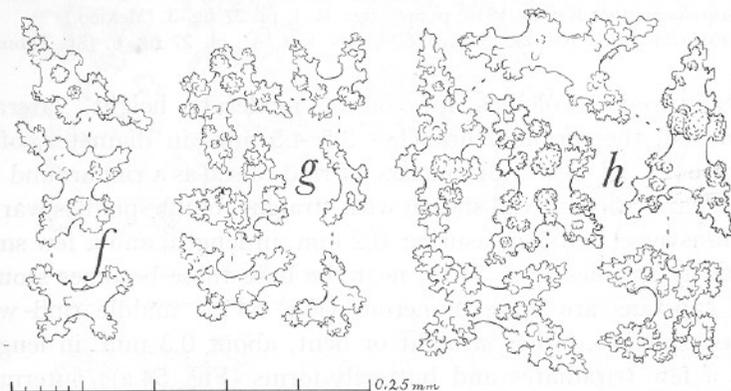
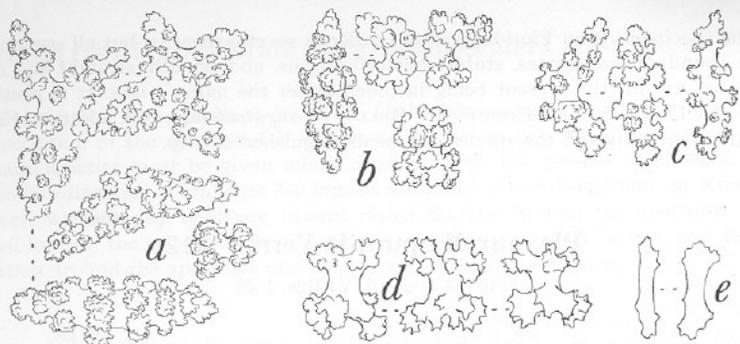


FIGURE 54. *Plexaurella pumila* Verrill, a specimen from Bahia, Brazil (USNM 5279): a, spicules of middle rind; b, spicules of axial sheath of main stem; c, spicules of axial sheath of terminal branch; d, spicules of outer rind. *Plexaurella fusifera* Kunze, spicules. e-h, of a specimen from Cuba (50711): e, anthocodial rods; f, spicules of axial sheath; g, spicules of outer rind; h, spicules of middle rind; i-l, of a specimen from Sarasota, Florida (50602): i, anthocodial rods; j, spicules of axial sheath; k, spicules of outer rind; l, spicules of middle rind. (Enlargement of a-c, f-h, j-l indicated by 0.5 mm. scale below a; that of d, e, and i by 0.25 mm. scale above i.)

Plexaurella fusifera Kunze, 1916

(Fig. 54 e-l)

Plexaurella fusifera KUNZE 1916, p. 563, figs. D-F, pl. 27 fig. 2. (Barbados.)

Diagnosis. Colonies dichotomously branched, with the terminal branches moderately or very long, 8.0-10.5 mm. in diameter and somewhat clavate; calyces well-separated, the rind a little elevated around the orifices to form a distinct rim. Axial sheath containing irregular spindles, crosses, and sexradiates often with two rays longer (Fig. 54 f, j); middle cortex with quadriradiate butterflies, triradiates, and spindles, measuring about 0.3-0.4 mm. in their greatest dimension (Fig. 54 h, l); outermost layer with numerous capstans having two long rays ('antlerforms'), mostly 0.10-0.15 mm. in greatest dimension (Fig. 54 g, k); the polyps contain small, flat rods 0.05-0.07 mm. in length (Fig. 54 e, i). Color, yellowish brown or gray.

Material. In the U.S. National Museum: Gulf of Mexico near FLORIDA, about 3 $\frac{1}{2}$ miles southwest of Longboat Pass, Sarasota, J. Brookes Knight coll., 24.III.1915 (50602); Key Vaca, Henry Hemphill, 1884, 2 lots (16848); DRY TORTUGAS, Garden Key, M. H. Boehme and F. M. Bayer, 26.IV. 1948 (50708); CUBA, Enseñada de Cajon, off Cape San Antonio, P. Bartsch and J. B. Henderson, Tomas Barrera Exp., 22-23.V.1914, 4 large colonies (50711).

Distribution. Southern Florida and the Antilles.

Remarks. The specimens from Cuba are large and richly branched, nearly a meter in height. They agree with *P. fusifera* in most points of spiculation and in such details of gross morphology as have been described. The branches resemble those of *Plexaurella nutans* but are more slender, and the colonies are more profusely branched. There is not a preponderance of spindles as noted by KUNZE, and radiate forms are abundant (Fig. 54 f-h).

The specimen from Sarasota, Florida is smaller than those from Cuba and has abundant spindles in the middle layer of rind (Fig. 54 l).

Genus *Muricea* Lamouroux, 1821

Muricea LAMOUROUX 1821, p. 36. (Type species, *Muricea spicijera* Lamouroux, by subsequent designation: MILNE EDWARDS & HAIME 1850.)

Muricea, RIESS 1929, p. 383.

Eumuricea (part), RIESS 1929, p. 397.

Muricea, KÜENTHAL 1924, p. 141.

Muricea, DEICHMANN 1936, p. 99.

Diagnosis. Plexaurids with usually stout branches covered with prominent, shelf-like calyces which have a rough surface due to the projecting spinose spindles in their walls. Spicules of the axial sheath in the form of capstans, spindles, and oval bodies, never purple in color.

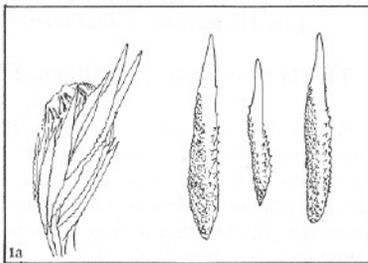
Distribution. Bermuda; southern Florida and the Antilles; southern California to Panama; endemic ampho-American.

Remarks. Only two species are eligible to be the type species of the genus *Muricea*: *Muricea elongata* Lamouroux and *M. spicijera* Lamouroux. In 1850, MILNE EDWARDS & HAIME unambiguously designated the latter. Its questionable identity creates an academic problem, but the concept of the genus is not altered whether we consider *Muricea spicijera* to be synonymous with *M. muricata* (Pallas), or a good species identical with that called *M. atlantica* (Kükenthal) in the present paper.

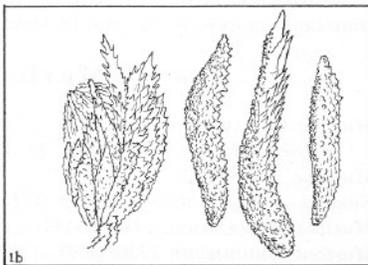
KEY 16

ILLUSTRATED KEY TO THE WEST INDIAN SPECIES OF *Muricea*

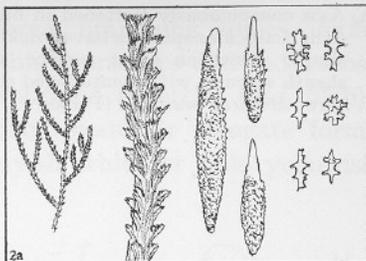
1a. Calycular spindles with a strong, smooth, terminal spike: 2



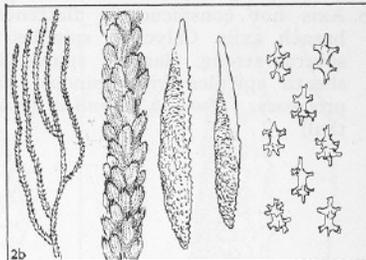
1b. Calycular spindles with prickles or several stout, slanting spines on the outer surface, but no strong terminal spike: 3



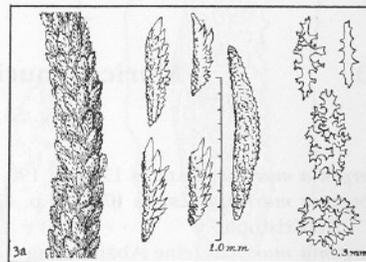
2a. Branching pinnate, twigs short and stiff. The smaller calycular spindles have a terminal spike: *Muricea pinnata* spec. nov.



2b. Branching lateral, twigs long and flexible. Large calycular spindles also have a terminal spike: *Muricea laxa* Verrill

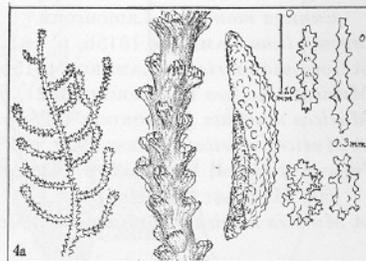


3a. Colonies tall and bushy, branching openly pinnate, with long, ascending terminal twigs. Calycular spindles less than 1 mm. long, with several slanting spines on the outer surface: *Muricea elongata* Lamouroux



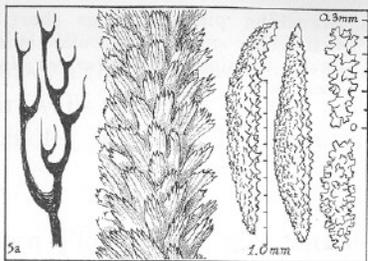
3b. Colonies branched in one plane or several parallel planes: 4

4a. Branching regularly pinnate, with short branchlets. Calycular spindles with low, blunt spines on the outer surface: *Muricea pendula* Verrill

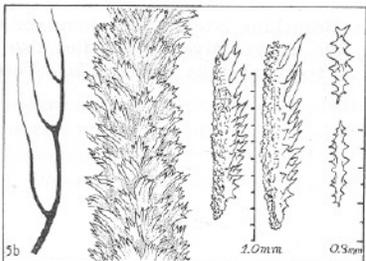


4b. Branching lateral, not pinnate; colonies broad, spreading: 5

5a. Axis conspicuously flattened in branch axils. Calycular spindles have prickles or simple spines on outer surface; axial sheath spicules with complicated sculpture: *Muricea muricata* (Pallas)



5b. Axis not conspicuously flattened in branch axils. Calycular spindles with several strong, slanting spines; axial sheath spicules with spinous, simple processes: *Muricea atlantica* (Kükenthal)



50

Muricea muricata (Pallas), 1766

(Fig. 55; Pl. V fig. 5)

Gorgonia muricata PALLAS 1766, p. 198. (Locus: Archipelagus Americanus.)

Gorgonia muricata, ESPER 1791, 2, p. 42, pl. 8. ("Am häufigsten bey Curassao, und St. Christoph.")

Gorgonia muricata (eine Abänderung . . .) ESPER 1792, 2, p. 130, pl. 39.

not *Gorgoniae muricatae* Variet. ESPER 1796, Fortsetzung 1, p. 152, pl. 39A [= *Eunicea mammosa* Lamouroux.]

Gorgonia lima LAMARCK 1815b, p. 163. (Habite l'Océan des Antilles.)

not *Gorgonia muricata*, LAMARCK 1815b, p. 163.

?*Muricea spicifera* LAMOUROUX 1821, p. 36, pl. 71 figs. 1-2. (Océan des Antilles.)

?*Muricea muricata* (?) GORDON 1925, p. 15. (Curaçao.)

not *Muricea muricata*, RIESS 1929, p. 391. [= *Muricea atlantica* (Kükenthal).]

Muricea spicifera, DEICHMANN 1936, p. 102, pl. 9 figs. 9-11. (Florida; Dry Tortugas; Havana; Guadeloupe.)

not *Muricea muricata*, DEICHMANN 1936, p. 100. [= *Muricea atlantica* (Kükenthal).]

Diagnosis. Colonies spread in one plane, broad and flabellate, laterally branched and with strongly flattened axis in the branch axils (Pl. V fig. 5). Spindles of outer layer (Fig. 55 c) either with simple spinules on the outer surface and tubercles on the inner, or

covered with tubercles only; no large, branching spines. Axial sheath near branch tips containing blunt spindles and rods, most of which are ornamented with complicated tubercles (Fig. 55 b); near the base, many coarse, globular, ovate, or elongate forms occur (Fig. 55 a). Dry colonies grayish white or pale yellowish brown in color.

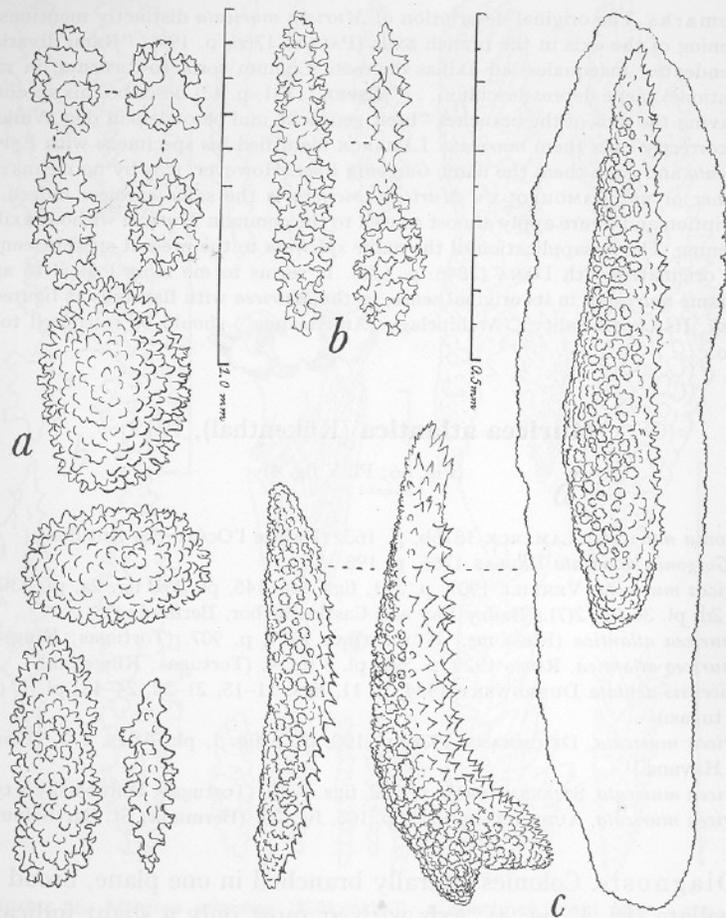


FIGURE 55. *Muricea muricata* (Pallas), spicules of a specimen from Klein Curaçao (USNM 50314): a, spicules of axial sheath of main stem; b, spicules of axial sheath of terminal branch; c, spindles of outer rind, the larger in outline only. (Enlargement of a and b indicated by 0.5 mm. scale at right of b; that of c by 1.0 mm. scale at right of a.)

Material. From Hummelinck's collection: KLEIN CURAÇAO, east ashore, sta. 1046, 1.X.1948, 6 dry specimens (USNM 50314). St. EUSTATIUS, Gallows Bay, rocks, 2 m., sta. 1116B, 15.VII.1949, dry spec. (USNM 50313).

In addition to the above, 2 specimens from BARBADOS, State University of Iowa Barbados-Antigua Exp., 1918 (USNM 42003, 44118).

Distribution. Florida to Curaçao.

Remarks. The original description of *Muricea muricata* distinctly mentions the flattening of the axis in the branch axils (PALLAS 1766, p. 199): "Rami divaricato adscendentes, inaequales, ad axillas depressi. Lignum coriaceo-corneum, in ramis (siccatione) saepe depressiusculum. . ." ESPER (1791, p. 43) describes his specimens as having the axis of the branches "breit gedrückt und besonders in den Winkeln" and correctly calls them *muricata*. LAMARCK identified his specimens with ESPER's *muricata* and gave them the name *Gorgonia lima*. However, it is by no means clear whether or not LAMOUREUX's *Muricea spicifera* is the same species; indeed, the description and figure apply almost as well to the common *Muricea* without axillary flattening. The misapplication of the name *spicifera* to the present species seems to have originated with DANA (1846, p. 673). It seems to me more logical to apply the name *muricata*, in its original sense, to the *Muricea* with flat axils as figured by ESPER. Its type locality ("Archipelagus Americanus") should be restricted to Curaçao.

51 *Muricea atlantica* (Kükenthal), 1919

(Fig. 56; Pl. V fig. 4)

Gorgonia muricata, LAMARCK 1815b, p. 163. (Habite l'Océan des Antilles.)

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). (Bailey Bay and Castle Harbor, Bermuda.)

Eumuricea atlantica (Riess ms.) KÜKENTHAL 1919, p. 907. (Tortugas; Kingston.)

Eumuricea atlantica, RIESS 1929, p. 399, pl. 8 fig. 4. (Tortugas; Kingston.)

Eunicensis dentata DUBROWSKY 1934, p. 11, figs. 11-15, 21-22, 24-48; pl. 1. (Tortugas.)

Muricea muricata, DEICHMANN 1936, p. 100, pl. 6 fig. 1, pl. 9 figs. 1-3. (Florida; Havana.)

Muricea muricata, STIASNY 1941b, p. 262, figs. 9-10. (Tortugas; Dubrowsky's type.)

Muricea muricata, AURIVILLIUS 1931, p. 105, fig. 20. (Bermuda; St. Bartholomew.)

Diagnosis. Colonies laterally branched in one plane, broad and flabellate (Pl. V fig. 4); axis with at most only a slight indication of flattening in the branch axils. Spindles of outer layer with strong, often spinulose, spines on the outer surface (Fig. 56 d). Axial sheath near branch tips containing sharply pointed spindles,

most of them with simple, spinous processes (Fig. 56 c); toward the base the spicules are larger and more commonly sculptured with tubercles, but no large globular and ovate bodies occur (Fig. 56 b). The typical arrangement of the spicules of the crown is shown in Figure 56 a.

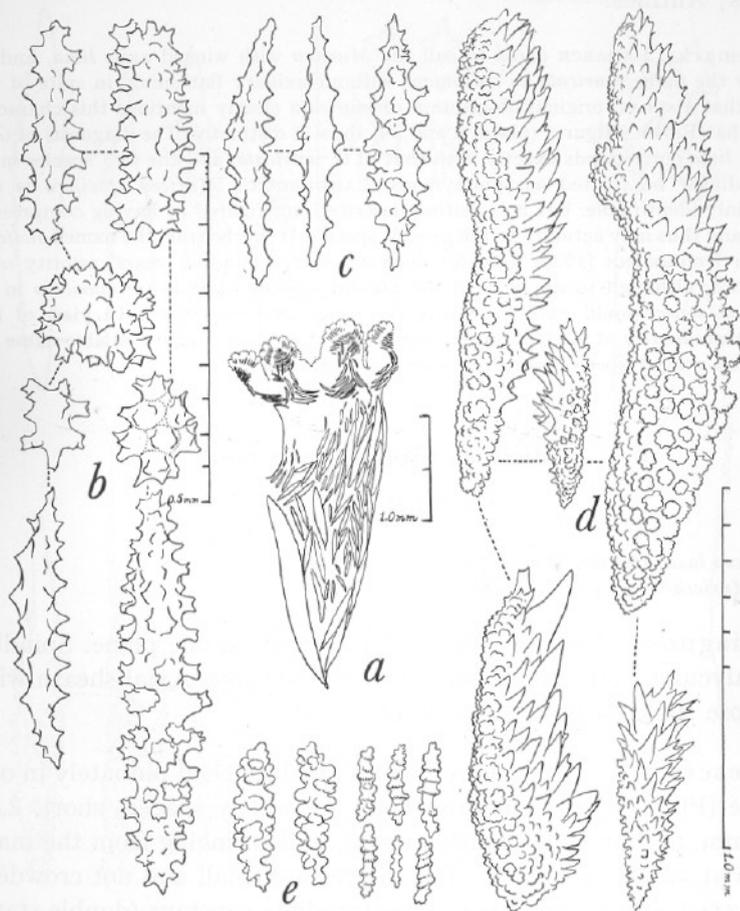


FIGURE 56. *Muricea atlantica* (Kükenthal), a specimen from Key Largo, Florida (USNM 49769): a, expanded polyp showing relationship of crown to calyx; b, spicules of axial sheath of large branch; c, spicules of axial sheath of terminal branch; d, spicules of outer rind; e, spicules of crown. (Enlargement of a indicated by 1.0 mm. scale adjacent; that of b, c, and e by 0.5 mm. scale at right of b; that of d by 1.0 mm. scale adjacent.)

Material. A large number of USNM specimens; including: BERMUDA (50656); FLORIDA, Soldier Key, Biscayne Bay (50672), Elliott Key (50254), Key Largo (49769); NEW PROVIDENCE, Bahamas (50557); CUBA, Cayo Hutia (50700); JAMAICA, Rackham Cay, Port Royal Cays (51396); off Portland Bight, 10 fms. (51362); GRAND CAYMAN (51397).

Distribution. Bermuda; Bahamas; southern Florida and the Keys; Antilles.

Remarks. LAMARCK chose to call the *Muricea* with winged axils *lima*, and to apply the name *muricata* to specimens without axillary flattening, in spite of the fact that PALLAS' original description of *muricata* clearly mentions this character and that ESPER's figures (plates 8 and 39) show it distinctly. The diagnosis of *Gorgonia lima* corresponds exactly with that of *G. muricata*, and the two species must accordingly be treated as synonymous. LAMOUREUX's *Muricea spicifera* is not certainly identifiable, but it is neither described nor figured as having compressed axils and thus may actually be the present species. If this be true, the name *spicifera*, which DEICHMANN (1936) used for *muricata*, has a hundred years' priority over *atlantica*, although to apply it to the present species while using *muricata* in its original sense would exactly reverse the usage of DEICHMANN. In view of the doubtful identity of *M. spicifera*, it seems better to use the next available name for the non-winged species, which is *atlantica* of Kükenthal.

52

Muricea pinnata spec. nov.

(Fig. 57 a-d; Pl. V fig. 6)

Muricea laxa, BAYER 1952, p. 184.

not *Muricea laxa* VERRILL 1864b, p. 36.

Diagnosis. Colonies branched pinnately in one plane. Spindles of calycular walls with a smooth terminal spike. Axial sheath with spinose spindles and double stars.

Description. The colony is erect and branched pinnately in one plane (Pl. V fig. 6). The branchlets are widely spaced, short, 2.5-3.0 mm. in diameter, slightly curved, and springing from the main stem at angles of 40°-45°. The calyces are small and not crowded. The axial sheath contains small octoradial capstans (double stars) about 0.1 mm. in length, some of which are more elongate and rod-like, up to 0.15 mm. long, with two whorls of spines (Fig. 57 c); toward the base, the axial sheath spicules become somewhat stouter (Fig. 57 d). The outer rind contains long, slender spindles

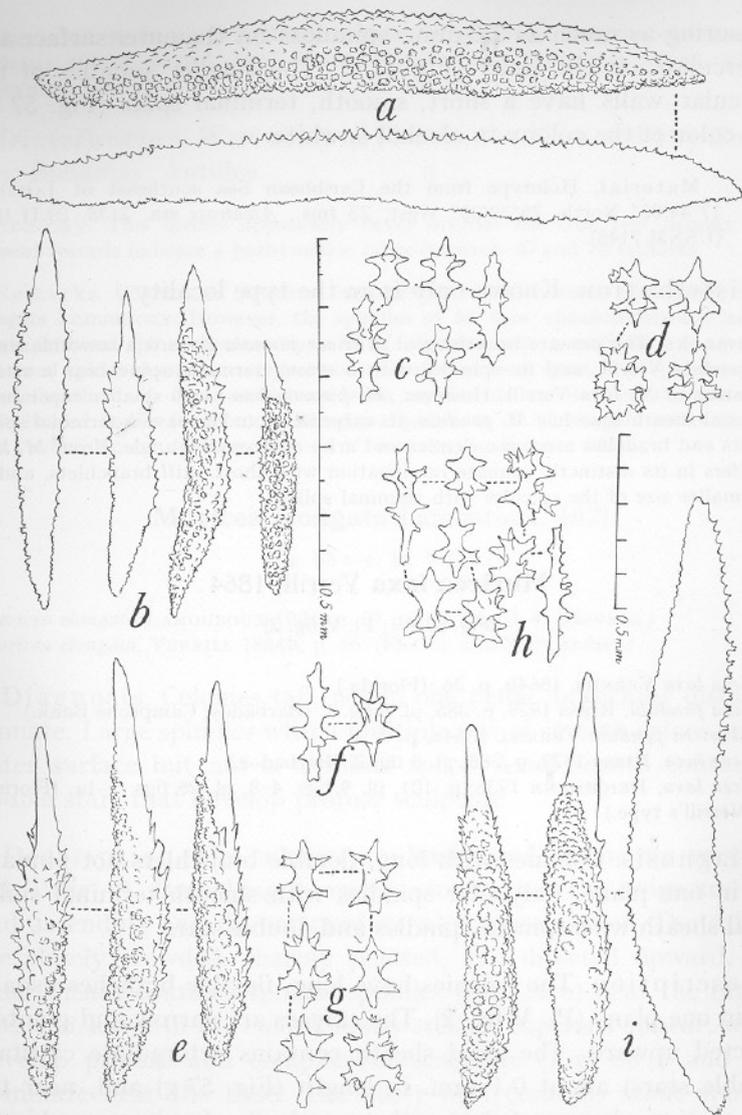


FIGURE 57. *Muricea pinnata* spec. nov., spicules of the holotype from southeast of Jamaica (USNM 7148): a, spicules of stem rind, one in outline only; b, spicules of calycular walls; c, spicules of axial sheath of terminal branch; d, spicules of axial sheath of main stem. *Muricea laxa* Verrill; e-g, spicules of a specimen from Dry Tortugas (50162): e, spicules of calycular walls; f, spicules of axial sheath of terminal branch; g, spicules of axial sheath of main stem. h-i, spicules of a specimen from Cat Cay, Bahamas (49495): h, spicules of axial sheath of terminal branch; i, spicules of calycular walls and rind, the latter in outline only. (Enlargement of a indicated by 0.5 mm. scale at right of b; that of all other figures by 0.5 mm. scale at right of h.)

measuring as much as 2.0 mm., spinulose on the outer surface and tuberculate on the inner (Fig. 57 a). The smaller spindles of the calycular walls have a short, smooth, terminal spike (Fig. 57 b). The color of the colony in alcohol is white.

Material. Holotype from the Caribbean Sea southeast of JAMAICA, 17°44'05" North, 75°39'00" West, 23 fms., *Albatross* sta. 2138, 29.II.1884 (USNM 7148).

Distribution. Known only from the type locality.

Remarks. The pinnate branching of *Muricea pinnata* gives it a resemblance to *M. pendula* Verrill, and its spindles with a strong terminal spine bear a strong similarity to *M. laxa* Verrill. However, *M. pinnata* has much smaller capstans in the axial sheath than has *M. pendula*, its calycular spindles have a terminal spike, and its end branches are more slender and arise at a smaller angle. From *M. laxa* it differs in its distinctly pinnate ramification with short, stiff branchlets, and in the smaller size of the spicules with terminal spike.

53

Muricea laxa Verrill, 1864

(Fig. 57 e-i; Pl. V fig. 2)

Muricea laxa VERRILL 1864b, p. 36. (Florida.)

Muricea pendula, RIESS 1929, p. 385, pl. 8 fig. 1. (Barbados; Campeche Bank.)

not *Muricea pendula* VERRILL 1864a, p. 9.

Muricea laxa, RIESS 1929, p. 388, pl. 8 fig. 2. (Barbados.)

Muricea laxa, DEICHMANN 1936, p. 101, pl. 9 figs. 4-8, pl. 28 figs. 1-1a. (Florida; Verrill's type.)

Diagnosis. Colonies with long, flexible branchlets not pinnate, not in one plane. Calycular spindles with smooth terminal spike. Axial sheath with spinose spindles and double stars.

Description. The colonies have long, flexible branches usually not in one plane (Pl. V fig. 2). The calyces are narrow and pointed, directed upward. The axial sheath contains octoradiate capstans (double stars) about 0.1 mm. in length (Fig. 57 g) and, near the branch tips, elongate forms with two whorls of spines, reaching a length of 0.2 mm. (Fig. 57 f, h). The outer cortex contains stout spindles, those in the calyx walls with a smooth, strong, terminal spike (Fig. 57 e, i). The color of the colonies is white in alcohol, grayish or bluish white in life; occasionally yellowish brown.

Material. From the U.S. National Museum, specimens from the west coast of FLORIDA (16347, 43222), Cape Florida (50250), DRY TORTUGAS (50162, 50240), BAHAMAS, Cat Cay (49495), and CUBA, off Havana (10140).

Distribution. West coast of Florida, the Keys and Dry Tortugas; Bahamas; Antilles.

Ecology. This species apparently never invades the true reef habitat. The present records indicate a bathymetric range between 10 and 70 fathoms.

Remarks. Colonies of *Muricea laxa* closely resemble small specimens of *M. elongata* Lamouroux. However, the spindles of *M. laxa* characteristically have a single terminal spine, whereas those of *M. elongata* have a multiple row of stout, flattened spines along one side but not a simple terminal spine. The spicules of the axial sheath in *M. laxa*, aside from being smaller, do not develop the extremely complicated bodies found in *M. elongata*. Specimens of *M. elongata* are commonly of a yellowish color, whereas those of *M. laxa* are usually pure white.

54

Muricea elongata Lamouroux, 1821

(Fig. 58 a-c; Pl. V fig. 1)

Muricea elongata LAMOUROUX 1821, p. 37, pl. 71 figs. 3-4. (Havana.)

Muricea elongata, VERRILL 1864b, p. 36. (Florida and West Indies.)

Diagnosis. Colonies tall, not in one plane, branching distantly pinnate. Large spindles with a multiple row of smooth spines on the outer surface but not a terminal spike. Axial sheath containing double stars that develop profuse sculpture.

Description. The colonies are bushy and commonly very tall (Pl. V fig. 1). Branching is openly pinnate but the twigs are long and ascending and do not produce a plumose aspect. The calyces are closely crowded, sharply pointed, and directed upward. The axial sheath contains spinose spindles (Fig. 58 b) near the branch tips, but lower in the colony many stellate capstans appear, which develop profuse and complicated sculpture (Fig. 58 c) and predominate near the base. The outer rind contains stout spindles with strong spines on one side (Fig. 58 a). The spines tend to be rather flat and often appressed so that the sculpture has an imbricated appearance. Dry colonies orange brown; in alcohol, yellowish brown, rarely white. The color is incorporated in the spicules, which are clear yellow or amber-colored.

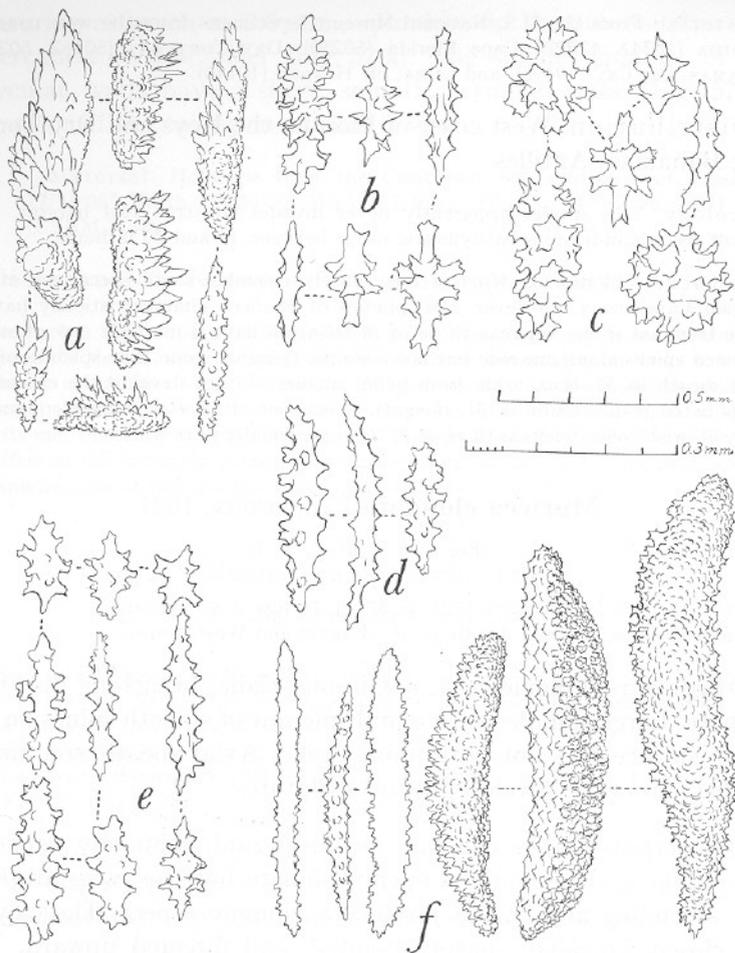


FIGURE 58. *Muricea elongata* Lamouroux, a specimen from Ragged Keys, Florida (USNM 50272): a, spicules of calycular walls and rind; b, spicules of axial sheath of terminal branch; c, spicules of axial sheath of main stem. *Muricea pendula* Verrill, a specimen from North Carolina (49748): d, spicules of axial sheath of terminal branchlet; e, spicules of axial sheath of main stem; f, spicules of calycular walls and rind. (Enlargement of a and f indicated by 0.5 mm. scale below c; that of b-e by 0.3 mm. scale at right of d.)

Material. NEW PROVIDENCE, between Hog Island and Athol Island, sandy bottom with eelgrass, 3 m., sta. 1149, Hummelinck coll., 16.VIII.1949, fragmentary specimen (USNM 50246).

A number of other USNM specimens; these include colonies from southern FLORIDA and the Keys (50255, 50272, 50428), the DRY TORTUGAS (50271, 50273), the west coast of Florida (44146), and BARBADOS (50510).

Distribution. West coast of Florida, the Keys and Dry Tortugas; Bahamas; Antilles.

Remarks. This is the common *Muricea* of inshore waters from Miami southward; it also occurs along the Gulf coast of Florida north to Apalachee Bay.

55

Muricea pendula Verrill, 1864

(Fig. 58 d-f; Pl. V fig. 3)

Muricea elegans (Agassiz ms.), VERRILL 1864a, p. 9. (Charleston, South Carolina.) not *Muricea elegans* DUCHASSAING & MICHELOTTI 1860, p. 19. [Unidentifiable.]

Muricea pendula VERRILL 1864a, p. 45.

not *Muricea pendula*, RIESS 1929, p. 385, pl. 8 fig. 1. [= *Muricea laxa* Verrill.]

Muricea pendula, DEICHMANN 1936, p. 103, pl. 9 figs. 12-14. (Charleston, S.C.: VERRILL's type.)

Diagnosis. Colonies openly pinnate, in one plane. Large spicules of outer rind with only spinules on outer surface, without terminal spike. Axial sheath with spinose spindles and capstans.

Description. The colonies are tall and openly but regularly pinnate, with the end twigs usually 20-30 mm. long but as much as 50 mm., originating from the main stems at right angles but soon turning upward; branching is in one plane and anastomoses occur infrequently (Pl. 5 fig. 3). The calyces are openly spaced, conspicuously standing out from the rind, with a pointed lip. In the axial sheath of the terminal branches there are acute spindles with spinous sculpture (Fig. 58 d), but toward the base of the colony, short capstans appear and on the trunk become the predominant type of sclerite (Fig. 58 e). In the outer rind there are stout spindles with the tubercles of the outer surface transformed into blunt prickles, but without strong spines (Fig. 58 f). Color, brownish yellow or brownish orange; spicules amber-colored.

Material. USNM material from the coast of THE CAROLINAS (49739, 49744, 49748, 50069); and from the Gulf of Mexico off northwest FLORIDA (44222, 44223), LOUISIANA (49812), and TEXAS (50533).

Distribution. Coast of the Carolinas; northern Gulf of Mexico from Florida to Texas; a typical Carolinian disjunct distribution. Bathymetric range 7 to 15 fathoms.

Remarks. *Muricea pendula* is easily recognized by its pinnate branching and the absence of strong outer spines or terminal spikes on the spindles of the calycular walls.

Family GORGONIIDAE Lamouroux, 1812

Diagnosis. Holaxonia having a purely horny axis with cortex loculated little or not at all and with a narrow, cross-chambered central core. Spicules small, reaching a length of about 0.3 mm., ornamented with tubercles arranged in regular transverse girdles, exclusively spindles or derivatives thereof. Anthocodiae with a weak crown of flat rodlets with sinuous or scalloped margins, fully retractile, sometimes forming hemispherical calycular verrucae, usually in biserial arrangement on the branches, in a few cases generally distributed.

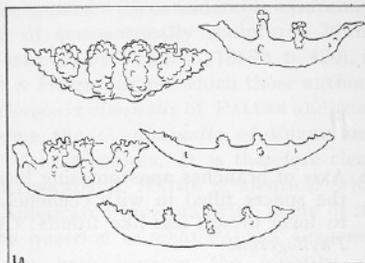
Remarks. In the study of gorgoniids it is of the utmost importance to observe the nature of the spicules carefully. It is necessary to roll the spicules about in order to detect any asymmetry of sculpture, and to be sure that scaphoids lying on their backs are not mistaken for simple spindles. Temporary spicule preparations, in water, are better for this purpose than are permanent mounts, because the spicules are free and can easily be rolled over for observation from all sides.

The family Gorgoniidae contains some of the most important reef and shallow-water species in the West Indian region and, together with the Plexauridae, makes up the major part of the shallow-water octocoral fauna.

KEY 17

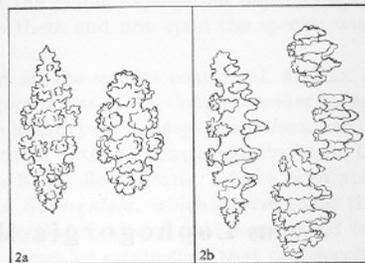
ILLUSTRATED KEY TO THE WEST INDIAN GENERA OF *Gorgoniidae*

- 1a. Spicules include curved, canoe-shaped scaphoids: 4



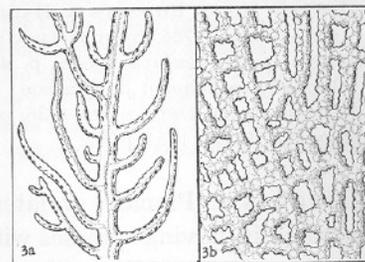
- 1b. Scaphoids not present: 2

- 2a. The cortical spicules are spindles only, either blunt or acute or both, but never with spines along one side or tubercles fused into disks: 3



- 2b. Many of the spindles have the tubercles fused into disks: Genus *Leplogorgia*

- 3a. Branches slender, free, never anastomosing: Genus *Lophogorgia*

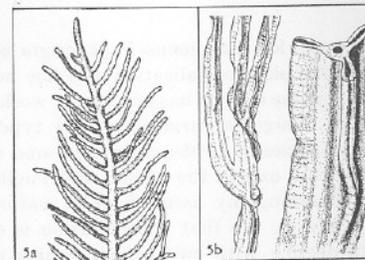


- 3b. Branches regularly anastomosing: Genus *Pacificogorgia*

- 4a. Branches entirely free: 5

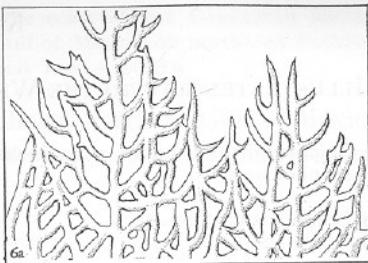
- 4b. Branches anastomose: 6

- 5a. Branching pinnate, twigs round or slightly flattened, but without conspicuous marginal flanges into which the polyps retract: Genus *Pseudoptergorgia*

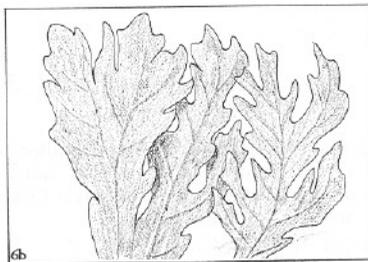


- 5b. Branching lateral, twigs flat or triangular because of longitudinal flanges of coenenchyme into which the polyps retract: Genus *Pterogorgia*

6a. Branches anastomose regularly, forming flat, net-like fans: Genus *Gorgonia*



6b. Axis of branches anastomosing loosely, the spaces filled in with coenenchyme to form broad, leaf-like fronds: Genus *Phyllogorgia*



Genus *Lophogorgia* Milne & Edwards Haime, 1857

Lophogorgia MILNE EDWARDS & HAIME 1857, I, p. 167. (Type species, *Gorgonia palma* Pallas 1766, by monotypy.)

Litigorgia (part) VERRILL 1868b, p. 414. (Type species, *Litigorgia florae* Verrill 1868, by subsequent designation: VERRILL 1868a, p. 387.)

Leptogorgia (part), DEICHMANN 1936, p. 175.

Leptogorgia, BAYER 1951, p. 98.

Diagnosis. Pinnate or laterally branched gorgoniids without anastomosis, having spindles with symmetrical sculpture not fusing into disks. Anthocodiae with weak crown of flat rods.

Remarks. The genus *Lophogorgia* is the most generalized of the gorgoniids. It lacks spicular specialization and has no strong colonial modifications. Among the Gorgoniidae it alone has practically world-wide distribution in temperate and tropical waters. *Gorgonia sarmentosa*, the type species of the genus *Gorgonella*, belongs here. Species of *Lophogorgia* are found on both shores of the Atlantic, in the Mediterranean, and in the Indian and Pacific Oceans.

Concerning my assignment of various species to the genera *Lophogorgia* and *Leptogorgia*, the first consideration is one of systematics, namely that we are in fact dealing with two genera, which can be separated upon spicular characters

rather than peculiarities of colonial form such as the flattening of branches and the distribution of polyps along the twigs. The second consideration is partly nomenclatural and partly systematic, and revolves around the question of what names should be applied to these two genera. As we know, the genus *Lophogorgia* has as its type species the *Gorgonia palma* of PALLAS (1766), by virtue of monotypy. That species, from the Cape of Good Hope, can be recognized with considerable assurance, and is found to have spiculation consisting of symmetrically sculptured blunt capstans. The type of the genus *Leptogorgia*, selected by VERRILL (1869b, p. 420), is the *Leptogorgia viminalis* of MILNE EDWARDS & HAIME, under which those authors listed as questionable synonyms the original *Gorgonia viminalis* of PALLAS and that of DELLE CHIAJE, and as positive synonyms the *G. viminalis* of ESPER and the uncharacterized *Plexaura viminalis* of VALENCIENNES. It is therefore clear that the *Leptogorgia viminalis* of MILNE EDWARDS & HAIME is identical with that of ESPER, which is the common east American whip-coral with many of its capstans transformed into disk-spindles. The question of what PALLAS' *Gorgonia viminalis* was does not vitally concern us here because the identity of *Leptogorgia viminalis* as the type species of the genus *Leptogorgia* depends upon what MILNE EDWARDS & HAIME had before them and not upon the species with which they identified their material.

It would be ideal to examine the types of all the species concerned, as PAX & MÜLLER (1956) in their recent paper on the gorgonians of the Congo consider necessary, but there can be little doubt about the identity of *Lophogorgia palma*, nor of *Leptogorgia viminalis* sensu MILNE EDWARDS & HAIME. Thanks to Professor G. RANSON of the Muséum National d'Histoire Naturelle at Paris, I have been able to examine a fragment of LAMARCK's type of *G. virgulata*, which proves to be the same as ESPER's *viminalis*. Thus the name *virgulata* Lamarck 1815 must stand for MILNE EDWARDS & HAIME's *viminalis* until it can be established that this species is identical with *Gorgonia viminalis* Pallas. The result will have no bearing upon the generic name *Leptogorgia*, but only upon the name of its type species, the identity of which seems clearly established. I therefore maintain my separation of *Leptogorgia* and *Lophogorgia* as set forth in 1951. No clear evidence is available, at least from the illustrations given by BIELSCHOWSKY (1929), STIASNY (1936), and PAX & MÜLLER (1956), that the West African species they assigned to *Leptogorgia* have the disk-spindles characteristic of that genus, and they must accordingly be assigned to *Lophogorgia* instead.