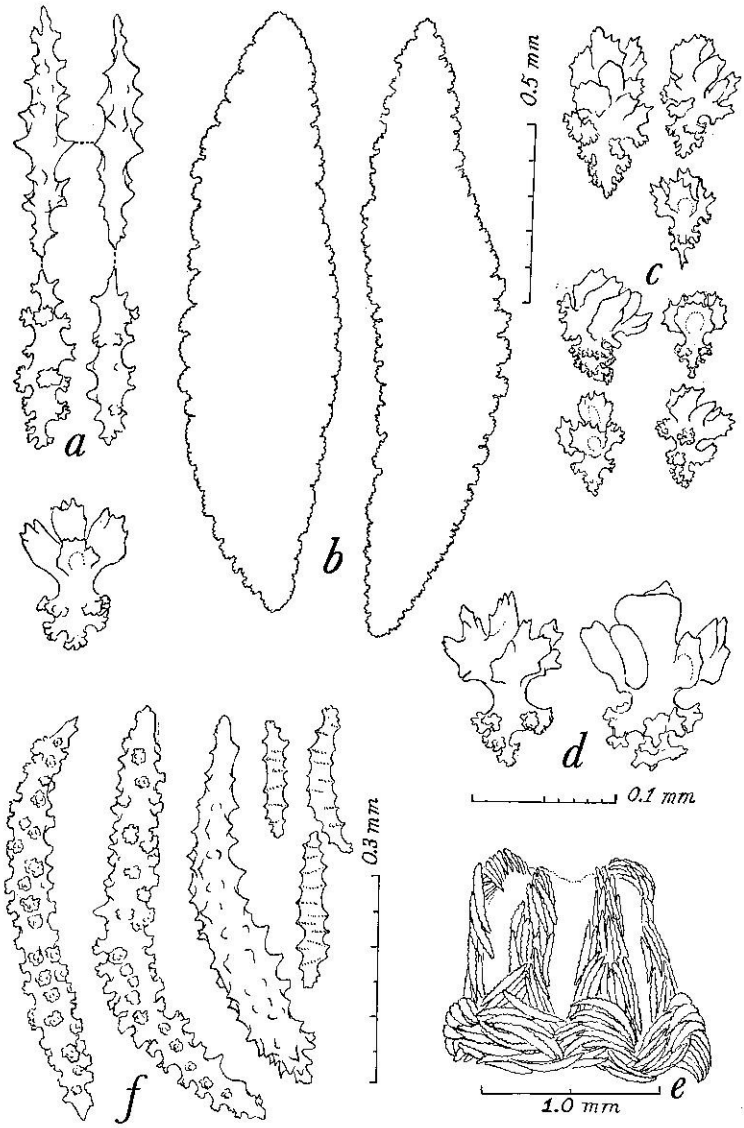


FIGURE 45. *Eunicea calyculata* (Ellis & Solander), typical form; a specimen from off Palm Beach, Florida (USNM 49719): *a*, spicules of axial sheath; *b*, spindles of middle rind; *c*, spicules of outer rind; *d*, clubs of outer rind at greater magnification (third club-shaped spicule underneath the 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. LAMOUROUX (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.

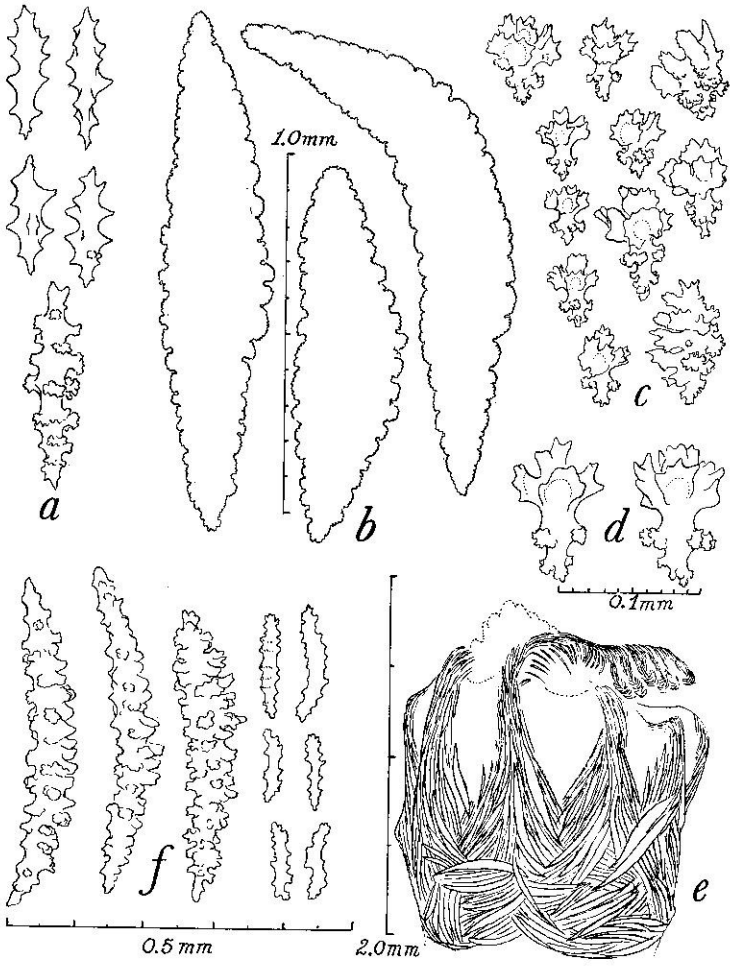


FIGURE 46. *Eunicea calyculata* (Ellis & Solander), forma *coronata* nov.; a specimen from Campeche Bank (USNM 50686): *a*, spicules of axial sheath; *b*, spindles of middle rind; *c*, spicules of outer rind; *d*, clubs of outer rind, at greater magnification; *e*, side view of crown, one tentacle extended 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.)

40 **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.

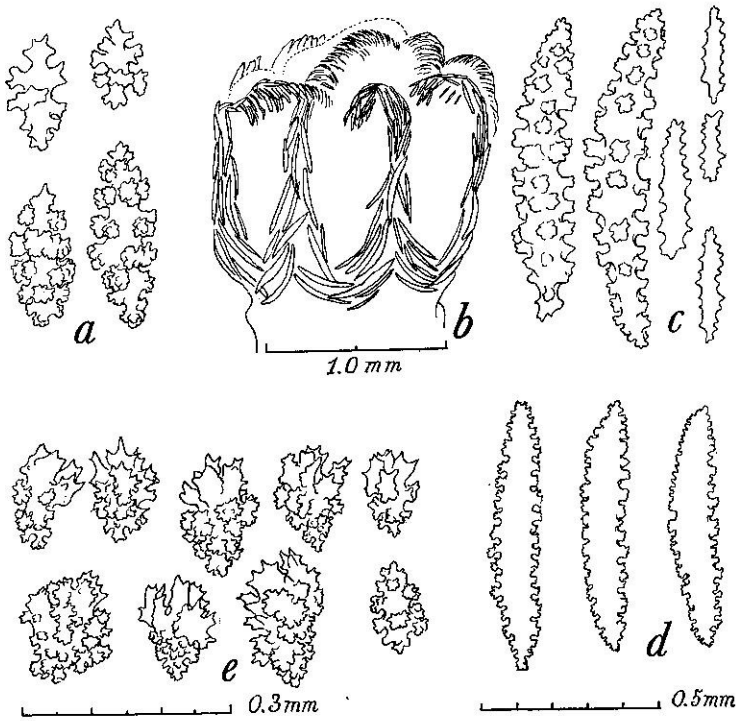


FIGURE 47. *Eunicea* sp. indet., from St. Martin's Reef, Florida Banks (USNM 16353): *a*, spicules of axial sheath; *b*, side view of crown; *c*, anthocodial spicules; *d*, spindles of middle rind; *e*, sclerites of outer rind. (Enlargement of *a*, *c*, and *e* indicated by 0.3 mm. scale below *e*; that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

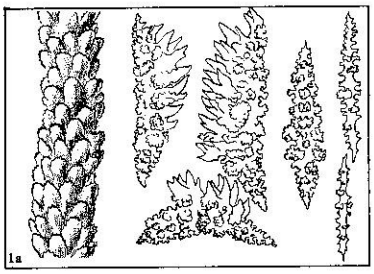
VERRILL'S genus *Plexauropsis* was based upon a specimen of *Pseudoplexaura porosa* and cannot be maintained.

KEY 14

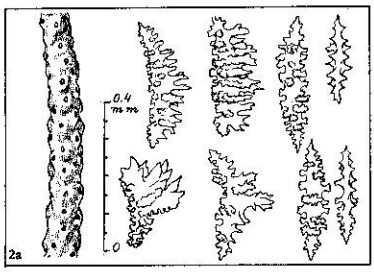
ILLUSTRATED KEY TO THE SPECIES OF *Muriceopsis*

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

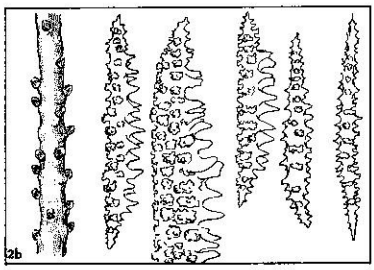
1b. Colonies pinnately branched, plumose; calyces low or absent: 2



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 Brasilian Sea.)
Muricea sulphurea, EHRENBERG 1834, p. 358.
Eunicea humilis MILNE EDWARDS & HAIME 1857, *1*, p. 149, pl. B^2 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* Lamouroux.]
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.)
Plexauropsis? flavida, STIASNY 1935d, p. 71, fig. S, pl. 1, fig. 5. (Curaçao.)
Plexauropsis flavida, STIASNY 1941d, p. 106, pl. 1 figs. 5–6. (Los Frailes.)
Plexauropsis 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?)

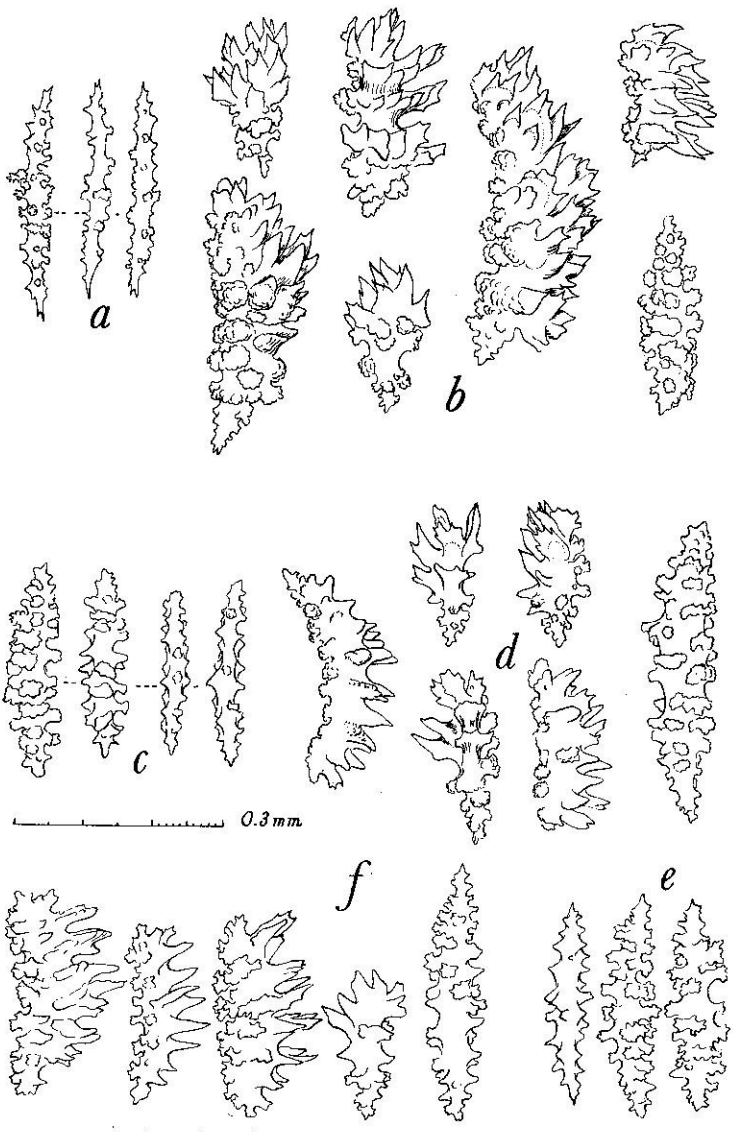


FIGURE 48. *Muriceopsis sulphurea* (Donovan), spicules of a specimen from Brazil (USNM 5286): *a*, spindles of axial sheath; *b*, spicules of the outer rind. *Muriceopsis flavida* (Lamarck), spicules of a specimen from St. Thomas (50245): *c*, spindles of axial sheath; *d*, spicules of outer rind; spicules 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

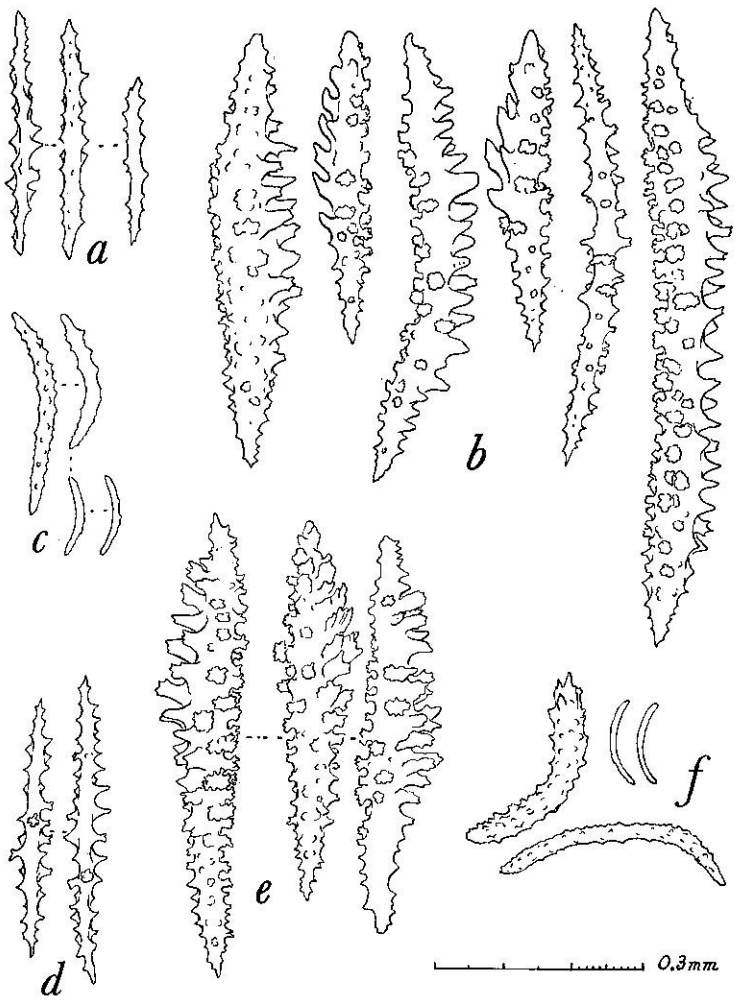


FIGURE 49. *Muriceopsis petila* spec. nov., spicules. *a–c*, of a paratype specimen from Cat Cay, Bahamas (USNM 50383): *a*, spindles of axial sheath; *b*, spicules of outer rind; *c*, anthocodial spicules. *d–f*, of the holotype from off Fernandina, Florida (50382): *d*, spindles of axial sheath; *e*,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

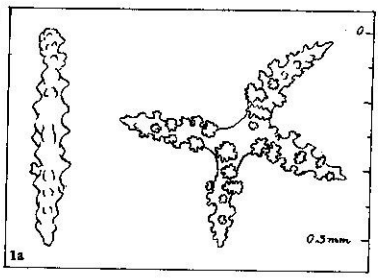
KÜKENTHAL (1924) accepts nine species, and does not include those described from Brazil by VERRILL (1912). I am able to distinguish only six species but others may be demonstrable when adequate studies are made on a large series of specimens.

KEY 15

ILLUSTRATED KEY TO THE SPECIES OF *Plexaurella*

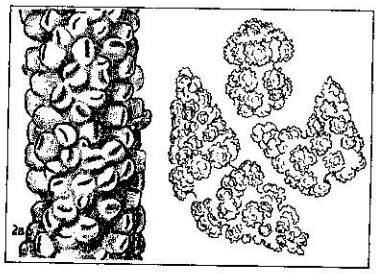
1a. Polyps strongly armed with stout rods about 0.3 mm. long. Quadriradiates with slender arms. Colonies with a few long branches 10–15 mm. in diameter. Rind elevated around apertures: *Plexaurella nutans* (Duchassaing & Michelotti)

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

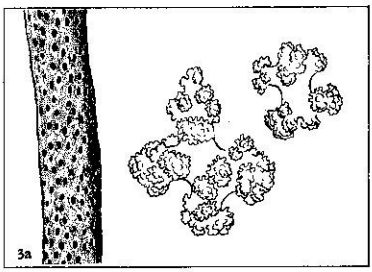


2a. Calyces protuberant, non-retractile. Cortex with coarsely sculptured bent spindles, double heads, and small butterflies: *Plexaurella grandiflora* Verrill

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



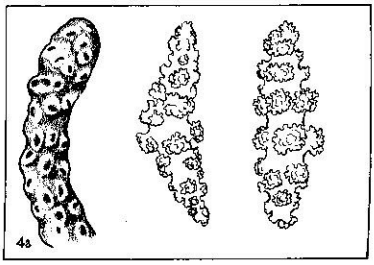
3a. Most of the spicules of the middle layer sexradiates with two arms more strongly developed; butterflies with short rays; axial sheath with symmetrical sexradiates. Colonies with long, rodlike branches 5–7 mm. in diameter; rind smooth, apertures porelike: *Plexaurella grisea* Kunze



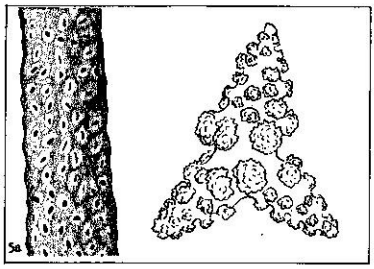
3b. Most of the spicules of the middle layer are quadriradiate butterflies or double spindles that are straight or bent at the waist: 4

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

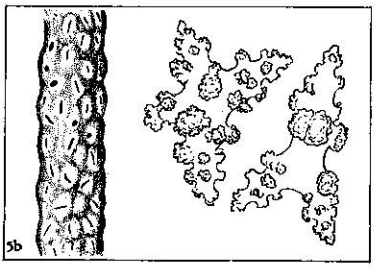
4b. Terminal branches stouter, 7–18 mm. in diameter: 5



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



44 **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.

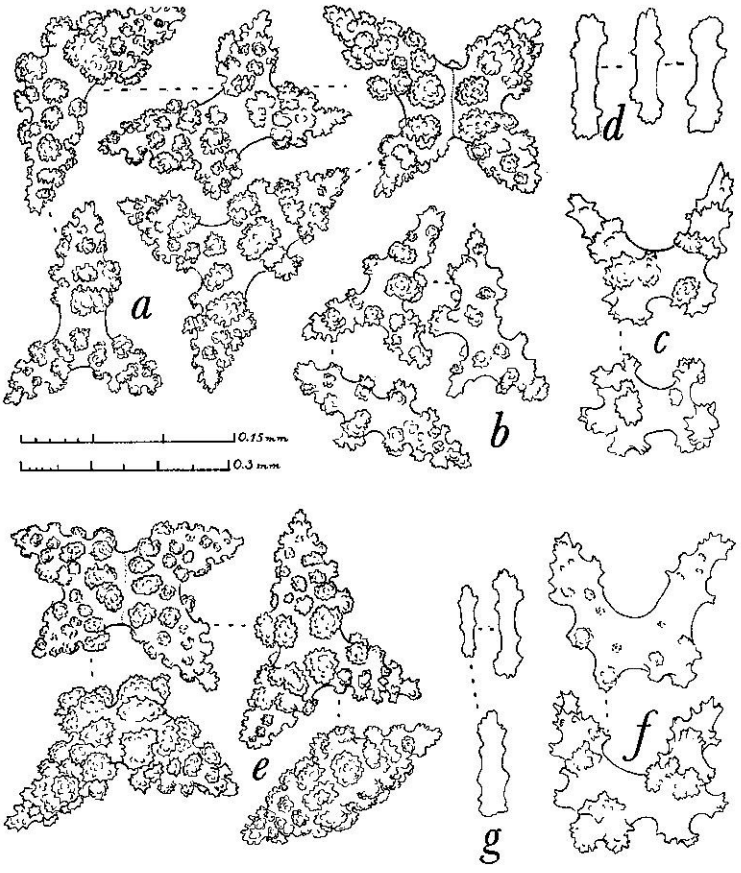


FIGURE 50. *Plexaurella dichotoma* (Esper), spicules, *a–d*, of a specimen from Anguilla (USNM 50410): *a*, spicules of middle rind; *b*, spicules of axial sheath; *c*, spicules of outermost rind; *d*, anthocodial rods. *e–g*, of a specimen from New Providence, Bahamas (14390): *e*, spicules of middle 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* LAMOUROUX 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.)

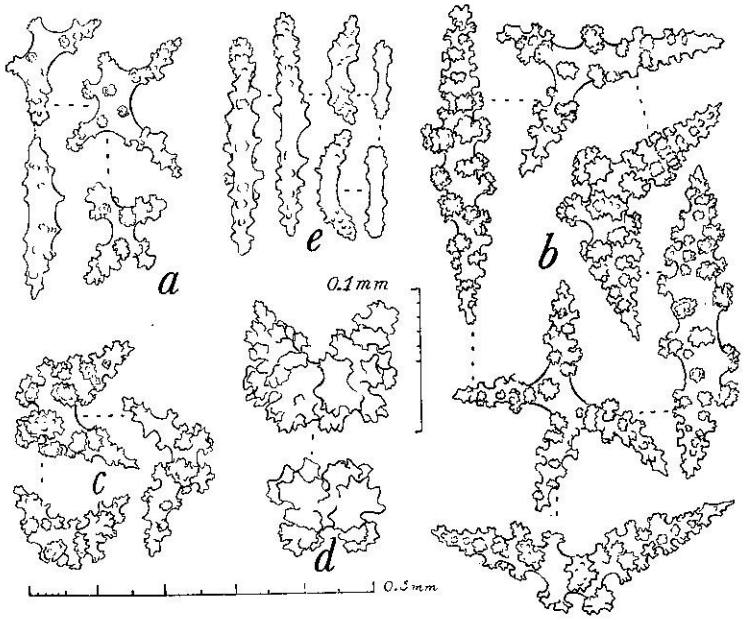


Figure 51. *Plexaurella nutans* (Duchassaing & Michelotti), spicules of a specimen from Dry Tortugas (USNM 50130): *a*, spicules of axial sheath; b, spicules of middle rind; *c*, larger spicules of outer rind; *d*, smaller spicules of surface layer; *e*, anthocodial rods. (Enlargement of *a–c* and *e* 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.

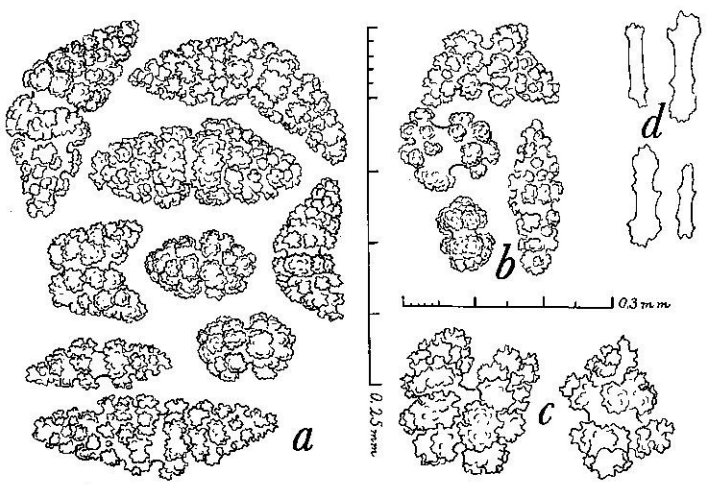


FIGURE 52. *Plexaurella grandiflora* Verrill, spicules of a specimen from Brazil (USNM 5276): *a*, spicules of middle rind; *b*, spicules of axial sheath; *c*, spicules of outer rind; *d*, anthocodial rods. (Enlargement of *a* and *b* indicated by 0.3 mm. scale below *b*; that of *c* and *d* by 0.25 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, 11.1887 (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.

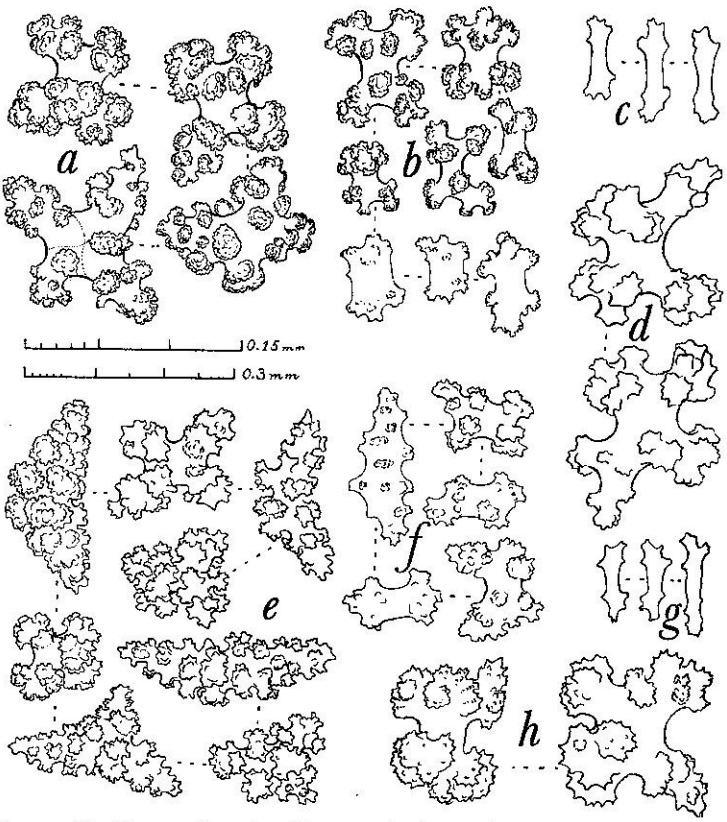


FIGURE 53. *Plexauvella grisea* Kunze, spicules. *a–d*, of a specimen from St. Christopher (USNM 50534): *a*, spicules of middle rind; *b*, spicules of axial sheath; *c*, anthocodial rods; *d*, spicules of outer rind. *e–h*, of a specimen from Florida (50535): *e*, spicules of middle cortex; *f*, spicules 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. (Periperí 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 warted 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.

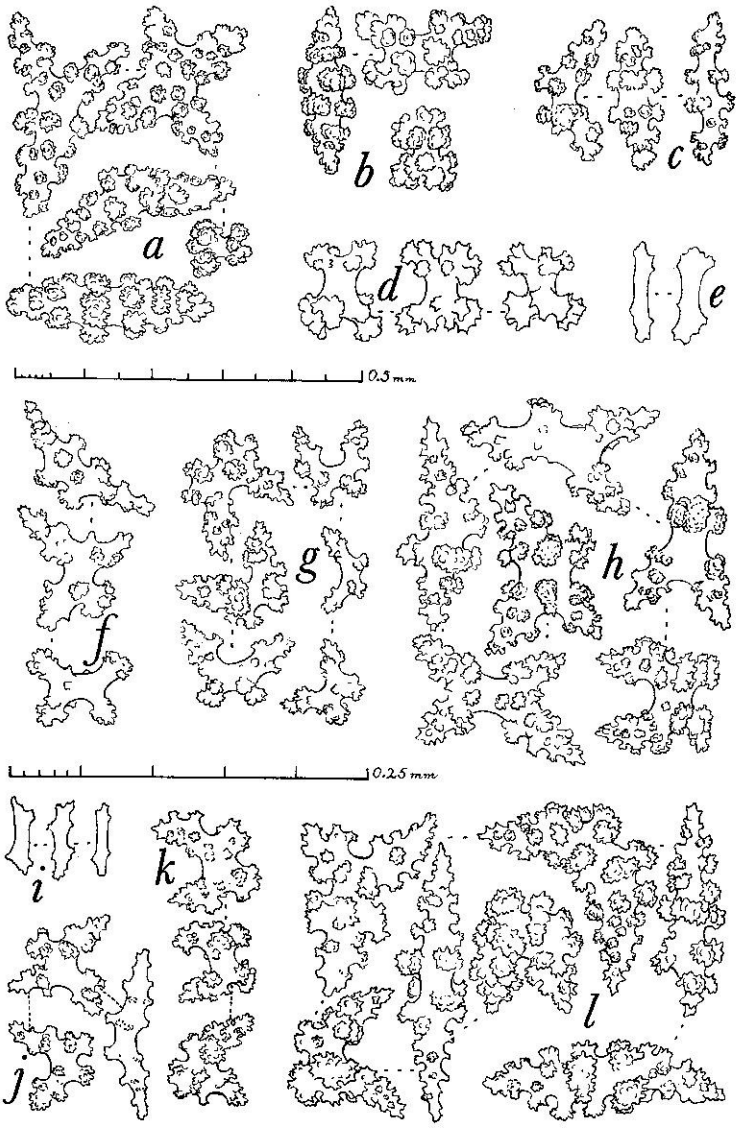


FIGURE 54. *Plexaurella pumila* Verrill, a specimen from Bahia, Brazil (USNM 5279): *a*, spicules of middle rind; *b*, spicules of axial sheath of main stem; *c*, spicules of axial sheath of terminal branch; *d*, spicules of outer rind. *Plexaurella fusifera* Kunze, spicules. *e–h*, of a specimen from 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*.)

49 **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 3½ 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 spicifera* Lamouroux, by subsequent designation: Milne Edwards & Haime 1850.)
Muricea, Riess 1929, p. 383.
Eumuricea (part), Riess 1929, p. 397.
Muricea, Kükenthal 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.

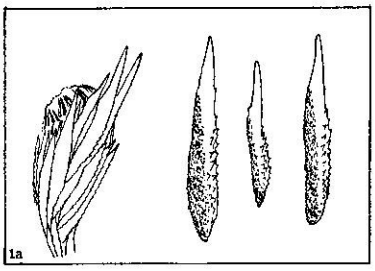
Distribution. Bermuda; southern Florida and the Antilles; southern California to Panama; endemic amphi-American.

Remarks. Only two species are eligible to be the type species of the genus *Muricea*: *Muricea elongata* Lamouroux and *M. spicifera* 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 spicifera* to be synonymous with *M. muricata* (Pallas), or a good species identical with that called *M. atlantica* (Kükenthal) in the present paper.

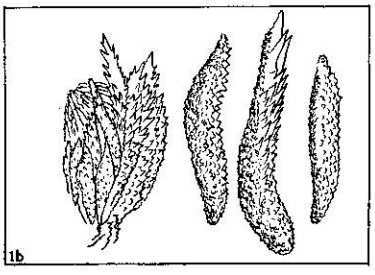
KEY 16

ILLUSTRATED KEY TO THE WEST INDIAN SPECIES OF *Muricea*

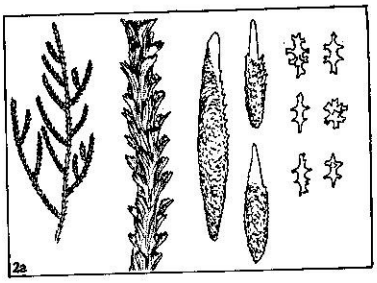
1a. Calycular spindles with a strong, smooth, terminal spike: 2



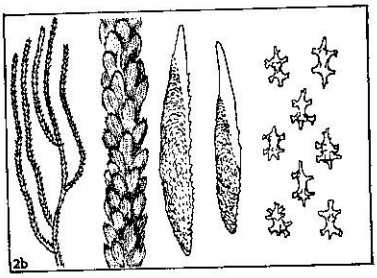
1b. Calycular spindles with prickles or several stout, slanting spines on the outer surface, but no strong terminal spike: 3



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

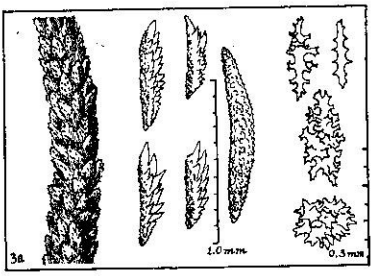


2b. Branching lateral, twigs long and flexible. Large calycular spindles also have a terminal spike: *Muricea laxa* Verrill



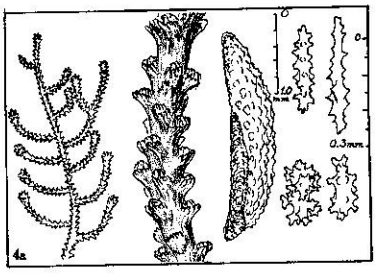
3a. Colonies tall and bushy, branching openly pinnate, with long, ascending terminal twigs. Calycular spindles less than 1 mm. long, with several slanting spines on the outer surface: *Muricea elongata* Lamouroux

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

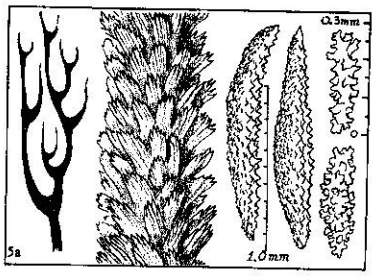


4a. Branching regularly pinnate, with short branchlets. Calycular spindles with low, blunt spines on the outer surface: *Muricea pendula* Verrill

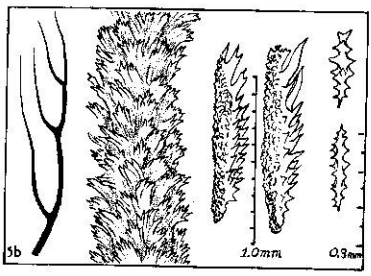
4b. Branching lateral, not pinnate; colonies broad, spreading: 5



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. Cristoph.")
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.

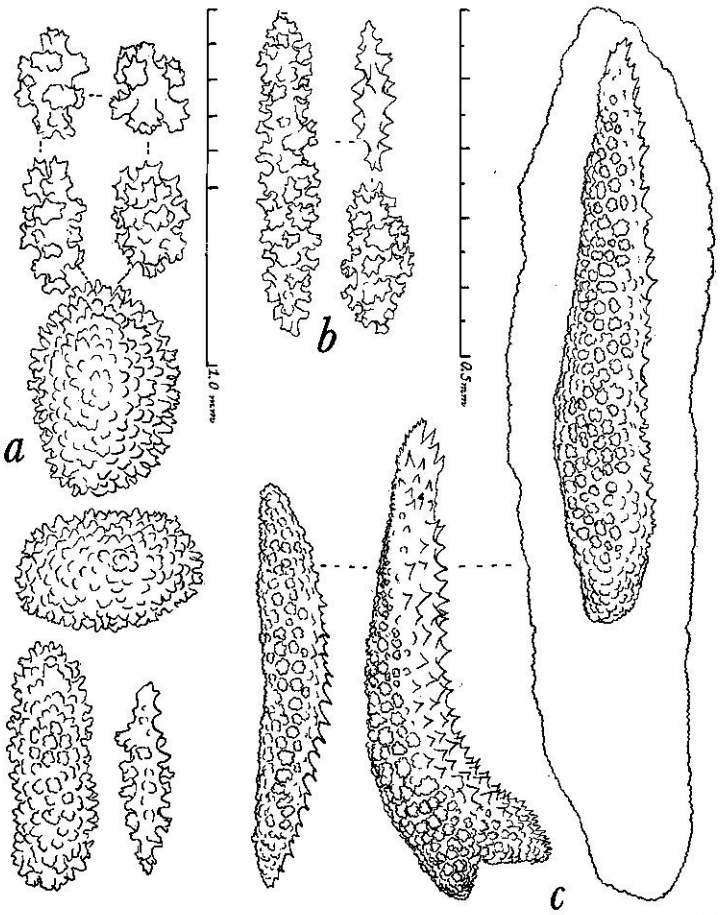


FIGURE 55. *Muricea muricata* (Pallas), spicules of a specimen from Klein Curaçao (USNM 50314): *a*, spicules of axial sheath of main stem; *b*, spicules of axial sheath of terminal branch; *c*, spindles of outer rind, the larger in outline only. (Enlargement of *a* and *b* indicated by 0.5 mm. scale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

Material. From Hummelinck's collection: KLEIN CURAÇAO, cast 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 gedruckt 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 LAMOUROUX'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.

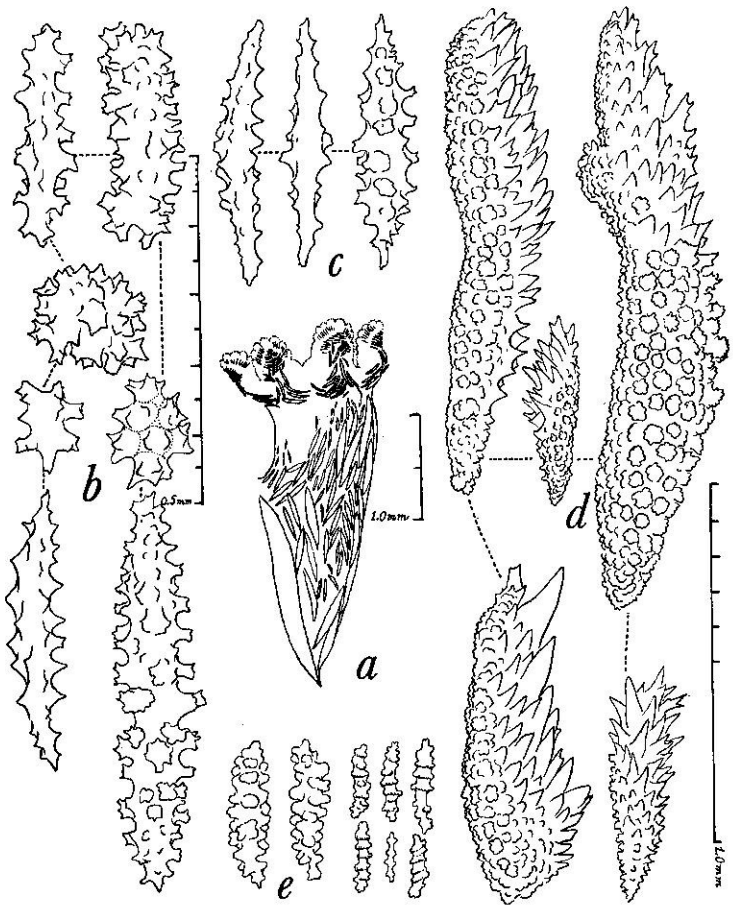


FIGURE 56. *Muricea atlantica* (Kükenthal), a specimen from Key Largo, Florida (USNM 49769): *a*, expanded polyp showing relationship of crown to calyx; *b*, spicules of axial sheath of large branch; *c*, spicules of axial sheath of terminal branch; *d*, spicules of outer rind; *e*, spicules of crown. (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. LAMOUROUX'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 octoradiate 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

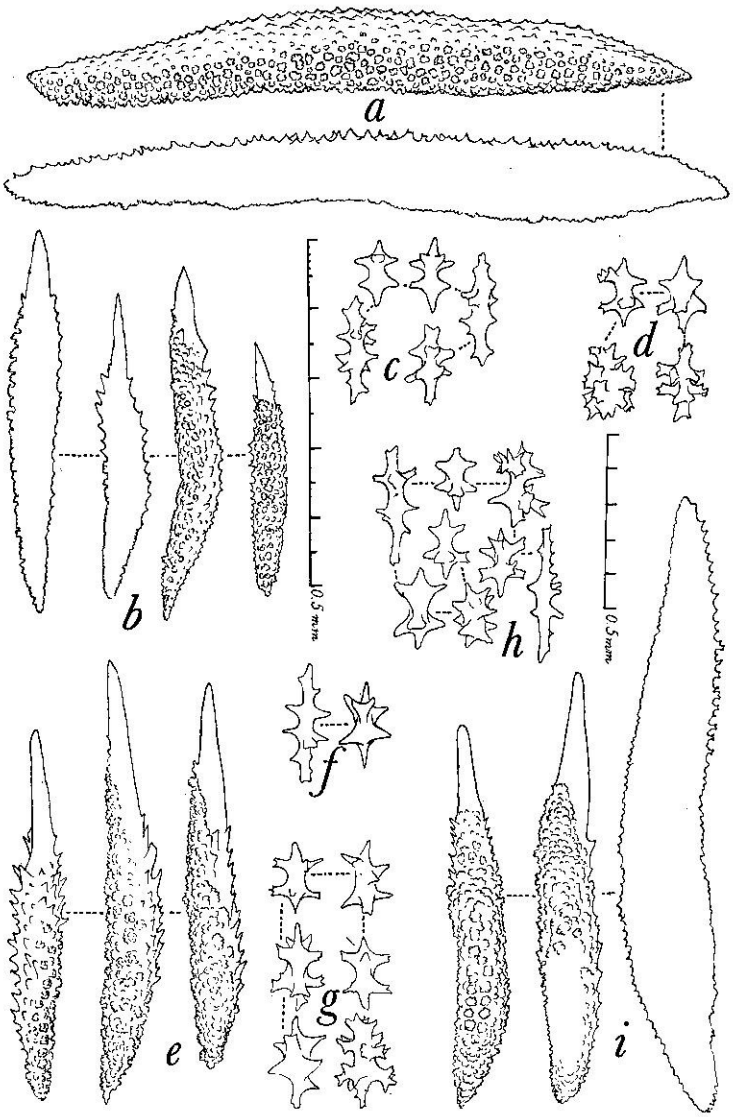


FIGURE 57. *Muricea pinnata* spec. nov., spicules of the holotype from southeast of Jamaica (USNM 7148): *a*, spicules of stem rind, one in outline only; *b*, spicules of calycular walls; *c*, spicules of axial sheath of terminal branch; *d*, spicules of axial sheath of main stem. *Muricea laxa* Verrill; *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.

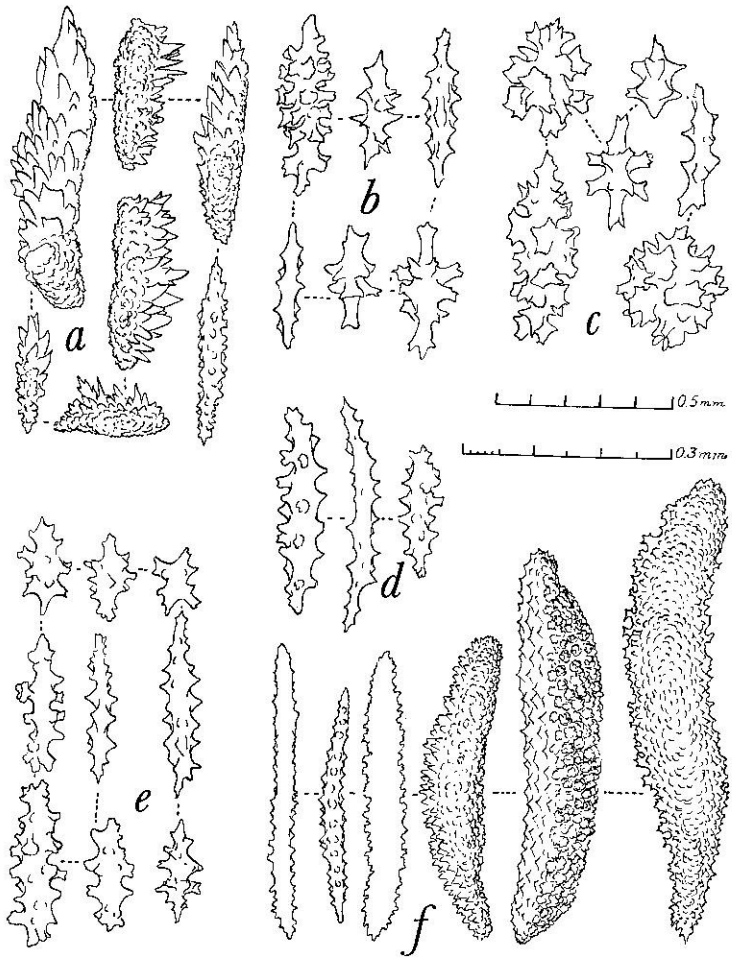


FIGURE 58. *Muricea elongata* Lamouroux, a specimen from Ragged Keys, Florida (USNM 50272): *a*, spicules of calycular walls and rind; *b*, spicules of axial sheath of terminal branch; *c*, spicules of axial sheath of main stem. *Muricea pendula* Verrill, a specimen from North Carolina (49748): *d*, 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.

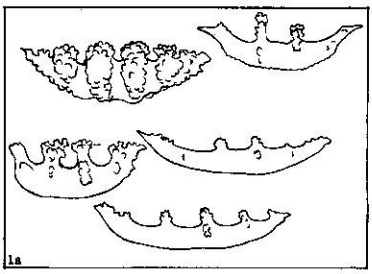
The family Gorgoniidae contains some of the most important reef and shallow-water species in the West Indian region and, together with the Plexauridae, makes up the major part of the shallow-water octocoral fauna.

KEY 17

ILLUSTRATED KEY TO THE WEST INDIAN GENERA OF *Gorgoniidae*

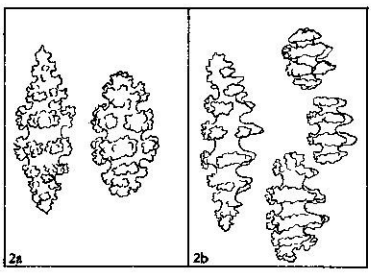
1a. Spicules include curved, canoe-shaped scaphoids: 4

1b. Scaphoids not present: 2



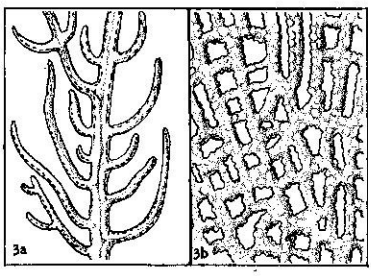
2a. The cortical spicules are spindles only, either blunt or acute or both, but never with spines along one side or tubercles fused into disks: 3

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



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

3b. Branches regularly anastomosing: Genus *Pacifigorgia*

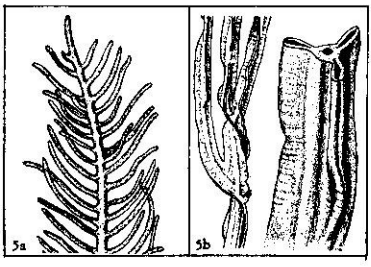


4a. Branches entirely free: 5

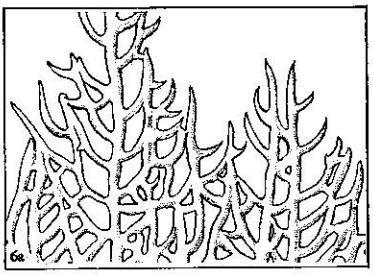
4b. Branches anastomose: 6

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

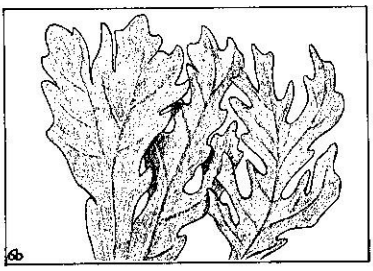
5b. Branching lateral, twigs flat or triangular because of longitudinal flanges of coenenchyme into which the polyps retract: Genus *Pterogorgia*



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, 1, 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 *Loptogorgia 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.

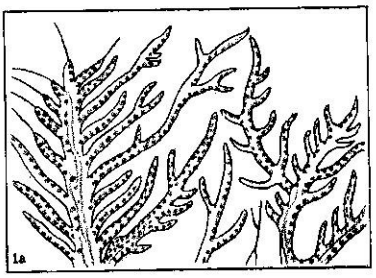
It would be ideal to examine the types of all the species concerned, as PAX & MÜLLER (1956) in their recent paper on the gorgonians of the Congo consider necessary, but there can be little doubt about the identity of *Lophogorgia palma*, nor of *Leptogorgia viminalis* sensu MILNE EDWARDS & HAIME. Thanks 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.

KEY 18

ILLUSTRATED KEY TO THE WEST INDIAN SPECIES OF *Lophogorgia*

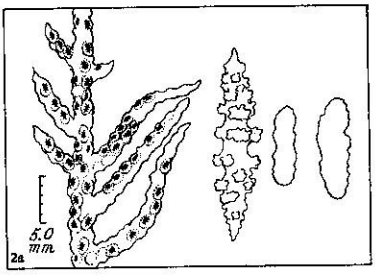
1a. Colonies pinnate, rind yellow with red or purple calyces: *Lophogorgia sanguinolenta* (Pallas)

1b. Colonies of various form, uniformly colored or with calyces somewhat paler than the rind: 2



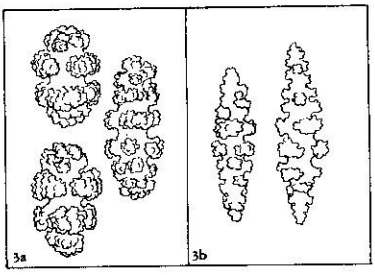
2a. Anthocodial rods only half as long as the longest spindles of the rind. Branching pinnate, bushy. Color, rose-purple: *Lophogorgia violacea* (Pallas)

2b. Anthocodial rods more than 3/4 as long as the longest spindles of the rind, and sometimes longer: 3



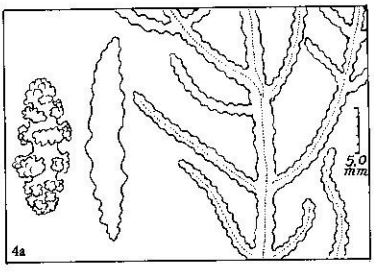
3a. Cortical sclerites predominantly blunt capstans; acute spindles rare or absent: 4

3b. Cortical sclerites including many acute spindles in addition to blunt capstans: 6

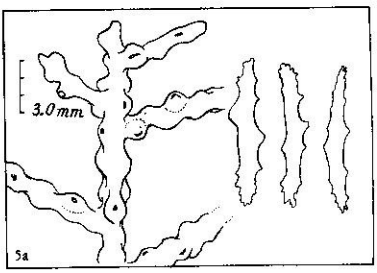


4a. Largest anthocodial rods up to 1.5 times as long as the longest spindles of the rind. Terminal branchlets with calyces in a single row along the two edges. Color bright vermilion red: *Lophogorgia miniata* (Milne Edwards & Haime)

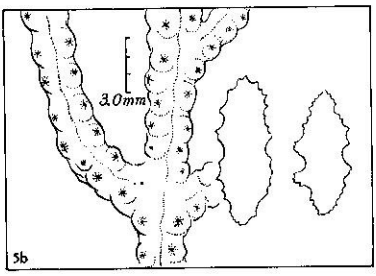
4b. Largest anthocodial rods only slightly, if at all, longer than longest spindles of rind: 5



5a. Terminal twigs slender, about 0.5 mm. in diameter exclusive of calyces. Anthocodial rods narrow, with nearly parallel edges indented with broad scallops. Color, purplish red: *Lophogorgia* sp. indet. (b)

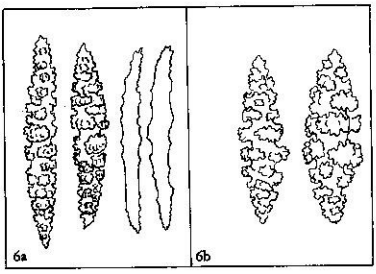


5b. Terminal twigs stout, 1–2 mm. in diameter exclusive of calyces. Anthocodial rods broad, tapered toward the ends, with numerous small serrations in the margins. Color orange, red, or purple: *Lophogorgia hebes* (Verrill)



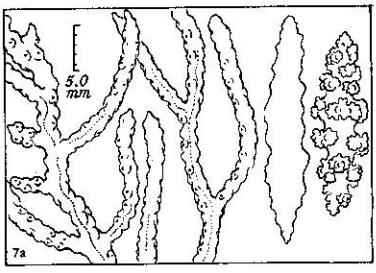
6a. Spindles predominantly long and sharp, about 6 times as long as wide; small, blunt capstans not numerous. Anthocodial rods colorless, about as long as the cortical spindles and very slender: *Lophogorgia barbadensis* spec. nov.

6b. Acute spindles stouter, usually only 3 to 4.5 times as long as wide. Anthocodial rods colored: 7

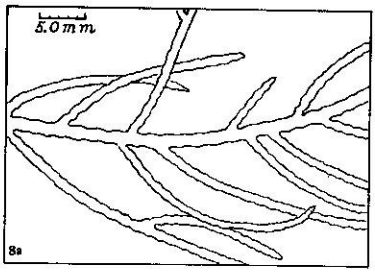


7a. Colonies openly pinnate, with stout, upward-curving, crooked branches and twigs. Diameter of terminal branches 1.5–2.0 mm.; *Lophogorgia* sp. indet. (a)

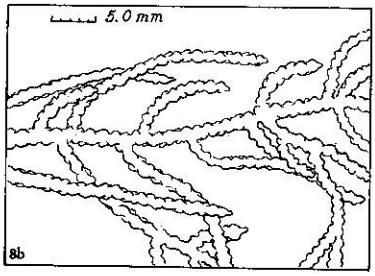
7b. Colonies with slender branchlets about 0.5 mm. in diameter: 8



8a. Colonies orange, vermilion or bright red; regularly pinnate, twigs long and nearly straight, not markedly curving upward. Calyces usually in strict single series along two sides of terminal twigs: *Lophogorgia cardinalis* spec. nov.



8b. Colonies purple or reddish purple, irregularly pinnate, twigs rather short, crooked, curving upward. Calyces commonly in alternating double series along the two sides of terminal twigs: *Lophogorgia punicea* (Milne Edwards & Haime)



56 **Lophogorgia sanguinolenta** (Pallas), 1766

Gorgonia sanguinolenta PALLAS 1766, p. 175. (Mare Atlanticum, Americanum.)
?*Gorgonia sanguinolenta*, ESPER 1791, *2*, p. 86, pl. 22. ("Nach allen übereinstimmenden Nachrichten, hält sich diese Gorgonie in den Meeren des Mittägigen America auf, wo sie auch sehr häufig angetroffen wird.")
Gorgonia petechizans, ESPER 1791, *2*, p. 55, pl. 13. ("Unsere Horncoralle wird überdiss nie in dem mittelländischen Meer, sondern nach übereinstimmenden Nachrichten in dem ostindischen Ocean gefunden.")
not *Gorgonia petechizans* PALLAS 1766, p. 196.
Pterogorgia turgida EHRENBERG 1834, p. 370. (Prope insulam Sti Thomae.)
Pterogorgia festiva DUCHASSAING & MICHELOTTI 1860, p. 31. (St. Thomas.)
Gorgonia sanguinolenta, KÖLLIKER 1865, p. 139, pl. 18 fig. 39.
Leptogorgia sanguinolenta, DEICHMANN 1936, p. 181, pl. 17 figs. 1–2, pl. 19 figs. 39–40. (Hayti; West Indies.)

Diagnosis. Branching openly pinnate, with short terminal branchlets. Cortex yellow with red or purple calyces.

Material. No specimens examined.

Remarks. Due to lack of material it is impossible to define this species accurately at the present time. *Lophogorgia sanguinolenta* is probably the only West Indian species of the genus with purple calyces on a yellow rind, in which color phase it

would be unmistakable. However, according to DEICHMANN (1936, p. 181), it occurs in a completely violet phase that would be difficult to recognize. A unicolored specimen collected by A. J. VAN KOOLWIJK, probably at Aruba, agrees except for color with KÖLLIKER's figure of the spicules of *Gorgonia sanguinolenta*, which probably were taken from ESPER's specimen, and with specimens of *Lophogorgia hebes* (Verrill) from North America, but this is not considered sufficient evidence to equate the two species. The bicolored form is retained as distinct until adequate comparative material becomes available.

57 **Lophogorgia violacea** (Pallas), 1766

(Fig. 59 a–i; Pl. VII figs. 1, 3)

Gorgonia violacea PALLAS 1766, p. 176. (Mare Americanum.)
Gorgonia purpurea, ESPER 1796, Fortsetz. 1, p. 159, pl. 43.
not *Gorgonia purpurea* PALLAS 1766, p. 187 [= ?*Leptogorgia virgulata* (Lamarck).]
Lophogorgia violacea, BAYER 1959, p. 19 (Paqueta, Brazil, and Rio de Janeiro.)

Diagnosis. Colonies low, shrubby, pinnate (Pl. 7 figs. 1, 3). Calyces distinct, low, rounded, in alternating double series along two sides of the branchlets. Spicules of cortex as blunt capstans (Fig. 59 a, f, i) and acute double spindles (Fig. 59 b, d, g); anthocodial rods (Fig. 59 c, e, h) half, or less than half, as long as the longest spindles.

Material. BRAZIL, Paqueta, 3–4 fms., 12.II.1877, 2 specimens in alcohol (USNM 17329); Rio de Janeiro, dry spec. (USNM 50225), both collected by Richard Rathbun.

Distribution. Coast of Brazil.

Remarks. The specimen from Rio de Janeiro closely resembles ESPER's figure of *Gorgonia purpurea*, which is certainly not the *purpurea* of Pallas. The dry colony is dusky purplish rose in color, but in alcohol the color is bright reddish purple. Spicules deep amber red, anthocodials colorless.

58 **Lophogorgia barbadensis** spec. nov.

(Fig. 59 j–l)

Leptogorgia sp. DEICHMANN 1936, p. 184, pl. 17 fig. 5., pl. 19 figs. 41–43. (St. Croix.)

Diagnosis. Colony pinnate, branches rigid; calyces low-conical, biserial. Cortex containing slender, acute spindles 6 times as long as

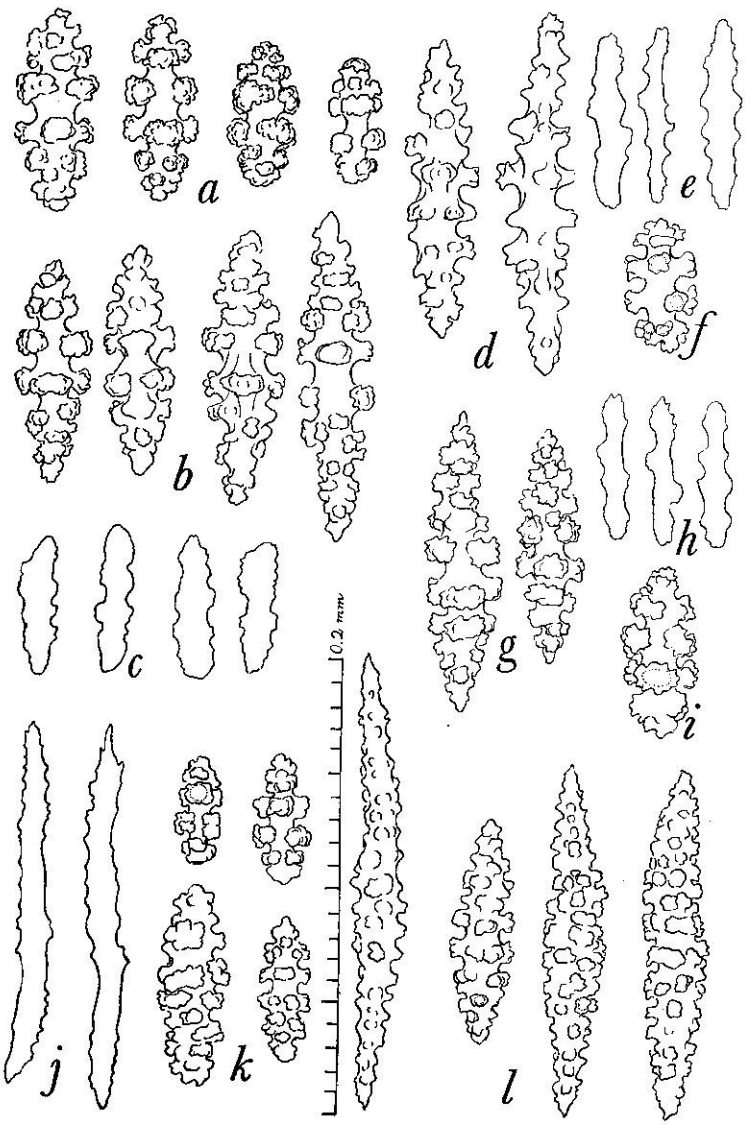


FIGURE 59. *Lophogorgia violacea* (Pallas), spicules. *a–c*, of a specimen from Rio de Janeiro (USNM 50225): *a*, capstans of outer rind; *b*, spindles of inner rind; *c*, anthocodial rods. *d–f*, of a specimen from Paqueta, Brazil (17329): *d*, spindles of inner rind; *e*, anthocodial rods; *f*, capstans of outer rind. *g–i*, of another specimen from Paqueta: *g*, spindles of inner rind; *h*, anthocodial rods; *i*, capstans of outer rind. *Lophogorgia barbadensis* spec. nov., spicules of the holotype from Barbados (50227): *j*, anthocodial rods; *k*, capstans and blunt spindles of outer rind; *l*, acute spindles of inner rind. (All figures drawn to the same scale.)

wide, and small, blunt capstans; anthocodial rods slender, flat, as long as the acute spindles. Color orange red, calyces paler.

Description. The holotype is a broken colony 7 cm. tall including the base of attachment. The main stem, which is 1.0 mm. in diameter, pinnately gives off widely spaced lateral branchlets arising at angles from 65° to 70°. One of the branches bears three small twigs on its upper edge. The polyps form low-conical calyces, which are biserially arranged, 2–5 mm. apart, closest near the twig ends, most distant on the main stem. The predominant spicules are slender, acute spindles with little trace of a median waist (Fig. 59 l). They are about 0.15 mm. long and 0.025 mm. in diameter; in the axial sheath the acute spindles are somewhat longer and less strongly sculptured. There are also a few blunt capstans 0.05–0.09 mm. in length in the outer cortex (Fig. 59 k). The anthocodiae are armed with long, narrow, flattened rods measuring as much as 0.17 mm. in length (Fig. 59 j). The colony is dark orange red in color, becoming yellowish around the calycular orifices. The cortical spicules are amber yellow, the anthocodial rods quite colorless.

Material. Holotype from BARBADOS, $1^1/_4$ miles due west of white lighthouse at Needham Point, 67–70 fms., University of Iowa Barbados-Antigua Exp., sta. 11, 16. V. 1918 (USNM 50227).

Distribution. St. Croix, 38 fathoms; Barbados, 67–70 fathoms.

Remarks. *Lophogorgia barbadensis* is certainly identical with Deichmann's *Leptogorgia* sp. It is here treated as a new species because it is quite distinct from any species heretofore described in the literature, and because it should not continue nameless indefinitely.

59 **Lophogorgia cardinalis** spec. nov.

(Fig. 60; Pl. VII fig. 5)

Diagnosis. Colonies pinnate, branches flexible; calyces low, rounded, biserial, crowded. Cortex containing acute spindles about 4 times as long as wide, and blunt capstans; anthocodial rods equaling or slightly exceeding the length of the longest spindles. Color uniform, brilliant red, occasionally dull orange.

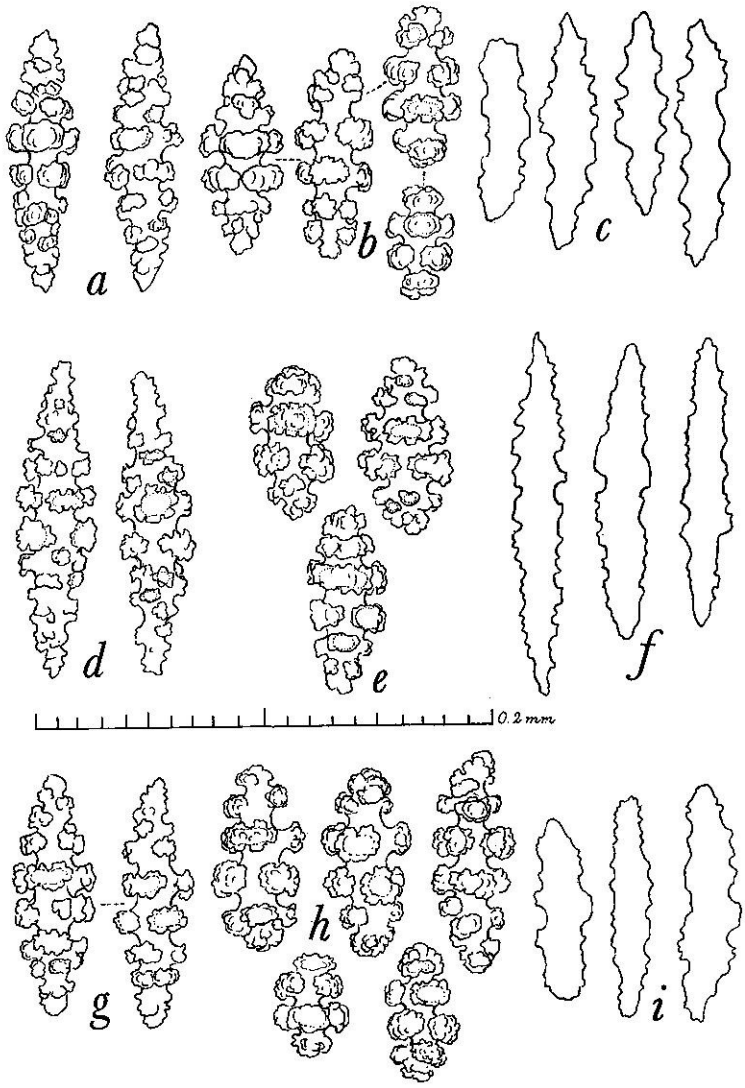


FIGURE 60. *Lophogorgia cardinalis* spec. nov., spicules. *a–c*, of the holotype from Palm Beach, Florida (USNM 50230): *a*, acute spindles of inner rind; *b*, blunt spindles and capstans of outer rind; *c*, anthocodial rods. *d–f*, of a paratype from Florida (50231): *d*, acute spindles of inner rind; *e*, blunt spindles and capstans of outer cortex; *f*, anthocodial rods. *g–i*, of another paratype (49927): *g*, acute spindles of inner cortex; *h*, blunt spindles and capstans of outer cortex; *i*, anthocodial rods. (All figures drawn to the sample scale.)

Description. The type is a branch 11.5 cm. tall without base of attachment. Ramification is in one plane, regularly pinnate. The branchlets originate at angles from 40° to 50° along both sides of the main stem, at intervals of 3–13 mm. They are gently curved, up to 6 cm. long, and only slightly more slender than the main stem. The calyces are biserial and closely set so that the branches are flattened and about 2 mm. wide overall. The biserial arrangement of polyps is quite uniform near the branch tips but proximally the calyces in each row incline alternately toward front and back of the colony. The cortical spiculation consists of blunt capstans (Fig. 60 b) and numerous acute spindles (Fig. 60 a). The former reach a length of about 0.1 mm., the latter 0.12 mm. The anthocodial rods are of the usual shape (Fig. 60 c), and the largest ones are equal in length to the longest spindles of the cortex. The color of the colony in alcohol is brilliant vermilion red; the cortical spicules are clear orange, the anthocodial rods pinkish.

The paratype specimens (Pl. VII fig. 5) from the same station that yielded the holotype agree satisfactorily with the type, as do specimens from nine other stations off southern Florida. The largest specimens, 12–15 cm. tall, have a stout main trunk 4–5 mm. in diameter, and some strong lateral branches that subdivide in the typical pinnate manner. In some colonies the acute spindles are exceptionally slender (Fig. 60 d), and there is variation in the length of the anthocodial rods (Fig. 60 f, i).

A specimen from off Captiva Island, west coast of Florida, and another from off Havana, Cuba, are alike in being dull orange rather than bright red in color. The former specimen does not differ in spiculation from the typical red colonies, but the one from Havana has unusually large and stout anthocodial rods.

Material. Holotype from FLORIDA, Palm Beach, 20 fms., A. R. Thompson and T. L. McGinty coll., yacht *Triton* sta. 183, 22.VII.1950 (USNM 50230). Thirty paratypes from the vicinity of Palm Beach, A. R. Thompson, T. L. McGinty, and J. W. Donovan (USNM 49711, 49714, 49716, 49926, 49927, 49932, 50231, 50232). Other USNM material: off Captiva Island, 26°14.3′ North, 83°47′ West, 44 fms., Robert H. Stewart, 12.VI.1952 (50052); DRY TORTUGAS, 6 miles south of south channel buoy, 18 fms., W. L. Schmitt, sta. 44, 22.VII.1924 (49525); CUBA, vicinity of Havana, 23°10′36″ North, 82°19′12″ West, 169 fms., *Albatross* sta. 2333, 19.I.1885 (10174).

Distribution. Palm Beach, Florida, to the north coast of Cuba, in 15–169 fathoms.

Remarks. *Lophogorgia cardinalis* differs from *L. barbadensis* in its stouter spindles and flexible colonies. In specimens with unusually slender spindles, the sculpture is less crowded than in *L. barbadensis*, and the anthocodial rods are colored yellow and are of different shape. From *L. miniata*, the other bright red *Lophogorgia* of the West Indies, *L. cardinalis* differs in having pointed spindles, slender anthocodial rods not much longer than the cortical sclerites, and a more distinctly pinnate colonial form.

60 **Lophogorgia punicea** (Milne Edwards & Haime), 1857

(Figs. 61 a–h, 62 a–e; Pl. VII fig. 6)

Gorgonia punicea Valenciennes 1855, p. 12. (Brésil, Rio de Janeiro.) [Nomen nudum.]

Gorgonia pumicea, Milne Edwards & Haime 1857, *1*, p. 160 (Brésil.) [Error of transcription.]

Leptogorgia purpurea, (part) Wright & Studer 1889, p. 151, pl. 29 fig. 1, pl. 34 fig. 3 (Bahia, Brazil, 10–20 fms.; but probably not the record from Sarmiento Channel, Chile, 400 fms.)

Leptogorgia pumicea, Verrill 1912, p. 399, pl. 33 fig. 10 (spicules of type in Paris Museum), fig. 9 (spicules of specimen from Rio de Janeiro, U.S. Expl. Exp.), p. 35 fig. 11 (branchlet of latter).

?*Leptogorgia studeri* Verrill 1912, p. 400. (Nom. nov. for *L. purpurea* Wright & Studer, non Pallas.)

Leptogorgia rathbunii Verrill 1912, p. 397, pl. 29 figs. 4–4a, pl. 33 fig. 11, pl. 35 figs. 9–9a. (Parannao, Brazil.)

Leptogorgia pumicea, Stiasny 1951, p. 73. (Brésil.)

?*Leptogorgia diffusa*, Stiasny 1951, p. 71, pl. 20 fig. B, pl. 21 figs. 2–3. (Guyane française, Ile Royale.)

not *Leptogorgia diffusa* Verrill 1868a, p. 397. (Bay of Panama; Costa Rica.)

Diagnosis. Branching openly pinnate (Pl. VII fig. 6), terminal twigs 0.5 mm. in diameter, ascending; calyces prominent, hemispherical, in alternating double rows on two sides of branches. Cortical spicules include numerous acute double spindles up to 0.11 mm. long (Fig. 61 a, d, g), and blunt capstans up to 0.08 mm. (Fig. 61 b, e, g); anthocodial rods flat, as long as the longest cortical spicules (Fig. 61 c, f, h). Color, dark purple or reddish purple; cortical spicules orange-red; anthocodials pink.

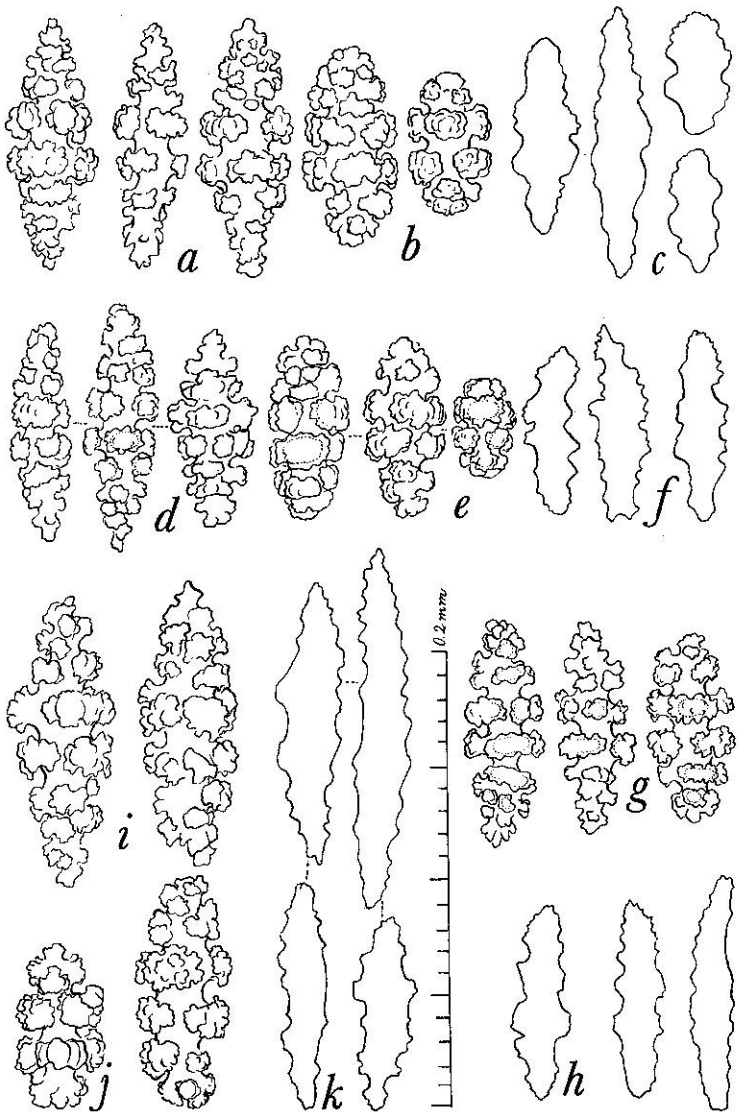


FIGURE 61. *Lophogorgia punicea* (Milne Edwards & Haime), spicules. *a–c*, of a specimen from Rio de Janeiro, Brazil (USNM 633): *a*, acute spindles of inner rind; *b*, blunt spindle and capstan of outer rind; *c*, anthocodial rods. *d–f*, of a specimen from near Rebecca Shoal, Florida (44228): *d*, acute spindles of inner rind; *e*, blunt spindles and capstan of outer rind; *f*, anthocodial rods. *g–h*, of a specimen from Palm Beach, Florida (49713): *g*, spindles of rind; *h*, anthocodial rods. *Lophogorgia* sp. indet. (a), spicules of specimen from the Gulf of Mexico (50413): *i*, acute spindles of inner rind; *j*, blunt spindle and capstan of outer rind; *k*, anthocodial rods. (All figures drawn to the same scale.)

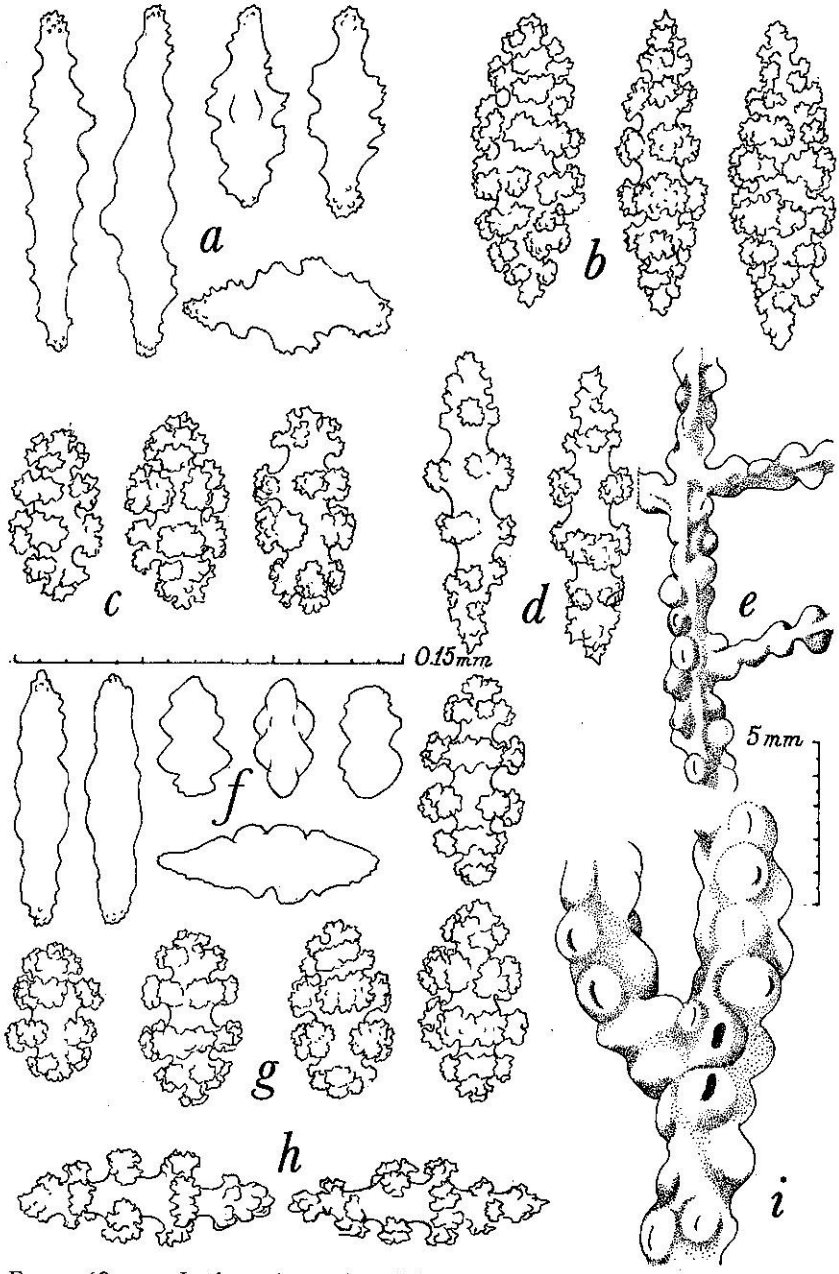


FIGURE 62. *a–e*, *Lophogorgia punicea* (Milne Edwards & Haime) (a syntype of *Leptogorgia rathbunii* Verrill from Brazil (PMYC 4556): *a*, flat anthocodial rods; *b*, acute spindles of outer cortex; *c*, blunt capstans of outer cortex; *d*, spindles of axial sheath; *e*, part of a branch. *f–i*, *Lophogorgia hebes* (Verrill) (the type of *Leptogorgia rubropurpurea* Verrill from Brazil (4523): *f*, flat anthocodial rods; *g*, blunt capstans of outer cortex; *h*, spindles of axial sheath; *i*, part of a branch. (Enlargement of all spicules according to 0.15 mm. scale; enlargement of *e* and *i* according to 5 mm. scale.)

Material. BRAZIL, Rio de Janeiro, J. P. Couthouy coll., U.S. Exploring Exp., 1838, dry specimen (USNM 633); FLORIDA, near Rebecca Shoal, 24°34′ North, 82°37′ West, 10.5 fms., J. Q. Tierney, 2.X.1948, alcoholic spec. (USNM 44228); Palm Beach, 40 fms., A. R. Thompson and T. L. McGinty, yacht *Triton*, 26.IV.1950, alc. spec. (USNM 49713). Also a syntype of *Leptogorgia rathbunii* Verrill (PMYC 4556) from Parannao, Brazil, C. F. Hartt Exp. through the courtesy of Dr. Willard D. Hartman of the Peabody Museum.

Distribution. Southern Florida to Brazil.

Remarks. The specimen from the Exploring Expedition was collected at the type locality and agrees in details with the short description given by MILNE EDWARDS & HAIME (1857, p. 160), and with the figures of spicules from the type given by VERRILL (1912, pl. 33 fig. 10). No significant difference can be found between the topotypic specimen and those from Florida. Both Brazilian and Floridian material have numerous acute double spindles up to 0.11 mm. long, blunt capstans reaching about 0.08 mm., and flat, tapered anthocodial rods at most only slightly longer than the longest spindles of the cortex.

One of the specimens from Florida (44228) is outwardly very similar to the topotype, although slightly more slender. Its spicules are somewhat smaller. The other (49713) is stouter, with straighter branches, and its spindles are less acute. Inasmuch as these differences fall within the range of variation seen in other species of the genus, there is no sound reason for separating the specimens taken at Florida localities from those collected in Brazil.

The name *punicea*, established as a nomen nudum by VALENCIENNES, obviously refers to the color of the colonies (Latin *puniceus*, reddish, red, or purple-colored). MILNE EDWARDS & HAIME (1857), in validating the name, incorrectly cited it as '*pumicea*' (Latin *pumiceus*, of pumice or soft stone), a spelling that has been used in the few subsequent references to the species. Because MILNE EDWARDS & HAIME cited the name incorrectly both in synonymy and in the main heading, because those authors committed similar errors of transcription (e.g., '*laxispina*' for *laxispica*) elsewhere in the same work, and because the adjective *pumiceus* has nothing at all to do with the specimens described, the original spelling proposed by VALENCIENNES is retained.

61 **Lophogorgia hebes** (Verrill), 1869

(Figs. 62 f–i, 63; Pl. VII fig. 4)

Leptogorgia hebes VERRILL 1869,b p. 422. (Key West.)

Leptogorgia rubropurpurea VERRILL 1912, p. 398, pl. 29 figs. 5–5a, pl. 30 fig. 1, pl. 33 fig. 8, pl. 35 figs. 10–10a. (Rio de Janeiro, Brazil.)

Leptogorgia hebes, DEICHMANN 1936, p. 179, pl. 17 fig. 3, pl. 19 figs. 16–23. (Beaufort, North Carolina, and Cape Fear River, Florida [error?].)

Diagnosis. Colonies profusely branched, mostly in one plane, irregularly pinnate; terminal twigs 1–2 mm. in diameter, ascending (Pl. VII fig. 4); calyces in alternating double rows along the two edges of the twigs, multiple rows along the larger branches, and all around the main branches and trunk, where are in rows separated by distinct grooves that indicate the presence of the stem canals. Distinct, hemispherical calyces are formed in the older parts of the colonies, but on the twigs the polyps commonly form no calyces or only indistinct ones. Spicules chiefly blunt, ovate capstans (Fig. 63 a, e, g, j); those of the inner layer may be more slender and tapered, sometimes acute (Fig. 63 b, d, h), but such forms are not abundant. Anthocodial rods usually about the same length as the largest cortical spicules, but longer in some colonies (Fig. 63 c, f, i, k). Color of colonies orange, red, reddish purple, or deep purple; cortical spicules of corresponding colors; anthocodial rods pink, yellow, or amber-colored.

Material. USNM specimens from: North Carolina, near mouth of New River, 25 feet, A. S. Pearse coll., 29.VI.1949 (49589); 7 miles west of Boca Grande sea buoy, 26°40′ North, 82°27′ West, 8 fms., J. Q. Tierney, 28.IX.1948 (44226); 8 miles north-east of East Pass sea buoy, 29°50′ North, 84°32′ West, J. Q. Tierney, 26.X.1948 (44227); Florida, off Longboat Pass, Sarasota, J. Brookes Knight, 1951 and 1952, 5 spec. (49953, 50260); Texas, Matagorda, John Kain (49751); Port Aransas, 20 fms., W. K. Emerson (50411); and a fragment, possibly from Aruba, collected by A. J. van Koolwijk, 1886 (50412). Also the type specimen of *Leptogorgia rubropurpurea* Verrill (PMYC 4523) from Brazil, Rio de Janeiro, C. F. Hartt Exp.; through the courtesy of Dr. Willard D. Hartman of the Peabody Museum.

Distribution. North Carolina to Brazil; apparently absent from the southeast coast of Florida but abundant along most of the Gulf coast of that state, where it grows in company with *Leptogorgia virgulata*.

Remarks. Toward the northern limit of its range, where *Leptogorgia virgulata* and *L. setacea* are the only other gorgoniids present, the much-branched, flattened colonies of *Lophogorgia hebes* serve to separate it at a glance from other members of the family. There is, however, a considerable degree of variation, both in colonial form and in spiculation, which presents some difficulty in separating *L. hebes* from those that occur with it in more southerly waters. The calyces of *L. hebes* may be hemispherical and prominent or low and quite flush with the surface of the rind, even in the same colony, but they usually project at least to a small extent. Colonies