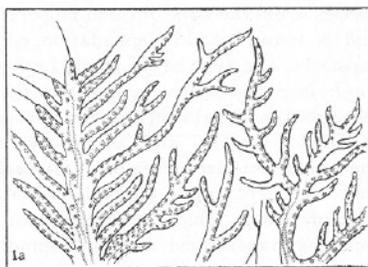


KEY 18

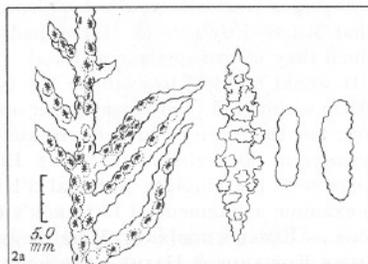
ILLUSTRATED KEY TO THE WEST INDIAN SPECIES OF *Lophogorgia*

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

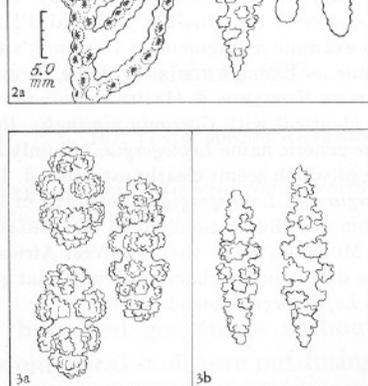


1b. Colonies of various form, uniformly colored or with calyces somewhat paler than the rind: 2

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



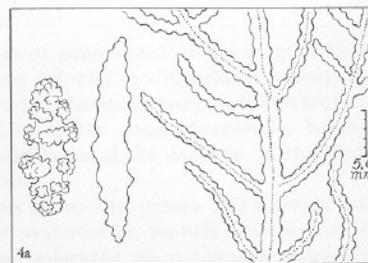
2b. Anthocodial rods more than 3/4 as long as the longest spindles of the rind, and sometimes longer: 3



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

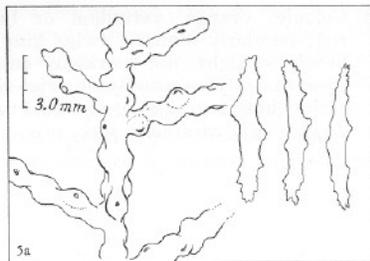
3b. Cortical sclerites including many acute spindles in addition to blunt capstans: 6

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)

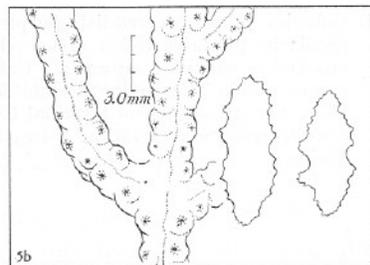


4b. Largest anthocodial rods only slightly, if at all, longer than longest spindles of rind: 5

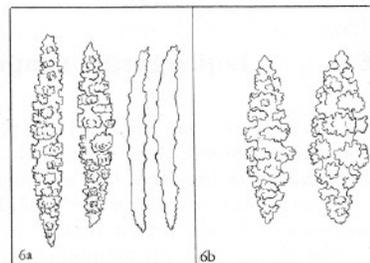
5a. Terminal twigs slender, about 0.5 mm. in diameter exclusive of calyces. Anthocodial rods narrow, with nearly parallel edges indented with broad scallops. Color, purplish red: *Lophogorgia* sp. indet. (b)



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)

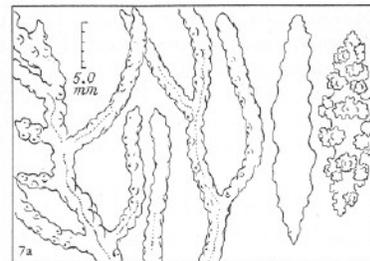


6a. Spindles predominantly long and sharp, about 6 times as long as wide; small, blunt capstans not numerous. Anthocodial rods colorless, about as long as the cortical spindles and very slender: *Lophogorgia barbadensis* spec. nov.



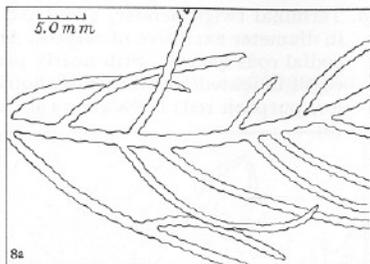
6b. Acute spindles stouter, usually only 3 to 4.5 times as long as wide. Anthocodial rods colored: 7

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)

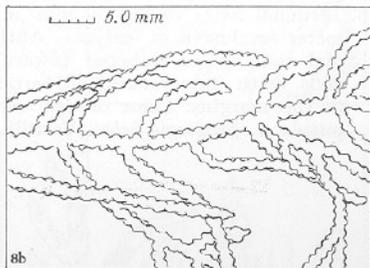


7b. Colonies with slender branchlets about 0.5 mm. in diameter: 8

- 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

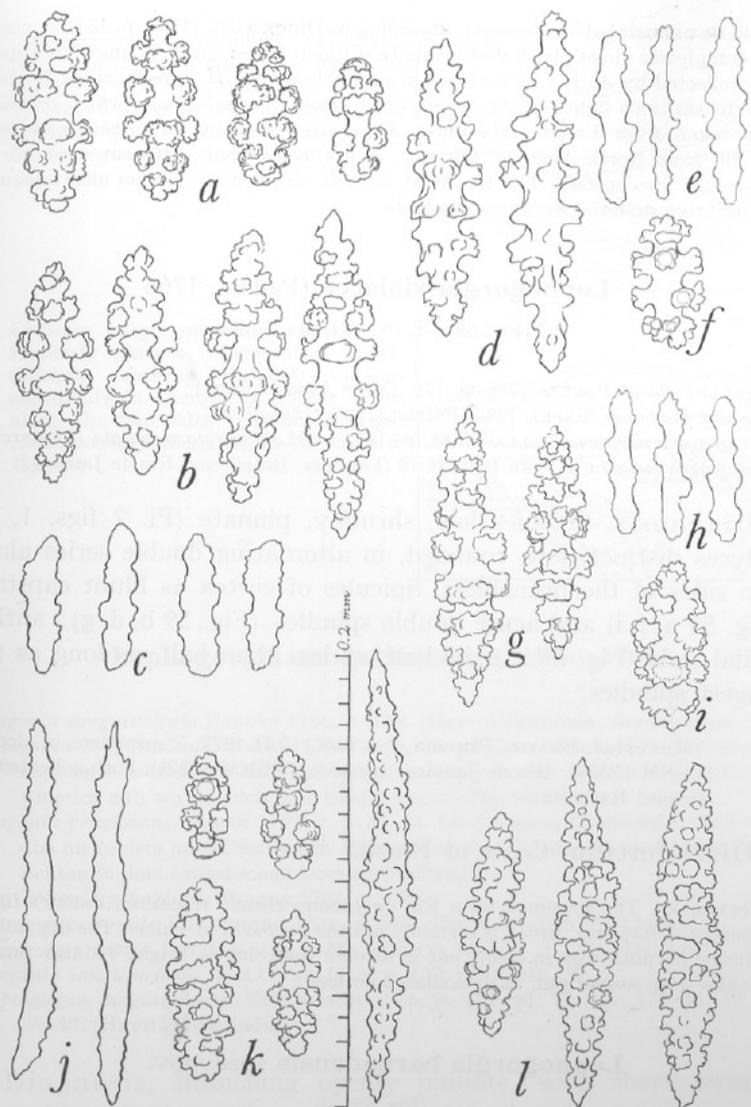


FIGURE 59. *Lophogorgia violacea* (Pallas), spicules. *a-c*, of a specimen from Rio de Janeiro (USNM 50225): *a*, capstans of outer rind; *b*, spindles of inner rind; *c*, anthocodial rods. *d-f*, of a specimen from Paqueta, Brazil (17329): *d*, spindles of inner rind; *e*, anthocodial rods; *f*, capstans 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, 1¼ 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.

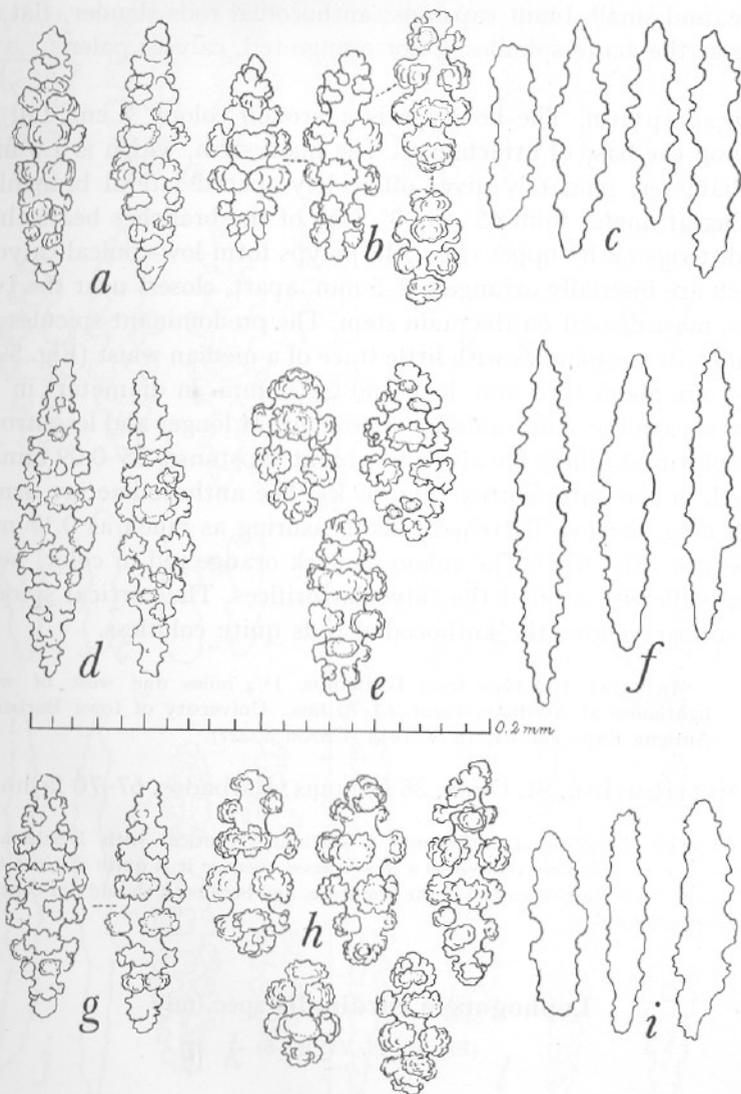


FIGURE 60. *Lophogorgia cardinalis* spec. nov., spicules. *a-c*, of the holotype from Palm Beach, Florida (USNM 50230): *a*, acute spindles of inner rind; *b*, blunt spindles and capstans of outer rind; *c*, anthocodial rods. *d-f*, of a paratype from Florida (50231): *d*, acute spindles of inner rind; *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 t, 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, $26^{\circ}14.3'$ North, $83^{\circ}47'$ 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, $23^{\circ}10'36''$ North, $82^{\circ}19'12''$ 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 punicea, MILNE EDWARDS & HAIME 1857, I, 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 punicea, 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 punicea, 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.

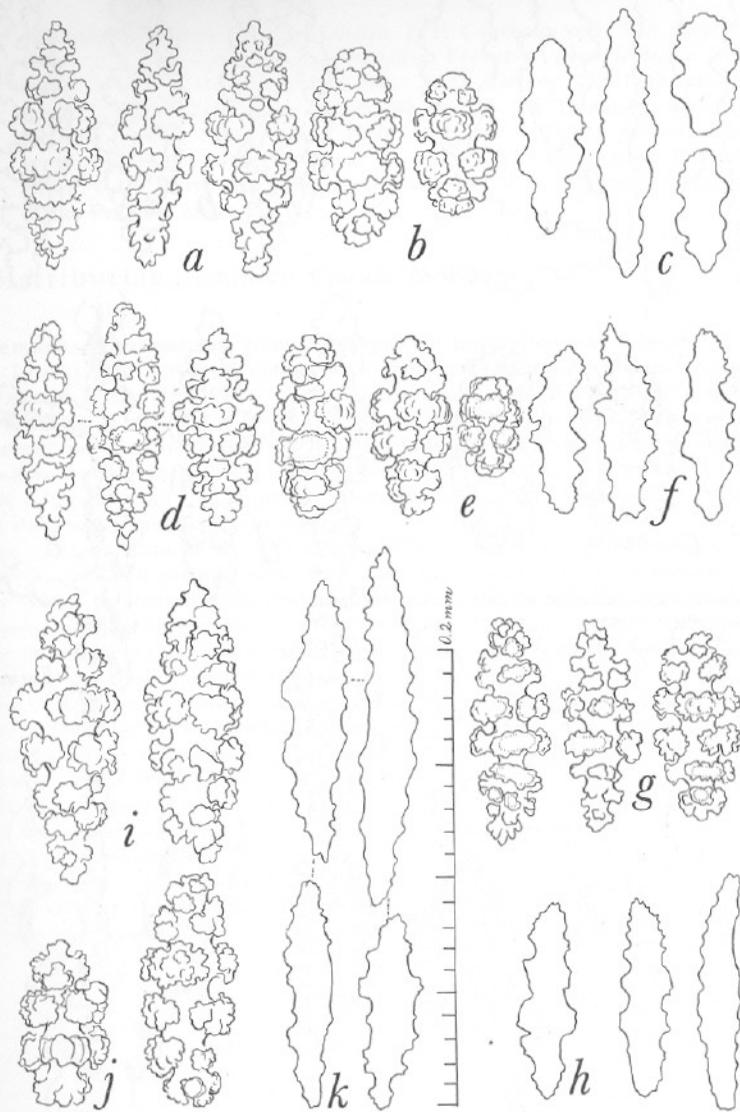


FIGURE 61. *Lophogorgia punicea* (Milne Edwards & Haime), spicules. a–c, of a specimen from Rio de Janeiro, Brazil (USNM 633): a, acute spindles of inner rind; b, blunt spindle and capstan of outer rind; c, anthocodial rods. d–f, of a specimen from near Rebecca Shoal, Florida (44228): d, acute spindles 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.)

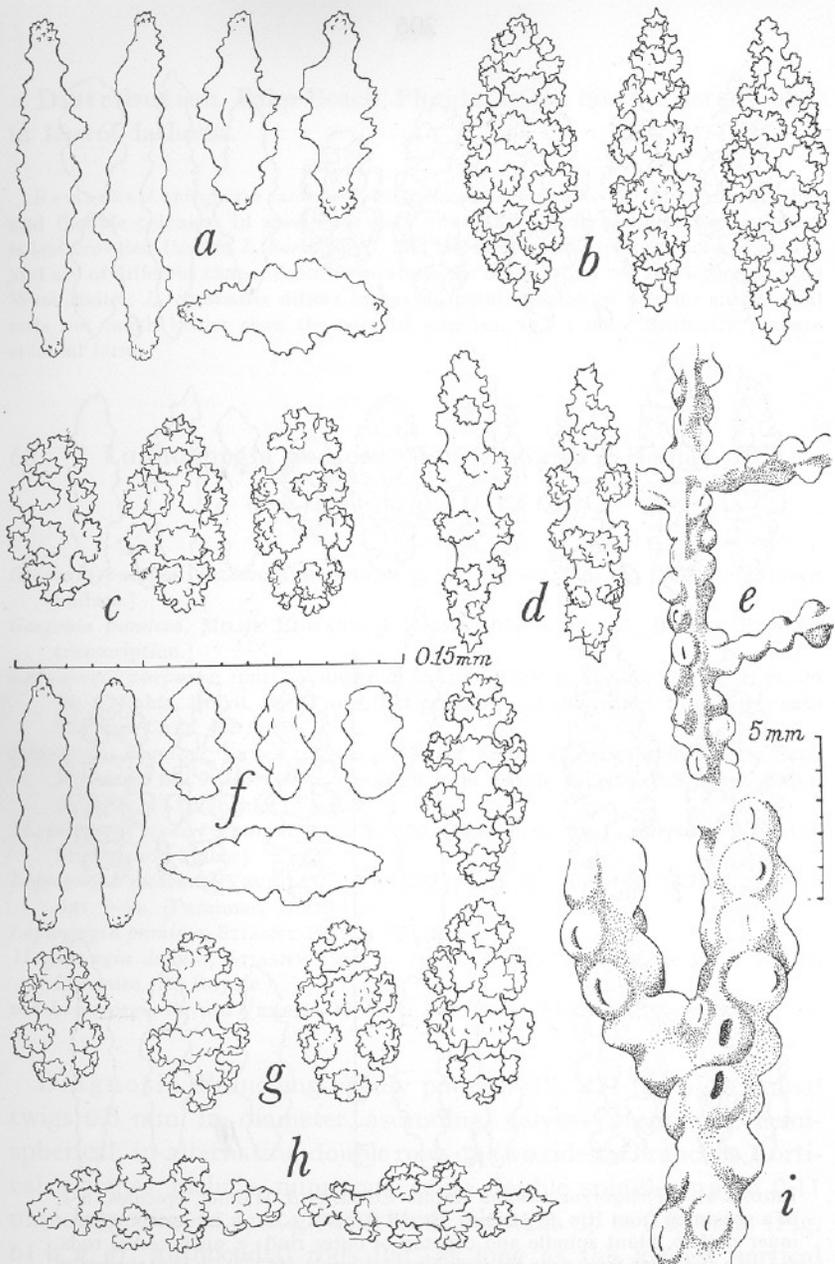


FIGURE 62. a-e, *Lophogorgia punicea* (Milne Edwards & Haime) (a syntype of *Leptogorgia rathbunii* Verrill from Brazil (PMYC 4556): a, flat anthocodial rods; b, acute spindles of outer cortex; c, blunt capstans of outer cortex; d, spindles of axial sheath; e, part of a branch. f-i, *Lophogorgia hebes* (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 Paranao 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 *pumiceus*, 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

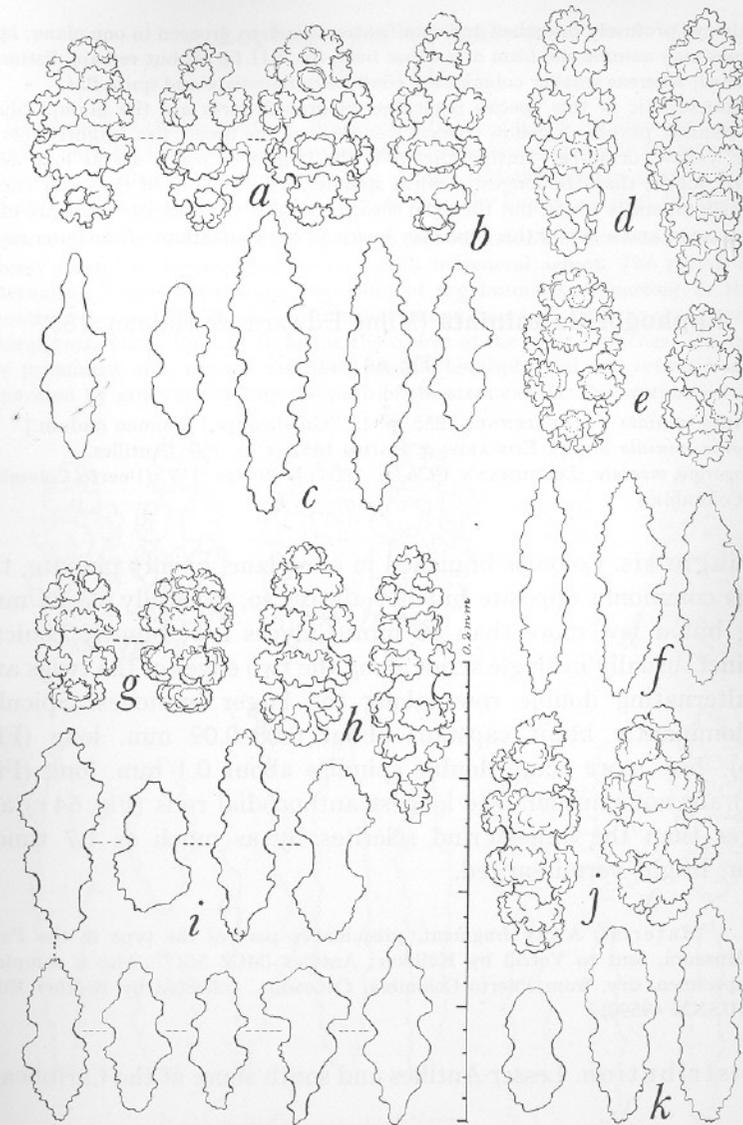


FIGURE 63. *Lophogorgia hebes* (Verrill), spicules. a–c, of a reddish purple specimen from Texas (USNM 50531): a, capstans of outer rind; b, spindle of inner rind; c, anthocodial rods. d–f, of a purple specimen from Sarasota, Florida (50260): d, spindles of inner rind; e, capstans of outer rind; f, anthocodial rods. g–i, of a yellow specimen from Texas (49751): g, capstans of outer rind; h, spindles of inner rind; i, anthocodial rods. j–k, of a specimen from North Carolina (49589): j, spicules of rind; k, anthocodial rods. (All figures drawn to the same scale.)

are always profusely branched and ramification tends to proceed in one plane; large colonies may assume the form of a dense bush (pl. VII fig. 4) but remain distinctly flattened, whereas smaller colonies are commonly flabellate and quite flat.

Characteristic of this species regardless of growth form are the plump, blunt, deep reddish, purple, or yellow cortical spindles and the broad, flat, brightly colored (pink, yellow, or amber) anthocodial rods the largest of which are as long as or slightly longer than the longest cortical spindles. The spindles of the outer cortex are predominantly blunt, but the axial sheath contains some sclerites that are more or less acute and a few of this type may be found in preparations of the outer layer.

62 *Lophogorgia miniata* (Milne Edwards & Haime), 1857

(Fig. 64 a-c)

Gorgonia miniata VALENCIENNES 1855, p. 12. (Guadeloupe.) [Nomen nudum.]

Gorgonia miniata MILNE EDWARDS & HAIME 1857, *r*, p. 160. (Antilles.)

Leptogorgia miniata, DEICHMANN 1936, p. 180, pl. 19 figs. 1-7. (Puerto Colombia, Colombia.)

Diagnosis. Colonies branched in one plane, openly pinnate, the twigs commonly opposite but not always so, generally 12-25 mm. long but a few more than 30 mm. Calyces low, bluntly conical, distinct, usually in single series along the two edges of the twigs and in alternating double rows along the larger branches. Spicules predominantly blunt capstans about 0.08-0.09 mm. long (Fig. 64 b), but more acute double spindles about 0.1 mm. long (Fig. 64 a) are not unusual. The longest anthocodial rods (Fig. 64 c) are longer than the largest rind sclerites by as much as 1.7 times. Color, bright vermilion red.

Material. A dry fragment, presumably part of the type in the Paris Museum, sent to Verrill by Kölliker; Antilles (MCZ 5017). Also a complete specimen, dry, from Puerto Colombia, COLOMBIA, collected by Brother Elias (USNM 49590).

Distribution. Lesser Antilles and south shore of the Caribbean.

Remarks. The large specimen from Colombia is very similar to the fragment from Paris in the collections of the Museum of Comparative Zoology. There are numerous blunt capstans about 0.08 mm. in length, and spindles, also blunt, up to 0.1 mm. The anthocodial rods, which are nearly twice the length of the longest cortical spindles, are flat, tapered toward the ends, serrate, and orange or salmon pink in color. The cortical spicules are clear orange-red.

Lophogorgia sp. indet. (a)

(Fig. 61 i-k)

Diagnosis. Colonies pinnate, branches stiff, 1.5-2.0 mm. in diameter, crooked, upward curving. Calyces in alternating double rows along each side of the branches, producing a squarish cross section. The longer cortical spindles acutely pointed. Largest anthocodial rods somewhat longer than the longest cortical spindles.

Description. A flabellate colony 17 cm. tall without base, branched in one plane, closely resembles *Lophogorgia hebes* (Verrill) in general aspect. The polyps are in alternating double rows along two sides of the branches, imparting to them a squarish cross section. The major branches ascend sinuously, and the openly pinnate lateral twigs curve upward to follow the course of the main branches. The calyces are prominent and, toward the base, become hemispherical and oriented in rows separated by grooves marking the path of the stem canals. The spiculation differs

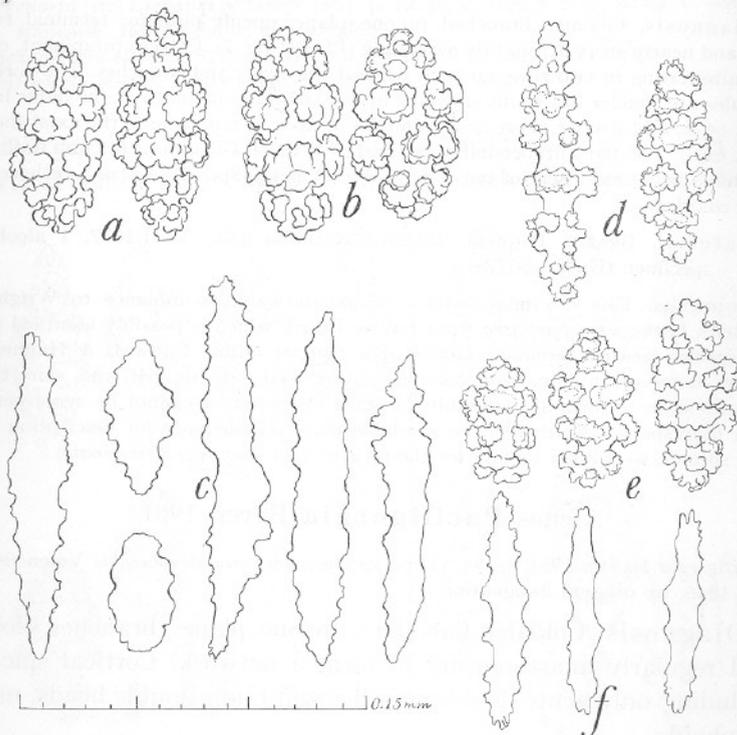


FIGURE 64. *Lophogorgia miniata* (Milne Edwards & Haime), spicules of a specimen from Colombia (USNM 49590): a, spindles of inner rind; b, capstans of outer rind; c, anthocodial rods. *Lophogorgia* sp. indet. (b), spicules of a specimen from Brazil (50226): d, spindles of inner rind; e, capstans of outer rind; f, anthocodial rods. (All figures drawn to the same scale.)

from that of *L. hebes* in the presence of numerous stout but acute spindles (Fig. 61 i) as well as blunt capstans (Fig. 61 j). The flat rods of the anthocodiae (Fig. 61 k) are more slender than is usually the case in *L. hebes*.

Material. Gulf coast of FLORIDA, F. G. Walton Smith coll., 1947, University of Miami Gulf Exp., lot 213, 1947, 1 specimen (USNM 50413).

Distribution. West coast of Florida.

Remarks. The material available is not sufficient to determine whether the differences between this form and *Lophogorgia hebes* represent individual variation or specific difference. It is included in the key and listed without a name, in the hope that additional material will be recognized.

64 *Lophogorgia* sp. indet. (b)

(Fig. 64 d-f; Pl. VII fig. 2)

Diagnosis. Colonies branched in one plane, openly pinnate; terminal twigs stiff and nearly straight, slightly ascending (Pl. VII fig. 2). Calyces prominent, close set, alternating in two rows on each edge of the twigs and branches. The cortical spicules are slender but blunt capstans up to 0.08 mm. in length in the outer layer (Fig. 64 e), and slender, more acute spindles up to 0.12 mm. long in the axial sheath (Fig. 64 d). The flat anthocodial rods (Fig. 64 f) reach a length of 0.1 mm. Color of colonies, bright red ("scarlet-red or coral-red," Verrill). Spicules dull red, anthocodial rods colorless.

Material. BRAZIL, Paqueta, Richard Rathbun coll., 12.II.1877, 1 alcoholic specimen (USNM 50226).

Remarks. This specimen bears a strong outward resemblance to Wright & Studer's *Leptogorgia purpurea* from Bahia, Brazil, which is possibly identical with the species treated herein as *Lophogorgia punicea* (Milne Edwards & Haime). It differs, however, in its narrow, colorless anthocodial rods (fig. 64f) and, since those spicules seem to form a reasonably constant character, it cannot be synonymized with that species. Neither is the available material adequate for description as a new species, so it must remain for the present as a *species indeterminata*.

Genus *Pacifigorgia* Bayer, 1951

Pacifigorgia BAYER 1951, p. 94. (Type species, *Gorgonia stenobrochis* Valenciennes 1846, by original designation.)

Diagnosis. Colonies flabellate, in one plane; branches closely and regularly anastomosing to form a network. Cortical spicules including only acute double spindles and blunt double heads, never scaphoids.

Distribution. Pacific coast from the Gulf of California to Panama; Atlantic coast from Trinidad to Brazil. Endemic ampho-American.

Remarks. It is not necessary to repeat here the historical aspects of this genus, which were discussed at the time of its original publication and in a subsequent paper (BAYER 1953).

The genus *Pacifigorgia*, which contains about fifteen species in all, is represented in the Atlantic Ocean by only one, which has received several names over the years.

65 *Pacifigorgia elegans* (Milne Edwards & Haime), 1857

(Fig. 65)

Rhipidogorgia elegans MILNE EDWARDS & HAIME 1857, *r*, p. 177. (Iles de la Trinité.)
Rhipidogorgia elegans, DUCHASSAING & MICHELOTTI 1864, p. 20, pl. 4 fig. 4. (In insula Trinitatis.)

Gorgonia hartli VERRILL 1912, p. 391, pl. 29 figs. 6-6a, pl. 30 fig. 2, pl. 33 fig. 6, pl. 35 fig. 6. (Marannao, Brazil.)

Gorgonaria [sic] *Crevauxi* STIASNY 1951, p. 72, pl. 22 figs. 4-5, pl. 20 fig. C. (Guyane française, Iles du Salut, Ile Royale.)

Rhipidogorgia elegans, STIASNY 1951, p. 70, pl. 20 fig. A. (La Trinité.)

Pacifigorgia elegans, BAYER 1959, p. 19, fig. 5. (Surinam.)

Diagnosis. Bright reddish purple anastomosing sea fans with cortical spindles reaching 0.12 mm. in length (Fig. 65 a) and double

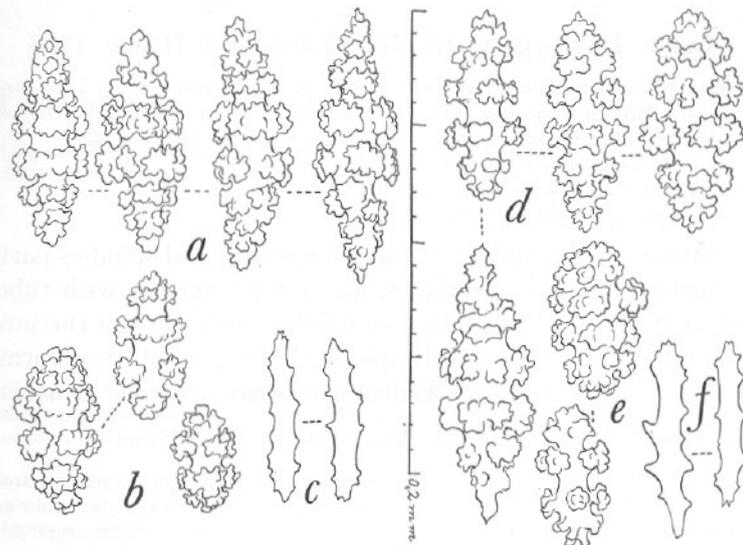


FIGURE 65. *Pacifigorgia elegans* (Milne Edwards & Haime). a-c, spicules of a specimen from Trinidad: a, spindles; b, double heads; c, anthocodial rods. d-f, syntype of *Gorgonia crevauxi* Stiasny from French Guiana: d, spindles; e, double heads; f, anthocodial rods. (All figures drawn to same scale.)

heads somewhat shorter, 0.05–0.08 mm., sometimes 0.1 mm. (Fig. 65 b). Anthocodiae with slender flat rods having widely spaced marginal serrations, usually about 0.07 mm. long but commonly shorter and occasionally longer (Fig. 65 c).

Material. Specimens from TRINIDAD, Toco, collected by Dr. Elisabeth Deichmann, in the Museum of Comparative Zoölogy; and a fragment of a syntype of *G. crevauxi* Stiasny from FRENCH GUIANA, through the courtesy of Dr. L. B. Holthuis of the Leiden Museum (USNM 50742). Several specimens from SURINAM, in 15 fathoms (USNM 50953).

Distribution. Trinidad to Maranhao, Brazil. Could be expected at Curaçao and adjacent islands, but has not yet been reported inside the Caribbean.

Remarks. Specimens collected by Miss DEICHMANN at Toco, Trinidad, agree in form with both VERRILL's and DUCHASSAING & MICHELOTTI's species, and with the former in regard to spiculation. It should be noted that the scaphoids mentioned by VERRILL for *G. hartti* are the result of contamination.

The syntype of *G. crevauxi* is identical with *G. hartti* except for the fact that the blunt double heads are somewhat larger. All published descriptions and all available material indicate that in the Atlantic there is but a single species of *Pacificorgia*, for which the earliest name is *elegans* of MILNE EDWARDS & HAIME.

Genus *Leptogorgia* Milne Edwards & Haime, 1857

Leptogorgia MILNE EDWARDS & HAIME 1857, 1, p. 163. (Type species, *Leptogorgia viminalis* Milne Edwards & Haime = *Gorgonia virgulata* Lamarck = ?*Gorgonia viminalis* Pallas, by subsequent designation: VERRILL 1869b, p. 420.)

Leptogorgia, VERRILL 1869b, p. 419.

Leptogorgia, (part) BIELSCHOWSKY 1929, p. 81.

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

Diagnosis. Gorgoniids with outer coenenchymal spindles partly in the form of short disk-spindles, partly long spindles with tubercles of outer surface partly fused and higher than those of the inner surface; inner coenenchyme with spindles having sculpture uniformly developed on all sides. Anthocodiae with weak or strong armature.

Distribution. Chesapeake Bay to the reefs of Brazil.

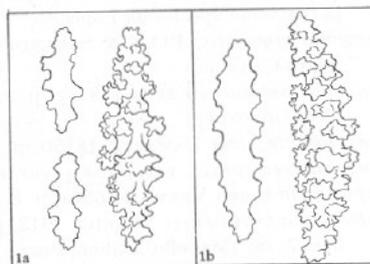
Remarks. There is absolutely no justification for considering *Gorgonia petechians* Pallas to be the type species of *Leptogorgia* as was done by BIELSCHOWSKY and later authors, because that species was not originally included in *Leptogorgia*.

My concept of the genus differs from that of BIELSCHOWSKY in that I exclude all those species that have uniformly sculptured cortical spindles. Those species agree satisfactorily with the definition of *Lophogorgia*, where it seems more logical to place them.

KEY 19

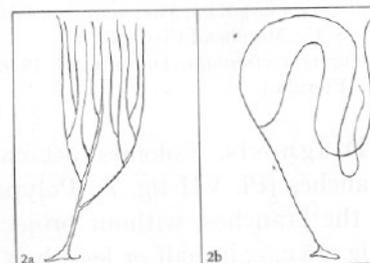
ILLUSTRATED KEY TO THE SPECIES OF *Leptogorgia*

1a. Anthocodial armature weak, the flat rods always less than $\frac{2}{3}$ the length of the longest spindles of the rind. Colonies usually attached but sometimes free: 2



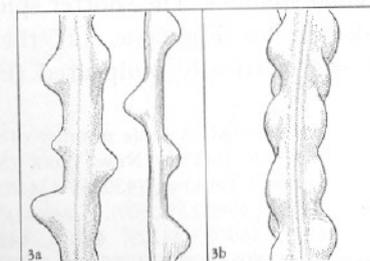
1b. Anthocodial armature strong, the rods reaching or exceeding $\frac{2}{3}$ the length of the longest spindles in the rind. Colonies usually unattached: 3

2a. Colonies with a number of long, straight branches, usually rather stiff; always attached: *Leptogorgia virgulata* (Lam.)



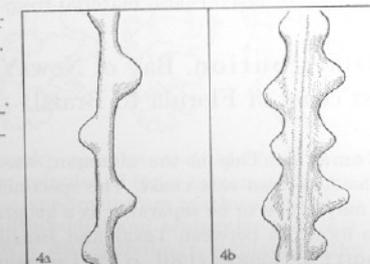
2b. Colonies unbranched or with only one or two long, slender, flexible branches. Colonies sometimes unattached: *Leptogorgia setacea* (Pallas)

3a. Calyces prominent, widely separated: 4



3b. Calyces distinct but more closely spaced: *Leptogorgia medusa* (Bayer)

4a. Extremely slender colonies, diameter of stems (excluding calyces) 0.75 mm. or less: *Leptogorgia siheno* (Bayer)



4b. Stoutier colonies, diameter of stems (excluding calyces) 0.9 mm. or more: *Leptogorgia euryale* (Bayer)



66 *Leptogorgia virgulata* (Lamarck), 1815

(Fig. 66; Pl. VII fig. 7)

?*Gorgonia viminalis* PALLAS 1766, p. 184. (Mare Mediterraneum [in error, if this is the same species as Esper's].)

Gorgonia viminalis, ELLIS & SOLANDER 1786, p. 82, pl. 12 fig. 1. (Charleston, in South Carolina.)

Gorgonia viminalis, ESPER 1791, 2, p. 51, pl. 11 [but not 11A]. (Das mittelländische Meer [in error].)

Gorgonia virgulata LAMARCK 1815b, p. 157. (Habite l'Océan atlantique américain.)

Gorgonia ceratophyta, var. *flava* + var. *rubra* DONOVAN 1825, 4, p. 114, 115.

Leptogorgia tenuis VERRILL 1864a, p. 8. (Bay of New York.)

Leptogorgia brasiliensis VERRILL 1912, p. 392, pl. 29 figs. 3-3a, pl. 33 fig. 7, pl. 35 figs. 7-7a. (Mapelle, Bahia, Brazil.)

Leptogorgia sulfurea BIELSCHOWSKY 1929, p. 126, fig. 20, pl. 3 fig. 11. (Verbreitung?)

Leptogorgia virgulata, BIELSCHOWSKY 1929, p. 127, fig. 21, pl. 3 fig. 12. (Charleston, S. C.; Morehead City, N.C.)

Leptogorgia virgulata, DEICHMANN 1936, p. 177, pl. 19 figs. 24-34. (New York to Florida.)

Diagnosis. Colonies attached, with several long, whip-like branches (Pl. VII fig. 7). Polyps in multiple series along two sides of the branches, without projecting calyces, armed with flat rods (Fig. 66 c, g, h) half or less than half as long as the longest coenenchymal spindles. The shorter spicules of the outer cortex are mostly disk-spindles (Fig. 66 a, e, i); the longer spindles of the inner cortex are symmetrically sculptured (Fig. 66 b, f, j).

Material. A large number of specimens in the U. S. National Museum, from the BAY OF NEW YORK (569, 765, 766), CHESAPEAKE BAY (49763), NORTH CAROLINA (43036, 43415, 43420, 49592, 49753), SOUTH CAROLINA (44057, 49602, 50509), GEORGIA (49669, 49679), west coast of FLORIDA (6877, 15903, 44229, 44230, 44232, 49690, 49732, 49752, 50056, 50259, 50544, 50545, 50564, 50566, 50657), LOUISIANA (49813), and TEXAS (50529, 50532, 50416); also material from BRAZIL, collected by R. Rathbun (49749).

Distribution. Bay of New York? Chesapeake Bay to Georgia; west coast of Florida to Brazil.

Remarks. This is the common, moderately branched, whip-like *Leptogorgia* of the American east coast. The specimens from Brazil do not differ significantly, but may prove to be separable as a geographic subspecies. I have not seen material from localities between Texas and Brazil; the record from Jamaica, published by HARGITT & ROGERS (1901, p. 287) remains to be confirmed.

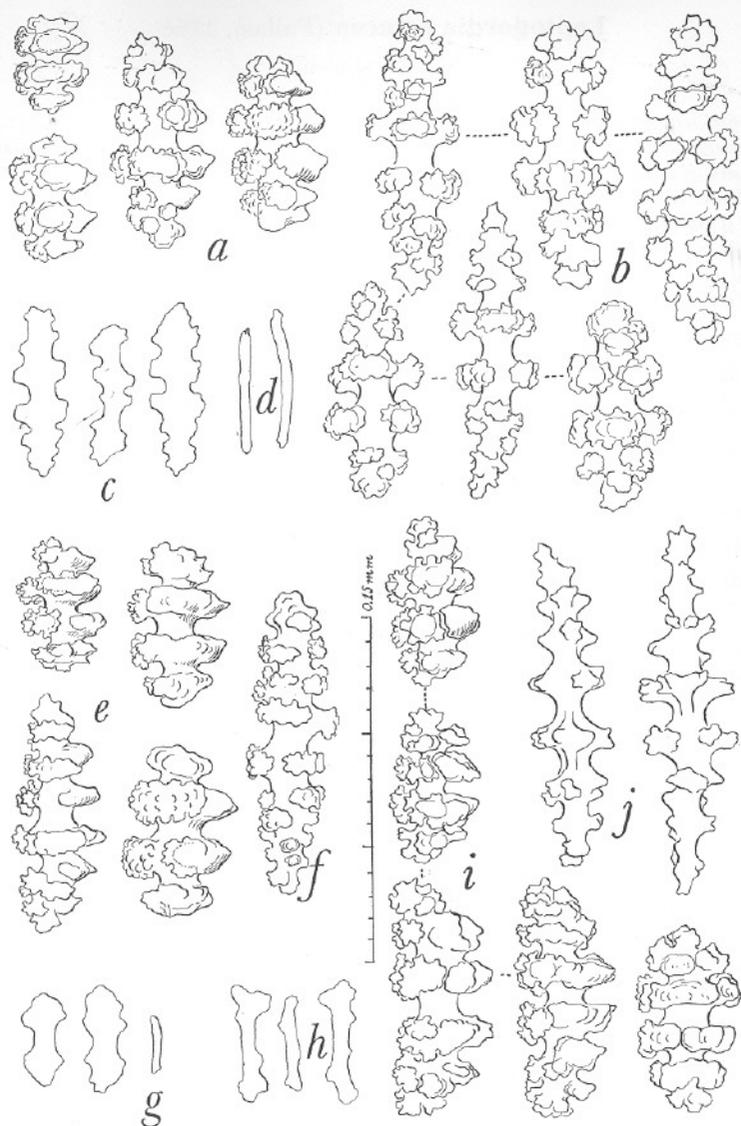


FIGURE 66. *Leptogorgia virgulata* (Lamarck), spicules. a-d, specimen from the Carolinas: a, disk-spindles; b, regular spindles of inner cortex; c, flat anthocodial rods; d, rodlets of tentacles. e-g, specimen from northwest Florida: e, disk-spindles; f, regular spindles; g, anthocodial and tentacular rods. h-j, specimen from Brazil: h, anthocodial rods; i, disk-spindles; j, regular spindles (All figures drawn to the same scale.)

67 *Leptogorgia setacea* (Pallas), 1766

(Figs. 67, 68 a-d)

Gorgonia setacea PALLAS 1766, p. 182. (Mare Americanum.)*Pterogorgia gracilis* VERRILL 1868a, p. 359, pl. 4 figs. 2-3. (Abrolhos Reefs, Brazil.)*Gorgonia gracilis*, VERRILL 1912, p. 393, pl. 29 fig. 2, pl. 35 figs. 5-5a. (Abrolhos Reefs, Brazil.)not *Xiphigorgia setacea*, KÜENTHAL 1916b, p. 502.*Leptogorgia virgulata*, COWLES 1930, p. 332. (Chesapeake Bay.)*Leptogorgia setacea*, DEICHMANN 1936, p. 178, pl. 19 figs. 35-38. (North Carolina; Texas; Brazil.)

Diagnosis. Colonies attached or free, unbranched or with a very few long, flexible branches; polyps in single or double series along two sides of the stems, with low or moderately prominent calyces. Anthocodial rods (Fig. 67 d, e, m) less than $2/3$ the length of the longest cortical spindles, usually only half or less than half as long. Disk-spindles of cortex similar to those of *L. virgulata* but more ornately sculptured (Fig. 67 b, h, j); outer rind also containing spindles with warts of outer surface more or less fused and spine like (Fig. 67 a, g, k). Spindles of inner rind uniformly sculptured all around (Fig. 67 c, i, l). Color, purple or yellow; Brazilian specimens may be nearly white.

Material. A large number of USNM specimens from VIRGINIA, Chesapeake Bay and vicinity, including those reported by Cowles (1930) (17319, 43029, 43241, 43242, 43245, 43252, 43254, 49757, 50588, 50702, 50706), and from FLORIDA, Fernandina (50590); from the Gulf of Mexico, west Florida (42717); LOUISIANA (50652), TEXAS (44218, 43411, 49977), and MEXICO, Matamoros (42162); also several specimens from BRAZIL (33606, 49657, 49659, 50654).

Distribution. Chesapeake Bay to Brazil. This species seems to have about the same range as *L. virgulata*, but has not been reported north of Chesapeake Bay.

Ecology. *Leptogorgia setacea* ventures into bays and river mouths where salinity is much reduced. It has been taken in Chesapeake Bay as far north as the mouth of the Potomac River (COWLES 1930, p. 332). In Brazil, it "grows abundantly in little tufts on the edges of the reefs of the Abrolhos region below low-tide, with *Hymenogorgia quercifolia*." (VERRILL 1868a, p. 360.) It is one of the few species of gorgonian that can live completely unattached.

Remarks. *Leptogorgia setacea* is a common inshore species along the Atlantic coast of North America, from Chesapeake Bay southward. It can be recognized by its unbranched, often unattached, filiform colonies with low, crowded, biserial calyces and small anthocodial rods. Its color may be yellow, purple, or some intermediate shade.

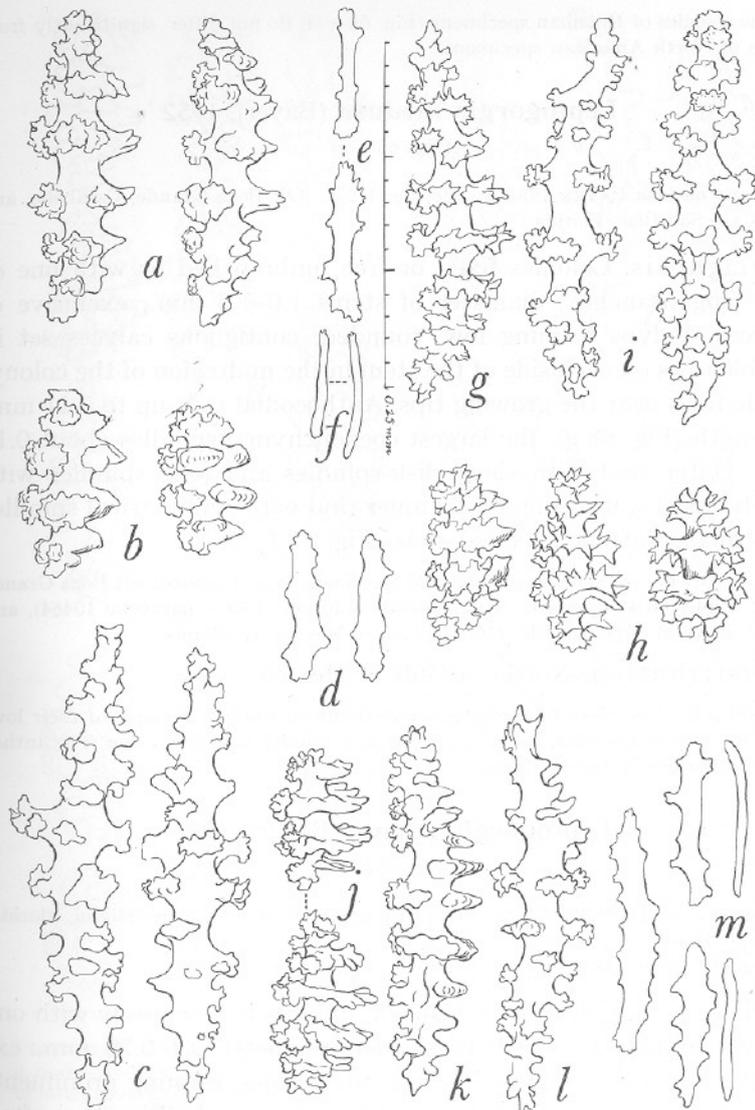


FIGURE 67. *Leptogorgia setacea* (Pallas), spicules. a-d, specimen from Chesapeake Bay: a, spindles of outer cortex; b, disk-spindles of outer cortex; c, spindles of inner cortex; d, anthocodial rods. e-i, specimen from Texas: e, anthocodial rods; f, tentacular rods; g, spindles of outer cortex; h, disk-spindles of outer cortex; i, spindles of inner cortex. j-l, specimen from British Guiana: j, disk-spindles of outer cortex; k, spindle of outer cortex; l, spindle of inner cortex; m, anthocodial and tentacular rods. (All figures drawn to same scale.)

The spicules of Brazilian specimens (Fig. 68 a-d) do not differ significantly from those of North American specimens.

68

Leptogorgia medusa (Bayer), 1952

(Fig. 68 e-g)

Eugorgia medusa BAYER 1952, p. 188, fig. 1 t-y. (Off Boca Grande, Carrabelle, and Cape San Blas, Florida.)

Diagnosis. Colonies fixed or free, unbranched or with one or two long branches; diameter of stems 1.0-1.5 mm., exclusive of calyces. Polyps forming low, rounded, contiguous calyces set in double rows on each side of the stem in the midregion of the colony, single rows near the growing tips. Anthocodial rods up to 0.11 mm. in length (Fig. 68 g), the largest coenenchymal spindles about 0.14 mm. in length (Fig. 68 e), the largest coenenchymal spindles about 0.14 mm. Outer rind with short disk-spindles and long spindles with partly fused warts (Fig. 68 e); inner rind with symmetrical spindles and small, flattened, belted rods (Fig. 68 f).

Material. The original USNM specimens from FLORIDA, off Boca Grande Light (10483), south of Carrabelle (holotype 49766, paratype 10464), and south of Cape San Blas (10331), Gulf of Mexico, 24-27 fms.

Distribution. Northern Gulf of Mexico.

Remarks. Colonies of *Leptogorgia medusa* are distinctive because of their low, close-set calyces and their uniform yellowish or pinkish buff coloration. The anthocodial armature is quite strong.

69

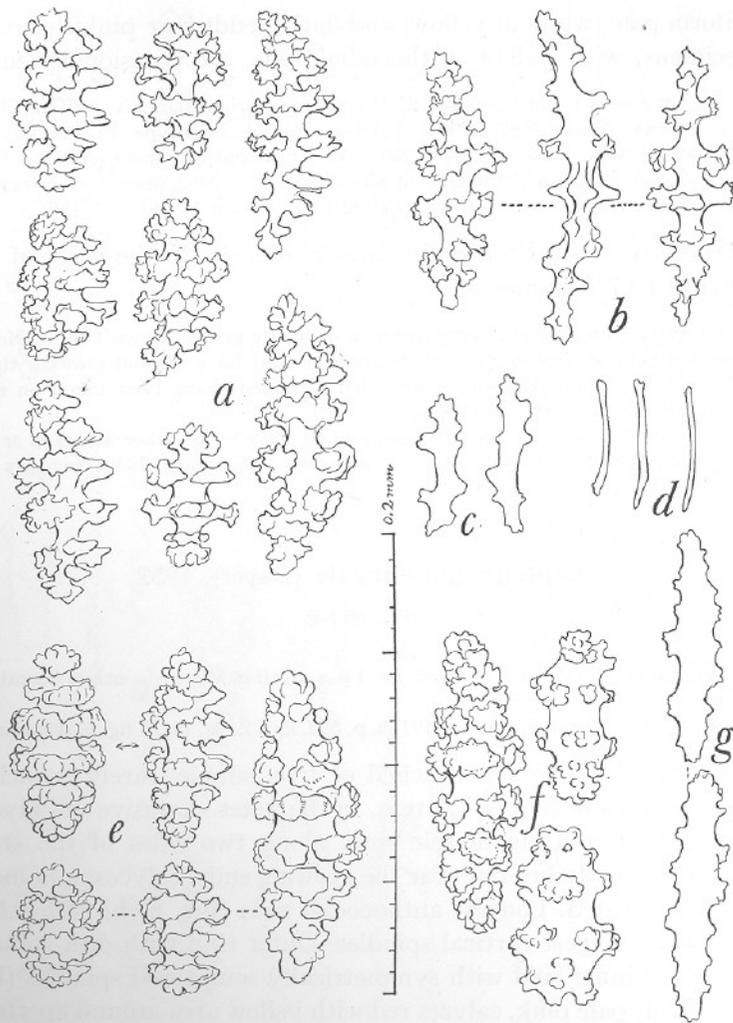
Leptogorgia stheno (Bayer), 1952

(Fig. 69 a-e)

Eugorgia stheno BAYER 1952, p. 186, fig. 1 j-n. (Off Palm Beach and Miami, Florida, and Mobile, Alabama.)

Leptogorgia stheno, BAYER 1959, p. 17, fig. 4. (Surinam.)

Diagnosis. Colonies unattached, unbranched or rarely with one or two branches, extremely slender, diameter 0.4-0.75 mm. exclusive of calyces. Polyps biserial, alternating, forming prominent, conical calyces; anthocodiae armed with stout rods (Fig. 69 c) often attaining a length of 0.14 mm., or equal to the longest cortical spindles. Outer rind contains disk-spindles and longer spindles with partly fused warts (Fig. 69 a-b); inner rind contains symmetrically ornamented spindles (Fig. 69 d). Color, white or yellow, with red calyces;



FIGURES 68. *Leptogorgia setacea* (Pallas), spicules of a specimen from Brazil: a, disk-spindles and longer spindles with fused warts, from outer rind; b, spindles of inner rind; c, anthocodial rods; d, tentacular rods. *Leptogorgia medusa* (Bayer), spicules of a specimen from off Boca Grande, Florida: e, disk-spindles and longer spindles with fused warts, from outer rind; f, spindle and flat rods of inner cortex; g, anthocodial rods. (All figures drawn to same scale.)

uniform pale (white or yellow) and dark (reddish or pinkish orange) specimens, with yellow anthocodial rods, are occasionally found.

Material. The original USNM specimens, from FLORIDA, off Palm Beach (49784), Miami (49785), and ALABAMA, Mobile (holotype 49774, paratypes 49775-49777, also 49778-49783); five additional lots from off Palm Beach (50429, 50438) and the Gulf of Mexico (50033, 50062, 50063). One fragment of an extremely slender colony from SURINAM, in 14 fms. (50845).

Distribution. From Palm Beach, Florida, to the coast of Alabama; 14-67 fathoms.

Remarks. This species is very common on sandy ground in the Gulf of Mexico, where the colonies live completely unattached and have normal growing tips at both ends. Both attached and unattached specimens have been taken on rocky bottom off the east coast of Florida.

The incomplete material from Surinam might have lived either attached or free; the predominantly soft character of the bottom, mud with shells, suggests that they probably were unattached.

70 *Leptogorgia euryale* (Bayer), 1952

(Fig. 69 f-i)

Eugorgia euryale BAYER 1952, p. 186, fig. 1 o-s. (Gulf of Mexico, south of Carrabelle, Florida.)

?*Xiphigorgia setacea*, KÜENTHAL 1916b, p. 502, figs. Z, A', pl. 23 fig. 6. (Honduras.)

Diagnosis. Colonies attached or free, simple, rarely branched, moderately slender, 0.9-1.0 mm. in diameter exclusive of calyces; polyps in alternating double rows along two sides of the stem, becoming strictly biserial near the growing ends; calyces prominent, widely separated. Longest anthocodial rods (Fig. 69 h) 0.75-0.8 as long as the longest cortical spindles. Outer rind with disk-spindles (Fig. 69 i); inner rind with symmetrically sculptured spindles (Fig. 69 f). Color, pale pink, calyces red with yellow area around aperture.

Material. FLORIDA, south of Carrabelle, 24 fms. (holotype USNM 49764, paratype 49765).

Distribution. Northern Gulf of Mexico; Honduras?

Remarks. It seems likely that the specimen that KÜENTHAL called *Xiphigorgia setacea* is in reality the present species. Its few, long branches with prominent calyces and its coloration agree perfectly. Unfortunately, KÜENTHAL did not figure the spicules of his specimen in adequate detail,

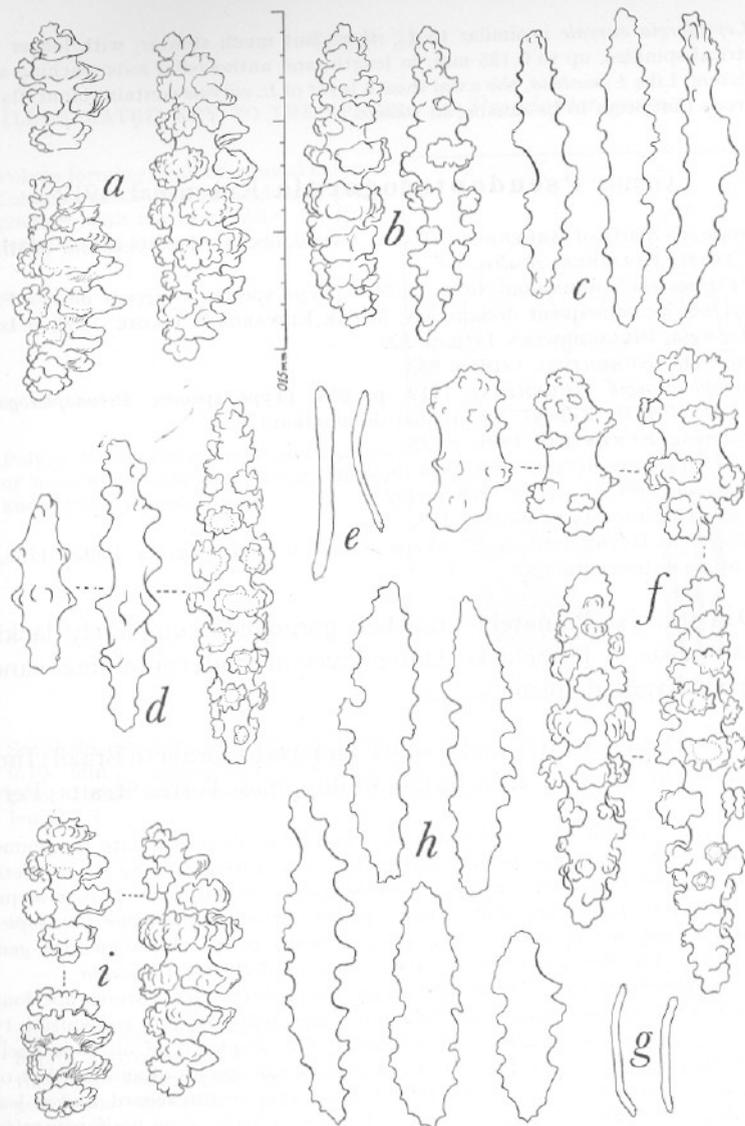
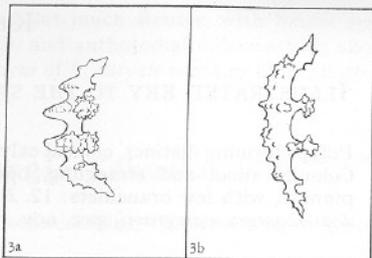


FIGURE 69. *Leptogorgia steno* (Bayer), spicules: a, disk-spindles and longer spindles with fused warts, from outer cortex; b, spindles with partly fused warts, from outer cortex; c, anthocodial rods; d, spindles of inner cortex; e, tentacular rods. *Leptogorgia euryale* (Bayer), spicules: f, spindles and flattened rods of inner cortex; g, tentacular rods; h, flat rods from anthocodiae; i, disk-spindles and longer spindles with fused warts, from outer cortex. (All figures drawn to same scale.)

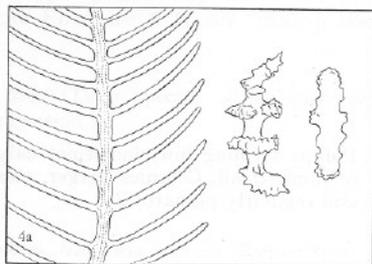


3a. Sculpture of convex side of scaphoids as high as, or higher than, that of concave side, and fused into prominent transverse ridges or collars: 4

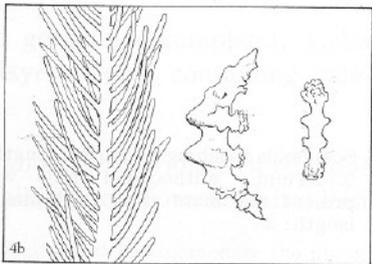


3b. Sculpture of convex side of scaphoids lower than that of concave side, sometimes suppressed completely: 5

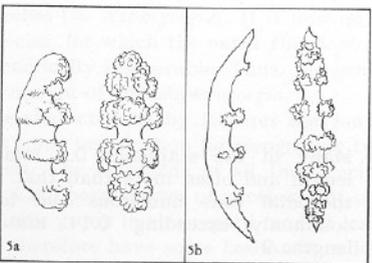
4a. Twigs 4–10 mm. apart, strictly opposite, in one plane: *Pseudopterogorgia bipinnata* (Verrill)



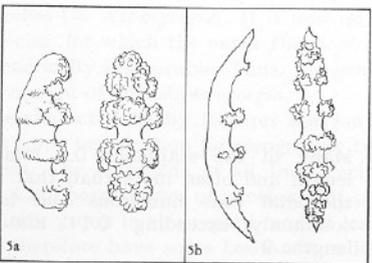
4b. Twigs 4 mm. apart or less, not strictly opposite, not in one plane, strongly ascending: *Pseudopterogorgia hallos* (Bielschowsky)



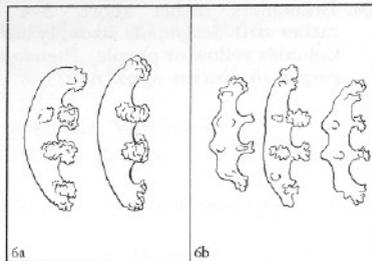
5a. Scaphoids typically blunt at the ends; regular spindles also blunt: 6



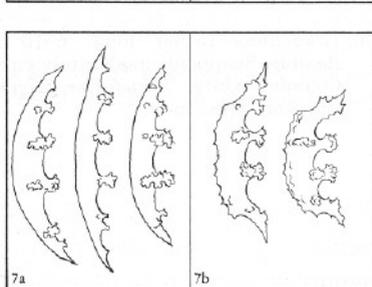
5b. Scaphoids pointed at the ends; regular spindles acute: 7



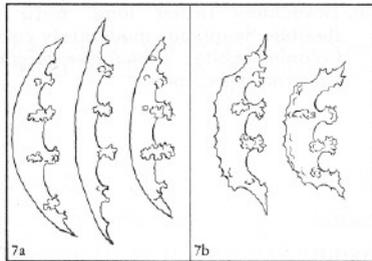
6a. Convex profile of scaphoids smooth or minutely echinulate, without low, broad ridges continued from concave side: *Pseudopterogorgia rigida* (Bielschowsky)



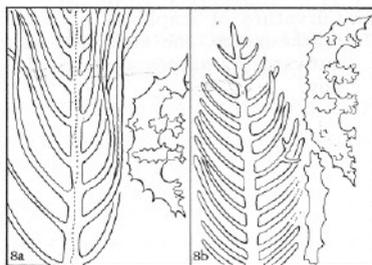
6b. Convex profile of scaphoids strongly echinulate, rarely smooth, often with low, broad, transverse ridges: *Pseudopterogorgia blanquillensis* (Stiasny)



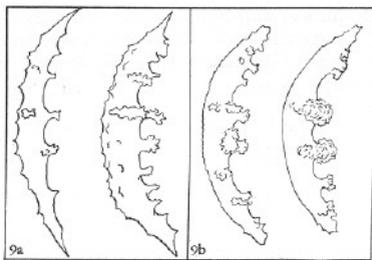
7a. Scaphoids slender, gently and uniformly curved, parenthesis-like, the ends not recurved outward; convex profile smooth or very finely echinulate: *Pseudopterogorgia acerosa* (Pallas)



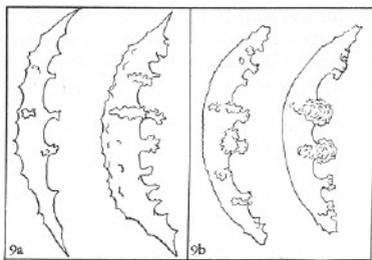
7b. Scaphoids stouter, more strongly bent, the ends recurved outward; convex profile distinctly echinulate: 8



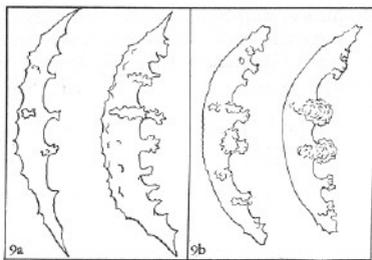
8a. Large, flexible, ostrich-plume colonies with long branchlets; very slimy in life. Anthocodial rods lacking: *Pseudopterogorgia americana* (Gmelin)



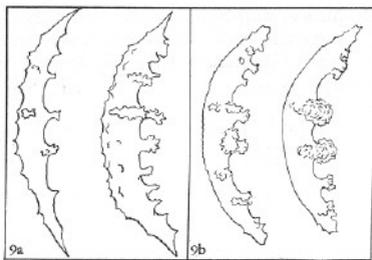
8b. Small, stiff, feather-like colonies with short branchlets; flat rods present in anthocodiae: *Pseudopterogorgia hummelincki* spec. nov.



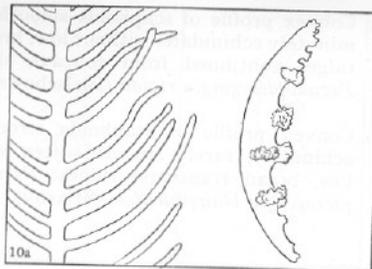
9a. Convex profile of scaphoids strongly echinulate. Branches flexible and slender, 0.5–0.75 mm. in width: 11



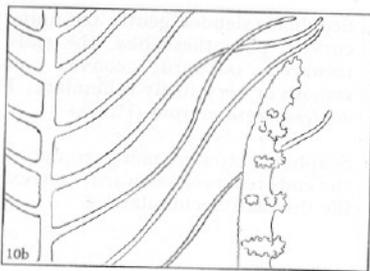
9b. Convex profile of scaphoids smooth or only weakly echinulate. Branches stouter, 1.5–2.0 mm. in width: 10



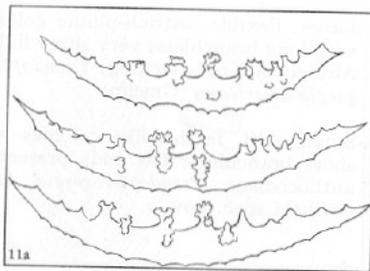
- 10a. Branchlets rather short, 3–4 cm., rather stiff. Scaphoids strongly curved. Colonies yellow or purple: *Pseudopterogorgia elisabethae* spec. nov.



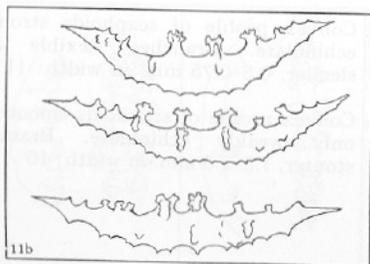
- 10b. Branchlets rather long, 6–10 cm., flexible. Scaphoids moderately curved. Colonies white: *Pseudopterogorgia albrossae* spec. nov.



- 11a. Curvature of scaphoids uniform, parenthesis-like, the ends not recurved outward: *Pseudopterogorgia navia* spec. nov.



- 11b. Many scaphoids more strongly bent near the ends, which are recurved outward: *Pseudopterogorgia hystrix* spec. nov.



71 *Pseudopterogorgia bipinnata* (Verrill), 1864

(Figs. 70–72; Pl. VIII fig. 3, XI fig. 1)

- Pterogorgia bipinnata* VERRILL 1864b, p. 31. (Cumaná, Venezuela.)
 not *Gorgonia bipinnata*, HARGITT & ROGERS 1901, p. 287, pl. 3 fig. 4. [= *Gorgonia mariae* spec. nov.]
 not *Pterogorgia bipinnata*, BIELSCHOWSKY 1918, p. 61. [= *Pseudopterogorgia acerosa* (Pallas).]
Pterogorgia antillarum BIELSCHOWSKY 1918, p. 61. (St. Thomas.)
 not *Pterogorgia bipinnata*, BIELSCHOWSKY 1929, p. 213, fig. 37, pl. 4 fig. 21. [= *Pseudopterogorgia acerosa* (Pallas).]
Pterogorgia antillarum, BIELSCHOWSKY 1929, p. 215, fig. 38, pl. 5 fig. 25. (St. Thomas.)
Pterogorgia bipinnata, DEICHMANN 1936, p. 195, pl. 21 figs. 1–16. (Marquesas, Florida; Cumaná, Venezuela.)
Pseudopterogorgia bipinnata, BAYER 1959, p. 20

Diagnosis. Colonies pinnately branched, chiefly in one plane, the secondary branches often branched to form bipinnate colonies. Twigs rather stiff, blunt, 25–40 mm. in length at full growth (longer than this, they bear lateral twigs), somewhat flattened, 1.0–1.5 mm. wide, straight or gently curved; almost invariably they are opposite, openly and quite uniformly spaced at intervals of about 5 mm. (4–8 mm.) and arising at angles of 60° to 70° with the main stems; a few twigs low in the colony may anastomose here and there. Polyps in a double row, commonly alternating, along each edge of the twigs, fully retractile and visible as small slits without any calycular prominence. Axis of main trunk more or less flattened in the plane of branching, longitudinally striated, brown in color; in the branches and twigs it becomes paler in color and very slender. Cortex consisting of an outer layer containing scaphoids up to 0.18 mm. in length, with the belts of tubercles fused to form collars on the convex side, as high as or higher than the unfused complicated tubercles on the concave side, and symmetrical, acute spindles up to 0.2 mm. in length; and an inner layer of spindles only. Anthocodiae with armature of large, flat rods with scalloped edges, 0.07–0.14 mm. in length, arranged 'en chevron' in the tentacle bases. Color usually violet, occasionally yellow or whitish; spicules clear violet, colorless, or pale yellow; anthocodial rods colorless.

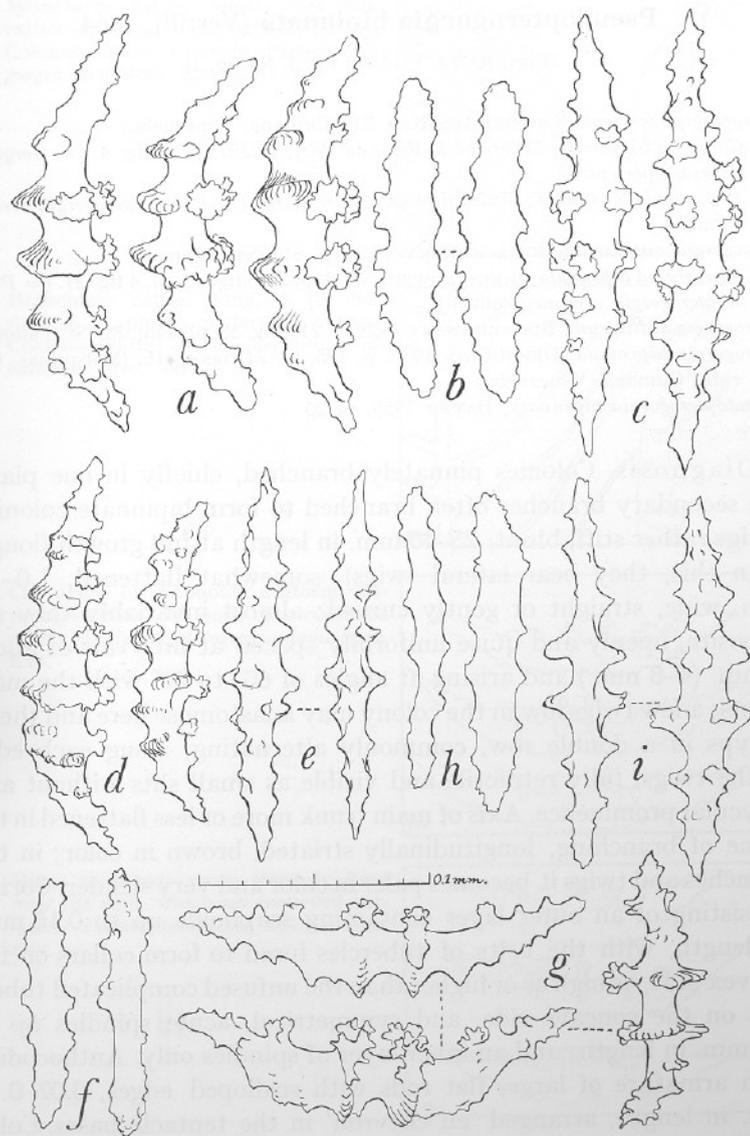


FIGURE 70. *Pseudopterogorgia bipinnata* (Verrill), spicules. *a-c*, of the holotype from Cumaná, Venezuela (MCZ 5080): *a*, scaphoids; *b*, anthocodial rods; *c*, spindles. *d-f*, of a specimen from Old Providence (USNM 44150): *d*, scaphoids; *e*, spindles; *f*, anthocodial rods. *g-i*, of a specimen from the Dry Tortugas (50249): *g*, scaphoids; *h*, anthocodial rods; *i*, spindles. (All figures drawn to the same scale).

Description. The holotype is a colony 22 cm. in height, lacking base, and 18 cm. in breadth (Pl. VIII fig. 3). It is spread in one plane and branched in a regular pinnate manner with the twigs arising from the stems at a wide angle (60° – 70°). Eight of the lateral branches from the main stem are much elongated and produce lateral branches to form a bipinnate colony. There are a few anastomoses among twigs in the lower part of the colony, but a reticulate network is not formed. The spicules are long, pointed scaphoids reaching a length of 0.18 mm., which show typical fusion of the warts on the convex side (Fig. 70 a). The deeper layer of cortex contains symmetrical spindles of acute, slender form (Fig. 70 c). The anthocodial rods are flat and have numerous marginal sinuosities (Fig. 70 b). The dry colony is violet in color.

Material. The holotype from VENEZUELA, Cumaná, collected by J. P. Couthouy, V. 1859 (MCZ 5080); one specimen from the MARQUESAS KEYS (MCZ 5082), two from the DRY TORTUGAS (MCZ 5083, USNM 50249), and several other USNM specimens from: FLORIDA KEYS (50214, 50239), BAHAMAS (14513, 50212, 50213, 50731), CUBA (50216), GRAND CAYMAN (51398), OLD PROVIDENCE (44149, 44150).

Distribution. The Bahamas, Florida Keys and Antilles, Caribbean islands, and northern coast of South America.

Remarks. There has been confusion in the literature regarding this species, partly because of its variability and partly because of erroneous determinations. The following notes on the variation of the specimens studied are presented to clarify the identity of the species and the limits of its variation.

USNM 14513 contains two colonies about 20 cm. in height. They are quite bushy in appearance because neither the main branches nor the simple branchlets remain in one plane. The branchlets are 1.5–1.75 mm. wide and reach a length of about 30 mm. before giving rise to secondary branchlets. The polyps are not arranged strictly in double rows, but in irregular multiple tracts along the sides of the branchlets. The scaphoids reach a length of 0.16 mm. and have rather low, thick collars on their convex side (Fig. 70 a); the symmetrical spindles reach 0.17 mm. and are not unusual in any way (Fig. 70 c); the anthocodial rods are large, up to 0.13 mm. in length, and closely resemble those of the type (Fig. 70 b). In alcohol the colonies are light reddish purple, the polyps appearing as small, creamy white spots.

USNM 44149 is a small fragment of a colony of slender growth form. The twigs, which are narrow, 1.0 mm. wide and up to 30 mm. long, are in one plane and 3–4 mm. apart. The polyps occur usually in a single row along the narrow edges of the twigs. The scaphoids are up to 0.13 mm. in length and have thick, often warty collars on the convex side (Fig. 72 j); the spindles are rather slender and attain a length of 0.18 mm. (Fig. 72 i); the anthocodial rods are unusually narrow and at

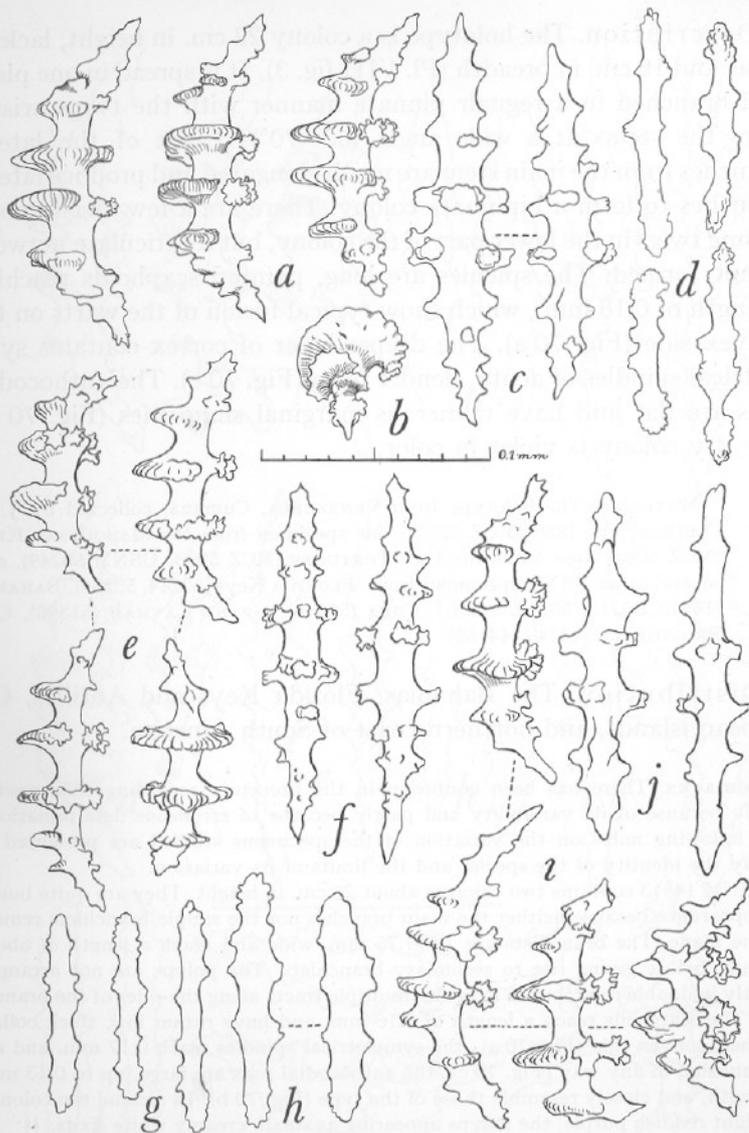


FIGURE 71. *Pseudopterogorgia bipinnata* (Verrill), spicules. *a-d*, of a specimen from Cuba (USNM 50216): *a*, scaphoids; *b*, end view of scaphoid; *c*, spindles; *d*, anthocodial rods. *e-g*, of a specimen from the Marquesas Keys (MCZ 5082): *e*, scaphoids; *f*, spindles; *g*, anthocodial rods. *h-j*, of a specimen from Nassau, New Providence (USNM 50212): *h*, anthocodial rods; *i*, scaphoids; *j*, spindles. (All figures drawn to the same scale.)

most 0.1 mm. long, with only moderate marginal lobulation. Colony pale violet in alcohol.

USNM 44150 is a single branch, very flexible and limber, about 13 cm. in length. It bears pinnate, opposite branches 30 mm. long at intervals of about 6 mm. The polyps occur in an open, alternating row along each side of the twigs. They are not fully retracted in preservation and thus are quite prominent, but they seem to have no well-formed calyces. The scaphoids reach a length of 0.17 mm. and have rather low, broad collars on the convex side (Fig. 70 d); the spindles are slender, acute, and about the same size as the scaphoids (Fig. 70 e); the anthocodial rods reach, or slightly exceed, 0.11 mm. The color of the specimen in alcohol is brownish white, but in life it apparently was green. The field label says: "Alcohol extracted the bright green color so rapidly this was at first glance taken to be an alga and was for a time kept in formalin." (W. L. SCHMITT.)

USNM 50212 is a flabellate branch with bipinnate ramification closely resembling the type specimen. It differs in having somewhat smaller scaphoids with strongly developed collars on the convex side (Fig. 71 i) and slightly smaller anthocodial rods (Fig. 71 h).

USNM 50213 is a tall and rather straggling colony with a stout main stem and several large branches. The unbranched lateral twigs reach a length of about 30 mm. before producing secondary twigs. The polyps are arranged in multiple rows along the two sides of the branchlets just as in 14513. The spicules include scaphoids up to 0.12 mm. in length, with thick collars; typical spindles up to 0.15 mm.; and anthocodial rods about 0.11 mm. long. The color in alcohol is light reddish purple, with the polyps appearing as white dots.

USNM 50214 is the largest specimen in the collection, a straggly but profusely branched colony about 45 cm. in height. Its branching is pinnate, with the twigs widely separated, usually 6 mm. apart but often as much as 15 mm. and occasionally 20-30 mm.; twigs 1.5-2.75 mm. wide and as much as 6 cm. long before producing secondary branchlets. The major branches are long and ascending, not in one plane. The scaphoids are at most 0.12 mm. in length, some with thick, coarse collars, some with thin, crest-like flanges on the convex surface (Fig. 72 e); the spindles also reach a length of about 0.12 mm. and are of typical form (Fig. 72 g); the anthocodial rods are small, at most 0.075 mm. in length, and broad (Fig. 72 d, h). Color of the dry colony, deep purple.

USNM 50216 is a broken colony 32 cm. tall, including base. It had several large lateral branches of which only one remains. Ramification is pinnate and the twigs are mostly in one plane, 5-6 mm. apart and up to 5.5 cm. in length before they produce secondary branchlets. The cortex is poorly preserved but the polyps seem to be in multiple lateral rows. In this specimen, the scaphoids, which are at most 0.15 mm. in length, have exceptionally high and crest-like collars around the convex side (Fig. 70 a); the symmetrical spindles reach a length of 0.18 mm. (Fig. 71 c); and the anthocodial rods 0.11 mm. (Fig. 71 d). The dry specimen is pale, cream-yellow.

MCZ 5082 is an extremely fragmentary specimen. Its scaphoids (Fig. 71 e) have strongly developed, crest-like collars similar to those of USNM 50212. The anthocodial rods are of similar size but more slender (Fig. 71 g). Color of the dry colony, pale violet.

MCZ 5083 is a small colony about 14 cm. in height, complete with base. It is branched up to the third order; the simple lateral twigs are slender, about 1.0 mm.

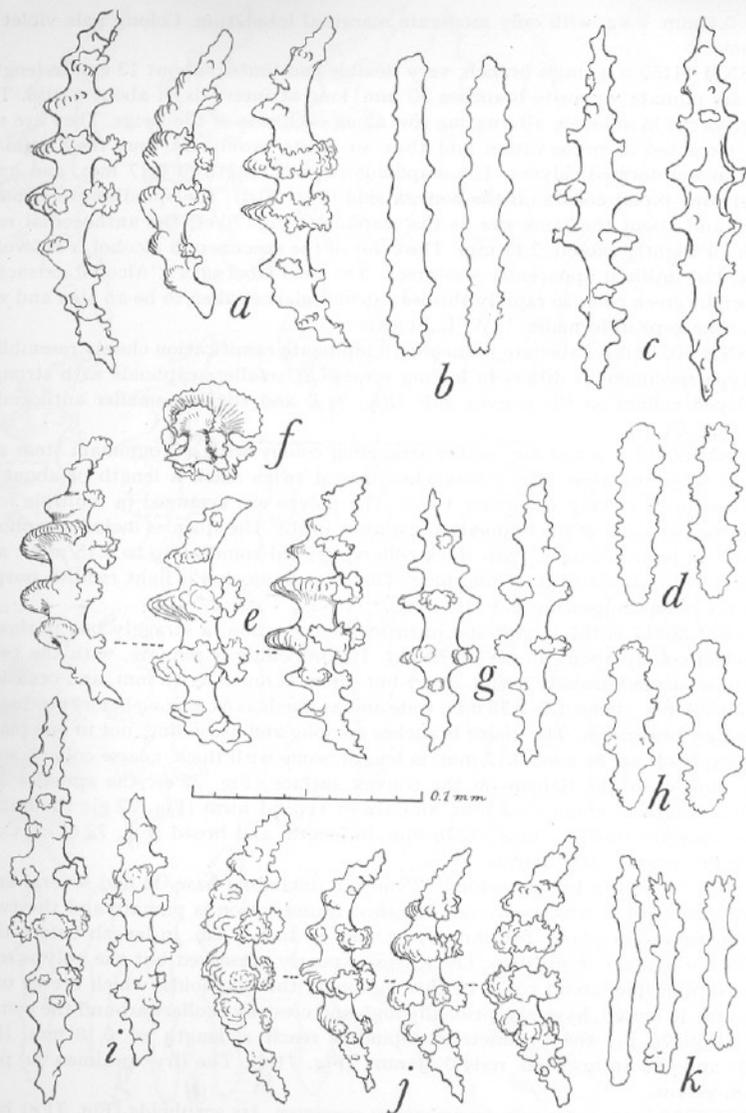


FIGURE 72. *Pseudopterogorgia bipinnata* (Verrill), spicules. *a-c*, of a specimen from Nassau (USNM 14513): *a*, scaphoids; *b*, anthocodial rods; *c*, spindles. *d-h*, of a specimen from off Rodriguez Key, Florida: *d* and *h*, anthocodial rods; *e*, scaphoids; *f*, end view of scaphoid; *g*, spindles. *i-k*, of a specimen from Old Providence (USNM 44149): *i*, spindles; *j*, scaphoids; *k*, anthocodial rods. (All figures drawn to the same scale.)

wide and up to 45 mm. long. The branchlets lie in one plane but a few of the larger branches stray from the principal plane of the colony. The scaphoids reach a length of 0.13 mm. and have thick collars on their convex side; the spindles are of typical form and reach a length of 0.15 mm. The anthocodial rods are up to 0.09 mm. long. The dry colony is yellowish white; the spicules are almost colorless.

72 ***Pseudopterogorgia kallos* (Bielschowsky), 1918**

(Fig. 73)

Pterogorgia kallos BIELSCHOWSKY 1918, p. 62.

Pterogorgia kallos, KÜENTHAL 1919, p. 919. (Tortugas, Bird Key Riff in 22-23 m. Tiefe.)

Pterogorgia kallos, BIELSCHOWSKY 1929, p. 217, fig. 39, pl. 4 fig. 22. (Tortugas, Bird Key Riff.)

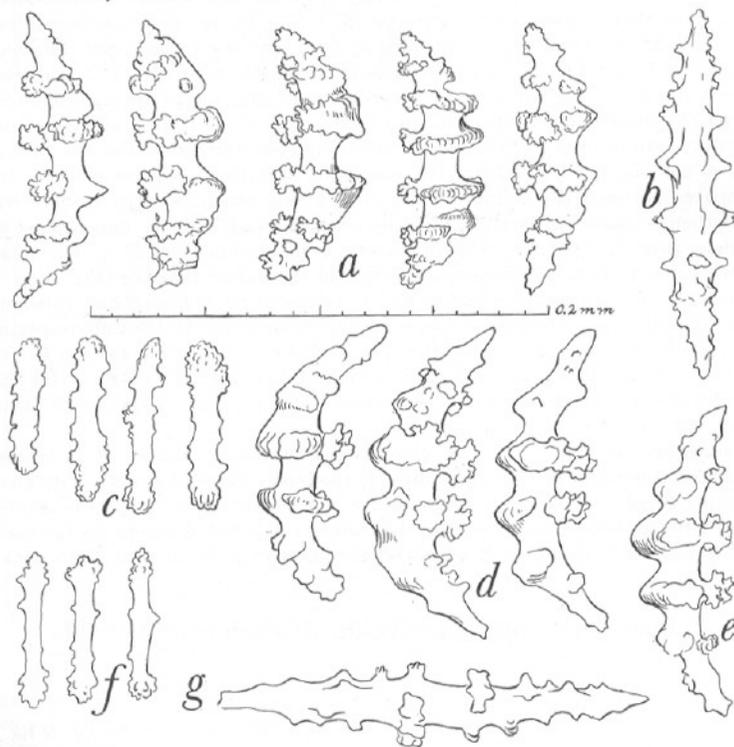


FIGURE 73. *Pseudopterogorgia kallos* (Bielschowsky), spicules. *a-c*, of a specimen from Florida (USNM 50215): *a*, scaphoids; *b*, spindle; *c*, anthocodial rods. *d-g*, of a specimen from Cuba (MCZ 3981): *d-e*, scaphoids; *f*, anthocodial rods; *g*, spindle. (All figures drawn to the same scale.)

Diagnosis. Plumose colonies with crowded branchlets not strictly in one plane and arising at an angle of 45° or less. Scaphoids commonly with the space between the transverse crests of the convex side filled in. Anthocodial rods narrow, up to 0.08 mm. long.

Material. A fragmentary specimen from FLORIDA, probably from the vicinity of Miami at Bache Shoal or Triumph Reef (USNM 50215), and a fragment from CUBA, probably north coast (MCZ 3981).

Distribution. Florida Keys, Dry Tortugas, and Cuba.

Remarks. The West Indian collections that I have examined contain two specimens of this species, one from Florida and one from Cuba. They are alike in their plumose form, with the twigs more closely spaced (4 mm. or less) than in *P. bipinnata*, not strictly in one plane, not strictly opposite, and ascending more sharply (45° or less) than is usual in *P. bipinnata* (55° – 70°). In the specimen from Florida, some of the unbranched twigs are as long as 7 cm., but 3–4 cm. is usual. The longest unbranched twigs of the Cuban specimen are about 4.5 cm., with 2.5–3.5 cm. usual. In both specimens the twigs are nearly cylindrical, the polyps arranged bilaterally in multiple series separated by a narrow naked tract along front and back of twigs. No calyces are formed and the polyps are completely retracted. The spiculation of the two colonies is very similar. The scaphoids of both show a tendency to fill in the spaces between the collars of the convex side except for the median waist, giving them a coarse appearance. They are at most about 0.14 mm. long in the Cuban specimen (Fig. 73 d, e), 0.13 mm. in the one from Florida (Fig. 73 a). The spindles of both agree in form, but are slightly larger in the Cuban example (Fig. 73 g). The anthocodial rods are small, slender, and have distinctly enlarged and tuberculate ends, a condition not observed in the material of *bipinnata*. In the Cuban specimen, which has larger cortical sclerites, the anthocodial rods (Fig. 73 f) reach a length of 0.068 mm.; in the Floridian specimen they may be as long as 0.075 mm. (Fig. 73 c). The Cuban specimen is yellow, the one from Florida grayish brown with purplish tinges; both are dry.

Pseudopterogorgia kallos is very close to the shrubby examples of *P. bipinnata* but can, in summary, be recognized by: (1) the bushy habit of growth, with steeply ascending twigs not strictly in one plane and not always opposite; (2) the scaphoids with the spaces between the crests of the convex side filled in except for the median constriction; and (3) the short anthocodial rods with noticeably clubbed ends.

73 ***Pseudopterogorgia rigida* (Bielschowsky), 1929**

(Fig. 74; Pl. IX fig. 1)

Pterogorgia acerosa, var. *rigida* BIELSCHOWSKY 1929, p. 212, fig. 36, pl. 5 fig. 24. (Kingston, Jamaica; Barbados.)

Pterogorgia americana, DEICHMANN 1936, p. 196, pl. 21 figs. 29–32. (Florida.)
not *Gorgonia americana* Gmelin 1791, p. 3799.

Antillogorgia americana, BAYER 1952, p. 185. (Big Marco Pass, Florida.)

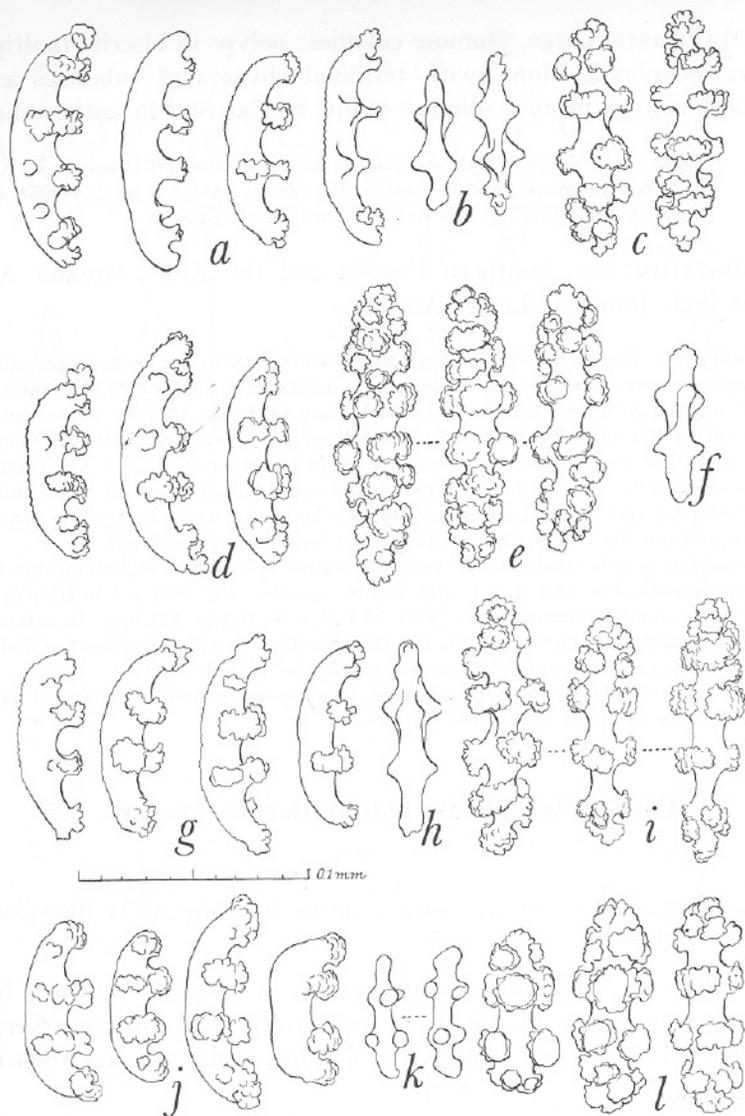


FIGURE 74. *Pseudopterogorgia rigida* (Bielschowsky), spicules. a–c, of a specimen from southwest Florida (USNM 44225): a, scaphoids; b, octoradiate rods from polyps; c, spindles. d–f, of a specimen from Biscayne Key (50210): d, scaphoids; e, spindles; f, octoradiate rod from polyp. g–i, of a specimen from the Dry Tortugas: g, scaphoids; h, octoradiate rod from polyp; i, spindles. j–l, of a specimen from Cuba (50209): j, scaphoids; k, octoradiate rods from polyps; l, spindles. (All figures drawn to the same scale.)

Diagnosis. Large, plumose colonies; polyps in biserial multiple rows. Scaphoids blunt, with terminal clusters of tubercles and smooth convex profile; spindles blunt; no flat rods in anthocodiae.

Material. Single USNM specimens: from FLORIDA, off Biscayne Key, in 16-34 feet of water (50210); west of Big Marco Pass, 6.5 fms. (44225); the DRY TORTUGAS (50211); and CUBA, Tarara Beach (50209).

Distribution. Southern Florida and the Keys; Greater Antilles incl. Jamaica; Lesser Antilles.

Remarks. This is the species that Miss DEICHMANN in her monograph called *Pterogorgia americana*. She has subsequently suggested to me (*in litt.*) that the real *americana*, based upon ELLIS & SOLANDER's plate 14, figure 3 (1786), is the species with rather flat branchlets, often exsert polyps, and acute, echinulate scaphoids, and, with Miss DEICHMANN's permission, I adopt that treatment here. The present species, which has smooth, blunt scaphoids and round branchlets was first recognizably described and figured by BIELSCHOWSKY under the name *Pterogorgia acerosa* var. *rigida* and that name, elevated to specific rank, is here employed.

Pseudopterogorgia rigida has a very distinctive spiculation including smooth, blunt scaphoids (Fig. 74 a, d, g, j) and stubby spindles (Fig. 74 c, e, i, l). Its polyps have a few small octoradiate rods (Figs. 74 b, f, h, k) but no flat rods. In external form the colonies are quite variable, but the branchlets usually are almost cylindrical, with the polyps in multiple rows along the sides (Pl. IX fig. 1).

This appears to be an uncommon species. It is not represented in material I have seen from the southern part of the Antilles.

74 *Pseudopterogorgia blanquillensis* (Stiasny), 1941

(Fig. 75 a-c)

Pterogorgia blanquillensis STIASNY 1941d, p. 113, fig. D, pl. 2 figs. 13-14. (Blanquilla, Porto del Jaque.)

Diagnosis. Plumose colonies; polyps in single or multiple bilateral rows. Scaphoids blunt, convex profile with low, transverse ridges and commonly echinulate; spindles blunt; no flat rods in anthocodiae.

Material. A fragment of the type, from BLANQUILLA, Playa del Jaque, sandy debris, 4 m. deep, sta. 1213, 22.VII.1936 (Leiden Museum).

Remarks. In spiculation, *Pseudopterogorgia blanquillensis* with its blunt spindles and scaphoids with warty ends resembles *P. rigida*, of which it may prove to be a synonym. The colonies are typical 'ostrich plumes' with branchlets up to 12 cm.

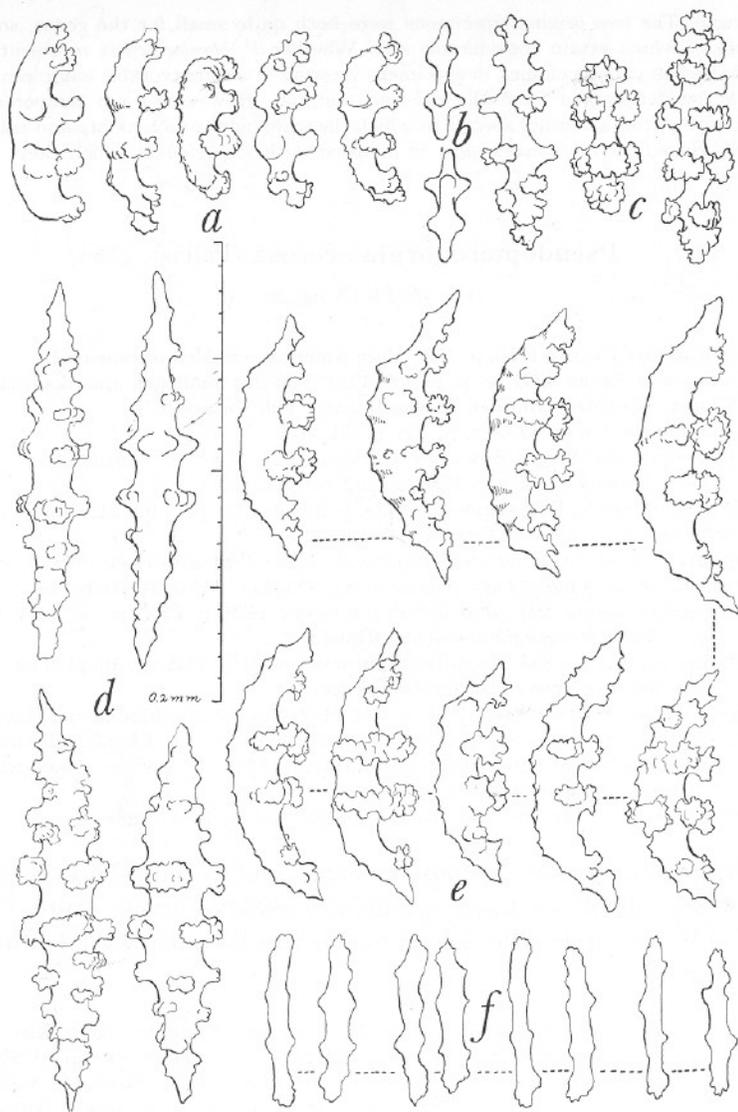


FIGURE 75. *Pseudopterogorgia blanquillensis* (Stiasny), spicules of the holotype from Blanquilla (Leiden Museum); a, scaphoids; b, octoradiate rods from polyps; c, spindles. *Pseudopterogorgia hummelincki* spec. nov., spicules of the holotype from Anguilla (USNM 50203): d, spindles; e, scaphoids; f, anthocodial rods. (All figures drawn to the same scale.)

in length. The two original specimens were both quite small for the genus, some species of which attain considerable size. Whether *P. blanquillensis* represents a small species, young colonies, or specimens growing in an unfavorable environment cannot be determined from the existing material. However, I am temporarily maintaining it as a distinct species in which the scaphoids are echinulate and transversely ridged on the convex side, in contrast with *P. rigida* in which they are smooth.

75 *Pseudopterogorgia acerosa* (Pallas), 1766

(Fig. 76; Pl. IX fig. 3)

- Gorgonia acerosa* PALLAS 1766, p. 172. (Mare Americanum, Mediterraneum.)
Gorgonia setosa ESPER 1791, 2, p. 66, pl. 17. ("Von den südlichen amerikanischen Küsten, besonders von den Inseln Jamaica und Curassao.")
Gorgonia acerosa, ESPER 1792, 2, p. 106, pl. 31.
Pterogorgia pinnata, MILNE EDWARDS & HAIME 1857, 1, p. 168. (Antilles.)
 not *Gorgonia pinnata* LINNAEUS 1758, p. 802. (O. Asiatico.)
Pterogorgia bipinnata, BIELSCHOWSKY 1929, p. 213, fig. 37, pl. 4 fig. 21. (Barbados.)
 not *Pterogorgia bipinnata* VERRILL 1864b, p. 31.
Pterogorgia acerosa, forma *typica* and forma *arbuscula* BIELSCHOWSKY 1929, p. 209, figs. 32-34, pl. 4 figs. 19-20. (Kingston, St. Thomas, Tortugas, Barbados.)
 not *Pterogorgia acerosa*, var. *elastica* BIELSCHOWSKY 1929, p. 210, fig. 35, pl. 5 fig. 23. [= *Pseudopterogorgia americana* (Gmelin).]
 not *Pterogorgia acerosa*, var. *rigida* BIELSCHOWSKY 1929, p. 212, fig. 36, pl. 5 fig. 24. [= *Pseudopterogorgia rigida* (Bielschowsky).]
Pterogorgia acerosa, DEICHMANN 1936, p. 198, pl. 21 figs. 17-20. (Florida and Hayti.)
Pterogorgia ellisiana, DEICHMANN 1936, p. 199, pl. 21 figs. 21-24. (Florida and Cuba.)
 not *Pterogorgia ellisiana* MILNE EDWARDS & HAIME 1857, 1, p. 169. [= *Pseudopterogorgia americana* (Gmelin).]
Pterogorgia acerosa, var. *elastica*, STIASNY 1941d, p. 112. (Los Frailes.)

Diagnosis. Large, plumose colonies; surface not slimy in life. Scaphoids smooth or finely echinulate, weakly curved, acute, less than 0.18 mm. in length; spindles acute; anthocodiae with delicate, flat rods.

Material. From Dr. Hummelinck's collection: CURAÇAO, Knip Baai, on perpendicular cliff, 1 m., sta. 1017, 8.I.1949, specimen in alcohol (USNM 50447). Santa Marta Bay, sandy bottom, 3.4 m., J. H. Stock, 12.X.1958 (Amsterdam). Piscadera, inner bay near turtle hatchery, sandy bottom, 3 m., J. H. Stock, 6.I.1959 (51305; Amsterdam). Valentijnbaai, 4 m., J. H. Stock, 2.XII. 1958 (51306; Amsterdam). BONAIRE, Kralendijk, Hotel Zeebad, sandy coral debris, 2.5 m., 24.II.1949, dry spec. (USNM 50208) and 2 branches in alc. (USNM 50449); 4 m., 12.IV.1955, dry colony (USNM 51313). LOS FRAILES, Puerto Real, sandy debris, 3-4 m., sta. 1214, 18.VI. 1936, dry fragments, part of the material studied by Stiasny (1941, p. 112)

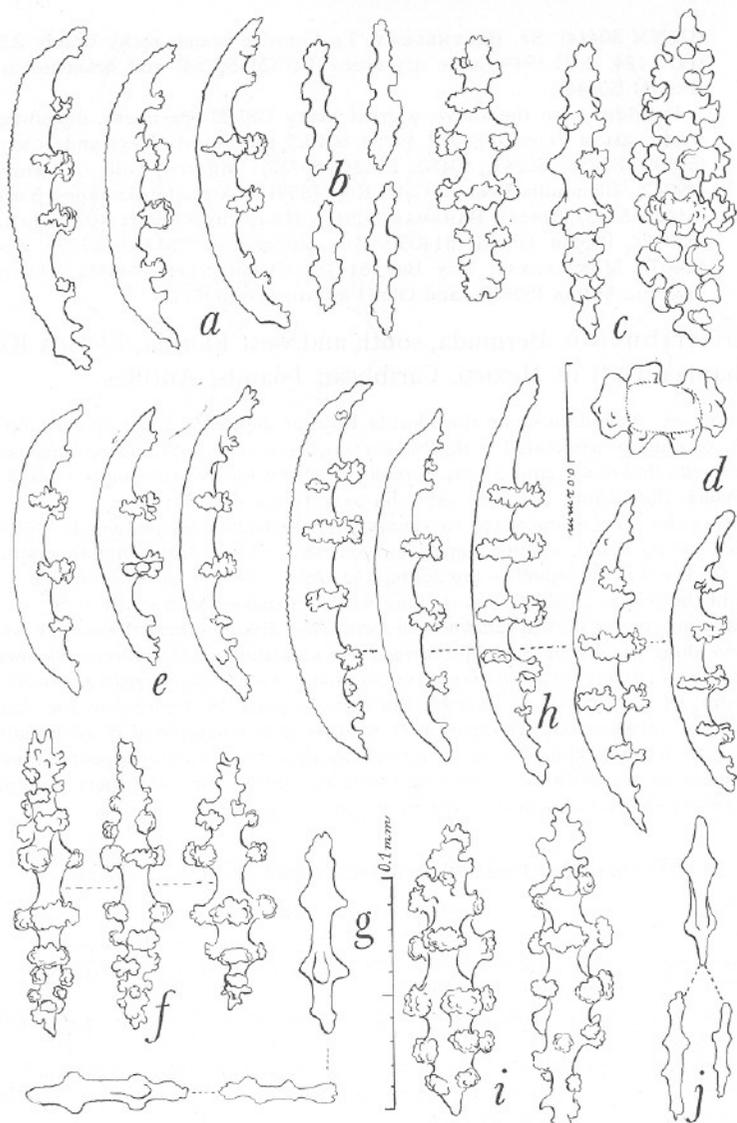


FIGURE 76. *Pseudopterogorgia acerosa* (Pallas), spicules. *a-d*, of a specimen from Bonaire (USNM 50208): *a*, scaphoids; *b*, anthocodial rods; *c*, spindles; *d*, single tubercle of spindle. *e-g*, of a specimen from Caesar's Creek, Florida (53614): *e*, scaphoids; *f*, spindles; *g*, flat rod and octoradiate rods from anthocodiae. *h-j*, of a specimen from the west coast of Florida (6914): *h*, scaphoids; *i*, spindles; *j*, octoradiate rods and flat rods from anthocodiae. (All figures drawn to the same scale except *d*, to which the 0.02 mm. scale applies.)

(USNM 50414). ST. BARTHÉLEMY, La Fourche island, rocky beach, 2.5 m., sta. 1124, 2.VI.1949, large dry spec. (USNM 50754) and branches in alc. (USNM 50446).

In addition to the above, a great many USNM specimens, including the west coast of FLORIDA (6914, 49754, 50402), the Florida Keys and TORTUGAS (50097, 50236, 50241, 50450, 50674, 50732); MEXICO, Gulf of Campêche (49942), Blanquilla Reef off Cabo Rojo (50917), Arrecife Alacranes, Yucatan (51436, 51437, 51461); BAHAMAS (50547); HISPANIOLA, Haiti (4075); JAMAICA (33099), Pigeon Island (51400), Port Royal Cays (51363, 51399, 51401-51403); MONTSERRAT, Fox Bay (51418); GUADELOUPE (44055); DOMINICA (50335); ARUBA (50658), and OLD PROVIDENCE (33617).

Distribution. Bermuda, south and west Florida, Florida Keys, Bahamas, Gulf of Mexico, Caribbean Islands, Antilles.

Ecology. Abundant along the Florida Keys at depths of 3 feet or more (at low tide); commonly associated with *Pseudopterogorgia americana*, *Pterogorgia anceps*, *Plexaurella dichotoma*, and *Muricea atlantica*. Often host of the snails *Simnia* and *Cyphoma*, the shrimp *Tozeuma*, and the basket-star *Astrophyton*.

Remarks. This is one of the two common West Indian sea-plumes. It is characterized by its acute, slender, gently curved, smooth or nearly smooth scaphoids (Fig. 76 a, e, h). The spindles are acute (Fig. 76 c, f, i), and there are delicate, flat rods in the polyps (Fig. 76 b, g, j) along with the sparse, octoradiate rods.

Many specimens show a tendency to form long, drooping branchlets very widely spaced along the stems. Such specimens were identified as *Pterogorgia ellisiana* by DEICHMANN (1936), but *P. ellisiana* is synonymous with *Pseudopterogorgia americana* (Gmelin) as the citation of ELLIS & SOLANDER's plate 14, figure 3 in the original synonymy suggests. An examination of spicules from a sample of *P. ellisiana* that KÖLLIKER sent to VERRILL from Paris confirms this view. The more openly branched specimens seem to differ in no essential from the denser ones, and there is no justification for retaining names for the many small variations.

76 *Pseudopterogorgia americana* (Gmelin), 1791

Fig. 77; Pl. IX fig. 2, XIX)

Gorgonia pinnata, ELLIS & SOLANDER 1786, p. 87, pl. 14 fig. 3. (West Indies.)

not *Gorgonia pinnata* LINNAEUS 1758, p. 802.

Gorgonia americana GMELIN 1791, p. 3799. (Habitat in mari Americano medium alluente frequens.)

Pterogorgia ellisiana MILNE EDWARDS & HAIME 1857, 1, p. 169. (Guadeloupe.)

not *Pterogorgia americana*, DEICHMANN 1936, p. 196, pl. 21 figs. 29-32. [= *Pseudopterogorgia rigida* (Bielschowsky).]

Diagnosis. Large, plumose colonies; surface very slimy in life. Scaphoids strongly curved, the sharp ends often recurved outward, convex profile distinctly echinulate; spindles acute; no flat rods in anthocodiae.

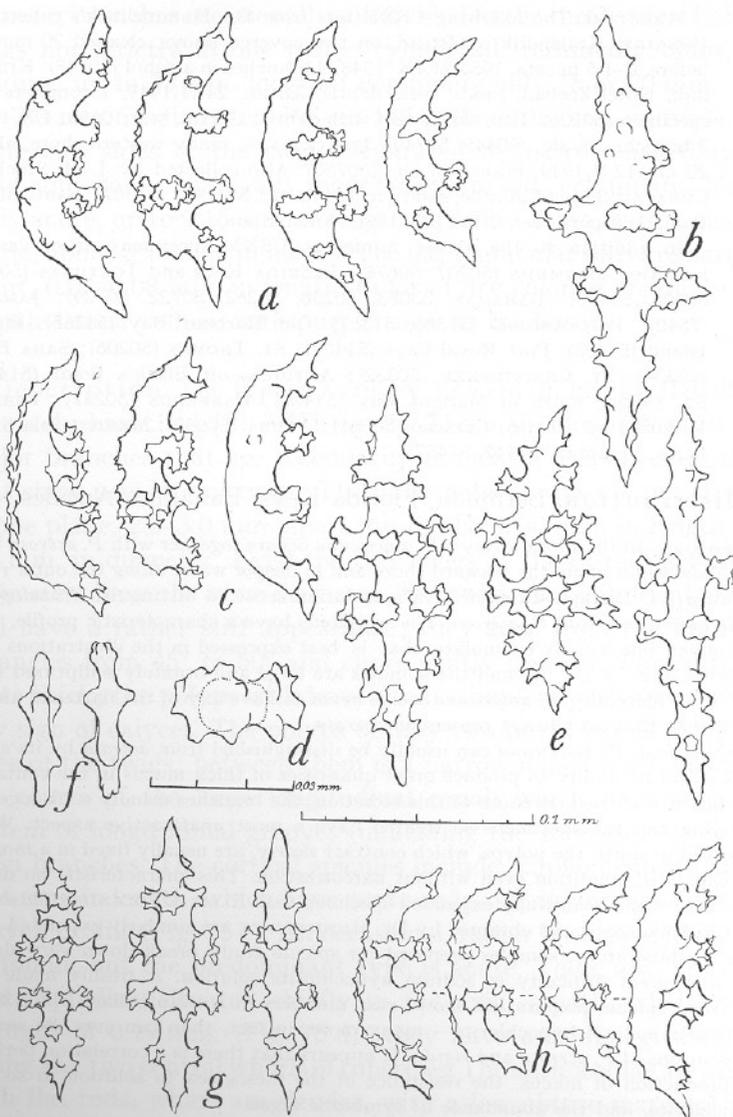


FIGURE 77. *Pseudopterogorgia americana* (Gmelin), spicules. a-b, of a specimen from Bermuda (USNM 50207): a, scaphoids; b, spindle. c-e, of a specimen from Bonaire (50206): c, scaphoids; d, tubercle of scaphoid; e, spindles. f-h, of a specimen from St. Thomas (50205): f, octoradiate rods from polyps; g, spindles; h, scaphoids. (All figures drawn to the same scale except d, to which the 0.03 mm. scale applies.)

Material. The following USNM lots from Dr. Hummelinck's collection: BONAIRE, Kralendijk roadstead, on two covered buoys, cleaned 20 months before, 0-1.5 m., sta. 1053, 21.IX. 1948, 4 branches in alcohol (50748). Kralendijk, Hotel Zeebad, sandy coral debris, 2.5 m., 24.II.1949, 1 complete dry specimen (50206). Lac, sandy reef with debris, 1-2 m., sta. 1068a, 1.X.1948, 3 branches in alc. (50445, 50749). ISLOTE AVES, sandy western shore, about 20 m., 12.V.1949, branch in alc. (50750). Also collected by J. H. Stock on CURAÇAO: Playa Chikitoe, sandy reef, 4 m., 23.XI.1958 (51307); Santa Marta Baai, Acropora reef, 3 m., 8.X.1958 (Amsterdam).

In addition to the above, numerous USNM specimens, from various localities: BERMUDA (50207, 50676); FLORIDA Keys and TORTUGAS (50391, 50608, 50673); BAHAMAS (33053, 50238, 50262, 50722, 50729); JAMAICA (7540), Port Antonio (51366, 51367), Old Harbour Bay (51365), Pigeon Island (51405), Port Royal Cays (51404); ST. THOMAS (50205); SABA Bank (50334); ST. CHRISTOPHER (50332); ANTIGUA, off Black's Point (51421); ST. LUCIA, south of Marigot Bay (51420); BARBADOS (50237); TOBAGO, Milford Bay (51419); Curaçao (50661); ARUBA (50662); MEXICO, Isla Sacrificios, Veracruz (51442, 51457).

Distribution. Bermuda, Florida Keys, Bahamas, Antilles.

Ecology. In the Florida Keys, *P. americana* occurs together with *P. acerosa* both in shallow water along the seaward shore and in deeper water along the outer reefs.

Remarks. Distinct differences in spiculation serve to distinguish *Pseudoptero-gorgia americana* from *P. acerosa*. The scaphoids have a characteristic profile, with the convex side usually echinulate, that is best expressed in the illustrations given herewith (Fig. 77 a, c, h), and the spindles are large and ornately sculptured (Fig. 77 b, e, g). Moreover, *P. americana* seems never to have any of the flattened anthocodial rods that are always present in *acerosa*.

In the field, *P. americana* can usually be distinguished from *acerosa* by its slimy surface and its ability to produce great quantities of thick mucus in the container in which it is carried. Because of this secretion, the branches usually stick together in drying and the specimens so treated have a most unattractive aspect. When preserved in spirit, the polyps, which contract slowly, are usually fixed in a more or less expanded condition even without narcotization. This characteristic no doubt accounts for the beautifully expanded specimen that ELLIS & SOLANDER illustrate. The alcoholic specimens obtained by Dr. HUMMELINCK are similarly expanded.

In the laboratory, samples prepared for spicule study break down very slowly and with great difficulty in sodium hypochlorite solution. A freshly made and unwashed spicule preparation shows vast numbers of zooxanthellae, which resist solution in sodium hypochlorite - many more, in fact, than can ever be seen in preparations of *P. acerosa* and *rigida*. It appears that there is a correlation between the production of mucus, the resistance of the mesogloea to solution in sodium hypochlorite, and the abundance of symbiotic algae.

77 *Pseudoptero-gorgia hummelincki* spec. nov.

(Fig. 75 d-f; Pl. VIII figs. 4-5)

Diagnosis. Colonies small, spread in one plane; branching

pinnate; branches occasionally subdivided to the third order. Lateral twigs not strictly in one plane, cylindrical, terminally blunt, ascending, up to 30 mm. long but commonly only 15 or 20 mm., and 1.5-2.0 mm. in diameter. Polyps fully retractile, in a multiple row along two sides of the twigs, separated by narrow naked tracts front and back. Scaphoids moderately curved, echinulate, terminally acute, up to 0.15 mm. in length. Spindles acute, with a median girdle, about 0.19 mm. in length. The flat tentacular rods are narrow, blunt, 0.07-0.08 mm. in length. Color of dry colonies creamy white or pale lemon yellow, with purple tinge at the base.

Description. The type is a colony 12.5 cm. in height, flabellate, pinnately branched (Pl. VIII fig. 5). The main stem gives off five major branches that are secondarily branched, and several others that show new lateral twigs. The unbranched twigs are not strictly in one plane, 2.5-3.0 mm. apart, up to about 30 mm. in length and 2.0 mm. in diameter. Even the tiny twigs at the distal part of the main stem have the same diameter. The twigs are cylindrical, blunt, and have a rather stiff appearance; they arise from the branches at angles from 45° to 50° and curve gently upward. The cortex is quite thick; the polyps withdraw into it completely without leaving any sign of calyces. The polyps occupy two broad bands along the sides of the twigs; between them is a narrow naked tract (marking the course of the large longitudinal canal) which joins with the system of longitudinal grooves (indicating the stem canals) on the main branches. The cortical spicules include scaphoids up to about 0.14 mm. in length, which have acute ends and distinctly echinulate convex profile (Fig. 75 e). An occasional, rather blunt scaphoid may be found, but the predominant type is acute. There also are long, acute spindles, situated chiefly in the axial sheath, which reach a length of 0.19 mm. (Fig. 75 d); they have a median girdle separating the two central whorls of tubercles. The anthocodiae are armed with flat rods, which are slender, with a few obtuse marginal processes (Fig. 75 f). The cortical spicules are pale yellow or colorless; part of those in the axial sheath are violet. The colony is pale lemon yellow, tinged with violet at the base.

A paratype from the same station is like the holotype in all essential

features. It is 20 cm. tall, spread in one plane, with short lateral twigs of the same size and interval as in the holotype and likewise not strictly in one plane. Some of the lateral twigs have developed into strong branches with pinnate twigs of their own. The spiculation is identical with that of the type. The colony is cream white, tinged with violet toward the base.

Material. ANGUILLA, Upper Prickly Pear Island, P. Wagenaar Hummelinck coll., 17.VI.1949 (holotype, USNM 50203, paratype 50204).

Distribution. Known only from the type locality.

Remarks. In growth form, *Pseudopteroorgia hummelincki* resembles the *bipinnata* group of species but may readily be distinguished from them by the scaphoids, which lack any trace of high, transverse crests around the convex side. The spicules of *P. hummelincki* are similar to those of *americana*, which has quite a different growth form.

78 *Pseudopteroorgia elisabethae* spec. nov.

(Fig. 78; Pl. VIII fig. 2)

not *Pterogorgia bipinnata*, var. *sparsiramosa* BIELSCHOWSKY 1929, p. 215, pl. 5 fig. 26. [= *Pseudopteroorgia acerosa*.]
Pterogorgia sparsiramosa, DEICHMANN 1936, p. 197. (West Indies.)

Diagnosis. Colonies pinnately branched; twigs in one plane, 3.5 to 10 mm. apart (average, 6 mm.), flattened, 5 cm. long and 1.5–2.0 mm. wide, the polyps in single or alternating double series along the edges. Scaphoids coarsely pointed, smooth or slightly echinulate on the convex profile, often with a median waist, reaching a length of 0.225 mm.; spindles up to 0.24 mm.; anthocodial rods 0.18 mm.

Description. The holotype is a complete colony 26 cm. tall. The main stem, which is 4 mm. in maximum diameter, gives off several lateral branches, some of them stunted, some of ordinary length, and two large ones that are further subdivided and form the major part of the colony (Pl. VIII fig. 2). The simple lateral twigs, which arise roughly in one plane, are flattened, about 2 mm. wide and as much as 5 cm. long; they originate at angles of from 40° to 45°, at intervals of 5–10 mm. The polyps are arranged chiefly

in double rows along the two edges of the branches, becoming uniserial only near the twig tips. The cortex contains coarsely pointed scaphoids with smooth or slightly echinulate convex profile, that reach or somewhat exceed a length of 0.2 mm. (Fig. 78 a). There

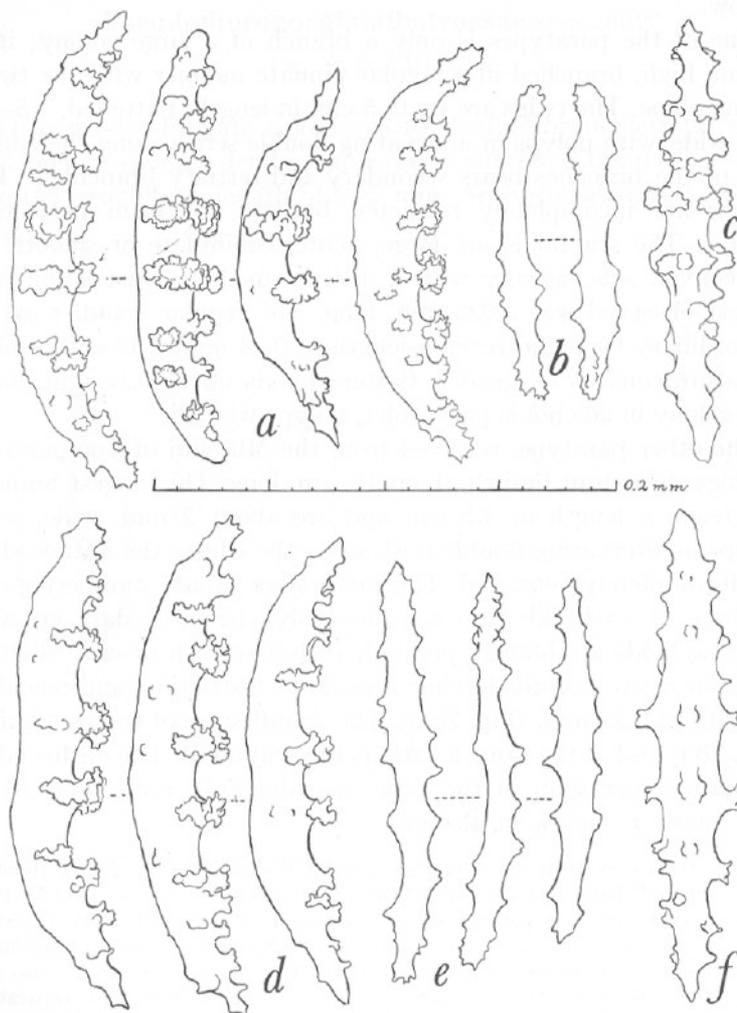


FIGURE 78. *Pseudopteroorgia elisabethae* spec. nov., spicules. a-c, of the holotype from Cuba (USNM 34679): a, scaphoids; b, anthocodial rods; c, spindle. d-f, of a paratype (50068): d, scaphoids; e, anthocodial rods; f, spindle. (All figures drawn to the same scale.)

are also simple spindles of the usual type (Fig. 78 c). The anthocodiae have a good armature of flat rods up to 0.14 mm. long (Fig. 78 b). The color of the colony in alcohol is deep cadmium yellow; the axis is nearly black in the older parts; spicules pale yellow.

One of the paratypes is only a branch of a large colony; it is 10 cm. high, branched in a regular pinnate manner with the twigs in one plane. The twigs are up to 5 cm. in length, flattened, 1.5–2.0 mm. wide, with polyps in alternating double series along the edges. One of the branches bears secondary and tertiary branchlets. The polyps are incompletely retracted but do not form projecting calyces. The scaphoids are large, acute, echinulate or smooth on the convex side, usually with a distinct median constriction, the largest observed was 0.025 mm. long. The regular spindles are of the ordinary type and reach a length of 0.24 mm. The anthocodial armature consists of slender, flattened rods up to 0.15 mm. long. The colony in alcohol is pale violet, polyps whitish.

The other paratype, received from the Museum of Comparative Zoölogy, is a stout branch about 15. cm. long. The longest branchlets reach a length of 4.5 cm. and are about 2 mm. wide, with polyps in alternating double rows along the edges; the anthocodiae are incompletely retracted. The main stem canals, numbering one to three on each side, are conspicuously visible as dark streaks. The scaphoids are bluntly pointed, with a smooth or only slightly irregular convex profile having a median constriction, and reaching a length of 0.22 mm. (Fig. 78 d). The spindles are of the usual kind (Fig. 78 f) and of the same length as the scaphoids. The anthocodial rods are larger than in the type, reaching 0.18 mm. (Fig. 78 e). The colony is yellow in alcohol.

Material. Holotype from CUBA, Bahia Honda, 2–12 fms., J. B. Henderson and Paul Bartsch coll., Tomas Barrera Exp., sta. 15, 4–5.VI.1914 (USNM 34679). A paratype from FLORIDA, east of Cape Florida, Biscayne Key, 30 fms., F. M. Bayer, 29.II.1948 (USNM 50235); one dry specimen from NEW PROVIDENCE, Conrad Limbaugh, 1956 (USNM 50560); also one specimen labelled 'West Indies', received from the Museum of Comparative Zoölogy (MCZ 5083) through the kindness of Dr. Elisabeth Deichmann (USNM 50068).

Distribution. Bahamas, Florida Keys; Cuba.

Remarks. The distinguishing features of *Pseudopterogorgia elisabethae* are its short, stout branchlets, large, moderately pointed scaphoids with nearly or quite smooth convex surface, and large anthocodial rods. The colonies may be either yellow or purple.

79 ***Pseudopterogorgia albatrossae* spec. nov.**

(Fig. 79; Pl. VIII fig. 1)

Diagnosis. Pinnate colonies with flexible branchlets up to 12 cm. long. Scaphoids slender, moderately curved, echinulate, bluntly pointed, reaching a length of 0.25 mm. Anthocodial rods 0.15 mm. long.

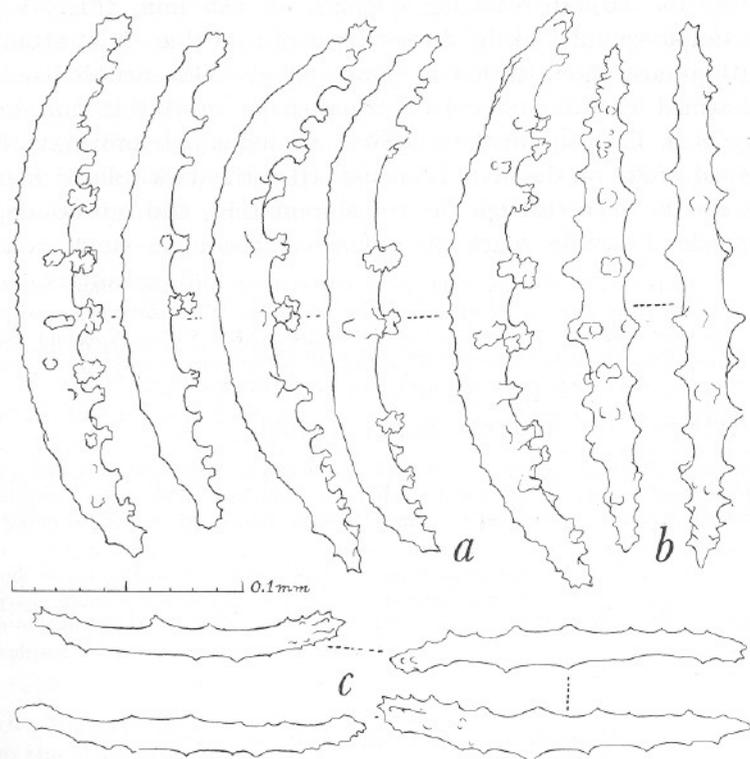


FIGURE 79. *Pseudopterogorgia albatrossae* spec. nov., spicules of the holotype from between Jamaica and Haiti (USNM 50233): a, scaphoids; b, spindles; c, anthocodial rods. (All figures drawn to the same scale.)

Description. The type is a complete colony about 40 cm. tall. The main trunk, which has a maximum diameter of about 5 mm. just above the base, is rather short and crooked, evidently deformed. The major part of the colony derives from two of the lateral branches, which have numerous long, flexible pinnate branches arising in one plane. These are mostly 5–15 mm. apart, 2 mm. wide, and as much as 12 cm. long; they are long and drooping, and the upper part of the colony is generally quite supple. The polyps are fully retractile but are preserved more or less exsert over most of the colony so that there appear to be calyces in an irregularly alternating double row along each edge of the branchlets. The cortex contains long, arcuate scaphoids with moderately echinulate convex profile, the largest reaching a length of 0.25 mm. (Fig. 79 a). The simple spindles of the deeper layer of rind (Fig. 79 b) attain a length almost equal to that of the scaphoids. The anthocodiae are well-armed with flat rods of the usual shape, up to 0.15 mm. long (Fig. 79 c). The color of the colony in alcohol is pale brown, with a tinge of violet on the main branches. Here the dark colored horny axis can be seen through the translucent rind, and several dark, longitudinal streaks mark the course of the main stem canals.

Material. Holotype, from the north end of Albatross Bank between JAMAICA and Haiti, 17°44'05" North, 75°39'00" West, 23 fms., coral and broken shell, *Albatross* sta. 2138, 29.II.1884 (USNM 50233). A second specimen from the same station (USNM 50234). A third one from ST. JOHN, outer ridge 6 mi. s.e., 200 feet, T. Chess, 13.I.1960 (USNM 51750).

Distribution. Albatross Bank; St. John.

Ecology. The type specimen is infested with barnacles that form galls, and there are four small ophiuroids entwined around the branchlets. The second specimen has similar barnacles and ophiuroids and, besides, two small crinoids clinging to its branches.

Remarks. The second specimen from the type locality is similar to the holotype in general appearance and spiculation, but its scaphoids are more sharply echinulate. They are of the same size and shape as those of the type, and do not have the very regular, arcuate curve and acute ends to be seen in the scaphoids of *Pseudopterogorgia navia*.

80 ***Pseudopterogorgia navia* spec. nov.**

(Fig. 80; Pl. VIII fig. 7)

Diagnosis. Pinnate colonies with flexible branchlets up to

6.5 cm. long. Scaphoids arcuate, sharply pointed, conspicuously echinulate, 0.26 mm. long. Anthocodial rods up to 0.18 mm. long.

Description. The holotype is a flexible, drooping colony about 20 cm. in height (Pl. VIII fig. 7). It is pinnately branched in one plane, the lower branches being likewise branched. The terminal branchlets arise at intervals of 10–25 mm. and are about 6 cm. long when fully developed. The uppermost six or seven of them decrease in length, the youngest being about 1.5 cm. long. The branchlets are distinctly flattened, 0.5–0.75 mm. in width, and bear the polyps biserially. The rind may be a little elevated near the polyps but no calyces are formed. The anthocodiae are mostly exsert in the preserved specimen, perhaps because the heavy armature of flat rods 'en chevron' (Fig. 80 b) hindered retraction or rendered it unnecessary. The cortical sclerites are huge scaphoids attaining a length of 0.26 mm., and acute spindles of about the same size. The scaphoids are arcuate, parenthesis-like, and very sharply echinulate on the convex surface (Fig. 80 c). The spindles are also sculptured with spinous projections (Fig. 80 d). The bases of the tentacles contain flat rods up to 0.18 mm. in length, arranged 'en chevron' (Fig. 80 a).

The collections of the Museum of Comparative Zoölogy contain a specimen that is referable to this species. It is young, only about 13 cm. in height, with none of the lateral branchlets further subdivided. The longest branchlets are about 5 cm. in length, flattened, 1.0–1.5 mm. wide, with the polyps biserially arranged in an alternating row along each edge. Almost all of the polyps are exsert so that the anthocodiae with their strong armature are clearly visible. The cortex contains arcuate, echinulate scaphoids reaching a length of 0.24 mm. (Fig. 80 f), and straight spindles as much as 0.27 mm. length (Fig. 80 e). The anthocodial rods (Fig. 80 g) are practically identical in shape and size with those observed in the type.

The holotype is white, with colorless spicules; the small specimen from the Museum of Comparative Zoölogy is light purple, with clear, pale violet spicules.

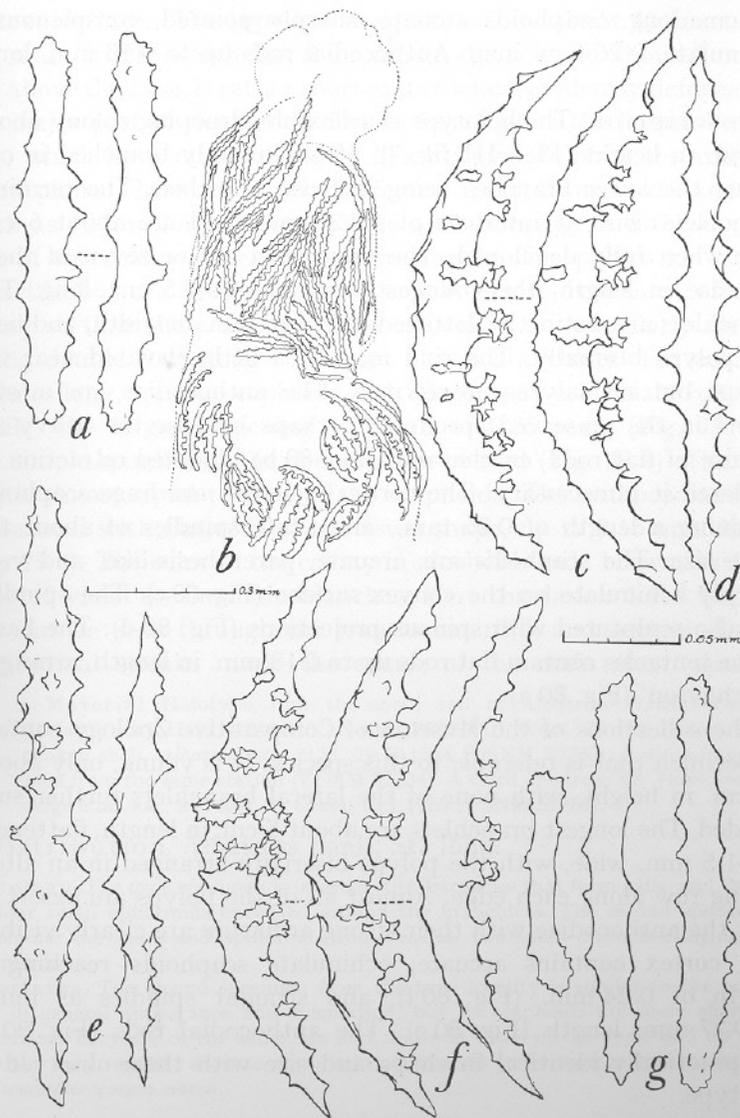


FIGURE 80. *Pseudopterogorgia navia* spec. nov., spicules. *a-d*, of the holotype from Hispaniola (USNM 50070): *a*, anthocodial rods; *b*, anthocodial spiculation; *c*, scaphoids; *d*, spindle. *e-g*, of the paratype: *e*, spindles; *f*, scaphoids; *g*, anthocodial rods. (All figures drawn to the same scale except *b*, to which the 0.3 mm. scale applies.)

Material. Holotype from the north coast of HISPANIOLA, 19°10'35" North, 69°20'45" West, 15 fms., Johnson-Smithsonian Exp., *Caroline* sta. 51, 16.II.1933 (USNM 50070). Paratype from BAHAMAS, off Orange Key, 9 fms., Pourtales Gulf Stream Explorations, cast no. 2, 1.IV.1869 (MCZ 5047).

Distribution. Bahamas and Greater Antilles.

Remarks. The two specimens described above, while differing somewhat in superficial appearance, agree so well as to spiculation that they must be considered as representatives of the same species. The size and form of the scaphoids distinguish this species from all others heretofore described.

81 *Pseudopterogorgia hystrix* spec. nov.

(Fig. 81; Pl. XI figs. 2-3)

Diagnosis. Pinnate colonies with slender branchlets up to 12 cm. long. Scaphoids sharply echinulate, many of them with the ends recurved outward, reaching a length of 0.25 mm. Anthocodial rods up to 0.15 mm. in length.

Description. The holotype is a regularly pinnate colony about 35 cm. tall, with the base of attachment. The lateral branchlets, which are about 1.5 mm. wide and reach a length of 12 cm., arise at intervals of 10-20 mm. and at angles of 45°-60°. The polyps are biserial, with a strong anthocodial armature but without projecting calyces. The cortex contains echinulate scaphoids (Fig. 81 *a, b*) up to 0.25 mm. long, with their ends very sharp and often recurved outward; the tubercles of the concave side are tall and spinous, extending around the spicule laterally as sharp ridges or acute spines. The straight spindles are slender, acute, and often exceed a length of 0.2 mm. (Fig. 81 *d*). The anthocodial rods reach a length of 0.15 mm. and are of conventional form (Fig. 81 *c*). The colony is pale gray in alcohol, the spicules colorless.

Material. From the south end of the Tongue of the Ocean, GREAT BAHAMA BANK, 23°34'00" North, 76°33'00" West, 36 fms., bottom 74.2°F, *Albatross* sta. 2649, 12.IV.1886 (holotype USNM 50385, paratype 50386.)

Distribution. Known only from the type locality.

Ecology. *Pseudopterogorgia hystrix* appears to be one of a non-reef assemblage made up of deep-water representatives of the typical reef genera. Also collected

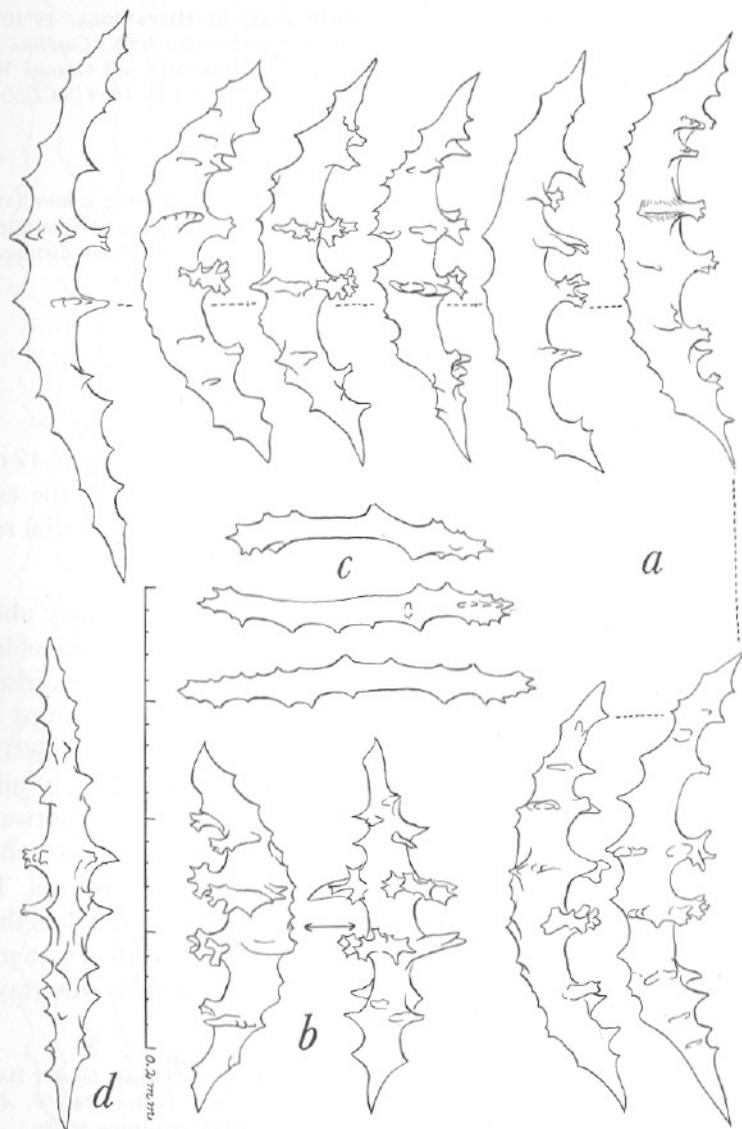


FIGURE 81. *Pseudopterogorgia hystrix* spec. nov., spicules of the holotype from the Great Bahama Bank (USNM 50385): a, scaphoids; b, two views of the same scaphoid; c, anthocodial rods; d, spindle. (All figures drawn to the same scale.)

at the same station were *Plexaura nina* and *Eunicea pinta*, both new species related to common reef-dwelling forms.

Remarks. The spicules of *Pseudopterogorgia hystrix* are even more spinose than are those of *P. navia*, and the very sharp ends of the scaphoids are recurved outward as in *P. americana*. Only the longest of the scaphoids equal in size those of *P. navia*; the majority measure 0.18–0.20 mm.

The tissues of *Pseudopterogorgia hystrix* contain abundant zooxanthellae and show a resistance to sodium hypochlorite like that noted in *P. americana*, but to a lesser degree.

The most distinctive feature of *P. hystrix* is the conspicuous and acute sculpturing of the scaphoids, which are shaped like those of *P. americana*.

82 *Pseudopterogorgia marcgravi* spec. nov.

(Fig. 82)

Diagnosis. Small colonies, under 10 cm. tall, very sparsely branched in a pinnate manner, sometimes unbranched. Polyps biserial, usually alternate, forming prominent calyces. Spicules including acute scaphoids with irregular convex profile, and symmetrical spindles. Anthocodiae with flat rods expanded at the ends.

Description. The type is a nearly complete colony about 5 cm. tall (Fig. 82 a). The main stem, which is 0.75 mm. in diameter, gives off five pinnate lateral branches, two on one side, widely separated, three on the other, close together; the longest of these is about 35 mm. long and 0.5 mm. in diameter. All the branches originate at an angle of about 60°, except for one that is not normal. The polyps are 2–4 mm. apart, biserial, and form moderately to strongly projecting calyces (Fig. 82 b). They are absent from the proximal half of the main stem. The cortical spicules are chiefly scaphoids with the convex profile irregularly serrated (Fig. 82 c) and symmetrical spindles of conventional form (Fig. 82 d). The spicules of the calycular walls (Fig. 82 c–d) may be somewhat longer than those of the stem rind (Fig. 82 e–f) but otherwise are not different. The anthocodiae contain short, flat rodlets with expanded ends and peculiar, granular sculpture (Fig. 82 g). The colony in alcohol is pale brown, almost white; the spicules are colorless.

The several paratypes are either simple or have one or two branches. The calyces are prominent and biserial, but they often incline alternately toward front and back of the colony. The antho-

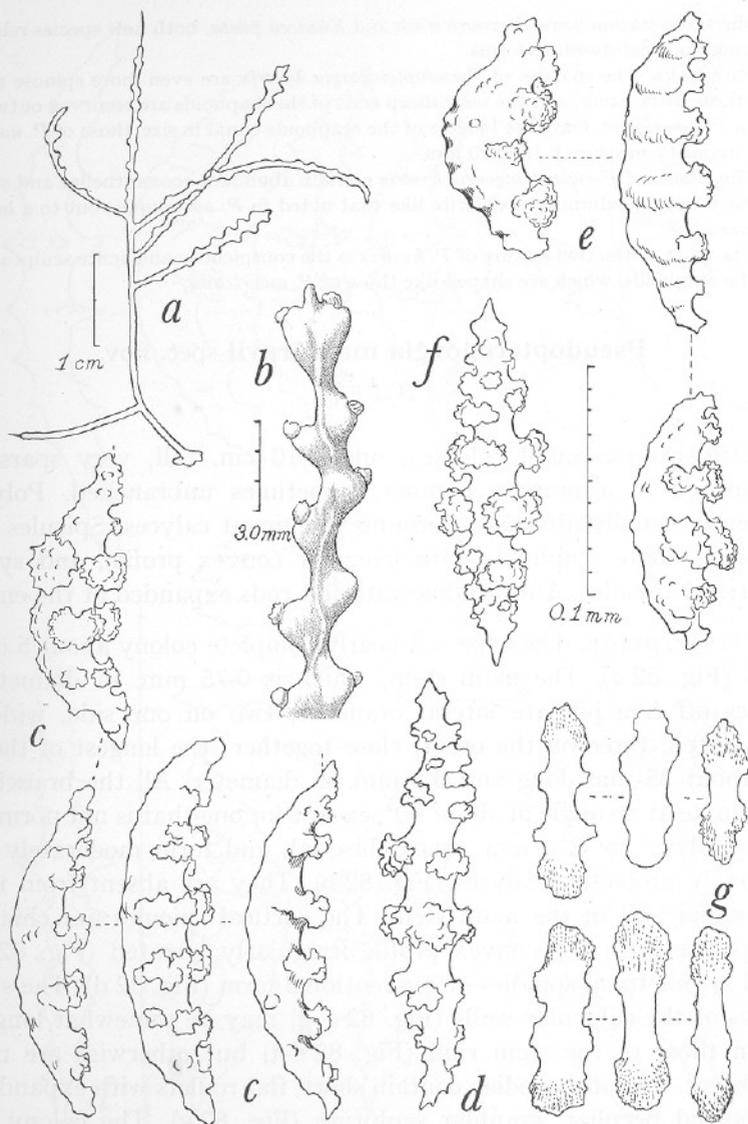


FIGURE 82. *Pseudopterogorgia marcgravii* spec. nov., the holotype from Brazil (USNM 50228): a, the entire colony; b, branch tip; c, scaphoids from the calycular walls; d, spindle from the calycular walls; e, scaphoids from the stem rind; f, spindle from stem rind; g, flat rods from anthocodiae. (Enlargement of a and b as indicated by scales; all spicules drawn to the same scale, shown to the right of f.)

codiae are often preserved exsert. The spiculation is uniformly like that of the type. The color is nearly white, with a tinge of purple toward the base in some specimens.

Material. BRAZIL, off Parahyba do Norte (João Pessoa), 6°59'30" South, 34°47'60" West, 20 fms., bottom 79°F, *Albatross* sta. 2758, 16.XII.1887 (holotype USNM 50228, 17 paratypes 50229).

Distribution. Known only from the type locality.

Remarks. *Pseudopterogorgia marcgravii* differs from other members of the genus in its dwarf growth form and prominent calyces. Its rude scaphoids and peculiar anthocodial rods are unlike other members of the genus. It is also easily distinguished from small colonies or branches of *Phyllogorgia dilatata*, which have thick branches with pore-like apertures on all sides.

Genus *Gorgonia* Linnaeus, 1758

Gorgonia LINNAEUS 1758, p. 800. (Type species, *Gorgonia flabellum* L., by subsequent designation: VERRILL 1868a, p. 386.)

Rhipidigorgia VALENCIENNES 1855, p. 13. (Type species, *Rhipidigorgia flabellum* (L.), by subsequent designation: VERRILL 1868a, p. 385.)

Gorgonia, BAYER 1951, p. 93.

Diagnosis. Net-formed gorgoniids with scaphoid spicules.

Distribution. Bermuda and south Florida to Curaçao: endemic West Indian.

Remarks. Among the sea-fans of the West Indian region there is always a noticeable variation in color, size of meshes, flattening of branches, and form of spicules. The extremes of variation may differ from one another to a marked degree and, in the absence of large suites of specimens, could be considered morphologically distinct species. It may have been such variants that led LINNAEUS to name, in the 10th edition of his *Systema Naturae*, two species of sea-fan: (1) the common Venus' Fan, *Gorgonia flabellum*; and (2) *Gorgonia ventalina*, of which he said (p. 801): "Differt haec a *G. flabello* solum ramis non versus ramulos, sed a lateribus exterioribus compressis," and then explained that from the published figures he could not decide to which of the two species the various synonyms applied.

When a large suite of specimens of the common sea-fan is examined with care, it will be observed that many specimens do, indeed, have the branches flattened in the plane of branching, as LINNAEUS described for *G. ventalina* ("a lateribus exterioribus compressis"), and not at right angles to it ("non versus ramulos [compressis]"). It seems logical that such specimens, with branches 'externally compressed,' are true *ventalina* as LINNAEUS understood it. It remains only to demonstrate that this form can be separated from *flabellum* on valid taxonomic grounds.

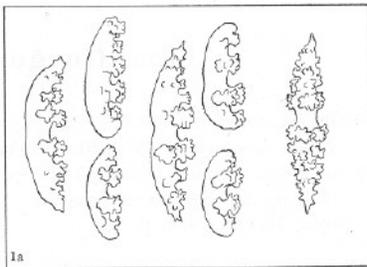
It is, I think, quite clear that PALLAS' *Gorgonia ventilabrum*, in which LINNAEUS' *G. ventalina* was erroneously included, is not the same species, nor is ESPER's *G. ventalina*. It obviously was ESPER's figure that led BIELSCHOWSKY to identify a small, reddish purple sea-fan of the Panamic province as *G. ventalina*, but in spite of the fact that it may be the species that ESPER figured, it certainly has nothing to do with LINNAEUS' original *ventalina*.

In the West Indies there are four species of sea-fans with anastomosing branches, three of them belonging to the genus *Gorgonia*.

KEY 21

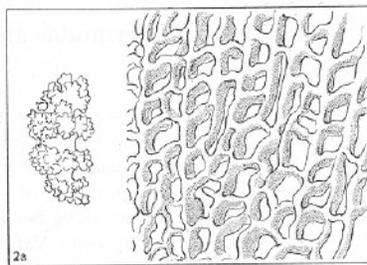
ILLUSTRATED KEY TO THE SPECIES OF *Gorgonia*

- 1a. Convex profile of scaphoids smooth. Branches usually not strongly flattened at right angles to plane of the fan; *Gorgonia mariae* spec. nov.

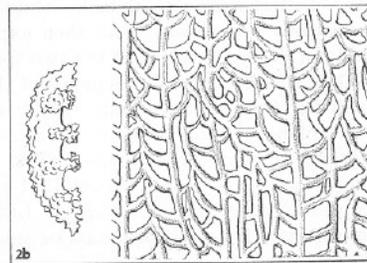


- 1b. Convex profile of scaphoids noticeably sculptured; perfectly smooth scaphoids not present: 2

- 2a. Convex profile of many scaphoids with tuberculate sculpture. Ascending and connecting branches strongly flattened at right angles to the plane of the fan. Anthocodial rods 0.05–0.08 mm. long; *Gorgonia flabellum* Linnaeus



- 2b. Convex profile of scaphoids with echinulate sculpture, but never with complex tubercles. Ascending branches inconspicuously flattened at right angles to plane of the fan or not at all; connecting branches flattened in plane of fan. Anthocodial rods 0.065–0.10 mm. long; *Gorgonia ventalina* Linnaeus

*Gorgonia flabellum* Linnaeus, 1758forma *flabellum*

(Fig. 83; Pl. X fig. 2)

Frutex marinus elegantissimus CLUSIUS 1605, p. 120, woodcut. (Ex India Orientali.)

Planta corallii natura CERUTUS 1622, p. 16, coppercut. (Ex Americano Oceano.)

Flabellum Veneris ELLIS 1755, p. 61, pl. 26 fig. A. (West-Indies.)

Gorgonia Flabellum LINNAEUS 1758, p. 801. (Habitat in O. Indico.)

Rhipidogorgia flabellum, VALENCIENNES 1855, p. 13.

Rhipidogorgia [sic] *flabellum*, DUCHASSAING & MICHELOTTI 1860, p. 33. (Antilles.)

Gorgonia flabellum, BAYER 1951, p. 93, fig. 1. (CERUTUS' fig. reproduced.)

Diagnosis. *Gorgonia* with ascending branches and connecting branchlets strongly compressed at right angles to the plane of the fan; no free branchlets arising from the surface of the fan. Scaphoids commonly with complex tubercles on convex side (Fig. 83 c, d, h). Anthocodial rods usually 0.05–0.06 mm. long, rarely longer (Fig. 83 a, f, g). Color, grayish white or pale lavender; sometimes deep yellow.

Material. From Dr. Hummelinck's collection in the USNM: BONAIRE, Punt Vierkant, sandy reef, 1 m., sta. 1059a, 26.III.1955, dry fragment (51345). Lac, cast ashore, 25.II.1949, 2 dry specimens (50220). ANGUILLA, north of Sandy Ground, rocky beach behind sandy reef, 1.5 m., sta. 1142, 19.VI.1949, complete dry colony (51344). Upper Prickly Pear Island, cast ashore, 17.VI.1949, 4 dry spec. (50223).

From the same Museum: a large number of specimens from several localities including NEW PROVIDENCE, Nassau (14365), Long Key (14369), WATLING'S ISLAND (San Salvador, Bahamas) (14400); HISPANIOLA, Haiti (50217, 50730); MEXICO, Mujeres Hbr., Quintana Roo (51756–51758), Cozumel Island (51766), Bahia de la Ascencion, Quintana Roo (51767), B. de la Espiritu Santo, Quintana Roo (51765).

Distribution. Abundant in the Bahamas, becoming scarce to the south through the Lesser Antilles; apparently absent from Bermuda and uncommon in Florida.

Ecology. In the Florida Keys, neither *Gorgonia flabellum* nor *G. ventalina* occurs near the shore, but only in deeper water on lagoonal reef patches and along the outer reefs.

In certain situations, probably where current patterns are unusual, individuals of *G. flabellum* may produce numerous lateral branchlets from one or both faces of the flabellum. This ecophenotype was given the name *occatovia* by MILNE EDWARDS & HAIME (1857). Such a form apparently does not occur in *G. ventalina*, which, however, may produce some small accessory fans in much the same manner.

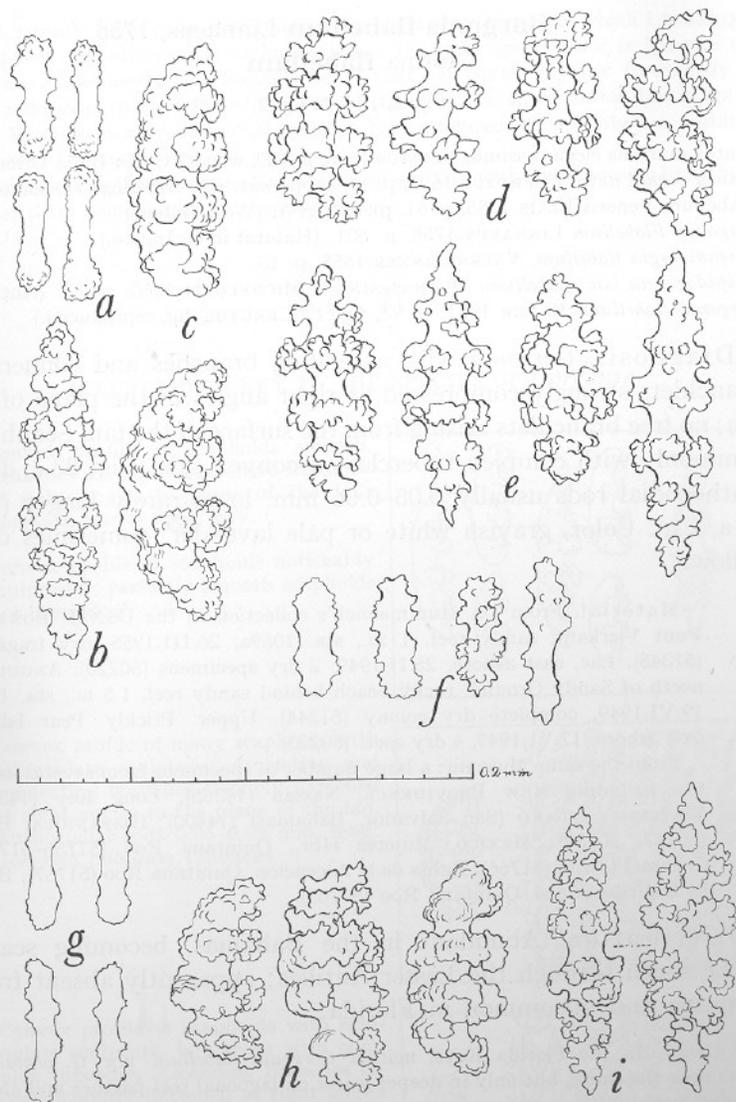


FIGURE 83. *Gorgonia flabellum* Linnaeus, typical form spicules. *a-c*, of a specimen from Trinidad (USNM 14400): *a*, anthocodial rods; *b*, spindle; *c*, scaphoids. *d-f*, of a specimen from Nassau (14365): *d*, scaphoids; *e*, spindles; *f*, anthocodial rods. *g-i*, of a specimen from Long Key, New Providence (14369): *g*, anthocodial rods; *h*, scaphoids; *i*, spindles. (All figures drawn to the same scale.)

Remarks. Many of the sea-fans from the Bahamas exactly fit the original description of *Gorgonia flabellum* as given by LINNAEUS (1758, p. 801): "*Gorgonia reticulata*, ramis interne compressis," and also agree with his characterization in the *Hortus Clifortianus*: "Lithoxylon retiforme, ramis parallele compressis: primordialibus crassioribus." These fans are further distinguished by the tuberculate sculpture of the convex side of the scaphoid spicules. Toward the west, in Florida, and the south, in the Lesser Antilles, *G. flabellum* becomes less and less abundant and, unfortunately, less easily recognized. The flattening of the branches may be less pronounced and colonies approach the external appearance of *G. ventalina*, the commoner species in those areas. The spicules remain recognizable, however, and it is upon their characteristics that *G. flabellum* is best distinguished from *G. ventalina*.

83a

Gorgonia flabellum* Linnaeus, 1758**forma ***occatoria Milne Edwards & Haime, 1857

(Fig. 84)

Rhipidigorgia occatoria VALENCIENNES 1855, p. 13. (Guadeloupe.) [Nomen nudum.]

Rhipidigorgia occatoria MILNE EDWARDS & HAIME 1857, I, p. 175. (Côtes de la Guadeloupe.)

Diagnosis. *Gorgonia flabellum* with numerous short branchlets growing from one or both sides of the fan. The scaphoids (Fig. 84 a), spindles (Fig. 84 b), and anthocodial rods (Fig. 84 c) are identical with those of the typical form.

Material. Collected by Dr. Hummelinck: ST. JOHN, Turner Bay, rock debris, 1 m., sta. 1407, 18.VI.1955, dry colony with commensal gastropods; *Coralliophila* attached to base and several yellow *Neosimnia* clinging to branches (USNM 51346).

From the U.S. National Museum: several specimens from NEW PROVIDENCE, Nassau (50755), Long Key (50756), and the Sea Garden at the east of Hog Island (50757); and one from HISPANIOLA, Haiti (50224).

Distribution. Probably coincides with that of the typical form.

Remarks. It appears quite certain that specimens of this growth form were in hand when VALENCIENNES (1855) and MILNE EDWARDS & HAIME (1857) established *Rhipidigorgia occatoria*. The latter authors state (p. 175): "Un grand nombre de petites branches accessoires naissant sur l'une et l'autre surface de l'éventail formé par le polypiéroïde." Furthermore, the color was said to be whitish, as several of the specimens before me are.

***Gorgonia ventalina* Linnaeus, 1758**

(Figs. 85-86; Pl. X fig. 1, XXVII)

Gorgonia Ventalina LINNAEUS 1758, p. 801. (Habitat in O. Americano & Asiatico.)not *Gorgonia ventilabrum* PALLAS 1766, p. 165.not *Gorgonia ventalina*, ESPER 1791, 2, p. 20, pl. 1. [= ?*Pacificogorgia elegans* (Duchassaing & Michelotti).]not *Gorgonia ventalina*, BIELSCHOWSKY 1929, p. 152, fig. 25, pl. 3 fig. 14.*Gorgonia flabellum*, VERRILL 1907, p. 297, fig. 142, pl. 33C figs. 2-3, pl. 36 fig. 1 (1a).

Diagnosis. *Gorgonia* with branches usually compressed in the plane of the fan; ascending branches occasionally somewhat compressed at right angles to the fan, but not the connecting branchlets. Scaphoids with sculpture of convex side reduced to low prickles, sometimes placed on low transverse ridges (Figs. 85 a, f; 86 a, d, e); spindles acute (Figs. 85 b, e; 86 c, f); anthocodial rods 0.065-0.1 mm. long (Figs. 85 c-d; 86 b, g). Color of colonies, yellow or purple, occasionally whitish.

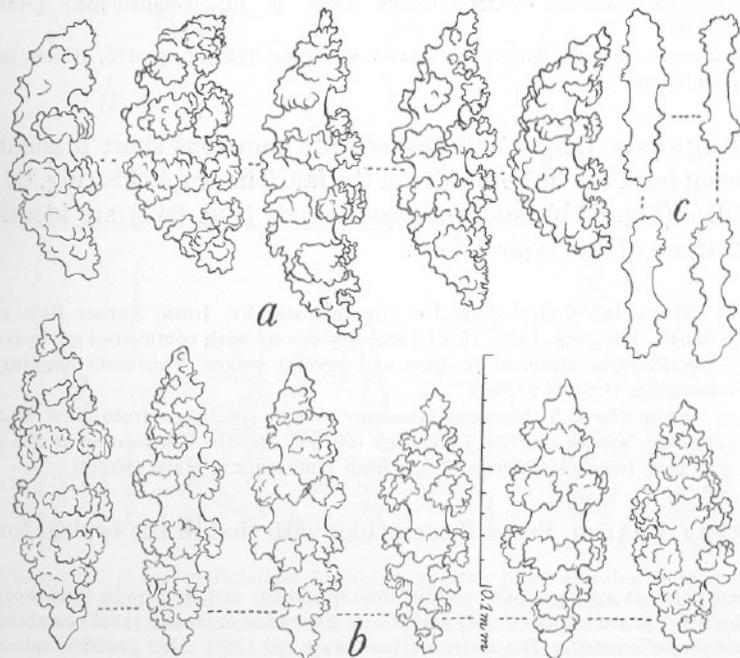


FIGURE 84. *Gorgonia flabellum* Linnaeus, forma *occatoria* Milne Edwards & Haime: spicules of a specimen from Haiti (USNM 50224): a, scaphoids; b, spindles; c, anthocodial rods. (All figures drawn to the same scale.)

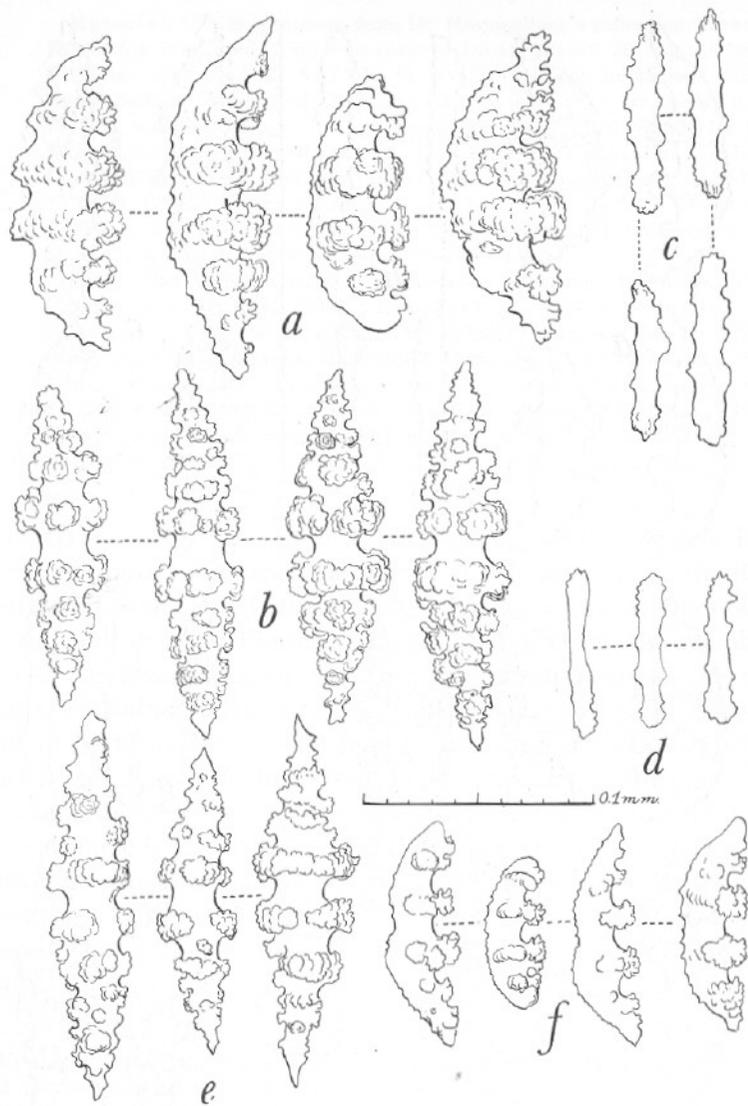


FIGURE 85. *Gorgonia ventalina* Linnaeus, spicules. a-c, of a specimen from Rodriguez Key, Florida (USNM 8860): a, scaphoids; b, spindles; c, anthocodial rods. d-f, of a specimen from Bonaire (50218): d, anthocodial rods; e, spindles, f, scaphoids. (All figures drawn to the same scale.)

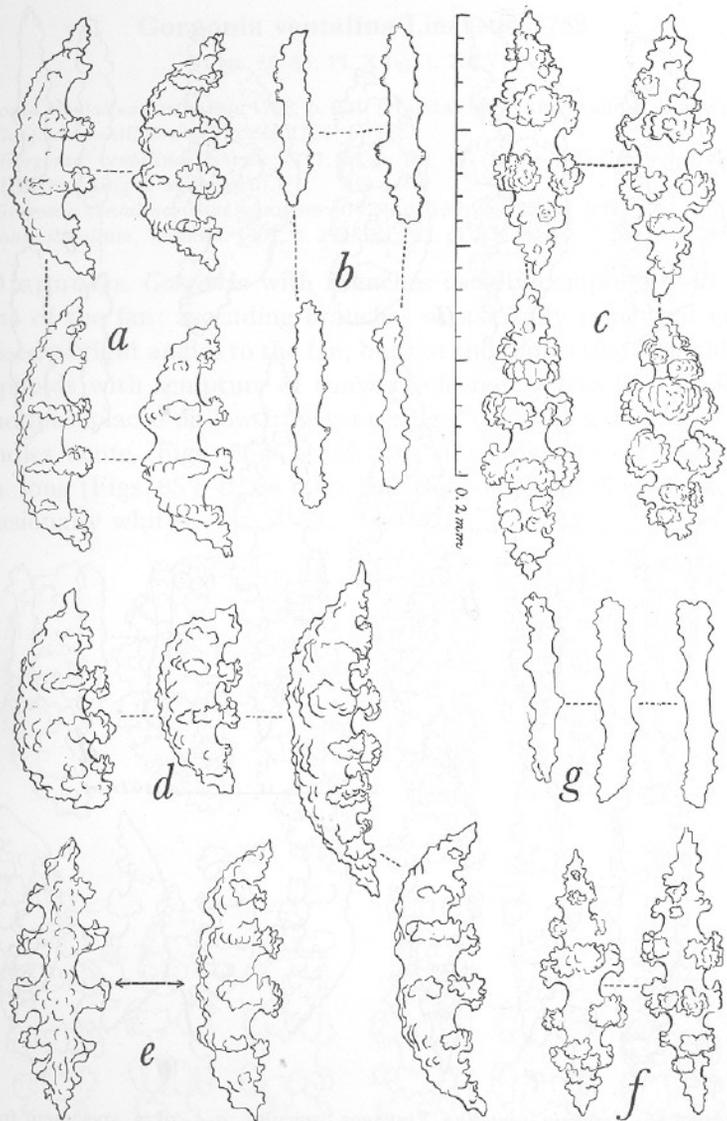


FIGURE 86. *Gorgonia ventalina* Linnaeus, spicules. *a-c*, of a specimen from St. Barts (USNM 50222): *a*, scaphoids; *b*, anthocodial rods; *c*, spindles. *d-g*, of a specimen from St. James (50758): *d*, scaphoids; *e*, two views of same scaphoid; *f*, spindles; *g*, anthocodial rods. (All figures drawn to the same scale.)

Material. USNM specimens from Dr. Hummelinck's collection: BONAIRE, Kralendijk roadstead, from two covered buoys cleaned 20 months before, 0-1.5 m., sta. 1053, 21.XI.1948, 11 small specimens in alcohol (50218). Punt Vierkant, sandy reef, 2 m., sta. 1059B, 9.IX.1948, fragments in alc. (50219). KLEIN CURAÇAO, J. S. Zaneveld, 9.I.1955 (51352). Found by J. H. Stock on CURAÇAO: Blauwbaai, 3 m., 17.X.1958; Fuik Baai, 3 m., 3.XI.1958 (Amsterdam). St. EUSTATIUS, Gallows Bay, rocky beach, 2 m., sta. 1116B, 15.VII.1949, dry spec. (50221); J. H. Stock, 11.II.1959 (Amsterdam). St. BARTHÉLEMY, Fourche, rock debris, 1.5 m., sta. 1124, 2.VI.1949, 6 complete dry spec. and fragments in alc. (50222, 51347).

Many other USNM specimens from various localities: BERMUDA (50670, 50671); FLORIDA Keys (8860); DRY TORTUGAS (50392); BAHAMAS, New Providence (50550, 50719), Rum Cay (50725), Watling's Island (50696); CUBA (34680); HISPANIOLA, Haiti (4082); JAMAICA, Port Royal Cays (51406); PUERTO RICO (42144); VIRGIN ISLANDS (49561, 50348); SABA Bank (50346); St. CHRISTOPHER (50347); ANTIGUA (34045); TOBAGO, Milford Bay (51422); CURAÇAO and ARUBA (50663, 50664, courtesy of the Leiden Museum); OLD PROVIDENCE (8857).

Distribution. Geographically, *Gorgonia ventalina* ranges from Bermuda south to Curaçao. In Florida, it extends through the Keys southward to the Dry Tortugas but, so far as I know, does not occur on the Gulf coast of Florida; where it reappears on the mainland to the southward cannot be determined from available records. The U.S. National Museum has a very badly damaged specimen said to be from Texas, but there is absolutely no assurance that the species lives off that coast. The collections from the Gulf of Campeche and the Yucatan Peninsula, scant though they are, do not include it. It is known from Old Providence Island off Nicaragua, and may occur on the mainland in that latitude. It occurs at Curaçao, Aruba, Bonaire, and probably all the other islands of the Leeward Group, and perhaps lives also along the mainland.

Ecology. Along the Florida Keys, sea-fans are restricted to the outer reefs and the reef patches in deeper water in the lagoon. At Bermuda, according to VERRILL (1907, p. 298), it reaches its maximum growth off the outer reefs in 10 to 20 feet of water, where its height may be 5 to 6 feet.

Remarks. It is no easier to separate the various references in the literature into their proper species today than it was in Linnaeus' time. The correct assignment of the older references will depend upon a reexamination of specimens, insofar as they are extant, and it will likely prove that many of them deal with both *Gorgonia ventalina* and *G. flabellum*.

Gorgonia mariae spec. nov.
forma *mariae*

(Figs. 87-88 a-c; Pl. X figs. 3-4)

Gorgonia bipinnata, HARGITT & ROGERS 1901, p. 287, pl. 3 fig. 4. (Off. St. Thomas and Vieques Island.)

not *Pterogorgia bipinnata* VERRILL 1864b, p. 31.

Diagnosis. *Gorgonia* with large meshes. Scaphoid spicules with their convex profile entirely smooth, the long ones pointed, the short one blunt and stubby. Spindles mostly double cones with girdles of very complicated tubercles. Anthocodial rods narrow, with enlarged ends, up to 0.06 mm. in length.

Description. All of the known colonies are of small size, the largest being a complete specimen about 28 cm. in height. The holotype is a complete colony 20 cm. in height and about the same in width. Branching is pinnate, in one plane, and regularly anastomosed. The branchlets are 1.0-2.0 mm. wide, but 1.5 mm. is usual; they arise at intervals of 3-6 mm. (commonly 4-5 mm.), usually in an alternating manner and, as soon as they are sufficiently long (10-15 mm.), anastomose freely with one another. Small colonies tend to show few anastomoses until some strong lateral branches are developed, but as soon as this occurs the branchlets invariably fuse so that well-developed colonies are complete nets. The polyps, which occur in irregular, alternating double rows along the two edges of the branchlets, usually appear as tiny slits, occasionally with a somewhat raised rim, and rarely at the summit of a slight coenenchymal swelling. Protruding calyces are not formed. There are the usual two categories of spicules in the cortex, namely, scaphoids and spindles. The scaphoids are of two types: (1) long and acute, and (2) short and blunt. The former reach a length of 0.16 mm. and are gently curved and sharply pointed; the latter are at most 0.12 mm. long, usually 0.06-0.08 mm., with blunt, incurved ends that give them the appearance of beetle-grubs or, perhaps, mammalian embryos. Both long and short scaphoids are entirely smooth on their convex surface (Figs. 87 a, d; 88 a). The spindles are very acute double cones up to 0.17 mm. in length;

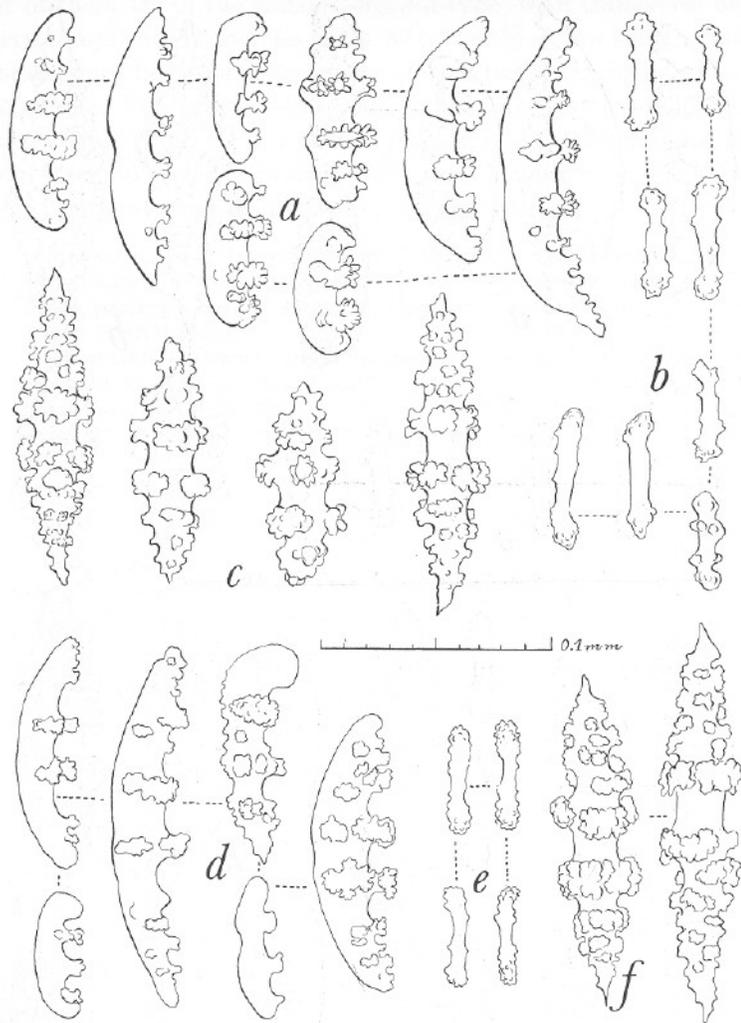


FIGURE 87. *Gorgonia mariae* spec. nov., spicules. a-c, of a paratype from St. Eustatius (USNM 50422): a, scaphoids; b, anthocodial rods; c, spindles. d-f, of a specimen from Puerto Rico (50073): d, scaphoids; e, anthocodial rods; f, spindles. (All figures drawn to the same scale.)

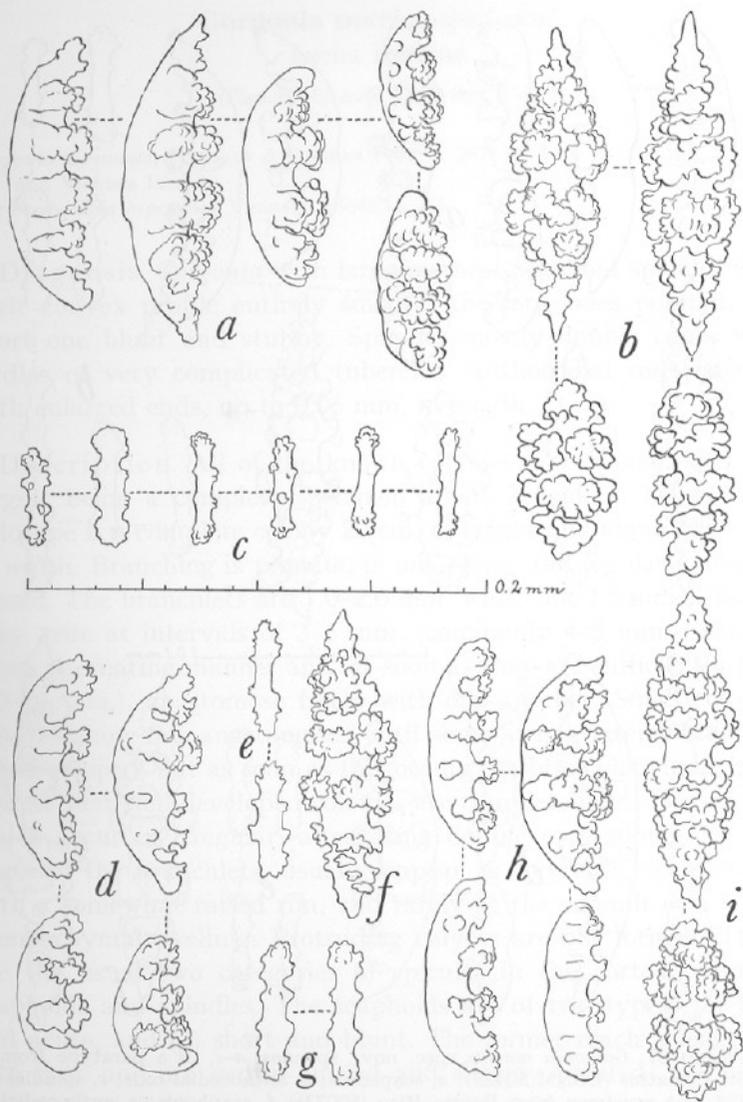


FIGURE 88. *Gorgonia mariae* spec. nov., spicules, a-c, of the holotype from St. Eustatius (USNM 50421): a, scaphoids; b, spindles and capstans; c, anthocodial rods. *Gorgonia mariae* forma *cymosa* nov., spicules, d-i, of two specimens from St. Martin (50423): d and h, scaphoids; e and g, anthocodial rods; f and i, spindles. (All figures drawn to the same scale.)

most of them are of the usual 'Gorgonia-type' with transverse belts of very complicated tubercles (Figs. 87 c, f; 88 b). A few short, stubby capstans may be present, in some colonies but seem to be missing from others. The anthocodial rods, which are narrow and have enlarged ends (Figs. 87 b, e; 88 c), reach a length of 0.06 mm. Dry colonies lemon yellow, occasionally tinged with violet near the base; specimens from deeper water nearly white.

Material. From Dr. Hummelinck's collection: ST. EUSTATIUS, Gallows Bay, rocks, 2 m., sta. 1116B, 15.VII.1949, 14 specimens (holotype USNM 50421, paratypes 50422). ANGUILLA, Upper Prickly Pear Island, 17.VI.1949, 1 spec. (USNM 50653).

Other USNM material: One of the specimens reported by Hargitt & Rogers, from off St. THOMAS, Sail Rock W. by N., 1/2 N., 6 miles, 20-23 fms., Fish Hawk sta. 6079, 6.II.1899 (42153); St. JOHN, 50-200 feet, T. Chess, 1960 (51747-51749); PUERTO RICO, 18°27'35" North, 65°33'35" West, 26

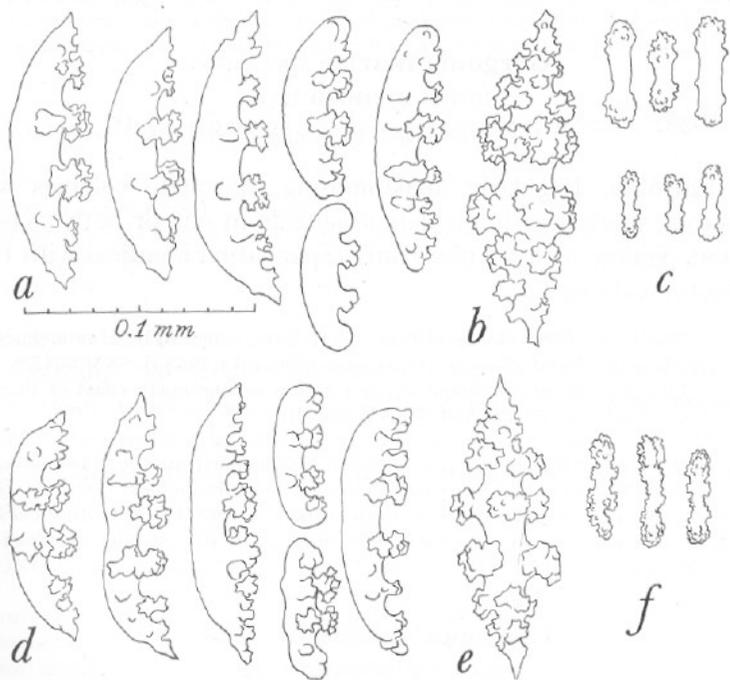


FIGURE 89. *Gorgonia mariae* spec. nov., forma *plumosa* nov. Spicules of two paratypes from Anegada (USNM 51027): a, scaphoids; b, spindle; and c, anthocodial rods of specimen at left in Pl. XI fig. 4; d, scaphoids; e, spindle; and f, anthocodial rods of specimen at right in Pl. XI fig. 4. (All figures uniformly enlarged according to 0.1 mm. scale.)

fms., *Caroline* sta. 75, Johnson-Smithsonian Exp., 25.II.1933, large but fragmentary spec. (50073); near Santurce, Ted Arnow, XII.1958 (51348); SABA Bank, 17°28' North, 63°13' West, Smithsonian-Bredin Exp., sta. 106-56, 13.IV.1956, two spec. (50345). Through courtesy of Dr. Elisabeth Deichmann of the Museum of Comparative Zoölogy, a specimen from CUBA (MCZ 3979), and another without locality (MCZ 3980). Specimens from between St. Thomas and St. John, 15-20 fms., 23. XII. 1905, and between St. John and Thatch Cay, 15± fms., 9. III. 1906, both Th. Mortensen, were examined in Univ. Zool. Museum Copenhagen.

Distribution. Recorded with certainty from Cuba, Puerto Rico, St. Thomas, St. John, Anguilla, and St. Eustatius; the forma *cymosa* from Puerto Rico and St. Martin; the forma *plumosa* from Puerto Rico and Anegada. From a little below low tide to 26 fathoms.

Remarks. *Gorgonia mariae* was first figured by HARGITT & ROGERS under the name *Gorgonia bipinnata* (Verrill), but only the colony was figured. It has, of course, nothing whatever to do with VERRILL's species, which has entirely different spicules.

85a ***Gorgonia mariae* spec. nov.**
forma ***cymosa* nov.**

(Fig. 88 d-i; Pl. X fig. 5)

Diagnosis. Regularly anastomosing, flabellate colonies with numerous short, free branchlets arising from one or both faces of the fan. Yellow with purplish tints. Spiculation identical with that of the typical form.

Material. Five colonies of this growth form, collected by Hummelinck on ST. MARTIN, Point Blanche Bay, east ashore, 5.VI.1955 (USNM 50423).

Five dry specimens, found by Ted Arnow on the north coast of PUERTO RICO, Santurce, 20.VI.1959 (USNM 51351).

Remarks. Two of the above-mentioned colonies demonstrate the fullest development of the *occtoria*-condition, with numerous short branchlets (some of them sub-branched) springing densely from both surfaces of the fan. The other colonies show it to a lesser degree, one of them only slightly. In all cases the spicules (Fig. 88 d-i) are like those of the typical form.

85b ***Gorgonia mariae* spec. nov.**
forma ***plumosa* nov.**

(Fig. 89; Pl. XI fig. 1)

Diagnosis. Tall, plumose colonies with anastomosis of inner and

lower branchlets but with many terminal twigs remaining entirely free. Bright yellow, infrequently with purplish tints. Spiculation as in the typical form.

Material. Five colonies of this growth form, collected by Dr. Waldo Schmitt on ANEGADA, Pomato Point, depth about 1 m., Smithsonian - Bredin Caribbean Exp. II, sta. 42-58, 8.IV.1958 (USNM 51027). Dry material found by Ted Arnow on the north coast of PUERTO RICO, near Punta Puerto Nuevo, 24.III.1959, 5 spec. (51349), and 6.VI.1959, 7 spec. (51350).

Remarks. These tall plumose colonies, which reach a height of about 40 cm., have much the appearance of a *Pseudopterogorgia*, and indeed are quite like *P. hummelincki*, although larger. Closer examination reveals a lax but constant anastomosis of branchlets never found in species of *Pseudopterogorgia*, and the terminal portions of these colonies are identical with the free tips of fully anastomosed examples of typical *G. mariae*. The bright yellow color of the rind is the same as in typical *mariae* from shallow habitats, showing similar weak tints of purple. The spiculation (fig. 89) is in such close conformity with that of *G. mariae* forma *mariae* and forma *cymosa* that there can be no doubt that we are here dealing with a single morphologically labile species with at least three growth forms.

Genus *Phyllogorgia* Milne Edwards & Haime, 1850

Phyllogorgia MILNE EDWARDS & HAIME 1850, p. lxxx. (Type species, *Gorgonia dilatata* Esper 1806, by original designation.)

Hymenogorgia VALENCIENNES 1855, p. 13. (Type species, *Hymenogorgia quercifolia* = *Gorgonia Quercus folium* Ehrenberg 1834 = *Gorgonia dilatata* Esper 1806, by monotypy.)

Diagnosis. Colonies flabellate, ramification pinnate, lax, loosely anastomosing; coenenchyme greatly expanded in the plane of ramification, more or less completely filling in the spaces between branches to produce lacinated, leaf-like, or broadly-lobed colonies. Cortical spicules are scaphoids with echinulate convex profile, and stout, belted spindles.

Distribution. Guadeloupe? Brazil.

Remarks. VERRILL (1912, p. 394) correctly observed that anastomosis of the axis occurs in typical *G. quercusfolium*, and that the spicules do not differ from *G. dilatata*, making it impossible to maintain VALENCIENNES' genus *Hymenogorgia*.

Several species and varieties of these leaf-corals have been described, largely because of their extraordinary variation in growth form. There is also a wide range of variation in the spicules but, unfortunately, the two variables do not correlate so it is impossible to recognize more than a single species.

Phyllogorgia dilatata (Esper), 1806

(Fig. 90; Pl. X fig. 6)

Gorgonia dilatata ESPER 1806, Fortsetz. 2, p. 25, pl. 51. ("Wahrscheinlich das Meer des südlichen America.")

Gorgonia Quercus folium EHRENBURG 1834, p. 367.

Phyllogorgia dilatata, MILNE EDWARDS & HAIME 1850, p. lxxx. (Bahia.)

Phyllogorgia foliata VALENCIENNES 1855, p. 13. (Guadeloupe.) [Nomen nudum.]

Phyllogorgia foliata VERRILL 1912, p. 397, pl. 33 fig. 5. (Guadeloupe; locality doubtful.) [Spicules of type in Paris Museum described and figured; name validated.]

Phyllogorgia frondosa VERRILL 1912, p. 395, pl. 31 fig. 2, pl. 33 fig. 4, pl. 35 fig. 8. (Abrolhos Reefs, Brazil.)

Phyllogorgia quercifolia var. *quercifolia* + var. *lacerata* VERRILL 1912, p. 394, pl. 30 fig. 3, pl. 32 fig. 1, pl. 33 figs. 1-1a; p. 395, pl. 30 fig. 4, pl. 32 fig. 2, pl. 33 fig. 2. (Cape Frio to Pernambuco.)

Phyllogorgia dilatata, VERRILL 1912, p. 396, pl. 33 fig. 3. (Bahia.) [Spicules of Milne Edwards' specimen in the Paris Museum.]

Phyllogorgia dilatata, BAYER 1959, p. 20.

Diagnosis. As for the genus. The spicules of the cortex are scaphoids of various curvature (Fig. 90 b, c, e, g) and belted spindles, some acute, some blunt (Fig. 90 a, d, f, i). The anthocodiae seem to lack flat rods, but have small octoradiate rods (Fig. 90 h).

Material. Several USNM specimens from Periperi, the Abrolhos Islands, and Fernando de Noronha, BRAZIL, collected by the Hartt Exp. They include specimens of the typical *dilatata* form (5245, 5258), *frondosa* form (5249), *quercifolia* form (5252, 5253, 5257), and *lacerata* form (5256).

Distribution. Guadeloupe? Coast of Brazil from Cape Frio to Pernambuco.

Ecology. VERRILL (1868a, p. 359) quotes HARTT's observations on this species:

This is a very common species on the Brazilian coast, and ranges from Cape Frio northward to Pernambuco. It is very abundant at the entrance to the Bay of Victoria, as well as at the Abrolhos, Porto Seguro, and Bahia. It sometimes occurs in some of the larger tide pools on the surface of the reefs at low-tide level, but its usual station is on the edges of the reef, and ranging from low-water mark downward to a depth of 5-6 feet or more. It is sometimes laid bear [sic] by spring tides. The color, when alive, is yellowish or pinkish; the latter tint is apt to fade in drying. A small *Ovulum* (*O. gibbosum*) is parasitic on this species.

Genus Pterogorgia Ehrenberg, 1834

Pterogorgia (part) EHRENBURG 1834, p. 368. (Type species, *Gorgonia anceps* Pallas, by subsequent designation: MILNE EDWARDS & HAIME 1850, p. lxxx.)

Xiphigorgia (part) MILNE EDWARDS & HAIME 1857, I, p. 171. (Type species, *Gorgonia anceps* Pallas, by subsequent designation: BIELSCHOWSKY 1918, p. 62.)

Pterogorgia, BAYER 1951, p. 96.

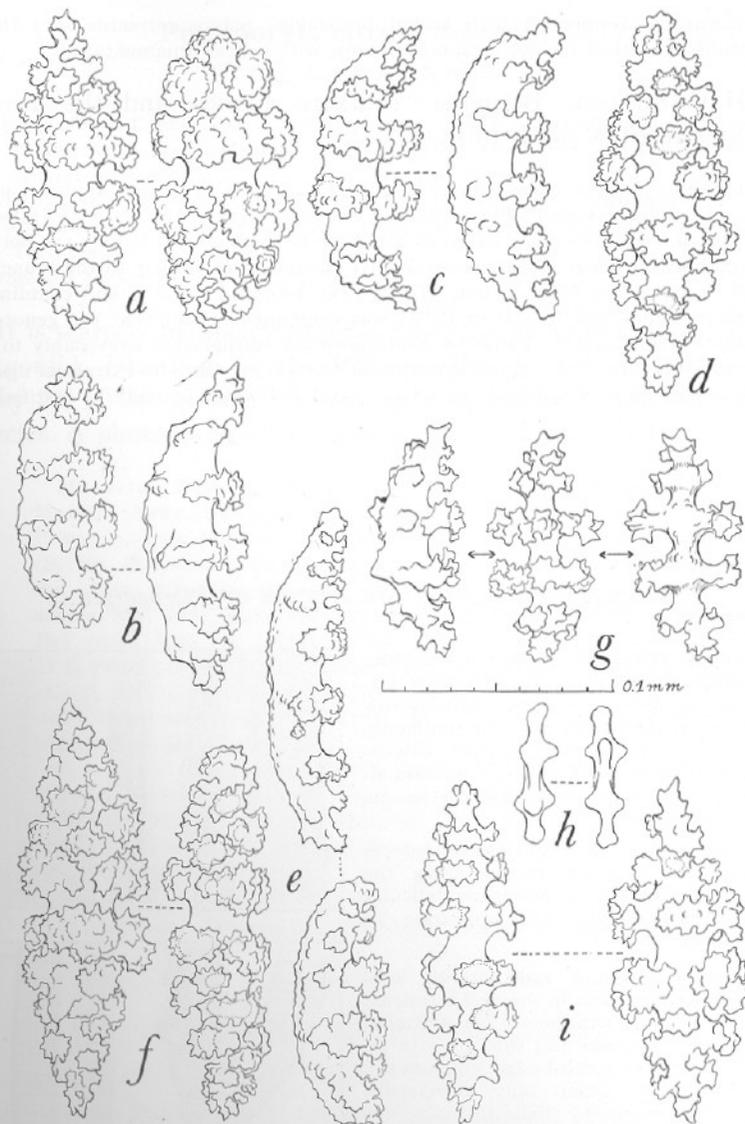


FIGURE 90. *Phyllogorgia dilatata* (Esper), from Brazil, spicules. a-b, of a specimen of the *lacerata* form (USNM 5526): a, scaphoids; b, spindles. c-d, of a specimen of the *frondosa* form (5249): c, scaphoids; d, spindle. e-f, of a specimen of typical *dilatata* form (5248): e, scaphoids; f, spindles. g-i, of another specimen of *dilatata* form (5252): g, three views of the same scaphoid; h, octoradiate rods from polyps; i, spindles. (All figures drawn to the same scale.)

Diagnosis. Gorgoniids with lateral branching; polyps retractile into thin, longitudinal cortical flanges. Scaphoids blunt, with coarse ornamentation.

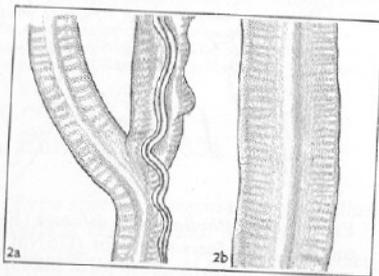
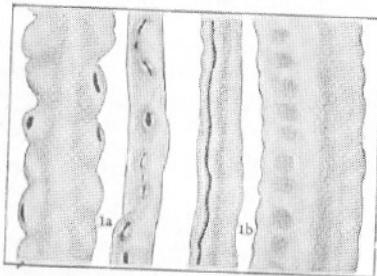
Distribution. Bermuda, southern Florida and the Keys; Greater Antilles south to Curaçao.

Remarks. I have already pointed out (1951, p. 96) that the application of EHRENBERG's generic name *Pterogorgia* was narrowed by MILNE EDWARDS & HAIME's selection of *Gorgonia anceps* Pallas as genotype to those species having the polyps retractile within longitudinal coenenchymal flanges which impart to the branches a flat or triangular cross section. *Xiphigorgia*, proposed in 1857 and containing *G. anceps* Pallas and *G. selacea* Pallas was consequently stillborn; the genotype designation of *G. anceps* Pallas by BIELSCHOWSKY consigned it irrevocably to its nomenclatural grave as a junior synonym of *Pterogorgia*. Only by extralegal means could it now be re-established, an action that I feel would scarcely be justifiable.

KEY 22

ILLUSTRATED KEY TO THE SPECIES OF *Pterogorgia*

- 1a. Polyps retracting into low, distinct calyces each with its own separate slit-like aperture, along the two narrow edges of the branches. Color commonly yellow with reddish purple calyces appearing as marginal spots; occasionally uniform olivaceous gray: *Pterogorgia citrina* (Esper)
- 1b. Polyps retracting into close-set calyces within a common groove along the narrow edges of the branches, calicular apertures usually not appearing as separate slits: 2
- 2a. Branches 3-6 mm. wide, usually with 3 or 4 edges even in young specimens; some colonies with only a few scattered calyces along one flat side, or with no trace at all of a third edge; colonies tall and bushy when fully developed: *Pterogorgia anceps* (Pallas)
- 2b. Branches 7-10+ mm. wide, always flat, never more than 2 distinct margins bearing polyps; colonies broad, rather sparingly branched, tending to remain in one plane: *Pterogorgia guadalupensis* Duchassaing & Michelin

*Pterogorgia citrina* (Esper), 1792

(Fig. 91 d-f; Pl. IX fig. 5)

Gorgonia citrina ESPER 1792, 2, p. 129, pl. 38. ("Es wurde diese Coralle aus America beygebracht, und nach jener Anzeige ist die Küste von Neuspanien der bestimmtere Aufenthalt.")

Pterogorgia citrina, DUCHASSAING & MICHELOTTI 1860, p. 30. (Antilles.)

Xiphigorgia citrina, KÜKENTHAL 1916, p. 498, figs. W-Y, pl. 23 fig. 5. (St. Thomas; Tortugas.)

Pterogorgia citrina, BAYER 1951, p. 97.

It is scarcely necessary to redescribe this common shallow-water gorgoniid. Drawings of the spicules (Fig. 91 d-f) and branches (Key 22, 1a) are given for comparison with those of the other two species. A photograph of the colony is given on Pl. IX fig. 5.

Material. From Dr. Hummelinck's collection, now in the U.S. National Museum: ARUBA, Pova Beach, cast ashore, 27.IV.1955, dry specimen (50737). CURAÇAO, Boca Grandi, cast ashore, sta. 1016A, 2.V.1930, dry fragments (50199). BONAIRE, 1948, spec. in alcohol (50198); Lac, sandy reef, 1.5 m., sta. 1068a, 1.X.1948, alc. spec. (50744). GRENADA, near St. George's, cast ashore, sta. 1392, 22.I.1955, dry spec. (50739). ST. EUSTATIUS, Gallows Bay, rocks, 2 m., sta. 1116B, 15.VII.1949, 6 dry spec. (50195); J. H. Stock, 11.II.1959, purple (51308; Amsterdam). ST. MARTIN, Simpson Bay, cast ashore, 27.V.1949, dry spec. (50197). ANGUILLA, North of Sandy Ground, rocky beach with sandy reef, 1-2 m., sta. 1142, 19.VI.1949, 6 dry spec. and fragments in alc. (50196, 50667).

In addition many other USNM specimens from various West Indian localities including FLORIDA, Palm Beach (49717), Florida Keys (4043), BAHAMAS (14372), JAMAICA, Hanover, Bull Bay (51368), GUADELOUPE (44054), Aruba (50200, received from the Leiden Museum), and MEXICO, Cozumel Island (51771).

Distribution. Bermuda; southern Florida and the Keys to Curaçao.

Pterogorgia anceps (Pallas), 1766

(Fig. 91 a-c; Pl. IX fig. 4, XXVI)

Gorgonia anceps PALLAS 1766, p. 183. (Mare Americanum.)

Gorgonia anceps, ESPER 1792, 2, p. 38, pl. 7 ("Die südlichen Küsten von America, und besonders ... Cürassao.")

Pterogorgia anceps, EHRENBERG 1834, p. 369.

Xiphigorgia anceps, KÜKENTHAL 1916b, p. 493, figs. R-V, pl. 23 fig. 4. (Drunken Man Cay, Bai von Kingston, Jamaika.)

Pterogorgia anceps, BAYER 1951, p. 96.

This species is probably as widely known as *P. citrina*. It has much the same geographic range, excepting Bermuda, but inhabits a slightly lower zone. It is a larger species, whose branches come off at an acute angle suggestive of dichotomy. The terminal twigs are always longer, wider, and flatter than those of *P. citrina*. In

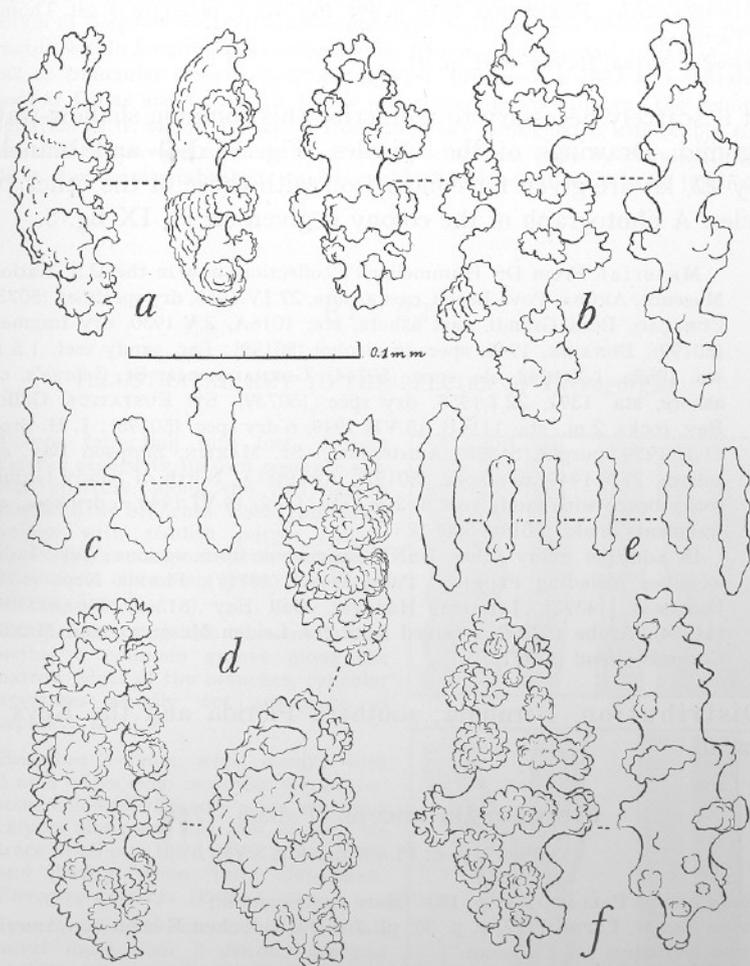


FIGURE 91. *Pterogorgia anceps* (Pallas), spicules of a specimen from Florida (USNM 8855): *a*, scaphoids; *b*, spindles; *c*, anthocodial rods. *Pterogorgia citrina* (Esper), spicules of a specimen from St. Eustatius (50195): *d*, scaphoids; *e*, anthocodial rods; *f*, spindles. (All figures drawn to the same scale.)

the lower parts of the colony there is a strong tendency toward three-flanged branches which is characteristic. Rarely, both *P. citrina* and *P. guadalupensis* may have a few polyps along the flat side of the lower branches, but they never occur so regularly and abundantly as to form a third continuous flange. *P. anceps* ordinarily is brownish purple in color, sometimes olive green or gray, rarely dull yellow. Spicules are illustrated on Fig. 91 a-c, and the complete colony on Pl. IX fig. 4 and XXVI.

Material. A number of USNM specimens, mostly from localities around FLORIDA, Palm Beach (49720), Florida Keys to Dry TORTUGAS (49756, 50369, 50616, 50666), and Sarasota on the Gulf coast (50057); also specimens from the BAHAMAS (50558), CUBA (50701), JAMAICA, Yallahs Point (51407), GRAND CAYMAN (51408, 51409), and MEXICO, Mujeres Hbr., Quintana Roo (51759-51762), Cozumel Isl. (51770), Bahia de la Ascencion, Quintana Roo (51763).

Distribution. Southern Florida to Curaçao; apparently absent from Bermuda.

89 *Pterogorgia guadalupensis* Duchassaing & Michelin, 1846

(Fig. 92; Pl. IX fig. 6)

Pterogorgia guadalupensis DUCHASSAING & MICHELIN 1846, p. 218.

Xiphogorgia guadalupensis, DUCHASSAING & MICHELOTTI 1860, p. 33, pl. 4 fig. 3. (Guadeloupe.)

Pterogorgia guadalupensis, BAYER 1951, p. 97. (Gulf of Mexico.)

An examination of the spicules of this species reveals that they are little different from those of *P. anceps* and *P. citrina*. They include a somewhat higher proportion of branching forms than is usual in the other species, and their sculpture is very coarse (Fig. 92). The specimen collected by Dr. HUMMELINCK in Curaçao has larger tentacular rods (up to 0.1 mm. long) than has *P. anceps*, but those of the specimen from Florida and of another from Curaçao measure 0.08 mm., rarely 0.09 mm.

The wide, flat branches, over 7 mm. across in the terminal regions and 10 mm. or more toward the base, are highly distinctive. All the colonies that I have seen show an inclination to branch in one plane, thus producing a flabellate form (Pl. 9 fig. 6), whereas *P. anceps* is typically quite bushy, branching in all directions.

Material. From Dr. Hummelinck's collection: ARUBA, J. G. v. d. Bergh coll., 1955, dry spec. (USNM 51311). CURAÇAO, received from the Curaçao

Museum, dry spec. (USNM 50315); Boca Santoe Pretoe, rocky beach, about 1 m., sta. 1022, 12.III.1949, several branches in alcohol (USNM 50201).

In addition, the specimens reported by Bayer, 1951 (p. 97), which were collected 4 miles S.W. by W. of Smith Shoal Light, FLORIDA, 24°41' North, 81°58' West, in 7¼ fathoms, by J. Q. Tierney, University of Miami Marine Laboratory Gulf Exp., 29.IX.1948 (USNM 44233).

Distribution. Florida Keys to Curaçao.

Family ELLISELLIDAE Gray, 1859

Gorgonellidae DEICHMANN 1936, p. 202.

Diagnosis. Holaxonians branching mostly in one plane, free or anastomosing, or unbranched. Calyces in biserial single or multiple rows; always with a naked tract along the main longitudinal

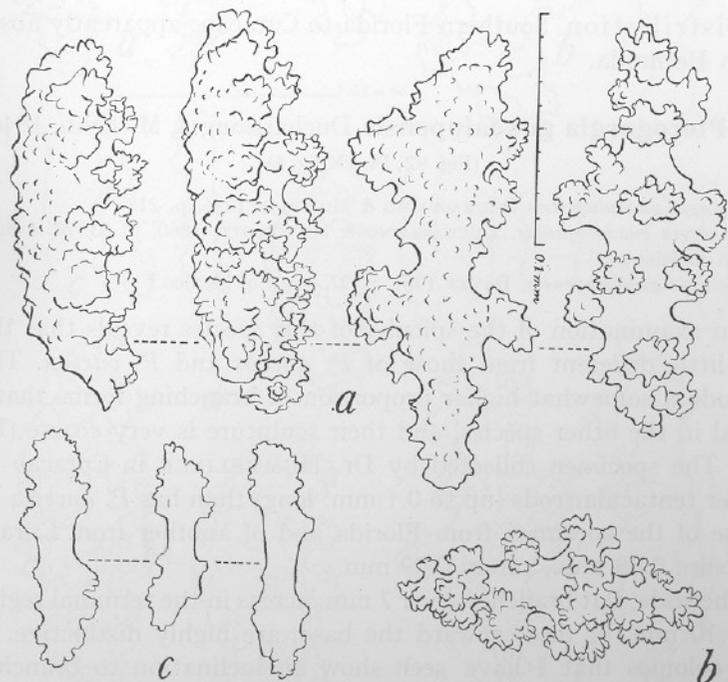


FIGURE 92. *Pterogorgia guadalupensis* Duchassaing & Michelin; spicules of a specimen from Curaçao (USNM 50201): a, scaphoids and irregular spindles of outer rind; b, spindle of inner rind; c, anthocodial rods. (All spicules drawn to the same scale.)

stem canals, of which there are usually two, sometimes three. Cortical sclerites characteristically as small double clubs, 0.05–0.1 mm. long, in some genera becoming more elongate in the calycular walls, where they may reach 0.2 mm. Axis heavily calcified in a radial pattern, the core calcareous and not chambered.

Remarks. This family is unmistakably characterized by the distinctive dumbbell-shaped or double head spicules and the strongly calcified axis with radial structure present in all species.

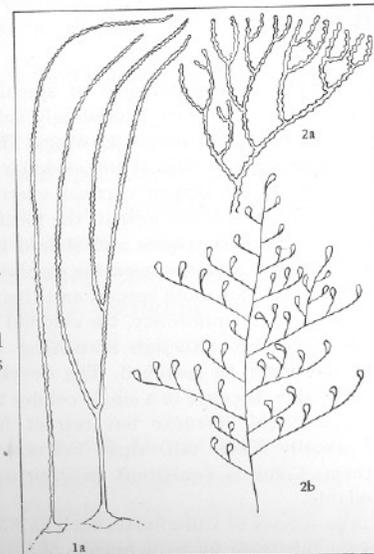
In the West Indies, there are about a dozen species inhabiting depths ranging from 25 to about 450 fathoms; they have been described and figured in detail by DEICHMANN. Keys to all the genera are given by KÜKENTHAL (1919, 1924), TOEPLITZ (1929), and DEICHMANN (1936).

A key to the West Indian genera is presented below, along with the description of a new species of *Nicella* from the Caribbean Sea.

KEY 23

ILLUSTRATED KEY TO THE WEST INDIAN GENERA OF ELLISELLIDAE

- 1a. Colonies unbranched or with a few long, slender, whiplike branches: Genus *Ellisella*
- 1b. Colonies with numerous branches mostly in one plane, not long and whiplike: 2
- 2a. Branching lateral or dichotomous; sympodial: Genus *Nicella*
- 2b. Primary branching lateral, terminal branching pinnate; monopodial; Genus *Riisea*



Genus *Ellisella* Gray, 1858

Ellisella GRAY 1858, p. 287. (Type species, *Gorgonia elongata* PALLAS 1766, by subsequent designation: NUTTING 1910, p. 31.)

Scirpearia EHRENBERG 1834, p. 288.

not 'Scirpéaires' CUVIER 1817, 4, p. 85. [*Scirpearia* in several later editions.]

Scirpearia, DEICHMANN 1936, p. 206.

Diagnosis. Whiplike or sparsely branched ellisellids with polyps biserial or in bilateral tracts. Rind with double spheres 0.05–0.1 mm. in length; calycular walls with spindles or double spindles up to about 0.2 mm. in length.

Distribution. Western Atlantic: Bermuda, Florida, Gulf of Mexico, Caribbean and West Indies. Eastern Atlantic: Azores to South Africa. Red Sea, Indian Ocean, East Indies, eastward in the warmer parts of the Pacific to the Gulf of California (new records, to be reported elsewhere).

Ellisella elongata and *E. barbadensis* occur from the northern shore of the Gulf of Mexico and southern Florida to the vicinity of the mouth of the Amazon River, Brazil, the former at depths from 15 to 120 fathoms and the latter from 11 to 262 fathoms.

Remarks. The differences of spiculation employed in the discrimination of species in this genus are exceedingly subtle and difficult both to interpret and to express in words and simple drawings. The typical size range of the cortical spicules, the relative sizes of cortical and calicular spicules, and the arrangement of tubercles on the dumb-bell shaped cortical sclerites all must be taken into consideration. The size and, to a lesser extent, the form of the pharyngeal sclerites seems to differ among the various species and should be investigated more thoroughly. Due to their small size and the need for careful dissection to locate them, they have not been described for most species and their variability is not known.

Because of its uniformity, the colonial form is of scant importance in the recognition of species, although branching, when it occurs, appreciably narrows the field that must be searched. The development of calyces is also a character of limited value, because in a single colony the polyps in the upper parts may produce tall, cylindrical verrucae but retract fully toward the base; however, species that usually have tall, rigid verrucae almost always show some indication of them. Color is consistent in some species but not in others and is therefore unreliable.

Large species of Ellisellidae, such as *Ellisella barbadensis* and *E. elongata*, require a rocky substrate for attachment. Where conditions are suitable, they may grow

in dense stands at depths from a few feet below low tide down to 10 or 20 fathoms. Smaller species may inhabit sandy or muddy bottoms, where they attach to any small pebbles or shells that may be present, or even lie prone and grow quite free of any attachment.

Six valid species are described from the western part of the Atlantic under the generic name *Scirpearia* by DEICHMANN (1936). Two of these are found in shallow water in the West Indian region, where they can be dredged with limited equipment or collected by diving. These two species that extend upward into shallow water are described as representatives of the genus. *Ellisella atlantica*, *E. funiculina*, and *E. grandis* also occur at moderate depths (BAYER 1958a, p. 386); at present, *E. grandiflora* Deichmann is known only from 191–218 fathoms.

90 *Ellisella barbadensis* (Duchassaing & Michelotti)

(Fig. 93)

Juncella barbadensis DUCHASSAING & MICHELOTTI 1864, p. 22, pl. 5 figs. 5–6.
(Barbados; Guadeloupe.)

not *Juncella barbadensis*, WRIGHT & STUDER 1889, p. 159.

Scirpearia rigida typica Toeplitz in KÜKENTHAL 1919, p. 859. (No locality.)

Scirpearia rigida var. *tenuis* Toeplitz in KÜKENTHAL 1919, p. 859. (No locality.)

Scirpearia rigida, TOEPLITZ 1929, p. 297, fig. 11, pl. 6 fig. 5 (Barbados, 100 fms.)

Scirpearia rigida, var. *tenuis*, TOEPLITZ 1929, p. 299, fig. 12, pl. 6 fig. 5a. (Barbados, 183 meters.)

?*Scirpearia flagellum*, TOEPLITZ 1929, p. 308, fig. 16. (Barbados, 55 meters.)

Scirpearia barbadensis, DEICHMANN 1936, p. 208, pl. 24 figs. 1–19. (Havana; St. Croix; Grenada; Barbados; 92–262 fms.)

Ellisella barbadensis, BAYER 1958a, p. 386, fig. 4b. (South of Mobile, Alabama, 41–42 fms.)

Ellisella barbadensis, BAYER 1959, p. 21, fig. 9. (Surinam; Brazil; 75–110 fms.)

Diagnosis. Flagelliform colonies reaching a large size. Calyces upturned, prominent; biserial or in multiple lateral bands. Spicules of outer cortex predominantly dumb-bell forms in the shape of double heads, reaching a length of 0.06 mm.; capstans infrequent, chiefly localized in the axial sheath, where they reach a length of 0.07–0.08 mm. Spicules of the calyces including many double spindles up to 0.11 mm. in length. Color of colony (dry) white to brick red.

Description. The specimen from which the accompanying illustrations were made is an exceptionally large one collected by diving off the south east coast of Florida. The colony was more than 6 feet in length, with a diameter of about 8 mm. near the base.



FIGURE 93. *Ellisella barbadensis* (Duchassaing & Michelotti): a specimen from Port Everglades, Florida (UMML 7-181; also USNM 51342). *a*, pale yellow, flattened calycular rods; *b*, practically colorless, flattened tentacular rods; *c*, colorless pharyngeal rodlets; *d*, deep amber-colored double-headed (predominant) and capstan types of dumb-bells from outer cortex; *e*, more or less flattened, pale yellow capstans from axial sheath; *f*, part of the colony within about 1 foot of apex; *g*, part of the colony close to the base. (All spicules uniformly enlarged according to 0.1 mm scale; enlargement of *f* and *g* indicated by individual 5 mm. scales.)

The extreme tip is not preserved, but the uppermost part observed has a diameter of about 3.5 mm. (exclusive of calyces) and carries the polyps in two bilateral tracts of 3-4 rows, separated by two longitudinal grooves that mark the position of the main stem canals (Fig. 93 *f*). The calyces are prominent and upturned, in the lower part of the colony appressed and scale-like (Fig. 93 *g*). In the type specimen, the polyps were originally described and figured as being biserial, but DEICHMANN (1936, p. 208) indicates that the species is of extremely variable external form, and mentions specimens with as many as three rows of polyps in the lateral tracts.

The spicules of the present specimen agree in size and form with those described by DEICHMANN (1936, p. 208). The predominant form in the outer cortex is the double head with regular, close-set tubercles, the plump ones mostly 0.05-0.06 mm. long, the slender ones up to 0.07 mm. (Fig. 93 *d*). A few spicules of the capstan type, with tubercles arranged in two belts and terminal clusters, are present in the outer cortex, but are found mainly in the axial sheath, where they are distinctly flattened and up to 0.08 mm. in length (Fig. 93 *e*). The special sclerites of the calyces are elongated, flattened double spindles up to 0.12 mm. in length (Fig. 93 *a*); similar but smaller bodies occur in the tentacles (Fig. 93 *b*). The tops of the tubercles are granulated, most conspicuously in the double heads of the outer cortex, more weakly in those of the calyces, tentacles and axial sheath. The pharynx contains rodlets about 0.04 mm. long, with two belts of warts, and a few that resemble the cortical heads on a miniature scale (Fig. 93 *c*).

In this specimen, the spicules of the outer cortex are of a deep amber color, those of the axial sheath and calyces are pale yellow, and those of the tentacles and pharynx colorless or nearly so. When alive, the colony was bright vermilion red in color; dry, it is dull brick red that brightens to indian red upon moistening with alcohol. The color of the preserved specimen is due to the concentration of colored spicules, but the vermilion hue of the living animal must have been due, at least in part, to unstable cellular pigments.

Five additional specimens, from Miami, Florida, are of closely similar external form, varying somewhat in the size of the calyces and in the size of the spicules, which tend to be smaller than those of the colony from Port Everglades.

Material. Two miles southeast of Port Everglades, FLORIDA, off jetties, depth 65+ feet, collected by Eugene Shinn, 15.VI.1958; tip and lower part of a large colony more than six feet long (USNM 51342). Off sea buoy at entrance of channel to Miami harbor, 115 feet, Eugene Shinn, 1.III.1959; one complete colony 71.5 inches in length, and the uppermost parts of four others measuring 73 inches (broken at both ends), 78.75 inches (broken at both ends), 84.75 inches (cut off at base, attachment missing), and 89.75 inches (cut off at base, attachment missing) (USNM 51343). (Parts of colonies preserved in University of Miami Marine Laboratory reference collection UMML 7-181.) For the privilege of examining these specimens I am indebted to the collector, and to Dr. Harding B. Owre. Also single USNM specimens from off St. Augustine, Florida, 25 fms. (50395); off Havana, CUBA, 213 fms. (10272); south of Mobile, ALABAMA, 41-42 fms (50610); SURINAM, 75-80 fms (51294); and from off the mouth of the Amazon River, BRAZIL, 110 fms. (50904).

Distribution. East coast of Florida and northern shore of the Gulf of Mexico southward through the Antilles to Brazil, at least as far as the mouth of the Amazon River; in depths from 11 to 262 fathoms.

91 *Ellisella elongata* (Pallas)

(Fig. 94)

Gorgonia elongata PALLAS 1766, p. 179. (Oceanus Atlanticus: ex Sinu Gaditano; Curassoa.)

Gorgonia elongata, ESPER 1806, 2, p. 35, pl. 55. (Trankenbar.)

Ellisella elongata, GRAY 1857, p. 287. (No locality.)

Ellisella elongata, TOEPLITZ 1929, p. 285. (No locality.)

Scirpearia cylindrica TOEPLITZ 1929, p. 306, fig. 15, pl. 7 fig. 7. (Barbados, 40-50 meters.)

Scirpearia elongata, DEICHMANN 1936, p. 212, pl. 24 figs. 46-48. (Montserrat; Barbados; Honduras; 41-120 fms.)

Ellisella elongata, BAYER 1958a, p. 386, fig. 4e-f. (Gulf of Mexico: off Fort Walton, Florida, 13-14 fms.; off Cape San Blas, Florida, 60 fms.)

Ellisella elongata, BAYER 1959, p. 23, figs. 10-12. (Surinam; French Guiana; Brazil; 15-110 fms.)

Diagnosis. Colonies large, branched, with a few long, slender, whiplike but rather stiff branches; young colonies occasionally flagelliform. Calyces hemispherical, low, apertures directed upward; in 2-3 longitudinal tracts composed of 2-5 oblique rows of polyps. Spicules of outer cortex containing many dumb-bells of the capstan type, up to 0.075 mm. long, and smaller double heads mostly 0.05-0.06 mm. Axial sheath containing flattened capstans with weaker tuberculation. Spicules of calyces are short, blunt rods up to 0.09 mm. long. Color (dry) white to brick red, commonly brick red with white calyces.

Description. The specimen from which the accompanying figures were made is a large, branched colony more than a meter in height, with about 25 long, stiff, nearly straight terminal branches. Ramification begins near the base and is dichotomous. The main stem has a diameter of 6 mm. and the terminal branches about 2 mm. (exclusive of calyces). On some branches there are two longitudinal tracts of polyps, on others three. Near the branch tips these tracts are composed of oblique rows of two polyps, gradually increasing in number based up to five; on the largest branches and main trunk the oblique rows of polyps become quite irregular and indistinct.

The spicules of this large example agree in the main with the description and figures of West Indian material given by DEICHMANN (1936). In the outer cortex, dumb-bells of the capstan type (i.e., with two transverse girdles of tubercles and terminal clusters) 0.06-0.075 mm. long predominate but there also are double heads of smaller size, up to 0.05-0.06 mm. (Fig. 94 d). The axial sheath contains flattened capstans up to 0.085 mm. long (Fig. 94 e). The special sclerites of the calicles are blunt double spindles and double rods reaching a length of 0.09 mm. (Fig. 94 a). Similar but smaller spicules are found in the tentacles (Fig. 94 b). As usual, the tubercles of these spicules are granulated, strongly in those of the cortex, faintly in those of the axial sheath and tentacles. The pharynx contains belted rods of remarkably large size - up to 0.085 mm. - longer than the cortical dumb-bells (Fig. 94 c).

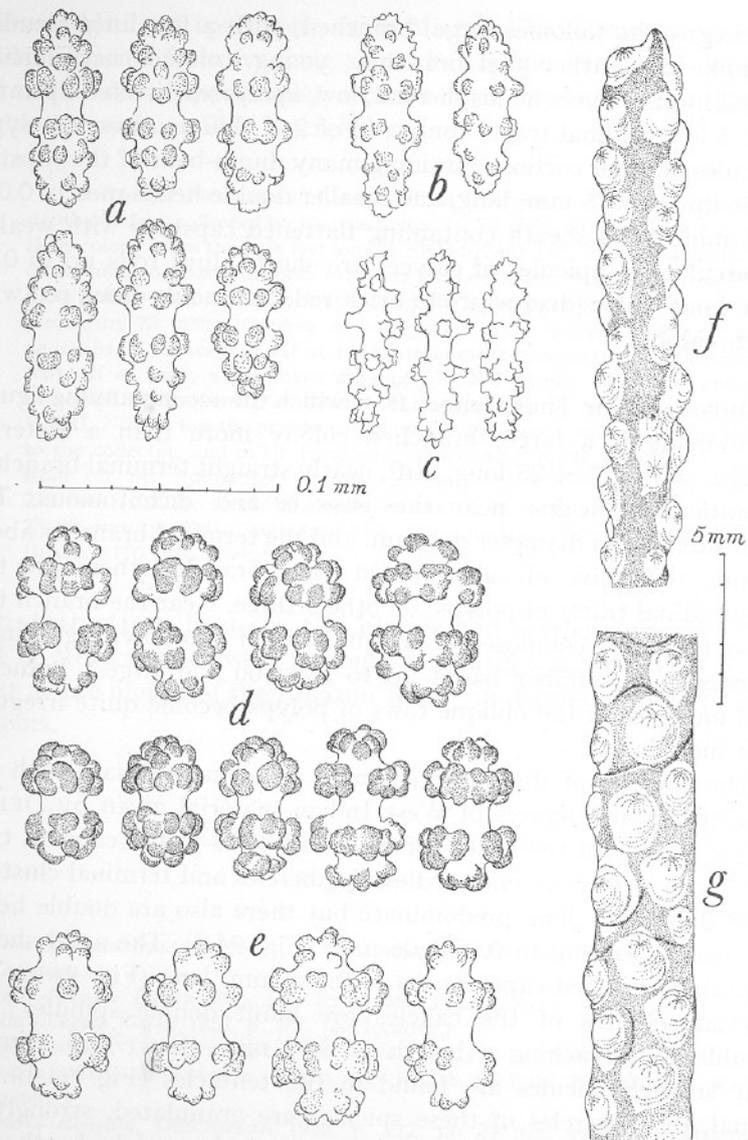


FIGURE 94. *Ellisella elongata* (Pallas): a specimen from off Cape San Blas, Florida (USNM 50415). a, colorless, flattened calycular rods; b, colorless, flattened tentacular rods; c, colorless pharyngeal rods; d, amber-colored capstan (predominant) and double-head types of dumb-bells from outer cortex; e, more or less flattened, pale yellow capstans from axial sheath; f, branch tip; g, part of a large branch near its origin. (All spicules uniformly enlarged according to 0.1 mm. scale; enlargement of f and g indicated by 5 mm. scale.)

In this bicolored specimen, which has white calyces and light brick-red rind ("ferruginous" of RIDGWAY), the spicules of the outer cortex are clear amber yellow in color, those of the axial sheath pale yellow. All spicules of the calyces, tentacles and pharynx are colorless. Other specimens range in color from white to uniform brick-red; the colony illustrated by ESPER is a uniform light red.

Material. A large dry colony roughly 4 feet tall, with about 25 long, stiff endbranches produced dichotomously, dredged off Cape San Blas, FLORIDA, in 60 fms. (Bayer 1958a, fig. 4f) (USNM 50415). Also three other USNM specimens from the Gulf of Mexico, off Fort Walton, Florida, 14-15 fms. (50066; Bayer 1958a, fig. 4e); south of Pensacola, Florida, 30 fms. (50684); and south of Galveston, TEXAS, 47-50 fms. (50900). Specimens from the coast of SURINAM, 75-80 fms. (51295), FRENCH GUIANA, 15 and 19 fms. (50901, 50903) and from BRAZIL, 38 and 110 fms. (50899, 50902; Bayer 1959, p. 23).

Distribution. Northern part of the Gulf of Mexico southward through the Antilles and Caribbean to Brazil, at least as far south as the mouth of the Amazon River; in depths from 14 to 120 fathoms.

Remarks. The 'capstan' form of the cortical spicules differentiates *Ellisella elongata* from *E. barbadosensis* and *E. atlantica*, in both of which the 'double head' type of dumb-bell predominates. The branching colonial form further distinguishes it from all other western Atlantic species of *Ellisella* except *E. grandis*, which seems consistently to have slightly larger calicular rods.

Genus *Nicella* Gray, 1870

Nicella GRAY 1870a, p. 40. (Type species, *Nicella Mauritanica* Gray = *Scirpearia dichotoma* Gray, by monotypy.)

Nicella, DEICHMANN 1936, p. 216.

Diagnosis. Ellisellids branched sympodially in one plane, in a dichotomous manner; occasionally lateral. Spicules of rind as blunt double heads, those of the thin axial sheath layer somewhat more flattened and less closely sculptured than those of the outer layer; spicules of the calycular walls as spindles or double spindles about twice as long as the double heads of the rind.

Remarks. Four species of *Nicella* are reported in the West Indies by DEICHMANN (1936) and TOEPLITZ (1929). A fifth, from moderate depths in the Caribbean Sea, is reported below.

Nicella schmitti spec. nov.

(Fig. 95 a-e)

Diagnosis. Branching unilaterally dichotomous, branches arising at about 45°. Calyces biserial, cylindrical, 1.0 mm. tall, inclined upward. Surface of rind verrucose. Outer cortical spicules as double heads 0.05–0.07 mm. long; axial sheath spicules the same size but flattened and less closely sculptured; spicules of calycular walls as double spindles 0.09–0.1 mm. long. Color of colonies brick red, in alcohol.

Description. Two identical branches from the same dredge haul, and probably from the same specimen, represent the species. The branching is dichotomous in a somewhat unilateral manner, the branchlets almost straight and quite stiff (Fig. 95 a). The diameter of the branches is slightly over 1.0 mm. The calyces are almost cylindrical, about 1.0 mm. tall, and inclined upward; they occur on the two sides of the branches, the individuals alternatingly inclined toward front and back. The surface of the rind is covered with conspicuous papillae and has a distinctly rough appearance. The outer layer of rind contains double heads of the usual type, 0.05–0.07 mm. long (Fig. 95 b); the inner rind, or axial sheath, is extremely thin and contains spicules of the same size but somewhat flattened and less strongly sculptured (Fig. 95 c); the calycular walls contain double spindles about 0.1 mm. long, with a distinct median waist (Fig. 95 d); in the tentacles are small rods with 2–4 whorls of prominent projections (Fig. 95 e). The color of the colony in alcohol is uniformly brick red.

Material. Two branches, from off Colon, PANAMA, 9°32'20" North, 79°54'45" West, 34 fms., *Albatross* sta. 2147, 2.IV.1884 (holotype USNM 7587, paratype 7611).

Distribution. Known only from the type locality.

Remarks. This is the first really distinct species of *Nicella* to be reported from the West Indian region since *N. guadalupensis* was described by DUCHASSAING & MICHELOTTI (1860), the other three known forms being either close to or identical with that species. *Nicella schmitti* differs strikingly in external appearance, with its nearly straight branches, prominent cylindrical calyces, and con-

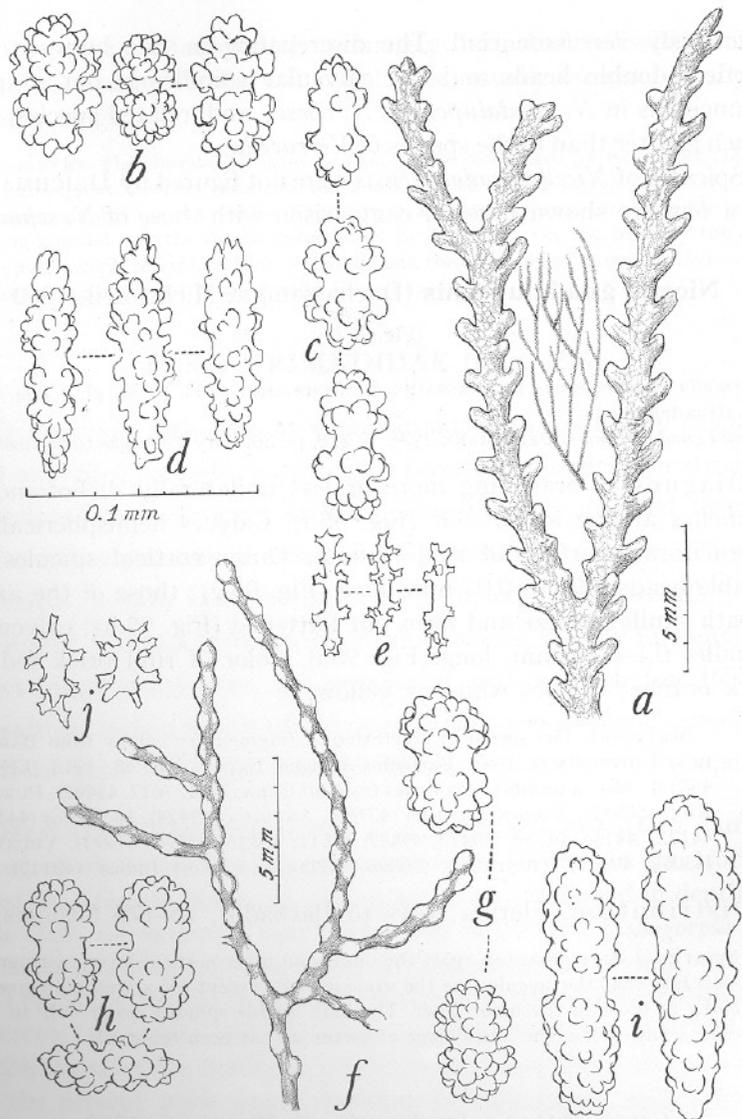


FIGURE 95. *Nicella schmitti* spec. nov., the holotype (USNM 7587): a, terminal branches and sketch of branching pattern; b, spicules of outer rind; c, spicules of inner rind; d, spicules of calyces; e, spicules of tentacles. *Nicella guadalupensis* (Duchassaing & Michelotti), a specimen from Barbados (49514): f, terminal branches; g, spicules of outer rind; h, spicules of inner rind; i, spicules of calyces; j, spicules of tentacles. (Enlargement of a and j indicated by respective scales (but sketch of branching at a is reduced); all spicules drawn to the scale indicated at d.)

spicuously verrucose rind. The discrepancy in size between the cortical double heads and the calycular spindles is not so pronounced as in *N. guadalupensis*, *N. obesa*, and related species, but much greater than in the species of *Verrucella*.

Spicules of *Nicella guadalupensis* were not figured by DEICHMANN, so a few are shown here for comparison with those of *N. schmitti*.

93 *Nicella guadalupensis* (Duchassaing & Michelotti), 1860

(Fig. 95 f-j)

Verrucella guadalupensis DUCHASSAING & MICHELOTTI 1860, p. 33, pl. 4 figs. 5-6. (Guadeloupe.)

Nicella guadalupensis, DEICHMANN 1936, p. 218, pl. 36. (Dry Tortugas to Barbados.)

Diagnosis. Branching more or less unilaterally dichotomous, branches arising at 80°-90° (Fig. 95 f). Calyces hemispherical or verruciform. Surface of rind smooth. Outer cortical spicules as double heads 0.06 to 0.07 mm. long (Fig. 95 g); those of the axial sheath similar in size and form but flattened (Fig. 95 h); calycular spindles 0.1-0.15 mm. long (Fig. 95 i). Color of rind brick red or dark orange; calyces white or yellow.

Material. The specimen illustrated, a fragmentary colony from BARBADOS, University of Iowa Barbados-Antigua Exped. sta. 65, 1918 (USNM 49514). Also, a number of colonies from off CUBA (7091, 7617, 49492), PUERTO RICO (50949), VIRGIN ISLANDS (43789), ANTIGUA (49424), Barbados (44119, 44122, 44134-44136, 49473, 49487, 49511, 49516, 50579, 51277), YUCATAN (43052, 49437), HONDURAS (50896-50898), and 'West Indies' (43110).

Distribution. Florida Keys to Barbados, 75-170 fathoms.

Remarks. I have dissected apart the outer and inner cortical layers with great care and find that the spicules are the same in both except for a greater degree of flattening in those of the inner layer. The long double spindles occur only in the calycular walls, not in the inner layer of cortex as has been reported.

Genus *Riisea* Duchassaing & Michelotti, 1860

Rusea DUCHASSAING & MICHELOTTI 1860, p. 18. (Type species, *Rusea paniculata* Duchassaing & Michelotti, by monotypy.) [Erroneous spelling.]

Riisea, DUCHASSAING & MICHELOTTI 1864, p. 14. [Corrected spelling.]

Riisea, DEICHMANN 1936, p. 224.

Riisea, BAYER 1956, p. 215.

Diagnosis. Monopodial, pinnately branched ellisellids with spiculation as in *Nicella*. Calyces clavate, usually terminal on short, slender twigs.

Remarks. The ellisellid affinities of *Riisea* were recognized by KÖLLIKER (1865), but subsequent workers removed the genus to the family Chrysogorgiidae. This arrangement was maintained by KÜKENTHAL and DEICHMANN, although the latter author pointed out the doubt entertained by VERRILL. On the basis of the axis structure, which resembles that of *Nicella* and the other ellisellid genera, *Riisea* has recently been returned to the family Ellisellidae.

Family PRIMNOIDAE Gray, 1857

Diagnosis. Arborescent gorgonaceans with a strongly calcified but unjointed axis whose concentric layers are distinctly or strongly undulated in conformity with the longitudinally grooved surface. No radial orientation of calcareous material. Polyps large, 1-5 mm. in height, usually bent inward toward the axis, set in whorls, pairs or singly. Polyp sclerites in the form of scales, usually in eight distinct longitudinal rows, the uppermost scale of each row folding inward to form a sector of the operculum; scales show a cruciform pattern when viewed in the dark field of polarizing microscope.

Remarks. The Primnoidae is a large and important family, most of whose species live at considerable depths. In the tropical western Atlantic, however, some species may be found in depths of less than 100 fathoms, and in the Gulf of Mexico *Callogorgia verticillata* has been taken in water as shallow as 20 fathoms.

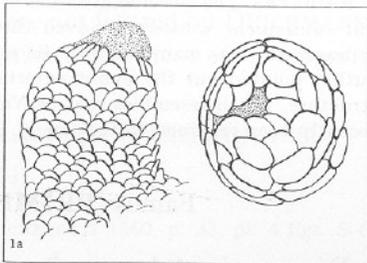
The West Indian primnoids have been thoroughly treated by DEICHMANN (1936), and the large papers of KÜKENTHAL (1919 and 1924) consider the family on a world-wide basis. Detailed treatment in the present work would therefore be superfluous, and coverage is limited to an illustrated key to all of the genera and a few remarks concerning the one species that is known to venture into the bathymetric region under consideration.

Of the thirteen genera herein recognized, seven occur in the West Indian area. DEICHMANN (1936) reports thirteen species and one variety inhabiting depths from 30 to 1742 fathoms.

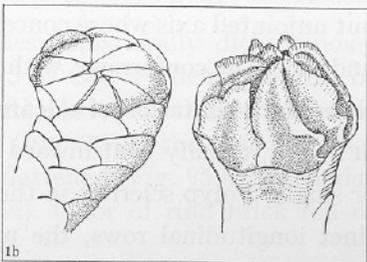
KEY 24

ILLUSTRATED KEY TO THE GENERA OF PRIMNOIDAE

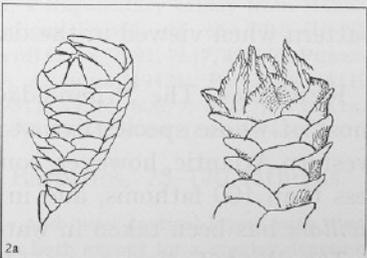
- 1a. Polyps with scales irregularly arranged; distal scales not differentiated into special marginal and opercular scales: Genus *Primnooides*



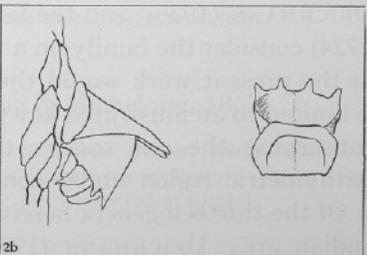
- 1b. Polyps with scales regularly arranged in longitudinal rows; distalmost scales folding as an operculum over the retracted tentacles: 2



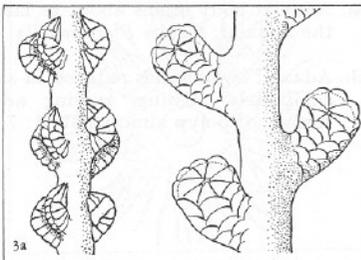
- 2a. Polyp body protected by numerous scales: 3



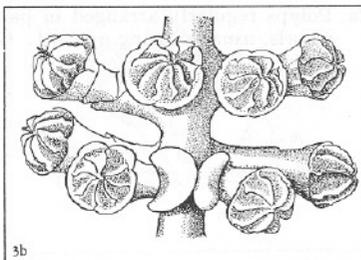
- 2b. Polyp body encased in a cuirass made up of two or three pairs of large scales that partially or completely surround it and may be fused together ringwise: 11



- 3a. Polyps inclined upward at angles of 45° or less and often curved inward toward the axis: 4

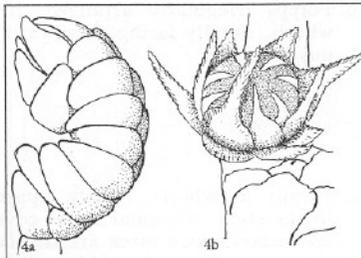


- 3b. Polyps standing at about 90° with the axis, never curved inward: 9



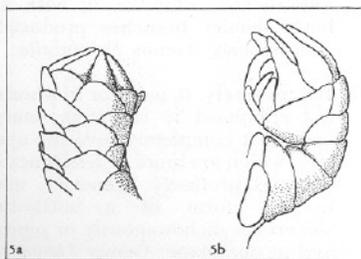
- 4a. The marginal scales cannot be folded inward over the operculars: 5

- 4b. The marginal scales can be folded over the operculars, which may be much reduced in size: 8



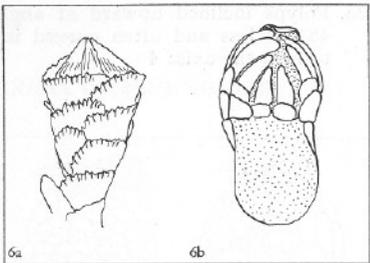
- 5a. Polyps with eight longitudinal rows of body scales: Genus *Plumavella*

- 5b. Polyps with fewer than eight longitudinal rows of body scales: 6

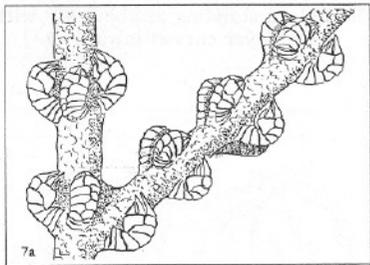


6a. Adaxial body scales about as large as the abaxial: Genus *Pterostenella*

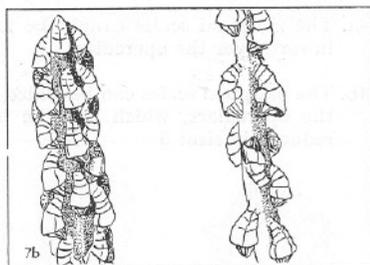
6b. Adaxial body scales reduced in size or completely missing, leaving adaxial surface of polyp almost naked: 7



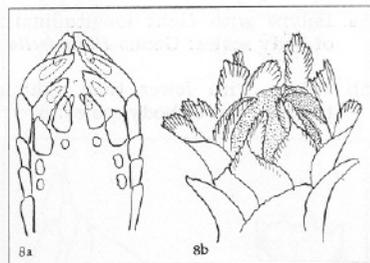
7a. Polyps regularly arranged in pairs or whorls, usually facing upward: Genus *Callogorgia*



7b. Polyps irregularly arranged, not in whorls, usually facing downward: Genus *Primnoa*

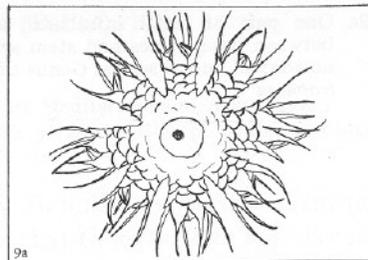


8a. Polyps in whorls, closely appressed to the stem; marginal scales covering operculars which often are reduced in size and completely hidden. Colonies unbranched, whiplike, or with a few long, slender branches produced dichotomously: Genus *Primnoella*

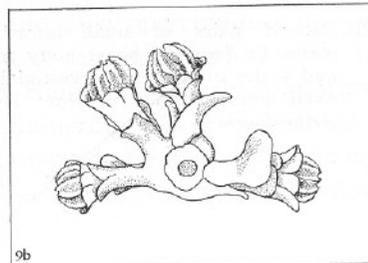


8b. Polyps singly, in pairs, or in whorls but not appressed to the stem; marginal scales not completely covering operculars, which are more or less functional. Colonies profusely branched, usually in the form of a bottle-brush, sometimes dichotomously or pinnately and in one plane: Genus *Thouarella*

9a. Polyps arranged in crowded whorls of eight or more; marginal scales with projecting spines. Colonies unbranched: Genus *Callozostxon*

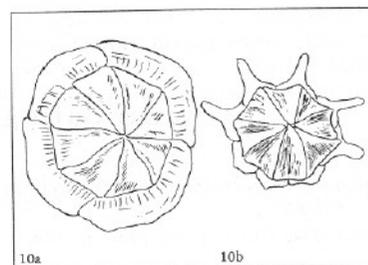


9b. Polyps arranged singly or in widely spaced whorls of five or fewer. Colonies profusely branched: 10



10a. Marginal scales four in number: Genus *Candidella*

10b. Marginal scales eight in number: Genus *Parastenella*



11a. Polyps with three (rarely four) pairs of large body scales: Genus *Narella*

11b. Polyps with two pairs of large body scales: 12

